ANGLIA RUSKIN UNIVERSITY

NATURAL GAS MARKET REFORM IN TURKEY: A CRITICAL REVIEW OF PROGRESS TOWARD LIBERALISATION AND THE GAS TARGET MODEL

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ABSTRACT

LORD ASHCROFT INTERNATIONAL BUSINESS SCHOOL

DOCTOR OF PHILOSOPHY

NATURAL GAS MARKET REFORM IN TURKEY: A CRITICAL REVIEW OF PROGRESS TOWARD LIBERALISATION AND THE GAS TARGET MODEL

By ONUR DEMIR

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Abstract

Located at the crossroads of the major supply and demand regions for the energy markets of the East and West, Turkey can be a major energy hub and/or transit country. With its remarkable consumption rates, natural gas is expected to supply almost a quarter of the energy used in the country by 2023 despite other fuels. In view of a future accession to the EU, Turkey's restructuring of its inherently monopolistic gas industry began through the Natural Gas Market Law of 2001. However, as the recent history of gas market liberalisation in Turkey demonstrates, many of the measures that had been initially considered for adoption have either been postponed or have never been adopted especially during the last decade when liberalisation was thought to be the answer for the sectors' most problems.

Taking the perspective of qualitative research methods, this thesis firstly seeks to expand the understanding of the natural gas liberalisation process within the EU context with an emphasis on mandatory regulatory instruments (i.e. market opening, regulatory authority, unbundling and third party access) and the Gas Target Model. It critically examines the key challenges persisted around Turkey's institutional landscape, regulatory reforms and gas pricing mechanisms which impact the country's gas sector liberalisation. The data was accrued from a combination of documents, archival records and interviews which were conducted with key members of staff across two institutions (EMRA, BOTAS), and private gas companies operating in Turkey. Despite fifteen years of legal transformation with limited evidence of an impact on competition overall, the overarching objective during the data collection process was to extensively investigate the Turkish gas market and to ask key individuals -as insiders- directly for their views regarding why the liberalisation has so far been (un)successful in Turkey, why the differences in the adoption of the liberalisation model still persist amongst different segments of the market and what is the optimum way for Turkey to proceed with progress towards liberalisation and the Gas Target Model.

This research found that the Turkish gas market is highly politicised and there is a lack of commitment to curtailing the exercise of monopoly power. This thesis offers the recommendations that policy makers should give due consideration to the consolidation of EMRA's independent role and to make its decisions challengeable with appropriate safeguards laid out against attempts of misuse as a regulator. This thesis concludes by suggesting that there is a compelling need to move forward with a consolidated reform strategy sooner rather than later should Turkey genuinely wants to take a leadership position in the regional race to be a gas 'hub', and indeed to be part of the single European gas market.

KEY WORDS: Turkish Natural Gas Market, European Union Energy Directives, Market Opening, Energy Market Regulatory Authority, Unbundling, Third Party Access, Gas Target Model, Network Codes

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List of Abbreviations

UNITS

bcm	billion cubic metre
bcm/y	billion cubic metre per year
GJ	gigajoule
GWh	gigawatt hour
kb/d	thousand barrels per day
km	kilo metre
kWh	kilowatt hour
m ²	square metre
m ³	cubic metre
mcm	million cubic metre
MMBtu	million British thermal unit
Mtoe	million tonne of oil equivalent
Mt	million tonne
MW	megawatt
MWe	megawatt electric
MWt	megawatt thermal
tcf	trillion cubic feet
tcm	trillion cubic metre
toe	tonne of oil equivalent
TRY	Turkish Lira
TWh	terawatt hour
US\$	United States dollar

OTHERS

ACER	Agency for the Cooperation of Energy Regulators
AKP	Justice and Development Party (Ak Party)
BA	Bilateral Agreements
BGC	British Gas Corporation
BIST	Borsa Istanbul
BNC	BOTAS Network Code
BO	Build- Operate

BOT	Build-Operate-Transfer
BOTAS	Petroleum Pipeline Company
BP	British Petroleum
BUPPs	Basic Principles and Procedures of Use
CAM	Capacity Allocation Mechanisms
CAPEX	Capital Expenditure
CBA	Cost-Benefit Analysis
CBRT	Central Bank of Republic of Turkey
CCF	Consumer Connection Fee
CCGT	Combined Cycle Power Gas Turbine
CEER	Council of European Energy Regulators
CESS-NGS	Commission for Enduring and Supervising Security of Natural Gas
	Supply
CIEP	Clingendael International Energy Programme
CMP	Congestion Management Procedure
CNG	Compressed Natural Gas
CWDM	Capacity Weighted Distance Methodology
DSO	Distribution System Operator
EBB	Electronic Bulletin Board
EC	European Commission
E/E	Entry/Exit
EIA	Energy Information Administration
EML	Electricity Market Law
EMRA	Energy Market Regulatory Authority of Turkey
ERGEG	European Regulators Group for Electricity and Gas
ENTSO-G	European Network of Transmission System Operators for Gas
E&P	Exploration and Production
EPIAS	Energy Markets Business Corporation
EU	European Union
EUAS	Turkish Electricity Generation Joint-Stock Company
FDI	Foreign Direct Investment
FG	Framework Guidelines
GDP	Gross Domestic Production
GECF	Gas Exporting Countries Forum

GFPPs	Gas-Fired Power Plants
GGPOS	Guidelines of Good Practice for Open Seasons
GOG	Gas-on-Gas
GTM	Gas Target Model
HHI	Herfindahl-Hirschmann Index
IA	Integrated Auctions
IAEA	International Atomic Energy Agency
ICT	New Information and Communication Technologies
IEA	International Energy Agency
IGU	International Gas Union
ILQD	Import License Qualification Document
IMF	International Monetary Fund
ISO	Independent System Operator
ITO	Independent Transmission Operator
IP	Interconnection Point
LNG	Liquefied Natural Gas
LPG	Liquefied Petroleum Gas
MAC	Maximum Allocable Capacity
MENR	Ministry of Energy and Natural Resources
MoU	Memorandum of Understanding
MOSES	Model of Short-term Energy Security
Mtoe	Million tonne of oil equivalent
NBP	National Balancing Point
NC	Network Code
NGML	Natural Gas Market Law
NGV	Natural Gas Vehicle
NIGEC	National Iranian Gas Export Company
NOPP	Network Operation Principles and Procedures
NRA	National Regulatory Authority
nTPA	Negotiated Third Party Access
OECD	Organisation for Economic Co-operation and Development
OIES	Oxford Institute for Energy Studies
OIZ	Organised Industrial Zone

OPEC	Organisation of Petroleum Exporting Countries
OPEX	Operating Expenditure
OS	Open-Seasons
OTC	Over-the-Counter
PCF	Participant Consent Form
PCR	Price-Cap Regulation
PIS	Participant Information Sheet
PPS	Purchasing Power Standard
P2G	Power-to-Gas
RAB	Regulated Asset Base
RES	Renewable Energy Source
ROR	Rate of Return Regulation
RPI	Retail Price Index
RSI	Residual Supply Index
rTPA	Regulated Third Party Access
SCPs	Standard Capacity Products
SOCAR	State Oil Company of Azerbaijan Republic
SoS	Security of Supply
STCs	Standard Transportation Contracts
STSP	Short Term Standardised Products
TANAP	Trans-Anatolian Natural Gas Pipeline
TAP	Trans-Adriatic Pipeline
TETAS	Electricity Trading and Contracting Company
ТоР	Take-or-Pay
TPA	Third Party Access
TPAO	Turkish Petroleum Corporation
TP	Transfer Point
TPES	Total Primary Energy Supply
TQN	Transportation Quantity Notification
TSO	Transmission System Operator
TURKSTAT	Turkish Statistical Institute
TYND	Ten-Year Network Development
UAE	United Arab Emirates

UDN	National Balancing Point of Turkey
UGS	Underground Storage
UIOLI	Use-It-Or-Lose-It
UIOSI	Use-It-Or-Sell-It
UK	United Kingdom
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNECE	United Nations Economic Commission For Europe
US	United States
USDC	Unit Service and Depreciation Charge
USSR	Union of Soviet Socialist Republics
UTC	Universal Time Coordinated
VAT	Value Added Tax
VoLL	Value of Lost Load
VP/VTP	Virtual (Trading) Point
WDO	Within-Day Obligations
WTO	World Trade Organisation

Declaration

This dissertation is the result of my own work and includes nothing which is the outcome of work done in collaboration except where specifically indicated in the text. It has not been submitted in whole or in part for consideration for any other degree or qualification at this university or any other institute, and complies with the relevant guidelines of Anglia Ruskin University.

Onur Demir

I dedicate this work to my mom "Türkan Sultan"

"Atatürk's message is that East and West can meet on the ground of universal secular values and mutual respect, that nationalism is compatible with peace, that human reason is the only true guide in life. It is an optimistic message and its validity will always be in doubt. But it is an ideal that commands respect. "

"Atatürk" by Andrew Mango (2004, p. 539)

Chapter 1: Introduction

1.1 Introduction

Natural gas is a strategic sector for Turkey given its direct and indirect impact on economic/social development and growth, and its control that has been controlled by the state for decades is shifting. Provided that liberalisation is the reverse process of protectionism (Hillman, 2004) and mostly accompanied by liberal legislation the reformative transformation of the Turkish gas market, with the onset of the Natural Gas Market Law since 2001, has been ongoing. Nevertheless, a number of challenges still remain unaddressed, although considerable efforts have been put in to the industry by the government. Thus, the main rationale for undertaking this study is to examine the liberalisation process within the Turkish natural gas industry and to understand the limitations and key challenges the country has encountered in its transition from monopolistic to (semi) liberalised gas market in the context of the European Union (EU).

Despite the complexity of the 'liberalisation' and 'competition' concepts in the energy sectors -which are composed of different elements with every stage having its own intrinsic characteristics and consequences- they are believed to provide Turkey with access to the EU's single energy market. This thesis is an attempt to analyse the Turkish natural gas industry and the chronological implementations of gas market reforms which have involved numerous stages to set up a competitive well-functioning sector with increased third party participation and minimal government interference in all segments of the industry.

This thesis has two targets: firstly it discusses natural gas market liberalisation in the context of the EU providing a balanced discussion of the role of the EU energy Directives and the Gas Target Model in it. Secondly, after addressing what the instruments of the EU gas regulations are trying to achieve, it takes the liberalisation debate a step further and attempts to draw some parallels between the developments in the European and the Turkish gas markets.

The introduction chapter has four sections. The first section describes the conceptual background to the research providing information about what liberalisation in gas markets is; what expectations both developed and developing countries have from it; and what approaches towards reform are undertaken. The second section provides the aims of the thesis and the research questions. The third and fourth sections define the contribution to knowledge and give an overview of the thesis structure, respectively.

1.2 Introduction of Natural Gas Reforms and Motivations

Since the late 1970s, a number of academic, financial, governmental and international institutions have been trying to better understand the factors and challenges by which energy industries have been impacted and that they still confront today. Fundamentally, the core pillars of the energy sector constitute of well-balanced systems in order to deliver secure and sustainable energy supplies at affordable prices. It is broadly examined in existing literature that energy is one of the most essential commodities that enables economic growth, social well-being and prosperity, and it is an imperative driving force behind essential investments and infrastructure developments worldwide. With this in mind, governments of both developed and developing countries strive to identify innovative developments to meet the requirements of their energy securities and efficiencies. Following the historical demonstrations of how volatility in energy prices and cuts in production/imports can play vital roles on major macroeconomic variables, for example, the 1973-1974 Oil Embargo¹ imposed by Arab members of OPEC² against the U.S. and its allies, a large body of research has been conducted to investigate the relationship between energy and economic development (e.g. Kraft and Kraft, 1978; Contanza, 1980; Hamilton, 1983; Mork, 1989; Hoa, 1993; Cheng, 1996; 1997; Glasure and Lee, 1997; Asafu-Adjaye, 2000; Stern, 2004; Zachariadis, 2007; Apergis and Payne, $2010)^3$.

Given the inextricable link between energy and socio-economic developments, both developed and developing countries aim to liberalise their energy markets and

¹ The 1973-1974 Oil Embargo was imposed by Arab members of the OPEC namely against the U.S. later extended to Netherlands, Portugal, South Africa in response to the U.S. decision to re-supply the Israeli military during the Arab-Israeli war in 1973 and lifted in March, 1974. For detailed information: http://history.state.gov/milestones/1969-1976/oil-embargo.

² The Organisation of the Petroleum Exporting Countries.

³ For further reading see: Nachane, Nadkarni and Karnik, 1988; Yu and Choi, 1985; Masih and Masih, 1996; Soytas and Sari, 2003; Stern and Cleveland, 2004; Ayres and Warr, 2009.

substituting costly and environmentally unfriendly fossil fuel sources⁴ with natural gas and renewable energy resources. Also as the energy output coming from renewable energy sources (RES) suffer from intermittency, since RES based (electricity) generation heavily relies on weather/seasonal conditions, natural gas has by far been one of the most popular fossil fuels in the energy mix. In order to reduce greenhouse emissions and other intrinsically related pollutions, to mitigate global warming, and to reduce external reliance on energy supplies countries have established ambitious reform programmes to set up fully-fledged energy markets. In his seminal book, Competition in Energy Markets: Law and Regulation in the European Union, Peter Duncanson Cameron (2007, p.33) defines liberalisation "*as a process of market opening which at a minimum removes legal barriers to trade but in the EU context involves creation of an industrial structure in which competitive forces can work and a competitive ethos can <i>be stimulated*" and provides the definition of competition in the words of a leading competition lawyer, the late Daniel Goyder, as:

"Competition is basically the relationship between a number of undertakings which sell goods or services of the same kind at the same time to an identifiable group of customers. Each undertaking having made a commercial decision to place its goods and services on the market, utilising its production and distribution facilities, will by that act necessarily bring itself into a relationship of potential contention and rivalry with the other undertakings in the same geographic market ..." (Goyder, 2003 cited in Cameron, 2007, p.5).

Cameron examined the relationship between governments and electricity/gas markets which had undergone a dramatic change, and distinguished three broad stages in the evolution of these relationships. Firstly, the intervention stage began with the creation of state-owned monopoly suppliers. This occurred due to the reconstruction and expansion after the Second World War, followed by the second stage, a period of uncertainty, during which the relationship was exposed to critical reassessment following the energy crises of the 1970s. In 1985, it entered a third stage, globalisation, resulting in the loosened of ties between governments and their energy companies via commercialisation or privatisation or both (ibid, p.12-15). The drivers behind natural gas reform programmes have been widely divergent not only between developed and developing countries, but also between those who produce and/or export natural gas and

⁴ E.g. coal, oil.

those who do not.

In developing countries, for instance, the primary objective of the reforms has been to purportedly achieve economic efficiency by introducing competition into segments where it is most feasible⁵. This is supported by the reviews of $OECD^6$ on regulatory reform⁷ according to which countries that take advantage of a crisis to engage in comprehensive regulatory reform fare better, and greater competition and openness increase their ability to recover more quickly from crises as well as increasing potential long-term growth (OECD, 2010, p.3). According to reform proponents, opening a market to competition would not only mean all competitors would have access to the market but it would also serve as an opportunity for countries (not least with underdeveloped infrastructure) to get those ameliorated by private firms which would not be possible as quickly by monopolistic national champions otherwise. In line with the corporatisation of state owned enterprises, competitiveness of private firms in terms of price and service quality is also envisaged to provide more efficient allocation of resources. Utilising market price signals and consumer choice as significant tools to match supply and demand, obliging private firms to achieve production efficiencies and ruling out the possibility of realising extra profit at the expense of consumers resulting in end-users reaping the benefits from the competition in the market have been the other motivations for reforms in the developing world (Bernstein, 1988; Sullivan, 1990; Schram, 1993; Bhattacharyya, 1995; Dunkerley, 1995; Caruso and Chen, 1997; Arun and Nixson, 1998; El-Banbi, 1998; Stevens, 1998; Rosellón and Halpern, 1999; Vogelsang, 1999; World Bank, 2000; Zarrili, 2003; Gabriele, 2004; and Kessides, 2004)⁸. Like many other developing countries, Turkey has also learnt lessons from the implications of restructuring a reform programme -supported by the International Monetary Fund (IMF)- to attenuate the severe economic crises encountered in 1999 and 2001. The government used the crises to give the country's liberalisation process a concise direction and highlighted that privatisation in the energy sector was crucial to both realise receipts through transfer of operating right contracts and to foster

⁵ Keeping in mind their vast population most of which have poor or no access to energy resources and their very few existing export-oriented economic activities such as production/transportation of agricultural and mining commodities which cannot function without a reliable industrially generated energy supply (Gabriele, 2004).

⁶ Organisation for Economic Co-Operation and Development.

⁷ Referring to the action of improving both the stock and flow of regulations, by reforming regulations that raise unnecessary obstacles to competition, innovation, growth and market (trade) openness, while ensuring that regulations efficiently serve important social objectives. See OECD (2010, p.3).

⁸ For further reading: Yarrow and Jsinsky, 1996; Girod and Percebois, 1998; Andrew-Speed and Dow, 2000; Von Hirshhausen and Vincentz, 2000; Wälde and Gunst, 2003.

investment and efficiency in the sector. Accordingly, legal amendments would be passed by the parliament to define energy as a sector subject to the Turkish commercial code as a prior action⁹. Indeed, since 2002 the rise of Turkey in the global arena led by successful economic reforms and the political stability instilled by successive governments led by the President Recep Tayyip Erdoğan's Justice and Development Party (AKP) have been evident. The country's first and only Natural Gas Market Law, came into force in 2001, has achieved most of the hallmarks of a liberalised market integrating the EU's energy reforms framework into Turkey's legislation although the full implementation still remains unaccomplished as will be discussed in greater detail in Chapter 5.

In developed countries, motivations for reform are argued to hinge mainly upon the creation of vibrant competitive and well-functioning markets into which new players enter barrier free. In other words, liberalisation is expected to encourage private participation, limit extensive market power of national champions, realise nondiscriminatory access to common facilities, expand customer choice, encourage interregional (or cross-border) natural gas trade, and increment of transportation capacity (Juris, 1998; Cavaliere, 2007; Melling, 2010; Joskow, 2005; Saluz, 2011; UNECE, 2012; Panebianco, 2013; Stern and Rogers, 2014; Corsini et al., 2014). The reforms are by and large expected to ameliorate the poor performance of state-run natural gas operators (e.g. unreliable supply, inability to meet the investment and maintenance costs of natural gas industry against accruing demands) as outlined by the ITC (2001). According to the ITC report, the liberalisation reforms are also expected to provide new market access opportunities to private firms allowing them to invest abroad in natural gas transmission, distribution and marketing sectors, with an aim to foster growth of international trade in services. However, Cameron (2007) criticises assumptions based on such a positive vision of liberalisation -especially that of which the European energy markets were introduced to. The author primarily argued that despite the high expectations that (particularly industrial) energy consumers would benefit from a greater choice of supplier and possibly from lower prices, by the end of the first decade of "managed liberalisation" in the EU they were left with a number of issues to address including consumer prices that appeared to be volatile and lacking in transparency; gas markets that remained segmented into national compartments; a marked absence of new

⁹ For details <u>https://www.imf.org/external/np/loi/1999/120999.htm</u>

entrants; continuously growing dependence on non-EU imports of gas for power generation; and worse still a new set of problems to deal with, such as large investments being required to modernise and expand the ageing network infrastructures (p.4).

In countries with abundant natural gas endowments, however, liberalisation reforms have generally been centred around gas prices (oil-linked regulated prices versus market-based), structure of the export/import contracts (long term take-or-pay versus spot), and cultivating the involvement of the private sector in the upstream gas sectors (exploration and production activities) in order to acquire the innovative technology and efficiency the sector requires (Zamani, 2007; Adeniji, 2013; Henderson, 2013; Krane and Wright, 2014; IEA, 2014; Duncan, 2015; Stevens, 2015; Farchy, 2016). These countries rely heavily on the revenues that come from the sales of natural gas and the funds generated play a lifesaving role in sustaining the economic contribution of exports to the countries' budget revenues. Russia, the world's biggest gas producer and second largest reserve holder following Iran (BP, 2015), for example, has been long striving to increase domestic gas prices since the 2000s¹⁰. This is not only in order to balance the low domestic prices with its inexorably high export prices in Europe or to economically justify the new expensive and mega projects¹¹ but also to meet the entry requirements for the World Trade Organisation (WTO) according to which the subsidised prices provided to the industrial sector are considered as a threat to, inter alia, the optimal use of Russia's hydrocarbon resources and energy efficiency measures (Henderson, 2012).

¹⁰ Russia has a two-tier gas market where the country's vertically integrated entity, Gazprom, is forced to sell gas to domestic consumers at (low) 'regulated price' whereas newly emerged independent gas producers e.g. Novatek and Itera are not subject to price regulations and can charge whatever higher price consumers are ready to pay. For detailed information see Henderson (2012).

¹¹ For example, development of the huge gas fields on the Yamal Peninsula which requires more than US\$100 billion investment to reach total production of 250 billion cubic meter gas per annum (ibid).



Figure 1. Natural Gas Market Segments, Cost Components and Prices

Source: ITC (2001), p.2-3

Similarly, Darbouche (2013) discusses the natural gas transition of the energy rich Arab region ¹² and calls the region a place of "easy gas" in addition to being the least economically integrated natural gas market in the world. He lists the immediate drivers for gas reforms in these countries as i) the realisation of price reforms in order to overhaul the policies formed during the 1970s and 1980s which no longer suit the current socio-economic circumstances and yet underlie an immense domestic gas demand; ii) shifts in upstream gas policy to bring the attention of foreign investors to their descending gas production sectors due to insufficient investment¹³/waning mature reserves; iii) development of poorly traded regional gas¹⁴ and the enhanced role of regional companies to replace the unfulfilled potential of the industry with the deregulated business model allowing neighbours to import gas relatively cheaply.

¹² The region comprises 22 Arab League members, namely, Qatar, Saudi Arabia, the UAE, Yemen, Morocco, Algeria, Iraq, Mauritania, Tunisia, Libya, Egypt, Oman, Bahrain, Kuwait, Jordan, Lebanon, Palestine, Syria, Sudan, Comoros, Somalia and Djibouti.

¹³ According to the International Energy Agency (IEA) estimates this region will need to invest over US\$2.2 trillion in the next 25 years to keep oil, gas and power infrastructure up to the required level. For detailed information see Darbouche (2012).

¹⁴ As of 2012, the number of each regional and intra-regional projects in operation were as little as two (Darbouche (2013).

1.3 Aims of the Thesis and Research Questions

Following the 1994 ruling of the European Court of Justice, which recognised electricity as a commodity 'like any other' rather than a public service within the (European) Community, the situation of natural gas became evident to follow the same route (Yafimava, 2013). In view of this, the European Commission (EC) adopted three Natural Gas Directives in 1998, 2003 and 2009 to put in place the regulatory regimes needed to integrate and harmonise the somewhat heterogeneous legislation of the (now) twenty-eight member states. Given the wide divergence in the size/shape of economies, development levels and regulatory frameworks, the drive and attempts of the EC to liberalise European markets has faced strong opposition and resistance from its dissenters, although the Republic of Turkey (hereafter referred to as Turkey) implements the Directives to meet the liberalisation levels of the more advanced countries on a volunteer basis.

Turkey is not a full member of the European Union but its official candidacy was announced at the Helsinki Summit on 10-11 December 1999, and the accession negotiations were launched between Turkey and the EU in October 2005 (EC, 2001). Despite the fact that Turkey as a candidate is not obliged to follow the EU laws as yet, the national legislations have been established in line with much of the EU legislation since the 1990s. The liberalisation of energy markets, on the other hand, according to energy expert Okan Yardimci at the Energy Market Regulatory Authority of Turkey¹⁵, has been evident in the government policies and progress reports for a long time whilst relations with international institutions has given the process a concise direction and helped to gain momentum. In this vein, to harmonise the Turkish legislation with the EU's energy acquis the first law enacted was -the Electricity Market Law (EML) No 4628- followed by the Natural Gas Market Law (NGML) No 4646 in 2001. Despite having better success in the electricity market liberalisation, a detailed analysis of the Turkish natural gas market reveals that the country is still far from having a fully liberalised and competitive market.

Given the legislative initiatives of liberalisation that have introduced a degree of complexity to the market, which has contrarily been characterised by the state monopoly and a very strong government presence for almost eight decades, and

¹⁵ Telephone interview on 4 August 2015.

following fifteen years of legal transformation with limited evidence of impact on competition overall, this thesis is concerned with critically analysing the evolution of the Turkish gas market liberalisation process within the EU framework. This research is inspired by the recent attempts of the Turkish government to eradicate the deficiencies in the enforcement of the NGML. It provides a comprehensive examination of the EU legal framework based on three major gas Directives and relevant regulations, and how they are implemented within the Turkish gas market. The core legal rules and principles of the EU energy legislation are looked at within four (mandatory) regulatory instruments namely market opening, unbundling, third party access and establishment of an independent regulatory authority. This thesis also advances the arguments concerning the EU's Gas Target Model (GTM), its role in creating well-functioning wholesale markets and the kind of competition and harmonisation that are expected to follow from its implementation. Given Turkey's willingness to be part of the EU's internal gas market, which requires a high degree of harmonisation, this research is also concerned with the implementation of the GTM in Turkey. The focus of this analysis is to identify what elements in the design of the GTM have already been adopted in the Turkish gas market and what frameworks should be developed to lead to a barrier free trading environment in Turkey for national and international market participants. Thus, to explore how consistent the country's natural gas market reforms are with the EU principles concerning liberalisation and the GTM, how competition and the GTM are expected to promote, *inter alia*, the effective capacity allocation mechanisms, capacity management procedures, optimal balancing and transmission tariff structures in upstream and downstream parts of the gas value chain, the thesis seeks to address three questions:

- 1) What are the characteristics of the legal framework that has been created to ensure natural gas market liberalisation in Turkey and how effective is it?
- 2) How compliant is the legal framework in Turkey with the Gas Target Model of the European Union?
- 3) What are the major obstacles encountered by Turkey so far during its reform process and how should Turkey's progress towards liberalisation and competition proceed?

The data used and presented in this research covers a period starting from 2001 to 2015. The year 2001 is chosen as the commencing date for the data coverage as it represents the outset of the Turkish gas market reforms, 2015 is the final year as that was the most recent data available at the time of writing.

1.4 Contribution to Knowledge

Fifteen years have passed since the introduction of the first legislation as a basis for a more liberalised Turkish natural gas market and the completion of the reform process still suffers from a lack of enforcement. Given the costly nature of reform tasks and a pervasive controversy in the literature regarding their benefits for the host country, this thesis seeks to thoroughly investigate the overall natural gas reform performance of Turkey specifically in regards to addressing both shortfalls and setbacks, which have prevented Turkey from the fulfillment of the regulatory implementation since 2001, and how the prospectively liberalised natural gas market can effectively operate at all levels within the GTM framework. Notwithstanding the global trend of implementing an array of energy reforms that started in the 1970s, which spurred researchers to produce studies on regulatory reforms from theoretical and empirical points of view in order to explore subjects in depth such as institutions, utility regulations, effects of privatisation on pricing policies, transferrable property rights and so on, such comprehensive studies that critically and objectively analysed the evolution of the Turkish gas market reforms have remained scarce to date. Thus, this research aims to fill this gap by providing a comprehensive analysis examining the impact of reforms on economical, fiscal and political aspects.

As most studies regarding the Turkish gas markets do not reflect the key debates and conflict of opinion present in the whole sector and the reform process refers to, this thesis attempts to formulate an alternative roadmap to (i) better understand the factors that have been and still are preventing Turkey from the final implementation, and (ii) show how to ensure a better functioning sector can be created according to the GTM especially in terms of harmonised capacity allocation mechanisms, congestion management procedures, gas balancing arrangements and tariff structures with the European gas transmission network.

1.5 Overview of Thesis

This thesis aims to critically analyse Turkey's natural gas liberalisation process and the implementation of the GTM. It constitutes eight parts:

Chapter 1 explores and establishes the natural gas liberalisation measures in the context of European gas market reform. In order to design a benchmark to represent the range of laws commonly adopted by the EU member states and to measure the performance of Turkey accordingly, the first part of chapter provides information about what liberalisation is and what the underlying reasons are for divergent expectations and approaches towards the liberalisation reform undertakings both in developed and developing countries. The second section presents the aims of the thesis and the research questions whilst the third part highlights the contribution to knowledge. The last section presents an overview of the thesis.

Chapter 2 presents the literature review and positions the research within a body of relevant literature. It provides a mixture of theoretical, institutional and empirical considerations of the issues regarding natural monopoly, regulation, deregulation and liberalisation in network industries. The second part of the chapter provides discussions about the price regulations, and the third part weighs up the institutional feasibility of competitive reforms for naturally monopolistic industries through franchise biddings, yardstick competition and contestability. The last part concludes the chapter with a review of various commonly used pricing structures (e.g. oil-linked, marked-based and hub-based prices) leading to the elucidation of the European gas hubs.

Chapter 3 delineates how the research has been designed and implemented. Firstly, the essential features of qualitative research are presented, locating it within research methodology. The following section provides the research purpose, and the chapter finally addresses data collection methods, their design and implementation followed by a discussion about how to ensure the validity and credibility of the findings and ethical concerns.

Chapter 4 focuses on natural gas market reforms at an international level and provides a review of the European policies. Whilst a broad spectrum of literature pertinent to the EU's main energy Directives with an emphasis on the mandatory instruments that all

members are obliged to adopt are reviewed in the first part of the chapter, the second part proceeds by reviewing the Gas Target Model of the EU and its evolution starting from 2010.

Chapters 5 and 6 constitute two case studies regarding the natural gas industry of Turkey, and whilst the former gives the market outlook, the concept of recent trends and supply-demand equilibrium, the latter introduces a full examination of the legislative/regulatory market environment together with the GTM performance of the country. The chapters as a whole are intended to consolidate the theoretical discussions of Chapter 2 and deepen the understanding of how the EU legal framework -in terms of gas market liberalisation and the implementation of GTM- has been adopted in Turkey.

Chapter 7 continues to discuss the issues raised in *Chapters 5 and 6* in more critical manner. It represents a critical analysis of the major obstacles encountered by Turkey so far during its reform process and it addresses how Turkey's progress towards liberalisation and competition should proceed. The chapter utilises the third and distinctive part of the primary data collection technique of this research –interviews-and provides an in-depth understanding of the key stakeholders' views and opinions of Turkey's liberalisation experience.

Chapter 8 provides the final remarks, a set of policy recommendations and directions for future research.

Chapter 2: Literature Review

2.1 Introduction

This section of the thesis presents a mixture of theoretical, institutional and empirical consideration of issues regarding natural monopoly, regulation, deregulation and liberalisation in network industries. I have specifically focused on natural monopoly theory, public choice theory and economic theory of regulation since utilities in Turkey, such as the natural gas industry, are mostly state owned and prone to natural monopolies. Since 'natural gas market reforms' may be regarded as a form of regulation (or a change in regulation) implemented as a result of a political decision, public choice theory of regulation span the spectrum of rational behaviour in energy markets.

I begin by presenting an institutional analysis that delves into the concept of natural monopoly from the traditional regulatory perspective which is then contrasted with the economic theory of regulation and public choice theory. Whilst public choice theory sheds light on the scope of rational behaviour in political mechanisms, the economic theory of regulation uses rationality to understand politics and also focuses on the shortcomings of the contention that regulation is for public benefit. It is followed by a review of the literature on price regulation which captures the fragmented state of different pricing mechanisms used to regulate industries globally.

In the subsequent part, the institutional analysis is extended by distinguishing several new regulatory agendas and theoretical alternatives to weigh up the institutional feasibility of competition reforms for naturally monopolistic industries. The first application is the franchise bidding auctions via competition for market approach which has various impacts on the economic and political stakeholders. This is particularly relevant for countries like Turkey wherein the distribution of natural gas is completely based on such a system. Other applications that were investigated are vertical separation, yardstick competition and contestable markets which require more analysis of the industry and recurring redefinitions of property rights are more distinctive throughout.
Finally the chapter is concluded with a review of various pricing structures such as oillinked prices and marked-based prices. Since the globalisation of markets and the technological progress, that plays a key role in the cost curves, has enabled many countries to re-examine the characteristic forms of natural monopoly regulation and undermined the economic rationale of monopoly retention, profound transformation of the regulation of network industries has grown in importance. Whilst the potential benefits and deficiencies of competitive reforms on pricing mechanisms are elucidated, explanations on European gas hubs and hub-based prices are also covered.

2.2 Theoretical Backgrounds and Institutional Analysis

2.2.1 Public Choice Theory

Since the late 1940s there has been considerable discussions regarding the potential uses of public resources and powers to improve the economic status of economic groups (e.g. industries and occupations) in the literature of both the science of politics and the science of economics. Although these fields are under the umbrella of social sciences, the types of questions they ask and the methodologies they employ distinguish them. Political science has inherently examined the behaviour of humans on the public stage and posited that politicians pursue the public interest while economics assume that all men in the marketplace are motivated vastly by self-interest with a logic unique behaviour (Mueller, 2003). An economic study of nonmarket decision-making behaviour via the utilisation of the rational-choice postulate, public choice, was launched by Duncan Black's paper on the rationale of group decision-making in 1948. Black demonstrated that if voter preferences are single-peaked over a singledimensional issue space, a unique equilibrium exists in the motion most preferred by the median voter (Black, 1948). This result, according to the founding father of public choice, was the political science counterpart of competitive market equilibrium in his own discipline of economics (Rowley, 2004).

Public choice theory, the subject matter of which includes the theory of the state, voting rules, voter behaviour, party politics, bureaucracy and so on, postulates human beings as utility (wealth) maximisers and characterises governments as a mechanism utilised by rational, self-seeking individuals to redistribute wealth within society (Downs, 1957;

Rowley 2004; Mueller, 2003). A number of approaches have so far been proposed within public choice to address a wide range of issues each applicable to different situations and each having its own concept of what comprises a solution. However, there remains a dichotomy amongst the perspectives which ultimately generated three schools of thought¹⁶. Amongst the early practitioners of the discipline such as Arrow (1950; 1951) and Downs (1957) -the former essentially challenged Black's theoretical view on political stability by offering an assertion that political markets are inherently unstable whilst the latter elaborated on the insight of Black and propelled the foundations of the theory forward paving the way for the application of which in every aspect of the political market- Buchanan and Tullock (1962) made a distinct contribution to the literature. In their seminal work, The Calculus of Consent, Buchanan and Tullock differed themselves from other contributors not only by their emphasis on the methodological individualism, which represents an attempt to reduce all issues of political organisation to the individual's confrontation with alternatives and his choice among them, but also by their defiance against the new welfare economics of Samuelson (1947) and Arrow (1950) that fundamentally encouraged the government intervention in free markets by reference to the prevalent market failure (Buchanan and Tullock, 1962; Rowley and Schneider, 2004).

In similar fashion, Mancur Olson's book *The Logic of Collective Action* uniquely challenged the benign view of traditional political science upon interest groups. It brought about the behaviour of interest groups from the perspective of rational choice theory into the focal point within public choice literature (Rowley and Schneider, 2004). For Olson (1965) interest groups were not simply the information supplier to political markets but also had salient advantages over political groups in the race for political gains; smaller groups seemingly more effective in securing differential gains than the large groups. That is to say, in other words, policy makers towards particular sectors or about particular public goods will face strong pressure from well-organised special interest groups in the form of irresistible incentives being offered to them.

Similar notion holds sway in Shughart's (2004) study in which he considers many policy decisions as rational political responses (i.e. favoured treatment including rights to charge prices in excess of costs, erection of market entry barriers, and proscription of

¹⁶ The schools presently dominates the public choice landscape are namely Rochester, Chicago and Virginia.

business practices/contractual agreements) to the demands of well-organised pressure groups in return for votes, campaign contributions and the like. Thus, he concludes "As a result, the benefits of regulation are now seen to accrue chiefly, not to the public at large, but to politically well-organised pressure groups." (ibid, p.279). These reciprocal benefits provided then reflect the broader question of how the redistribution policies supplying these benefits affect others. According to Thorbecke (2004, p.304), they are harmed either unwittingly or because they cannot muster sufficient votes or contributions to resist the transfers. So in his description "Public choice theory posits that the actors in the political arena seek to maximise utility just as consumers do in the economic arena."

2.2.2 Theory of Natural Monopoly

According to Viscusi, Harrington and Vernon (2005 in Erdogdu, 2013) the characterisation of public choice theory, in essence, is attributed to the concept of natural monopoly. Whilst the primordial use of the term 'natural monopoly' that was carefully distinguished from artificial monopoly goes back to the 1800s' classic economists, e.g. Malthus (1815) and Bastitat (1848), the definition of 'natural monopoly concept' was provided by John S. Mill in 1848, in his own words, "[...] All the natural monopolies (meaning thereby those which are created by circumstances, and not by law) which produce or aggravate the disparities in the remuneration of different kinds of labour, operate similarly between different employments of capital. If a business can only be advantageously carried on by a large capital, this in most countries limits so narrowly the class of persons who can enter into the employment, that they are enabled to keep their rate of profit above the general level. A trade may also, from the nature of the case, be confined to so few hands, that profits may admit of being kept up by a combination among the dealers" (Mill, 1848: II.15.9).

Traditionally, natural monopolies were deemed to be caused by government interventions via franchises, protectionism and other means due to the large-scale production and economies of scale (DiLorenzo, 1996). Following the rudiments of large-scale production notion, Wells (1889) argued that the world solicits cheaply produced commodities in abundance and this was only feasible through the employment of great capital on an extensive scale. The assumption of the concentration of great capital was bound to a specific set of conditions by Gunton (1888) as to whether or not it tended to build up monopolies, destroy the competition and increase the prices. He encapsulated the imperfections of the arbitrary monopoly (especially government monopoly) and insisted that they were not only the herald of irresponsibility, incompetency and waste but also the reason for the high prices for inferior products. For him, the governments are disinterested developers of improved methods of service in order to maintain the maximum number of employees and rather eager commanders of political allegiance via inclination of industrial favours.

According to Duffy (2005) there were two important implications of declining average costs. Firstly, all production should be undertaken by one large firm enabling the firm to realise an economies of scale by avoiding wasteful duplication of fixed costs and hence spreading them over more units of production. This would be more efficient than having multiple small firms do so. The second implication he highlighted was the impossibility of achieving a market price at marginal cost, the classic imperative of perfectly competitive markets, as a long-run equilibrium without any governmental subsidy. He justifies this with the perception that if the market price of the goods was driven to marginal cost, it would not be possible for potential producers to recover their fixed costs and that would thwart them from entering the industry in the first place. Alchian and Allen (1964), interpreted the issue similarly with the view that, given the impossibility of more than one firm being profitable, two was too many. In other words, one of the two firms could always expand in order to reduce costs and the selling price, therefore the elimination of the other firm would be inevitable even before taking into account the wasted resources as a result of too many attempting to share the industry. To the contrary, if there was one incumbent firm then that would be able to set prices above free entry costs for a long time.

Although natural monopoly proponents may seem to be potentially accurate in arguing that the necessity of government intervention persists insofar as the failures of the markets remain (e.g. inefficiency and fluctuating prices due to competition) according to the economists of the 1960s and 1970s such as Demsetz (1968), Stigler (1968) and Posner (1975) these studies were unable to cover the relationships between expanded roles for governments and their potential impacts on entry barriers and social costs. They did not acknowledge the fact that the natural monopolies were beneficial. Since the publication of his 1968 study "Why Regulate Utilities" Harold Demsetz has

continued to argue against the assertion that the existence of scale economies in the production of the service was relative to a determination of the number of rival bidders. His main criticism of the theory of natural monopoly was to be devoid of a logical base for monopoly prices and the nonexistence of clear evidence proving the cost of colluding (of potential bidding rivals) in the public utility industries to be markedly lower than it was for other industries for which unregulated market competitions worked smoothly. Others argued along similar lines; for example, Posner (1975) assumed that competition to obtain a monopoly results in the transformation of expected monopoly profits into social costs and the public regulation was a larger source of social costs than private monopoly. In that study, he highlighted the precise equality of the expected profit of being a monopolist to the cost of obtaining a monopoly status without any intra-marginal monopolies in most sectors. He subsequently drew attention to the existence of some circumstances that the observed monopoly profits in an industry could have underestimated the social costs of monopoly in the same sector. This means even when monopoly profits in an industry are zero it can still cause very high social costs due to the expensive nature of facilitating the enforcement of anti-monopoly measures by authorities or consumers themselves to reduce those profits (Posner, 1975).

According to Chang (1997) natural monopolies suffer from the potential consequences of non-competitive market environments such as 'deadweight welfare loss¹⁷, as a result of allocative inefficiency, productivity inefficiency due to lack of competitive pressures, high likelihood of predatory pricing or pre-emptive investments, and other wasteful behaviour which leads to the exploitation of consumers and of input suppliers by the dominant firms. It is also due to the difficulties natural monopoly poses in terms of enjoyment of the cost benefits of single firm production two traditional approaches have been adopted by many countries to tackle this. The first one is used by governments to protect the natural monopoly themselves predominantly via nationalisation. The typically quoted example of the supply mode of utilities (e.g. electricity, gas, telecommunications and water) in the UK during the pre-1980s could be seen as a classic illustration of this. In such a situation, governments decide to operate the services at a price equal to marginal cost and provide a lump-sum subsidy to keep the company in operation since allowing neither a natural monopolist to set the monopoly price nor the natural monopoly to sell at the efficient price would be desirable or

¹⁷ OECD defines the deadweight welfare loss as a measure of the dollar value of consumers' surplus lost (but not transferred to producers) as a consequence of a price increase. For detailed information see http://stats.oecd.org/glossary/detail.asp?ID=3187

feasible due to the Pareto inefficiency¹⁸ and negative profits, respectively (Kim and Horn, 1999).

2.2.3 Economic Theory of Regulation

Regulatory measures based on traditional rationales of natural monopoly have been the catalysts of a number of approaches by economists during the last four decades and still perpetually necessitate due attention when reforming the existing regulatory regimes. Within this context, Noll (1989) stated that economics research on regulation has three main themes. The first one focuses on market failures and the corrective actions that government can undertake to ameliorate them whilst the second examines the effects of regulatory policies, and asks whether government intervention is efficient or more efficient than doing nothing. The third investigates the political causes of regulatory policy. According to Blaug (1993), Hennipman (1992) and Den Hertog (1999), there is a categorical distinction between positive and normative theories of economic regulation: whilst the positive theory investigates the economic explanation of the regulation and its consequences, the normative theory searches for the most efficient regulation type.

In answer to why regulation of markets is needed and what should be regulated, two theories of regulation have been proposed to explain the pattern of government intervention in the markets namely, taxes and subsidies, explicit legislative and administrative controls over rates, entry and other facets of economic activity. Firstly, the public interest theory, the essence of which is that regulation is supplied as a government response to public demand for the correction of the inefficient or inequitable market practices in industries where the likelihood of monopoly is greatest (Posner, 1974). Secondly, the economic theory of regulation (also known as the Stigler-Peltzman theory of economic regulation (Mueller, 2003, p.347)), proposes that regulation is directed by the exchange for political support chiefly for the attainment of re-election of the politicians who set up income transfers in favour of the industries. It is clear that the economic theory of regulation does not give support to the argument that

¹⁸Pareto efficiency is named after the 19th century economist and sociologist Vilfredo Pareto who was first to examine the implications of the idea that Pareto improvement exists when there is a way to make some people better off without making anybody else worse off (Varian, 1990). The author argues that if an allocation allows for a Pareto improvement, it is called Pareto inefficient.

there should be correction of market failures, but rather concentrates on honouring the demands for regulation by different branches of industry. In its broadest interpretation, the theory stresses the influential power of interest groups in the political decision-making process where the contribution to re-election is provided through vote supply, campaign contributions, chairing fundraising committees and the offer of employment to party members (Den Hertog, 1999).

The 'Welfare Economics' founded by Arthur Cecil Pigou in 1920 has been one of the microeconomic foundations for the theory of rational pricing and brought to bear on the effects of government regulation in a wide range of industries. He justifies state interference in markets where self-interest, acting through simple competition fails to make the national dividend as large as it might have been otherwise. According to his conventional wisdom, the right amount of resources would not have been turned into industries without the governmental operations in the industries through fiscal devices such as levying taxes (or penal legislation in extreme cases) or offering subsidies (Pigou, 1932).

Assumptions based on such a perspective regarding welfare and the government intervention into the private economy received early criticism from the 'institutionalist' economist, Ronald Coase (1937) who questioned why the allocation of resources was not done directly by the price mechanism. This was followed by another interrogation of the divergent treatment of governments and other bodies with regulatory powers in terms of exchange transactions on the market and the same transactions organised within the firm. Two decades later, in a similar vein, he summarised the inessentiality of government intervention to resolve the externality problems and offered a plausible and empirically relevant alternative to government action in externality issues given the fact that all solutions had costs and the costs of handling the problems via governmental regulation were frequently heavy (Coase, 1960). According to him the Pareto-optimal resolutions of externality problems could be, and often were, worked out between the affected parties without the help of the government (Mueller, 2003). Glachant and Perez (2008, p.7) argued that Coase's work also suggests that the existence of negative externalities in production or consumption gives rise to failure in the system of market prices.

Stigler and Friedland (1962) examined the empirical support for two predictions namely whether the purpose of the public regulation of prices to curtail the exercise of monopoly power and to eliminate certain forms of price discrimination holds true for electricity prices across the U.S. (in both regulated and unregulated) between 1912-1937. Their cross-sectional regression results presented no statistical evidence of influence in state regulation in the average level of rates. They also showed that the recognition of the greater potential of political popularity for low rates for the marginal consumers was not the case in the U.S. during the said period since a significant difference between the ratios of monthly bills in regulated states from unregulated states was only found in one out of four comparisons. This relationship remained after controlling the effectuality of regulation in the comparative charges to domestic and industrial electricity users. Again, no detectable effect on the reduction of price discrimination was found as industrial consumers, contrary to what is expected, continued to pay higher prices independently of the regulatory nature of the states. The reasons for the ineffectiveness of the regulation in the electrical utilities of the U.S. according to Stigler and Friedland were (1) due to the confrontation of the competition of other utility systems, an individual utility system was not possessed of any large amount of long run monopoly power and (2) the incapability of regulatory bodies to force the utility to operate at a specified combination of output, price and costs. This significant study paved the way for George Stigler to lay the foundations of economic theory of regulation and for Sam Peltzman to reformulate the theory for a more general framework for the prospective contingencies, a decade later.

Regulation, in Stigler (1971), was taken to mean the employment of a state's power to prohibit or compel, to take or give money, for the distribution of threat to industries in the society. Stigler's formulation of the economic theory of regulation, although having been acknowledged as an early foundation of the main theory, criticised two popular thoughts on regulation i) regulation is for public benefit and ii) rationality cannot be used to understand politics (Erdogdu, 2013, p.9). Stigler described the channels of political decision-making as "filtered and gross" unless they were able to discover or act on everybody's negligible preferences for, say, Policy A over B (Stigler, 1971, p.12). Therefore, although political decisions must be frequent and global from his point of view, the voter's expenditure to learn the merits of individual policy proposals (and to express his preference) were determined by expected costs and returns just as that in the private marketplace and hence many decisions were unwittingly affected by uninformed

voters (ibid, p.11). This assumption was coupled with the causes and consequences of antitrust. As Henderson (1995, p.62) argued from the public choice perspective that "consumers never asked for an Interstate Commerce Commission to prevent new truckers from entering the business. Nor had consumers been heard from when the federal government set up milk marketing boards to restrict the supply of milk and drive up the price" and it was major players (truckers and milk producers) who sought to limit the competition in the first place. These exemplifications consequently paved the way for antitrust laws and Shugart (2004) provides excellent discussions on this topic. In his own words:

"The economic theory of regulation generally and antitrust in particular looks behind the stated intentions of the proponents of government intervention into the private economy to uncover hidden agendas of wealth redistribution. The theory's main thrust is that the formulation and enforcement of public policies toward business has, in fact, tended to protect politically powerful constituencies at the sacrifice of competition and economic efficiency." (p.279).

Following in the footsteps of Stigler's theoretical foundation, Sam Peltzman's reformulation of the economic theory of regulation was a more general one. Peltzman (1976) modelled regulation in which every identifiable group contains winners and losers in terms of attainment of the political power relationships. Being depicted as self-seeking, rational political actors, regulators were only attempting to maximise political support ensuring reappointment or another index of job security. The pursuit of the regulators' self-interest is however constrained and Peltzman derives an equilibrium in which the utility maximising politician allocates benefits across groups (producers and consumers) optimally in line with the usual marginal costs. That is, all groups will share in the rents at the regulator's disposal and as long as some consumers can offer some votes or money for a small departure from the cartel equilibrium, pure producer protection would not be the dominant political strategy of the regulator by and large (Peltzman, 1976; Peltzman, Levine and Noll, 1989).

Another major contribution to theoretical development of the economic theory of regulation came from Becker (1983). Having built on the Peltzman's analysis, Becker presented a theory of competition amongst pressure groups for political influence. According to his formulation, political equilibrium was built upon the efficiency of each

group in producing pressure, the effect of additional pressure on their influence, the size of different groups, and the deadweight cost of taxes and subsidies. Policies that raise efficiency were shown to win out in the competition for influence since they produce gains instead of deadweight cost and let the benefiting group have the intrinsic advantage in comparison to the harmed one (ibid; Rowley and Schneider, 2004).

As summarised above, the theory of natural monopoly underlines that a natural monopoly exists when production with relatively high fixed costs causes long-run average total costs to decline as output expands, and thus a single firm can produce total business output much cheaper than two or more firms due to the economies of scale. On the contrary, the literature regarding the theory of public choice and economic theory of regulation has made its mark on academic research by experimenting with the introduction of rational actor models into the study of politics. These theories fundamentally emphasise that individuals, whether voters, politicians or regulators, will facilitate political mechanisms in accordance with their own self-interest since it is electoral votes that count in the political process. The cost for the electorates to get information on alternatives or get a thorough understanding of any courses of political action determines their role in political behaviour. Regulators similarly are self-seeking political actors whose decisions may not always be free from bias. One of the reasons why regulation as a whole may be biased in favour of particular groups (mainly producers) is because of the undeniable influence of well-organised, compact interest or pressure groups. Although the political payoff of regulation is directly linked to wealth distribution and thus the deadweight loss yielding policies are naturally prone to being shunned, the neutrality of regulation during the course of lessening or eliminating the inefficiencies engendered by the market failure is yet to be justified.

2.2.4 An Analysis: Regulation or Deregulation?

In the last two decades globalisation of markets and technological progress, which has played a key role in the cost curves, have enabled many countries to re-examine the characteristic forms of natural monopoly regulation and undermined the economic rationale of monopoly retention. Given its vulnerable nature to serious market failure complications, the regulation of network industries has also undergone profound transformation. To elaborate, the operational framework in which the economics of regulation govern network industries has faced three major changes namely (i) a decrease in information costs brought about by new information and communication technologies (ICT); (ii) the knowledge required to understand the issues surrounding innovation is inseparably imbedded in its functioning; and (iii) modularity in the production and usage process of network industries (Glachant, 2009).

Alongside other conditions, the inevitability of natural monopoly and focus on regulation were traditionally underpinned by the market failure argument which was asserted to cause threat to opportunities for trade and to have ramifications as externalities. The wealth of information and monitoring tools provided by ICT these days however offers various remedies for so-called failures of traditional markets. The cost of collecting and processing real time information on injections and withdrawals of power in the electricity industry, for example, was once deemed to be the main hurdle to the creation of open wholesale markets but today the share of daily power exchanges and wholesale electricity prices amongst European countries like Belgium, France, Germany and the Netherlands are just common practice thanks to the proliferation of ICT on informational potential and facilitation on monitoring complex operations (Glachant, 2009; Wilson, 2002).

In practical terms, the concentration of regulatory policy focusing on natural monopoly has palpably shifted with the evolution of an information society which operates on creating knowledge and propels growth by innovation. According to Joskow (1998) many infrastructure services that are vertically integrated and often state owned have now been shown to be no longer monopolistic entities though the accession to a bottleneck monopoly or certain essential facilities are still needed to make competition in these supply segments feasible. In light of the embrace of the competitive model, Glachant (2009) examined the modifications affecting the essence of regulatory activity in network industries and classified the remaking of regulation into categories. His research found, there was a renewed interest in allocating the monopoly's fixed cost amongst various actors and users. As long as network infrastructures remained integrated in ownership and in the management of the production, a provision for integrated competition could frame two simultaneous activities. In one activity, the producers of the basic service consumed by the final user would make the decision to invest in the network (both in capacity and technology choice) and the future consequences. Adversely, in the second activity, should the network infrastructures remain monopolies but be separated from the basic service through 'unbundling', it is the infrastructure manager who would make investment decisions anticipating the future activities of producers and the behaviour of final consumers (Leautier and Thelen, 2008 cited in Glachant, 2009, p.4).

Alternative theories have been proposed for the last forty-five years in identifying new regulatory policies accompanying deregulation (also known in some contexts as restructuring (Cudahy, 2009)), privatisation and expansion of other means of competition into the domain of monopolistic entities. For Paul Joskow competition and restructuring were umbrella terms for a variety of means for achieving economic goals. To achieve it, the characterisation of what public policy goals are for each infrastructure sector given its current and envisioned levels of performance under prevailing institutional arrangements must be well defined. The benefits competition was expected to generate included improving the ability of sectors to mobilise adequate financial resources to support the required sector investments and to increase sector productivity by reducing operating costs as well as bringing prices in line with costs to provide consumers with good price signals. It was also envisioned that it would adjust the prices charged for sector services hence making them compatible with the introduction of competition into the competitive segments (tariff rebalancing) where prices and entry were to be deregulated and competition govern the allocation of resources (Joskow, 1998).

Den Hertog (2010) drew on the economic theories of regulation to evaluate whether the theories were able to account for deregulation and privatisation and if so, to what extent. Within this context, the main causes of deregulation were initially due to the relative political power of pressure groups as a result of more efficient combating of free-riding ¹⁹, an increased influential use of media and special entrepreneurship, or alternatively when these effective groups decided that they could better promote their economic interest in unregulated markets such as by self-regulation. Another element that could result in deregulation was the decreasing profits and increasing deadweight cost. The exercise of price fixing or the introduction of entry restrictions, especially in industries such as airlines or freight, could potentially pave the way for competition to take place in other dimensions of the product.

¹⁹ Albanese and Van Fleet (1985, p.244) refer the term "free rider" to a member of a group who obtains benefits from group membership but does not bear a proportional share of the costs of providing the benefits.

The traditional view of economic theories of regulation is that regulation tackles market failures²⁰ and externalities. Interpreted in this way, according to Glaeser and Shleifer (2003), the theory is unable to explain, however, why neither contract nor tort law could successfully address these problems in the first place. Developing a new theory of law enforcement in which private litigation, government regulation, a combination of the two, or doing nothing were considered as alternative institutional arrangements to secure property rights, the evidence from their study appeared to show that whatever law enforcement strategy the society chooses, private individuals will seek to subvert its working to benefit themselves. The model the authors used proved that regulation had been an incrementally efficient strategy of law enforcement in the U.S. between 1887-1917 but that was not to say that regulation was by and large an efficient solution to the problem of market failure due to its vulnerability to subversion by special interests groups and bureaucrats. Hence they concluded that establishing law and order was an economic problem of its own and doing nothing had been the most efficient response to market failure in many circumstances (ibid).

An important contribution to the opposing literature which addresses the alleged disadvantages of deregulation like predatory pricing, fluctuating and discriminatory prices, insufficient service, incremental absence of safety, job insecurity and redundancy for large groups of employees is 'The Coming Demise of Deregulation' by Cudahy (1993; 2009). He, in his former work, adversely exemplified the unattractive legacies of deregulation specifically in the airline industry (i.e. the bankruptcies of some airlines and other unpleasant consequences). Following the fiasco of the Californian experiment of electricity deregulation just a few years later which not only vindicated Richard Cudahy's early argumentation meaning he was righteously validated in his later study, but it also furnished the other critics of deregulation with ample ammunition.

Apart from its theoretical merits which are widely discussed by scholars, the main reasoning behind the deregulation of electricity industry has been to produce cheaper electricity power via competition and to provide a choice of electricity suppliers for end users. For the California debacle however, due to lack of slackening in the price of electricity which instead went up to record highs (nearly US\$30 per megawatt hour in

²⁰ According to Meadway (2013), market failures can occur on either or both sides of the market due to imperfect competition amongst suppliers, badly informed market participants, and the unintentional consequences of market operations.

April 2000, more than US\$100 by June and it rose to between US\$250-450 by November that year), the legislature failed to foresee the potential problems that could arise if utilities were faced with rising wholesale prices and an inability to pass the increase along to consumers. Instead, it became about outrunning supply with power shortages and skyrocketing wholesale prices which eventually led to rolling blackouts. Despite the continual outcries against government intervention by its apologists, the Californian example demonstrated that the public would demand mandatory measures to be taken if market outcomes became unbearable (Cudahy, 2002).

2.2.5 Privatisation and Subsidies

As highlighted in the previous section, alternative theories have been proposed over the years to identify new regulatory policies accompanying deregulation, privatisation and expansion of other means of competition into the domain of monopolistic entities. Geographic and energy specific perspectives of global privatisation -which deal particularly with the interdependence between liberalisation of energy markets and privatisation of their utilities; whether or not privatisation reveals similar patterns or a specific step sequence when executed in different countries; and whether it is a cure or indeed a disease in economic terms- have all served to form the outline of privatisation literature that is surveyed by scholars and organisations like EIA, 1996, Estache, 2002 and Heddenhausen, 2007.

The Office of Energy Markets and End Use of the Energy Information Administration²¹ defined privatisation in its 1996 report as "any movement toward a market-driven economy or any movement that diminishes public ownership and control and increases private ownership and control." (p.v), and argued that better understanding of the economic rationale underlying the privatisation of state-owned energy resources would imply having a better grasp of what objectives could be achieved and how countries – regardless of development level- could benefit from it. According to the EIA report, the objectives nations wished to achieve through the shift in ownership/control from public to private hands included: 1) raising revenue for the state; 2) raising investment capital for the industry or company being privatised; 3) reducing the government's role in the economy; 4) promoting wider shared ownership; 5) increasing efficiency; 6)

²¹ Of the United States.

introducing greater competition; and 7) exposing firms to market discipline (EIA, 1996, p.4).

In the case of Argentina, during the 1990s, Estache (2002) found that Argentina's drive for a wide-ranging privatisation program covering its utilities and transport services was mainly fiscal, as the government was no longer able to afford subsidising those services or invest further to ensure their proper operation. He assessed the privatised sectors' performance from different economical dimensions (e.g. economic efficiency in terms of productivity, technical/cost, and allocative efficiency); service delivery that meets distributional fairness promised by the government through its laws/decrees; and achievement of financial viability). The results author had revealed systematic efficiency increases across the board while some (private) operators did better than others. The report also highlighted that the operational shock given to the sector through restructuring in order to promote competition and flows of investment brought by private operators could not be associated with the worsening economic performance of the sectors as approximated by various efficiency measures. This, in his view, would make the case for reform and privatisation a cure rather than a disease for Argentina although the success of other measures was highly dependent on strong regulatory oversight (p.11).

Bodislav (2015, p.15) analysed the case of Great Britain and argued that should the impact of privatisation on welfare be seen as an economic milestone, the absolute value of prices and the developed trend could be seen as inconclusive. When considered under the difficult conditions of the 1970s-80s with high inflation rates, the large-scale privatisation was seen as a success through its allocation efficiency although prices had an ascending trend and after the privatisation process their slope decreased. However, not all the evidence in the privatisation debate should be viewed from an economic angle. Indeed, concentrating solely on its economical merits has received criticism. Paul Starr's "The Limits of Privatisation", is an important contribution to the contrary literature. It attacks the concept that we should reduce our choices to a basic public-private dichotomy and states "no single remedy is appropriate to the vastly different problems that distinguish collecting taxes from collecting trash, running schools from running railroads, managing prisons from managing shipyards. (...) We have a more extensive repertoire of intermediate options in organisational forms and modes of ownership, control, and finance. The illusory appeal of privatisation is to provide a

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single solution for many complex problems. But if the idea of privatisation has any merit, it is to force us to rediscover the rationale of the public services we need and to remind us, if we had forgotten, that the public-private mix ought not to be considered settled for all time." (p.125).

According to the Energy Information Administration, another form of privatisation is the removal of subsidies. It discussed that the removal of subsidies for European coal operations ultimately paved the way for the constriction of Europe's coal mining industry and encouraged a large shift in coal investment from European mines to mines in the U.S., Australia, and Latin America. (EIA, 1996, p.6). Gil-Molto, Poyago-Theotoky and Zikos (2010, p.2) discussed production related inefficiencies and the role of output subsidies in correcting them and stated that "privatising a public firm, in the absence of subsidies, improves social welfare under a number of different assumptions. However, if firms' outputs are subsidised privatisation does not improve welfare." In the absence of subsidies "output levels are suboptimal (as the private firm produces too little) and the distribution of costs across firms is inefficient (as the public firm tends to produce more but at a higher marginal cost than a private firm)" (p.2).

2.3 Price Regulations

Since the theory of deregulation had gradually lost support worldwide, a regulatory reform movement to fix both market and government failures became popular in the 1990s (Ida, 2004). As an alternative to nationalisation, the second practice being used by governments to handle the inevitable impact of monopolisation is to allow private enterprises to operate in the market and to regulate the private monopolists through the imposition of adequate price and entry regulation and/or quality standards (Ogus, 1994). A large body of literature exists indicating that the structure of regulatory mechanisms is a key determinant of the level of incentives given to regulated firms to run their services more efficiently (supply-side efficiency) and also to the consumers to make their utilisation decisions efficiently (demand-side efficiency). The achievement of these and the other goals of the regulator, such as rent and capital extraction as well as ensuring income redistribution void of external public finance instruments, would be fairly straight forward if they had totally exogenous information about the firms' overall production and cost patterns. Due to the inevitable exposure to asymmetry of

information at the expense of the regulator, and the additional concerns of interest groups against a regulatory procedure closed to public scrutiny and judicial review, the design of regulatory mechanisms holds a vital importance for all the parties (Laffont and Tirole, 1993; Joskow, 1998). There are two main regulatory mechanisms known globally, namely cost-plus and fixed-price mechanisms. Before discussing the econometric support for each it is useful to give brief definitions for both.

2.3.1 Price-Cap Regulation (PCR)

Under a fixed-price regulatory mechanism, the prices are not tied directly to the regulated firm's cost or profits, but rather defined by the regulator for specific services then formulated for future adjustments. The UK instituted another version of fixed-cost regulation, incentive or price-cap regulation (PCR), according to which utility prices were adjusted on a predetermined frequency according to a formula RPI - X22 where RPI and X stand for retail price index and expected annual productivity growth, respectively in the early 1980s. The main focus of PCR is to promote managerial efforts and investment with decreasing operating costs. But, arguably, because of the lengthy period between the formal price reviews which is four to five years, it has been singled out for criticism for enabling firms to reap excess profits during this period (Den Hertog, 2010; Newbery, 1997).

At the other extreme of the spectrum for regulatory mechanisms lies the cost-plus pricing, exemplified mainly by the U.S. in the form of rate of return- ROR (also known as profit or cost-of-service regulation). In essence, the cost-plus pricing strategy requires submission of a bill with a breakdown to show the regulated firm's operating expenses and capital costs inclusive of an after-tax return on its investment, which either equals or exceeds the cost of capital (the 'plus'). The submitted cost is then passed on the prices that consumers are obliged to pay. The lack of rigorous measures, unless taken by the regulator, to minimise the asymmetry of information about the firms' cost opportunities, managerial effort and associated costs means the pure cost-plus regulation (regardless of its perfect cost accounting or auditing tools) has been considered as an emboldening task for regulated firms not to minimise costs. That is, far

²² For example, if inflation rises by 5% and an annual productivity increase is 3%, regulated firms are then allowed to increase their prices according to the cost increase, which is 2% (Den Hertog, 2010).

too high audited prices will be passed on to consumers contradicting the mechanism's very own goals of rent extraction and supply-side efficiency (Joskow, 1998).

Silve and Saguan (2011) discussed that any natural gas retail tariff regulation must aim to fulfill at least four market functions. It should allow regulated companies to recover theirs costs but also preclude them from capturing an inordinate regulatory rent. It should also send good price signals to both supply and demand sides, and appropriately allocate risks between them. In passing from one part of the spectrum to another, both price regulations can be assessed in terms of their ability to fulfill the afore-cited functions.

Elliot (2006) and Sappington (2005) drew attention to the difficulty under PRC to actually observe whether the regulated company decreases the costs at the expense of quality, level of maintenance, reliability and frequency. To prevent this, the regulators may occasionally add an extra factor in the formulae to motivate the managers to reach certain quality levels and connive in increasing prices if those levels are reached although, once anticipated by firms this may yield a reluctance to minimise the costs otherwise. By and large, price-cap regulation seems to best suit promoting the cost efficiency of firms, however if attracting more investment to the network sector is the main objective then cost-plus regulation may be a better option as investors are prevalently known to be motivated by profits rather than by prices (Den Hertog, 2010).

Foreman-Peck and Millward (1994) show earlier evidence of this and it seems consistent with the above conclusion. Analysis of both public- and state-owned British infrastructural industries from a structural, managerial and performance point of view between 1820-1990 presented that early attempts to regulate prices were not effective in the UK. Having fourteen market players in London by 1850 soon proved that the quality suffered greatly with such a competitive market and precipitated municipal ownership which looked more attractive in keeping prices at a reasonable level and decrease local taxes, which eventually led to the nationalisation of all public utilities in Britain (Gourvish, 1995).

2.3.2 Rate of Return Regulation (ROR)

The U.S. version of cost-plus regulation, ROR, appears to be comparatively stable since it requires fair and reasonable prices from investors in exchange for a fair rate of return (Newbery, 2001). It is however widely argued that because regulators would not risk the firms going bankrupt, they would gradually set the rate of return higher instead of lower. Although some might not consider this a direct catalyst for efficient productivity since it would encourage over-capitalisation by firms (say, favouring capital intensive production technologies), it is presumed to be a profitable contributor to dynamic efficiencies should those technologies contain innovations (Den Hertog, 2010). This compliments the study of Greenstein, McMaster and Spiller (1995) which argued that due to the vagueness of ROR, which provides the regulator potent discretionary powers, there will remain an issue with commitment in regulatory institutions. So, whilst ROR might reduce incentives to cut costs it may take incentive reductions further to introduce modern, capital-intensive technologies.

In summary, there are two main regulations instituted to thwart monopolistic infrastructure firms from over-charging, and although it has been shown that both regulatory mechanisms influence the infrastructure sectors differently, the quest for more superior alternatives to PCR and ROR regulations will probably continue. The constraints of each option notwithstanding, governments and regulatory agencies can quantify how the choice of regulatory regime might impact prices and the allocation of risks in the relative sector. Given the above mentioned causes however neither PCR nor ROR regulation is often able to avoid the inevitable trade-offs between greater incentives for cost reduction and greater rent transfer to consumers.

2.4 Institutional Transformations: Competition In and For Market?

It is widely noted above that there has always been great concern when it comes to transferring public monopolies into private monopolies. Regardless of the distinct differentials between privatisation and liberalisation policies in terms of what they offer, whether or not either of these will actually take place and to what extent they are realisable at the outset crucially depends on the appropriateness of the governance structure in relation to the particular industry or country characteristics involved. By and large, network industries are integrated sectors of production, distribution and retail where the distributional part (i.e. pipes, wires, railways etc.) has network characteristics. Whilst varying in size these networks, if the market demand is adequate, could be supported or several substitutes would be made available via the introduction of competitive mechanisms ensured with a general antitrust enforcement in place (Parker, 1999; Levy and Spiller, 1996; Den Hertog, 2010). On some occasions, however, if competition between networks or a substitute is not possible -given the market demand and technological eligibility- an alternative arrangement "Competition for Market" can be adopted simply by keeping the existing monopolistic structure and finding private firms to run the services rather than the state (Kim and Barn, 1999; Den Hertog, 2010).

Also, in many circumstances due to the economies of scale firms are obliged to charge the same price to all customers and that price is sought to maximise economic efficiency as measured by the standard concept of consumer plus producer surplus. While this maximum surplus can be generated in the market, a pricing policy that leads to the allocation of resources is termed the first-best price. However the regulator may attempt to, without price discrimination or external subsidies to the firm, direct the firm to set a price voiding a deficit and maximising net economic benefit whilst allowing the firm to remain viable. Since profits are negative at first-best price, a net benefit loss (deadweight loss) for the firm is expected. Then there is the creation of the breakevenconstrained optimum, second-best price. Given the difficulty to achieve first-best prices without government intervention (i.e. external subsidy to the firm) and the costly nature of government intervention, the quest for an alternative approach to achieve an economic performance near second best prices without government intervention has been embarked on (Braeutigam, 1989).

2.4.1 Competition For Market: Franchise Biddings

Founded by Sir Edwin Chadwick as early as 1859 and later promoted by Herold Demsetz in 1968, franchise bidding (or so-called Chadwick-Demsetz auction) as an alternative to regulation is one of the commonly used forms of competition for market. Franchise bidding has experienced a surge of expansion worldwide, with more than one hundred years of experimenting in letting water concessions in both France and Spain as well as more recent initiatives in China, Mexico and Hungary. In essence, franchising constitutes a system in which a strategic alliance is built up between the parties by conferring rights of a production of one or more services/products to a sole firm or a combination of firms for a scheduled period of time. It can be deemed as a fundamental strategy for introducing competition, at least partially, into the markets where competition within the market is not possible or desirable. These characteristics, hence, do make public utilities especially infrastructure services with unfavourable natural monopoly conduct the most suitable candidates for the adoption of franchising (Dnes, 1995).

Chadwich (1859) designated competition for the field (market) as an administrative principle which meant that the whole field of service should be put up for competition on behalf of the public with a sole condition on which efficiency and utmost cheapness could be economically administrated with full securities towards the public for the performance of the requisite service during a specified period of time. The competition for the right to be the natural monopolist could, in this way, be an adequate substitute. A further proposal from Demsetz (1968) for the monopoly franchise contracts was, in essence, competitive bidding to take place between a government authority (franchisor) and the supplier (franchisee). Monopoly franchises could be auctioned off to the bidder offering the best price-quality package to consumers. With Demsetz's system, the (seller) rivals did not have to share the market or production of goods, thus the likelihood of competition in the bidding causing an uptrend in per-unit production costs was envisioned to be rather small. Though franchising authorities, dependent of the country and sector, may reserve the right to add additional normative criteria to the bidding process, competition via bidding usually ensures minimum selling prices since it is expected that the winning franchisee will lower bid prices to the equivalent of the unit costs of production unlike the prices that are set simply by bureaucrats in noncompetitive markets. Demsetz's proposal is also appealing as it advocates competition in the industries where substantial economies of scale prevail, and it is free from the usual regulatory apparatus and regulation-related incentives for firms, which can cause them to behave in an economically inefficient manner (Demsetz, 1968; Braeutigam, 1989; Dnes, 1995; Joskow, 2006).

Demsetz's competition proposal could be implemented in multifarious circumstances. These include a relatively simple environmental application of, say, local collection of refuse in which the municipality authority need not own the facilities used by the refuse collector company, or auctions for taxi license plates, to a more complicated scenario of the right to operate a cable television franchise or natural gas distribution therein the government may own the facility but auctions off the right to operate the system (Williamson, 1976; Breautigam, 1989).

At first glance, franchising in network industries seems to provide attractive efficiency properties that for example PCR could not achieve due to the information advantage of the firm over regulator. Thus, the firm could always gain a rent from the informational asymmetry. The benchmark model of Harstad and Crew (1999), which tried to provide insight into the design of franchise bidding practices, and address a gap in the literature, provided stronger arguments in support of franchise bidding in comparison to other alternatives inclusive of ROR and PCR. Addressing the deficit issue, to begin with, bidding offers good efficiency benefits in relation to unregulated monopoly, ROR or PCR as there will exist several avenues to acquire the funds needed to cover such a deficit (e.g. changes in the baseline rules, taxes imposed on the utility, on customers or the bidders themselves). A franchise fee would shift the equilibrium bid function up, and hence lead to higher prices in the production market. A two-part tariff inclusive of a license fee to be charged to the prospective customers over the contract period which is fixed by and payable to the regulator would raise revenue by impacting demand only via income effects as well as leaving the consumers still better off versus other regulatory regimes.

Like other regulation modes, franchise bidding is also contingent upon regulatory commitments and there is no way of avoiding this commitment in regulation. Since the other regulation models throughout which the regulators' commitments would most likely be cornered by manipulative pressure from the monopolist for more favourable terms, the only countervailing source of pressure would then be the consumers who are typically less organised. Franchise bidding is however able to offset the pressure of the incumbent on the regulator by entrants who will be subject to the incumbency gains at contract renewal intervals (Harstad and Crew, 1999). Also the benefits franchise bidding brings into the governmental domains compared to traditional ROR regulation are evident as the governments no longer need to obtain information on costs and demand to achieve optimal pricing. The existence of a regulatory agency is no longer a needed establishment and cost inefficiencies stemming from regulation are not present (Den Hertog, 2010). Correspondingly, franchising schemes also may avoid pitfalls associated with traditional regulation of such industries or with their nationalisation.

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Where competition cannot be introduced in the market, as tends to be the case for water supply for example, it should at least be introduced for the market. Properly structured tenders or auctions will allow the government to extract part of the monopoly rents for the benefit of the treasury (Brauetigam,1989; Dnes, 1995; Guislain, 1997; Kim and Horn, 1999). Although it is also argued that governments also extract part of the monopoly rents for the benefit of the benefit of the consumers, it is not quite clear in the literature how the consumers in this deal are benefited unless the extracted revenues are used to somehow subsidise consumers (or at least some) from those monopoly prices.

Benefits notwithstanding, franchising is not free of flaws especially when collusive bidding and the opportunistic behaviour of a single firm (e.g. getting insider information via bribing officials) enjoying strategic advantages from franchise competition exist. Subject to level playing field condition in which all buyers are allowed to access to the same technology, and thus the market would be characterised by bilateral negotiations between buyers and sellers, Demsetz tries to refute the theory that collusion (or a merger of buyers) would be prohibitively costly as long as bidding rivals colluded successfully regardless of their number, and the supply elasticity of bidders and the costs of colluding are measured empirically. According to Klemperer (2001), however, the bidders' tacit agreement to divide up the market at a very favourable price for themselves especially if they are few in number and in close interaction with one another via frequent contracts by each bidding aggressively for quantities then its collusive share can easily deter other bidders from bidding for more. Similarly, certain advantages of the current franchisee (i.e. readily made necessary capital investment, better knowledge in technology and better information on market demand) can disincline other firms to compete with the incumbent realising the trivial chance of winning the competition (Viscusi, Vernon and Harrington, 2005).

Another problem Demsetz's competition proposal does not address successfullyfaces (like traditional regulation does) is how governments should set and monitor the quality standards since there is a possibility of a short term strategy adaptation by the franchisee to provide the lowest quality service after winning the right to serve. Given the incompleteness of contracts and the limitations of the contract terms which in itself is equally difficult to specify in the first place due to the difficulty in determining the characteristics of the product or service (i.e. price and quality of service) at the formation stage which are subject to adjustment based on changing market conditions,

there exist contingencies that are unknown and unknowable at the outset of the franchise establishment. The challenges in write such a comprehensive contract that contain mechanisms which can be adjusted to future occurrences without significantly undermining the original terms of the contract award go without saying. As the crux of the context of the Demsetz proposal suggests a firm that wins the bidding today may attempt renegotiating his contract tomorrow, leaving the government authority (franchisor) with relatively costly alternatives to either force compliance, renegotiate or file a new bidding process for another franchisee after a firm decides to go that route (Goldberg, 1976; Brauetigam, 1989).

Some of the difficulties like accountancy ambiguities and the possibility of the franchisee exploiting the accounting data with a threat of bankruptcy in order to disincline the franchising agency from failing him, which infects the renegotiation process, can be mitigated by introducing extensive monitoring and accounting control techniques by the franchisor. Then a quasi-regulatory relationship between the parties would be ensued (Williamson, 1976).

Demsetz's proposal of franchise bidding also gives rise to conflict when the enterprise provides more than one service to its customers. In the single product environment where a uniform price prevails the winner may have been selected on the tariff basis that the firm agrees to charge to customers and that tariff would be the second best since it would leave the firm with only normal profits. The generalisation of this selection criterion in the case of multiple products however raises issues. In this case, the bidding may lead to a number of different un-dominated bids, and the Demsetz proposal does not offer any explicit basis for choice amongst these un-dominated prices even though some of which may be rather inefficient relative to others (Brauetigam, 1989).

Despite safeguards built into the agreement, should the assets need to be transferred at the contract renewal interval the problem of significant sunk costs may arise. Since these assets have to be valued before the handover, the question of how to do so holds key importance. One way is letting the new bidders bid a value for the assets for which they need to have information on future prices given exogenously by a 'regulator' since there is no market setting price(s), or, alternatively having provided the assets valuation letting the forthcoming bidder offer the lowest price to consumers combined with a systematic strategy to incentivise the incumbent to invest and efficiently operate the system along the way. The gap between the replacement valuations under both circumstances seems likely to determine the size of sunk costs (Helm, 2003).

One might thus ask what is the real focus of franchise auctions. The key purpose is to allocate existing capacity and to encourage new investments in the industry. Having the property rights well defined means the bidders know what they are buying and the relative government authority gets an indication of potential franchisees' willingness to pay for a particular network utilisation (Erdogdu, 2009). The probability of virtual network trading also exposes future price identification and a grand mechanism to be used for investment determination if governments are serious about benefiting from auctions thoroughly. This is altogether a demanding task and it requires a series of structural measures as well as well-set links between the bidding process, the futures market and the revenues from the auctions. To do so, auctions should firstly comprise of competition with many buyers and sellers, and a liquid transparent futures market should be present. The information auctions create is not valueless given that they provide a method of testing the network operator's plans, whether or not there are suppliers avid and able to pay for new capacity or simply allocating the existing capacity (Helm, 2003). Auctions as part of the planning process also raise the issue that a certain degree of regulation is required from both sides e.g. the investor's dependence on regulatory protection to finance their functions and the auctions requirement of regulators to determine the property rights and the preclusion of market power abuse. Whether these costs are worth the anticipated benefits is however an empirical question (Erdogdu, 2009).

As noted above franchise biddings take on added complexity when the services to be auctioned off get multiplied and are more sophisticated. Franchising vertically integrated public utilities is one of them. One presumable way to lessen these complexities is to separate different functions of the integrated utility into, for example, production, transmission, distribution and retail, or building, operating and transfer of the infrastructure. The identification of merits and vices of vertical separation compared to franchising and regulation has however been a contentious issue in the literature. Unbundling of vertically integrated public utilities is often advocated in network industries with respect to the manifold advantages it offers compared to both franchising and regulation. Scholars such as Crew, Kleindorfer and Sumpter (2005); Jenkinson and Mayer (1996); and Newbery (2002) summarised that the separation

would first of all allow the identification of the parts of the industry to be subjected to franchising or to regulation when competition amongst multiple networks was not available. With this, competition could augment in other stages and franchise contracts would be less complicated as well as increasing the number of applicants, ceteris paribus. Also touched upon is that if the network could not be separated from the production or marketing stages due to its bottleneck²³ facility, the position of the incumbent to abuse its ownership of the network or strategic practices to thwart competition via, say, raising rival's costs or price squeezes could be again derailed by separation (Den Hertog, 2010).

2.4.1.1 Vertical Separation (Unbundling) as a Solution?

According to Mulder, Shestalova and Lijesen (2005) vertical separation strongly increases the independence of the network management and fosters the network companies' focus on their main activities by encouraging innovations and investments in the grid. They argue that it would also enable the regulators to acquire much accurate information for the determination of appropriate access charges, and generate a clear distinction between the role of government and activities of third parties in liberalised industries.

Others, however, do not share the notion that unbundling is always beneficial. The model has been challenged on the grounds that the coordination between activities in different stages which were normally executed by internal managerial command and control methods now have to be replaced by means of contracts which are grueling to write and enforce. The loss of economies of scale and scope of integration vanish integrated firms from the adjacent or downstream market (unless allowed to) thus decreasing competition, and devaluing the incentives to invest in case operating costs rise or all revenues generated from those investments cannot be appropriated. Finally there is the risk created by separation paving the way to the double marginalisation problem as highlighted by Den Hertog (2010), and Mizutani and Uranishi (2012).

Countries handle vertical separation in various ways for different industries. Compared to other network industries, the railway industry seems to so far reap the greatest benefits from the vertical separation of railway operations from infrastructure

²³ This is sometimes known as common carriage, i.e. pipelines, transmission lines etc. (Klein, 1996).

management. A comparative analysis of fifteen EU member states with respect to competition level in the rail freight markets executed by Drew and Nash (2011) indicated more competition in countries with vertically separated railways than in those of integrated. In Sweden and the Netherlands the evidence suggested that vertical separation improved performance, reliability, capacity and exposed reduction in delays unlike Italy wherein the new entrants still identify barriers obstructing access to the network in addition to ongoing integration issues.

The experience of EU members in power industries does, however, provide little evidence of the impact of separation. Overall imperfections in the transposition of the Electricity and Gas Directives into national laws to create a level playing field for market opening has meant a number of members have failed to finalise the unbundling provisions. It does not mean to say that network operators necessarily comply with the provisions even if they are fully adapted, or incentives for preferential treatment within vertically integrated operators do not still remain. It appears that national regulators cannot yet verify to a satisfactory degree whether separation provisions are respected in practice, due to lack of resources and adequate power. The incumbent suppliers thus continue to view their networks as strategic assets, which serve their commercial interests (Lowe, et al., 2007).

2.4.2 Competition in The Market

2.4.2.1 Yardstick Competition

As articulated above, in franchised monopolies regulators try to bring the firms' prices for providing a service in line with the costs at each point in time (cost-of-service regulation) by allowing high enough prices to induce firms to supply and simultaneously avoiding welfare losses from monopoly pricing. This scheme however is not considered to confer a huge advantage on addressing the problem of efficient cost reduction by the regulated firm. This being the case, Shleifer (1985) postulated a *benchmarking* or *yardstick competition* to provide regulators with a cost comparison across similar firms to set the prices accordingly. This scheme might be useful to introduce competition into certain industries which usually get organised regionally due to the impossibility of vertical separation. The essential idea of yardstick competition is to separate the industry horizontally (regionally) instead and compare the average cost of firms by regions taking into account individual factors (i.e. population density, ratio of business versus residential consumers, environmental factors, etc.). This way, the regulator sets the price of a firm's product equal to the average costs of all firms in a certain region (excluding the average costs of that particular firm) and could ideally use this for tougher performance targets or tariff adjustments at the time of a regulatory review. Although yardstick competition as such is expected to motivate the utmost cost efficiency amongst firms according to its advocates, the difficulties to find comparable firms in differing market conditions and to get a sufficient number to do so may be regarded as its Achilles heel. Extending the horizontal separation of the industry too far would also hold a risk of diseconomies of scale and scope (Foster, 1992; Ogus, 1994; Kim and Horn, 1999; Den Hertog, 2010).

2.4.2.2 Contestable Markets

The final model used to introduce competition into monopolistic industries is via the facilitation of contestability. Put forth by Baumol, Panzar and Willig (1982), contestable markets, might be described as if an industry into and exit from which is costless²⁴ and most of the benefits of perfect competition may be attained regardless of the market share of the incumbent and without government intervention. The key aspect of contestable markets is to give the incumbent monopolists and oligopolists effective incentives to behave virtuously by offering the consumers the benefits which competition would otherwise bring. Bailey and Baumol (1984) further argued that although contestability analysis defined an entry barrier as something which provides incumbent firms sufficient protection from entry and continuity of obtaining above normal profits, perfect contestability guaranteed the absence of excess profits, inefficiencies and cross subsidies even in the presence of scale economies. In other words, scale economies were not considered as a source of undesirable performance or a form of entry barrier in contestable markets. The degree of contestability of a market can be measured by the share of the investment that is composed of sunk capital, and the industries with extensive sunk costs (i.e. the railway industry) are considered unlikely to be contestable in comparison to that of other industries where the capital is highly mobile (Teece, 1994; Kim and Horn, 1999).

²⁴ Contestability thus achieved due to no cost-discrimination against entrants (ibid).

This interpretation is supported by several empirical analyses which showed the relationship between sunk costs and the degree of contestability of the airline industry. Subscribing to George Stigler's view of the nature of entry barriers namely that economies of scale, per se, pose no threat to market efficiency since they do not necessarily cause barriers to entry, the empirical study of Bailey and Panzar (1981) examined the relevance of the theory to city-pair airline markets in the U.S. between 1978-1980. They argued that the airline capital costs albeit substantial, were not sunk costs as the major portion of it (i.e. aircraft) could be recovered from any particular market at almost no cost and such factor mobility made potential entry and exit to these industries easy. That is, most airline markets were readily contested and entry of airlines at airports was relatively fluid. Despite various market imperfections (i.e. slot and fuel allocations, market power exercised by airport authorities due to noise and environmental constraints) there existed one hundred and forty-three cases of new entry by the local carriers into hub airports in 1979 against that of one hundred entries by trunk carriers in 1978. Similar results occurred for the pricing behaviour of locals as it was expected to be different in short-haul markets where they faced actual trunk competition than it was in competition absent short-haul markets. Indeed, in markets below 400 miles, the presence of a trunk carrier meant fares were 15.9 percentage points lower than they were in a monopoly market of similar length.

2.5 Pricing Structures in Liberalised Energy Markets

2.5.1 Oil-linked Prices versus Market-Based Prices

The gas market is vital to a country's energy needs and is a matter of economic development, national security and environmental impact. An efficient, successful liberalisation would be expected to transform the gas industries, bring the prices in line with costs and lower import bills. The wholesale gas prices have been long linked and indexed to the price of oil with the initiation of the Netherlands in the early 1960s (Kingma, Lijesen and Mulder, 2002). Being specified on long-term take-or-pay (ToP) contracts, subject to international arbitration with enforceable price clause for gas imports also, the oil-linked prices have been based on the value of gas to the customer rather than the cost of production.

Having relatively low costs of production and development given its vast onshore discoveries, such value-based pricing in the Dutch context, posed a contradiction to the system used in continental OECD²⁵ Europe especially in the UK. Instead of cost-plus pricing, the Netherlands opted for a market-value principle in which the negotiations for gas prices based on the weighted average value of the gas in competition with other fuels (e.g. oil products) adjusted to allow for transportation and storage costs. Whilst this paved the way for Shell, Exxon and the Dutch government to earn higher revenues, the state monopoly British Gas Corporation (BGC) and diverse field producers adopted various other pricing forms in the 1970s (Stern, 2012; Stern and Rogers, 2014). Unlike the Dutch experience, costly British offshore discoveries left the producers with a high rate-of-return after taking into account the high seasonal 'swing factor' which necessitated production facilities and transportation infrastructure to be sized for flows higher than average offtakes. This consequently saved Britain from building seasonal storage facilities during the development stage of its natural gas industry and the contracts²⁶ signed between field producers and the BGC included an initial price with provisions for indexation related to cost inflation rather than to competing fuels. Overall, the cost-plus mechanism helped gradual displacement of oil products in sectors and increase the market share of gas in Britain and throughout Europe at that time (ibid, 2012; 2014).

Although for some, the rationale for retaining oil linked prices via long-term ToP contracts is still strong given its merit of consumer switch between burning gas and oil products, it does not however make much commercial sense in light of the recent developments in gas markets. Stern and Rogers (2011) discussed that the conditions in the gas market should set price levels rather than oil since the supply/demand dynamics of each were essentially divergent and the emergence of modern gas-burning equipment in which the use of oil products no longer meant a substantial gain of efficiency. Even though it was practically very difficult to make fundamental changes to the price formulae on long-term contracts more often than permitted by the three-year review and it was still considered acceptable by European countries, Stern and Rogers further argued that the globalisation of gas markets, namely sharp movements in demand, supply and other types of gas and prices becoming available elsewhere in other parts of

²⁵ Organisation for Economic Cooperation and Development.

²⁶ Called depletion.

the world especially after 2008, exacerbated the problems of reliance on rigid oil-linked price formulae in the continent. These very reasons gave new impetus to the emerging European hubs to provide the best indicator of a market price, which was not hitherto reflected in long-term contracts.

2.5.2 European Gas Hubs and Hub-Based Pricing

The study by Patrick Heather of continental European gas hubs and whether or not they were fit for purpose lies squarely along the borderline between the readiness of the hubs to offer a market-price mechanism for gas trading and the changes needed to be made to make those hubs credible, for example, price creation, discovery and reference points. Heather (2012) divided the hubs into three categories and provides a definition for 'trading hubs' as those which were transparent, mature within certain levels, based on virtual trading points with easy access to the legions of participants to trade, and are already being used for the financial risk management of gas. In similar fashion, the 'transit hubs' were defined as those which were actual transit locations (or physical points) with a primary role to facilitate the transit of large quantities of gas for onward transportation as well as giving market participants a platform to trade. Lastly, 'transition hubs' were defined by Heather as virtual trading points which are not as mature as trading hubs albeit presenting signs of progress towards becoming a marker price for their respective national markets by attracting a substantial volume of gas year on year (ibid).

As one of the pioneers of liberalisation of energy markets, the creation of Britain's National Balancing Point (NBP) in 1996, followed by the Dutch Title Transfer Facility (TTF) in 2003 gave rise to a dramatic increase in the volumes of hub traded gas (gas-on-gas competition (GOG)) within Europe which rose from 15% in 2005 to 53% in 2013. In addition, the avalanche of spot-priced LNG overflowing from the UK into northwest Europe has acted as a catalyst for the rise of Continental European hubs²⁷

²⁷ In Europe by 2002, there were only two operational gas hubs Belgium (Zeebrugge, ZEE) and German (HubCo, that later became Gaspool) which soon followed by the Tile Transfer Facility (TTF) in the Netherlands and Punto di Scambio Virtuale (PSV) in Italy in 2003. France, Austria and Germany respectively established Points d'Echange de Gaz (PEG), the central European Gas Hub (CEGH) and E.on Gas Transport (EGT) during the three consecutive years. And the hub landscape of Europe was compeleted by Germany's two more hubs in 2009, NetConnect Germany (NCG, preceded by EGT) and Gaspool in 2009. Heather (2012) classifies the NBP and TTF as mature 'trading hubs', ZEE and CEGH as 'transit hubs' and GPL, NCG, PEG and PSV as 'transition hubs'.

especially between 2005 and 2013 whereas the traded gas volume at NBP in 2010 was larger than all of the Continental European hubs put together. In terms of wholesale price formation mechanism, Northwest Europe saw the sharpest change reducing the market share of oil-linked prices from 72% in 2005 to 20% in 2013 while the Netherlands has managed to realise a complete displacement of oil-linked prices putting the trading on a 100% GOG competition basis. The GOG competition is however not one homogenous category consisting solely of a trading mechanism and there also exist, inter alia, bilateral agreements (BA) and spot LNG imports (IGU, 2014). Contrary to the change in price transformation for North American and European trading markets which have so far been eye-catching although not necessarily uniform across the regions (the Northwest of Europe is to materialise the most remarkable change in the whole of Europe, for example), the experience of the rest of the world has given a different picture in terms of other market activities. Australia, Russia and Argentina are exemplary in their transformation of price mechanisms away from regulated to market pricing in which there is no hub trading but instead multiple buyers and sellers entering into bilateral agreements. To touch upon oil-linked price complacent countries at the other end of the spectrum, China's increasing pipeline gas imports from Turkmenistan together with intra-regional trade of the Former Soviet Union of which the pricing mechanism switched from bilateral monopoly to oil-linked prices are just a few to mention (IGU, 2013).

Although the merits of hub-based (or market) pricing throughout Europe leave a positive impression overall, it should not come as a surprise that hub-based prices do not always result in decreasing prices. Wieczorkiewicz (2014) discusses this very issue and highlights the likelihood of hub prices surpassing oil-linked prices in periods of high demands given its supply-demand equilibrium nature. Even though storage sites could be referable as a rescuer under such circumstances, their capital intensive and prohibitively costly characteristics may not always allow the situation to be saved instantaneously. The study equally stresses the impact of the supply factor on market prices and according to which the import reliance of the EU markets combined with their waning domestic output could diminish the ability of the EU to offset potential supply demand shocks. In line with this, Stern and Rogers (2011) draw attention to the fallacy of equating market based prices with low prices basing their facts on the studies of Rogers (2010) and Honore (2011), which both projected a tightening of the European

system and oversupply of gas as opposed to transportation capacity to deliver gas to Europe to come to an end by 2014.

This kind of sanguine approach to the competitiveness of European energy industries in globalising markets will be entrenched by building a single market for gas and electricity to increase economic efficiency and lower the costs for the end consumers is difficult to reconcile with the assumption that moving to hub-based pricing might actually hold the possibility of manipulation and volatility. In their seminal work Neumann, Siliverstovs and von Hirschhausen (2006) used time-varying coefficient estimation models applying the Kalman filter to examine the existence of price convergence between different hubs in Europe. Their findings revealed that an almost perfect price convergence existed between the UK and Belgium following the construction of a pipeline between the two locations. The study by the University of Groningen (Harmsen and Jepma (2011)) investigated price movements on six major North West European hubs (NPB, TTF, ZEE, NCG, Gaspool, PEG), using econometric techniques between 2007-2010, and found a strong statistical correlation that the hubs in said region form one integrated market for natural gas in which the prices were never expected to drift too far apart. The study defines this result as 'striking' since there were numerous reasons which could have thwarted this expedient market integration with the most salient one being the lack of arbitrage opportunities between hubs as a result of pipeline capacity constraints. Again, ICIS-Heren's (2010) data showed robust correlation in season-ahead prices between four main European hubs (NBP, TTF, ZEE and NCG) which gradually retarded towards month and day-ahead prices across the hubs. Hence, the suggestion of Stern and Rogers (2011) for market manipulation of individual hubs, if it is indeed happening, was to maintain a contract price based on month-ahead prices (or an average of day-ahead prices over a monthly period) for a hub or an average of hubs as robust as possible against such suspicions. Also due to the additional participant liquidity gains of hubs, the scope for manipulation by any single player would be diminished.

In support of the manipulation contention, the Algerian energy minister's call for united gas supply action especially from Russia and Qatar to reduce production in order to boost gas prices (due to the oversupply in European markets) and plans to speak out in the Gas Exporting Countries Forum (GECF) in Oran, Algeria in 2009 is notable (Hoyos, 2010). Although there was no written documents or a persuasive plan received at the April GECF meeting in 2009, some associate the reduction in Russian and Algerian deliveries in the second half of 2010 with the plea of Algeria to peg the gas prices at around US\$13-14 per million British thermal units (MMBtu) which was around US\$3.4 per MMBtu in the most liquid market of the world, the U.S. A similar issue was brought to the attention of the market experts in the same year when Qatar decreased its LNG exports purportedly by technical issues with half of its LNG trains. It was speculated that the world's biggest LNG producer Qatar was intentionally withholding gas from the market to support prices (Stern and Rogers, 2011). On the same oversupply and weak gas demand basis in summer 2010, Qatar also took advantage of the low charges to store LNG and parked at least eight tankers off Fujairah of which the vessels had a combined capacity of 1.8 mcm (more than a monthly supply of the UK). This once again led to a further speculation that Qatar was using them for floating storage and this was entangled with the very watchful eyes of the U.S. firms (Sethuraman, 2010). Generally speaking, long term contracts make short term seller manipulation of prices or volumes constrained but given the global transition towards market prices the likelihood of gas-OPEC type of organisations being founded and of members to act in unison becomes more feasible than ever (Stern and Rogers, 2011).

The prices at NBP reached the highest level of US\$14/MMBtu in the 2005-2006 period due mainly to the loss of the key Rough storage facility during the winter months and the lack of sufficient import flows coming from Continental Europe via the Bacton Zeebrugge Interconnector pipeline (IUK) in response to high British prices following the constrained storage operations by public service obligations and lack of short term transportation capacity availability (Foss, 2011; Stern and Rogers, 2014). With the onset of higher Norwegian imports in 2007 the prices decreased around US\$3-4/MMBtu but rose again nearly to its 2006 level in the pre-crisis period of 2008. The U.S. Henry Hub prices followed a fluctuating course trending upwards in the early 2000s and mid-2005. This was due to diminishing domestic output, which occasionally led to inter-fuel competition between gas and fuel-oil in power generation (when the prices of oil and oil products were high) and temporary shutdown of offshore production caused by Hurricane Katrina whereas the emergence of shale gas production post-2006 counterbalanced the upward trend in prices and brought them to around US\$13/MMBtu by mid-2008 and firmly in the US\$3-5 range since early 2010 (ibid, 2011; 2014).

The evidence concerning how well competition is serving the interests of households

and small firms is expected to be generally positive as long as consumers are fully aware of their options and the benefits that they can reap from switching between alternative suppliers. However, the picture which emerges from the actual experience of different countries, as discussed below, is somewhat confusing. To elaborate, the British domestic gas and electricity markets have been open to retail competition for sixteen years and it has been twelve years since price controls were removed. At privatisation, fourteen regional monopoly suppliers were created, five large of which, EDF Energy, E.ON, RWE npower, ScottishPower and Scottish and Southern Energy have evolved through consolidations and acquisitions (Ofgem, 2013). However, the rate of switching amidst British consumers has hitherto been as low as 38% and more interestingly 37% of electricity users are still supplied by their regional incumbents while Centrica, for example, has continued to supply the same gas customers (40%) for more than fifteen years since the market was liberalised. Thanks to the extensive publicity and media interest surrounding the recent price increases, this has reflected a remarkable spike in switching in the November-December 2013 period (the highest levels for five years) although it markedly decreased again by January 2014 (Ofgem, 2014).

A partial counterbalance to this outlook can be found in Spain wherein the recently restructured retail gas market is robustly competitive, with seventeen marketers actively trading although the lion's share of the retail market (90%) is held by four major companies, Repsol YPF-Gas Natural-Union Fenosa, Iberdrola, Endesa and Naturgas. Italian consumers (households) on the regulated retail market pay $\notin 4.25/m^3$ more than those in the free market in comparison to industrial users and power generators who pay €7.39/m³ and €6.87/m3 more, respectively (UNECE, 2012). French customers are offered two types of contracts under cost-based regulated tariff and market prices. Due to the unwillingness of the incumbent supplier to claw back the market changing prices frequently resulted in 13% of connections to be realised at market prices and a 6% switch rate from incumbent to alternative suppliers in the first half of 2009. Lastly, as of 2012, twenty one U.S. states and District of Columbia have allowed residential and small consumers to switch from their traditional utility supplier to other providers and the participation level spanned from 0 to 100% with an active four to fourteen marketers between the states. The 2012 UNECE report showed that although 82% of customers were eligible for switch, barely 13.5% of which exercised the option.

2.6 Conclusion

Liberalisation of energy industries is frequently advocated by bodies like the International Energy Agency, World Bank and European Union as it is assumed to be necessary for the development of competition and to eliminate discrimination in gaining access to infrastructure and hence to protect final consumers. The purpose of this chapter was, accordingly, to understand the economic argument for liberalisation in the Turkish natural gas market (effective regulations- both on paper and on implementation) and how it can safeguard consumers from the obvious limitations that any private system of production and distribution of utilities would necessarily have mainly due to the nature of the market and the tendency for collusion among cartels.

The chapter began with a definition of natural monopoly and delineation of three theoretical perspectives within institutional literature (namely public choice theory, natural monopoly theory, and economic theory of regulation) to objectively gauge the underpinnings of two controversial approaches in order to be able to establish a level playing field to be built upon by the liberalisation research. From a natural monopoly standpoint, state owned vertically integrated monopolies as expounded and advocated by its extant apologists are strictly necessary due to the economies of scale and probable market failures if sectors are left alone whereas public choice theorists highlight latent threats of monopolies and attempts to refute the theory on the basis of rational behaviour of political actors who are self-interested utility (wealth) maximisers in the first place. They also model economic regulation as a direct result of a natural monopoly, in which every identifiable group contains winners and losers in terms of attainment of the political power relationships and hence regulators only maximise political support ensuring the reappointment or other index of job security postgovernment in exchange for benefit allocations to particular interest groups. This was explored further with a regulation versus deregulation analysis to assess the possibility of a so-called 'a new way forward' for natural gas markets with minimal government encumbrance. The literature was then reviewed on price regulations to capture the fragmented state of different pricing mechanisms used to regulate industries globally. It highlighted that scholars engaged in explaining merits and vices of each mechanism have embarked on a quest for more superior alternatives to PCR and ROR given the constraints of each option.
In the subsequent part of the chapter, the body of regulation literature that focuses on the dynamic evolution of monopolistic industries was reviewed. The review shows that there had been suggestions from scholars, prominently Chadwick (1859) and Demsetz (1968), that the introduction of competitive reforms for naturally monopolistic industries in various competition for market forms was rather feasible especially via 'franchise biddings auctions' without costly government intervention. This thesis responds to this and attempts to study the dynamic evolution of the Turkish natural gas market by analysing the monopolistic nature of the industry, the progress of franchise biddings auctions which has been used in the retail market for more than a decade now and what role the local gas distribution tenders indeed play with a brief summary of economic impacts provided. Such analysis is of great importance not only to provide a comprehensive insight into the Turkish retail market but also enabling us to weigh up the benefits and limitations of the franchise biddings and assess them for a more liberalised market. Vertical separation (unbundling) as a solution to the shortfalls in franchise biddings was then examined.

The Turkish government pays oil-linked prices for its gas imports and is the utiliser of cost-plus tariffs for its natural gas distribution. Thus the last part of the chapter attempted to study both the existing pricing mechanisms and prospective market-based pricing which Turkey is expected to adopt after the final implementation of the reforms. By doing this price analysis to see how market-based pricing could determine the Turkish wholesale and retail market prices, the thesis also aims to contribute to the scant knowledge which exists in the literature to date.

In broad terms, the review on existing liberalisation literature explores new institutional arrangements for energy markets that is believed will provide long-term benefits to society, to ensure a reasonable share of these benefits are passed on to consumers through market prices which reflect the efficient economic cost of gas and electricity supplies, and service quality attributes that echo consumer valuations²⁸. Therefore, there has been greater emphasis on how to design an innovative and comprehensive energy sector privatisation and restructuring, and simulation analysis of market power in the deregulated wholesale and retail gas markets under alternative market structures. At the same time there is an attempt to understand the impact of market-based prices in power industries in comparison to regulated prices. Simply put, despite the success of these

²⁸ See e.g. Joskow (2008).

reforms in the UK and the Nordic countries the solution for optimal liberalisation applying to all countries in all sectors, taking into account the collapse of California's wholesale electricity market and the bankruptcy of Britain's largest railroad company, often remains unclear and continues to be subject to heated debate. This necessitates more country specific analysis to determine whether competition should be introduced and if so, how, ensuring the right approach to foster lasting competition and efficiency given the very different circumstances of the countries and industries such as technological ability, resistance of incumbents, changing legal environment and market entry situations.

As has been stressed throughout the literature review, there has always been a great concern when transferring strategic public monopolies into private hands, and countries' willingness and even success in materialising reform programmes has been far more elusive. Therefore, there is a need to address how likely it is for individual countries to be able to demonstrate the standard textbook form of liberalisation (for example in this case, market opening, unbundling, third party access to upstream and downstream markets, adopting market-based prices, competition in gas supply to all end users)? In Chapters 5 and 6, two studies regarding the structure and governance of the Turkish gas industry and its liberalisation process in terms of what liberalisation has actually meant to Turkey, to what extent the country has managed to realise the gas market reforms and the GTM depending on the appropriateness of its governance structures and other characteristics are provided. Since there is no research that systematically analyses the dynamic evolution of natural gas market liberalisation of Turkey in greater depth, this research locates itself in the emerging category of comparative research within liberalisation literature. In that context, the research questions are outlined as:

- 1) What are the characteristics of the legal framework that has been created to ensure natural gas market liberalisation in Turkey and how effective is it?
- 2) How compliant is the legal framework in Turkey with the Gas Target Model of the European Union?
- 3) What are the major obstacles encountered by Turkey so far during its reform process and how should Turkey's progress towards liberalisation and competition proceed?

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The following methodology chapter adopts case study strategy and seeks to address these research questions. By pursuing case study research the aim is to pose extensive and more compelling evidence. Subsequently, Chapters 6 and 7 revisit these questions and discuss them in more detail based on the preceding findings from the analysis of the case studies (Chapters 5 and 6).

Chapter 3: Research Methodology

3.1 Introduction

This chapter delineates how the research has been designed and implemented. It is comprised of seven sections. The first section outlines qualitative research design and locates it within research methodology. The second section gives a description of the research purpose elaborating on the different stages in the process of qualitative research in relation to the research aims. Section three presents the choice and objectives of the data collection methods in a qualitative study (documentation, archival record and interviews), their design and implementation, followed by a discussion of how to ensure the validity, credibility and reliability of the findings in section four. The fifth section is a consideration of the ethics and access issues, and the sixth section concludes.

3.2 Research Design: Qualitative Method

This thesis uses qualitative research methods to address the issues previously identified. In seeking to extend and deepen the knowledge of the natural gas liberalisation process in general and the evolution of certain countries' experience in particular, qualitative methods permit a thick and detailed (Geertz, 1973) description of varied concepts providing the researcher with the appropriate tools to focus on the phenomena about which either little or much is known. Indeed, the flexibility as such equips the researcher not only to create new perspectives on already known issues but also to identify a number of different concepts or variables which might later be subject to quantitative validation (Saunders, 2014).

Contrary to the quantitative research which has been more positively received on the prevailing pretext of being more valid, reliable, generalisable and scientifically rigorous as Letherby and Bywaters (2007) state, qualitative research is a notably appropriate method when the recognition and analysis of different perspectives and the reflections of researchers and participants on the research as part of the process of knowledge production discovering and developing either new or empirically grounded theories is required (Flick, 2009). Continuing with Flick's own words:

"Unlike quantitative research, qualitative methods take the researcher's communication with the field and its members as an explicit part of knowledge instead of deeming it an intervening variable. The subjectivity of the researcher and of those being studied becomes part of the research process. Researchers' reflections on their actions and observations in the field, their impressions, irritations, feelings, and so on, become data in their own right, forming part of the interpretation, and are documented in research diaries or context protocols." (Flick, 2009, p.16)

With the emphasis of this thesis on how natural gas liberalisation has been implemented in Turkey and what challenges have hitherto been experienced in different segments of the market during this ongoing process, qualitative research offers a valuable and powerful method via interviewing technique to better understand the liberalisation issues where the respondents' understanding and weighing of the information gives the whole research project a real context. This also captures the complexities encountered by the respondents in real life. Of course, this raises validity and ethical issues but these concerns do not exclusively apply to qualitative research. The last section of the chapter offers explanations regarding how this study deals with validity concerns. The main focus of this thesis will be on whether or not the findings of this research could be generalised, and if so how.

3.3 Research purpose: Descriptive and Exploratory

The methodology of this thesis follows both a descriptive and an exploratory path. As a forerunner to exploratory research (Saunders, Lewis and Thornhill, 2012), the descriptive part of the thesis begins with a presentation of the liberalisation phenomenon in detail (Chapter 4) which is defined as a regulatory regime or a bundle of arrangements triggered by a process in the context of the European gas reform (Haase, 2008). It then continues with a comprehensive expose of how the Gas Target Model has developed between 2010-2015 and how divergently competition and wholesale market functioning have emerged in different countries. Furthermore, although the liberalisation reforms first entered the agenda of the EU as softly prescribed market design suggestions which eventually became mandatory regulatory instruments for the member states there is, needless to say, a considerable level of ambiguity concerning

how countries employ and implement these instruments to meet the provisions and what obstacles they encounter during this process given the characteristics of varying national gas markets (e.g. market size/structure, existing network and import structure etc.). In this context, exploratory research enables the researcher to design and execute a more systematic and extensive study to increase the understanding of the Turkish gas market evolution in the process of European gas market liberalisation (Chapter 5 and 6). This type of research, as Neuman (2014) stated, seldom yields any definitive answers but does address the 'what' questions.

Since the central questions of this research are "what are the characteristics of the legal framework that has been created to ensure natural gas market liberalisation in Turkey and how effective is it?"; "how compliant is the legal framework in Turkey with the Gas Target Model of the European Union?"; and "what are the major obstacles encountered by Turkey so far during its reform process and how should Turkey's progress towards liberalisation and competition proceed?" exploratory research provides this study with the necessary tools to revise the idiosyncratic facts of the Turkish gas market, to discover the already existing evidence and moreover to make analytical sense of it.

3.4 Methods of Data Collection

This thesis uses three different data collection techniques. Whilst documentation and archival records are foregrounded in the study as primary methods, (semi-structured) interviews are used to further conceptualise and deepen the understanding of the Turkish case, providing significant insights into key interviewees' views and opinions related to particular occurrences with the help of primary methods providing the context for interpretation. The overarching objective during the data collection process is to extensively explore the Turkish natural gas market and to illuminate its reform process by comparing and contrasting the rationales for liberalisation of other EU markets, and to enumerate the potential lessons for Turkey from those experiences. Since there is no single type of source that has a complete advantage over others, this study has tried to rely on as many sources as possible and treat each mode of data collection technique in a way that complements the use of one another.

3.4.1 Documentation

It is generally acknowledged that document (as unobtrusive measures) analysis is appropriate and useful for almost all types of research (Stake, 1995; Coffey and Atkinson, 1996; Simons, 2009). Within this scope, this study is initiated with a thorough review of the documentary evidence addressing what relevant documents already exist, are accurate, and readily available and accessible in the public domain. In order to construct a corpus of documents, both formal and informal document analyses which portray and enrich the context of 'natural gas market liberalisation' are exploited.

In essence, documents might take the form of an electronic file or text, and both formats are utilised in this research. For the Turkish case study, the running records such as actuarial records, political and judicial records (as distinguished by Gray, 2014) in addition to annual reports and sector evaluation studies are collected chiefly from the Ministry of Energy and Natural Resources (MENR), Energy Market Regulatory Authority (EMRA), Turkish Petroleum Corporation (TPAO), Petroleum Pipeline Corporation (BOTAS), OECD Annual Reports by Country, International Gas Union (IGU) and the U.S. Energy Information Administration (EIA) Country Analysis. Other administrative documents (as internal records and progress reports) are collected from Kibar Enegy, Shell, Bosphorus Gaz and Akfel, whilst Argus Media, Bloomberg News, Financial Times, LNG World News, Reuters, Zaman Daily, Caspian Forum, Gas Matters Monthly and Platts European Gas Reports have provided the news clippings and various relevant articles. A few seminal PhD theses pertinent to the research have also been consulted as a major lens through which the liberalisation efforts of various countries and the obstacles have been effectively portrayed.

3.4.2 Archival Records

Sharing an excessive similarity with the documentation method, archival records expose perhaps more quantitative and precise data. Examined in Yin (2014, p.109), the examples of archival records are divided into five categories as public use files and other statistical data which are made available by governments, service records, organisational records, maps and charts of the geographical characteristics of a place and lastly survey data produced by others regarding the participants or residents of the

study in question.

The cross-sectional dataset collected especially for Chapters 4-6, examined the European and Turkish natural gas market reforms and the GTM of the EU, and the concept of recent trends in both, is expected to be an overt illustration of archival records. They are gathered predominantly from multiple secondary data sources, and for Chapter 4 observations for European countries determined by their prominence in the sector and data availability are provided. In addition to the Turkish Statistical Institute (TURKSTAT) which has provided the most relevant case study specifics, the regional statistics are derived from the BP Statistical Reviews, Eurostat, the U.S. Energy Information Administration and the International Energy Agency as the main source. Frequently used maps of e.g. natural gas reserves, infrastructures and transmission systems and so forth throughout the thesis also show a comprehensive use of archival records.

3.4.3 Interviews

For Allport (1942), should something about people's activities are needed to be known the best way to find that out is to 'ask them'. Reiterating and strengthening this view, Brenner, Brown and Canter (1985) pointed out that "probably the central value of the interview as a research procedure is that it allows both parties to explore the meaning of the questions and answers involved. There is an implicit, or explicit sharing and/or negotiation of understanding in the interview situation which is not so central, and often not present, in other research procedures." Indeed for these very reasons, interviews as the third and distinctive part of primary data collection technique of this study are utilised to effectively and swiftly gain a more in-depth understanding of an individual's beliefs, lived experiences and the meaning they make of that experience (Seidman, 2013), and perhaps more importantly to be able to engage in dialogue with participants (Simons, 2009).

This thesis concentrates on the EU's Gas Target Model and the four main instruments of energy Directives, of which all member states follow at the discretion of the European framework regulation. It aims to critically review Turkey's progress towards natural gas liberalisation in order to explore why the completion of the reform process has been so prolonged in Turkey and also what the major challenges are which have prevented Turkey from the fulfillment of natural gas market liberalisation implementation. Allowing the research questions and preceding findings in the field to inform the interview process, there is a need to incorporate the informants' views and self-concepts into the process to ensure a better understanding and re-evaluation of the issues at hand. Given that the interviewees were chosen via purposive sampling (Miles and Huberman, 1994) with the aim to select individuals according to their (expected) level of new insights for the development of the theory in relation to the state of theory elaboration so far (Glaser and Strauss, 1967).

In doing so, twelve semi-structured interviews were conducted in Turkey during March-April 2016 with interviewees including policy makers from the Energy Market Regulatory Authority and members of private gas companies that have been allowed into the sector since 2005 (as discussed in Chapter 5). Members of the Petroleum Pipeline Company (BOTAS) were contacted to be interviewed but due to legal constraints interviewing BOTAS staff is subject to ministerial permission. Thus, they rejected the invitation to (officially) be part of this study. However, some questions were able to be asked to both current and ex BOTAS staff and their answers are provided in Chapter 7. With the emphasis of this thesis on how natural gas liberalisation has been implemented in Turkey and what challenges have hitherto been experienced in different segments of the market during this ongoing process, qualitative research offers a valuable and powerful method via interviewing technique to better understand the liberalisation issues where the respondents' understanding and weighing of the information give the research a real context. As Gray (2014) puts it, semi-structured interviewing enables both the interviewer to add additional questions (when necessary) that were not anticipated at the outset of the interview and for the respondents to simply expand their answers for better probing of views and opinions.

According to Wengraf (2001, p.5) "semi-structured interviews are designed to have a number of interviewer questions prepared in advance but such prepared questions are designed to be sufficiently open that the subsequent questions of the interviewer cannot be planned in advance but must be improvised in a careful and theorised way." Indeed, the views of informants from the Turkish Energy Market Regulatory Authority are expected to be particularly vital for the authenticity of this study given their task to operate a very large part of the regulation apparatus in the subject market with their

price setting power. Thus, asking those key individuals directly for their views about the real reasons why the liberalisation has so far been successful or unsuccessful in Turkey, why the differences in adoption of liberalisation model still persist amongst different segments of the Turkish gas market and what is the optimum way to proceed Turkey's progress towards liberalisation and the gas target model, will further illuminate the energy market liberalisation phenomenon and help to understand the mechanisms in which individuals and institutions interact. Some interviews with particular interviewees were held in two phases in an effort to make more sense of (or challenging) respondents' interpretation and experiences of liberalisation dynamics (e.g. Why certain events took place? Could it not be prevented? etc.) after a rigorous corroboration of the first round correspondence from other sources and contrary evidence.

No professional agencies or contacts are appointed for identification of the participants. Instead, an introductory letter combined with the research outline, the length of the proposed interview and possible locations for the interview were constructed by the researcher and sent to the prospective interviewees who were selected by the researcher²⁹. All interviews were conducted face-to-face and each took about two to two-and-a-half hours. They were digitally recorded, transcribed and on which thematic analysis has been carried out. The transcribed data was shared with the interviewees for approval to make sure the reporting of their perspectives tallied with their telling and their meaning. This, in a way, is referred to as respondent validation as extensively argued in Simons (2009).

3.5 The Quality of Research Design and Validation Issues

A research design is supposed to represent a logical set of statements and the quality of any given design can be judged according to certain logical tests as Yin (2009, p.40) puts it. Validity and reliability, in that framework, are salient concepts for assuring the quality and adequacy of findings. Since different scholars advocate different approaches and critisise alternatives as inferior regarding the existence or demise of validity in both quantitative and qualitative research, Maxwell (1992, p.284) states what seems to be a consensus amongst realists. Unlike positivists and instrumentalists, he argues that

²⁹ EMRA has provided a list of names (natural gas industry experts) to be interviewed.

validity is always dependent on some community of inquirers on whose perspective the account is based because understanding is relative.

Stake (1995) reminds us that qualitative researchers (case study in particular), who deal with a plethora of complex phenomena for which no consensus can be found as to what really exists, should not settle for a lower standard validation in their qualitative measurements and highlights the need of certain protocols and procedures to increase precision and accuracy criteria of validity. He draws particular attention to four systematic triangulation protocols, namely data sources, investigator, theory and methodological. In this study, however, some of the protocols of Norman Denzin (1970; 1989) -one of the pioneering authors most often cited in support of triangulation- have been incorporated formulations of triangulation modes to increment credence in thesis' interpretations and to demonstrate commonality of its assertions. This thesis attempts to compare, for instance:

- Documentary evidence with interview data and archival records data (*methodological triangulation*)
- Different levels of data i.e. individuals, institutions, government documents (*combined levels of triangulation*), and different opinions and self-interpretation from different respondents i.e. sector experts, policy makers and regulators etc.
- Different theories i.e. public choice and the economic theory of regulation *(theoretical triangulation)*

In this thesis, triangulation was concerned with production of knowledge on different levels via utilisation of different data sources, theories, methods and even researchers (this refers to a systematic comparison of different researchers not a simple division of labour, Flick (2009)) to ensure multiple voices and perspectives were involved in the contextualisation (Creswell, 1998). This has allowed determining whether the gas industry liberalisation phenomenon and its mode of execution both in Turkey and other EU members remained the same under different circumstances.

Below concisely explicates Maxwell's (1992) formulation of five validity issues which are also central to qualitative research and closely related to the types of understanding linked to it.

3.5.1 Descriptive Validity

Ensuring factual accuracy of the researcher's primary understanding or reportage (Runciman, 1983) and that they do not make up or distort things they have seen, heard or observed constitutes the essence of descriptive validity, not least on the primary aspect of validity. It is especially pertinent to interviewing during which the likelihood of mishearing, misremembering or mis-transcribing, say, a particular statement of an informant is high and should be kept at minimal if not zero. Framing descriptive validity in this way, this thesis has tried to establish it by providing the transcription of the interviews to the informants for an accuracy check of their content, statements and the timeframe of critical events they mentioned.

3.5.2 Interpretive Validity

Analogous to the descriptive type of validity, interpretive validity pertains strictly to participants' perspective of what objects, events, behaviours and so on mean to them. Since qualitative research is essentially an interpretive research (Simons, 2009; Gray, 2014) it is important that the researcher is aware of the significance of respondents' interpretations of accounts especially when those meanings are in question, interpretive validity concerns in such studies are inherently being dealt with. In this research this was assured by relying on the respondents' own words, timelines and concepts almost invariably, and again the respondents were involved in the transcription process to provide clarification especially when expressing the pivotal events needed.

3.5.3 Theoretical Validity

Whereas the two preceding validities are concerned with the accuracy of terms (not appropriateness) which characterise the phenomena, theoretical validity contrarily concentrates on the theoretical constructions the researcher brings, develops or tests during the study. Simply put, it checks the legitimacy of the application of a given theory against established facts or indeed whether any agreement can be reached regarding what the facts are (Maxwell, 1992, p.292). Theoretical validity shares a prime

similarity with what Yin (2009) describes as "construct validity³⁰" and for that three tactics are required to entrench a study's validity, namely usage of multiple sources of evidence, establishment of a chain of evidence and getting the (case) study report reviewed by key respondents. This research attempts to apply these tactics to rule out validity threats to its conclusions.

3.5.4 Generalisability

Generalisability (or transferability as termed by Walsh (2003, p.72)) is the extent to which one might extend the account of a specific situation (or study) to a range of situations or other settings. Notwithstanding its key purpose, however, many scholars argue that qualitative research suffers more than quantitative research from its susceptibility to generalisation issues. Whilst, for example, Thomson (2011) states that for qualitative research generalisability is problematic given that qualitative research is concerned with the concepts and idiosyncratic characteristics of a select group; therefore, the findings or theory may only applicable to a similar group (Auerbach and Silverman, 2003; Maxwell, 1992; and Strauss and Corbin, 1998 in Thomson (2011, p.79)) Denzin (1983) refuses to acknowledge the generalisation goal of qualitative researchers altogether. That said, Freeman et al. (2007, p.25) convey a sanguine view about the concept as they state "People unfamiliar with qualitative research assume that knowledge produced is not generalisable in the sense that it does not make what Kaplan (1964), a philosopher of science, called nomological generalisations, assertions that are "truly universal, unrestricted as to time and space . . . always and everywhere the case, provided only that the appropriate conditions are satisfied" (p. 91)."

For this thesis, given the current energy policy landscape in particular, it was thought to be more feasible to compare Turkey's case with other seminal cases around Europe to generate differences and highlight replications, and is aimed to elevate the research findings from particular towards the general.

3.5.5 Evaluative Validity

³⁰ Drawing on Yin (2009), Yazan (2015, p.146) summarises the ways to guarantee construct validity as through the triangulation of multiple sources of evidence, chains of evidence, and member checking.

The final validity measurement is evaluative validity or test of reliability (Maxwell, 1992; Yin, 2009). Any challenge to non-minimised errors and biases of the study that would yield different findings and conclusions if it were conducted all over again shifts the validity from descriptive, interpretive or theoretical to evaluative. Having materialised a richly documented research procedure via the use of case study protocol is one solution to this (Yin, 2009). Consequently, this study develops a basic protocol depicting the outlook and the design of interview schedules to ensure its credibility and fairness.

3.6 Ethical Concerns

This is a qualitative research and with its central emphasis on obtaining greater insights from policy makers and regulators themselves it seeks to critically review Turkey's progress toward natural gas market liberalisation since 2001, analyse the compliance of the legal framework of Turkey with the EU Directives and the GTM. Concerns about ethical issues in qualitative studies are, however, paramount. Whilst Orb, Eisenhauer and Wynaden (2001), Eysenbach and Till (2001), Sanjari et al. (2014) and Flick (2009) stress the significance of ethical behaviour in qualitative research, Birch, et al., (2012, p.8) rightly highlights that *"this is because of the impact of new information and apparently borderless, digital technologies on our daily lives and the ways in which these have now seeped into everyday life making the ethical dilemmas, and questions on right and wrong actions more visible and transparent, or contrarily, more invisible and fraught."*

To assure this research met ethical standards, several safeguards were laid out. The study has followed the code of ethics and received ethical approval by the Lord Ashcroft International Business School at Anglia Ruskin University. All respondents were sent and asked to sign a Participant Information Sheet (PIS) and a Participant Consent Form (PCF)³¹ in order to elucidate the purpose and procedure of the research, participants' role, risks and protection of data. All points concerning confidentiality and anonymity were made clear, and the respondents were given the option to withdraw from the research at any time without prejudice. The data access was only available to

³¹ See Appendices A and B for the PIS and PCF, respectively.

the researcher in password-protected files and the supervisors were provided with access to the information in various drafts wherein the identities were kept anonymous. Despite the identity anonymity however, the respondents' workplaces have been occasionally identified to put it into the specific context.

3.7 Conclusion

The methodological approach adopted in this research has allowed an in-depth understanding of the liberalisation phenomenon (Chapter 4) and paved the way to analyse how the EU countries employ and implement European regulatory instruments given the characteristics of varying national gas markets. Adaption of descriptive and exploratory research has enabled us to design and execute a systematic study to increase the understanding of the Turkish gas market evolution in the process of European gas market liberalisation (Chapter 5 and 6).

The study began with the collection of multiple sources of data -documentation and archival records- in order to extensively explore Turkish natural gas market and to illuminate its reform process by comparing and contrasting the rationales for liberalisation to other EU markets. Further analysis suggested that the incorporation of views and self-concepts of decision-makers and regulators at different hierarchical levels into the process was needed to explore and re-evaluate why the completion of the reform process in Turkey has been so prolonged, how Turkey's progress towards liberalisation and competition should proceed, and what lessons Turkey can learn from other experiences. The outcomes of the interviews are discussed in Chapter 7.

The methodology developed in this study ensured that every effort was made to capture perceptions in the best possible way, so that the captured data does reflect reality as acknowledged in Mendas (2010), and putting the methodological notes aside the next chapter provides a systematic investigation of natural gas market liberalisation from the European perspective and its categories: the EU natural gas Directives and mandatory legal instruments, and the Gas Target Model.

Chapter 4: Natural Gas Market Liberalisation in the Context of the European Union

4.1 Introduction

In line with the assumption of a 3.6% annual rate of growth in world GDP, the International Energy Agency envisages an increment of 1.8 billion in population by 2035 translating into an ever-increasing energy demand for energy sources (IEA, 2010, p.46). The consensus in favour of keeping the EU's competitive advantage amongst other growing economies around the globe has been the basis for creating a fully functioning and competitive internal gas (and electricity) market via which the EU can ideally create an adequate framework for securing supplies, add an extra 0.6%-0.8% to its GDP by 2020, create employment and downscale inflation as the European Commission (2013, p.1) argued. For this, reformative transformation of the EU gas market with the onset of consecutive energy Directives since 1998 has been ongoing and the EU has already managed to outline for its members the permissible ownership changes (not least for vertically integrated natural monopolies), industry restructurings and non-discriminatory access of third parties to gas networks. Coupled with its GTM in 2010, the EU has kindled the discussion of more advanced topics such as how market concentration and vertical foreclosures in gas markets can be thwarted; how lack of market integration, transparency and regulatory oversight for cross border issues can be dissipated; and how a harmonised balancing markets and price formations can be founded.

This chapter first discusses natural gas market liberalisation in the context of the EU and provides the role of 1st, 2nd and 3rd energy Directives in it. By this it aims to depict the European regulatory framework and to address what the instruments of the EU gas regulations have tried to achieve with a hope, in turn, to draw some parallels between the developments in the EU and Turkey. Secondly, the liberalisation debate is taken a step further by describing the GTM of the EU and analysing how the EU plans to move Europe from its fragmented state into an integrated gas market into which Turkey strives to enter.

The chapter begins with a presentation of the EU's three energy Directives with the

focus on the mandatory instruments namely market opening, energy regulatory authority, unbundling, and third party access. Section two extends the basis of institutional analysis to GTM and the three major pillars it is fundamentally based on (i.e. enabling well-functioning wholesale markets; connecting them; and ensuring secure supply and economic investment). An updated version of the GTM from 2013 onwards ("New GTM") is delineated in section three, and finally the chapter is concluded with section four.

4.2 Natural Gas Liberalisation in the Context of the European Union

According to Cameron (2007) there a number of prerequisites for the introduction of liberalisation and competition into gas markets which include changes in the legal and institutional framework of regulation in order to ensure non-discriminatory access by third parties, industry restructuring, and ownership changes especially where the industry has been vertically integrated or highly concentrated horizontally. The EU started the process of transforming the gas market structures with its First Energy Directive (Dir. 1998/30/EC) in 1998³² which concerned common rules for the internal market in natural gas. This continued with the Second Directive (Dir. 2003/55/EC), Regulation 1775/2005 and the final Third Energy Package³³ of 2009.

In a nutshell, the 1st Directive introduced the concept of competition and common rules, based on non-discriminatory rights to build new gas infrastructure facilities, fair and transparent access to the gas transportation and storage systems, and the unbundling of internal accounts, to govern the EU gas markets (ITC, 2001). A series of benchmarking and EC Inform-Energy reports showed that liberalisation faced significant opposition across Europe (e.g. Germany, France, Luxembourg). Competition performance was disappointing and issues such as barriers to cross-border trade, the impact of derogations due to take-or-pay arrangements on the introduction of effective third party

³² Entry into force and the date of transposition were 10/08/1998 and 10/08/2000, respectively.

³³ The 3rd Energy Package is a combination of five legislative texts comprising two Directives and three Regulations of 13 July 2009: Directive 2009/73/EC concerning common rules for the internal market in natural gas; Directive 2009/72/EC concerning common rules for the internal market in electricity; Regulation (EC) No 713/2009 establishing an Agency for the Cooperation of Energy Regulators; Regulation (EC) No 714/2009 on conditions for access to the network for cross-border exchanges in electricity and Regulation (EC) NO 715/2009 on condition for access on conditions for access to the natural gas transmission networks (CEER, 2011a, p.6).

access with lacking relevant insights or propositions were alarming (Haase, 2008). The 2^{nd} Directive came into effect on 26 June 2003 in a context that displayed an arguably faster and more complete liberalisation of gas sector for the EU. The radical shifts it envisaged were in areas such as market functioning, non-discriminatory transmission and distribution tariffs, and the rights of small and vulnerable customers. However, the impact of the 2^{nd} Directive upon the functioning of the European gas markets especially in terms of market opening, removing barriers to free competition and to new entrants remained limited too. As a result of this, the EC launched the 'DG Competition Report on Energy Sector Inquiry³⁴' in January 2007, a seminal paper focused on identifying areas where competition lacked (of functioning) and called for urgent action for the liberalisation to yield useful results in the public interest instead of describing how well the liberalisation process had grown in both breadth and depth across Europe.

Indeed, contributions to the inquiry constituted the foundations of the 3rd Package and the subsequent GTM which have both aimed to address the issues faced by the EU gas markets namely i) market concentration/market power; ii) vertical foreclosure (chiefly inadequate unbundling of network and supply); iii) lack of market integration and lack of regulatory oversight for cross border issues; iv) lack of transparency; v) price formation; vi) downstream markets; vii) balancing markets; and viii) liquefied natural gas (LNG) (EC Competition DG, 2007).

The following sections address a number of areas that are expected to provide precursory foundations for the examination of the Turkish natural gas market and the Turkish Natural Gas Market Law (NGML No. 4646) in Chapters 5 and 6. The first aspect examined is what the mandatory instruments of the EU natural gas regulations are and what they try to achieve. Next, the broader aim to create an internal gas market which bore the idea of the GTM is described together with comments and proposals of the Council of European Energy Regulators (CEER), the Agency for the Cooperation of Energy Regulators (ACER), stakeholders and market participants. The attempts to diminish the enormity of divergences in member states' gas trade patterns, access to transport capacities, tariffs structures and the use of long-distance networks by reference to the GTM are also analysed.

³⁴ The Article 17 of the Council Regulation (EC) 1/2003 gave the Commission a power of investigation to conduct inquiries into particular sectors and particular agreements associated with those sectors by requesting the undertakings and the respective associations to provide the Commission with necessary information (Regulation 1/2003, Chapter V, Art. 17).

4.2.1 Regulatory Regimes: The EU Natural Gas Directives and Mandatory Instruments

4.2.1.1 Market Opening

The EU Gas Directives have brought 'market opening' into being via obliging the member states to firstly designate eligible customers inside their territories, in the categories of:

i) Gas-fired power generators (irrespective from their annual consumption level); and

ii) Other final customers consuming more than 25 million cubic metres³⁵ (mcm) of gas per year on a consumption site basis (Dir. 1998/30/EC, Art. 18(2))

in order to facilitate the opening. The 1st Directive foresaw retail market opening in three phases (20% by August 2000, 28% by August 2003, and 33% by August 2008) prescribing the member states to ensure that the first phase allowed power generators and other retail customers consuming more than 25 mcm to choose their gas suppliers, the second phase extended market opening to all consumers of more than 15 mcm per year, and the third phase offered choice to all consumers of more than 5 mcm (ITC, 2001; EC, 2000). Additionally, the member states were given the flexibility within the Commission's knowledge to introduce "*a threshold, which may not exceed the level envisaged for other final customers, to safeguard the balance of their electricity market for the eligibility of combined heat and power producers*" (Dir. 1998/30/EC, Art. 18(2)).

With a good implementation response from the members, the 2^{nd} Directive expanded the consumer switching from designated eligible customers to all customers including residential to be effective from 1 July 2007 and linked the opening-up of the market directly to service quality, consumer protection and security of supply objectives (Dir. 2003/55/EC, Art. 3, 23 (1)). Whilst the definition of eligible customers outlined by the 2^{nd} Directive remained unchanged, the new measures the 3^{rd} Directive introduced have been primarily about establishing a timeline for the switching procedure and avoiding

³⁵ The 25 mcm threshold was envisaged to be reduced to 15 mcm in 2003 and 5 mcm in 2008 (Art. 6).

an imbalance in the opening of the gas markets, obliging the member states to ensure that:

- where a customer, while respecting the contractual conditions, wishes to change supplier, the change is effected by the operator(s) concerned within three weeks; and customers are entitled to receive all relevant consumption data (Dir. 2009/73/EC, Art. 6(a, b)).
- contracts for the supply with an eligible customer in the system of another Member State shall not be prohibited if the customer is eligible in both systems involved (Art. 37(2a)).
- where transactions as described in point (2a) are refused because the customer is eligible in only one of the two systems, the Commission may, taking into account the situation in the market and the common interest, oblige the refusing party to execute the requested supply, at the request of one of the Member States of the two systems (Art. 37(2b)).

4.2.1.2 National Energy Regulatory Authority

There was no mention of establishing separate and independent national regulatory authorities (NRAs) in the 1st Directive apart from providing member states with some guidance to designate a competent authority in order to settle disputes concerning negotiations and refusal of access to the national gas network. The main criteria the dispute settlement authority needed to fulfill in terms of cross-border disputes was to consult with other competent authorities concerned with the system elsewhere and settle the dispute together according to the Directive's other provisions (Dir. 1998/30/EC, Art. 21(2,3)). The 2^{nd} Directive on the other hand specifically required member states to establish one or more competent bodies with the function of regulatory authorities (Dir. 2003/55/EC, Art. 25(1)). Although determination of the functions, competencies and administrative power of these authorities were at the discretion of the member states (at least the same minimum set of competences were expected to be shared in all member states), the utmost importance was given to the independence of these authorities from the interests of the gas industry. The Directive did not require, however, a complete separation of the regulators from the existing government structures and so the relevant ministries were given the right to accept or reject the regulators' decisions with the exception of making amendments on them (EC, 2004a).

Whilst the 2nd Directive added more duties to the regulators' core responsibilities (e.g. licensing market activities, fixing and approving tariffs for network and balancing services etc.), their lack of authority to ensure non-discrimination, effective competition and the efficient functioning of markets was a matter of particular concern. Hence, the regulators were provided with an extensive and overt role to monitor (and intervene when necessary):

- the rules on the management and allocation of interconnection capacity
- the mechanisms to deal with congested capacity within the national system
- the time taken by transmission and distribution undertakings to make connections and repairs
- the publication of appropriate information by transmission and distribution system operators (TSOs and DSOs) concerning interconnectors
- the effective unbundling of accounts to avoid cross subsidies and the unbundling compliance programme
- connecting new producers
- the access conditions to storage, linepack and to other ancillary services
- the overall compliance of TSOs and DSOs with the Directive
- the level of transparency and competition (Dir. 2003/55/EC, Art. 25(3,4); EC, 2004a, p.2)

In the 3rd Directive, the lack of independence for regulators from governments, and their insufficient powers and discretion are highlighted, alternative proposals have been developed to provide further strengthening of the national regulators' impartiality and harmonisation of powers by granting them extra:

- power to issue binding decisions in relation to natural gas undertakings, and to impose effective, proportionate and dissuasive penalties on natural gas undertakings which fail to comply with their obligations
- power to decide, irrespective of the application of competition rules, on appropriate measures ensuring customer benefits through the promotion of effective competition necessary for the proper functioning of the internal market in natural gas
- rights to establish gas-release programmes to promote effective competition and

proper functioning of gas markets

• power to contribute to ensuring high standards of public service in compliance with market opening, to the protection of vulnerable customers, and to the full effectiveness of consumer protection measures (OJ L211, p.94)

Most important of all, what the 3rd Package tries to ensure is that the national role of energy regulators are taken to the EU level. For this, both the Council of European Energy Regulators and the Agency for the Cooperation of Energy Regulators have been created overtaking the European Regulators Group for Electricity and Gas (ERGEG) which was an advisory group set up by the Commission Decision on 11 November 2003 to consolidate a single EU gas and electricity market and to monitor the implementation of the good practice of gas storage system operators (ERGEG, 2005, p.2). Predictably, the foundation of ACER has also been significant also because it has approved the regulatory inertia and validated the fact that national regulatory authorities were not able to sufficiently cope with the tasks of regulation outside their national zones let alone at the EU level. Thus, ACER has been fully equipped with special expertise on technical issues to deal with cross-border disputes when an agreement on how to regulate cross-border energy infrastructure cannot be reached by national regulators.

Drafting Framework Guidelines (FG) in various areas for action, which are to be turned into binding EU-wide Network Codes (NC)³⁶ for the operation of cross-border gas pipelines, is perhaps the most striking task ACER has been tasked with. The Codes according to Bartok (2010 cited in Yafimava, 2013, p.4)) include an extensive list of rules for capacity allocation and congestion management; balancing; interoperability; network connection; security and reliability; data exchange and settlement; transparency, harmonised transmission tariff structures; third party access; trading; energy efficiency regarding gas networks and lastly operational procedures in an emergency. Some of these NCs are discussed in the GTM section of the chapter.

³⁶ As a first step in the process, the European Commission establishes a priority list of issues to be tackled annually. It then requests ACER, for each topic, to develop non-binding Framework Guidelines within a six months period of time. Following the adoption of the Framework Guidelines by ACER, the European Network of Transmission System Operators for Gas (ENTSO-G) is invited by the EC to develop, on the basis of the FGs, the relevant NC within 12 months, and submit them to ACER. It has 3 months to deliver an opinion, which assesses the alignment between the FGs and the NC. Once the alignment is approved, ACER submits it to the EC with a recommendation for its adoption in comitology. For a fuller discussion of this, see

http://www.acer.europa.eu/Gas/Framework%20guidelines_and_network%20codes/Pages/default.aspx.

4.2.1.3 Unbundling

As has been seen in Chapter 2, the economics of regulation literature depict the potential conflict of interest if, say, both the network owners and operators are to extract monopoly rents allowing both players to involve in generation or supply phases. As the supply chain of gas markets are potentially competitive and transmission and distribution stages are naturally monopolistic, there is always a concern that the customer might be charged any amount the monopolist wishes for network access (Cameron, 2007). Thus, non-discrimination and fair tariffs being the main drivers of the European Commission, a solution of 'unbundling or vertical separation' has been introduced via gas Directives.

Figure 2. Vertically Integrated Company in Gas Markets



Source: Corbeau, et al., (2012), p.37

There are four main forms of unbundling as listed in Conte and Irlam (2005):

- 1. Accounting is the weakest form of unbundling and involves the preparation of separate accounts for different segments of the vertically integrated business that may be subject to public officials' audition and scrutiny.
- 2. Functional (or management) unbundling involves the creation of separate accounts and exhibits the use of commercially sensitive information (that is transferred across business segments but is not available to the market) by the integrated business to gain competitive advantage. This, in practice, requires definition of employee roles and the creation of codes of conduct.
- 3. **Legal** unbundling requires individual management and decision-making structures for each segment of the business whilst a single department can still make some broad financial decisions such as budget allocations.
- 4. **Ownership** unbundling translates into a complete legal and operational separation with no common ownership at all.

The 1st directive solely required member states to publish the accounts of natural gas

undertakings (regardless of their system of ownership or legal form) but did not shed light on the issues of legal or management unbundling which constituted mainly the subject matter of the 2nd Directive. The only reference was made, instead, to the separation of accounts as "Integrated natural gas undertakings shall, in their internal accounting, keep separate accounts for their natural gas transmission, distribution and storage activities, and, where appropriate, consolidated accounts for non-gas activities, as they would be required to do if the activities in question were carried out by separate undertakings, with a view to avoiding discrimination, cross-subsidisation and distortion of competition. These internal accounts shall include a balance sheet and a profit and loss account for each activity" (Dir. 1998/30/EC, Art. 13(3)).

Strong provisions of the 2nd Directive subsequently obliged the vertical separation of DSOs and TSOs. By obliging the operators to establish a compliance programme to ensure thereby that discriminatory conduct was excluded, the Directive, revealed three types of unbundling namely, legal, functional and accounting (EC, 2004b).

	Accounting	Functional	Legal	Ownership
Distribution, less than 100,000 customers	Obligatory	Exemption possible	Exemption possible (until 1.7.2007)	No requirement
Distribution, more than 100,000 customers	Obligatory	Obligatory	Obligatory	No requirement
Transmission	Obligatory	Obligatory	Obligatory	No requirement
Storage	Obligatory	No requirement	No requirement	No requirement
LNG	Obligatory	No requirement	No requirement	No requirement

 Table 1. Unbundling Requirements of the 2nd Directive

Source: Conte and Irlam (2005), p.11; EC (2004b), p. 21

The phenomenon of vertically integrated gas undertakings goes hand-in-hand with network businesses which are at the same time involved in generation and supply of the gas and all their network operations are done within the same legal structure. Through the legal and functional unbundling requirements, the 2nd Directive thus aimed to first separate the TSOs and DSOs from all other activities not related to transmission and distribution, and second to ensure the independence of these operators from the vertically integrated parent company. That is, whilst a separate company only concerns the network business and the management staff of that network business do not work simultaneously for the production and supply segments of the parent company, all other

activities can continue to be operated in one single company. Additionally the separation of TSOs and DSOs from each other could be materialised via unbundling of the accounts (EC, 2004b).

The Directive permitted, however, two exemptions to the unbundling provisions and implementation deadlines first to those states whose DSOs served less than 100,000 customers to be exempted from the legal and management unbundling requirements (Art. 13) and the second to allow all members a delaying option for the implementation of legal unbundling of DSOs until 1 July 2007 (i.e. the date of full market opening) instead of 1 July 2004.

The primary goal of competition in industries like gas is to remove the incentive for vertically integrated undertakings to discriminate against competitors as regards to access to the network, commercially relevant information and investments in the network. The next question, which concerned what kind of model(s) should be adopted to provide for different degrees of structural separation of network operation from production and supply activities, were answered with the 3rd Directive. Repealing the 2nd Directive, the new Directive stressed that the rules on legal and functional unbundling as provided for by its predecessor did not led to effective unbundling of the TSOs and so the risk of discrimination in network businesses was introduced and re-unbundling of the TSOs and DSOs were mandated (Figure 3).



Figure 3. Unbundling Options under the 3rd Energy Package

Source: Corbeau, et al., (2012), p.52

In terms of unbundling for TSOs, the new Directive provided three optional models each offering various degrees of structural separation of network operations from production and supply activities and one common goal to effectively remove the conflict of interests between producers, suppliers and TSOs, and to create incentives for the necessary investments (EC, 2010). The first model the member states could opt for is *the ownership unbundling model* and according to which:

- (a) owner of a transmission system can act as a TSO;
- (b) same person cannot exercise control over a production/supply company and at the same time exercise control or any right over a transmission system, and vice versa;
- (c) same person cannot appoint board members of a TSO and exercise control or any right over a production/supply company; and
- (d) same person cannot be a member of the board of a TSO and of a production/supply company (Dir. 2009/73/EC Art. 9 (1,2); Bel, 2011)

It is discussed in the EC (2010) that if these rules are applied to both private and public entities, and say two separate public bodies are seen as two distinct persons, the common influence in violation of the rules of one over another would be minimised.

This being the case, the report continued, two entities could be in a position to control generation and supply activities separately from the transmission activities. Simply put, each undertaking that owns a transmission system is required to act as a TSO and will be responsible, inter alia, for granting and managing third-party access on a non-discriminatory basis to system users, collecting access charges (including congestion) and payments under the inter-TSO compensation mechanism, and maintaining and developing the network system. In terms of investments, the owner of the transmission system will be responsible for ensuring the long-term ability of the system to meet reasonable demand through investment planning (EC, 2010).

The second model, establishing an '*independent system operator (ISO)*' is an alternative option for the member states who do not wish to opt for the radical ownership unbundling. Whilst the transmission system remains with the vertically integrated company, technical and commercial operations of the system are performed by an ISO which, in essence, acts as a TSO and is given a strong say in investment planning (Bel, 2011). The regulatory authorities undertake perhaps the most vital roles as to monitor the compliance of both the ISO and the transmission system owner- who is legally and functionally unbundled-, the relations and communications between them, ensuring the collection of network access tariffs by the ISO including the remuneration for the network owner (EC, 2010, p.9-10).

The last available model is the *'independent transmission operator (ITO)'* and it requires an absolute independence from the vertically integrated company with respect to decision-making rights. Under this model, the TSO may remain part of a vertically integrated undertaking however a number of rules are provided in order to ensure effective unbundling. Thus the ITOs must:

- be autonomous;
- own certain assets, the personnel and the financial resources that are necessary for fulfilling the tasks and obligations;
- employ a sufficient number of qualified staff members to handle day-to-day core activities;
- have effective decision-making rights, independent from any other part of the vertically integrated undertaking, with respect to assets necessary to operate, maintain and develop the transmission system;

- have the power to raise money on the capital market; and
- ITOs are not allowed to share IT systems or equipment, physical premises and security access systems with any other part of the vertically integrated undertaking (Art. 17,18; EC, 2010)

For the unbundling regime of a DSO that is also part of a vertically integrated undertaking, legal, functional and ownership unbundling options are offered to the member states and the DSOs are expected to be independent at least in terms of its legal form, organisation and decision-making from other activities not relating to distribution. To prevent DSOs from taking advantage of their vertical integration as regards to their competitive position on the market, not least in relation to household and small non-household customers, the 3rd Package calls for careful monitoring of progress in DSOs. The monitoring strictly encapsulates the branding and communication tools of vertically integrated DSOs to prevent potential confusions over the parent companies' separate identity of the supply branch. Whilst ownership unbundling has been discretionary, the states that serve less than 100,000 customers are allowed to be exempt from the unbundling requirements (Art. 26).

Finally, the storage operators are envisaged to operate through legally separate entities that have effective decision-making rights with respect to assets necessary to maintain, operate and develop storage facilities (OJ L211, p.96).

4.2.1.4 Third Party Access

Third party access (TPA) to natural gas networks is one of the curial issues faced by countries working for effective energy market reform especially in terms of wholesale pricing. Greater clarity is needed in the downstream area of markets as regards to incentives to be given to domestic producers and for the creation of competition at the large customer level. Due to the absence of an appropriate roadmap and a rigid implementation motive, the effectiveness of the 1st Directive of TPA remained shallow, and its terms and conditions for the organisation of access to the system did not go beyond a recommendation of two types of TPA to the member states, namely negotiated

(nTPA)³⁷ and regulated (rTPA)³⁸. Whilst right of access to the system under the former TPA was simply based on negotiation in good faith, the rights for the latter were obtained on the basis of published tariffs and/or other terms and obligations (Dir. 1998/30/EC, Art. 15(1), 16). Surprisingly, the Directive received a strong resistance from vertically integrated incumbents, who already function as transport operators, to open their grids to other firms and to gain market shares (Haase, 2008) even though Article 17 clearly made the refusal of network access for both nTPA and rTPA possible:

"Natural gas undertakings may refuse access to the system on the basis of lack of capacity or where the access to the system would prevent them from carrying out the public-service obligations referred to in Article 3(2) which are assigned to them or on the basis of serious economic and financial difficulties with take-or-pay contracts having regard to the criteria and procedures set out in Article 25 and the alternative chosen by the Member State according to paragraph 1 of that Article. Duly substantiated reasons shall be given for such a refusal" (Dir. 1998/30/EC, Art. 17(1)).

This very clause according to the Energy Sector Inquiry (2005) of EC begot many complaints made by a number of market participants simply due to the exploitation of incumbent players in terms of capacity reservations and available secondary capacity relating to the main transit routes in Europe. In practice, companies would simply request capacity from incumbents to flow their gas in the pipelines but the report revealed that major pipelines were either fully booked³⁹ or secondary capacity was hardly available for the new entrants⁴⁰. Given those facts, the 2nd Directive introduced more radical terms and abolished the nTPA altogether. In line with the complementary

³⁷ In the case of negotiated access, Member States shall take the necessary measures for natural gas undertakings and eligible customers either inside or outside the territory covered by the interconnected system to be able to negotiate access to the system so as to conclude supply contracts with each other on the basis of voluntary commercial agreements. (Dir. 1998/30/EC, Art. 15(1)).

³⁸ For the regulated access, members shall take the necessary measures to give natural gas undertakings and eligible customers either inside or outside the territory covered by the interconnected system a right of access to the system. This right of access for eligible customers may be given by enabling them to enter into supply contracts with competing natural gas undertakings other than the owner and/or operator of the system or a related undertaking (ibid, Art. 16).

³⁹ For example, the primary capacity on Benelux-Italy axis was booked until 2022 in other words the TPA was exempted for the next seventeen years (EC, 2005, p.19)

⁴⁰ E.g. when capacity was allocated on the secondary market roughly half of it was being bought by affiliates of the primary capacity owners whilst important part of the secondary allocation was going to other incumbents and gas producers making barely 5% of longer term capacity available to new entrants (ibid, p.20)

Gas Regulation (EC) 1775/2005⁴¹, the Directive obliged TSOs to offer their services to all network users especially:

"[...] a transmission system operator offers the same service to different customers, it shall do so under equivalent contractual terms and conditions, either using harmonised transportation contracts or a common network code approved by the competent authority" (Regulation No 1775, Art. 4(1a)).

The capacity issues caused by the preceding regime were also dealt with in Regulation 1775 and TSOs were given an exclusive right to offer unused capacity to other parties at least on a day-ahead and interruptible basis (Article 5 (3a)). It also put the tariff methodologies into legal text leaving the determination of tariffs at the discretion of the member states via market-based arrangements (e.g. auctions approved by the NRAs). The TPA to storage facilities was also a subject of the 2nd Directive given its vital importance for gas suppliers to manage the seasonal fluctuations. The states were provided with the choice of negotiated and/or regulated TPA to storage facilities, line-pack⁴² and other ancillary services to be chosen by their regulatory authority. For the rTPA, the access right to storage and line-pack were given to natural gas undertakings and eligible customers on the basis of published tariffs⁴³ and/or other terms and obligations (Dir. 2003/55/EC, Art. 19(4)) whilst for the nTPA:

"Member States shall require storage system operators and natural gas undertakings to publish their main commercial conditions for the use of storage, line-pack and other ancillary services within the first six months following implementation of this Directive and on an annual basis every year thereafter" (Art. 19(3)).

Perhaps the most striking note on the 2nd Directive, notwithstanding all specified terms and conditions above, was Article 22 which allowed, upon request, the full and partial exemption of major new gas infrastructures (such as interconnectors, LNG and storage facilities) and significant increases of capacity in existing infrastructure from TPA and cost regulation obligations. Corbeau, et al., (2012) explain the rationale behind the

⁴¹ Regulation No.1775 came into effect on 28 September 2005 to provide technical rules regarding TPA services, principles of capacity allocation mechanisms, congestion management procedures and transparency requirements (Recital 1).

⁴² Line-pack is a technique known as storing gas in above-LNG facilities (Cameron, 2007, p.25).

⁴³ Tariff calculation was regulated to be base on actual costs, appropriate rate on investments and incentives to construct new infrastructure (Corbeau, et al., 2012).

Article as a risk mitigation move for the infrastructure which was according to EC (2009) essential for the integral market and effective competition. Predictably, the 3rd Directive has followed the same route. It currently allows refusal of access to existing and major new infrastructure and postulates the NRAs to, on a case-by-case basis, decide on the exemptions (Art. 35; 36). It does not however provide any specific criteria in terms of financial and volumetric characteristics for a new project to be referred to as 'major' for granting exemption and Yafimava (2013) argues that the high degree of EC discretion in these matters may naturally result in costly problems on deciding a project's fitness for the list of liable categories of infrastructure and their added value to the EU supply.

Besides, Regulation No 715/2009 requires TSOs and storage and LNG operators to offer network users both firm and interruptible TPA services on long and short-term basis, and make relevant information, especially data on the use and availability services, public (Art. 14,15).

Amongst other things, Regulation 715/2009 specifies that TSOs must adopt "Entry-Exit (E/E) systems" as a network access model which is to create gas transport through zones instead of along contractual paths by allowing network users to book capacity rights independently at entry and exit points (Recital 19; Art. 13; DNV KEMA (2013)). Written by the order of the European Commission, the DNV KEMA report characterises the full E/E system by four features namely i) entry and exit capacities that can be contracted separately by network users; ii) free allocability of capacities meaning that gas brought into the system at any entry point can be made available for off-take at any exit point within the system; iii) virtual trading points which is needed by the E/E system for the tradability of gas independently of its location so that the shippers can bilaterally transfer the title of gas and/or swap their imbalances; and finally iv) inclusion of distribution level meaning that both TSOs and DSOs can deal with capacity and connection related issues at their interconnection points i.e. city gates (p.5). Although, at first sight, the E/E systems seem to provide an adequate basis for a harmonised system of European TSO network codes Glachant (2011, p.5) drew attention to the difficulty of implementing such systems without a comprehensive vision especially given the inevitable fact that all countries, policy makers and stakeholders were to interpret and implement the 3rd Package provisions in a different way or work on different strands of implementation that can actually contradict each other. To prevent this, he suggested, a target model which could play a beneficial role for shaping the future of internal gas market and unifying the visions for, was due.

The following section delves into the details of the Gas Target Model launched by the Council of European Energy Regulators (CEER) in 2010 to give the high level vision the 3rd Package needed and to provide the roadmap for the European gas market design over the next decade.

4.3 The Gas Target Model

Creating a single European energy market is not a relatively new idea located at the interface between economic and political facts of Europe. In concert with the provision of the 3rd Energy Package, it was the 18th Madrid Forum that gave rise to the emergence of an integrated and competitive European gas market in September 2010. Probably the most important accomplishment of the 3rd Package has been the demonstration that a problem of vertical integration of supply, generation and infrastructure would lead to a lack of equal access and insufficient investment and most importantly the possibility of collusion between incumbent operators as both Moselle and White (2011) and EC (2007) highlighted. To exemplify, both reports argued, that if incumbent gas utilities which control most of the gas present on the national markets hoard capacity on gas pipelines by signing contracts for most or all of the available capacity on cross-border pipelines, then new entrants would have literally no chance to either use the pipeline for their gas importation or compete with the incumbent with their relatively small volume of gas, never mind the congestion this situation would create on the interconnectors. Worse still, with the help of non-burgeoning wholesale markets with stodgy liquidity, the process could be extended to accommodate a wide variety of wrong price signals and inadequate remuneration for investments (Moselle and White, 2011, p.1; EC, 2007, p.47).

The GTM is a conceptual model -or a structural framework- that aims to help the emergence of functioning markets given that natural gas will continue playing its crucial role in Europe not only as a source of energy but also as feedstock (CEER, 2011c). To give the high level vision the 3rd Package needed since no notification of full implementation was received from any EU members and due to the existence of

critically intertwined issues which would potentially form a destructive roof over the gas markets (CEER, 2011a), the EC, ACER and CEER collectively drafted the GTM after a series of stakeholder meetings, roundtables and public consultations. The first GTM workshop was launched in Vienna in December 2010 by CEER and it was concluded that the EU had national markets designed differently with very low market integration and high price differentiation between them. Unless the issues such as (i) effective implementation of entry/exit systems; (ii) efficient capacity allocation procedures; (iii) efficient usage of pipeline capacity reducing the physical and contractual congestions for cross-border flows; (iv) improving the integration of trading points (convergence of market prices, reflecting market risks and supply/demand imbalances); (v) connected and well-functioning wholesale markets in all of Europe; (vi) improving security of supply with appropriate capacity enhancements to infrastructure; and (vii) upstream investments were widely discussed with all stakeholders and all work streams fitted together, the vision for the European gas market design over the next decade would be blurred (Boltz, 2010, p.5-6).



Figure 4. The 3rd Package and the GTM Interacting Instruments

Source: Boltz (2010), p.4

As expected, the CEER's vision for the European GTM has moved on from its early beginnings and the first draft vision for a European GTM that outlined the key elements to help achieve an internal gas market was launched for public consultation⁴⁴ in July 2011. For sustainable national gas markets and thus a sustainable single European gas market, three pillars were contemplated for the GTM to be based on. Before looking to how the final cornerstones of the GTM have been set up in 2015 and what the members'

⁴⁴ See Appendix C for Questions for Public Consultation.

states of play are, the evolution of each pillar is discussed below.

4.3.1 Pillar One: Enabling Well-Functioning Wholesale Markets

In the literature, one of the most unequivocal definitions for a "well-functioning wholesale market" comes from the Clingendael International Energy Programmeme (2011). The CIEP states "A well-functioning wholesale market for gas is a market in which any party, be it a reseller or a large industrial user, can engage at any moment with any other party, within the same zone, across zones and across borders or outside the EU, purchase and sell natural gas, on terms and conditions which are mutually agreeable." (2011, p.11). As such, the report further discussed that the route to get to such an ideal market would be two-tiered via commodity transactions and transport arrangements, and the priority had to be given to the former and then to the latter.

Different views were expressed by the stakeholders offering a diversity of approaches and structural conditions towards the functioning of the wholesale markets⁴⁵. The LECG Model and MECO-S Model were found most appropriate and each worthy of a brief discussion. The intellectual entrepreneurs of the MECO-S model foresaw the creation of three alternative zones for the wholesale markets purely based on whether or not they were able to create their own functioning markets within the boundaries such as (i) market areas at national level; (ii) trading regions; and (iii) cross-border market areas. It presumed that each market area would be large enough to attract a slew of wholesalers and well connected to other markets so that every European end-user could be effectively served (Glachant and Ascari, 2011).

By employing National Market Areas and Cross-border Market Areas, a virtual point (VP or VTP) for trading indicated by the authors, a fully integrated wholesale market, one balancing zone from import points to end-users and a single balancing entity with a single set of balancing rules whilst via Trading Regions they envisaged one VP for trading, a fully integrated wholesale market, end-users who are balanced in national end-user zones reflecting national specifics, end-user balancing which can be done by national balancing entity, and congestion-free interconnection between trading region

⁴⁵ Overall five studies were executed and submitted to CEER by LECG, Florence School of Regulation, Frontier Economics and CIEP. For details and comparison of each model see Appendix D.

and end-user zones through the common VP (Glachant and Ascari, 2011, p. 10-11). It was further argued that once the MECO-S Model was implemented the functioning wholesale markets would act as enablers and fertilisers for retail competition given the easy access they could provide to competitively priced gas which would be the basis for proper risk management. Complementary issues such as new infrastructure, within-day markets, balancing requirements, the role of storages and LNG, cost-reflective tariffs and interoperability etc. needed further research (p.26-7).

The LECG Model, on the other hand, focussed on three⁴⁶ main price zones primarily targeting cross-border capacity allocation issues namely (i) explicit transmission capacity combined with national/sub-national price zones (or a Framework Guidelines Driven Model); (ii) explicit transmission capacity combined with larger, regional price zones (Merged Markets Model); and (iii) implicit transmission capacity combined with national/sub-national price zones (Coupled Markets Model). Moselle (2011a) and Moselle and White (2011) argued that the first option of the LECG model could be the likely outcome of the FGs and NCs development process and under that option the size of price zones would remain unchanged and a single price for gas in the system would prevail⁴⁷ given the 3rd Package's E/E system obligation from September 2011 onwards. The risk of pancaking⁴⁸ and having notable problems with contractual congestion unless some anti-hoarding mechanisms were effectively implemented, however, persisted with the model. Similarly, it was argued that the Merged Markets model would have counterproductive effects especially on investment incentives for the TSOs and would require inter-TSO compensation mechanisms contrary to expectations that it would perhaps help concentrate the liquidity. Thus, the idea of using the Coupled Markets model for allocation of short-terms rights through a specified platform⁴⁹ at specified times and locations whilst TSOs continued to provide long-term explicit rights gained ground. By creating its own programme by accepting bids for gas flows to maximise surplus, it was argued, that this model would inevitably create locational prices although prices would remain the same between zones as long as there was not any transmission constraints (Moselle and White, 2011, p.2-3).

⁴⁶ In total they focused on six options and the other three options -Point-to-Point, Nodal Pricing and Hybrid- were either rejected or not found viable in medium term (Moselle, 2011, p.11)

⁴⁷ In fact an E/E zone would then be described as a price zone itself such as TTF in the Netherlands and NBP in Great Britain.

⁴⁸ Tariff distortions caused by natural gas flows crossing many 'price zone' borders (Moselle, 2011a)

⁴⁹ Ideally operated by a TSO or exchange (Moselle and White, 2011, p.3).
The results of CEER's first public consultation between July-September 2011 unraveled the focus of fifty-one market participants and stakeholders across Europe, and the majority of the respondents agreed that functioning wholesale markets would be best achieved through the creation of National Market Areas with ideally one national E/E system whilst the other options of the MECO-S model were found either too complex or somewhat unrealistic. The consultation also revealed that most participants supported the idea that provisions of the 3rd Package and the development of NCs were ideal steps to be taken in enabling functioning wholesale markets by 2014 although some found the timeline overly ambitious (CEER, 2011b, p.5).

Thanks to the 3rd Package wholesale markets are now structured as E/E zones where entry capacity can be allocated independently from exit capacity and be delivered to any point in that zone. As this clearly paves the way for the development of trading hubs meaning fewer jobs for the TSOs given that network users on the hubs will realise most market-based balancing themselves, CEER (2011c) highlights the transparency requirements as a core element for creating a level playing field for all participants. However, the report further argues that although necessary neither transparency rules nor market-based balancing were enough to create liquid well-functioning wholesale markets unless the markets had, for example, sufficient presence and low concentration of active players, a certain level of churn ratios⁵⁰ and Herfindahl-Hirschmann Index, availability of gas from diverse sources and sufficient demand for it as shown in Table 2.

 Table 2. The GTM Metrics for Wholesale Market Functioning, 2011

	Churn Rate	Zone Size	No of Sources	HHI	RSI*
GTM Target	<u>≥</u> 8	\geq 20 bcm (or 215 TWh/y)	≥ <u>3</u>	< 2000	≥110

*Residual Supply Index = (total supply – largest seller's supply) / total demand. More than 110% RSI is desired for more than 95% of days per year.

Source: CEER (2011c)

Once functioning wholesale markets are enabled, they then need to move forward to an integrated market as Boltz (2011) stated that reaching this goal "... will maximise efficiency and thereby public welfare in/from supply and trading on a European scale

⁵⁰ Total volume of gas traded compared to the volume of gas consumed (CEER, 2011c, p.6).

by making sure that all gas assets (procurement contracts, storage etc.) are used in the most economic manner" (slide 11). To do this, the second pillar of the GTM was put in place by the Council of European Energy Regulators aiming to foster short and mid-term price convergence between the functioning wholesale markets by tightly connecting them through facilitating cross-market supply & trading and potentially implementing market coupling as far as the given infrastructure (at any time) allows.

4.3.2 Pillar Two: Connecting Functioning Wholesale Markets

Once the above requirements are met by each member state, the solution to manage the gas trade between those E/E zones and gas hubs is to get the markets tightly connected especially where interconnector capacity is not effectively used. However, the CEER reports specifically confirmed as of 2011 that there was not effective use of cross-border capacity throughout Europe and that chiefly stemmed from the 'contractual congestion' at most interconnection points (IPs) whereby the access was not provided to all market participants -fully booked but mostly went unused instead of being offered back to the market- and capacity was not used in supporting the gas flow from low priced areas to high priced areas (CEER, 2011a; 2011c). Market participants and stakeholders, via the 2011 public consultation and at various CEER/ACER GTM workshops, made headway in a more detailed diagnosis of constraints that manifested evident problems to the market connections, such as:

- Capacity Allocation Mechanisms (CAM) and Congestion Management Procedure (CMP)
- Gas Balancing Arrangements
- Transmission Tariff Structures

4.3.2.1 Capacity Allocation Mechanisms (CAM) and Congestion Management Procedure (CMP)

One of the long-available yet little-used tools in Europe's gas markets is gas-on-gas competition since a great deal of evidence suggests that the transport of most gas still is governed by transit arrangements. Europe is highly dependent on natural gas imports which come to specified points on transmission networks despite the fact that the 3rd Package foresees completion of a single European gas market with better harmonised

national arrangements made to networks in terms of non-discrimination, effective competition and market-based design (Moselle, 2011a).

The CAM and CMP rules are one of the twelve⁵¹ areas Regulation 715/2009 tasked the European Gas Transmission Network for gas (ENTSO-G) to elaborate on binding union-wide harmonised NCs⁵² and ACER to prepare non-binding FGs⁵³ for them (Art. 8(6)). Both agencies collaboratively finalised their tasks as of 2012 and the final NC CAM went into comitology in 2012 to be fully effective at both virtual and physical IPs⁵⁴ throughout Europe from 1st November 2015⁵⁵ (ENTSOG/ACER, 2014).

In line with the suggestions of the FG CAM, the final NC has defined a new standardised CAM in the form of an auction procedure (i.e. explicit auctions for long-term trades and implicit auctions for short-term) via which the Standard Capacity Products (SCPs) -yearly, quarterly, monthly, daily and within-day- will be made available to all network users registered on a central booking platform. Moreover, the allocation of existing capacity for the upcoming fifteen years would be possible to by yearly auction process (CEER, 2012). By replacing the E/E capacity products that were being sold per IP point separately, countries are expected to implement the final NC CAM and modify their national regulatory frameworks to introduce auctions by harmonising the specified measures such as gas day (D) to be 5:00 to 5:00 in winter and 4:00 to 4:00 in summer, temperature to measure gas and virtual IP creation (ACER, 2014). Furthermore, the NC sets out how adjacent TSOs shall cooperate in order to

⁵¹ Network security and reliability rules; network connection rules; third-party access rules; data exchange and settlement rules; interoperability rules; operational procedures in an emergency; capacity-allocation and congestion-management rules; rules for trading related to technical and operational provision of network access services and system balancing; transparency rules; balancing rules including network-related rules on nominations procedure, rules for imbalance charges and rules for operational balancing between transmission system operators' systems; rules regarding harmonised transmission tariff structures; and energy efficiency regarding gas networks (Regulation 715/2009, Art. 8(6a,g)).

⁵² Fundamentally, the NC defines a standardised CAM in the form of an auction procedure for relevant IPs within Europe, including the underlying standard capacity products to be offered and the description of how cross-border capacity will be allocated. Further, the NC sets out how adjacent TSOs cooperate in order to facilitate capacity sales, having regard to general commercial as well as technical rules related to CAM (NC CAM, Art. 1.1)

⁵³ In fact, the European Regulators Group for Electricity and Gas (ERGEG) the predecessor of ACER, was one that commenced the process of elaborating a Pilot FG on CAM in 2010 and suggested that the NC should design an anonymous, transparent (explicit) auction mechanism to make the capacity at IPs available to all shippers for each time interval (including within-day capacity) curtailing any exercise of monopoly powers (ERGEG/FG (2010) Art. 3.1.1).

⁵⁴ According to ENTSO-G/ACER (2013, p.5) report, there are 49 uni-directional (flow direction) and 47 bi-directional IPs where CAM is expected to apply on both sides of IPs, and 24 uni-directional and 4 bi-directional IPs where CAM is expected to apply on one side of IPs. Turkey's Malkoclar IP (with Greece) is not on the list of IPs for the expected or possible application of the NC CAM, but is already on the IP list where future application is possible (subject to NRA decision).

⁵⁵ Many provisions are already in place since 2013.

facilitate capacity sales, having regard to general commercial and technical rules related to capacity allocation mechanisms (NC CAM, Art. 1.1).

			As a % of physical capacity		
IP name	Direction	Physical capacity in	Booked capacity	Used	Difference
		GWh/day	-1	capacity (2)	(3) = (1) - (2)
Veľké Kapušany/Uzghorod	UA > SK	3.088	95%	68%	27%
Baumgarten	SK > AT	1.632	99%	66%	33%
Lanzhot	SK > CZ	1.266	100%	64%	36%
Tarvisio/Arnoldstein	AT > IT	1.184	100%	62%	38%
Waidhaus	CZ > DE	1.118	100%	57%	43%
Mallnow*	PL > DE	931	100%	65%	35%
latere en este e	BE > UK	807	100%	43%	F7 0/
Interconnector	UK > BE	630	100%		57%
Oude Statenziil/Bunde**	DE > NL	677	96%	21%	75%
oudo otatonziji/Dundo	NL > DE	410	91%	2170	1070
Medelsheim/Obergailbach	DE > FR	648	77%	37%	40%
Dunkerque	NO > FR	619	94%	74%	20%
Taisnieres/Blaregnies H+L	BE > FR	588	82%	57%	25%
Bocholtz	NL > DE	527	100%	62%	38%
Julianadorp	NL > UK	475	95%	42%	53%
Tarifa	AL > ES	355	71%	62%	9%
Oberkennel	AT >DE	146	95%	0.00/	20/
Oberkapper	DE > AT	107	100%	92%	3%
Larrau	FR > ES	100	94%	63%	31%

Table 3. Used Capacity versus Booked Capacity at Natural Gas IPs (Averages for
2011)

* Data from May 2011.

** The Oude Statenzijl IP cluster only shows values from the TSOs flowing high-quality gas through the cluster. Note that, for certain reversible IPs, (2) and (3) values are maximum values in terms of daily dominant flow. Note that, AL = Algeria in the above table.

Source: ACER/CEER (2012), p.143

Although it gained almost full public support, due to the higher level of security of supply and facilitation of cross-border investments they offer, explicit auctions are fundamentally deemed to cause contractual congestion⁵⁶ and capacity hoarding since they maintain cross-border bottlenecks where the congestion chiefly appears. Following the rudiments of the Draft Vision for an European GTM and the LECG Model, CEER (2011a) argued that CMP or in other words freeing up capacity was feasible through the employment of anti-hoarding mechanisms by requiring TSOs to operate firm use-it-or-lose-it (UIOLI) or use-it-or-sell-it (UIOSI) arrangements via which a volume of unused

⁵⁶ Regulation 715/2009 Article 2 (21) defines 'contractual congestion' as a situation where the level of firm capacity demand exceeds the technical capacity.

capacity left behind after the shippers' nomination of day-ahead gas flows could be removed and put into day-ahead auctions for other network users' use for trading across the border; and providing for NRAs to implement overbooking or overselling arrangements to incentivise TSOs to offer additional capacity on a financially firm basis (p.15). Nonetheless, explicit auctions are argued to be unable to tackle the capacity issues in short timescales since it requires shippers to coordinate buying network capacity with gas to be eligible for trading across borders (CEER, 2011c). As discussed in the previous section, the LECG's Coupled Market model (implicit auctions) was chosen for short-term capacity allocations and CEER (2011, p.10) describes how the system is expected to work:

"[...] Under implicit allocation, market participants submit bids and offers onto the platform to buy and sell gas on two (or more) entry-exit zones. The platform collates all bids and offers into a single "bid-offer ladder", TSOs provide details on the available interconnection capacity between the entry-exit zones and those bids and offers with the greatest price spread will be accepted until the capacity is fully used or wholesale gas prices converge."



Figure 5. Effects of Implicit Auctions (Market Coupling)

Source: Nevelling (2011), p.4

In support of implicit auctions the FG CAM envisaged that the NC should determine the breakdown of available capacity services appropriately between long and short-term services and set aside at least 10% of the available firm capacity at each IP for short

term trading (FC CAM, Art. 2.3). Despite the fact that coupling markets (and volumes) has been tried in electricity markets⁵⁷ the pioneering works of CEER and LECG about short-term natural gas trading via market coupling has raised many questions.

Would the concept of market coupling that has been successful for electricity markets be easily applicable to gas markets? Was the imposition of implicit CAM for gas markets appropriate or necessary? Whilst Europex (2011) discussed certain peculiarities of gas at the 19th Madrid Gas Regulator Forum in March 2011 such as that gas was more flexible than electricity as a commodity and gas trading in European markets was on a continuous basis unlike electricity markets which under implicit auctions requires a price fixing mechanism, a number of respondents to CEER's public consultation expressed their reservations about the simple importation of a typical electricity approach to fundamentally different gas markets, and thus its unlikely success considering the distortions and wider unintended consequences to be brought to the systems⁵⁸. Stateoil, Energie-Nederland and the Gas Forum expressed their direct stance against implicit auctions for gas. CEER has announced the project of coupling PEG Nord and PEG Sud hubs developed by GRTgaz and Powernext in France as a pilot project for the GTM although some respondents stood in favour of pilot projects that were implemented between countries and involved different TSOs instead (CEER, 2011b).

4.3.2.2 Gas Balancing Arrangements

As mentioned earlier, the 3rd Package set forth a range of measures for a wellfunctioning, competitive internal gas market. Being one of the crucial matters for such a market, of course, the role of gas balancing is undeniable. Imbalance in transmission systems may be attributable to differences between the volume of gas being put into the system and that of exiting from it, or fluctuations in gas pressure due to varying levels of gas in the system unlike would be expected from an operationally secure system where the pressures should be kept within a certain range (ERGEG, 2010). Normally

⁵⁷ For example Central West Europe electricity market coupling that covers more than a third of Europe's consumption comprising Benelux, France and Germany/Austria regions. See Platts website: <u>http://www.platts.com/latest-news/electric-power/london/cwe-flow-based-power-market-coupling-delayed-26889340</u>.

⁵⁸ Full list of stakeholders responses to the CEER's public consultation may be found at: <u>http://www.ceer.eu/portal/page/portal/EER_HOME/EER_CONSULT/CLOSED%20PUBLIC%20CO_NSULTATIONS/GAS/Gas_Target_Model/Results</u>.

the logic requires the party who causes the imbalance to offset it as long as the system is being used singlehandedly. However, the transmission networks today have multiple shippers utilising their gas at different E/E points and this does not only make the balancing issues more complex but also structuring the most appropriate balancing regime that preserves system integrity is a must.

Pursuant to Regulation No. 715/2009 Art 8(6h) ENTSO-G elaborated the initial NC on Gas Balancing of Transmission Networks (NC BAL) and submitted to ACER for reasoned opinion in October 26, 2012. After the relevant amendments were made the final NC was released in February 2013. Its provisions, in a nutshell, set rules about:

- Clearly defined balancing systems and adequately shared balancing responsibilities between TSOs and network users since unbundling of TSOs ingeniously shifts the TSOs well away from the network users trading gas. Provided that shippers are given the responsibility and incentive⁵⁹ to balance their portfolios at the so-called virtual trading points already defined by the 3rd Package as integral part of E/E systems the workload of TSOs is expected to be less although TSO actions may still be required even if the systems are in balance (ERGEG, 2010).
- Accurate and timely provision of information on balancing related matters that TSOs provide to shippers free, electronically accessible, clear and quantifiable information about the overall status of the network, the shippers' inputs and offtakes for the gas day, and the TSOs' balancing actions (NC BAL, Art. 34,35). This is particularly relevant in markets whereby the vertically integrated incumbents own the majority of networks not least storages and LNG terminals the main source of flexible gas for balancing (ERGEG, 2010).
- A market-based and harmonised balancing daily regime where TSOs undertake balancing actions via buying/selling short term standardised products on a day ahead or intraday basis seven days a week on electronic trading platform(s) or through use of balancing services⁶⁰. The procurement of balancing systems is

⁵⁹ The NC BAL Art. 14(4a) bases the incentive mechanism on the transmission system operator's performance via capped payments to the transmission system operator for outperformance and by the transmission system operator for underperformance, that are measured against predetermined performance targets which may include but not be limited to costs targets.

⁶⁰ As opposed to non-market based systems where TSOs rely on regulated or bilaterally negotiated longterm contracts with storage operators or gas companies in other countries for flexible gas. And when gas is procured via long-term contractual arrangements, the cost reflection of (daily) imbalance charges in

market-based, non-discriminatory and should be based on public tender procedure within national rules. The duration of a balancing service cannot exceed twelve months (Art. 11, 12, 13).

- The harmonisation of (re)nominations procedures which is vital to cross-border trade and market liquidity. Hence, according to the NC rules, shippers have to submit their nominations to TSOs for gas day (D) no later than 13.00 UTC⁶¹ on gas day D-1 and the confirmation notices have to be sent by TSOs no later than 15.00 UTC⁶² on D-1. Pre-nomination cycles can also be offered by TSOs to shippers at either side of IPs as allowed in the NC for which the deadline rules remain unchanged with just a time difference, 12.00 UTC and 12.30 respectively ⁶³. Shippers can submit re-nominations immediately after the confirmation notices within 2 hours from the start of each re-nomination cycle (Art. 17, 18). Rejection of (re)nominations under certain circumstances⁶⁴ is probable no later than 2 hours after the (re)nomination deadline. In case daily and hourly (re)nominations co-exist at an IP TSOs and NRAs can consult stakeholders regarding whether harmonisation of (re)nominations are necessary depending on its impact on the daily balancing regime at the IPs (Art 19(1)).
- The imbalance charges, within-day obligations and operational balancing between transmission systems. As set out above, it is clear that in cases of differences in balancing rules across Europe it would not be realistic to expect implications of uniform imbalance fees and/or penalties by TSOs⁶⁵. Whilst the Regulation 715/2009 requires imbalance charges to be cost-reflective and to avoid cross subsidisation between shippers (Art. 21(3)), the 3rd Directive empowers NRAs to fix and approve the calculation methodologies for imbalance charges (Art. 41). Based on the NC, the applicable price to be used in daily imbalance charges is determined either as the marginal sell price (where the daily imbalance quantity is positive) or the marginal buy price (where that of

terms of TSOs' gas procurement or sale of the day reduces and this may lead to the need for imbalance charges to be indexed to gas prices in other markets (ERGEG, 2010).

⁶¹ Or 12.00 UTC when daylight saving time applied.

⁶² Or 14.00 UTC.

⁶³ The TSOs reserves their rights to apply pre-agreed default nomination rules in the event of valid nomination absence (NC BAL Art. 17(5)).

⁶⁴ That they do not comply with the requirements as to its content; and/or they are submitted by an entity other than a shipper; and/or in the case of daily (re)nominations they results in a negative implied nomination flow rate; and/or they exceed the shipper's allocated capacity.

⁶⁵ The EC impact assessment report (2013) presents at least five different imbalance mechanisms prevail in Europe (e.g. market-based, oil formula, settlement in kind, LNG based tariff and administered price.

is negative)⁶⁶ including a penalizing component- not more than 10% of weighted average price at the virtual point (NC BAL, Art. 25(5))- applied either to the whole imbalance of the shipper or only to the part above certain pre-defined tolerance levels (DVN KEMA, 2013).

And finally the principle of TSO neutrality with respect to all related costs and revenues. That is, any costs or revenues arising from such actions are to be passed to shippers and should these costs be related to balancing actions undertaken by TSOs then NRA oversight can be required to gauge whether or not the TSOs have reasonably mitigated the cost incurred when undertaking the action⁶⁷ (NC BAL, Art. 31-33).

4.3.2.3 Transmission Tariff Structures

Taken into account the need for efficient gas trade and competition, avoided cross subsidies and undue discrimination, delivery of cost reflective charges and ensured cost recovery (Heidelberger, 2012) the Network Code on Harmonised Transmission Tariff Structures for Gas (NC TAR) was developed by ENTSO-G to be applicable in all member states by 1 October 2017.

Regulation 715/2009 has obliged separate tariffs to be set up based on cost-allocation mechanisms and rate setting methodology for each E/E point into/out of the transmission network and foreseen no contract paths for the network charge calculations any more (Art. 13). In line with provisions of the NC CAM, the NC TAR requires the member states to apply a reference price methodology in order to calculate the reference price for a firm capacity product with duration of one year. This is expected to constitute the starting point for calculation of the reserve prices for non-yearly SCPs for firm capacity and both yearly and non-yearly SCPs for interruptible capacity (Recital 3). The NC details two primary reference price methodologies (i.e. postage stamp and

⁶⁶ In order to provide shippers with economic incentives to balance their portfolios, the former should represent the lower of the lowest price of any trades in title products the TSOs are involved or the weighted average price of gas in respect of that gas day, minus a small adjustment whilst the latter represents the highest price of any trades in title products the TSOs is involved in respect of the gas day; or the weighted average price of gas in respect of that gas day, plus a small adjustment (NC BAL, Art. 25(2a, b)).

⁶⁷ What is more, limiting the aggregate financial loss to TSOs' inefficiently incurred costs and revenues as indicated in Article 31(3) of the NC can be viewed as reflective of underlying incentive promotion for carefully undertaken balancing action at the expense of TSOs.

capacity weighted distance methodology 68) and three secondary adjustments (i.e. equalisation, benchmarking and storage adjustment) to be adopted. The result of such methodologies is obliged to be the final reference prices and be uniformly applied to all E/E points in any given E/E system (Recital 3; Art. 6-10).

ENTSO-G stands clearly against any pricing of interruptible capacity at a substantially lower price than firm capacity especially while the firm capacity is still available (Heidelberger, 2012). Hence, the NRAs are tasked by the NC TAR to set or approve the parameters of the reference price methodologies in the face of transparency, cost-reflectivity, non-discrimination and stability of transmission tariffs, and to publish the information with respect to the allowed or target revenue of the TSO and to the derivation of different transmission and non-transmission tariffs (Recital 4). Although the NC favours 50/50 entry-exit split⁶⁹, the decision is left with the NRAs again to set or approve other split-levels to minimise cross-subsidisation between network users; in particular between cross-border and domestic network users; not to create barriers to cross-border trade; and to avoid differences between allowed revenue and actually obtained revenue (Art. 12).

In terms of revenue reconciliation, as stipulated in Article 27-30 of the NC, the TSOs are allowed to use only one regulatory account for aggregating the under- and overrecovery of transmission services revenue originating from all E/E points. The TSOs are to split the regulatory account into a number of sub-accounts to track the under- or overrecovery originating from a particular group of points or from a particular type of transmission tariff. In the event of the existence of earned auction premia attributable to a specific account separate from the regulatory account the NC sets, the decision lies once again with the NRAs to use that auction premia for reducing physical congestion or to decrease the transmission tariffs for the next tariff period.

⁶⁸ The relevant parameters for PSM includes (a) the part of the transmission services revenue to be recovered from capacity-based transmission tariffs; (b) the forecasted contracted capacity at each entry point and at each exit point; (c) if applicable, the entry-exit split (e.g. 50/50 or other at the NRA discretion). The parameters for CWDM includes, on the other hand, (a) the part of the transmission services revenue to be recovered from capacity-based transmission tariffs; (b) the forecasted contracted capacity at each entry point or a cluster of entry points and vice versa; (c) where entry points and exit points can be combined in a flow scenario, the distance between an entry point or a cluster of entry points and an exit point or a cluster of exit points; (d) the entry-exit split (as above) (Art. 7 and 8).

⁶⁹ The NC provides entry-exit split definition as the revenue from capacity-based transmission tariffs at all entry points and the revenue from capacity-based transmission tariffs at all exit points (Art. 19).

4.3.3 Pillar Three: Ensuring Secure Supply and Economic Investment

According to Sylvia Beyer's (2011) presentation on behalf of the EC at the 20th Madrid Forum, Europe's total investment needs in electricity and gas sectors between 2010 and 2020 was more than €1 trillion. As with every other region, without secure energy supplies and adequate investment the exercise of reforming and/or developing an integrated European energy market is bound to be challenging. In order to get the aforementioned mechanisms effectively working and to address issues such as unclear interaction between investment decision/network development and capacity allocations especially in terms of incremental and new capacity⁷⁰, both are not covered by the NCs, CEER has been seeking to develop workable options for supporting cross-border market-based investments. With its 2012 public consultation paper, CEER officially initiated a comprehensive proposal seeking to answer i) when and how to decide to offer new transmission capacity to the market, taking into account both market (i.e. user demand) and non-market based objectives (i.e. security of supply or market integration); ii) when and how to decide to invest; and iii) who should pay for the investments and take on the risks and/or benefits? (CEER, 2012a).



Figure 6. Investment Decision and Network Planning in Europe

Source: CEER (2012a), p.12

Legally, the 3rd Package tasks TSOs to submit to the NRAs national ten-year network

⁷⁰ CEER (2012a, p.10) defines 'incremental capacity' as a capacity that is provided on top of technical capacity available at an existing interconnection point and 'new capacity' as a capacity provided at a new interconnection point.

development (TYND) plans containing measures to guarantee the adequacy of the system and the security of supply (Dir. 2009/73/EC, Art 22(1)), and then the NRAs are to submit non-binding Community-TYND plans every two years (Reg. 715/2009, Art. 8(b)). In case ITOs are in charge of the transmission systems, the national TYNDs become binding in such countries and the identified investments are to be executed within three years (ibid, Dir., Art 14(2c)). For this, the respective NRAs take at least one of the below measures:

(a) requiring the transmission system operator to execute the investments in question;

(b) organising a tender procedure open to any investors for the investment in question; or

(c) obliging the TSO to accept a capital increase to finance the necessary investments and allow independent investors to participate in the capital (Art 22(7a, b, c)).

Moreover, CEER highlights that in most European countries investment decisions are subject to NRAs' approval (or directly governments' if the market is vertically integrated) whereas in some regulators neither need to approve investment decisions nor fix tariffs. But the 3rd Package gives a more proactive note about the role of NRAs for the years to come and requires them to approve tariffs and tariff methodologies to be able to set out appropriate regulatory framework for investments (CEER, 2012a).

There are two types of common market-based investment procedure to gauge market demand for existing and incremental capacity, and to secure necessary bookings for its development, namely Open-Seasons (OS) and Integrated Auctions (IA) (CEER, 2012a). Via the OS mechanism market players are invited to translate their needs into long-term commitments⁷¹ through an open season procedure as outlined by the Guidelines of Good Practice for Open Seasons (GGPOS) of ENTSO-G (then ERGEG) in 2007⁷² once

⁷¹ First they submit their bids for an estimation of the actual interest in capacity and help to identify under what terms the capacity sale would best fit the needs of the market. Once the offer of capacity is settled and the economic test is agreed (determining the level of cost-coverage the subscriptions to reach to trigger the investment decision), a –binding- phase starts and market-players are invited to make long-term subscriptions and if these generate sufficient revenue to cover the agreed level of costs, the final investment decision is taken (CEER, 2012a, p.14)

 $^{^{72}}$ The GGPOS do not apply to infrastructure that is used exclusively for distribution purposes. The decision about whether or not the OS is needed for distribution infrastructure is left to the NRAs (ERGEG GGPOS 2007, Art. 2(12)).

the infrastructure operators agree on capacity development needs and the interests for projects are surveyed. Although relatively common in the UK, integrated auctions on the other hand task the TSOs to provide information to shippers about the cost of providing a particular volume of incremental capacity and to receive their price bids for it. Thus, if a certain value of those costs is covered by the bidding process, the TSO will be obliged to provide that level of incremental capacity, by either investing in physical infrastructure or -instead of building- by managing flows more efficiently, by shifting demand between different points or applying a buy-back procedure⁷³ if needed in the end (ibid, p.16). In short, the IA procedure gives a leading role to TSOs and places an obligation on them to invest in new capacity when/if the auctions show that a certain level of capacity demand is reached whereas in the OS procedure TSOs remain silent and review the requests of shippers concerning initiating an investment and asking TSOs to build extra capacity, so TSOs decides on investment as stated by Yamifava (2013, p.23).

The difficulties associated with both mechanisms notwithstanding, the results of experience gained from the OS across Europe have been on the whole mixed⁷⁴. Almost half of the respondents to CEER's 2012 public consultation on 'Market-Based Investment Procedures for Gas Infrastructure' commented that OS as a standalone process would be the most appropriate mechanism when dealing with large, complex investment projects across several borders whilst three of them actually advocated for the sole use of IAs. Sixteen respondents supported both OS and IA mechanisms to be used for auctioning of incremental capacity.

Because the TSO practice of allocating capacities (100%) on a long-term basis (10-20 years) will soon be changed to 90% for long-term bookings and the remaining 10% capacity will be set aside for short-term bookings, the European regulators concentrate

⁷³ The CMP Guidelines prescribe a buy-back mechanism as "6. Where necessary to maintain system integrity, transmission system operators shall apply a market-based buy-back procedure in which network users can offer capacity. (...) The application of a buy-back procedure is without prejudice to the applicable emergency measures." (EC, 2014, p.6)

⁷⁴ Transparency issues, for instance, in setting the volume and price of capacity in OS procedures since binding commitments are generally the corollary of private negotiations between investors and individual shippers. To exemplify, satisfactory experience was gained from South Gas Regional Initiative to develop a cross-border capacity between France and Spain which resulted in a great market interest shown to the joint allocation of available capacity and a harmony between different TSOs and NRAs designing the economic test. Hence coordinated capacity allocation was done along 4 E/E zones, providing shippers with the same amount of capacity along the corridor for 10 years keeping a 10% capacity for the short term. However, some downsides such as cost reflectivity and transparency in tariff methodologies for the project were identified in the GGPOS monitoring report (CEER, 2012, p.15).

on key questions such as how much of the investment cost should be borne by user commitment (long term bookings) and by TSOs (and so underwritten by consumers) as well as who should take on the risk. Whilst the majority of respondents to CEER's 2011 consultation were in favour of an economic test to trigger new capacities, the respondents of the 2012 consultation explicitly or implicitly regarded the economic test as the determination whether or not a pre-defined percentage of deemed investment cost was underwritten by system users who submit binding commitments for future capacity payments. They indicated that the remainder of the investment cost needed be socialised to the consumer via the Regulated Asset Base (RAB) roll in, and to the project sponsor. Nine respondents also expressed that, as some harmonisation of the economic test was required, parameters such as the exact threshold of user underwriting for an investment should not be fixed but instead be tailored to the network, market and regulatory circumstances for a given project (CEER, 2011b; CEER, 2012b, p.13).

4.4 The New Gas Target Model

Developed by CEER, the EC, the stakeholders and market players under the European legal framework and the market structure of 2010-2011 the GTM has undergone substantial review and update since 2013. The revision was initiated by ACER, supported by informal advisory panels and various workshops, and was finalised with the publication of an extensive 'European Gas Target Model Review and Update' report in January 2015.

The old GTM, as thoroughly discussed above, aimed at creating a coherent framework with regards to full unbundling of network operators, development of NCs ⁷⁵, development of competition via well-functioning wholesale markets both nationally and across borders- comprising E/E zones with liquid virtual hubs (ACER, 2015). Over the two years however the impressionistic discussions of gas market realities, most of which held firm when the old GTM was drafted, have started to shift. As Boltz (2013) argued at the 1st ACER GTM workshop in Vienna, because gas market characteristics were changing (e.g. continuous decline in EU gas demand -wholesale and retail- since

⁷⁵ NC CAM was adopted in comitology on 15 April 2013 and applies from 1 November 2015 (first yearly capacity auction in March 2017). CMP was also established for effective use of existing capacity and to make unused capacity available for new entrants. Balancing NC was adopted in comitology on 2 October 2013 and applies from 1 October 2015 and lastly NC for harmonised transmission tariffs is to be adopted in comitology in 2015 and be applicable from 2017.

2008, and reduction in long-term oil-indexed supply contracts) and new challenges were being faced (e.g. growing interrelations between electricity and gas, higher flexibility requirements to back-up intermittent renewable electricity generation and the changing role of storage and LNGs) the current GTM had to be improved in certain areas to comply with the changes in the legal framework and system requirements.

Below illustrates the renewed vision of the EU for a secure and competitive European gas market that is expected to benefit all consumers, and delves into the concept of the new GTM updated accordingly. Differing from the old GTM's three pillars, this new GTM has four areas under its focus, namely wholesale market functioning and a selfevaluation process, security of supply and upstream competition, the role of gas in complementing renewable energy source (RES) generation, and new developments in the gas supply chain as moving to a low carbon society with increased renewables and smart, flexible responsive energy supply needed to be added.

4.4.1 Wholesale Market Functioning

The old GTM contemplated well-functioning markets based on the 'Hub-to-Hub Model'. That is, to create fully functioning wholesale markets (national/cross-border) and tightly connecting them by eliminating constraints at the interconnections (ACER, 2015) as specified in the MECO-S Model. A set of criteria was developed to determine the level of functioning, requiring namely, the market size to be equal or more than 20 bcm (or 215 TWh); number of supply sources to be not less than 3; measure of concentration amongst suppliers based on energy measured by firm to be equal or less than 2,000 according to HHI; and share of consumption which can be met without the largest supplier (based on supply capability) to be equal or greater than 110% according to RSI (Frontier Economics, 2014). However, the ACER/CEER Annual Reports on the Results of Monitoring the Internal Electricity and Natural Gas Markets in 2011-2012-2013 and the quantitative analysis made during the ACER workshops revealed that the GTM criteria were far from being met across Europe since in only six national markets gas demand was to exceed the 215TWh threshold whilst nine countries relied on less than three gas suppliers. Similarly, targeted liquidity with >8 churn rate was only met by the UK, and market concentration was undesirably high almost everywhere except the UK and Germany. Not surprisingly, the RSI was also problematic in many member

states particularly in Estonia, Finland, Latvia, Lithuania, Luxembourg and Sweden with 0% (Table 4).

Member state	Churn rate	Zone size (TWh/year)	Number of sources	нні	RSI
Austria	3	105	3	7,500	143%
Belgium	6	197	8	1,709	279%
Bulgaria		39	2	7,587	13%
Croatia		535	5	5,987	125%
Czech Republic		95	3	9,051	159%
Denmark		45	2	2,570	22%
Estonia		9	1	10,000	0%
Finland		36	1	10,000	0%
France	3	485	13	1,240	137%
Germany	4	438	4	1,982	116%
Greece		49	9	5,181	131%
Hungary		113	4	3,198	60%
Ireland		52	2	1,215	8%
Italy	3	799	12	2,093	108%
Latvia		15	1	10,000	0%
Lithuania		39	1	10,000	0%
Luxembourg		12	4	3,185	0%
Netherlands	7	424	6	2,488	189%
Poland		193	3	4,550	56%
Portugal		55	6	2,821	93%
Romania		157	4	3,270	104%
Slovakia		70	2	9,595	369%
Slovenia		12	5	5,027	74%
Spain		365	12	2,000	159%
Sweden		13	1	2,766	0%
United Kingdom	15	910	11	950	142%
GTM target	≥8	≥215	≥ 3	< 2,000	≥ 110

Table 4. Overall Results of GTM 2011 Criteria Assessment

Source: ACER (2015), p.15

Acknowledging the fact that the Hub-to-Hub model promoted by the old GTM did not necessarily allow for the full benefits of competition to be realised, the new GTM has focused on a new set of metrics to check, instead, whether conditions for "market health" and "market participants needs" were met. Deriving the threshold values from the performance of National Balancing Point in the UK and Title Transfer Facility in the Netherlands these newly refined metrics share much in common with the equivalent process in the old criteria as shown in Table 5.

Table 5. Th	e New G	GTM Metrics	for Wholesale	Market Functioning
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Market participants' needs metrics					
	Threshold				
Metric	Netric Day-ahead product		Front month product	Forward	
1. Order book volume	≥ 2,000 MW on each bid- and offer-side		≥ 470 MW on each bid- and offer-side	≥ 120 MW on each bid- and offer-side for 17 months ahead	
2. Bid-offer spread	≤ 0.4% of bid-price		≤ 0.2% of bid-price	≤ 0.7% of bid-price for 24 months ahead	
3. Order book price sensitivity	≤ 0.02% price distance between average price for 120 MW and best price on each bid- and offer-side		≤ 0.1% price distance between average price for 120 MW and best price on each bid- and offer-side	≤ 0.2% price distance between average price for 120 MW and best price on each bid- and offer-side for 24 months ahead	
4. Number of trades	≥ 420 trades per day		≥ 160 trades per day	≥ 8 trades per day for 22 months ahead	
"Market health" metrics Threshold		Threshold			
Metric Spot, promp			and forward market together		
5. Herfindahl-Hirschmann ≤ 2000 Index					
6. Number of su	pply sources	≥ 3			
7. Residual Supp	ly Index	≥ 110%			
8. Market cond bid and offer a	entration for activities	tion for ≤ 40% market share per company (or group of companies) for the best 12 ties MW on each bid- and offer-side			
9. Market conc trading activit	Market concentration for rading activities≤ 40% market share per company (or group of companies) for the sale a purchase of gas				

Source: ACER (2015), p.21-22

As expounded by its early advocates the essence of larger market zones was its alleged proclivity to provide more liquid wholesale markets, but according to the new GTM the system did not need to be artificially constrained by national borders which could adversely result in undesirable socialisation of significant intra-zone constraints via redispatch by the TSO⁷⁶ as discussed in ACER (2015). So, the market zone size and churn rate⁷⁷ were removed from the market health metrics and new measures such as market concentration for trading activities and bid and offer activities to bring the markets much needed competition, resilience and a high security of supply (SoS) were added. Starting with the theory that markets should have forward curve functioning (i.e. spot, forwards and futures), the addition of market participants' needs metrics⁷⁸ into the

⁷⁶ That means congestion rents earned by TSOs to shippers and distorted incentives that may potentially lead to inefficient outcomes and undesirable cross-subsidies that create problems for regulators (Moselle, 2011a, p.19).

⁷⁷ The definition of which was, according to ACER (2015a), also highly debated and it was considered as a blunt measure of liquidity.

⁷⁸ ACER (2015a, p.22) and Macwhinnie (2015, p.20) give the justification for the metrics as (i) order book volume: sufficient bid and offer volumes in the order book for delivery of gas reasonably far into the future allow market participants to buy and sell gas when they need it and support effective risk

system remained the view of a very large body of new GTM apologists. The metrics have been envisaged to not only enable market participants to effectively trade gas at fixed prices into the future and to enable retail markets but also to collectively indicate the probability of transactions at a reliable market price, near and far-dated contracts, in notable volumes at all times (ACER, 2015a). As noted in Wagner (2014, p.11) the expected outcomes from functioning gas wholesale markets are the availability of gas, competitive price formation, low transaction cost of gas trading and transparency of gas price whilst the ultimate benefits are lower cost of gas/power/heat for end-users and lower risk in the industry. Dr. Wagner particularly stressed the significance of bid-ask-spreads as the key element of gas trading transaction cost and concluded that improved gas market liquidity would typically lower bid-ask-spreads and so would the cost of gas, for example, an estimated €30-140 mn saving on gas cost per annum.

As this evolution progresses, the NRAs are asked to perform regular⁷⁹ "Self-Evaluation Processes" taking into account above metrics and the implementation of NCs to review the status of the markets and determine whether more active intervention is required and if so where. In the event of deep intervention being needed the NRAs are then to evaluate the possibilities and propose plans (with involvement of the authorities and stakeholders) with detailed cost-benefit analyses (CBAs)⁸⁰. There are three market integration tools brought forward should member states be found unlikely to have functioning wholesale markets by 2017 and so needed structural market reforms are needed (Cariello, 2015).

management; (ii) bid-offer spread: low bid-offer spreads mean low transaction costs for market participants and support market participants who have less flexibility over when they can trade; (iii) order book price sensitivity: low order book price sensitivity means less additional cost for market participants when buying or selling substantial volumes and supports market participants who have less flexibility with respect to when they can trade and (iv) number of trades: sufficient trading activities support market participants? Confidence that prices are transparent and represent a reliable market price in.

⁷⁹ At least once in every three years.

⁸⁰ According to ACER (2015, p.26) the CBAs should contain at least the costs of ensuring an adequate level of firm unrestricted capacities and other costs, as well as the benefits of integration (i.e. creation of a single demand and supply curve), benefits to competition (i.e. more efficient gas prices), benefits to Security of Supply and trading benefits (e.g. lower bid-offer spreads, lower risk management costs for market players, lower transaction costs, etc.).



Figure 7. Market Integration Tools of the New GTM

Source: Cariello (2015), p.30-32

Replacing the previous National Market Areas and Cross-Border Market Areas of the MECO-S Model, the new GTM offers a new set of market integration tools:

- Market Merger: having two neighbouring gas market areas to fully merge their balancing zones⁸¹ and VTPs to reap the benefits of an integrated wholesale market (spot and forward) and an integrated balancing zone incorporating all end users although issues like harmonising metering, allocation and balancing rules; strong regulatory cooperation and legislative actions; and inter-TSO compensation awaits to be addressed for both countries. Merged German market areas and the BeLux Project of Belgium and Luxembourg demonstrate good examples of this⁸².
- Trading Region: this refined and developed version of the trading region model formerly proposed within the MECO-S Model offers a quickly implementable

⁸¹ Both transmission and distribution systems.

⁸² Based on data in ACER (2015a) tools for gas market integration and connection Annex 6.

merged VTP for two neighbouring countries each of which is to continue keeping their own end-user balancing systems. Again, inter-TSO compensation may be required and potential synergies can be untapped. Presently, there are two projects in Europe, the COSIMA project implemented in October 2013 between Austria and Germany, and the CEERT project (covering Austria, Czech Republic and Slovakia) for which the feasibility study was conducted in 2012 (Hesseling, 2015).

Satellite Market: suitable for a ('satellite') gas market area with a weak wholesale market and no gas hub to get supported by its ('feeder') neighbour with a better functioning wholesale market and a hub to be co-used. Since no cross-border alignment is needed the model is labeled as easily implementable too and to cause positive externality for the feeder⁸³. The downsides are the restricting applications and untapped potential synergies (Cariello, 2015, p.30-32).

In terms of the market connection of two neighbouring countries the ACER continues to bolster the 'market coupling or implicit allocation' tool of the old GTM that fundamentally paves the way for establishing a process between two spot markets which closely ties the allocation of cross-border day-ahead (and potentially intra-day) capacity to the continuous trading process of gas in each of those markets. It also seems clear that certain European nations are in a position to adequately respond to the challenges an integrated market has to offer by themselves and have already attempted to share experience in the field of capacity booking platforms. Initiated by the TSOs from Austria, Belgium, Denmark, Germany, France, Italy and the Netherlands, these countries are to create a joint European capacity platform as an early implementation of the NC CAM. The PRISMA⁸⁴ project was founded in 2013 and is, as of 2015, linking the markets of fifteen countries and thirtyfive TSOs across Europe providing primary capacity bookings and secondary transport capacity trading through one single platform (Lassource, 2013; PRISMA-EFET, 2015).

Of course, an integrated energy market would not only be comprised of wellfunctioning markets especially given the impacts of the ongoing Ukraine crisis and the potential threat of the availability of gas from Russia. Hence, the new GTM has adopted

⁸³ Benefitting from an increase in traded market liquidity (ibid, p.13)

⁸⁴ PRISMA European Capacity Platform GmbH.

other measures to deal with the globally changing landscape of natural gas developments and therefore gas security of supply and upstream competition, gas-fired power stations and the use of alternative fuels and new technologies have hit the top of the energy agenda of the European Union.

4.4.2 Security of Supply and Upstream Competition

Both old and the new GTM proposals have argued that the Residual Supply Index focuses on capacity and determines the relationship between the sum of the supply capabilities of all suppliers except the largest source and total demand in the market. The GTMs have concluded that if the RSI is, at any given time, equal or greater than 1 (i.e. 100%) the largest supplier can be replaced and that supplier is not pivotal (ACER, 2015b). Table 4 in Section 4.4.1 presented that fifteen countries that did not meet the GTM threshold of 110% RSI and whereas this makes almost all Eastern European countries fully reliant on Russian supplies it does not make the countries with a seemingly high percentage (e.g. Austria, the Czech Republic and Slovakia) less vulnerable since they owe their RSIs to the interconnections between them (which are indeed all fed by the same source, Russia). Taken all into account, ACER (2015a) recommends the member states to enhance SoS by ensuring more geographically dispersed accessibility of existing gas sources outside the EU; cooperation in a supply emergency with no restriction put on cross-border flows to protect national interests; diversified upstream supply sources⁸⁵ and fostered upstream competition. Equally important, is the demand-side response mechanisms which need to be developed and gas shippers should be incentivised with adequate dynamic imbalance prices (with no price cap other than a Value of Lost Load (VoLL)) to balance supply and demand in case of gas-supply emergency. ACER also considers interruption caused to smaller customers (i.e. households) to be treated as a balancing action by the system operator too and the revenue recovered by this to be reimbursed to the affected consumers. Most important of all, due to declining gas demand in the EU, ACER foresees an improved use of storage and LNG to contribute into SoS such as by providing full unbundling of storage products to facilitate the efficient use of storage with different products for different purposes as the sector evolves; ensured system-balancing prices to reflect

⁸⁵ Via, for example, incentivizing TSOs to jointly develop complex project to bring conventional gas from relatively distant new sources by sharing the risks (ACER, 2015a). Or as last resort in case of overdependence on a particular source of gas, according to Boltz (2015, p.11) legal limitation of the share taken from that source should be considered.

VoLL; and entry-exit tariffs to recognise the role of storage with varied individual tariffs for, say, injection, withdrawal or working gas (Boltz, 2015).

The challenges of natural gas markets have evolved in an alarming way over the last two years. Due to a combination of increases that have occurred in renewables generation, the arrival of inexpensive coal from the US, and the low CO_2 price (ACER, 2015) the issue is no longer the SoS or wholesale markets alone but now a wider and more fundamental since the role of gas in power generation has been declining dramatically. So, faced with today's problems, what are the other solutions ACER and gas market participants have been considering?

4.4.3 Natural Gas - Electricity Coordination: The Role of Gas in Complementing Renewable Energy Sources (RES) Electricity Generation

Most discussions conducted at the ACER GTM workshops and via the public consultations⁸⁶ between 2013-2014 concluded that the energy output came from RES suffered from intermittency since RES generation heavily relied on weather/seasonal conditions. It is even more remarkable that increasing the demand for complementary electricity generation technologies over the coming years to address the problems of RES intermittency has taken precedence over other policies. The question that then needs to be faced is whether regulatory and market arrangements would allow efficient use of gas-fired power plants (GFPPs) as part of a cost minimising policy for the EU's environmental goals (ACER, 2015a). Whilst ACER argues that gas-fired plants are ideal to back up renewable generation because they operate at lower load factors (which means lower specific investment cost compared to, say, coal) and they are technically able to provide the flexibility (i.e. fast 'rump up' and 'ramp down')⁸⁷ the reserve markets need, Frontier Economics (2014), O'Brien (2014) and Rondella (2014), amongst others, identified the immediate problems of GFPPs as:

- Competitiveness of gas-fired generation is declining
- Transportation and storage tariffs have disadvantages⁸⁸

⁸⁶ Energy regulation: Bridge to 2025.

⁸⁷ Especially open cycle gas turbines.

⁸⁸ For example, fixed tariff discourages plants to run due to increase in fixed costs even if the plant does not run; variable tariff decreases the competitiveness of plants by adding to their marginal cost. Capacity-

- Lack of flexible short-term storage products
- Lack of short-term (day or half day) block auctions for balancing power
- Lack of coordination between gas and electricity markets (i.e. misalignment between 'gas day' (06.00-06.00) and 'electricity day' (00.00-00.00); and differences in nomination periods resulting in greater exposure to imbalance charges if gas-fired generator changes output at short notice etc.)





As regard to these inadequacies of the systems, ACER firstly suggests a possible way of resolving the capacity products issue by reviewing the existing arrangements, so that within-day capacity products can be promoted. The full unbundling of storage products has been deemed equally important as the efficient use of gas storage whose competitiveness and non-discriminatory availability to all shippers (not least those serving unpredictable loads) are crucial to a cost effective balancing regime and within day obligations. ACER recommends an obligatory measure to be put in place so that both gas and electricity TSOs would cooperate on (i) improving information flows between them thus the market participants could better optimise their operational decisions; (ii) developing TYNDPs for both sectors; and (iii) the alteration of industry timelines, before and after gate closures in particular, to reduce the lead times with respect to CBAs.

Source: Rondella (2014), p.10

based tariffs on the other hand create no incentives for TSOs to offer attractive products for GFPPs and provide inefficient incentives as "lumpy" increase from small usage so holders of capacity at co-located multiple exit points would further like to bundle capacity to reduce distortion of incentives from capacity charges (Frontier Economics, 2014, p.9).

4.4.4 New Developments along the Gas Supply Chain

Ever since the launch of Europe's flagship initiative – 'resource efficient Europe' and 'innovation union'– as part of the Europe 2020 strategy, the role of sustainable alternative fuels and new technologies to store electricity in gas forms became more prominent than ever (EU Directive Proposal, 2013). Following ACER (2015a) the new developments along the gas supply chain are here defined as the use of intensified gas (e.g. LNG and CNG) in the transport sector⁸⁹, small-scale application of LNG and CNG (including alternative distribution means e.g. virtual pipelines) and pioneer technologies to facilitate the storage of electricity generation in the form of hydrogen or synthetic gas, in other words 'power-to-gas'.



Figure 9. The New Uses for Gas and Their Roles Across The Gas Supply Chain

Source: Hesseling (2015), p.46

In every industrialised country it has been normal practice for governments to involve themselves in searching for cleaner and ideally cheaper energy sources. In the case of the EU this may be attributable to the introduction of stricter regulations as regards to pollution and tailpipe emissions. The Regulation R-110 dated June 2014 standardises the use of LNG and CNG in natural gas vehicles (NGVs) whilst the Directive 2012/33/EC adopts the restrictions put to the allowable level of sulphur in marine fuels' emissions⁹⁰ by the International Marine Organisation and favours the use of LNG-fuelled ships (Hesseling (2015)).

⁸⁹ Natural gas vehicles (NGVs) can be fuelled with Compressed Natural Gas (at ~200 bar) or with Liquefied Natural Gas (at -162°C). CNG is mainly used in urban transport as cars, taxis, buses, city service trucks and dailies whilst LNG is chiefly used by trucks for long distance travels (Hesseling, 2015).

⁹⁰ 0.1% as of 1/1/2015 in SOx Emission Control Areas (SECAs) and 0.5% as of 1/1/2020 in IMO

When compared, CNG seems to be more deployable given its easy accessibility from simple filling stations connected to the gas network whilst LNG promises vehicles longer distance coverage with three times more energy density and yet sumptuous filling stations with required virtual pipelines. ACER (2015a) defines a virtual pipeline as a supply chain transporting natural gas to final consumers in the form of LNG or CNG, using land and/or water transportation where construction of transmission systems are not economically or technically feasible. The potentially enormous significance of prevailing the NGVs might be downplayed by three factors however, namely the extra-investment needed to retrofit or purchase new LNG and CNG vehicles; price competitiveness compared to fuels to be substituted; and the intensity of utilisation of the vehicle. The current penetration of new use of gas in the EU transport sectors (both land and water) is negligible but it is expected to account for 3-15% of EU gas consumption in 2025 (Hesseling, 2015).

The new idea behind power to gas (P2G) technology is that via electrolysis combined with hydrogen methanation electricity can be taken as an input and be transformed into hydrogen or synthetic methane. When these outputs are injected into the existing gas network the transport and storage of energy could be facilitated. The practical reasons behind such technologies are that they can profit electricity curtailed RES generation, act as a balancing tool in electricity market, improve stability of the network and help predictability of renewable energy production (ACER, 2015a). Presently, Germany conducts fifteen operational pilot projects but Hesseling (2015) envisages full-scale commercial of the P2G technology post 2030.

4.5 Conclusion

The purpose of this chapter was to first discuss natural gas market liberalisation in the context of the EU and the role of energy Directives in the process; and second to understand how the EU plans to form an integrated gas market via the Gas Target Model by describing each of its building blocks. The analysis in this chapter has shown that the Directives have progressively aimed at freeing gas markets of the member states

members' territorial seas (ibid, p.49).

and via the GTM the EU has encouraged its members to look beyond the liberalisation concept to see how the internal gas market can have systematic effects.

For market openness, the foundational position is summarised in designation of eligible customers. Thanks to the 2nd Directive all natural gas consumers have been eligible to choose their suppliers -irrespective of their annual consumption level- since 2007 whilst the 3rd Package has focused on the avoidance of imbalance in the opening of gas markets and set concise timetables for the switching procedure. But contrary to what is expected, the evidence on how well competition can serve the interests of households and small firms does not seem to be fully realised as discussed in Chapter 2 since the rate of switching amidst European consumers remains low.

Also the results in this chapter have showed that the establishment of national energy market regulatory authorities throughout Europe and their equipment with core responsibilities (e.g. licensing, fixing/approving tariffs, balancing, monitoring -even intervening when necessary- the allocation of (interconnection) capacity and congestion management etc.) were materialised via the 2nd Directive. Once the system was established properly, the more comprehensive 3rd Package followed and the strengthening of NRAs' impartiality has been developed by granting them extra power to impose dissuasive penalties on natural gas undertakings failing to comply with their obligations, and rights to establish gas-release programmes to promote effective competition and proper functioning of gas markets.

Concomitant with establishing NRAs, the potential conflict of interest between network owners and operators - when both involved in generation or supply phases – is another issue the EU has tried to address via the Directives. Unbundling -or vertical separationbrings together the search for economic gain through extracting monopoly rents with the authorities' (mainly regulators') efforts to protect customers from being overcharged by the monopolist for network access. The EU discusses three models for transmission segment of the markets, i) ownership unbundling; ii) establishing an *independent system operator (ISO)*; and iii) the *independent transmission operator (ITO)* whilst for the unbundling regime of DSOs legal, functional and ownership unbundling options are presently offered to the members. The DSOs are expected to be independent at least in terms of its legal form and finally, the storage operators are envisaged to operate through legally separate entities that have effective decision-making rights with respect to assets necessary to maintain, operate and develop storage facilities.

Since greater clarity is needed in the downstream part of markets as regards to incentives to be given to domestic producers and for the creation of competition at large customer level, the non-discriminatory TPA to natural gas networks has become the main component of the hard core discussions of the EU. The 2nd Directive and Regulation 1775/2005 were particularly important in this regard since the former abolished the nTPA in transmission networks (though kept providing both nTPA and rTPA options for storage facilities, line-pack and other ancillary services), the latter dealt with the capacity issues by empowering TSOs to offer unused capacity to other parties at least on a day-ahead and interruptible basis (secondary market), and also put the tariff methodologies into a legal text leaving the determination of tariffs at the discretion of the member states via market-based arrangements. Equally fundamental, the 2nd Directive allowed the full and partial exemption of major new gas infrastructures from TPA and cost regulation obligations. These shifts were supported and justified in the 3rd Directive and it has postulated that the NRAs, on a case-by-case basis, decide on the exemptions. The 3rd Package has also required TSOs to adopt E/E systems as a network access model to serve as guideposts for creating gas transport through zones instead of along contractual paths.

The second phase of this analysis studied the Gas Target Model of the EU launched in 2010 focusing on how the GTM was planned to help the emergence of functioning gas markets throughout Europe. Based on three pillars (i.e. enabling well-functioning wholesale markets, connecting functioning wholesale markets and ensuring secure supply and economic investment) the old GTM aimed at creating a coherent framework relating to the full unbundling of network operators, development of NCs and competition via well-functioning wholesale markets both nationally and across borders-comprising E/E zones with liquid virtual hubs (ACER, 2015). With particular attention given to the harmonisation of national arrangements made with capacity allocation mechanisms, congestion management procedure, gas balancing arrangements and transmission tariff structures the integration of different wholesale markets across Europe was deemed to be out of the question.

The first step discussed in the understanding of new GTM is the changing gas market characteristics such as the decline in the EU gas demand and reduction in long term oil-indexed supply contracts. Next is an evaluation of the growing interrelations between electricity and gas sectors and the changing role of storage and LNGs. Differing from the old one, the new GTM determines the level of functioning of wholesale markets by two sets of new criteria namely i) market participants' needs metrics (i.e. order book volume, bid-offer spread, order book price sensitivity and number of trades); and ii) market health metrics (i.e. number of supply sources, HHI, RSI, market concentration for bid and offer activities and market concentration for trading activities). Also, the new GTM goes beyond articulating the functioning of wholesale markets and their integration, and suggests ways to lower the impacts of the ongoing Ukraine crisis and the potential threat to the availability of gas from Russia. For this, it adopts measures to deal with the globally changing landscape of natural gas developments and highlights the significance of gas security of supply, healthy interaction between natural gas and electricity sectors and use of alternative fuels and new technologies.

As noted in the OECD (2015) Turkey was required to harmonise its legal framework with EU norms concerning trade under the EU Customs agreement (p.19) and similarly, in view of a future accession to the EU, Turkey's energy markets should be harmonised with the EU energy Law, the identical content of the EU Directives and the GTM together with other member states. Turkey has already started liberalising it natural gas industry in concert with its NGML of 2001 and considerable reforms have already been undertaken. In the following two chapters the Turkish gas sector is explored in more detail and whilst Chapter 5 reviews Turkey's natural gas history and depicts the gas market development policies of the AKP government over the course of 2001-2014, Chapter 6 focuses on how regulatory institutions have attuned to sector developments and tries to find out how effective the NGML has been in the context of the EU energy Directives and how compliant the legal framework in Turkey is with the Gas Target Model of the EU.

Chapter 5: An Overview of the Turkish Natural Gas Market

5.1 Introduction

While short term changes in energy demand and the substitution of one fuel for another can be explained by energy prices and seasonal conditions by and large, long term changes in energy sectors can be addressed by a number of diversified reasons such as countries' deficient energy resources, openness to the development of unconventional energy resources which is presently led by developed countries, increasing energy needs mainly due to rising incomes and the provision of access to energy in poor regions of the world.

Turkey's natural gas market is in the midst of a reformative transformation and its role in global gas supply and demand is becoming a subject of interest. The Ministry of Energy and Natural Resources of Turkey has set three strategic targets, i.e. a strong and reliable energy infrastructure, optimum resource diversity and effective demand management to be met by 2019. The objective of this chapter is to provide an updated review of natural gas developments in Turkey over the 2001-2014 period. This thorough analysis is aimed at providing a prelude for the next chapter where the regulatory framework of the gas sector and liberalisation efforts of the Turkish government is examined. The chapter has four parts and begins with an overview of the Country in economic and political terms. Part two delineates evolutionary context of the Turkish energy markets in other segments whilst a broad scope of the literature pertinent to the background of Turkey's natural gas industry (e.g. the concept of recent trends, unconventional gas developments, import dependence, increasing consumption and developing infrastructure) is reviewed in the third part. Finally part four concludes.

5.2 Setting the Context: Country Overview in Economic and Political Terms

In line with the lessons learnt from the implications of restructuring a reform programme supported by the International Monetary Fund (IMF) to attenuate the severe economic crises encountered in 1999 and 2001, the rise of Turkey in the global arena led by

successful economic reforms and the political stability instilled by successive governments led by President Recep Tayyip Erdoğan's Justice and Development Party (AKP) since 2002 have been evident. Turkey, like many other developing countries, adopted the 'External Financial Liberalisation' policy and has experienced an upsurge in foreign influence in both foreign direct investment (FDI) inflows and portfolios since 1989. Turkey's membership in the WTO as a founder since 1995 followed by its accession to the Customs Union a year later and long standing negotiations with the EU as a candidate country, have played a major role to shape the Turkish economy to go beyond the Uruguay Round Commitments in shaping the liberalisation of international trade ahead of other members of the developing countries.

Turkey is eager to play a leading role as a regional and global player both economically and politically and this has, over the past decade, been fuelling a paradoxical debate upon the feasibility of a geopolitical alteration in its neighbourhood. The crucial questions often asked include whether or not Turkey is trying to gain ground to be the next leader in the region, how it could enhance its stalled accession negotiations with the EU and moreover how the mutual foreign policy tools initiated by both Turkey and the EU could lead to an achievement of essential consequences to name but a few (Alessandri and Altunisik, 2013; Burns, 2012; Düzgit and Tocci, 2009; Kirisci, 2006, Torun, 2012; and Seale, 2012). Without a doubt, recent developments in the Turkish economy, worldwide achievements of the Turkish firms operating in various industries abroad⁹¹, and the salient reputation of Turkey's visa-free regime with more than seventy countries have greatly contributed to the improvement of the new leadership image of Turkey as an economic powerhouse.

⁹¹ The statistical data by the Central Bank of the Republic of Turkey (CBRT) shows that Turkish FDI stock in neighbouring countries rose from about US\$900 million in 2001 to US\$6.25 billion in 2011.



Figure 10. Turkey's Foreign Trade with Major Trade Policy Developments

Source: OECD (2015a, p.20)

Notwithstanding its general strength particularly under the single party regime over the last decade, the Turkish economy is still a volatile one with recorded high increases followed by periods of equally rapid decline. Due to the global financial crisis in 2008-2009 during which many of the world economies contracted Turkey, too, experienced a slowdown. The foreign trade volume of Turkey that had been on the rise since 2002, for example, decelerated markedly to US\$243 billion in 2009 by a 27% decrease compared to that of 2008. However, the economy managed to regain momentum with growth rates of 9.2% and 8.5% in 2010 and 2011 respectively and these were the world's highest rates of growth after China making Turkey the Europe's fastest growing economy. 2012 was a similar year in which a steep decline in GDP growth was experienced (2.2%). With a prompt recovery throughout 2013 the economy grew by 4.3% almost doubling the growth expectation from the World Bank for Turkey. In the same year, the GDP⁹² reached US\$683.6 billion, an almost 80% increase comparing to that of the US\$364.5 billion in 2001, with an average growth rate of 4.6% during the 2000-2012 period which kept the country's position⁹³ as the world's seventeenth largest economy (and the sixth largest in Europe) unchanged (World Bank, 2013; OECD, 2015). Service and industry sectors have been the major drivers of this big economy by a 65% and 27% GDP contribution respectively whilst agriculture, though its share is relatively small (8%), occupies 25.5% of Turkey's labour force (World Bank, 2013). Also, an ambitious privatisation programme embarked upon by the AKP government throughout their administration to reduce the state's involvement in sectors including banking, transport, industry, telecommunication and infrastructure resulted in an accumulative revenue of US\$61.8 billion generated between 1985-2014 (Privatisation Administration, 2014).

5.3 The Evolution of Turkish Energy Markets

Clearly, the patterns described above reflect an ongoing cycle of economic prosperity in Turkey and that has rapidly spread across other economic activities in light of globalisation. The energy sector, in this context, following a high degree of urbanisation, economic diversification and growth, has become one of the most sought after industries by investors given the growing demand and investment requirements.

⁹² At constant 2005 US\$.

⁹³ According to the OECD 2014-2016 estimations Turkey is forecasted to have the largest average real GDP growth as 3.6% (OECD, 2015b).

Turkey is highly dependent on fossil fuel namely natural gas which accounts for 35%, coal (29%) and to oil (27%) as of 2014 (BP, 2015) and when compared to its relatively small indigenous production the country's overarching leadership strategy seems to be undermined. Since energy is directly and indirectly related to the national security of any country as a vital instrument fueling the economic engine, and political and social stability, Turkey has long been striving to address its energy security and efficiency issues. At the outset, trouble appears to begin with the cost of energy imports which has been a heavy burden on the Turkish economy for decades (Figure 11).



Figure 11. Cost of Energy Imports to the Turkish Economy, 2002-2014 (US\$ bn)

An aggregate US\$460 billion has been paid for energy imports since 2002 whilst the cost of 2013 alone accounted for one fourth of Turkey's total importation bill (BOTAS, 2014; CBRT, 2014). The contributory factors for Turkey's rising energy dependence, amongst others, may be attributed to the continual population⁹⁴ increase (18.61% growth between 2000-2013), expanding economic developments and its enfolding impacts on the living standards of people. Figure 12 shows the changes in gross domestic product and primary energy consumption of Turkey over the 2000-2014 period.

⁹⁴ As of 2014, Turkey's population is around seventy eight million and more than half of which is young.



Figure 12. Final Energy Consumption and GDP of Turkey, 2000-2014

Source: EIGM; IEA; WDI

As illustrated above Turkey's final energy consumption continues to follow an increasing trend since 2001 with the exception of the volatility during the economic recession in 2008. Similarly, its total primary energy supply (TPES) reached 120.2 million tonnes of oil equivalent (Mtoe) in 2013 by growing 63% since 2001. Industrial⁹⁵ and residential energy consumptions have so far been the largest in Turkey whilst transport, residential and transformation increased their use of energy the most between 2001-2013 (by around 90%, 76% and 68% respectively). Despite the fact that energy demand in Turkey grew at the fastest pace within the OECD in the past few years, its per capita energy consumption (1.52 toe as of 2012) remained still relatively low compared to those of OECD (4.28 toe) and the world (1.88 toe) averages (IEA, 2013).

The same picture can be drawn for the per capita electricity consumption of the country which stood at 2,677 kWh equaling almost one third of the OECD realisation for the same year. In order to measure and compare a country's energy efficiency performance against others, energy intensity⁹⁶ is one of the most commonly used indicators and is traditionally higher in low to medium income countries (Bergasse, 2013). The energy intensity of Turkey in 2012 was 0.18 toe and although it was about 29% higher than the OECD average (0.14 toe), it was much lower than the world level of 0.25 toe. According to the International Energy Agency, final energy consumption in Turkey is expected to

⁹⁵ Although industry is currently the country's main user of energy after transformation its share in TPES has decreased sharply from 75% in 2001 to 25% in 2013 according to EIGM Balance Tables available online at <u>http://www.eigm.gov.tr/tr-TR/Denge-Tablolari/Denge-Tablolari</u>.

⁹⁶ The share of energy input per unit of economic output (GDP).

double in the medium term despite the bleak 2030 projections of the BP Energy Outlook (2011) which posited at least a 10% decline for the share of other OECD countries in global primary energy consumption. These facts clearly call for further growth in the Turkish energy sector as well as indicating a necessity for large investments.
	Coal*	Crude Oil*	Oil Products	Natural Cas	Nuclear	Hydro	Geothermal	Biofuels	Flectricity	Heat	Tatal
	Cuai	Crude On	On i rouucis	Matur ar Gas	Nuclear	Ilyulu	solar etc	and waste	Lieunity	iicat	Iotai
Production	(12,485) 15,589	(2,729) 2310	(0) 0	(526) 521	(0) 0	(2,656) 4,976	(948) 3,508	(6,513) 3,652	(0) 0	(0) 0	(25,857) 30,556
Imports	(9,310) 19,462	(21,429) 19421	(9,114) 2,0291	(12,048) 37,801	(0) 0	(0) 0	(0) 0	(0) 51	(326) 501	(0) 0	(52,227) 97,528
Exports	(0) -5	(0) -376	(-1,293) -7418	(0) -507	(0) 0	(0) 0	(0) 0	(0) 0	(-38) -254	(0) 0	(-1,330) -8,560
Int. marine bunkers	(0) 0	(0) 0	(-399) -188	(0) 0	(0) 0	(0) 0	(0) 0	(0) 0	(0) 0	(0) 0	(-399) -188
Int. aviation bunkers	(0) 0	(0) 0	(-521) -1,030	(0) 0	(0) 0	(0) 0	(0) 0	(0) 0	(0) 0	(0) 0	(-521) -1,030
Stock changes	(719) -20	(-308) -280	(-348) -546	(61) -564	(0) 0	(0) 0	(0) 0	(0) 0	(0) 0	(0) 0	(123) -1,409
TPES	(22,514) 35,027	(23,850) 21076	(6,553) 11,110	(12,634) 37,251	(0) 0	(2,656) 4,976	(948) 3,508	(6,513) 3,703	(288) 247	(0) 0	(75,957) 116,897
Transfers	(0) 0	(0) 3003	(0) -2,985	(0) 0	(0) 0	(0) 0	(0) 0	(0) 0	(0) 0	(0) 0	(0) 18
Statistical Differences	(346) 274	(-194) -1668	(0) 381	(-214) 0	(0) 0	(0) 0	(0) 0	(0) 0	(0) 0	(0) 0	(-63) -1,013
Electricity Plants	(-9,767) -16,585	(0) 0	(-2,367) -270	(-6,724) 15,809	(0) 0	(-2,656) -4,976	(-68) -1,277	(-41) -108	(10,313) 1,9936	(0) 0	(-11,311) -19,089
CHP Plants	(-110) -185	(0) 0	(-225) -96	(-679) -2,074	(0) 0	(0) 0	(0) 0	(-17) -71	(431) 660	(386) 1225	(-215) -540
Oil Refineries	(0) 0	(23,759) -23169	(23,825) 23,575	(0) 0	(0) 0	(0) 0	(0) 0	(0) 0	(0) 0	(0) 0	(65) 405
Coal Transformation	(-1,841) -2,024	(0) 0	(0) 0	(0) 0	(0) 0	(0) 0	(0) 0	(0) 0	(0) 0	(0) 0	(-1,841) -2,024
Other Transformation	(0) 0	(104) 759	(-107) -786	(0) 0	(0) 0	(0) 0	(0) 0	(0) 0	(0) 0	(0) 0	(-4) -27
Energy industry own use	(-283) -686	(0) 0	(-1,554) -1,107	(-81) -1,249	(0) 0	(0) 0	(0) 0	(0) 0	(-744) -1,188	(0) 0	(-2,661) -4,230
Losses	(-14) 0	(0) 0	(0) 0	(-26) -4	(0) 0	(0) 0	(0) 0	(0) 0	(-2,043) -3,067	(0) 0	(-2,083) -3,071
Total final consumption	(10,845) 15,821	(0) 0	(26,125) 29,821	(4,910) 18,115	(0) 0	(0) 0	(880) 2,231	(6,455) 3,524	(8,245) 16,589	(386) 1,225	(57,846) 87,326
Industry	(8,829) 6,831	(0) 0	(4,799) 1,682	(1,666) 7,994	(0) 0	(0) 0	(97) 268	(0) 0	(3,964) 7,764	(386) 1,225	(19,741) 25,765
Transport	(1) 0	(0) 0	(11,652) 16,880	(40) 199	(0) 0	(0) 0	(0) 0	(0) 72	(66) 73	(0) 0	(11,758) 17,224
Other	(2,015) 8,989	(0) 0	(6,245) 4,426	(3,112) 9,658	(0) 0	(0) 0	(783) 1,963	(6,455) 3,452	(4,216) 8,753	(0) 0	(22,825) 37,240
Residential	(2,015) 4,834	(0) 0	(3,592) 884	(2,694) 7,283	(0) 0	(0) 0	(783) 1,581	(6,455) 2,505	(2,054) 3,902	(0) 0	(17,594) 20,888
Commercial & Public services	(0) 4,088	(0) 0	(0) 0	(417) 2,241	(0) 0	(0) 0	(0) 0	(0) 0	(1,897) 4,347	(0) 0	(2,315) 10,676
Agriculture/Forestry	(0) 68	(0) 0	(2,653) 3542	(0) 86	(0) 0	(0) 0	(0) 382	(0) 0	(264) 493	(0) 0	(2,917) 4,571
Fishing	(0) 0	(0) 0	(0) 0	(0) 48	(0) 0	(0) 0	(0) 0	(0) 0	(0) 10	(0) 0	(0) 58
Non-specified	(0) 0	(0) 0	(0) 0	(0) 0	(0) 0	(0) 0	(0) 0	(0) 1047	(0) 0	(0) 0	(0) 1,047
Non Energy Use	(0) 0	(0) 0	(3,429) 6,833	(92) 264	(0) 0	(0) 0	(0) 0	(0) 0	(0) 0	(0) 0	(3,521) 7,097
of which chemical/petrochemica	$\mathbf{d} \qquad (\overline{0}) 0$	(0) 0	(1,367) 1,711	(92) 264	(0) 0	$(\overline{0}) 0$	(0) 0	(0) 0	(0) 0	(0) 0	(1,459) 1,974

Table 6. Energy Balance of Turkey, (2000) and 2012 (Ktoe)

Parantheses show the data for 2000.

*The column of coal also includes peat and oil shale where relevant; that of crude oil includes crude oil, NGL, refinery feedstocks, additives and other hydrocarbons.

Source: EIA

Table 6 presents the major energy sources of Turkey as coal, natural gas, oil and renewables (in the form of hydropower, solar, geothermal and waste). Fossil fuels accounted for 90% of the country's total primary energy output with coal providing 30% of shares in 2012. Coal (primarily lignite) constitutes the largest fossil fuel reserve of Turkey⁹⁷ and about 88% of the lignite reserves are explored and produced by the state.

In terms of oil, the demand between 2000-2012 showed a slight increase rising from 662.8 thousand barrels per day (kb/d) to 670.3 kb/d whereas the share of oil in TPES had constantly decreased from 40% to 28% during the same period (EMRA, 2012). The transport sector is the major consumer of oil and given its limited indigenous output, Turkey imports crude oil from a restricted number of countries predominantly Iraq (31.3%), Iran (29.7%), Saudi Arabia (11.5%) and Nigeria (9.8%). The country has two major oil pipelines - the Iraq-Turkey Crude Oil Pipeline⁹⁸ and the Baku-Tbilisi-Ceyhan Oil Export Pipeline (BTC) - carrying crude oil from Iraq and Azerbaijan to Turkey under the operatorship of BOTAS and the latter generates significant revenues to the host countries as well as holding exceptional importance for Europe and the Mediterranean as an East-West Superhighway (BP, 2013; MENR, 2014; Cornell, Tsereteli and Socor (2005)). The Turkish government has hugely raised its upstream investments for the exploration of new oil fields from US\$100 million in 2002 to US\$1.36 billion in 2011. But, in the face of a 7.7% increase in the world's proven oil reserves mostly due to a large proportion of increase in the heavy crude oil reserves of Iran and Venezuela in 2012 (Oil and Gas Journal, 2012 cited in TPAO, 2013), the recoverable domestic oil reserves in Turkey still remains relatively small (294.8 million barrels). Notwithstanding the discovery of new oil fields and the development of secondary production methods which have incontestably saved the indigenous oil production from declining sharply around 93% of Turkey's discovered oil fields can only be classified as small whilst a mere 7% of which is midfield to date. In case of no new discoveries, with the current production level of total domestic crude oil the reserves only have a life span of 18.5 years (TPAO, 2013). The small production capacity in addition to a set of undiversified import destinations proves a great vulnerability for Turkey's oil supply security and hence for the socioeconomic developments.

⁹⁷ 8.7 billion tonnes of coal in 2014 (accounting for 1% of world's total (BP, 2015)) and the Afsin-Elbistan coalfield has Turkey's largest lignite reserve.

⁹⁸ Length of the pipeline is 1,876 km and has 70.9 million ton/yr (553 million barrels/yr) transport capacity. Its operations were once suspended and are presently limited in conjunction with the embargo imposed on Iraq by the UN (MENR, 2015).

Turkey's installed hydropower capacity was at 12,241 MW in 2002 and by increasing 78% over a decade it reached 23,455 MW in 2014. There is an economically feasible 140 billion kWh/year of total hydropower potential in Turkey 44% of which has already been facilitated whilst another 31% is still under construction by enterprises. Similarly, the installed capacity of geothermal energy, which was marginal a decade ago (17.5 MW), rose dramatically totaling 358.4 MW in 2014. Turkey has 31,500 MWt geothermal potential and the energy produced by which is mainly used for heating (not least residential and greenhouse) and tourism purposes. The developments in wind energy have been by far the most bewildering with installed capacity increased from as small as 18.9 MW in 2002 to 2,482 MW in 2012. With the addition of one hundred and ninety-nine new projects by private investments during the 2013-2014 period some 3,980 MW capacity has entered into system and plans are underway to gradually increment the share of renewables in the country's energy mix even further over the next ten years (MENR, 2014; 2015).

Lastly, despite having the Turkish Atomic Energy Authority⁹⁹ readily established since 1956 and some unsuccessful prior attempts to build nuclear power plants during the 1965-1997 period, nuclear energy as a means of alternative energy came to Turkey's agenda in real terms as belated as 2005. This was chiefly due to the hypertrophic growth in electricity demand and the AKP's sustainable economic growth targets. The selection of locations for Turkey's two commercial nuclear power plants was finalised in 2006 and the Turkish Electricity Trade & Contract Corporation (TETAS) started to invite bids from interested parties for the Akkuyu site and Sinop in 2008 and 2013, respectively (TAEK, 2013). For the Akkuyu project, consequently, an intergovernmental agreement was signed with the Russian Federation National Nuclear Corporation (Rosatom) in May 2010 for four 1,200 MWe VVER-2006 units to be built on build, own and operate (BOO) basis and the Russian government to be the guarantor of the project¹⁰⁰. The construction start date is projected to be early 2016 with the aim to bring the first unit online in 2020-21. The US\$22 billion build-operate-transfer (BOT) based Sinop nuclear project, on the other hand, was agreed to materialise by a consortium led by Mitsubishi Heavy Industries

⁹⁹ Formerly General Secretariat of Atomic Energy Commission.

¹⁰⁰ A fixed proportion of the power to be generated (70% output of the first two units and 30% for the other two) in the Akkuyu site will be bought by the state Electricity Trading and Contracting Company (TETAS) at fixed price of US\$12.35 cents/kWh on weighted average for 15 years and the rest will be sold in the open market. The Turkish government will start to be paid 20% profit after 15 years (IAEA, 2015). See <u>http://www-</u>

pub.iaea.org/MTCD/Publications/PDF/CNPP2014_CD/countryprofiles/Turkey/Turkey.htm

and Itochu, with GDF SUEZ (now Engie) following the intergovernmental agreement signed with Japan in May 3, 2013¹⁰¹. The proposed project includes four Atmea 1 reactors with a total capacity of 4,480 MWe to be commenced in 2019 and the first unit to be commissioned in 2023 (IAEA, 2015; MENR, 2015).

5.4 Emergence of Natural Gas: A Background to Turkey's Natural Gas Industry

According to the EIA (2013) report, world energy demand will increase more than 50% between 2010-2040 although the OECD region projections shows almost no growth at all (0.5% per annum). Turkey is perhaps the only member of OECD that foresees over 80% increase in its TPES by 2023 (MENR, 2015) and notwithstanding the government plans to either integrate the nuclear power plants into the Turkish electricity grid or to switch away from natural gas and liquid fuels when feasible, natural gas is expected to supply almost a quarter of the energy used in Turkey by 2023 and continue to be the backbone of energy supply. This being the case, the following sections provide the natural gas market outlook of Turkey in greater detail.

5.4.1 Reserves and Production

Whilst oil exploration and production activities in Turkey date back to the 1930s, natural gas exploitation is a comparatively new development that has been accelerated chiefly from 1987. Turkey has limited proved gas reserves 25.77 bcm as of 2012 with a remaining producible gas of 6.8 bcm in 2012 that reduced to 6.16 bcm in 2013 and to 3.7 bcm in 2015. This, according to 2013 Turkish Petroleum Corporation report, translated into a ten-years life for the remaining recoverable gas if no new discoveries were made. Table 7 below illustrates the natural gas reserves in Turkey and the upstream companies that operate them:

¹⁰¹ The World Nuclear Association details equity shares of the parties as MHI (15%), Itochu (15%), Engie (21%) and Turkish Electricity Generation Joint-Stock Company (EUAS) (49%), see <u>http://www.world-nuclear.org/info/Country-Profiles/Countries-T-Z/Turkey/</u>.

Company	Gas in reserves*	%	Producible gas	%	Remained producible gas	%
TPAO	16 267 954 165	63.1	12 050 635 459	59	3 972 681 642	58
N.V .Turkse Perenco	340 680 073	1.32	340 680 073	1.7		
Amity Oil Int. & TPAO	1 924 833 289	7.46	1 586 975 398	7.8	86 853 167	1.3
Thrace Basin & Pinnacle Turkey Inc.	5 320 873 992	20.6	4 828 601 173	24	2 299 472 242	34
Tiway& TPAO & Foinavon & P.O.A.S.	1 336 910 000	5.18	1 005 490 000	5	143 089 510	2.1
TransAtlantic & Petrako & Valeura Energy	140 993 784	0.54	133 253 784	0.7	9 796 449	0.1
Arar	240 013 267	0.93	192 013 267	0.9	190 588 584	2.8
Tiway-TEM	161 400 000	0.62	141 600 000	0.7	135 316 297	2
Petrogas	27 533 214	0.1	27 533 214	0.1	40 208	
Amity Oil Int.	17 656 097	0.06	17 656 097	0.1	3 539	
Maya & Çalık Enerji & Petrogas	1 049 720	0	1 049 720	0		
2012 Total	25 779 897 601	99.9	20 325 488 185	100	6 837 841 638	100
2013 Total	24 359 724 923	-	19 432 830 521	-	5 383 639 186	-
2014 Total	23 079 577 130	-	18 414 676 595	-	3 863 376 035	-
2015 Total	23 180 917 237	-	18 657 686 896	-	3 707 662 926	-

Table 7. Natural Gas Reserves of Turkey and Producers, 2012-2015 (m3)

*Sum of proven, probable and possible reserves.

Source: TPAO; PIGM

The last decade saw a marked thirteen-fold increase in pre-drilling exploration activities (chiefly materialised using public resources) by the national petroleum company, TPAO compared to the preceding years. Although the upstream activities of TPAO had traditionally been onshore it has expedited its exploration and production (E&P) activities of hydrocarbon resources both in Turkey and overseas. The current exploration focus is comprehensively on the large-scale offshore developments in deep waters, the underexplored basins of Black Sea and Mediterranean Sea in particular (BOTAS, 2013; TPAO, 2013).

As has been said at the beginning, Turkey's natural gas market is in the midst of a reformative transformation and in spite of the TPAO's long-term exclusivity in the upstream Turkish natural gas market for almost fifty years, private companies have been allowed since 2003 to take part in E&P activities primarily in Southeastern Anatolia, Thrace and Western Black Sea regions. The E&P activities are carried out under

exploration and operation licenses (Petroleum Law No. 6326) granted by the General Directorate of Petroleum Affairs. The Law does not deem natural gas generation as a market activity but since the generation companies are required to hold a wholesale license to operate they can trade their output to wholesale, import, export¹⁰² and distribution companies within the country. The local output can also be sold to CNG transmission and distribution companies with the exception of CNG sales companies if the gas is not brought out from the wellhead or by the eligible consumers (EMRA, 2011).

Figure 13. Natural Gas Production in Turkey and Share in Consumption, 2000-2015



Source: EMRA; TPAO

Thanks to successfully attracted participation of international producers some significant gas production growth was realised in Turkey¹⁰³ between 2003 and 2008 (Figure 13). However, given the economic crisis and depleting fields domestic output has been declining and has barely covered more than 2% of total demand since then.

5.4.2 Shale Gas Developments

¹⁰² For direct exports, an additional export license needs to be obtained.

¹⁰³ Mainly in five cities namely Duzce, Edirne, Istanbul, Kirklareli and Tekirdag collectively providing 97% of the output (EMRA, 2014).

Although the production of unconventional oil resources via horizontal drilling and hydraulic fracturing began in the 1980s, the commercially viable, large-scale unconventional gas production -deep shale gas in particular- was pioneered by the Mitchell Energy and Development Corporation in the Barnett Shale in North-Central Texas in the 1990s (EIA, 2013). These sweeping changes have opened a whole new door for ambitious energy companies and the new finds of unconventional gas supplies are forecasted to transform the world's energy mix. Undeniably, the advent of developments in shale gas, inventions of necessary technologies and adequate drilling and completion equipment combined with experienced personnel could be a game changer for countries which are not only net exporters with ample conventional resources but also for those that lack resources and fight for energy security. Turkey is clearly one of them.



Map 1. Shale Gas Assessment of Turkey

Source: EIA (2013), p. xxvi-1

The TPAO and several international companies have commenced exploration activities in shale formation in two basins, the Thrace Basin in western Turkey and the Southeast Anatolia Basin along the border with Iraq and Syria (Map 1). According to the EIA's assessment of technically recoverable shale oil and shale gas resources in forty-one countries outside the U.S., these two basins were estimated to contain a collective 164 trillion cubic feet (tcf) of risked gas in place and 23 tcf of technically recoverable shale gas resource in 2013 as illustrated in Table 8 (EIA, 2011; 2013).

With a substantial volume of petroleum source rocks throughout its 6,500 square miles (mi²) area and reservoirs in two formations, the Thrace Basin holds 34 tcf risked gas in place and 6 tcf technically recoverable shale gas for which significant exploration works are underway by the TPAO and Canada-based TransAtlantic Petroleum.

			Diskod	gas in	Techn	ically		Success fact	ors
	Basin Thrace SE Anatolian Turkey To World Tot:	Formation	place	(Tcf)	recov resour	erable ce (Tcf)	Play	Prospective area	Composite
			2011	2013	2011	2013	2013	2013	2013
	Thrace	Hamitabat	14	34	4	6	60%	60%	36%
Turkey		Mezardere	7	-	2	-	60%	50%	30%
-	SE Anatolian Dadas		43	130	9	17	40%	60%	24%
Turkey Total			64	164	15	23			
	World Tota	22,016	31,138	5,760	6,634				

Table 8. Detailed Tabulation of Shale Gas Resources of Turkey, 2011-2013

*Not including the U..S shale gas resources.

Source: EIA (2011; 2013)

Hamitabat is the Thrace Basin's oldest, deepest and most thermally mature¹⁰⁴ formation having shale in the gas window at depths of 14,000 feet to 16,400 feet in the centre. The proliferation of exploration activities by both companies into new shale plays has increased the risked gas in place and technically recoverable shale gas resources of the basin from a respective 14 tcf and 4 tcf in 2011 to 34 tcf and 6 tcf in 2013 according to the EIA and Advanced Resources International (ARI) 2013 calculations. Mezardere has been deposited in a deltaic environment and is another thick, regionally extensive shale interval formation in the Thrace Basin after the Hamitabat. It was found, according to the EIA (2011) investigations, that Mezardere contained 7 tcf of risked gas in place and approximately 2 tcf of which was to be technically recoverable but due to a less than 2% organic content found in the geological studies of EIA in 2013, a quantitative assessment for the formation was not made (EIA, 2013).

Described by the same report as having great affinity to oil rich Saudi Arabian and Iraqi plates, the Southeast Anatolian basin is already the chief oil-producing site of Turkey (EIA, 2011). The over-pressured Dadas formation is the primary source rock in the basin and contains 130 tcf of risked gas in place and 17 tcf of technically recoverable shale resources in three main reservoir wells (i.e. Goksu-#1R, Bahir-#1 and the Caliktepe-#2).

¹⁰⁴ Ranging from 1.3% to over 2.5% as in Aydemir, et al., (2010).

According to the EIA and TPAO estimations, the Sivas, Black Lake, Taurus, Salt Lake and the onshore portion of the Black Sea basins might also hold shale gas potential but given the limited reservoir data on shale formations the exact resource potential has not been assessed yet.

5.4.3 Consumption

Turkey has risen to the top ranks in global energy demand with its fast-rising natural gas demand that outpaces its trivial indigenous production by about 98.8%. It is the OECD's eighth largest natural gas importer and Europe's fifth largest consumer of gas (accounting for 8.7% in 2013¹⁰⁵). Natural gas has been the major source of its primary energy consumption accounting for 35% followed by coal (28.5%) and oil (27%) in 2015, and Turkey consumed 47.9 bcm natural gas in 2015 more than triple the volume fourteen years ago. The upward trend of the country's gas consumption growth slowed for the first and only time during the 2008-2009 period due to the global recession. As shown in Figure 15 below, BOTAS and EMRA (2016) resources declare the power generation sector as Turkey's largest consumer of gas with 39.2% of the mix, followed by industry (29.1%), residential (22.9%), service (6.5%) and other sectors (1.8%) in 2015.

¹⁰⁵ EIA website, "International Statistics" Energy page available online on http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm?tid=3&pid=26&aid=3 [accessed on 20 July 2015].

Figure 14. Natural Gas Consumption versus Production in Turkey, 2000-2015 (mcm)

Figure 15. Turkey Natural Gas Consumption by Sector, 2015



Source: BOTAS; EIA; EMRA (2016)

Turkey is one of the largest¹⁰⁶ electricity markets in the EU and natural gas has been the major fuel source for generation since 1987¹⁰⁷ primarily used by the sub-sectors like gasfired power plants, auto-producer power plants and auto-producer heat and power plants. Whilst natural gas made up 47.9% of the output in 2014 the volume of gas used in above plants increased by 11.35% in 2014 compared to that of 2013. At the end of 2014 about 80% of generated electricity came from thermal power stations whilst the contribution of hydro towards generation stood at 16.1% (MENR, 2015).

According to the projections of the MENR of Turkey a huge 96% demand growth (amounting to 500 TWh) is foreseen by 2023 (MENR, 2011). The challenge for this, when considered on the basis of the country's shrinking base of its own resources and a wider range of possible sources of supply disruption, lies in developing robust supply security measures. Turkey can hardly meet half of the said demand even if all its renewable resources are fully utilised and this may potentially place a great pressure on the government if the involvement of nuclear power into Turkey's energy mix is postponed for any reason.

¹⁰⁶ Of which power generation increased from 140.6 TWh in 2003 to 250.4 TWh in 2014.

¹⁰⁷ The first natural gas imported from Russia was used in Hamitabat and Ambarlı combined cycle power gas turbine (CCGT) plants located in the Thrace Region followed by Istanbul Fertilizer Industry Inc. (IGSAŞ) and Turkish Fertilizer Industry Co. (TÜGSAŞ) in 1989 (EMRA, 2011).

Consumption of gas in the industry sector began with only 5 mcm gas in 1989 and reached billion figures (2 bcm in 1998 and 13.9 bcm in 2015). Although the sector experienced some contractions over the years and the use of natural gas wherein markedly fell four times between 1998 and 2009, the industry sector today consumes more than quarter of Turkey's total whilst sub-sectors as organised industrial zones (OIZs), chemistry, iron and steel, and non-metallic minerals dominate this consumption (with respective 22.5%, 18.4%, 9.9% and 11% market shares as of 2015) (EMRA, 2016).

Figure 16. Largest Gas Consumers in **Power Generation Sector, 2015**

Figure 17. Gas Sales to Power Generators (mcm)

19 69'

17,271 17,649 17,119 17,848

14.3

13,002 13,347

0

23,442

19,011

21,142 21,636 21,053



Source: EMRA

Figure 18. Largest Natural Gas Consumers in Industry Sector, 2015





Source: EMRA

Figure 20. Largest Gas Consumers in **Residential Sector**, 2015



2004 2005 2006 2007 2008 2009 2010 2010 2011 2012 2013 2014 2015



Figure 21. Natural Gas Sales to **Residential Sector (mcm)**



Source: EMRA

The third strong demand anchor comes from the residential sector in Turkey and thanks to regional distributors the natural gas penetration in the sector has grown exponentially. Previously being available to six cities only, natural gas has now been converted into a better-shared prosperity for the Turkish people and almost eleven million customers have access to gas as of 2015. Istanbul, Ankara, Bursa, Kocaeli, Izmir, Eskisehir and Kayseri have the largest customer base consuming more than 70% of Turkey's gas total and more than 100 bcm natural gas has been used for space heating purpose since 1988¹⁰⁸ whilst an average 3.83 bcm/month was used in the residential sector throughout 2013 (BOTAS, 2013; EMRA, 2013; 2014). From the standpoint of the residential consumers, the affordability of natural gas is important and according to MENR (2015) the share of gas consumption in the minimum wage bracket decreased from 21.4% in 2003 to 15.5% in January 2015 given the country's constantly rising GDP as illustrated in Table 9.

Year	Minimum wage	Gas consumption*	Share of gas consumption in minimum wage
	(TRY/Net)	$(TRY/125m^{3})$	(%)
01.01.2003	226.0	48.4	21.4
01.01.2004	303.1	39.2	12.9
01.01.2005	350.2	51.2	14.6
01.01.2006	380,5	61.3	16.1
01.01.2007	403.0	76.9	19.1
01.01.2008	481.6	83.1	17.3
01.01.2009	527.1	136.3	25.8
01.01.2010	577.0	90.2	15.6
01.01.2011	630.0	90.2	14.3
01.01.2012	701.2	104.3	14.9
01.01.2013	773.0	134.9	17.4
01.01.2014	846.0	134.9	15.7
01.01.2015	949.1	146.9	15.5

Table 9. Share of Natural Gas Consumption in Minimum Wage, 2003-2015

*Average monthly gas use of a Turkish family is estimated at 125 m³.

Source: MENR (2015), p.32

¹⁰⁸ Natural gas was first supplied to the residential and commercial sectors in Ankara in October 1988, in İstanbul in January 1992, in Bursa in December 1992, in İzmit in September 1996 and in Eskişehir in October 1996 (EMRA, 2011).

In 2015, the service sector¹⁰⁹ used about 3.2 bcm natural gas which translated into 6.6% of the country's total and businesses as a sub-sector received the vast majority of gas (1,492 mcm) (EMRA, 2016). Transport (i.e. vehicular fuel, pipeline transportation), energy (i.e. petroleum refineries, blast furnaces), agriculture and forestry, and stockbreeding (i.e. fisheries, poultry and cattle dealing) are the other sectors which consume natural gas at marginal levels in Turkey.

5.4.4 Imports

As almost no gas production occurs in Turkey, nearly the whole consumption is met by the natural gas production of Russia, Iran, Azerbaijan, Nigeria and Algeria. Turkey has been one of the largest importers of natural gas amongst OECD countries since 2005, and it has seven long-term import contracts with six different countries. Though initially considered as an ideal solution to air pollution mainly in big metropolitan cities, the stateowned BOTAS signed an agreement for Turkey's first natural gas delivery project (West Line) with Soyusgaz Export Company of the Union of Soviet Socialist Republics (USSR) in February 14, 1986 to expand the use of natural gas even further. From the standpoint of liberalisation reforms in Turkey, natural gas importation and distribution (which is delineated in Section 5.4.5) carry a lot of weight and they are expected to provide an adequate foundation for transformation of the Turkish natural gas sector into a natural gas market by the third party access given to a number of new entrants. This section of the chapter is divided into three parts and whilst the first summarises Turkey's natural gas imports by long-term contracts, the second part reviews the LNG and spot LNG imports. The third part analyses the contract release programme initiated by EMRA in 2004 in an effort to liberalise the industry by reducing the state's monopoly as well as encouraging the involvement of the private sector.

5.4.4.1 Imports by Long-Term Contracts

As demand for natural gas is set to continue domestically, Turkey signed two more agreements with Russia in 1997 and 1998, and delivery of an additional 4 bcm and 16 bcm gas through 1,261 km transmission pipelines to Turkey were secured. Although the Turkish imports of Russian natural gas have been and still are the biggest, BOTAS

¹⁰⁹ Which consists of state offices, businesses and other premises that heavily use natural gas.

continued to sign further natural gas purchase agreements with Iran in 1996, Turkmenistan in 1999 and Azerbaijan in 2001 and 2011.

Contracts	Volume (Bcm, plateau)	Date of Signature	Date of Operation	Length (years)	Expiration Date	Status
Russia (West)	6	1986	1987	25	2012	Terminated
Russia (West)	8*	1998	1998	23	2021	In Operation
Russia (Blue Stream)	16	1997	2003	25	2025	In Operation
İran	10	1996	2001	25	2026	In Operation
Turkmenistan	16	1999	-	30	-	-
Azerbaijan(Phase-I)	6.6	2001	2006	15	2021	In Operation
Azerbaijan(Phase-lI)	6	2011	2017/2018	15	2032/2033	Under Cons.
Azerbaijan(BIL)	0.15	2011	2011	35	2046	In Operation
Algeria (LNG)	4	1988	1994	20	2024	Renewed
Nijerya (LNG)	1.2	1995	1999	22	2021	In Operation

Table 10. BOTAS' Existing Import Contracts

*Half of this import was transferred to private companies.

Source: BOTAS

Natural gas from Iran is imported via a 1,491 km pipeline and transported to Dogubeyazit compressor station. The agreement signed between BOTAS and the National Iranian Gas Exporting Company (NIGEC) in August 8, 1996 secured the delivery of a peak capacity of 10 bcm natural gas per annum for 25 years with the first delivery realisation in 2001. Despite the previous and ongoing disputes over gas disruptions and prices between the two countries, there are several natural gas projects the governments of Iran and Turkey have been examining since 2007, such as the involvement of the TPAO in the development of the South Pars gas field and constructing a US\$15 billion gas pipeline to deliver Iranian gas to Europe since Turkey, besides its import undertakings, poses a strategic export route for Iran's future production to the West. Perhaps this project along with a few others discussed between the two countries could finally realise not only the prolonged expectation of Iran to become a major exporter as it has somehow become a net importer despite its own massive resource endowment since 1997 (Jalilvand, 2013) but could also highlight the importance of Turkey's strategic position between those energy rich and seeking regions.

In practice, Azerbaijan is within pipeline-reach to eastern Turkey through Georgia and Armenia¹¹⁰ and BOTAS has been importing a contracted 6.6 bcm gas from the State Oil Company of Azerbaijan Republic (SOCAR) since 2007. The fifteen year long contract signed in 2001 was followed by two more agreements for the additional import of 0.15 bcm and 6 bcm gas in 2011 the latter of which being the actualisation of the second phase of the 2001 agreement (with expected completion for the infrastructure to be in 2017/2018) whilst the former took effect immediately. Altogether Azerbaijan accounted for 7.4% of the total Turkey natural gas imports between 2007 and 2015, providing the country with an annual average of 4.3 bcm gas during that time scale. (Table 11). As little as 0.75 bcm of Turkish imports of Azerbaijani gas is re-exported to Greece via the Turkey-Greece interconnector. Turkey and Azerbaijan are keen to shift their collaboration on energy affairs to a new level and a sizable volume (17 bcm) of Azerbaijani natural gas is set to be transported to Italy via the combination of a 56-inch Trans-Anatolian Natural Gas Pipeline (TANAP) running from the Georgia-Turkey border to the Turkey-Greece border, and Trans-Adriatic Pipeline (TAP) to link TANAP from Greece to Albania and Italy (EIA, 2014).

Turkey also has natural gas sales and purchase agreement signed with Turkmenistan in 1999 for the delivery of an annual 16 bcm gas with plans to gradually increase the amount to 30 bcm, 14 bcm of which is to be sold to Europe via an infrastructure across the Caspian Sea and Azerbaijan (Akcollu, 2006). However, this agreement was never implemented.

¹¹⁰ Armenia option has never been materialised due to Armenia's frozen diplomatic relations both with Turkey and Azerbaijan.

			Fre)m			
-	Pir	peline (bcm)		LNG (bcm)		
			Azerbaija				Total
Years	Russia	Iran	n	Algeria	Nigeria	Spot LNG	imports
2000	10.08 -		-	3.59	0.7	-	14.37
2001	10.93	0.11	-	3.63	1.20	-	15.87
2002	11.57	0.66	-	3.72	1.13	-	17.08
2003	12.46	3.46	-	3.80	1.11	-	20.82
2004	14.10	3.50	-	3.18	1.02	-	21.80
2005	17.52	4.25	-	3.79	1.01	-	26.57
2006	19.32	5.59	-	4.13	1.1	0.08	30.22
2007	22.76	6.05	1.26	4.21	1.40	0.17	35.84
2008	23.16	4.11	4.58	4.15	1.02	0.33	37.35
2009	19.47	5.25	4.96	4.49	0.9	0.78	35.86
2010	17.58	7.77	4.52	3.91	1.19	3.08	38.04
2011	25.41	8.19	3.81	4.16	1.25	1.07	43.87
2012	26.49	8.22	3.35	4.08	1.32	2.46	45.92
2013	26.21	8.73	4.25	3.92	1.27	0.89	45.27
2014	26.98	8.93	6.07	4.18	1.41	1.69	49.17
2015	26.78	7.82	6.17	3.91	1.24	2.49	48.43
Total	310.82	82.64	38.97	62.82	18.27	13.04	526.56

 Table 11. Natural Gas Imports to Turkey by Pipeline and LNG, 2000-2015

Source: Deloitte (2012, p.20); EMRA (2016); MENR (2015, p.47)



Source: Adapted from approaches used in Melling (2010) and Stern and Rogers (2014); Interview (March 2016)

As previously stated, Russia and Iran are Turkey's biggest natural gas suppliers of piped gas although this is expected to decline in the next decade because of the increased interest of the Turkish authorities in diversifying the supply sources with cheaper alternatives as well as the emergence of spot LNG to the country.

5.4.4.2 Imports of LNG and Spot LNG

As Turkey has gone on diversifying its gas sources over the past twenty years so as to secure more gas to meet its markedly growing domestic demand, Algeria and Nigeria were added to the list of its gas import destinations in the form of LNG. Turkey's LNG supply is met by BOTAS purchases through two long-term contracts with Algeria and Nigeria since August 1994 and August 1999 respectively. Its first source of LNG, Algeria, has undertaken a delivery of 4 bcm/yr LNG to Turkey and supplied about 11.9% of Turkish imports between 2000-2015 whilst an annual 1.14 bcm Nigerian gas covered 3.47% of the total imports during the same period (Table 11).

Being exposed to several gas supply disruptions that caused costly market imbalances during the last decade Turkey has been considering diversifying its contracts in other LNG ventures. It has already started to take advantage of gas developments in Qatar, Egypt and Norway and signed a number of short-term agreements with them. BOTAS' exclusivity in the spot LNG trade ended in 2009 with the involvement of EgeGaz A.S. in the sector. Two companies aggregately imported 781 mcm gas in 2009 where BOTAS' share accounted for 91.5%. The share of EgeGaz imports is fluctuating though and according to EMRA (2013 and 2016) reports EgeGaz provided approximately 24.62% and 10.79% Turkey's spot LNG volumes in 2013 and 2016, respectively.

To date, the total number of companies (inclusive of private) granted licenses to import spot LNG in Turkey is thirtynine rising from eighteen in 2010 but apart from BOTAS and EgeGaz spot LNG imports are not undertaken by these licensees. Whilst a small number of them prefer wholesaling the imported LNG domestically, the rest are not active at all. As the below Figure 22 illustrates the spot LNG imports have been following an evenly fluctuating path since 2009, and 83% of LNG imports came from Qatar, Nigeria and Norway while Trinidad and Tobago and other countries provided 6.68% and 10.35% of the supplies in 2015, respectively (EMRA, 2016).



Figure 22. Spot LNG Imports to Turkey, 2006-2015

Source: EMRA (2016), p.13

Figure 23. Turkey Natural Gas Imports and Destinations, 2015



Source: EMRA (2016)

Between 2005 and 2015 Turkey imported an accumulative 526.56 bcm natural gas from various countries and about 48.43 bcm of which (including LNG and spot LNG) constituted the share for 2015. Russia's contribution out of that total was 26.78 bcm

(54.8%) which was the highest of that year and was followed by the second largest supplier Iran with 7.82 bcm gas sent to the country which was about eighty times more than the first delivery of gas (0.11 bcm) in 2001. Azerbaijan and Nigeria stood out as the smallest contributors to Turkey's supplies with 12.3% and 2.9% in terms of piped gas and LNG respectively. Turkey's long-term LNG supplier since 1994, Algeria sent 4.18 bcm gas in 2014 and apart from Qatar and Norway, destinations for the spot LNG have changed completely in 2015. Whilst Qatar remains Turkey's stable spot LNG provider so far, Egypt, Yemen and the Netherland are now replaced with Nigeria, Trinidad and Tobago and other countries included Belgium, France and Spain (Figure 23).

5.4.4.3 Gas Release Programme

Theoretically, the NGML of Turkey has had a strict requirement to lower the market share of BOTAS by 2009 so as to liberalise the gas industry by shifting the state's monopolistic position. To be specific, the Law required BOTAS to meet an aggressively reduced market share from 100% to 20% by 2009 -by transferring 10% share of its import obligations to other market players per year commencing from 2002- as a means to trigger competition in the natural gas industry. However, this has never been met.

This being the case, a 'Gas Release Programme or Contract Transfer' was initiated by EMRA in 2004 as a step to private participation in the gas sector, and the primary aim was to transfer the exclusive importation rights of BOTAS to private entities. According to the implementation model ¹¹¹ contemplated for the programme, BOTAS was to guarantee nondiscriminatory public access to all interested parties by auctioning up to 41% of its gas undertakings¹¹² per annum. That translated into 16 bcm of gas to be auctioned and accordingly the first tender was arranged to be based on lots (each totaled 250 mcm/pa and applicable to a minimum US\$500,000 contract transfer fee as in Akcollu (2006) as presented in Table 12.

¹¹¹ The International Energy Agency (2009) Turkey Report states that Turkey had choice of two models to either 'contract transfer' (leaving the new takers ineligible to bargain for a lower price and undertaking all cross-border liabilities of the incumbent BOTAS) or 'volume transfer' its import obligations to private companies (leaving the interested entities to negotiate new contracts with the exporters) and the 2001 Law has favoured contract transfers (p.70).

¹¹² The programme comprised the import contracts with Russia (West 1, West 2, Blue Stream), Iran, Algeria and Nigeria, and the contracts with Azerbaijan (6.6 bcm) and Turkmenistan (16 bcm) were excluded.

	Exporter	Contracted Volume	Volume to be Released	Equivalent Lots to be Released
Contract/ Country	Company	(bcm/a)	(bcm/a)	(lot/250mcm)
Russia (West)	Gazexport	6	3	12
Russia (West)	Gazexport	8	4	16
Russia (Blue Stream)	Gazexport	16	3	12
Iran	NIGC	10	3.5	14
Algeria (LNG)	Sonatrach	4	2	8
Nigeria (LNG)	NLNG	1.2	0.5	2
Total			16	64

Table 12. Projected Contracts to Be Transferred via Gas Release Programme

Source: Akcollu (2006)

According to its proponents, contract transfers allow marketers to enter new markets where the situation is simply 'no competition' but of course there might still remain a widespread reluctance to consider such programmes as a solution to certain sectors at all, as in Turkey. For example, incensed by the dilatory and reluctant proceedings of BOTAS towards the contract transfers -which was primarily due to the imbedded complications such as the confidentiality clauses making the contract details non-seeable by the third parties and having some contracts with debt-service issues- the energy market regulator fined BOTAS and having already postponed tenders four times, it finally took place in November 30, 2005 after much heated debates (Akcollu, 2006). The participating parties were allowed to make appropriate preparations, especially in getting the preliminary Seller's Consent Protocol (SCP) from the respective export companies on a lot basis and the Import License Qualification Document (ILQD) which is required to be obtained from both foreign suppliers and EMRA (for many, these specific requirements were intentionally stipulated to raise extra difficulties in the process). Out of forty, thirty-seven companies were found eligible for the tender and the final four bid for a total 4 bcm gas contract with Russia whilst for the Iranian, Algerian and Nigerian contracts no valid interest was shown¹¹³ (Akcollu, 2006; IEA, 2009). Consequently, BOTAS conducted the contract transfer of 50% of the gas imports from Russia (West-2) and the highest bidders Shell Energy A.S. (with US\$2.01 million per lot), Bosphorus Gaz Corporation A.S. (US\$1.81 mn/lot), Enerco Enerji Sanayi ve Ticaret A.S. (US\$1.6 mn/lot) and Avrasya Gaz A.S. (US\$0.91 mn/lot) respectively won 1, 3, 10 and 2 lots (BOTAS, 2010; Sabah, 2006). Shell being the first company to obtain the tripartite agreement 'Deed of Assignment (DoA)' between the seller, the purchaser and BOTAS started its operations

¹¹³ Since the bidders failed to obtain the preliminary SCPs from the respective foreign suppliers, bids made towards the contracts with Iran, Nigeria and Algeria were deemed invalid while the lots went out to tender as part of Russia (West-1) contract has received no bids at all (Peker, et al., 2007).

in December 2007 followed by Bosphorus Gaz in January 2009, and Enerco and Avrasya Gaz in April 2009 (Akcollu, 2006; BOTAS, 2010; 2011). The identical action sets another auction for the transfer of another BOTAS-Russia Contract (Blue Stream) for 6 bcm (24 lots) natural gas was scheduled on 8 September 2011. Due to Russia's refusal to provide SCPs to potential bidders -ironically justifying this choice by reference to the "impossibility of the transfer of an intergovernmental contract"¹¹⁴- no desirable outcome was reached and the tender was nullified (Deloitte, 2012). Coinciding with the expiration of Turkey's oldest gas contract with Russia in 2012, private companies expressed their interest again to takeover and renew that contract at the invitation of BOTAS. Amongst thirteen vetted and assessed applications, only four private entities (i.e. Kibar Enerji, Bosphorus Gas, Akfel Gaz, Bati Hatti) submitted a gas purchase agreement signed with Russia and entered the market with actual imports to start from 2013 (Table 13).

	Start	Expiry	Private company	Import destination	Import amount
ase me	12.07.2007	12.07.2022	Shell Energy A.S.	Russia (West2)	0.25
eles ami	18.10.2007	18.10.2022	Bosphorus Gas Corp. A.S.	Russia (West2)	0.75
as r ogr	31.12.2008	31.12.2022	Enerco Enerji San.&Tic. A.S.	Russia (West2)	2.5
br G	26.02.2009	26.02.2022	Avrasya Gaz A.S.	Russia (West2)	0.5
				Total	4 bcm
ase me	26.11.2012	26.11.2042	Kibar Enerji Dağ. San. A.Ş.	Russia (West1)	1
ele. am 2	26.11.2012	26.11.2042	Bosphorus Gas Corp. A.S.	Russia (West1)	2
as I ogr	26.11.2012	26.11.2042	Akfel Gaz San. ve Tic. A.Ş.	Russia (West1)	2.25
D d	26.11.2012	26.11.2035	Batı Hattı A.Ş.	Russia (West1)	1
				Total	6 bcm

 Table 13. Materialised Contract Transfers to Private Companies (bcm/a)

Source: EMRA; Rzayeva (2014)

A large body of literature discusses that gas release programmes should they remain in place for a sufficiently long time, could be useful in ensuring that appropriate conditions and even market structures are shifted and elaborated, and so that a sustainable level of competition can be promoted (Bartok et al., 2006). In this manner, durations for both gas release programmes in Turkey were set for fifteen and thirty years, respectively¹¹⁵.

¹¹⁴ The prior contract transfer was made based on the fact that the gas purchaser of the contract was not directly BOTAS but instead a private company called 'Gama Gazprom' (the name of which was later changed to Turusgaz Taahhüt, Pazarlama ve Ticaret A.Ş.) in which BOTAS involvement was by 35% equity (Altunsoy, 2011).

¹¹⁵ With the exception for Bati Hatti A.S. which was 23 years.



Figure 24. Share of Companies in Overall Gas Imports into Turkey, 2014

Source: BOTAS; EMRA (2013; 2014)

To date, as shown in Figure 24, about 22% of Turkey's natural gas imports have been opened to private entities through gas release programmes. Although BOTAS has reduced the competition concerns of many onlookers at home and abroad it has obviously failed to fully meet the provisions of the 2001 Law. This issue is explored in more detail in Chapter 6.

5.4.5 Distribution

Prior to 2001, there were seven distribution companies (all either municipality, BOTAS or privately owned) supplying natural gas to seven million customers in six major cities in Turkey through a TRY6 billion network (EMRA, 2010). In order to satisfy the forecast demand and insure security of supply domestically, both the 2001 Law and relevant secondary legislation outlined a roadmap for introducing competition for the retail distribution segment of the gas industry and obliged EMRA to prepare regional distribution tenders from 2003 onwards. Since, the authorisations have been granted to winners via a competitive bidding process for the construction, enhancement and operations of distribution networks in regions wherein no access to natural gas exists. Today, the distribution of natural gas in almost all of Turkey is performed by regional monopolies and city gas companies each supplying gas to customers within a franchised service area through its own distribution lines (ITC, 2001; EMRA, 2013). In order to bring about the curtailment of the exercise of monopoly power, the Turkish government

planned to introduce competition for the market in phases and decided firstly to remove BOTAS from the distribution business by privatising BURSAGAZ and ESGAZ¹¹⁶ in 2003, and set the timetable for the privatisation of other four municipality owned companies¹¹⁷ given that all the external debts backed by the Treasury are cleared.

Natura	l Gas Distributed Re	gions Before the 2001 Law			
			Dat	e of	
	Region	Distributor company ^a	oper	ation Nb	
	Ankara	EGO (Municipality)	19	88 1	
	Bursa	BURSAGAZ (BOTAS)	19	92 1	
	Istanbul 1	IGDAS (Municipality)	19	92 1	
	Istanbul 2	(Nurol-Mesa-Suzer-TOKI)	19	94 1	
	Eskisehir	ESGAZ (BOTAS)	19	96 1	
	Izmit	IZGAZ (Municipality)	19	96 1	
	Adapazari	AGDAS (Municipality)	20	02 1	
Total				7	
Distrib	oution Tenders and Li	cences Given After the 2001	Law (as of 2014	4)	
	Tenders concluded		(65)		
	Licenses given f	or distribution regions	(65)		
	Gasified cit	ies		64	
	Cities to be	gasified (under const.)		6 ^b	
	Cancelled/Planned te	nders		4 [°]	
Total				74	
			Grand	Total 81	

 Table 14. Distribution Companies Established Before and After the 2001 Law

a Parent companies are given in the parentheses. b Bingol, Bitlis, Igdir, Mardin, Mus, Sinop c Artvin, Hakkari, Sirnak, Tunceli

Source: Akcollu (2006); EMRA (2014)

In 2003, EMRA initiated the exclusive grants of franchise on a regional basis and commenced the tendering process for natural gas distributions in concert with the 2001 Law and the Distribution and Customer Services Regulation. There are sixty-five tenders that have been concluded to date (Table 14) and some of the terms a standard tender file covers include the designated region to be distributed; license duration; a one-off

¹¹⁶ Transformed into corporations by the Higher Planning Council, BURSAGAZ and ESGAZ were included in the privatisation program in September 2002 and tenders were concluded for both in December 8, 2003. Following the final negotiations with 10 interested companies, Calik Energi bought BURSAGAZ for US\$120 mn whilst Kolin Insaat became the new owner of ESGAZ in return of US\$47 mn in December 30, 2003, EMRA (2010).

¹¹⁷ The privatisation of IGDAS has not yet been realised as of 2016 and it still belongs to Istanbul Metropolitan Municipality whilst the Privatisation Administration finalised the sale of 90% shares of AGDAS in 2003, Baskentgaz (formerly EGO) in return of US\$1.162 bn in 2013 and IZGAZ for US232 mn in 2009.

consumer connection fee (CCF) to be charged; core services and rights the winner company will have to agree to provide to both customers and to the Municipality (i.e. a free 10% ownership and representation in the board of directors and board of auditors, and an additional 10% share upon a negotiated price should requested by the Municipality without the Treasury backup); thresholds for eligible customers; a timetable for required investment and the provisions of equipment and quality standards; and lastly the Unit Service and Depreciation Charge (USDC) for supplying 1 kWh natural gas to consumers (¢/kwh) which are individually determined for each distribution zone¹¹⁸ and a fixed term the USDC are to be effective for (NGML 2001 Art. 4/4g; Reg. 24925 Art. 10, 12, 21). In addition to investment plans and quality and safety standards, the considerations of the tenders chiefly revolve around the best financial terms (i.e. the USDCs) proposed by the bidders and subsequently the lowest three offers get shortlisted. Those three then compete against each other (so-called Dutch auction, Akcollu (2006)) until the bidders' minimum acceptable price is reached and henceforth the lowest offer wins as articulated in Regulation 24925 Article 12. Natural gas distribution licenses which give companies the exclusive right within the franchised area to construct, operate, and maintain the gas distribution system (together with the right to use portions of roads, rights-of-way, and other lands owned, controlled or managed by the respective Municipality) are granted to franchisees for a standard term of thirty years according to the latest version of the 2001 Law and the respective Regulations. After several amendments over the years, the terms and conditions for obtaining exclusive distribution franchises rested on stringent conditions (Table 15):

¹¹⁸ Based on the region's development and gas consumption level by EMRA.

Table 15. Procedure for Distribution Franchise in Turkey

The company bears the full responsibility for the natural gas distribution system and → starts investments within 6 months. The company starts the first natural gas delivery within 18 months and finishes the → supply coverage of the entire franchised area within 5 years. The company establishes a dispatch control center for the distribution grids unless → determined by the Board otherwise due to lack of capacity. The company ensures all services provided pursuant to the tender agreement are in → accordance with the tariffs specified and monitored by EMRA (subject to price-cap regulation) The company obtains infrastructure information system and/or ISO 9001 quality → management systems and/or ISO 14001 environmental management system within 18 months. BOTAS connects the distributor's franchised region to the transmission grid not later → than 12 months from the effective date of the auction. The company is obliged to connect any customer residing in its franchised area given that they comply with technical criteria set out by EMRA. In the event of refusal to → connect, the case is submitted to EMRA for determination and the Board may order the connection of the refused party. The company gives written notice to EMRA not less than 12 months prior to the → expiration of the license term regarding its intention to negotiate renewal of the franchise agreement. EMRA prepares a new tender otherwise. Source: EMRA

The franchisees are allowed to sell or transfer their distribution network (as a whole) to a third party before the expiration of their licenses¹¹⁹ insofar as the new purchaser is technically and financially eligible to be granted a new license and agrees to all the terms and conditions of the agreement the seller had with the Municipality. Lastly, in the event termination of an agreement becomes inevitable a new tender is prepared by EMRA pursuant to the terms of the terminated agreement inclusive of the pre-determined USDC as the price-ceiling (NGML 2001 Art. 4/4g; Reg. No. 24925 Art. 31, 32). The latest amendment to the 2001 Law (No 6552/114 dated 10 September 2014) authorises a joint corporation by the provincial special administration and the Municipalities to perform the distribution activities in cities where tenders are offered three times with no interest at presence.

Turkey is an example of a country that has had a sufficient pipeline network constructed through franchise auctions executed by EMRA since 2003. Turkey's natural gas distribution networks have extended over 85,000 km with total investment of TRY10.4

¹¹⁹ Subject to the approval of the Board.

billion (exc. VAT) almost double the amount compared to that of TRY5.8 billion made towards the seven distribution regions before the 2001 Law (EMRA, 2014). To date, there are over sixty companies; joint ventures and other entities that distribute natural gas throughout Turkey some of which (e.g. Aksa Gaz Dagitim A.S., Enerya Gaz Dagitim A.S and Akmercan Group) holding distribution licenses for up to twenty regions. Despite the wide spread networks supplying natural gas to remote areas, however, the connection requests have remained relatively small (two million residential equivalent new connections) standing at around a 33% penetration rate¹²⁰ in 2010. Between 2003 and 2014 the number of gasified cities increased from seven to seventyone whilst for six cities the tenders have concluded and winner companies are currently working towards completion of the respective networks for late 2015. The 2015-2019 Action Plan of the Energy Ministry confirms BOTAS as the body to gasify the districts¹²¹ and OIZs that do not fall under any distribution region (MENR, 2015).

As can be seen in Table 16 and 17 below, the USDCs seems to be the only revenue to come from gas sales for licensed distributors whilst the transportation charge comes from gas dispatch to eligible customers who would rather buy natural gas from other suppliers ¹²². There exists a one-off CCF, determined at the discretion of bidder companies during the tender process, and is limited to be no more than 10% of the actual cost of connection for customers which use natural gas for production such as industrial (EMRA; Deloitte, 2012).

¹²⁰ Use Equivalent Consumption / Potential Consumption as in Deloitte (2012).

¹²¹ BOTAS declared the number of eligible districts and OIZs as 202 and 31 respectively and as of 2014 the projects for 25 districts and 19 OIZs have already been approved. BOTAS aims to finish the gasification of those in two phases by 2017 and envisages investments of US\$100 mm (plus expropriation fee of US\$7 mm) and US\$30 mm for the projects respectively (Küsmüs, 2014).

¹²² Board Decision No. 397 clarifies uncertainties about the ceilings for transportation charges and limits them to up to the respective USDCs. This however applies to distribution companies granted licenses after 2003 only, whilst the distributors operating in the sector before the 2001 Law continue following different charges set through the Board Decisions (Deloitte, 2012).

Table 16. Natural Gas Tariffs Breakdown for Residential Customers

			VAT (18%)	
		USDC	(1070)	
	Special Consumption	USDC		
	Tax (Fixed*)		Revenue of	
Profit Margin		Purchase price	distribution	Gas price for
of BOTAS	BOTAS' gas	paid by	companies	residential
Storage Cost	selling price to distribution	distribution companies		customers
Transmission Cost	companies			
Gas Import Cost				

*SCT for natural gas is fixed at TRY0.023/m³ Source: Erdogdu (2009, p.33)

Table 17. Natural Gas Prices in Distribution Regions of Turkey (October 2008)

No	Distribution Region - Company	Tender Date	First Gas Supply Date	Cost of gas purchase from BOTAS (TRY/m3)	As % of total price	Excise Tax (TRY/m3)	As % of total price	USDC (¢/kwh)	USDC (¢/m3)	USDC (TRY/m3)	As % of total price	VAT (18%)	As % of total price	Gas price for households (TRY/m3)	CCF (US\$)
1)	Kayseri - KAYSERIGAZ	19.06.2003	01.10.2004	0.651867	80.7	0.023	2.8	0.076	0.809	0.009791	1.2	0.1232	15.3	0.807896	180
2)	Konya - ENERYA	31.07.2003	21.10.2004	0.651867	80.9	0.023	2.9	0.064	0.681	0.008245	1	0.123	15.3	0.806072	180
3)	Erzurum - PALEN	13.08.2003	08.11.2004	0.651867	81.1	0.023	2.9	0.046	0.489	0.005926	0.7	0.1225	15.3	0.803336	180
4)	Corlu - CORDAS	28.08.2003	25.06.2005	0.651867	81.3	0.023	2.9	0.036	0.383	0.004638	0.6	0.1223	15.3	0.801816	180
5)	Gebze - PALGAZ	11.09.2003	01.12.2004	0.651867	81.1	0.023	2.9	0.052	0.553	0.006699	0.8	0.1227	15.3	0.804248	180
6)	Inegol - INGAZ	18.09.2003	24.10.2004	0.651867	80.9	0.023	2.9	0.061	0.649	0.007859	1	0.1229	15.3	0.805616	180
7)	Catalca - TRAKYADAS	25.09.2003	25.10.2005	0.651867	81.2	0.023	2.9	0.044	0.468	0.005668	0.7	0.1225	15.3	0.803032	180
8)	Bandirma - BADAS	09.10.2003	27.01.2005	0.651867	79.2	0.023	2.8	0.174	1.851	0.022416	2.7	0.1255	15.3	0.822794	180
9)	Balikesir - BALGAZ	16.10.2003	05.01.2005	0.651867	80.1	0.023	2.8	0.112	1.192	0.014429	1.8	0.1241	15.3	0.813369	180
10)	Sivas - SIDAS	30.10.2003	21.10.2005	0.651867	79.4	0.023	2.8	0.164	1.745	0.021128	2.6	0.1253	15.3	0.821274	180
11)	Kutahya - CINIGAZ	06.11.2003	04.01.2005	0.651867	80	0.023	2.8	0.124	1.319	0.015975	2	0.1244	15.3	0.815193	180
12)	Eregli (Konya) - NETGAZ	04.12.2003	16.10.2005	0.651867	79.3	0.023	2.8	0.172	1.83	0.022159	2.7	0.1255	15.3	0.82249	180
13)	Corum - CORUMGAZ	18.12.2003	15.10.2004	0.651867	80.6	0.023	2.8	0.079	0.841	0.010178	1.3	0.1233	15.3	0.808353	180
14)	Kirikkale Kirsehir - KIRGAZ	08.01.2004	29.09.2005	0.651867	79.5	0.023	2.8	0.158	1.681	0.020355	2.5	0.1251	15.3	0.820362	180
15)	Samsun - SAMGAZ	22.01.2004	29.10.2005	0.651867	81	0.023	2.9	0.055	0.585	0.007086	0.9	0.1228	15.3	0.804704	180
16)	Aksaray - AKSARAYGAZ	12.02.2004	22.11.2005	0.651867	78.3	0.023	2.8	0.236	2.511	0.030404	3.7	0.1269	15.3	0.832219	180
17)	Duzce Karadeniz Eregli - DERGAZ	08.04.2004	30.11.2005	0.651867	81.3	0.023	2.9	0.034	0.362	0.00438	0.5	0.1223	15.3	0.801512	180
18)	Gemlik - GEMDAS	22.04.2004	08.12.2005	0.651867	78.3	0.023	2.8	0.239	2.543	0.03079	3.7	0.127	15.3	0.832675	180
19)	Yalova - ARMAGAZ	01.07.2004	19.11.2005	0.651867	81.4	0.023	2.9	0.031	0.33	0.003994	0.5	0.1222	15.3	0.801056	180
20)	Usak - UDAS	02.12.2004	26.10.2005	0.651867	81	0.023	2.9	0.055	0.585	0.007086	0.9	0.1228	15.3	0.804704	180
21)	Polatli - POLGAZ	13.01.2005	09.02.2006	0.651867	78.4	0.023	2.8	0.23	2.447	0.029631	3.6	0.1268	15.3	0.831307	180
22)	Izmir - IZMIRGAZ	27.01.2005	01.06.2006	0.651867	81.7	0.023	2.9	0.012	0.128	0.001546	0.2	0.1218	15.3	0.798167	180
23)	Manisa - MANISAGAZ	24.02.2005	13.10.2006	0.651867	81.6	0.023	2.9	0.016	0.17	0.002061	0.3	0.1218	15.3	0.798775	180
24)	Nigde Nevsehir - KAPADOKYAGAZ	17.03.2005	23.09.2006	0.651867	80.4	0.023	2.8	0.098	1.043	0.012625	1.6	0.1237	15.3	0.811241	180
25)	Bilecik Bolu - BEYGAZ	09.06.2005	01.03.2006	0.651867	81.6	0.023	2.9	0.016	0.17	0.002061	0.3	0.1218	15.3	0.798775	180
26)	Karabuk Kastamonu Cankiri - KARGAZ	16.06.2005	Supplied	0.651867	80.8	0.023	2.9	0.069	0.734	0.008889	1.1	0.1231	15.3	0.806832	180
27)	Edirne Kirklareli Tekirdag - TRAKYAGAZ	23.06.2005	01.04.2006	0.651867	81.9	0.023	2.9	0	0	0	0	0.1215	15.3	0.796343	0
28)	Yozgat - SURMELIGAZ	30.06.2005	17.11.2006	0.651867	79.2	0.023	2.8	0.176	1.873	0.022674	2.8	0.1256	15.3	0.823098	180
29)	Malatya - PEGAZ	07.07.2005	22.08.2006	0.651867	81.3	0.023	2.9	0.037	0.394	0.004767	0.6	0.1223	15.3	0.801968	180
30)	Kahramanmaras - ARMADAS	14.07.2005	22.12.2006	0.651867	81.7	0.023	2.9	0.009	0.096	0.001159	0.1	0.1217	15.3	0.797711	180

31)	Denizli - KENTGAZ	21.07.2005	26.10.2006	0.651867	81.9	0.023	2.9	0	0	0	0	0.1215	15.3	0.796343	149
32)	Gaziantep Kilis - GAZDAS	28.07.2005	10.10.2007	0.651867	81.9	0.023	2.9	0	0	0	0	0.1215	15.3	0.796343	30
33)	Sanli Urfa - GURGAZ	09.11.2005	17.12.2007	0.651867	80.4	0.023	2.8	0.095	1.011	0.012239	1.5	0.1237	15.3	0.810785	180
34)	Canakkale - CANAKKALEGAZ	16.12.2005	22.12.2006	0.651867	81.8	0.023	2.9	0.001	0.011	0.000129	0	0.1215	15.3	0.796495	180
35)	Isparta Burdur - TOROSGAZ	23.12.2005	01.09.2008	0.651867	81.6	0.023	2.9	0.015	0.16	0.001932	0.2	0.1218	15.3	0.798623	180
36)	Afyonkarahisar - AFYONGAZ	06.01.2006	09.11.2007	0.651867	81.9	0.023	2.9	0	0	0	0	0.1215	15.3	0.796343	174
37)	Kars Ardahan - KARGAZ	20.01.2006	18.06.2008	0.651867	77.7	0.023	2.7	0.279	2.969	0.035943	4.3	0.1279	15.3	0.838756	180
38)	Erzincan - ERZINGAZ	27.01.2006	20.11.2007	0.651867	80.5	0.023	2.8	0.089	0.947	0.011466	1.4	0.1235	15.3	0.809873	180
39)	Karaman - DOGANGAZ	03.02.2006	08.09.2007	0.651867	79.7	0.023	2.8	0.144	1.532	0.018551	2.3	0.1248	15.3	0.818234	180
40)	Amasya Tokat Turhal - TAMDAS	10.02.2006	02.01.2008	0.651867	81.9	0.023	2.9	0	0	0	0	0.1215	15.3	0.796343	163
41)	Antalya - OLIMPOSGAZ	17.02.2006	N/A	0.651867	81.9	0.023	2.9	0	0	0	0	0.1215	15.3	0.796343	5
42)	K.bey M.Kemalpasa Susurluk - OVAGAZ	24.02.2006	17.11.2007	0.651867	80.6	0.023	2.8	0.081	0.862	0.010435	1.3	0.1234	15.3	0.808657	180
43)	Elazig - ELAZIGGAZ	21.07.2006	27.03.2008	0.651867	81.9	0.023	2.9	0	0	0	0	0.1215	15.3	0.796343	5
44)	Trabzon Rize - KARADENIZGAZ	15.09.2006	01.09.2008	0.651867	81.7	0.023	2.9	0.008	0.085	0.001031	0.1	0.1217	15.3	0.797559	180
45)	Gumushane Bayburt	22.09.2006	N/A	0.651867	78.1	0.023	2.8	0.25	2.66	0.032207	3.9	0.1273	15.3	0.834348	180
46)	Diyarbakir - DIYARGAZ	03.11.2006	N/A	0.651867	77.6	0.023	2.7	0.29	3.086	0.03736	4.4	0.1282	15.3	0.840428	180
47)	Adiyaman - AKMERCANGAZ	01.12.2006	N/A	0.651867	81.7	0.023	2.9	0.01	0.106	0.001288	0.2	0.1217	15.3	0.797863	180
48)	Ordu Giresun - FINDIKGAZ	08.12.2006	N/A	0.651867	81.9	0.023	2.9	0	0	0	0	0.1215	15.3	0.796343	169
49)	Van	16.03.2007	12.03.2008	0.651867	77.5	0.023	2.7	0.297	3.16	0.038262	4.5	0.1284	15.3	0.841493	180
50)	Seydisehir Cumra	23.03.2007	N/A	0.651867	80.9	0.023	2.9	0.063	0.67	0.008116	1	0.1229	15.3	0.80592	180
51)	Agri	30.03.2007	N/A	-	-	-	-	No bid	-	-	-	-	-	-	-
52)	Cukurova - AKSAGAZ	20.07.2007	N/A	0.651867	81.9	0.023	2.9	0	0	0	0	0.1215	15.3	0.796343	167
53)	Siirt Batman	28.12.2007	N/A	0.651867	78.3	0.023	2.8	0.235	2.5	0.030275	3.6	0.1269	15.3	0.832067	180
54)	Aydin	08.02.2008	N/A	0.651867	81.9	0.023	2.9	0	0	0	0	0.1215	15.3	0.796343	165
55)	Gevye Ali Fuat Pasa Pamukova	06.06.2008	N/A	-	-	-	-	Cancelled	-	-	-	-	-	-	-
56)	Istanbul - IGDAS	Public	Supplied	0.651867	73	0.023	2.6	0.635	6.755	0.081784	9.2	0.1362	15.3	0.892848	190
57)	Ankara - BASKENTGAZ	Privatized	Supplied	0.651867	74.4	0.023	2.6	0.522	5.555	0.06726	7.7	0.1336	15.3	0.87571	190
58)	Adapazari - AGDAS	Privatized	Supplied	0.651867	72.5	0.023	2.6	0.673	7.165	0.086759	9.7	0.1371	15.3	0.898719	290
59)	Izmit - IZGAZ	Privatized	Supplied	0.651867	73.4	0.023	2.6	0.602	6.403	0.077526	8.7	0.1354	15.3	0.887824	190
60)	Eskisehir - ESGAZ	Privatized	Supplied	0.651867	78.3	0.023	2.8	0.235	2.5	0.03027	3.6	0.1269	15.3	0.832062	190
61)	Bursa - BURSAGAZ	Privatized	Supplied	0.651867	78.3	0.023	2.8	0.235	2.5	0.03027	3.6	0.1269	15.3	0.832062	190
62)	Bahcesehir- BAHCESEHIR	Privatised	Supplied	0,651867	73,3	0,023	2,6	0,611	6498	0,078680	8,8	0,135638	15,3	0,889185	190

m3/kwh: 10.64

US\$/TRY parity in October 2008= 1.2108

Source: Erdogdu (2009), p.31-32

A closer look at Table 17 reveals that the lion share of prices paid by customers go to BOTAS and VAT components whilst the USDCs differed from one region to another depending whether or not they were distributed with gas before 2003. The USDCs for the regions distributed before 2003 were ranged from 3.6% to 9.7% and after 2003 from 0% to 4.5% as of October 2008. Despite the fact that what the margin distribution companies are entitled to is subject to a price-cap (which according to sector representatives does not help especially in the regions operated with high turnovers and should be covered by an additional margin to prevent distributors from falling prey to retail sales risks) there has been fierce competition for the franchise of certain regions that resulted in bids with zero USDCs (e.g. in Antalya, Elazig and Gaziantep the asking CCF were as little as US\$5-30 whilst the most striking bid 'zero USDC + zero CCF' was made for the Edirne, Tekirdag and Kirklareli region by Trakya Bölgesi Doğal Gaz Dağitim A.S. on top of TRY2.5 million¹²³ guaranteed payment to be made by the bidder (Erdogdu, 2009)). In reality, because the said region hosts most of Turkey's production fields and the winner company would be eligible to buy its gas directly from those producers whose prices were about 10% cheaper than that of the BOTAS' this very fact thus probably provides a partial justification for why the bidder decided to abandon an up to 4.5% profit (via USDC) and the connection fee.

The existence of such a possibility that any company accepting to invest into infrastructure and to supply gas in return for no cost recovery nor any profit for the first eight years obviously raises the issue of what brings companies to these almost charitable acts as Erdogdu (2009) rightly argues. His perturbation was noticeable and hallmarks of his arguments highlighted that the companies did either i) expect huge profits after the initial eight years so they took the risk; or ii) planned to import gas themselves in the future so they could make a big profit by removing the middle man; or iii) the connection fees they were to charge was alone, was enough to cover the investment and ensure they survived for the initial period; and finally iv) it was the large industrial companies colluding and bidding '0' together to provide the asking investment which was reportedly cheaper for them to pay the USDC to another company (p.17).

Long time has passed since Erdogdu's article and no study has been published since to critically analyse how the distributors have thus far progressed with their activities and what their latent motives actually were in entering the business. It is now known that the

¹²³ Equivalent of then US\$2 million.

tenders have rigorously continued since 2009 and in the current picture of distribution market today, some old tenders cancelled or renewed or transferred to other companies and nine new regions have access to natural gas together with some foreign companies joint ventured with local distribution companies. At the time of writing, fiftythree companies had come to the end of their first eight-year fixed tariff period and are now charging their customers at regulated tariffs under oversight of EMRA.



Figure 25. Natural Gas Distribution Tariffs Before and After 8-yrs Fixed Tariff Period (As of September 2015)

Source: Yardimci (2015)

It was pointed out in many EU documents that via market opening EU customers would reap the benefit of lower domestic bills for electricity and natural gas^{124} . In the case of Turkey, the latest analysis of Okan Yardimci, an energy expert on tariffs applications from EMRA, can be helpful to see how natural gas tariffs have changed since 2011, or as soon as the distribution companies stopped charging their customers the fixed tariffs. Above Figure 25 above illustrates that the distribution tariffs, which were kept stable for eight years¹²⁵, are increasing for all regions and with almost 0.8 cent/kWh growth Afyonkarahisar has realised the strongest increase. This is important since it could be a partial answer to the discussions of Erdogdu (2009) who questioned the charitable acts of some companies that bid zero USDCs for cities like Afyonkarahisar during the tendering process and the likelihood of their high profit expectations for a post fixed tariff period. Other 'zero bidden' cities have also shown some tariff growth to date, although not as much e.g. Denizli 0.25 cent/kWh, Amasya-Tokat 0.45 cent/kWh and Edirne-Tekirdag-Kirklareli 0.5 cent/kWh. When compared with regions with private distribution companies the surprisingly a lower growth rate of the country's only state owned region, Istanbul is notable. This is indicative of the need for cooperation between EMRA and distribution companies in Turkey should develop in all crucial areas, particularly in tariff regulations, investments and service efficiency since the idea is to give due protection to end-users during and after the liberalisation of energy markets.

5.4.6 Exports

Albeit small at international levels, Turkey's BOTAS and Greece's DEPA¹²⁶ have a longterm ToP contract signed on 23 December 2003 for the exportation of 750 mcm gas from Turkey to Greece. Turkey is one of the three piped gas suppliers of Greece along with Algeria and Russia, and provides about 23% of the country's supplies (IEA, 2011). The gas BOTAS exports are sourced by Azerbaijan's Şah Deniz field¹²⁷ and it is considered to be the formation of the 'South European Gas Ring' project of the EU, which has started with interconnecting the gas grids of Turkey and Greece and is subsequently expected to

¹²⁴ See <u>https://ec.europa.eu/energy/sites/ener/files/documents/analysis_retail.pdf</u>

¹²⁵ 8-year fixed-tariff period did not apply to Istanbul, Ankara, Bursa, Eskisehir, Adapazari and Izmit regions.

¹²⁶ The Greek Public Gas Corporation. Following the 2nd Directive the National Natural Gas System Operator (DESFA) S.A. was established as a subsidiary of DEPA in March 30th, 2007 and the national gas system was transferred from DEPA S.A. to DESFA S.A.

¹²⁷ Only the import agreement Turkey has with Azerbaijan allows the re-exportation of imported gas (unless in the form of LNG) within an added destination clause.

pave the way for the delivery of Caspian gas supplies to Italy and other European countries via soon-to-be-built infrastructure (Akcollu, 2006).



Figure 26. Turkey-Greece Natural Gas Figu Pipeline



There have also been some negotiations between BOTAS and Bulgargaz for the construction of a new Turkey-Bulgaria pipeline to link Bulgaria's gas compressor station in Lozenets to both Turkey's LNG terminals (Giamouridis and Paleoyannis, 2011). Whilst this, in practice, is legally possible on Turkish grounds and provides Bulgaria with an access gain to short-distanced gas supplies (for which Bulgaria has been rigorously striving in particular to lessen its reliance on Russian supplies since the Russia-Ukraine crisis of 2009) the ambition Turkey harbours is a broader one in view of becoming an energy hub in the near future. Against this backdrop, EMRA started issuing export licenses to private companies as well, and the number of licensees has reached nine between 2010 and 2015 with destinations pooling around Greece and Bulgaria. No actual transportation of gas has been carried out to date however. Table 18 presents these new licensees and their export destinations:
Licence Status	Start Date	Finish Date	Licensee	Destination
Terminated	06.04.2004	06.04.2014	BOTAŞ	Greece
Active	06.04.2014	06.04.2024	BOTAŞ	Greece
Active	08.04.2010	08.04.2040	Setgaz Doğalgaz İth. İhr. ve Toptan Satış A.Ş.	Bulgaria
Active	27.10.2010	27.10.2040	LNG İhracat Tic. Ltd. Şti.	Greece
Active	11.11.2010	11.11.2040	Ege Gaz A.Ş.	Greece
Active	22.03.2012	22.03.2042	TMAK Natural Gas İhracat Ticaret Ltd.Şti.	Macedonia
Active	12.04.2012	12.04.2027	Demirören EGL Gaz Toptan Tic. A.Ş.	Greece
Active	01.08.2013	01.08.2043	Angoragaz Doğalgaz Top. Sat. Tic. A.Ş.	Greece
Active	12.12.2013	12.12.2043	Akfel Gunvor Enerji Ticaret A.Ş.	Greece
Active	13.03.2014	13.03.2044	SOCAR Turkey LNG Sat. A.Ş.	Greece

Table 18. Natural Gas Exporters in Turkey and Destinations

Source: EMRA

5.4.7 Storage

In terms of procurement of natural gas especially for countries like Turkey -which is utterly dependent on external sources via long-term ToP contracts that oblige the country to pay penalties for any amount of contracted gas it claimed responsibility for yet cannot take-storage facilities play a crucial role in natural gas markets. By importing gas at substantial amounts, Turkey remains highly vulnerable in politically sensitive situations and permutations of various supply disruptions, and thus needs to provide flexibility, reliability and a timely response to seasonal imbalances of natural gas supply and demand through adequate storage facilities.

Presently, Turkey suffers from a lack of storage both in terms of underground storage (UGS) and LNG terminals. More facilities are underway both in the planning and construction stage as discussed below. There are four facilities owned and operated by BOTAS, TPAO and private Ege Gaz A.S. and Figure 28 and 29 illustrate how Turkey is placed amongst other IEA countries as regards to storage capacities and meeting gas demand:



Figure 28. Storage Capacities as A Percentage of Annual Demand

Figure 29. Storage and Send-out Capacities as A Share of Peak Demand



Source: EIA (2014), p. 60

Besides the main energy Directives which have directly targeted co-ordination and harmonisation of the gas markets of member states (for which Chapter 4 provides great regulatory and implementation details), the European Commission has issued some auxiliary Directives and regulations (e.g. the 2004 Directive (2004/67/EC) and Regulation (EU) 994/2010 adopted following the 2009 gas crisis) specifically concerning measures to safeguard the security of natural gas supply. Neither of these imposed mandatory natural gas storage requirements upon the members but instead left the necessary actions to be taken by the states themselves such as "...*Member States may set or require the industry to set indicative minimum targets for a possible future contribution of storage, either located within or outside the Member State, to security of supply. These targets shall be published."* (Directive 2004/67/EC, Art. 4(6). As in

countries like Denmark, Italy, Poland, Portugal, Slovakia and Spain the NGML of Turkey has imposed a gas stock obligation upon natural gas suppliers of 10% of their supplies into the country to tackle SoS problems.

Based on the data presented in the IEA's Energy Supply Security (2014) report, Estonia, Luxembourg, Norway and Switzerland have no storage facility at all (due to e.g. using facilities in neighbour countries or being either a net exporter or well-connected to interconnecting points). Whilst eight members of the IEA are able to meet 20% of the annual demand taking into account both underground and LNG storage capacities, only fourteen members can meet 10% of the annual demand and Turkey is amongst neither (Figure 19). Again, in terms of meeting its peak demand by means of maximum withdrawals from both UGSs and LNG terminals Turkey still cannot meet a 30% peak demand (Figure 20) whereas twelve countries cover at least 80% of their peak demand this way and six meet a 100% (IEA, 2014).

5.4.7.1 Underground Natural Gas Storages

Turkey has one operational underground storage facility, Silivri, owned by the national oil company, TPAO¹²⁸. It consists of two depleted production fields, Kuzey Marmara (offshore) and Değirmenkoy (onshore), discovered between 1988 and 1994. The Natural Gas and Reproduction Services Agreement signed between BOTAS and TPAO in July 1999 (Akcollu, 2006) sealed the allocation of a 1.6 bcm capacity use of Silivri to BOTAS, and operations started in 2007¹²⁹.

Following the implementation of the 2001 Law supporting TPA to underground storage facilities together with the secondary legislations issued by EMRA¹³⁰ on 4 June 2011, TPAO first ended BOTAS' exclusivity in Silivri and initiated a project to increase the capacity storage of the facility in three phases (and to gradually allocate capacities to private companies). The first leg of the project was realised in 2012 and a 1 bcm additional storage was added to the system amounting to 2.6 bcm in total. In 2013, nine private market participants (e.g. Aygaz, OMV, Bosphorus, Enerco, Enerjisa and Ewe etc.) accessed the

¹²⁸ The storage rights were given to TPAO (and BOTAS for LNG terminals) in a form of public document within the scope of 6326 Petroleum Law in 2001 and were converted to a Storage License to be effective for 30 years in 2003 (and in 2007 for BOTAS) (Incedalci, 2014).

¹²⁹ Originally planned for 2005 and then delayed twice to 2006 and 2007.

¹³⁰ Regulation on the Basic Use and Principles of Natural Gas Underground Storage Facilities, No. 27954.

capacity whilst BOTAS's share still accounted for 81% (TPAO, 2013). Capacity reservations for the 2014-2015 period presented that BOTAS continued to keep its 2.1 bcm capacity whilst private companies were given 428 mcm, and 133 mcm capacity remained idle as shown in Figure 30.



Figure 30. Silivri UGS by End-month Stocks and Capacity Reservations

As of 2015, the daily amount of gas being injected in to Silivri is 16 mcm/d -although fluctuates due to reservoir pressure, transmission network pipeline pressure, gas temperature and other operating parameters- and the withdrawal amount is 20 mcm/d. TPAO envisages to materialise the remainder phases¹³¹ of the capacity increase programme by 2018 which is ultimately projected to increment the facility's capacity to 4.3 bcm and daily gas injection and withdrawal levels to 40 mcm/d and 75 mcm/d, respectively.

Geographically, underground storage facility potential within Turkey seems to be plentiful thanks to an inherently appropriate geological structure with many available caverns suitable to be converted into storage sites. Some suitable areas have recently been identified by TPAO (Table 19) for further establishments in the near future and one could well be correct to point out that Turkey's courage to develop more underground storage facilities is gaining prominence.

Source: TPAO; EMRA

¹³¹ The Phase II includes a capacity extension project in Değirmenköy-Osmancık formation and Batı Sinekli field whilst the Phase III covers Kuzey Marmara capacity extension project.

Fields/City	Gas in place	Producable gas	Cumulative gas	Remaining producible reserves				
Hamitabat (Kırklareli)	5.2	3.4	3.2	0.2				
Adatepe (Tekirdağ)	0.6	0.5	0.4	0.1				
Güney Karaçalı (Tekirdağ)	0.6	0.5	0.4	0.1				
Göçerler (Tekirdağ)	0.6	0.5	0.4	0.1				
Derin Barbeş (Diyarbakır)	0.5	0.3	0.3	-				

 Table 19. Suitable Fields for Underground Natural Gas Storage in Turkey (bcm)

Source: Incedalci (2014), p. 9

Irrespective of how soon the realisation of the above may occur, the Tuz Gölü and Tarsus are Turkey's new UGS facilities presently under construction with estimated completions in 2019 and 2023 respectively. Being financed by the World Bank¹³² the Tuz Gölü UGS is projected in the salt domes of the Salt Lake to add up to a reasonable proportion of Turkey's annual consumption. It will have twelve caverns (each with 630,000 m³ volume), a working gas capacity of 1 bcm and 40 mcm of withdrawal capacity in total, and will be operated by BOTAS. At the close of 2014, 59% of the project was finalised (BOTAS, 2013) and it will ideally be used for storing the gas imports of Azerbaijan and Iran from 2018-19 (BOTAS, 2010; IGDAS, 2014).

Turkey is well aware of the fact that the gas industry would not take off without new storage capacities as it is hardly able to meet even the minimum 10% storage requirement of the 2001 Law. Given the falling indigenous production and the role of gas storage in GFPPs, Turkey encourages new UGS projects proposed by suppliers and independent project promoters as well. Toren Doğalgaz Depolama ve Madencilik A.Ş. and Gaz Depo ve Madencilik A.Ş., both subsidiaries of an established market player¹³³ Bendis Enerji Üretim Madencilik Danışmanlık San.Tic. Ltd. Şti., were provided thirty-year underground natural gas storage licenses by EMRA on 2 February 2014 and the operations for the Tarsus UGS are already underway in Tarsus/Mersin. The project is at different stages of advancement

¹³² The World Bank made public disclosure of the appraisal document for the Tuz Gölü project (on a proposed loan of US\$325 million to BOTAS with the guarantee of the Republic of Turkey) in October 31, 2005. In addition to World Bank's financial assistance, the Turkish Government has multiplied initiatives to favor the project and exempted it from customs tax and VAT to enhance the financial viability. The importation of US\$317.5 million worth of machinery and equipment together with a creation of 950 new jobs for the whole project is expected. The World Bank also approved an additional US\$400 mn flexible loan in July 2, 2014 towards the cost overrun in the facility (World Bank, 2014) available online on http://www.worldbank.org/en/news/press-release/2014/07/02/world-bank-continues-to-support-gas-sector-development-in-turkey accessed on 18 July 2015).

¹³³ The other fields Bendis Enerji Üretim Madencilik Danışmanlık San.Tic. Ltd. Şti. operates are, inter alia, gas distribution; spot LNG importation and power generation.

and licensing process¹³⁴ to date and an estimated US\$3 billion investment will be allocated to it (Radikal, 2014). The UGS is envisaged to have three injection and production stations for which typical configurations range between:

- Ballica Station: Storage capacity (2bcm), injection rate (0.8 mcm/hr) and withdrawal rate (1.6 bcm/hr);
- Alifaki Station: Storage capacity (1bcm), injection rate (0.4 mcm/hr) and withdrawal rate (0.8 mcm/hr), and;
- 3) Kocakoy Station: Storage Capacity (1bcm)

with a combined working gas capacity of 4 bcm to be come on stream by 2023 (Jordan, 2014).

5.4.7.2 LNG Terminals

The first LNG import to Turkey occurred in 1994 following a twenty-year contract signed between BOTAS and Sonatrach¹³⁵ for the 2 bcm equivalent of liquefied natural gas. Given the decline of indigenous production and the rigorously increasing natural gas demand the volume of Algerian LNG imports subsequently rose to 4 bcm and soon was followed by another long-term LNG purchase contract signed with Nigeria (Shell) for an additional 1.2 bcm in 1995. To act as a supply source in accordance with the LNG imports and to provide other sub-services (e.g. unshipping, storing, gasifying and dispatching to transmission lines) Turkey's first LNG terminal -Marmara Ereglisi- was commissioned in 1989 and has been on stream since 1994. Undergoing a few expansions since its establishment, its capacity nearly doubled between 1996 and 2001. Izmir province has Turkey's second LNG terminal –Aliaga- founded by a private enterprise, Colakoglu Group, in the west of Turkey. The installation of the infrastructure started in 2001 and under a terminal service contract signed with BOTAS operations started with the unloading of the first LNG from a commissioning cargo in 2006. The hourly gas deliverability from storage is 685,000 m³ and it has a total regasification capacity of 6 bcm per year (Table 20).

¹³⁴ The progress have been made in licensing include: Environmental Impact Assessment (as of June 2013); Gas Storage License (Feb 2014); DSO Freshwater Supply Protocol (June 2014); BOTAS Gas Connection Agreement (Aug 2014), and in terms of engineering as FEED Leaching System (Feb 2014); Operation Philosophy (Feb 2014); Compressor Selection Study (Feb 2014) and FEED Sub-Surface (Apr 2014) according to Jordan (2014).

¹³⁵ The Algerian National Company for the Transportation and Marketing of Hydrocarbons.

	MARMARA EREGLISI	ALIAGA
Description		
Ownership	BOTAS	EgeGaz A.S.
Shareholder	BOTAS	Colakoglu Group
Location	Marmara Ereglisi / Tekirdag	Aliaga / izmir
Functions	LNG Storage; Regasification; Dispatch	LNG Storage; Regasification;
Functions	(to Russia-Turkey Transmission Line (23 km)	Dispatch
Schedule	Const: 1989; Operational: 1994	Const: 2000; Operational: 2006
Investment	US\$364 million (approx.)	US\$400 million (approx.)
Techical Features		
Storage Capacity	255,000 m ³ (3x85,000 m ³)	280,000 m ³ (2x140,000 m ³)
Send-out Capacity	936,045 m ³ /hr	685,000 m ³ /hr
Re-gasification Cap.	8.2 bcm/y	6 bcm/y
Reservoir Capacity	153 mcm/d	168 mcm/d
Trans. Sys. Entry Cap.	22.1 mcm/d	16.1 mcm/d
Contractors	i.e Freyssinet; CB&I Tractabel, Sapiem LNG	i.e. Freyssinet; CB&I etc.
Supplies		
Resources	Algeria; Nigeria	Various ^a
Reserved Capacity	BOTAS	Own Use
Regulatory Approvals		
License Effectiveness	$04/04/2013^{b}$ for 10 years	04/04/2013 for 30 years

Table 20. Characteristics of Turkey's LNG Terminals

^a Imported, wholesaled or exported LNG by state or privately owned energy companies.

^b The initial license was obtained on 04/04/2003 for 10 years.

Source: BOTAS; Egegaz; EMRA

Given the structure and ownership of both terminals, there exist some fundamental differentials in the services both terminals provide as Marmara Ereglisi predominantly stocks the Algerian and Nigerian LNG supplies imported by BOTAS and private gas suppliers who strive to balance their supply/demand portfolios (e.g. importers and wholesalers that are required to make arrangements with storage operators for 10% of their contracted gas volumes within five years of their entrance into the market) whilst the storage capacity of Aliaga has been booked and filled by BOTAS only.

5.4.8 Transmission

As broadly depicted in Map 3 below, the Turkish natural gas grid is extensive and transports gas from both gas production fields and import points to around eleven million small and large customers. The total network length (including low pressure distribution pipelines) is 88,313 km (MENR Strategic Plan, 2015) and is owned and operated by BOTAS although construction of new lines by private enterprises is legally possible and

equally encouraged¹³⁶. The current NGML defines the transport of gas through gathering lines (used chiefly by production companies) gas pipeline networks (exclusive of distribution networks and transports via LNG vehicles) and BOTAS holds sole responsibility of taking all measures to ensure secure and cost-effective transmission of natural gas as the country's only system operator – TSO – (EMRA, 2012). As discussed in Chapter 6, non-discriminatory TPA to transmission lines is allowed through regulated tariffs (prepared by BOTAS) as long as transport and delivery contacts are signed between the TSO and other market players, say for example, import, export, wholesale, production and storage companies¹³⁷. EMRA acts as a dispute settler over the connection issues between the parties and requires 'open access' by obliging the TSO to connect willing companies to the most convenient point of the network in accordance with the respective provisions of the transmission Network Operation Principles and Procedures $(NOPP)^{138}$ which is a guideline regarding system entry, carriage quantity statement and programming, outage operation, dispatch control, system balancing, communication system, capacity allocation, natural gas delivery and gauging operation etc. Turkey's extensive network of pipelines transport gas from Russia, Iran and Azerbaijan, and export a small amount of gas to Greece.

¹³⁶ To date no application has yet been filed for a license to build one.

¹³⁷ Transport contracts are required to be signed between the TSO and import, export, wholesale and production companies whilst delivery contracts are signed between the TSO and eligible consumers, storage and other transmission companies (if any.)

¹³⁸ It was published on the Official Gazette No. 24918 of 26.10.2002.



Map 3. BOTAS Natural Gas Transmission System

Since 2003, EMRA has moved forward with the construction of a total 73,454,240 metre distribution grid as a means of regional distribution by calling for a number of natural gas distribution tenders to transport gas to/from remote locations as touched upon earlier. Presently, there are sixty-nine distributors taking gas to sixty-five cities and more than two hundred districts (MENR, 2014) which was not otherwise covered by the then existing BOTAS infrastructure. The tenders have helped with the extension of natural gas supply to almost all of Turkey (only ten cities remain gasless for four of which the engineering works are underway whilst the rest six are on the construction phase) whilst more than ten million customers served and a massive TRY11.7 billion investment (excluding operation costs and VAT) flew into the market by private sector. Most notably, as of 2015, the domestic distribution network throughout Istanbul (operated by IGDAS) stood out at around 16,956 km (which was barely 152 km in 1989 and 4,615 km in 2000) and is Turkey's largest (Figure 31).

Source: Deloitte (2013)



Figure 31. Top 10 Regional Gas Distributors by Installed Pipelines (metre) and Investment Made (TRY), 2015

Note: Pipelines include both steel and polyethylene. Source: EMRA (2016)

The second largest Başkent Doğalgaz Dağ. A.Ş., providing roughly 7% of the population with more than 3 bcm gas sales per annum, has 1,349 km steel and a 5,698 km polyethylene pipeline network. A total TRY1.3 billion investment was made towards the appropriate construction for the gasification of the cities of Bursa, Izmit and Izmir each of which was to consist at least 2,700 km pipelines laid in (EMRA, 2016). Besides, works have also been ongoing towards the construction of a compressor station in Eskisehir. It will comprise 4xSPCP-400 units (each 13.4 MW) and is expected to not only contribute significantly to increased hydraulic stability of Turkey's gas network but also to ensure cost-reductions for BOTAS by guaranteeing higher energy efficiency by the supplier Siemens (Girbig, 2015). The project has been previously delayed due to unforeseen

circumstances and is expected to come online in 2015. BOTAS is to pay an estimated US\$65 million for this project (EMRA, 2011).

In terms of LNG transmission, probably no other area of the natural gas market has witnessed such full private sector participation without any involvement of the state at any level. Nineteen private companies have been licensed by EMRA to carry out LNG transportation in Turkey and the amount of LNG transmitted since 2011 have decreased notably as presented in Figure 32.



Figure 32. Monthly Transmitted LNG in 2011-2014 (mcm)

5.5 Conclusion

One of the inescapable features of the energy market cycle, given countries' natural endowments and proximities to strategic regions that have rich resources, is the swing of the pendulum between self-reliance and costly import-dependence. This chapter explored how the pendulum has swung with regards to Turkey's natural gas market over the course of 2001-2015 and presented the main factors that influenced the sector's development.

Turkey is a big country, composed of poor hydrocarbon resources and growing energy needs. The distance between its energy demand and supply together with the orientation of its future energy policies (based on regulatory framework) is expected to shed light on what direction the Turkish natural gas market might be heading in the future (e.g. more statist-leaning or market-oriented). With increasing GDP growth under the AKP rule over

Source: EMRA (2014)

a decade, Turkey's economic development has been noteworthy although not necessarily sustainable unless it is set to continue reforming the energy markets especially electricity and natural gas as remains the view of a large body of scholars and energy experts. Electricity is important, as the demand for it has been expanding constantly since 2003. The dependence of the transformation sector on natural gas as the fuel of choice, which currently stands at 48% is likely to remain stable or in flux going up, raises the importance of natural gas in Turkey even further. As such, natural gas represents more than 30% of the country's TPES (followed by coal and oil) and at this junction the challenges the Turkish natural gas market faces today can be summarised in two areas:

• Small production / High import dependency. Due to the absence of enough indigenous production, Turkey's natural gas demand is almost entirely met by imports. This segment of the market has particularly seen a glut of sweeping changes over the last decade including expired contracts, declining contracted import supplies- which was then to be compensated by gas from other sources and by more spot LNG, and allowance of new market entrants via contract release programmes to name but a few. All of Turkey's long-term gas supply contracts are based on take-or-pay obligations which have made the country solely dependent on every one of the five supplying countries for at least twenty years in length. As in Turkey, De Hauteclocque and Glachant (2009) quite rightly discussed this pervasive feature of the European gas markets and challenged the assumption that the refinement and harmonisation of the European market designs would ever succeed in the face of long term contracts that, according to the authors, have anticompetitive foreclosure effects when imperfect competition prevails.

Arguably, the authors' notion holds firm for the case of BOTAS, too although it was probably not intentional that BOTAS has been using the long-term contracts signed with several countries a long while ago to control the market given the scarce prevalence of short-term contracts back then¹³⁹, and the less common use of LNG as an alternative form of gas as well as the role of trading hubs in natural gas markets until recently. One explanation, of course, is that BOTAS has the predominant market share as the apologists of liberalisation blatantly complain about and there is a great deal of accumulated evidence in its favour if one looks at the logic of long-term contracts which leave both sellers and buyers with strictly defined obligations. Turkey, for example, is linked with

¹³⁹ Given the benefits for both producers and consumers from risk hedging through long-term contracts (Neuhoff and von Hirschhausen, 2005, p.1).

Russia, Iran, Azerbaijan, Nigeria and Algeria into bilateral monopolies and the take-orpay clauses of these gas contracts bind Turkey to purchase at least 80% of the contracted amount¹⁴⁰ annually regardless of whether or not the gas is actually taken (payment liabilities incur for the shortfall otherwise). As with so many crucial undertakings at present and billions of dollars at stake, it is not surprising that these assumptions result in a much more benign view of BOTAS' current status.

Oil-linked prices which the long-term contracts are based on are another prolonged issue Turkey has been the victim of. Despite there no longer being a robust European gas demand and greatly pressurised high Gazprom prices, Turkey continues to buy the most expensive gas from Iran¹⁴¹ (US\$507 per 1000 m³) and Russia (US\$429/1000 m³) according to Rzayeva (2014). Though controversial to the notion that LNG requires more and a longer process so should be more expensive than the Algerian and Nigerian LNG imports seem to be the least detrimental of all to the Turkish economy (Altunsoy, 2013). The oil-indexed prices are put into gas contracts to protect both parties from notable price differences of those alternative fuels and in Turkey's case they are reviewed in January, April, July and October on an annual basis. Turkey is Iran's largest and Russia's second largest gas customer (in Europe), and after a number of disputes, renegotiations and seeking international arbitrations over high prices Turkey seems to be managing to get reductions along with the global gas developments and cost of crude oil. There is a hope that Turkey will no longer suffer from major disruptions caused by technical or price related conflicts.

Indeed, Turkey has been a victim of price/technical/terror related conflicts between three gas import/transit countries (i.e. Iran, Russia and Ukraine) since December 2004 and the bill for the last gas interruption by Russia at the expense of Turkey was around US\$11.7 mn a day in return of 11 mcm/d emergency LNG imports from Nigeria, Norway and Algeria (Gürer, 2009). However, not only does Turkey's search for minimising future supply cuts continue, but the country is also in the process of negotiating very strategic projects that would put the country in the centrepiece of the energy world today. By promptly shifting its route from South Stream¹⁴² to the 63 bcm TurkStream project in

¹⁴⁰ See Section 5.4.4.1 Map 1.

¹⁴¹ Since indigenous production is reserved for the domestic demand, Iran itself imports gas cheaply from Turkmenistan and transits it to Turkey with a very high price tag (Kinnander, 2010).

¹⁴² To deliver gas directly to Europe the South Stream was planned to abandon the Ukranian transit corridor completely and to have two lines with 31 bcm capacity which were to be expanded to four lines with a total 63 bcm/yr by the end of 2020, (Dickel, et al., 2014, p.65).

early 2015 Russia plans to replace Ukraine's transit role with Turkey's, and that project alone is believed to cultivate Turkey's ambition of becoming a gas trading hub and strengthen its bargaining power for reducing the gas prices (Giuli, 2015).

Whilst the import segment of the Turkish gas market has been in such a state the contract release programme as discussed in Section 5.4.4.3 had been and still is an opportunity for BOTAS to dispel the lingering doubts about its intentions to keep the monopolistic power in the eyes of Europe. In an effort to create and sustain competition in markets whereby all companies are supposed to compete for bringing gas at competitive prices the role of removing entry barriers for new comers is clearly undeniable. Hence, in this framework, BOTAS has passed on the importation of 10 bcm of Russian gas to private companies. In fairness, BOTAS did request the willing entrants to have the Seller's Consent Protocol to be qualified for the release programme when it first initiated the programme in 2004 (which was actually considered as an extra impediment to make the programme more difficult by many at the time) but it was in fact Russia, Iran, Algeria and Nigeria that rejected providing the SPCs to companies other than BOTAS. Leaving aside the growing literature rationalising these suppliers for the righteousness of their actions of not switching from BOTAS as a sole buyer of big volumes with sovereign back up of the Treasury to several different companies with changing contract terms and conditions, the current landscape of the Turkish market gives a rather different picture. Given the fact that BOTAS has transferred only the Russian gas contracts, and the ownerships of four out of the seven private companies the contracts were transferred to are largely with Russia's state owned gas company Gazprom¹⁴³ (up to 75%), the legitimacy of certain liberalisation components of the energy Directives (i.e. unbundling) seems to be in a great danger.

One could well be correct to point out that fundamental aspects of the Gazprom strategies are on the verge of change particularly because of unconventional gas revolution, the rising star of LNG and spot trading, unpopularity of oil-linked long term agreements and most importantly the EU's eagerness to diversify their import destinations given the bitter disruptions experienced recently. Now Russia does not merely want to export gas but also aims to play a role in the downstream markets of other countries. The EU is vehemently

¹⁴³ At present, Avrasya Gas and Bosphorus Energy has Russian participation at 60% and 75%, and Gazprom Schweiz has already filed an application with Turkey's antimonopoly regulator to buy controlling shares in Akfel Gas. Enerco Energy is being controlled by Akfel Gas with 60% shares and the other 40% already belongs to OMV Gas & Power, the biggest partner of Gazprom in Austria (Sokolov and Ritchie (2015) in EIA).

trying to thwart the vertical integration strategies of supply countries like Russia by prohibiting them owning majority stakes in downstream markets via its energy Directives and although the legal framework of this issue is briefly touched upon in Chapter 4 the discussions of actual risks of cartelisation and dumping Turkey could be exposed to are left to the next chapter.

• Lack of Infrastructure / Need for investment: Turkey's natural gas demand has seen considerable growth mainly driven by the transformation sector and is expected to reach 70 bcm by 2030. The present lack of storage and other infrastructure however undermine confidence in Turkey's future commitment to effectively manage the risk of supply disruption and to provide flexibility to offset seasonal and intra-day supply/demand gaps, and robust price signals. It currently has a 2.66 bcm storage capacity and supply companies¹⁴⁴ are obliged to hold storage capacity (10% of their imports) to respond the peak demand of their customers. This is clearly not enough to meet the country's large increase in demand. Although the MENR's 2015-2019 Strategic Plan calls for expansion of Turkey's storage facilities it is as yet far from reaffirming a clear strategy for the investors with no specific measures or timetables provided.

Following the unanticipated disruptions during the cold winter, both the EU and the IEA have set Energy Supply Security programmes to be differentially well-informed concerning the predictable emergency response of their members to specific energy security issues. Turkey, as a founding member of the IEA and a candidate to the EU, is part of these programmes and is subject to the oversight of both organisations on a regular basis. Requiring more capital-intensive infrastructure in comparison to oil the emergency measures countries can take to mitigate the impact of gas disruptions include emergency gas stocks, supply and demand response, interruptible contracts and fuel switching. The limited gas stock obligation Turkey has initiated is already discussed above and in terms of supply response, which is the subject matter of next chapter, BOTAS as the transmission operator takes action to identify the importer caused imbalances to the system and requires them to correct their imbalances within eight hours. If not identifiable then the operator implements interruptible contracts to redress the consumptions itself. The 2014 assessment report of the IEA states that Turkey has an established Commission for Enduring and Supervising Security of Natural Gas Supply (CESS-NGS) since 2011 and the core of which is to ensure all power plants hold

¹⁴⁴ Excluding spot LNG importers (IEA, 2013).

sufficient amount of secondary fuels (e.g. diesel) for fuel switching in case of emergency (IEA, 2014, p.461). Undoubtedly, for the entire mechanism to work decisively and effectively considerable reformation work has to be done both at the trading points (i.e. physical and virtual) and the plants. This would require seminal investment contribution from both state and private entities.

In this chapter, the Turkish gas industry is depicted and this analysis suggests that considerable efforts have been made in the industry by the government since 2002 although a great deal of challenges still remains unaddressed. Having unearthed the fundamental facts as a skeletal basis, the following chapter looks at how regulatory institutions have attuned to sector developments and where Turkey's natural gas industry liberalisation stands in the context of the EU. The industry's harmonisation with the Gas Target Model of the EU is another topic to be comprehensively covered in Chapter 6.

Chapter 6: Turkey's Natural Gas Market Liberalisation in the Context of the EU

6.1 Introduction

Energy for a strategically important country like Turkey, which sits at the crossroad of major supply and demand regions, clearly plays a crucial role both economically and politically. Therefore, the role of liberalisation in a healthier gas sector to serve the country's many needs has been particularly debated in Turkey since the late 1990s, and Turkey, whose natural gas consumption today accounts for more than one third of the EU's gas supply, has begun restructuring its inherently monopolistic natural gas industry in conjection with the process of liberalisation of the markets. Different parts of the market have thus far been affected by the reforms created by the country's first and only Natural Gas Market Law of 2001 although the degree and form of which vary considerably. Against this background, the objective of this chapter is to provide an updated overview of Turkey's natural gas market liberalisation in the context of the EU energy legislation and to discuss how regulatory institutions have attuned to sector developments. Furthermore, it is intended to answer the research questions of (1) "What are the characteristics of the legal framework that has been created to ensure natural gas market liberalisation in Turkey and how effective is it? and (2) "How compliant the Turkey's legal framework with the Gas Target Model of the European Union?"

To do so, the chapter begis with a review of Turkey's natural gas market structure before and after the NGML to compare how the reforms have led to changes including price regulation and the subsidies. It then studies the compulsory measures of the EU Energy Directives and compares the compliance of the 2001 Law with those. The following section analyses the Gas Target Model of the EU and Turkey's place in it, with special emphasis on the role of wholesale market functioning inclusive of gas balancing arrangements and transmission tariff structures; security of supply and upstream competition; natural gas – electricity coordination; and new developments along the gas supply chain. The final section concludes.

6.2 The Turkish Natural Gas Market Structure: Before and After The Natural Gas Market Law of 2001

Although a marginal amount of natural gas was already being produced by TPAO in the mid-1980s (IEA, 2013) natural gas was properly introduced to Turkish consumers in 1987 following the first gas sales and purchase agreement signed between BOTAS and Soyusgaz of the USSR in February 14, 1986. The Statutory Decrees No. 350 and No. 397^{145} were the earliest legislations regarding the country's natural gas sector which granted the governance of the sector consecutively to BOTAS authorisation to be able to import, purchase, transmit and sell natural gas and LNG (Yardimci, 2011). At that time, only the production segment of the sector was open to private participants and BOTAS was the sole seller to OIZs and industrial users consuming more than 1 mcm gas per year which, in other words, meant that BOTAS was the direct price setter for almost 80% of the market and indirectly for the rest.

The introduction of liberalisation reforms in Turkey's energy markets began on 20 February 2001 when the government of Turkey approved the Electricity Market Law No. 4628 which was soon followed by the Natural Gas Market Law No. 4646 (hereafter referred to as the 2001 Law) to be effective from May 2, 2001. The provisions of both laws aimed at the harmonisation of the Turkish energy legislation with the EU's energy acquis (Akcollu, 2006) and the NGML was developed to introduce competition into the sector and enhance opportunities for private sector involvement with the hope, in turn, to create lower prices and consumer choice for final gas users (ITC, 2001). BOTAS was a vertically integrated de facto monopoly until the enactment of the 2001 Law¹⁴⁶ as stated above and held considerable market power by participating in all aspects of the market except production and later distribution (Figure 33).

¹⁴⁵ Dated 18 November 1988 and 2 January 1990, respectively.

¹⁴⁶ BOTAS was founded to transport Iraqi crude oil to Turkey in 1974. The responsibilities of BOTAS was first expanded to natural gas transportation and trade activities in 1987 and soon followed by further monopoly rights granted on natural gas import, distribution, sales and pricing in 1990. Formerly acting as an affiliation to TPAO, BOTAS was restructured as an independent state-owned enterprise as a result of advancing natural gas operations (Cetin and Oguz, 2007).



Figure 33. Turkish Natural Gas Market Structure Before the 2001 Law

The 2001 Law can be considered as the beginning of a long, onerous process of transition for Turkey's gas sector governance and institutional framework, in which the liberalisation reforms were predominantly driven by the EU energy Directives. Following the provisions of the 1st Directive, the initial primary objectives were set out for the domestic market starting with the encouragement of the private sector to participate in market activities. This was bolstered with the establishment of an independent regulator, the Energy Market Regulatory Authority (EMRA) which was again initially set up as part of the liberalisation reform process for the electricity market and later became the sole regulatory authority for the entire energy market centralising powers previously spread amongst various agencies¹⁴⁷.

The Law allowed a preparatory period of twelve months¹⁴⁸ starting from May 2001 for both EMRA to enact the secondary legislation (Table 21) and the companies keen for market entry to prepare for the license applications. Given there was no availability of license or certificate grants to any company until the end of the preparatory period, the companies which were already involved in the market, based on an acquired legal right, document, permission or authorisation prior to May 2001, were allowed to continue

¹⁴⁷ The duties of the EMRA was expanded to the oil markets as a solely responsible authority by the Petroleum Market Law (PML) No. 5015 in 2003 and for LPG by the Law No. 5307 in 2005. In 2013, the Electricity Market Law (EML) No. 6446 was revised and the duties of the EMRA were re-arranged and expanded even further.

¹⁴⁸ During which the arrangements of tenders for natural gas city distributions, selection of the tender winners, approval of the winner companies by the Council of Ministers and authorisation of contracts with the Ministry were aimed to be carried out by EMRA (NGML 2001, Temporary Article 1).

their acts for a maximum of twenty-four months starting from the date the 2001 Law came into effect. Permanent continuation of their market activities was strictly conditioned to i) submission of a new application to EMRA within twenty months from the effective date of the Law and ii) be not previously banned from performing such activities (NGML 2001, Art. 6/6a(4); Temporary Art. 1).

Table 21. Natural Gas Market Regulations and Communiqués by EMRA

Natural Gas Market Law
Natural Gas Market Law (NGML) No. 4646
Natural Gas Market Regulations
Natural Gas Market Licensing Regulation
Natural Gas Market Certification Regulation
Natural Gas Market Distribution and Customer Services Regulation
Natural Gas Market Tariffs Regulation
Natural Gas Market Facilities Regulation
Natural Gas Market Transmission Network Operation Regulation
Natural Gas Market Interior Installations Regulation
Regulation on the Principles and Procedures to be Followed in Inspections, Preliminary
Researches and Investigations to be Carried Out in the Natural Gas Market
Regulation on the Basic Utilization Principles and Procedures Applicable to Natural Gas
Underground Storage Facilities
Regulation on the Establishment of Basic Utilization Principles and Procedures Applicable
to Liquefied Natural Gas
Natural Gas Market Communiqués
Principles and Procedures Applicable to Connections to Transmission Networks in the
Natural Gas Market
Principles and Procedures Applicable to Illegal or Irregular Use of Natural Gas
Liquefied Natural Gas (LNG) Transmission Communiqué
Communiqué on the Determination of Thresholds as a Basis for Natural Gas Invoicing and
Its Rudiments
General Communiqué on Accounting Practices and Financial Reporting (Communiqué No. 2002/1
Communiqué on the Fines to be Applied Under Article 9 of Natural Gas Market Law

Source: EMRA; Deloitte (2012), p.10-11

In these circumstances, the effective control held by the state-owned BOTAS over import and wholesale segments of the market was to be terminated so the nationwide gas market could free of monopoly power abuse. The Article 7a(2) of the Law is specifically concerned with the liberalisation of gas market supplies and thus with the formation of a stable and transparent gas market along with private companies neither of which is to be able sell more than 20% of the forecasted national gas consumption

per annum (excluding producers). This was particularly important for breaking the BOTAS monopoly in the supply chain since the Law precluded BOTAS from executing any more gas purchase contracts until its import share was gradually reduced to 20% of the national consumption by 2009. Although the Law theoretically required all companies to constrain their market shares, a set of principles as per Article 4/4a(3) and Temporary Article 2 placed two further restrictions on the operational flexibility of prospective import licensees planning to enter the market as:

New import companies cannot import natural gas from countries with which BOTAS already has unexpired gas sales agreements.

The licensees must store 10% of their imported gas in the national territory for five years.

From 2003, Turkey began updating the 2001 Law and issued several amendments to clarify and place additional liabilities on the market participants. In that vein, the Law which initially allowed all companies to perform only one market activity and enabled them to participate in another legal entity with the condition they not to own nor hold the majority shares outside their market field was amended to exclude BOTAS¹⁴⁹ from such liability in 2008¹⁵⁰. In the same year the amendment No. 9/7/2008-5784/20 also introduced an exception in favour of BOTAS being able to sign new LNG import contracts as opposed to the Temporary Article 2 which prohibited BOTAS' new contract signings until its market share was gradually reduced to one fifth of the national consumption.

With the exception of two companies, Bursagaz and Esgaz¹⁵¹ which were owned and operated by BOTAS, the distribution segment of the Turkish gas market was essentially municipality owned prior to 2001. The 2001 Law oversaw that those two companies be transferred to the Privatisation Administration within two months after its enactment and privatised within six months in order to remove BOTAS from the distribution segment completely along with other three municipality-operated companies (i.e. EGO, IGDAS and Izgaz). Provided the clearance of external debts was backed by the Treasury, the municipalities were mandated to remain in all distribution cities/regions

¹⁴⁹ And its current subsidiaries and prospective companies BOTAS may set up for international projects in the future.

¹⁵⁰ Amended Law (9/7/2008-5784/17) dated 26 July 2008 on Official Gazette No 26948.

¹⁵¹ The companies distributed gas in Bursa and Eskisehir, respectively, and their privatisation was overseen within 3 years.

by holding up to 20% of shares¹⁵² (NGML 2001, Temporary Art. 3a; 3b). What is more, the Law thwarted distributors from buying more than 50% of their supply from a single supplier (whether importer or wholesaler) per Article 7/4d and restructuring the distribution segment of the industry this way appears to have not only been favourable to new entrants but also laid effective groundwork for achieving a free and competitive trade in the gas market.

Nonetheless, despite the fact that the 2001 Law has broadly created the necessary conditions for the establishment of a competitive market the distribution sector continues to be regulated owing to its monopoly characteristics. To this end, the Law empowers EMRA to ensure that open, nondiscriminatory access is provided to new entrants for domestic gas distribution on a tender basis and to regulate the interregional/intercity transportation rates, tariffs and terms of service. This is actually a direct illustration of 'competition for the market' commonly applied by countries when the competition within the market is not feasible/undesirable as discussed in Chapter 2 in greater detail. When observing the number of licenses granted to state-owned and private companies by EMRA following the adoption of the 2001 Law between 2005 and 2015 (Table 22) it would be appropriate to say that the impact of Turkey's first legislation towards liberalisation had been effective and there was noticeable interest from private participants who were drawn into the market.

¹⁵² The Law oversees that the distribution companies must offer a 10% partnership to municipalities of their operation region (or a company owned by the municipality) with no capital investment in return. The share of municipalities could be increased for another 10% in return of capital equivalence paid by the municipalities' own resources (given that the municipality does not hold any debt to the Treasury). In the event that municipalities do not acquire any share or are not represented at least with one board member, EMRA may request the distribution companies to take the necessary measures that shall enable municipalities to be represented in the companies' board of directors and board of audit in accordance with the Turkish Commercial Code No. 6762, Art. 275 (NGML, Art. 4/4g).

No	Type of Licence	2005	State Owned	Private	2011	State Owned	Private	2015*	State Owned	Private
1	Import	6	6	-	42	9	33	55	9	46
	Long Term (Pipeline &LNG)	5	5	-	12	8	4	17	8	9
	Spor LNG	1	1	-	30	1	29	38	1	37
2	Export	1	1	-	4	1	3	9	1	8
3	Whole sale	11	1	10	38	1	37	45	1	44
4	Storage	2	1	1	4	3	1	8	3	5
	Storage (LNG)	1	-	1	2	1	1	3	1	2
	Storage (Underground)	1	1	-	2	2	-	5	2	3
5	Transmission	10	1	9	22	1	21	20	1	19
	Transmission (Piped Gas)	1	1	-	1	1	-	1	1	-
	Transmission (LNG)	9	-	9	21	-	21	19	-	19
6	Compressed Natural Gas (CNG)	28	-	28	71	-	71	112	-	112
	CNG Sale	21	-	21	46	-	46	73	-	73
	CNG Transmission and Distr.	7	-	7	25	-	25	39	-	39
7	Distribution	33	-	33	62	-	62	69	1**	68
Total			18	119	243	28	215	318	29	289

Table 22. Number of Licenses Granted to Companies by EMRA, 2005-2015

*As of October 2015. **Istanbul Metropolitan Municipality still owns IGDAS. Source: EMRA

As identified in the previous chapter, the ownership of Turkey's natural gas sector is still largely with the state. The infrastructure is owned by the government and each segment of gas value chain has its own issues to be addressed. In a very broad sense especially when compared with the gas market structure before the Law the essentials of a competitive market, at least legally, seems firmly established and Turkey had clearly moved from a single vertically integrated utility to a partially competitive market structure with a diverse set of generation, distribution, storage and wholesale companies now operational (Figure 34).



Figure 34. Turkish Natural Gas Market Structure After the 2001 Law

Source: Deloitte (2013), p.41

6.2.1 Pricing Regulations and Subsidies

According to the 2001 Law natural gas producers and importers sell their gas to eligible customers, wholesalers, importers, distributors and CNG companies¹⁵³ at unregulated prices whilst distributors sell gas to end-users at regulated prices. Transmission and dispatch control tariffs, a key contribution to reflect balance between fixed and variable costs are also regulated and set up *ex ante* according to pre-defined methodologies (subject to 'revenue cap' regulations) approved by EMRA. Since 2011 the focal point of the distribution tariffs (subject to 'price cap' regulation) has been the rising end user prices applied by those distributors who came to the end of their eight-year fixed tariff periods (see Section 5.4.5). This particularly highlights the importance of regulating this new 'competition introduced for' sector appropriately and monitoring all anticompetitive behaviour ahead of broader governance progress if necessary. In terms of storage, the Law and respective regulations theoretically leave the contract terms and tariffs for access to storage to be freely determined between market participants

¹⁵³ Producers can only sell 20% of their output to eligible customers and the rest to other participants. Sales of importers do not include to CNG companies.

(NGML, Art. 11) but they are currently being set by EMRA and this will continue to be so until the country reaches a sufficient level of storage facility (Demircan, 2008). EMRA sets price levels for storage to cover the cost of service including the recovery of investment and a reasonable rate of return (IGU, 2014).

In a competitive setting, natural gas markets are expected to be sustainable, secure and providing affordable gas to users reflecting both supply and demand fundamentals (UNECE, 2012). In the progress towards this, gas-pricing mechanism is another area to look at. In 2014 alone, gas-on-gas price formation was used in just over half of all pipeline gas import (304 bcm) made worldwide, Europe being the main contributor (200 bcm). At the heart of that were Germany, Italy, the UK and France wherein prices were determined by the interplay of supply and demand, and trades were made over a variety of different periods (e.g. daily, monthly, annually or other). In Turkey, bilateral monopoly and oil price escalation pricings account for all imports into the country (IGU, 2015). BOTAS treats the cost of imported gas as a trade secret and does not reveal them but it is indicated at many platforms that Turkey pays relatively high prices particularly for Iranian and Russian gas. Whilst future developments will determine the exact role of long-term oil-indexed contracts in Turkey's liberalising gas market, the country replaced its pricing mechanism for energy products with cost-based pricing¹⁵⁴ in 2008, introduced subsidisation in 2009 and as discussed in Rzayeva (2014) BOTAS' profitability has been severely impacted since then (loss of TRY1.3 bn in 2011 and TRY606 mn in 2012). When used as a tool for political gain, subsidisation in the energy sector may look appropriate from the end users' point of view, but could apparently be incompatible with the solvency in the gas sector. In the case of Turkey it is also notably controversial in terms of natural gas and electricity applications since BOTAS tends to recover its losses by increasing the price of gas sold to built-operate and built-operatetransfer based natural gas fired power stations (which produces about 40% of country's electricity).

Although one would argue that BOTAS' attempt to liberalise the natural gas prices in 2008 was a successful case in promoting cost-based pricing and convincing the public that the increases were due to high import prices and the need to improve BOTAS'

¹⁵⁴ Taking into account the oil price and ratio of exchange to be updated monthly.

financial situation¹⁵⁵ this turned out to be a short-lived experience and was eventually abandoned at the end of 2009. Due to low demand and decreasing oil prices BOTAS was left to bring the gas prices down and its profitability has continued to be severely impacted due to subsidies ever since¹⁵⁶. By political choice subsidies in Turkey are primarily provided to industrial consumers whilst price increases are moderately passed onto residential customers and BOTAS losses are largely recovered in the electricity sector through BO and BOT based GFPPs.



Figure 35. Cross-subsidisation of BOTAS

Source: Keuchel (2014), p.9

To provide a starting point for a brief discussion on subsidies, it would probably be correct to first acknowledge the fact that finding a commonly agreed definition of subsidies is difficult since countries largely decide to adopt their own definition of energy subsidies as IEA et al. (2010) explained. The IEA report reveals that although judicious use of energy subsidies might help address market failures or respond to social and distributional objectives, especially where social welfare mechanisms for directly providing income support to the poor do not exist, they are not free from shortcomings and may insidiously lead to distortive price signals, higher energy production/consumption and barriers to entry for cleaner energy services and thus create

¹⁵⁵ After holding gas prices constant and below market rates for a long time as noted in Atiyas, Cetin and Gulen (2012).

¹⁵⁶ Loss of TRY1.3 billion in 2011 and TRY606 mn in 2012 as in Rzayeva (2014).

	2013								2015								
	in U (nor	(S\$ bn ninal)	as a %	as a % of GDP		§ per ta*		in U (non	in US\$ bn (nominal)		% of DP	in US\$ per capita*					
Country	Total	Share of Gas	Total	Share of Gas	Total	Share of Gas		Total	Share of Gas	Total Share of Gas		Total	Share of Gas				
Austria	3.2	0.9	0.8	0.2	372.7	109.3		3.8	1.0	0.9	0.2	446.0	116.5				
Bulgaria	18.2	0.3	34.4	0.5	2517.8	35.3		19.5	0.3	33.9	0.5	2720.7	39.9				
Belgium	9.2	2.0	1.8	0.4	826.1	180.9		10.2	2.1	1.9	0.4	908.7	190.3				
Croatia	1.9	0.3	3.3	0.6	449.1	77.5		2.2	0.3	3.7	3.7 0.6		80.1				
Czech Rep.	15.2	1.1	7.6	0.6	1440.8	104.1		0.0	0.0	0.0	0.0	0.1	0.0				
Cyprus	0.0	0.0	0.0	0.0	0.1	0.0		17.6	1.2	8.4	0.6	1669.5	109.4				
Denmark	5.2	0.6	1.6	0.2	922.0	113.4		5.8	0.7	1.6	0.2	1027.0	122.0				
Estonia	0.1	0.1	0.5	0.4	85.7	70.5		0.1 0.1		0.5	0.4	95.2	78.2				
Finland	1.4	0.3	0.5	0.1	249.5	53.0		1.4 0.3		0.5	0.1	263.1	57.4				
France	26.6	6.3	0.9	0.2	417.7	99.4		30.1	6.5	1.0	0.2	469.1	101.9				
Germany	50.3	11.2	1.4	0.3	622.7	139.2		55.6	11.9	1.4	0.3	683.8	145.8				
Greece	5.9	0.4	2.4	0.2	534.4	35.9		6.6	0.4	2.6	0.2	600.9	39.8				
Hungary	4.6	1.5	3.5	1.2	460.8	154.7		5.2	1.6	3.9	1.2	528.7	159.5				
Ireland	1.1	0.5	0.5	0.2	236.8	119.1		1.2	0.6	0.5	0.2	261.8	129.1				
Italy	12.8	9.1	0.6	0.4	214.3	151.8		13.3	9.3	0.6	0.4	220.3	153.6				
Latvia	0.3	0.2	1.0	0.7	157.8	110.0		0.5	0.3	1.3	0.7	225.5	125.1				
Lithuania	2.0	0.5	4.2	1.1	664.0	174.2		2.2	0.6	4.4	1.2	764.6	203.5				
Luxembourg	1.9	0.2	3.1	0.3	3468.4	291.1		2.1	0.2	3.2	0.3	3747.2	303.2				
Malta	0.0	0.0	0.1	0.0	21.5	0.0		0.0	0.0	0.2	0.0	53.4	0.0				
Netherlands	9.9	5.2	1.2	0.6	588.4	307.8		10.1	5.2	1.1	0.6	595.2	309.7				
Poland	46.7	2.9	9.0	0.6	1227.7	77.1		54.2	3.3	9.1	0.5	1425.7	85.5				
Portugal	1.9	0.4	0.9	0.2	182.8	41.4		2.2	0.5	1.0	0.2	213.4	45.5				
Romania	14.1	1.6	7.5	0.9	662.8	75.6		14.0	1.7	6.5	0.8	707.8	88.1				
Slovakia	2.8	0.7	2.9	0.7	520.5	129.9		3.2	0.8	3.1	0.7	596.7	140.7				
Slovenia	1.1	0.1	2.3	0.2	529.1	41.2		1.2	0.1	2.4	0.2	583.7	44.3				
Spain	20.7	3.5	1.5	0.3	443.6	75.7		24.2	3.8	1.7	0.3	521.2	81.2				
Sweden	1.2	0.1	0.2	0.0	129.6	15.4		1.8	0.2	0.3	0.0	188.2	16.8				
Turkey	31.2	4.9	3.8	0.6	409.7	64.5		38.8	5.3	4.5	0.6	500.1	68.5				
UK	36.7	11.4	1.5	0.5	572.6	177.4		41.2	12.3	1.4	0.4	635.0	190.0				

Table 23. Post-tax Energy Subsidies in Europe, 2013-2015

*Nominal

Source: IMF

Coal subsidies represent the largest subsidies that Turkey provides to fossil fuel producers (and to coal consumers) due to country's vast reserves followed mostly by petroleum¹⁵⁷. However, given the increasing prevalence of gas use the total value of

¹⁵⁷ The IMF reported US\$24.16 billion in (post-tax) subsidies for coal in 2015 chiefly provided through aids to the hard-coal and lignite industry, and coal aid to poor families whilst subsidies for petroleum was

natural gas subsidies have increased notably depending on year-to-year fluctuations in world prices; shifts in demand; and domestic pricing policy changes. As discussed in Chapter 5 the upstream activities of TPAO have now been expanded to large-scale offshore developments in the deep waters of Turkey and overseas, and thus the largest subsidy in the form of a direct budgetary transfer goes to TPAO (Bast et al., 2014).

A review carried out by Coady et al. (2006) found supporting evidence that universal energy subsidies were not a cost-effective way to protect the real incomes of poor households, since they involved substantial leakage of benefits to higher-income groups using examples from Bolivia, Ghana, Jordan, Mali, and Sri Lanka. Similarly, the Independent Evaluation Group of the World Bank found that the bottom 40% of the population ranked by income distribution receives only 15–20% of the fuel subsidies whilst the rich receive the most of the total value of the subsidies (IEG, 2008 in IEA et al., 2010, p.24). When looking at Turkey, however, it is hard to estimate and monitor whether the BOTAS subsidisation of residential consumers is really distinguished between truly poor and better-income consumers. An interesting approach, at this junction, came from Rzayeva (2014) who discussed that the scale of gas subsidies provided to Turkish customers through low, regulated tariffs was not necessarily stimulating excessive demand and argued that the (subsidised) price of gas, which was US\$390/1,000 m³ for households at the time of writing, was not entirely affordable for the average income level of Turkish population anyway.

Given the national circumstances it would not be incorrect to say that currently available subsidies are fundamentally specific to Turkey and although the greater proportion the Turkish private gas sector opposes them the government backs the concept as it uses them as policy instruments to attain various economic and social objectives. In line with the arguments of private gas sector players in Turkey, Oil Change International (2015) also suggests that Turkey should phase out fossil fuel subsidies altogether by implementing the G20 commitments since they threaten Turkey's economy with a strained budget, increasing government liabilities, and heightening the risk of stranded assets whereas IEA (2006) attaches importance to the broad benefits of the transition period during which a healthy degree of caution on the speed of implementing price adjustments may be given and potential social discontents

US\$9.39 billion compared to US\$4.79 billion in 2013. It is worth noting that prices for gasoline and diesel fuel in Turkey are among the highest in the OECD, owing to the relatively high excise taxes levied on petroleum products as in OECD (2009, p. 2).

could be forestalled. At the time of writing, there has been no sign of any revision on the existing subsidies provided in the sector.

As discussed in Chapter 2, a large body of literature exists indicating that countries' success in materialising reform programmes may not always be as great as the policy makers and/or international organisations suggest. This situation may become even more insurmountable if one considers the increase of susceptibility in transferring the strategic energy monopolies to the private sector. Being no different to any other developing country trying to reform their gas markets, the past fifteen years in Turkey have been a watershed for the test of liberalisation policies and regulations by all market participants including the state-owned national champion, BOTAS. The following two sections analyse the dynamic evolution of the Turkish natural gas market in terms of the EU energy Directives and the Gas Target Model, and provide what liberalisation has actually meant for Turkey, to what extent Turkey has managed to realise the reforms depending on the appropriateness of its governance structures and other characteristics. In that context the first two research questions outlined as:

(1) What are the characteristics of the legal framework that has been created to ensure natural gas market liberalisation in Turkey and how effective is it?

(2) How compliant is the legal framework in Turkey with the Gas Target Model of the European Union?

are addressed.

6.3 The Liberalisation Process: Compliance of the 2001 Law with the EU Energy Directives

As has been discussed in Chapter 1, the EU initiated the process of creating market integration via various energy Directives for a borderless internal energy market where competition is ensued in all segments of natural gas and electricity industries. The EU mandates the alignment of member states' energy laws with the Community Energy Acquis and the implementation of the relevant regulatory instruments, which have been framed through the Directives since the 1990s, to be finalised (Corbeau, et al., 2012).

Also as briefly touched upon in Chapters 1 and 4, the liberalisation of the energy markets were not due to the obligations of EU membership since Turkey has no legal obligation outside of the scope of the Customs Union until the accession negotiations were officially launched between Turkey and the EU in 2005 ¹⁵⁸ (EC, 1999). Liberalisation had been in the government policies and progress reports for quite sometime until the IMF-guided economic stabilisation programme¹⁵⁹ formed in 1999 (IMF, 1999; CBRT, 2001) actually gave the process a concise direction. Thanks to the advance level of alignment with the IMF reforms, Turkey only had to bring the prevailing laws into force and check the functioning of the competitive markets as required. It would also be fair to say that the 2001 Law has achieved most of the hallmarks of a liberalised market (at the time) transposing the EU dimension of energy reforms into Turkey's legislation although the full implementation remains unaccomplished. Table 24 below shows the major concerns of the EU's 1st, 2nd and 3rd energy Directives and the compliance of Turkey's NGML with them.

¹⁵⁸ Turkey's official candidacy and the reaffirmation of its political criteria fulfillment were approved at the Helsinki Summit on 10-11 December 1999 and the Brussels Summit on 16-17 December 2004 respectively. The accession negotiations were subsequently launched between Turkey and the EU in October 2005.

¹⁵⁹ According to the Letter of Intent of the government of Turkey, dated 9 December 1999, which described the policies that Turkey intended to implement in the context of its request for financial support from the IMF, it is highlighted that privatisation in the energy sector was crucial, both to realise receipts through transfer of operating right contracts and to foster investment and efficiency in the sector. Thus, legal amendments would be passed by the parliament to define energy as a sector subject to the Turkish commercial code (a prior action). A financial recovery plan for state enterprises in the energy sector would be prepared and wholesale and retail electricity prices should be raised over time to stem fiscal losses, as necessary. For details <u>https://www.imf.org/external/np/loi/1999/120999.htm</u>

	EU	EU	E	U	Turkey				
	First Directive (1998/30/EC)	Second Directive (2003/55/EC)	Third I (2009/	Directive 73/EC)	The 2001	Law			
Effective Date	10/08/1998	04/08/2003	03/09	/2009	02/05/2001				
Transposition Date	10/08/2000	01/07/2004	03/03	3/2011	-				
End of validity	30/06/2004	02/03/2011		_	-				
Unbundling	<u>Transmission</u> ➤ Accounting ^e (mandatory) ➤ Legal (optional) <u>Distribution:</u> ➤ Accounting <u>Storage</u> : ➤ Accounting	TSO and DSO ^a ▶ Legal (mandatory)▶ Management (optional)▶ Accounting (optional)(Possibility of exemption from legal & management unbundling for DSOs)	TSs & TSOs ^b ≻ Ownership -ISO -ITO LNG & System	DSOs ► Legal ► Management ► Accounting Storage Operator	BOTAS ► Accounting BOTAS transmission division (as TSO) in 2004	<u>Private Comp.</u> ► Accounting			
ТРА	Transport and LNG access: rTPA, nTPA or hybridTPA Distribution and price system: Postage stamp tariffs Distance-related tariffs Entry-exit tariffs.	Transport: rTPA Storage: rTPA, nTPA	Transpo Storage: r' Upstream pipeli	ort: rTPA TPA, nTPA nes: rTPA, nTPA	Transport: rTPA Storage: nTPA				
Market Opening ^c (Eligible Consumers ^d)	Phase 1 (20% opennes):Power Gen & Retail consumers of >25 mcm by 2000Phase 2 (28% opennes): PGs & All consumers of 15 mcm by 2003Phase 3 (33% opennes): PGs & All consumers of 5 mcm by 2008	All consumers except households by 2004 All consumers by 2007	Consumers elig systems can contracts in	gible in multiple have supply another State	>1mcm for old distr >15 mcm for new dist 80% Market	ibution regions ribution regions Opennes			
Regulatory Body	Establishment of a RB	Establishment of a RB	Establishmer complement nat	nt of ACER to ional regulators.	Establishment of EMRA in 2001				

Table 24. Compliance of the Turkish Natural Gas Market Law with the European Union Directives

^a Countries serving less than 100,000 customers were exempted from both legal and management unbundling requirements for their DSOs.

^bFurther separation of production and supply from transmission networks.

[°] 1st Directive also introduced a 'ceiling' on market opening, concerned States wherein the market opennes is already >30% in phase 1 may then limit their openings in a balanced manner namely to 38% in phase 2 and 43% in phase 3).

^d In order to safeguard their electricity market balances (for example, in case of safety or security of supply risks) Member States may introduce a threshold for the eligibility of combined heat and power producers (CHPs).

Source: EC (2000); Akcollu (2000); EU Law and Publications (First; Second; Third Gas Directives); UNECE (2012

		Year													
Actions			2001	02	03	04	05	06	07	08	09	10	11	12	2013
Enactment of 2001 Law															
Preparatory Period															
Unbundling	Accounting	Distributors													
BOTAS	Accounting	BOTAS													
Legal		BOTAS													
Privatization of I	BOTAS' Activ	vities													
Gas Release Prog	gramme (Priv	ate 80%, BOTAS 20%)													
	Importers														
Mandatory	Wholegalore	Sales to Eligible Cust.													
Storage	wnoiesalers	Sales to Distributors													

Table 25. Timetable of Actions Required by the 2001 Law

Source: Akcollu (2006), p.11

The basis of European energy reform is analysed in more depth in the next section by distinguishing the four mandatory instruments used to weigh up the institutional feasibility of such reforms for the structurally monopolistic Turkish gas industry. First is the market opening, which is one of the major motivations for liberalising the energy markets in order to bring to bear on the competitiveness of private firms on the basis of price and service quality, and it is followed by other measures namely the establishment of regulatory authority, unbundling and TPA.

6.3.1 Market Opening

As discussed in Chapter 5, distribution is one of the very few segments in the Turkish gas industry wherein only private entities have actively participated since 2003 if one ignores the binding provisions of the Law that oblige respective municipalities to remain in the process with at least 10% of the shares. Prior to the implementation of the 2001 Law, the gas distributors were responsible for supplying gas to customers regardless of their eligibility in so-called old regions¹⁶⁰. In line with the EU Gas Directives which obliged market opening, or retail choice, for all customers from July 2007, the Board of EMRA passed the first amendment to the 2001 Law in December 27, 2002 (Decision No. 76) and distinguished the eligible customers (and customer associations) as below:

¹⁶⁰ Istanbul, Ankara, Eskisehir, Izmit, Bursa and Adapazari are the old regions whereby seven privately and/or municipality owned natural gas companies started the distribution of natural gas was between 1992 and 1998.

- *i) Gas-fired power generators*
- *ii)* Combined heat and power co-generators
- *iii)* Natural gas producers
- *iv)* Other final customers and customer associations consuming more than 1 mcm of gas (Article 8a)

Whilst the eligibility of customers in the first three categories was independent from their annual consumption level and the 1 mcm threshold remained effective for the old region customers only, EMRA was empowered to set and approve the eligibility limits for the new region consumers¹⁶¹. This was changed in 2004 however and all customers of the new regions who used more than 15 mcm per annum were entitled to eligibility according to the Board Decision No. 408. Those that informed their regional distributors about their commitment to exceed the threshold within the current year and submitted their bilateral agreements with other suppliers were also acknowledged as eligible customers. The 2006 amendment extended the opening to certain customers who owned more than one facility within the same region and allowed them to be considered as eligible by the sum of their estimated consumption at each facility if that was how they could exceed the set threshold (Dec. No. 1032).

From 2008 the eligibility limits have continually reduced from 1 mcm down to 700,000 m³ in 2011, to 300,000 m³ in 2013 and finally to 75,000 m³ in 2015. The regional differences in terms of threshold levels were also removed to make the provisions applicable to all customers. Of course, that is not to say all consumers based in the new regions could just choose their marketer as they wished since the Law continued to approve the captivity of household and other small ineligible customers to distributors, who won the franchise biddings to supply the region with gas, at least for the first five-year period (Dec. No. 1808/1; 2966).

¹⁶¹ The decisions were made mainly based on based on regions' development, infrastructure and gas consumption levels that are announced in the respective tender notices.



Figure 36. Natural Gas Customer Profiles in Turkey

Source: EMRA (2011, p.63); (2016, p.39)

As illustrated in Figure 36, the customer range with substantial market shares in 2011 spanned from eligible customers with more than 700,000 m³ gas consumption (using 38.65% of total gas supply) to comparatively small users (61.35%) including residential users, businesses, government offices and other small scale industrial users (EMRA, 2011). The number of captive residential customers who were served by their regional distributors accounted for 87% and 78% of small customers in 2013 and 2014 respectively (EMRA, 2013; 2014) and as of 2015 the share of eligible customers was 3.99% in total (EMRA, 2016). Although in a perfectly competitive market such a percentage would have made that category of customers the most targeted for gas suppliers to compete on the landscape of the Turkish retail gas market has nonetheless closed this large section of the market to competition since 2003, due to franchised distribution regions, and residential customers having not been able to capture the benefits that an open market would purportedly bring.

Theoretically, market openness in all its forms was energised in the 2001 Law in that the operation of competitive gas markets would work to further stability and socially beneficial economic outcomes. The Law foresaw the materialisation of openness by reducing the market share of the sole player BOTAS and thus the emergence of alternative suppliers for the customers. When compared with a number of EU members¹⁶² which out-performed the provisions in the Directives and managed to

¹⁶² Such as Austria, Denmark, Germany, Italy, Netherlands, Spain and UK 100%, Greece and Sweden 95%, Belgium and Finland 90%, Ireland 86% and finally Luxembourg 80% (CNE, 2012).

realise 80% or more market openness as early as 2005, it would not be incorrect to say that Turkey's aim of opening four fifths of the market has not been achieved at all and is unlikely to be so until BOTAS' still existing 78% market power (decreased from 100%) is further diminished.

Encouraging the active participation of consumers to influence suppliers through their choices, improvement of products and services regarding both quality and price is of high importance (UNECE, 2012). Over a decade since the momentous 2001 Law, eligible customers have made no significant switch from one supplier to another in Turkey and the switching rate in 2011 remained as low as 13.99% similar to the 14.10% rate of 2010. Not surprisingly, given their bargaining power and asymmetry of information in the market, the sale of 83% of natural gas was realised by the very large eligible customers who chose to trade with alternative suppliers whilst small eligible customers preferred to re-negotiate their terms with the local retailers (EMRA, 2011). Most switching actions took place in the new regions (Figure 37).



Figure 37. Gas Sales to Eligible and Non-eligible Customers by Distributors, 2011

Turkey has aimed to introduce competition into the retail segment of the industry in phases and all the amendments made to the Law have required a series of measures to provide eligible customers free choice of supplier and to enable other suppliers such as importers, producers and wholesalers to serve those eligible customers (Dec. No. 4169 Art. 13). At the end of 2014, there were two E&P companies, TPAO and Thrace Basin Natural Gas Corporation, at the service of eligible customers and sold 63.88% their produce to these customers with the additional wholesale licenses they held. Both
companies are actually the oldest and largest companies in the market collectively providing about 85% of the supplies since 2003 (EMRA, 2014) whilst Marsa Turkey, Amity Oil International Pty Limited and Transatlantic Exploration Mediterranean International Pty. Limited are the latest entrants to the market¹⁶³.



Figure 38. Natural Gas Sellers to Eligible Customers in Turkey

According to the 2001 Law production companies must have shipping and delivery agreements with the transmission company to gain a wholesale license¹⁶⁴ (unless have their own transmission pipelines) although they are allowed to transport their gas to eligible customers through direct lines should the production fields be remote from the connection systems. There are fifteen import licensees¹⁶⁵ able to sell piped gas to eligible customers and eight of these have contracts with BOTAS to transport their gas both from abroad and to eligible customers through its infrastructure. In terms of importation of spot LNG, BOTAS and Egegaz are the only entities that own and operate their own LNG terminals whereas the other thirty-six companies who applied as new entrants into this large-volume LNG retail segment are without one. To the contrary, transmission of LNG is fully participated in by nineteen private licensees with no state

Source: NGML 2001

¹⁶³ The latter two operate as the subsidiaries of TransAtlantic Petroleum Ltd.

¹⁶⁴ There used to be mandatory 'storage facility' requirement for this and it was removed by the Supplementary Law (30/5/2013-6491/27) in 2013.

¹⁶⁵ BOTAS alone holds six licenses for its import contracts with different countries.

participation at all¹⁶⁶.

With regards to prices, both captive residential customers and eligible customers who did not switch continue to purchase gas from their franchised distributors at regulated prices whereas other large customers and their choice of suppliers are free to determine the prices and transaction conditions between them as long as the regional distributor is notified within fifteen days¹⁶⁷ (Dec. No. 4169 Art. 8a). In such cases, the distributor reserves the right to ask the switching customers to replace their existing meters with remote reading meters to make instant information flow reachable in real time¹⁶⁸. Additionally, customers who consume 300 mbar gas (or higher) are required by EMRA to establish an automatic volume corrector system once they gain the eligibility (Art. 7b).

The fees for the eligible customers who fail to meet the eligibility thresholds (those who continue to be supplied by their regional distributor) in any given year remains bundled with the price of transportation ¹⁶⁹, unit service and depreciation charge and the difference between the retail prices charged to eligible and non-eligible customers by the distributors. Should distributors be charged differently by their own supplier based on the number of eligible customers they have in the region then the failed eligible customers shall also pay that difference to the distributor which is to be returned to the supplier of the distributor in the first place. The liability for paying regional distributors the retail price difference between eligible and non-eligible customers persists even when the failed eligible customers are provided gas by other suppliers (Dec. No. 4169 Art. 3).

With regards to customer satisfaction, although the number of complaints made to EMRA by eligible customers seemed to be on the decline compared to previous years (Table 25); the complaints are expected to continue as long as the mis-selling attempts of suppliers continue.

¹⁶⁶ See EMRA website <u>http://www3.epdk.org.tr/index.php/dogalgaz-piyasasi/lisans?id=952</u>

¹⁶⁷ Not doing so may cause the eligible customers to be still served by the regional distributor. The timetable for eligible customers to return from other suppliers back to their regional distributor is fifteen working days prior to the expiry date of their current agreements.

¹⁶⁸ Vice versa, the distributors are obliged to provide the eligible customers with technical information about the current counters upon written request (Dec. No. 4169 Art. 7a).

¹⁶⁹ The transportation fee cannot exceed the Unit Service And Depreciation Charge (USDC) rate the distributor's offer specified in the respective tender. Also note that EGO (the distributor of Ankara) was fully municipality owned during the said period which is now privatised.

	End of 2011	End of 2012	End of 2013
Connection	51.97	58.54	40.1
Billing, Metering and Price	4.45	9.26	11.7
Connection Fee (Non-eligile Consumers)	10.27	8.39	17.6
Retardation in Project Approval & Gas Opening	2.3	2.4	3.9
Deposit and Refunding	3.28	3.02	6.8
Eligible Consumers	4.5	4.22	2.9
Meter Re-commisioning Fee & Overdue Bills	1.45	2.65	4.9
Service Line, Box Installation and Waiting Period	6.1	6.74	1.9
Other	15.68	4.8	9.8

Table 26. Consumer (Complaints I	Made to Distributi	on Companies	, 2011-13 (%)
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Source: EMRA (2011; 2012; 2013)

Between 2003 and 2008, there were continual cases against EGO for unfair practices such as not informing the consumers regarding their gain/loss of eligibility in writing, preventing them from switching by not informing them about their rights and more importantly charging the eligible customers by the wrong pricing formulae where the USDC rate was added to the cost of natural gas rather than the transportation fee which, by the 2001 Law, could not be more than the USDC. In March 2003, EGO was fined by EMRA and given fifteen days to stop its unfair actions. In addition, it was decided the customers charged extra were to be reimbursed based on a monthly calculation correctly done by the company within a maximum 90 days together with their names and titles to be published both on the company's website (for 60 days) and twice in two local newspapers (Dec. No.1537/1).

6.3.2 Energy Market Regulatory Authority (EMRA)

In February 2001, the Turkish government enacted the EML and ultimately created a new electricity market regulatory authority the name of which was later changed to an umbrella term "Energy Market Regulatory Authority", and oversaw all energy markets, natural gas, oil and LPG, to be subject to regulatory authorisation by 2005. EMRA is structured as a commission with nine members and its responsibilities in terms of the natural gas market include introducing and promoting competition, protecting the interests of consumers, optimisation of quality, reliability and safety of the services, introduction of investment and improving the transparency of the regulations. EMRA has been undergoing structural changes since 2003 and with the adoption of the EU Directives in particular, the power and responsibilities of EMRA have been refined and

expanded greatly to, for example, acceptable accounting principles and procedures; regulating third party access to network and LNG facilities; unbundling; wholesale and retail pricing; and setting tariffs for transmission, storage and distribution services.

Similar to regulators of other countries in the liberalisation process, EMRA is considered administratively and financially autonomous ¹⁷⁰ (the former is further examined in Chapter 7), growing in experience and improving the clarity of its secondary legislation via regulations, communiqués and Board decisions (ITC, 2001). With regards to establishing a competent regulatory authority with the same minimum set of competences to be shared in all other member states, as required by the 1st and 2nd Directives, the alignment with the EU's Directives was fully achieved by the 2001 Law (Akcollu, 2006). Given the monopolistic structure of the Turkish natural gas market and the national champion BOTAS being responsible for virtually all operational activities within the entire gas market, EMRA was given the task of processing Turkey's gas market transition from exclusive ownership and control by BOTAS¹⁷¹ in both upstream and midstream activities to the competitive market. EMRA has been allowing private sector participants in various gas market activities previously reserved solely for BOTAS by granting, amending and policing licenses/certificates¹⁷² to companies which either produce, import (long term or spot), transmit (LNG or CNG), store (LNG or underground), wholesale, export or act as retail suppliers since 2003. EMRA determines not only the length, scope, conditions and fees of the licenses (together with rights and liabilities of the licensees), but also arranges the transfer of operating rights within the scope of existing contracts based on the provisions of the 2001 Law. Table 27 below illustrates the responsibilities of EMRA other than the allocation of licenses/certificates in line with other regulatory bodies:

¹⁷⁰ The EMRA is mostly financed through: fees collected from license applications, renewals, modifications, license copies and annual license fees; 10% of the administrative fines imposed to regulated entities and power transmission surcharges which are equal to one percent of the transmission tariff at most (EBRD Turkey Country Profile).

¹⁷¹ Also TPAO to certain extent.

¹⁷² Certificates are granted for construction internal installations and services related market activities, and are valid for 10 to 30 years.

Allocation of fair/reasonable profits	➢ Regulating natural gas transport and distribution to ensure that the prices charged are fair and reasonable
Promoting competition	 Promotes and protects competition both in gas supply and demand markets to prevent power abuse of existing monopolists. To ensure compliance with the legislation designed to prevent further monopolies. Cooperate closely with Competition Authorities.
Efficiency and rationality	Promoting the rational use of natural gas while ensuring due protection of the environment.
Optimization of quality	 Promoting the interests and rights of users through improvement of the quality of public service Setting service quality standards, which may be accompanied by financial incentives and penalties.
Reliability, safety and continuity of the services	 Setting technical and safety standards for the natural gas industry. Raising the levels of safety and reducing the number of incidents connected with the provision of service. Ensuring the continual and uninterrupted provision of services at all times. Promote the efficiency and continuity of transport and distribution services.
Market opening	Revising the definition and conditions of eligibility and announcing the thresholds for eligible customers at the end of December each year.
	 Facilitating and enforcing TPA to all existing and newly constructed networks (provided that sufficient capacity is available), and promotes better operation, reliability, equality and non-discriminatory access. Setting standards for the management of transmission network capacities in a transparent, reliable and fair manner for the facilitation of open access (depending on the type and level of unbundling), consulting all relevant parties whilst setting up the principals.
Third Party Access	 Determining the charges for capacity procurement and utilization although in some IEA countries the general policy framework sets the charging methodology by law. Approving a suitable methodology for access tariffs proposed by BOTAS. Approving the structure of the balancing market and the methodology for setting fixed charges for the purchase and sale of balancing energy. Determining rules, in some cases, for allocation of costs for unbundled businesses and taking an active role in setting out the requirements of the compliance audit. Reviewing and implementing rules for the transparent and non-discriminatory allocation of congested infrastructure. Carrying out an audited account of the use of any revenues from capacity allocation mechanisms. Deciding on exemptions to TPA relating to take-or-pay contracts. Involving in the investment decisions of network operators through the revenue-setting procedure and decides on possible exemptions for TPA for new investments. Cooperating closely with competition authorities. Developing guidelines concerning the form and content of applications for coverage under the BNC.

Monitoring and reporting	 Monitoring and reporting to the Ministry on security of supply issues. Supervising fulfilment of the obligations and rights of concessionaires and licensees Carrying out all inherent and necessary actions for the fulfilment of the functions of transport and distribution services in accordance with the prevailing rules. Monitoring the market performance of the participants and keeping records. Ensuring compliance of the obligations and rights of licensees with environmental legislation. Examining the market and system operations. Ensuring the NGML is authorized and appropriately treated in the gas market. Enforcing and improving the transparency of regulations
Unbundling	 Eliminating restrictions on foreign trade. Providing partial or full unbundling of natural gas transportation services from gas Requiring all firms to maintain an accounting separation between business segments to comply with prohibitions on cross-subsidies.
Pricing structure (wholesale and retail)	Identifying and ensuring the cost reflecting prices.
Securing investments	 Overseeing the introduction of investment. Promoting investments to ensure supplies in the long term. Involving in the investment decisions of network operators through the revenue-setting procedure and decides on possible exemptions for TPA for new investments.
Dispute settlement	 Acting as dispute settlement authority for the upstream gas industry. Conducting settlement procedures inclusive of financial compensations. Ensuring service quality standards (accompanied by financial incentives and penalties when necessary).
Guidelines for other issues	 Designating a supplier of last resort, SLR (although the SLR is currently not designated) Defining new functions for the meters. Encouraging the introduction of new technologies enabling more sophisticated metering of consumption, which will facilitate opening up to competition.

Source: Campodonico (1999); ITC (2001); Corbeau et al. (2012); UNECE (2012); EMRA

6.3.3 Unbundling

BOTAS, acting on an entirely monopolistic structure up until 2 May 2001, was responsible for gas procurement, transport, distribution, storage and wholesales in the Turkish natural gas market. This very structure, as discussed in Chapter 2, makes BOTAS a perfect candidate for a solution called vertical separation, or unbundling, which is proposed to increase the independence of network managements and to foster network companies' direct focus on their main activities by encouraging innovations and investments in the grid (Mulder, Shestalova and Lijesen, 2005). Whilst academic debate over its merit continues, the EU Directives have introduced unbundling regimes with different degrees of structural separations for the member states with a main goal

of separating network operations from production and supply activities. The 2001 Law required BOTAS to keep separate accounts for each activity it is involved in from 2003 onwards and to continue its vertically integrated structure (except for distribution) until 2009. A restructuring was envisaged thereafter and according to which BOTAS was only to be left with the monopoly on pipeline transmission whilst other to-be-formed legal entities were to be privatised by 2011 (Temporary Art. 2). Nevertheless, in Turkey where the implementation of such a drastic unbundling regime had been long prescribed, no step has been taken towards either legal separation or ownership unbundling of BOTAS. Presently, only the accounts of BOTAS' transmission and commercial activities are unbundled.

Acknowledging the regulatory gap outlined above, the AKP government considered revising the NGML Law and consulted the Turkish Competition Authority regarding the restructuring of BOTAS under the Law No 4054 on the Protection of Competition in 2012. The initial revision to the Law foresaw an ownership unbundling for the existing vertically integrated company and envisaged the establishment of two separate corporations namely (i) BOTAS to be responsible for storage and transmission; and (ii) Doğal Gaz Ticaret ve Taahhüt A.Ş. to take over the import, export and wholesale activities. As presented in Chapter 4 it was the 3rd Directive that introduced the radical "ownership unbundling" of network businesses and given the fierce opposition from France and Germany it did not become mandatory but remained optional along with comparably milder legal and functional separations to go with (i.e. ISO and ITO). For various reasons elaborated upon in their official response paper, the Competition Authority argued that Turkey had more legitimate reasons than France and Germany to not opt for the radical 'ownership' unbundling given its weak and strong points both nationally and internationally, and suggested BOTAS set up a trading company, Doğal Gaz Ticaret ve Taahhüt A.Ş. as a separate legal entity only (Soysal et al., 2012).

Another concern of the 3rd Directive was the specifics of exactly what is to be unbundled at the retail level and the designation of distribution system operators (DSOs) and closed distribution system (CDS) operators as per Article 24-28. The 2001 Law has however not distinguished between distribution and retail and (due to franchising) distribution is presently a monopoly in every region whilst every distributor is also a retailer (Yilmaz, n.d.). When viewed from this perspective the unbundling of Turkish DSOs is still in accordance with the 1st Directive which required the effective accounting unbundling of distribution companies. About seventy distribution companies are now accounting unbundled but of course the discussions held at the EU level (Table 28) regarding, inter alia, how to forestall DSOs' taking advantage of their competitive position on the market (not least household and small non-household customers, who bear the ultimate risk, to be the high candidate for priority (CEER, 2013)), seem far away with the Turkish decision makers and energy regulators under the current circumstances.

Table 28. TSO Unbundling Regimes in Europe

Country	Transmission Company	Unbundling Model	Country	Transmission Company	Unbund. Model	Country	Transmission Company	Unbund. Model	Country	Transmission Company	Unbund. Model
Austria	GCA	ITO	Germany	Bayernets	ITO	Germany	GTD Nord	ITO	Netherlands	GTS	Own.
Austria	TAG	ITO	Germany	Fluxys	Own.	Germany	Ontras	ITO	Sweden	Swedegas	Own.
Belgium	Fluxys	Ownership	Germany	GRTGaz	ITO	Germany	Gasunie Trans.	Own.	Slovenia	Plinovodi	ITO
Czech Rep.	Net4Gas	ITO	Germany	Jordgas	ITO	Germany	Thyssengas	ITO	Turkey	BOTAS	Accounting
Denmark	Energinet	Own.	Germany	Nowega	ITO	Hungary	FGSZ Zrt.	ITO	UK	NGG	Own.
France	GRTGaz	ITO	Germany	Terranets	ITO	Italy	Snam Rete Gas	Own.	UK	BBL	Own.
France	TIGF	Own.	Germany	Gascade	ITO	Italy	ITG	ITO	UK	IUK	Own.

Source: Groebel (2013); EC (2014)

Table 29. Status-quo on DSO Unbundling in Europe

	No of DSOs	DSOs serving <100,000 customes	DSOs rebranded their corporate identity	NRAs involved in the rebranding process	DSOs initially refused to rebrand their CI?	Rebranding / Branding satisfactory	DSOs have sufficient financial resources to ensure real decision- making power & independence in their work?	DSOs have sufficient personnel resources to ensure real decision- making power & independence in their work?	There was a change in the DSOs structures?	Compliance officers have enough information & resources to fulfil their tasks independently?	How satisfactory are the compliance programmes of theDSOs?Monitoring of the compliance programme by the compliance officer?	Data Management System	Behaviour of employees towards customers, customers of other parts of the integrated company and 3rd companies?	Transposition of 3rd Dir Art, 28 into national law?
Austria	20	14	some few	Yes	Yes	2	most	most	Yes	2	2	3	2	No
Belgium	18	8	all	Yes	No	2	all	all	Yes	N/A	N/A	N/A	N/A	Yes
Czech Rep.	86	80	none	No	No	5	all	most	No	N/A	N/A	N/A	N/A	No
Denmark	4	2	N/A	Yes	Yes	1	most	N/A	No	2	1	1	1	No
Estonia	26	26	some few	No	No	3	most	most	Yes	N/A	N/A	N/A	N/A	No
Finland	24	24	none	No	No	3	N/A	N/A	No	N/A	N/A	N/A	N/A	No
France	25	22	some few	Yes	No	2	all	all	Yes	1	1	1	2	No
Germany	720	640	N/A	Yes	No	3	N/A	N/A	Yes	3	2	2	3	Yes
Greece	3	2	none	No	No	1	N/A	N/A	No	N/A	N/A	N/A	N/A	Yes
Hungary	11	6	apprx. half	No	No	1	all	all	Yes	4	4	4	4	Yes
Italy	229	195	N/A	Yes	No	N/A	all	all	N/A	4	4	4	4	No
Lithuania	6	5	none	Yes	No	5	all	all	Yes	N/A	N/A	N/A	N/A	No
Luxemb.	3	3	some few	No	No	3	most	most	Yes	3	5	N/A	N/A	No
Netherlands	8	1	all	No	No	2	all	all	Yes	N/A	N/A	N/A	N/A	Yes
Poland	35	29	none	No	No	3	all	all	No	3	2	2	2	No
Portugal	11	7	some few	Yes	Yes	4	most	most	No	N/A	N/A	N/A	N/A	Yes
Romania	41	39	all	No	No	1	all	all	No	2	2	2	2	Yes
Slovenia	16	16	none	No	No	1	N/A	N/A	No	N/A	N/A	N/A	N/A	No
Spain	26	11	none	No	No	3	N/A	N/A	No	3	3	3	3	No
Sweden	5	5	none	No	No	3	all	all	No	3	3	3	3	Yes
Turkey	70	54	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No
UK	31	3	N/A	No	No	1	all	all	No	1	1	1	2	Yes

Source: CEER (2013, p.26); Interview (March 2016)

From the standpoint of the EU, ownership unbundling is the most effective tool to solve the inherent conflict of interests and hence free the network operator from any supply and production interests. Article 11(3b) of the 3rd Directive explicitly states that if certification is requested by a transmission system owner or a TSO which is controlled by a person(s) from a third country or third countries, the NRA should notify the Commission and refuse the certification if it should put at risk the security of the energy supply of the member state and the Community. By that, the EU principally targets Russia's attempts to be involved in the downstream markets of European countries and aims to thwart Gazprom and all other corporations representing Gazprom's interests from acquiring transmission operators due to the 'level playing field' provision that bars vertically integrated utilities from these markets. In other words, Gazprom will have to prove the compliance of its subsidiaries with effective unbundling regulations to the national regulators (Grätz, 2009, p. 78).

This argument holds true in the Turkish case as well. As presented in Chapter 5 BOTAS has transferred two of its long-term gas purchase contracts to private companies and a detailed analysis of ownership structures of these companies (Table 30) suggests that Russia's downstream expansion in the Turkish gas market is likely to remain the status quo.

		Private Company	Import Destination	Import Amount (bcm)*	Ownership Structure
Se	ne	Shell Energy A.S.	Russia	0.25	Royal Dutch Shell- 100%
lea	mr	Bosphorus Gas Corp. A.S.	Russia	0.75	Gazprom Germania- 71%, Tur Energy- 29%
Re	gra 1	Enerco Enerji San.&Tic. A.S.	Russia	2.5	Akfel Group- 60%, OMV Gas&Power- 40%
as	LO	Avrasya Gaz A.S.	Russia	0.5	Gazprombank- 60%, Tahincioglu- 40%
U	2		Total	4 bcm	
Se	ne	Kibar Enerji Dağ. San. A.S.	Russia	1	Kibar Holding- 100%
lea	m	Bosphorus Gas Corp. A.S.	Russia	2	Germania Gazprom- 71%, Tur Energy- 29%
Re	2 2	Akfel Gaz San. ve Tic. A.S.	Russia	2.25	Akfel Holding- 100% **
as	ro	Batı Hattı A.S.	Russia	1	Eksim Group- 60%, BIM- 40%
U			Total	6 bcm	

Table 30. Contracts Transferred to Private Companies and Ownership Structures

*1 Lot=0.25 bcm

** Gazprom Schweiz has already filed an application with Turkey's antimonopoly regulator to buy controlling shares in Akfel.

Source: EMRA; Rzayeva (2014); Platts (2013)

Currently, in three out of the seven companies the ownerships are largely with Russia's Gazprom and once the Turkish Competition Authority has determined the case of Akfel Gas the number of Russian-controlled Turkish import companies will increase to four. The analysis in Chapter 5 presented that no import countries had the motivation to sell gas to companies other than BOTAS in the course of 2005 unless some of which were forward integrated into the market and made money that way (Deloitte, 2012). Although one would argue that these companies do not seem to be a direct threat to the transmission operator BOTAS just yet, they are indeed the country's fresh suppliers brought into the sector to provide competition and better priced natural gas to customers. Most of those companies have now directly integrated themselves with the main supplier, Russia, with noticeably cheaper import prices compared to their counterparts. This grand strategy of Russia to implicitly re-sell gas to itself as a means of such importers and gaining ground in the Turkish domestic market can be considered as a straightforward illustration of Turkey's vulnerability and market players' expose to asymmetry of information, discrimination and non-transparency as acknowledged in the 2012 report of the Competition Authority of Turkey (Soysal et al., 2012).

6.3.4 Third Party Access to Transmission Network

Since the production sites and entry points for natural gas imports are concentrated in a few provinces BOTAS owns and operates extensive pipelines to move gas from suppliers to customers throughout Turkey. In order to curtail the exercise of monopoly power and to eliminate certain forms of access discrimination, the Turkish government issued the regulation for Transmission System Operations in October 26, 2002¹⁷³. Providing the legal basis for a national access regime this regulation paved the way to form the basics of the Network Operation Principles and Procedures (EMRA, 2013). Incorporating this commitment into a new piece of binding legislation the BOTAS Network Code (BNC) was published on 1 September 2004. Nevertheless, this did not necessarily translate into immediate enforcement until the emergent request of the wholesale company, AKSA Doğal Gaz Toptan Satış A.Ş., to transmit the production of TPAO from the Akcakoca field through the BOTAS network in July 2007 (Deloitte, 2012). This was followed by inquiries from other participants, Shell Enerji A.S. in

¹⁷³ Published in the Official Gazette No. 24918.

December 2007, Bosphorus Gas Corporation, Enerco Enerji and Avrasya Gaz in 2009 to use the infrastructure for natural gas imports from Russia as a result of the contract release programme (EMRA, 2012). However, despite its exclusive ownership and operatorship in transmission, however, BOTAŞ has been thwarted from holding any exclusive territorial rights and hence the building, owning and operating of the new transmission systems are not in any way limited or restricted. No company has nonetheless come forward to build one thus far due to potentially large cost recovery and perhaps the avoidance of duplication of facilities.

Setting terms and conditions for the organisation of access to natural gas networks, especially in vertically integrated markets, is rather challenging with profound implications for how gas will be priced and traded domestically and internationally. Chronologically, the EU's 1st, 2nd and 3rd energy Directives have introduced progressive terms regarding the TPA to European gas systems. Whereas the 1st Directive allowed shippers and transporters to either negotiate the right of access to transmission networks in good faith (nTPA) or to follow a more regulated route on the basis of published tariffs and other obligations (rTPA) with regulatory oversight, the later Directives eventually abolished the nTPA and the accessions now have only to be regulated. Under the provisions of the 2001 Law and the BNC, TPA to transmission networks in Turkey are regulated between shippers and the transmission system operator and EMRA sets the transmission tariffs.

Country TPA to		to	Country	TPA	to
Country	Transmission	Storage	Country	Transmission	Storage
Austria	Regulated	Negotiated	Latvia	Regulated	Regulated
Belarus	Regulated	N/A	Lituania	Regulated	Negotiated
Belgium	Regulated	Regulated	Netherlands	Regulated	Negotiated
Bulgaria	Regulated	Regulated	Poland	Regulated	Regulated
Croatia	Regulated	Regulated	Portugal	Regulated	Regulated
Czeck Rep.	Regulated	Negotiated	Romania	Regulated	Regulated
Denmark	Regulated	Negotiated	Serbia	Regulated	Regulated
France	Regulated	Negotiated	Slovakia	Regulated	Negotiated
Germany	Regulated	Negotiated	Spain	Regulated	Regulated
Greece	Regulated	Regulated	Sweden	Regulated	Negotiated
Hungary	Regulated	Regulated	Turkey	Regulated	Negotiated*
Ireland	Regulated	Negotiated	UK	Regulated	Negotiated
Italy	Regulated	Regulated			

 Table 31. Third Party Access Regime to Natural Gas Networks

*EMRA continues to apply rTPA instead on the basis of country's insufficient storage level. Source: GSE According to the definitions set out by the Directives and the guidelines for good TPA practice for storage system operators (GGPSSO), member states are provided with the choice of nTPA and/or rTPA to storage facilities, line-pack and other ancillary services. The 2001 Law stipulates negotiated access to storage and LNG terminals and leaves the parties to come to voluntary commercial agreements (Tariffs Reg. Art. 15). However, it is specified in the same Regulation that until the country's storage capacity reach a sufficient level the accessions may be regulated (Table 31) (ibid, Temporary Art. 2). This clearly bears the scars of country specific difficulties relating especially to gas storages proving that what may be straightforward from a regulatory perspective could be much more difficult in practical terms. That said, a number of rules have been brought to bear on the effects of EMRA's TPA regulations to such activities and they are published under the Basic Principles and Procedures of Use (BUPPs)¹⁷⁴ for LNG terminals in 2009 and underground storages in 2011. The BUPPs are taken to mean the employment of a compulsory instrument for the implementation of indiscriminate, impartial and coordinated operating of storage facilities and are subject to EMRA's approval. Neither BUPP¹⁷⁵ grants privileges to facility owners and purportedly welcomes the TPA. However, at this juncture, the argument of Turkey's Competition Agency in its 2012 report is important. It literally states that unless a well-functioning liquid market is enabled and alternative unbundled products are offered to network users, the extent of TPA on networks would not be much different. Indeed, the negligible use of both LNG terminals by private companies despite the given TPA since 2011 is a straightforward illustration of this.

A further, and arguably contentious, issue all Directives seem to support is the –full or partial- exemptions of the existing and major new infrastructure (e.g. interconnectors, LNG and storage facilities) from TPA. Neither the 2001 Law nor the BUPPs contains any basis for clear-cut derogations for Turkey's existing infrastructure except stating that the facility owners shall put capacities into service as long as the system is convenient and the operational reasons are justified. Again, the Competition Agency of Turkey highly advocates that an effective derogation regime would be an obvious

¹⁷⁴ The Regulations No. 27230 dated 16 May 2009 and No. 27954 dated 4 June 2011 put in order creation and publication of the related BUPPs for LNG terminals (Marmara Ereglisi and Aliaga) and underground gas storage facility (Silivri) respectively. The actual BUPPs were officially published for the LNG terminals in June 3, 2010 and for the underground in March 28, 2012.

¹⁷⁵ Marmara Ereglisi and Aliaga LNG Terminals.

contributor to incentivising large investments for the country's very limited storages (2012, p.87) whilst wholesalers give support to the argument for passing on the storage costs to end users on the segment basis for providing necessary market-based price signals for new infrastructure investments (Bulut, 2014).

As discussed in Chapter 4, Regulation 715/2009 of the European parliament and of the Council required member states to establish Entry/Exit systems for transmission networks for enhanced competition through liquid wholesale markets. Such systems are preferential simply because they allow the transportation of natural gas through zones and enable network users to book capacity rights independently at different E/E points with great flexibility (Recital 19). One of Turkey's notable successes in terms of compliance with the EU energy Directives is the full adaption of E/E systems (Map 4). As specified in the BNC, the Turkish transmission network comprises of nine entry points and a large exit zone covering hundreds of exit points throughout the country. Natural gas is brought into the system both at cross-border entry points including gas storages (i.e. Entry 1-7) and at entry points from domestic production (i.e. Entry 8-9), and exits the system either at major exit points to distribution networks or at auxiliary exits to directly connected eligible customers at TSO level¹⁷⁶ (Küsmüs, 2014).



Map 4. Entry/Exit System of Turkish Transmission Network

Source: EMRA

¹⁷⁶ The Exit Zone in Turkey comprises of 307 major and 449 auxiliary exit points delivering transmitted gas to distributors and eligible customers, respectively.

Globally, when the long used essential 'physical flows' at E/E points evince structural and practical flaws –meaning low gas tradability and entry barriers or on the other hand service abandonments and destructive competition- virtual trading platforms have been the usual prescription (Karan and Kazdagli, 2011). DNV KEMA (2013) elaborates on the VPs in greater detail describing them as quite a move away from the traditional trading done at specified physical locations and states that full E/E systems mostly contain at least one VP to facilitate trade of gas between network users (e.g. bilaterally transfer a title of gas or imbalance swap). In the case of Turkey, the ever changing energy landscape with the involvement of private participants into the market has brought about an alternative (virtual) option to all players to offset their imbalances and to trade between themselves. Amendments made to the BNC since 2008 incorporated provisions for a VP into the legislation, and the National Balancing Point of Turkey (UDN), and although neither as developed nor liquid as its namesake in the UK, it has started offering services which do not require capacity booking or depend on physical inputs/offtakes. There also exists a Transfer Point (TP) as part of the E/E system in Turkey where capacity bookings are strictly subject to a physical booking procedure and only a single handover is permitted for the market participants compared to the UDN's unlimited handover offering (Ünal, 2014).

The crux of the matter here is that transmission is the only fully monopolistic segment of the Turkish gas market where no private entity participates and the whole ownership and operational liabilities of the grid lie with the state-owned BOTAS. Undoubtedly, an important wrinkle in the accession of third parties to such an infrastructure is that government policies and respective energy regulations should be driven by a transparent and open approach for fair and non-discriminatory accessions of private companies/regional distributors to the system. The scope may even be expanded to other international players should the country becomes part of the internal gas market once full EU membership is gained. To allow the market participants maximum representation, EMRA has approved continual revisions to the BNC since 2007 by inviting network users to contribute to the framework guidelines on setting out clear and objective principles for development of the Code and balancing the transmission network of Turkey. The 2015 version of the BNC hence systematically establishes guiding principles for the basic and operational provisions as:

Liabilities of transporters and shippers

- Entry and exit requirements
- Capacity bookings, allocations, transfers and switching
- Dispatch control and system balancing
- > Transport quantities and notification programme
- Internal gas utilisation
- > Transfer of possessory rights and responsibilities
- Settlement of disputes
- Gas quality specifications (BNC, 2015).

Against the backdrop of limited new entry, unbundling and competition, ensuring an enhanced and well-functioning wholesale market is of high importance to Turkey and in the next section, where the main differences between the current Turkish gas market design and the European GTM will be identified, these provisions are delineated in greater detail.

6.4 Compliance of the 2001 Law with the Gas Target Model

6.4.1 Wholesale Market Functioning

Chiefly begun with the 3rd Energy Directive, functionality of wholesale markets was given a preponderant weight in the creation of a gas target model by the European authorities as Regulation 715/2009 emphasised that it "... *aims at ... facilitating the emergence of a well-functioning and transparent wholesale market with a high level of security of supply in gas*" (Art 1). With the involvement of devoted agencies like ACER and CEER to ensure that harmonisation of regulatory frameworks are achieved and monitored properly within the framework of the EU's energy policy objectives, the breadth and depth of what constitutes a well-functioning gas market have grown distinctly as discussed in Chapter 4.

From the standpoint of efficient price formation and level of competition, the role of wholesale market liquidity is incontrovertible and that is mainly measured by the number and diversity of market participants, and the volume of wholesale gas trades at trading hubs (ACER 2014). When looked at Turkey, by the same token, it is probably a little early to make mention of a very well-functioning wholesale market and defining

the market as still a developing one -where the number of wholesale licensees have increased from zero in 2002 to twenty-four in 2009 and to forty-seven in 2014- would be more appropriate. When considered within the provisions of the old GTM, the presence of a still vertically integrated BOTAS, a very high market concentration and insufficient interconnection capacity seem to be manifesting problems of liquidity and competition in the Turkish gas market whereas the measures e.g. size of the market and the level of diversity of Turkey's gas suppliers (coupled with two long-term LNG contracts from different sources) are within acceptable limits (Table 32).

 Table 32. Turkey's Wholesale Market Functioning Based on GTM1 Metrics

	Churn Rate	Zone Size	No of Sources	HHI	RSI*
GTM Target	≥8	\geq 20 bcm (or 215 TWh/y)	≥3	< 2000	≥110
Turkey	N/A	48.7 bcm	3+2 (LNG)	6,142	≤110

Source: CEER (2011c); EMRA; Accenture (2013)

Turkey does not have a gas exchange as of yet and no trade takes place other than for balancing purposes. This being the case, alas, full interpretation of Turkey's wholesale market - the size of which is estimated at \notin 15.7 billion by Accenture (2013) - functioning from the new GTM metrics becomes impossible. Plans are underway to establish a spot natural gas market within the recently set energy exchange, Energy Markets Business Corporation (EPIAS) which is, at the time of writing, the home for day-ahead and within-day electricity trade, whilst the 2014 Draft Law empowers Borsa Istanbul (BIST) with the operations of standardised gas contracts and derivatives to come (Art. 12/B).



Figure 39. Trades and Swaps in Turkish Gas Market

Source: ICIS (2013), slide 20





Source: Akturk (2014), p. 28

The balancing market is improving however and trades occur in two platforms. First is the Transfer Points where title transfers are carried out at E/E points and second is the National Balancing Point which enables shippers¹⁷⁷ to conduct balancing portfolio operations among themselves on a day-ahead and end-of-the-day basis. As such, all day-ahead trade occurs as over-the-counter (OTC) trading and unlike the UK's market based balancing mechanism Turkey's remains a penal based. Marketers impairing the system are subject to various fees¹⁷⁸ all placed under the dispatch control tariffs. To offset imbalances at TPs gas continues to be bought from BOTAS by the shippers and this is considered to be a significant barrier for the market liquidity and competition.

Given the modest gas trade being made with Bulgaria and Greece¹⁷⁹ and Turkey's EU membership status (which makes Turkey not directly impacted by the harmonisation of rules for CAM and CMP), a merger of the Turkish market with its European counterparts can be regarded as premature at this point. However, the discussions of how to increase the compatibility of Turkey's gas industry with its adjacent markets and to further develop trades with those, continues at a national level. Surprisingly, the proposition of ACER for the NRAs to perform a regular self-evaluation process in each state seems to be undertaken by private participants in Turkey and the rigorous efforts of private organisations such as DIVID and PETFORM¹⁸⁰ point towards a possible development of a European equivalent gas trade centre (TRGas-Hub) should not go unnoticed. Both have thus far managed many extensive consultations, studies and meetings with stakeholders to better understand the status of the market, the extent of the problems and to determine where active intervention of EMRA is required for a better functioning market¹⁸¹.

¹⁷⁷ Who are not importers but have access to the transmission network. These trades mainly happen with gas bought from private importers since BOTAS is not keen on its gas to be re-sold in a virtual environment except the 4bcm gas sold to those companies on the UND due to Russia-Ukraine related disruptions in 2009 (Deloitte, 2012).

¹⁷⁸ I.e. imbalance, disorder, excess capacity and service interruption fees.

¹⁷⁹ All capacity reservations are for forward flow since reverse flow at interconnection points are not allowed (Deloitte, 2012).

¹⁸⁰ Standing respectively for the Association of Natural Gas Importers and Exporters, and the Petroleum Platform Association.

¹⁸¹ See <u>http://www.petform.org.tr/?lang=en&a=1&s=5</u>

Capacity allocation (CA)	DE	FR	IT	NL	TR	UK
Capacity Allocation Mechanism	Auction / FCFS	FCFS / OSP	Open subscription window	FCFS	First Come First Serve	Auction/FCFS
In case of congestion		FCFS / OSP	Pro rata	Offering interruptible capacity	Pro rata	Auction (long- term)
In case of new capacity		Open Season	Open subscription window	Open season	First Come First Serve	Long-term auctions (QSEC)
Priorities in CA			Duration		Duration *	
1. Customer type				Peak supply to residential consumers		
2. Duration						
Congestion Management Procedure	Auction / UIOLI	Releasable capacity, UIOLI, LUIOLI	Interruptible UIOLI; Capacity traded on secondary market		Pro Rata**	Interruptible capacity; reverse flow; secondary trade; UIOLI; incentives for early delivery of new capacity; constrain LNG supply

Table 33. Capacity Allocation Mechanisms and Congestion Management Procedures in Selected Countries

*For entry points shippers with long-term contracts based on their DCQs have priority over others during the allocation of capacities whereas for exit points pure pro-rata is used in case of excess in demand (Erturk, 2014)

**Although there is no written/transparent code of practice regarding this.

Source: DNV KEMA (2013); Interview (March 2016)

Other developments notwithstanding, the major interest of shippers is the capacity. Turkey has applied dramatic changes to capacity allocations following the adaption of E/E systems though BOTAS' still bundled transmission and commercial activities as a TSO attracts notable criticism from the system users especially in terms of potential discrimination against other users. BOTAS grants Standard Transportation Contracts (STCs) to import, export, distribution and wholesale companies and all companies are required to submit the details of gas to be transmitted¹⁸². Almost all interprovincial gas distribution pipelines are privately owned- due to franchising- and thus the subscription of distributors to the BOTAS transmission system requires regulatory oversight as well.

¹⁸² I.e. proposed date for the first entry and expected annual quantities for the following 5 years -on monthly basis; entry and exit points to the network; and delivery requests regarding certain temperature and pressure the gas wanted at the main exit points.

Capacity is available on an uninterruptable basis in the Turkish market and its allocation is done pro-rata (based on use-it-or-lose-it arrangements (Akcollu, 2006)) when capacity demands exceed the maximum allocable capacity (MAC). The allocation programmes, announced on the booking platform - Electronic Bulletin Board (EBB) by BOTAS, determine how the capacity allocation shall be handled per E/E points before the gas year begins unless the transporter is notified of any specific provisions in the shippers' gas purchase agreements¹⁸³. Nominations are completed within a certain time period day ahead, and requests for changes in schedule are not accepted -except force majeure (Deloitte, 2012). Third party capacity transfer for a minimum of one month or for the remainder of the year at any entry and major exit points is possible whereas accession to the grid within the gas year (1 Jan-31 Dec) is possible only for the secondary market. The secondary market meant here is a market where unused or idle capacity is offered to shippers (with or without a STC obtained from the TSO earlier) for a minimum of one month. Although the capacity allocation system seems to satisfy market participants as it is, since there has not been any dispute over inadequate capacity¹⁸⁴ (Deloitte, 2012), it could be argued that the current system does not necessarily encourage small shippers and the new ones considering to enter the network. Furthermore, neither the specifics of existing and idle capacity allocations nor the unavailability of short-term products seem to align with EU's current GTM interests¹⁸⁵.

¹⁸³ Especially regarding the allocation methodology of gas to be delivered to multiple import entry points (excluding LNG terminals).

¹⁸⁴ Apart from dispute between BOTAS and Egegaz regarding insufficiently set 'maximum allocable capacity' at Aliaga LNG entry point. The issue was settled by EMRA and the capacity was increased by 1 mcm/day in favour of Egegaz in 2011 (Deloitte, 2012). See Table 13.

¹⁸⁵ The GTM has defined a new standardised CAM in the form of an auction procedure (i.e. explicit auctions for long-term trades and implicit auctions for short-term) via which the Standard Capacity Products (yearly, quarterly, monthly, daily and within-day) will be made available to all network users registered on a central booking platform. Moreover, the allocation of existing capacity for up 15 coming years would be possible to by yearly auction process (CEER, 2012a).

Table 34. Maximum Allocable Capacity versus Booked Capacity at Physical Entry and Exit Points, 2014 (m3/d)

ENTRIES	Bookings /	MA	С		ENTRIES		Booking	gs / MAC
Entry 1 Malkoçlar	4	51,43	8,240	Entry	6 Aliaga LNG			16,111,200
BOTA!	11,698,627					BOTA!	16,111,20	0
Bosphorus	10,716,300					Egegaz	1,000,000)
Enerco	9,823,275			Entry	7 Silivri UGS			20,000,000
Akfel	8,751,645					BOTA!	17,000,00	00
Bati Hatti	4,018,613					EWE	1,000,000)
Kibar	3,572,100					Aygaz	800,000	
Avrasya	1,964,655					Enerco	480,000	
Shell	893,025					Gastrans	100,000	
Entry 2 M.Ere! . LNG	2	2,05	0,000			OMV	70,000	
BOTA!	22,050,000				(GDF SUEZ	30,000	
Entry 3 Durusu	4	7,35	5,441	Entry	8 TPAO Akçak	oca Prod.		2,100,000
BOTA!	47,355,441					Gazport	150,000	
Entry 4 Gürbulak	2	8,59	5,963			TT Group	150,000	
BOTA!	28,595,963			Entry	9 TEMI Edirn	e Prod.		960,000
Entry 5 Türkgözü	1	9,08	2,359			Aksa	115,000*	
BOTA!	19,082,359					Zorlu	30,000*	
	Total Entry (MA	C)		207,693,203	\$		
	Total Exit	(Boc	oked)	205,55	8,203			
FX	TTS		MA	C	Bool	kings		
	115		201	14	Jan-14	20	14*	
Export Exit	Point		2,40	4,768	2,404,768	2,404,7	768	
Silivri UGS (Injection)		16,00	00,000	14,580,000	14,080,	000	
Silivri UGS ((Fuel)		28	38,000	140,000	140,	000	
Exit Zone (D	omes. Use)	(638,74	0,712	231,022,283	118,955,4	428	
!	stanbul Regio	on 1	174,19	4,400	75,523,750	37,900,65	50	
	Ankara Regi	on	90,864	1,640	32,943,812	13,408,8	12	
	Bursa Regi	on	83,394	4,000	25,677,250	15,980,7	50	
	Durbu Regio				/ /			
	Izmir Regio	on	76,569	9,600	32,501,816	21,811,6	51	
K	zmir Regio .Mara" Regio	on on	76,569 73,044	9,600 1,000	32,501,816 16,270,000	21,811,60 8,025,50	51 0	
Ki	zmir Regio! Mara" Regio! zklareli Regio!	on on on	76,569 73,044 35,802	9,600 4,000 2,800	32,501,816 16,270,000 15,371,395	21,811,60 8,025,50 9,397,29	51 0 5	
Ki S	zmir Regio Mara" Regio rklareli Regio Samsun Regio	on on on on	76,569 73,044 35,802 35,666	9,600 4,000 2,800 5,072	32,501,816 16,270,000 15,371,395 10,126,800	21,811,60 8,025,50 9,397,29 4,411,80	51 0 5 00	
Ki S	Izmir Regio Izmir Regio I.Mara" Regio rklareli Regio Samsun Regio Konya Regio	on on on on on	76,569 73,044 35,802 35,666 34,184	9,600 4,000 2,800 5,072 4,000	32,501,816 16,270,000 15,371,395 10,126,800 11,747,200	21,811,60 8,025,50 9,397,29 4,411,80 4,811,20	51 0 5 00	
K Ki S	Izmir Regio Izmir Regio Izmara" Regio Ramsun Regio Konya Regio Kayseri Regio	on on on on on on	76,569 73,044 35,802 35,666 34,184 18,593	9,600 4,000 2,800 5,072 4,000 3,200	32,501,816 16,270,000 15,371,395 10,126,800 11,747,200 7,440,800	21,811,60 8,025,50 9,397,29 4,411,80 4,811,20 2,070,80	51 0 5 00 00 0	
Ki S I E	Izmir Regio Izmir Regio Izmir Regio Ramsun Regio Konya Regio Kayseri Regio rzurum Regio	on on on on on on on	76,569 73,044 35,802 35,666 34,184 18,593 16,428	9,600 4,000 2,800 5,072 4,000 3,200 3,000	32,501,816 16,270,000 15,371,395 10,126,800 11,747,200 7,440,800 3,419,460	21,811,60 8,025,50 9,397,29 4,411,80 4,811,20 2,070,80 1,136,96	51 0 5 00 00 0 0	
K Ki S I E Total Exit	Izmir Regio Izmir Regio Izmara" Regio Ramsun Regio Konya Regio Kayseri Regio rzurum Regio	on on on on on on on	76,569 73,044 35,802 35,666 34,184 18,593 16,428 657,43	9,600 4,000 2,800 5,072 4,000 3,200 3,000 5,3,480	32,501,816 16,270,000 15,371,395 10,126,800 11,747,200 7,440,800 3,419,460 248,147,051	21,811,66 8,025,50 9,397,29 4,411,80 4,811,20 2,070,80 1,136,96 135,580, 1	51 0 5 00 00 0 0 0 196	

Source: BOTAS (2014); Unal (2014)

The avalanche of TPA to the networks increased the MAC significantly¹⁸⁶ and the vast majority of capacity is allocated to BOTAS. The bookings by private companies are mainly clustered at Malkoclar, Silivri UGS, TPAO Akcakoca and TEMI Edirne entry points (Table 34). It is hard to discuss much of the booked but unused capacity to date since all shippers seem to utilise their capacities to the fullest. The 2001 Law leaves it to the discretion of BOTAS to contact the bookers of unused capacity (unused for a

¹⁸⁶ E.g. the exit MAC increased from 360 mcm/d in 2007 to 639 mcm/d in 2014 (Ünal, 2014).

minimum of four months¹⁸⁷) if the capacity amounts to less than 20% of the respective MAC or to cancel and re-nominate the capacity otherwise. In terms of storage, no unbundled products are available and a minimum term for capacity booking is twelve months.

Table 35. Utilisation of Underground Storage Capacity via Third Party Access,2012-2016

Storage Periods	Capacity bookings made by third parties (m ³)	Idle Capacity (m ³)
2012-2013	73,676,734	487,323,266
2013-2014	370,076,734	190,923,266
2014-2015	427,557,543	133,442,457
2015-2016	429,997,543	131,002,457
Source: TPAO		

Allocations for storage products are also done pro rata but a further exploration of the booking process shows that not only the amount of unsold idle capacity continues to be high (Table 35) but also the allocation of unused capacity within the year is somewhat discriminatory¹⁸⁸. In summary, neither of these seem to align with the interests of revenue hungry UGS operators nor with the service receivers (not least new entrants who look forward to exercising secondary capacity rights at affordable prices), and addressing the capacity related issues once the market share of BOTAS is reduced via further contract/volume release programmes looks to be the next important step for Turkey.

6.4.1.1 Gas Balancing Arrangements

Prior to the gas release programme, BOTAS was responsible for inputting and off taking gas into/from the transmission system and hence the balancing of the system was lay solely with it. With multiple network users now operating in the market the transmission system needs to accommodate changing flow patterns and independent input/offtake of gas at different E/E points should be facilitated. Regulation No. 715/2009 set one of the essential components of the E/E systems as the VPs and stipulated easy access for network users to VPs for clearly defined balancing mechanisms. As expectedly, in line with varied TPA frameworks to gas infrastructure

¹⁸⁷ Except the force majeure.

¹⁸⁸ For example, no temporary bank guarantee is required from the early applicants in comparison to new entrants. What is more, market participants demanding idle capacity at any time of a storage year are being obliged to pay capacity fee for the whole year regardless of the start and duration of their usage of the system.

existing around Europe there is no uniform preconditions for VP accessions either. When compared, aspirant Turkish shippers seem to access the country's UDN with lesser preconditions than many European countries. Unlike Belgium, Estonia, Finland, Latvia, Lithuania, Luxembourg, Portugal, Romania and Slovenia, for example, Turkey has a VP integrated into its E/E system and it has managed to lessen the prerequisites for VP access similar to those of the so-called perfectly liquid markets (i.e. the Netherlands and the UK). In Turkey BOTAS offers title transfer services at both entry and exit points, and shippers who have a balancing contract with the transporter are given access to the UDN (Table 36).

Aspects	Features							
Aspects	DE	FR	IT	NL	TR	UK		
Name of VP	GPL and NCG	PEG (Nord, Sud, TIGF)	PSV	TTF	UDN	NBP		
Operator	NCG and GasPool	TSO (GRTgaz, TIGF)	TSO (Snam Rete Gas)	TSO (Gasunie Transport Services)	TSO (BOTAS)	National Grid		
Requirements for Access	Balancing agreement with market area operator	Supply license issued by the French Ministry of Ecology and access subscriptions to Title Transfer Points	Shippers & regasification companies: need a transport contract with TSO. Others: need to indicate a compensating party who will settle possible net balance of transaction	Shipper license (LA) and TTF registration	License by EMRA; Wholesale, import and export companies sign Standard Transportation Contract with TSO	Accede to UNC, no shipper license required for pure gas traders		
Fee	Variable	Fixed+Variable	No	Fixed + Variable	No	No		
Fixed Fee (EUR per year)	Not applicable	6,000 per title transfer point	Not applicable	15,156	Not applicable	Not applicable		
Variable Fee (EUR per traded kWh)	0.11 €ct/MWh at NCG and 0.25 €ct/MWh at GPL	0.00001	Not applicable	0.00001475- 0.00000202	Not applicable	Not applicable		
Capacity products without access to VP	Capacities with limited allocability, shorthaul	No	No	Wheeling Shorthaul	No	Not applicable		
Other VPs	No	No	Virtual Entry Points (VEPs) from national production fields, VEPs from storage fields (or "hubs"), Off-take Areas are combined virtual points	TTFB, VPPV	No	No		

Table 36. Characteristics of Virtual Trading Points in Selected Countries

Source: DNV KEMA (2013); Interview (March 2016)

The UDN is not accessible by non-shippers and by those without a balancing contract although BOTAS may require non-contracted shippers to be involved in balancing in case of insufficient natural gas in pre-determined entry and/or exit points, or other emergency measures (BNC, Art. 3.1.5). Clearly, establishing a VP is not always a direct prescription for a liquid market or plenty of participants, and like its many European counterparts the Turkish gas market remains predominantly national given the historic development of the industry and the promotion of national incumbents (EC, 2013). Although its connection to the European gas market is presently trivial and the majority of gas trading takes place at physical points, Turkey's full integration to the European gas markets requires (i) transposing the EC's soon-to-be-harmonised balancing rules into the Law; and (ii) addressing the obstacles deriving from national arrangements accordingly.

As detailed in Article 4(4) and 7(b) of the 2001 Law, appropriately provided information by the TSOs as well as other market participants regarding their market operations is central to maintain the network system within safe operational limits in Turkey. BOTAS' Dispatch Control Centre in Ankara monitors and controls the transmission network through SCADA¹⁸⁹ systems used between stations, and the EBB provides an online data exchange between the parties (BNC, Section E). Whereas the BAL NC foresees a number of provisions regarding the frequency of information that TSOs should be providing to shippers including non-daily; intraday; and daily metered offtakes¹⁹⁰ (Art 33-36), none of these upgrades are currently applicable to the systems used in Turkey since improvement and fine-tuning of the technical elements in both SCADA and the EBB are still underway.

Turkey, Austria, Belgium, Germany, Luxembourg and the Netherlands already apply daily balancing to keep their system within operational limits during the day and financially settle for deviations accumulated over the course of the preceding twenty-four hours¹⁹¹ as the BAL NC envisages (ACER/ENTSOG, 2014). Article 25 of the NC requires member states to impose specific within-day obligations (WDOs) relating to shippers' imbalances during the day (e.g. system-wide; balancing portfolio; and E/E

¹⁸⁹ SCADA is the acronym for Supervisory Control and Data Acquisition System.

¹⁹⁰ NC BAL defines the daily metered offtakes as measuring and collecting the gas quantity once per gas day; intraday metered offtakes as repeating the measurements two times within the gas day; and non-daily metered offtakes as less frequently than once per gas day (Art. 3(10-12).

¹⁹¹ Balancing gas price is determined on a monthly basis by taking the weighted average of the bids received prior to the month and the actual gas withdrawals within the month (Deloitte, 2012, p.26)

point WDOs) and a common characteristic of the proposed WDOs is incentivising shippers to balance their flows more frequently by providing them with hourly information about their balance positions instead of delegating TSOs to take residual balancing actions (EC, 2013). As said above BOTAS facilitates a purely daily balancing regime which is probably ideal from the new entrants' point of view and shippers are required to reset their imbalance positions to zero when their flows go beyond predefined 'tolerance levels' since not every risk of imbalance can be obviated. The idea behind harmonising the balancing periods across Europe is clearly to preclude arbitrage/abuse opportunities for network users between markets and different balancing regimes as shown in Table 36 (ERGEG, 2010; EC, 2013). When more cross-border trades take off between Turkey and other EU members where network users are incentivised to balance on an hourly basis, flows in may be exposed to inefficiency and within day charges would be affected if Turkey postpones the harmonisation.

Aspects			Fea	tures		
Aspects	DE		IT	NL	TR	UK
Separate balancing on distribution level	No	No	No	No	No	No
Application of WDOs in daily balancing	Yes	No	No	Other	No	No
Tolerance provided	Individual tolerance on a hourly basis	Individual tolerance on a daily basis	No	No	Individual tolerance on a daily basis	No
Balancing Gas Procurement	Wholesale and balancing market	Wholesale market	Balancing market	Balancing market	By BOTAS	Wholesale Market
Imbalance Setlement	Market based imbalance fee	Market based imbalance fee	Market based imbalance fee	Market based imbalance fee	Market based imbalance fee	Market based imbalance fee
Imbalance Fee	External price	External price + Multiplier	External price	External price	External Price +Penalty	External price

Table 37. Balancing and Imbalances Settlements in Selected Countries

Note: According to ACER-ENTSOG report on the early implementation of the Balancing Network Code: the Netherlands implemented the BAL NC on 1 July 2014; Germany will implement the NC by 1 October 2016 except for the use of a balancing platform as an interim measure for 5 years; and Belgium, France, Italy and Great Britain will be fully compliant with the Code by 1 October 2015.

Source: DNV KEMA (2013); Interview (March 2016)

Entry-Exit* Range (m ³)	А	В	Permitted Tolerance (C)
0-500,000	0	G	+/- 0.12 (12%)
500,001-1,000,000	+/- 60,000	G-500,000	+/- 0.08 (8%)
1,000,001-2,000,000	+/- 100,000	G-1.000,000	+/- 0.06 (6%)
2,000,001-4,000,000	+/- 160,000	G-2,000,000	+/- 0.05 (5%)
4,000,001 and above	+/- 260,000	G-4,000,000	+/- 0.04 (4%)

Table 38. Tolerance Levels Permitted for Balancing

G (Daily Imbalance Quantity) = Total Daily Input -Total Daily Exits T (Permitted Tolerance Quantity)= A+(B*C)

*Physical and/or virtual exit points.

Source: BNC (2015)

The balancing mechanism of Turkey relies entirely on financial settlement¹⁹² and the imbalance fee is based on the balancing gas price (BGP)¹⁹³. Shippers who impair the system are subject to a 'balance participation fee' consisting of i) daily imbalance charges (DIC) and ii) scheduling charges (SC)¹⁹⁴. There is a tolerance system provided (Table 38) and the current DICs, depending on who caused the imbalance and whether or not within the tolerance level, are calculated according to the below formula. The cumulative invoicing is made monthly (based on daily accruals):

i) If negative within the tolerance level: DIC= WTQ*BGP

(WTQ= absolute value of the Within Tolerance Quantity)

ii) If negative beyond the tolerance level: DIC= (WTQ*BGP) + (BTQ*BGP*F)

(BTQ=absolute value of the Beyond Tolerance Quantity and F=Seasonal Factor¹⁹⁵).

iii) If positive beyond the tolerance level: DIC= BTQ*BGP*F

In contrast to the Turkish system wherein imbalance charges are determined by the TSO and approved by EMRA, the BAL NC envisages DICs to be based on marginal prices

¹⁹² No in-kind settlement is used.

¹⁹³ BGP is determined on a monthly basis and does result from the weighted average of the bids received before the gas month and the actual gas withdrawals within the gas month (Deloitte, 2012, p.26).

¹⁹⁴ Scheduling Charge is applicable for imbalances (beyond the tolerance levels) caused at entry points of storage facilities, LNG terminals and production facilities, and at each exit points (BNC, Art. 3.3.2.1).

¹⁹⁵ Factors applied to DICs in order to calculate the impact of imbalance caused based on seasons, in other words it is 1.50 for winter, 1.25 for mid-term and 1.1 for summer periods (BNC, 2015, Art. 2.8).

(for example, marginal sell price where the daily imbalance quantity is positive and marginal buy price where that of is negative)¹⁹⁶, plus a small adjustment¹⁹⁷ applied across Europe. Additionally the TSOs are required to remain cash neutral with regards to balancing activities and pass any cost or revenues that arise to the shippers (Art. 29-30). There is no data available in terms of BOTAS' cash neutrality and this is one of the issues to be addressed during the interviews with the members of EMRA.

Another key feature of the BAL NC is the provision of operational balancing and nominations. The use of Short Term Standardised Products – STSPs - (e.g. title, locational, temporal and temporal locational) that are bought and sold on a dedicated balancing or trading platform by TSOs and shippers is foreseen by the NC in order to facilitate (cross-border) natural gas trading. Since the Turkish market participants already trade in two platforms both on a physical basis and through title transfers, Turkey seems to have passed the interim measures and is ready to focus predominantly on the liquidizing side of the wholesale business. Of course, in line with normal expectations, the pursuit of more cross-border natural gas trading implies more market integration with adjacent market areas and for the liquidity this means trades in short term standardised products of which the Turkish gas market does presently lack.

6.4.1.2 Transmission Tariff Structures

With respect to the transmission tariffs structure, Regulation 715/2009 highlighted two concerns: separate tariffs to be set for each E/E point into/out of transmission network based on cost-allocation mechanisms; and no contract paths to be used for network charge calculations. In Turkey, Transmission and Dispatch Control Tariffs are set up *ex ante* according to pre-defined methodologies and approved by EMRA prior to tariff periods. The transmission tariff includes capacity and service charges derived from CAPEX and OPEX whilst the dispatch control tariff consists of imbalance; disorder; and excess capacity fees (ERRANET, 2013).

¹⁹⁶ A marginal sell price is the lower of the lowest price of any trades in title products in which the TSO is involved in respect of the gas day; or the weighted average price (WAP) of gas in respect of that gas day, minus a small adjustment. And a marginal buy price is the higher of the highest price of any trades in title products in which the transmission system operator is involved in respect of the gas day; or the WAP of gas in respect of that gas day, plus a small adjustment (NC BAL, Art. 22(2)).

¹⁹⁷ The adjustment price is expected to incentivise shippers for timely balancing without penalising new entrants. The value of if cannot exceed 10% of weighted average price unless TSOs raise concerns that are approved by NRAs (NC BAL, Art. 22(6)).

As the tariffs set in one country can have an impact on access regimes in adjacent countries, the issues regarding tariff structure need to be considered in the context of the integration of gas markets across the EU (DNV KEMA, 2013, p.67). For this, the TAR NC has been developed to remove the 'patchwork of different tariff structures' currently the case for Europe and requires member states to apply a primary reference price methodology (either postage stamp, PSM or capacity weighted distance methodology, CWDM) and secondary adjustments (equalisation, benchmarking and storage adjustment) towards the calculation of a reference price. This price is for a firm yearly capacity product and is expected to be uniformly applicable at all E/E points in all E/E systems.

Tariff calculation and division of cost	DE	FR	IT	NL	TR	UK
Tariff model	Entry-exit	Entry-exit	Entry-exit	Entry-exit	Entry-exit	Entry-exit
Role of NRA	Methodology approval	Determination	Approval	Methodology Approval	Methodology approval, revenue setting	Methodology approval; revenue setting
Price control mechanism	Revenue cap / Auction	Revenue cap	Revenue Cap/RoR		Revenue cap	Revenue cap
Tariff calculation methodology	Differs among TSOs	Uniform	Method of least squares		Postage Stamp	Long-run marginal cost pricing
Entry/exit split			50/50	Not explicit	-	50/50
Capacity/commodity split	100/	100/0	Appr. 85/15 ¹³⁸	Only capacity	35/65	Variable
National/cross-border distinction	Differs among TSOs	None	If regional transmission grid is not used, a discount of 60% is applied on the commodity charge	No	N/A	N/A
Locational/Uniform tariffs	Differs among TSOs	Uniform	Locational	Locational	Locational (entry) & Uniform (exit)	Locational
Charging basis (booked capacity/other)	Booked capacity	Booked capacity	Booked capacity & on allocated gas volumes	Booked capacity	Booked capacity & on allocated gas volumes	Booked capacity & on allocated gas volumes

 Table 39. Transmission Tariffs in Selected Countries

Source: DNV KEMA (2013b); Interview (March 2016)

As shown in Table 39 a higher percentage of revenue is recovered by the capacity charge (65%) than by the commodity charge (35%) reflecting a higher share of fixed costs in comparison with the variable costs in Turkey (EMRA, 2013). On account of creating a level-playing field the TAR NC favours explicitly equalised revenues (50:50) from the sale of entry and exit capacity, but entry-exit split is yet to be implemented in Turkey as it is in Belgium, Finland, Ireland, Lithuania, the Netherlands, Romania, Slovenia and Spain (DNV KEMA, 2013). Since capacities are decoupled, the TSO prices them at both entry and exit points¹⁹⁸ whilst its allowed revenue is subject to "revenue cap" regulation (EBRD; ERRANET, 2013). The tariffs include a capacity and commodity component, and the basic contract duration for capacity tariffs is three to ten years. The price methodology used in Turkey is Postage Stamp as Deloitte (2012) and ERRA term it and it seems to align with the primary price methodology requested by the NC to be used for annual firm products. Nonetheless, due to lack of both short-term and interruptible capacity products unlike other EU countries this price is not being used as a base for calculating the reserve prices for such capacity products as required by the GTM.

	Tariff		Capa	city Produ	cts		Tariff basis	
	structure*	Annual	Quarterly	Monthly	Daily	Within- day	Capacity	Commodity
	Entry		F	F	F/I/RF	F	p/kWh/d	p/kWh
UK	Domestic exit	F			F	F	p/kWh/d	p/kWh
	Border exit	F			F/ I	F	p/kWh/d	p/kWh
	Entry	F/I/RF		F/I/RF	F/I/RF		€/m ³ /h	
NL	Domestic exit	F		F			€/m ³ /h	
	Border exit	F/I/RF		F/I/RF	F/I/RF		€/m ³ /h	
	Entry	F			F		TRY/kWh/d	TRY/kWh
TR	Domestic exit	F			F		TRY/kWh/d	TRY/kWh
	Border exit	F/FF			F/FF		TRY/kWh/d*	TRY/kWh
	Entry	F/ I	F/ I	F/ I	F/ I		€/MWh/d	
FR	Domestic exit	F/ I	F/ I	F /	F/ I		€/MWh/d	
	Border exit	F/ I	F/ I	F/ I	F/ I		€/MWh/d	
	Entry border	F/ I	F/I	F/ I	F/ I		EUR/cm/d	EUR/cm
IT	Other Entry	F					EUR/cm/d	EUR/cm
11	Domestic exit	F					EUR/cm/d	EUR/cm
	Border exit	F					EUR/cm/d	EUR/cm

 Table 40. Transmission Tariff Structure in Selected Countries

F = firm, I = interruptible, RF = reverse flow, FF = forward flow *Also available in TRY/m3/d terms.

Source: DNV KEMA (2013b); Interview (March 2016)

¹⁹⁸ Like France, Ireland and Portugal the Turkish TSO applies locational tariffs for different entry points and a uniform tariff for all exit points (DNV KEMA, 2013).

In terms of revenue reconciliation, as stipulated in Article 27-30 of the TAR NC, BOTAS has not yet given any regulatory account for aggregating the under- and overrecovery of transmission services revenue originating from the E/E points. Likewise, no mechanism has been kick started to use an earned auction premia towards the reduction of physical congestion or decrease of transmission tariffs for the next tariff period in Turkey.

6.4.2 Security of Supply and Upstream Competition

The International Energy Agency defines energy security as "the uninterrupted availability of energy sources at an affordable price" and states that the lack of energy security can have overly severe economic and social impacts not to mention the noncompetitive and volatile prices caused¹⁹⁹. Although primarily associated with oil supply, energy security issue now covers a wider range of vulnerabilities since disruptions can affect other fuel sources, infrastructure and end-use sectors (IEA, 2011). To quantify energy security situations the IEA has developed a comprehensive tool – Model of Short-term Energy Security (MOSES) - to analyse countries' vulnerability for fossil fuel disruptions based on risk factors such as import dependence, political stability of suppliers, and resilience factors such as diversity of suppliers, the number of entry points (inclusive of LNG ports and pipelines) and the level of stocks (ibid). When viewed in a historical perspective Turkey's obstinately high import dependence (99% in 2014) makes the situation of its gas supply security pretty daunting, alas. Although the IEA's 2011 MOSES assessment does not position Turkey amongst the countries that showed critically somber risk and resilience indicators (Table 41), the long-term ToP gas sales contracts it has with five countries (at least three of which can be classified as politically risky according to the OECD Country Risk Classifications²⁰⁰) still remains the beacon of supply vulnerability for Turkey (Table 42).

¹⁹⁹ See a detailed account on <u>https://www.iea.org/topics/energysecurity/subtopics/whatisenergysecurity/</u> ²⁰⁰ For example, Iran (risk level of 7), Nigeria and Azerbaijan (5), Russia (4) and Algeria (3). See a detailed account on <u>http://www.oecd.org/tad/xcred/crc.htm</u>

Table 41. Risk and Resilience Indicators for Short Term Natural Gas SupplySecurity in Turkey

Number of LNG ports									
			0			1-2		! 3	
	0						JP, KR		
Number of	1-1	2	HU,	FI, I	E, SE	GR, PT			
Pipelines	3-	4	AT, LU, S	SK, C	CZ, CH,				
	! :	5		DE		BE, IT, TURKEY		S, FR, UK, US	
					Inf	rastructure rat	ing		
			Low M		ledium		High		
	Lo	W	FI, HU,	IE,	, PL, SK				
Diversity rating	Me	ed			AT, CZ, GR, LU, PT, CH		DE,	DE, TURKEY	
	Hig	gh					BE, FR	, IT, JP, KR, ES	
					Fv	tarnal rasilia	nco rot	ing	
		(Import infrastructure and diversity)							
				Low	Mediu	m	High		
		Low	FI	I, IE, SE	LU, CI	H	BE		
Send-out Cap	acity]	Med	I	PL, SK	CZ, DE, TU	RKEY	FR, IT	
]	ligh		HU	AT, GR,	PT	JP, KR, ES	

Source: IEA (2011), p. 27-8

Table 42. Natural Gas Supply Interruptions and the Responses of Turkey

Date	By	Reason	Turkey's Response and Backup		
Dag 04	Iron	Price dispute/Technical	Cut-off/reductions on gas fired power plants		
Dec-04	ITall	reasons	Increased imports via Blue Stream		
Apr-05	Iran	Price dispute	N/A		
Jan-06	Iran	Climatic conditions/ demand	Increased imports through Blue Stream		
Sep-06	Iran	Three pipeline explosions	Increased imports through Blue Stream		
/Aug-07		plotted by PKK terrorists			
Dec-07 Jan-08	Iran	Cut of gas deliveries toIran by Turkmenistan Increased domestic need	Halted the delivery of Azeri gas to Greece (about 3 bcm) Purchase of LNG incurring substitution costs Used 1/3 stored gas		
Jan-09	Russia	Conflicts with Ukraine	Hamitabat gas fired power plant reduced to 50% capacity Increased imports via Blue Stream (from 33 to 49 mcm/d) Additional supplies from Iran (50% increase to 18 mcm/d) Purchase of additional spot LNG Used 18 mcm/d stored gas		

Source: Bilgin (2009); Kinnander (2010); Energy Charter Secretariat (2010)

It has been the contention of both the old and the new GTM that if the Residual Supply Index of a country is equal or more than 110% the largest gas supplier of the country is not pivotal and hence could be replaced. Like the majority of EU countries Turkey's RSI falls below 110% meaning that the Russian gas is still essential and preponderant for the country since two out of nine entry points are exclusively devoted to those supplies providing more than 50% of national consumption annually. Being exposed to imminent SoS risks not only based on contractual source diversity but also actual dependence on gas flows and vulnerabilities in the event of a range of supply failures at different times of the year (Stern, 2002), the response capability of Turkish market players in the event of failure of gas supplies or receiving terminals becomes increasingly important.

As mentioned in the preceding chapter, the 2001 Law has set standard gas supply security for suppliers in Turkey and obliged importers (not of LNG) to store 10% of their gas imports. Simultaneously, the BNC arranges the responsibilities of the TSO²⁰¹, importers and distributors in the event of a natural gas disruption as recommended by IEA (2014). Taking the lead as the TSO, BOTAS announces 'difficult days/limited capacity days' on the EBB when heavy imbalances take place and in order to swiftly restore the gas transportation mandates gas suppliers to implement disruption and interruption orders from the TSO within eight hours (ibid, p. 461). Although Article 14.11.2 of the BNC empowers both BOTAS and distribution companies (for certain exit points) to facilitate interruptible contracts for their eligible customers should the gas suppliers responsible for the imbalance be unable to be identified, but the impact of this option remains generally limited due to the negligible tariff difference between interruptible and uninterruptible contracts and the limitation on BOTAS to implement such contracts. In addition, the BNC allows reduction in the contractual capacities of gas-fired power plants (which can switch to alternative fuels); and then cuts the gas of other power plants, the industry sector and finally households (ibid).

The GTM draws attention to the TSOs' consideration of small customers in the event of taking balancing action and requires the affected households to be reimbursed by the shipper who impaired the balance of the system. This mechanism currently does not exist in the Turkish markets and the captive household users are not taken into account

 $^{^{201}}$ According to the BNC, BOTAS takes the lead in the event of a supply shortage under the supervision of EMRA.

during the rebalancing thus no payment has been made to them to date. Although one of the lessons learnt from the difficult day announced in February 13, 2012, due to the cold winter that affected almost the whole north hemisphere and the interruptions in Iranian and Azeri supplies, was that BOTAS reduced domestic electricity supplies instead of cutting gas flows to residential customers for heating purposes. It translated into disabling a total 11,320 MW installed capacity (of which 7,792 MW was due to lack of natural gas) which led to a meteoric rise in the open market price for electricity from 125-200 TRY/MWh to 2,000 TRY/MWh at peak hours and 687 TRY/MWh on daily average²⁰² which were record prices for the market.

The same applies to improving the use of underground storage and LNG gasification terminals to contribute into SoS as the GTM argued. However, neither unbundled storage products (e.g. injection, withdrawal, working gas) nor individual tariffs for such products are currently available for the market participants in Turkey as requested by the GTM and the system users continue to pay a single bundled price²⁰³ for the products they receive which covers service cut-off cost; charges for storage capacity, injection, withdrawal, gas swap and other charges based on the BUPP of each storage²⁰⁴ (EMRA sets all applicable surcharges and taxes according to revenue cap regulation).

6.4.3 Natural Gas - Electricity Coordination: The Role of Gas in Complementing Renewable Energy Sources (RES) Electricity Generation

Unlike the EU, power generation in Turkey has not been decreasing and demand for it followed a significant increase (185%) between 2001 and 2011 (Ertorun, 2013). This is most likely because the Turkish market is yet to mature and one of its main source of power generation is indigenous coal. Like other coal rich countries, e.g. China, the switching away from this popular fuel of choice has been highly problematical chiefly due to its abundance, easy storage, accessibility and availability (IEA, 2006), but despite the fluctuations in the use of coal in Turkey since 2003 and the government's mid-term plans to support 'home grown' energy²⁰⁵ the rise of natural gas in power

²⁰² At the spot power trading platform PMUM on 13.02.2012.

²⁰³ Since 2010 the storage sites started to provide unbundled tariffs for different products but currently due to lack of short term products and their trade customers generally buy all the services at once.

 $^{^{204}}$ The tariffs are adjusted monthly taking into account the changes in Producer Prices Index rate (2003=100).

²⁰⁵ Including renewables and nuclear.

generation has still been palpable (Figure 41).



Figure 41. Power Generation in Europe and Turkey

¹Refers to: BG, HR, CZ, DK, FI, FR, GR, HU, IE, IT, LT, NL, PT, SK, SI, ES, SE, UK Source: Boltz (2014, p. 14); Ertorun (2013, p. 15)

Gas-fired power plants (GFPPs) in Turkey generate more than 40% of the country's total power (48.6% in 2014) (MENR, 2015) and by virtue of their characteristics (i.e. consumption profiles, types and length of supply contracts, margins, and growth dynamics) they are given a greater emphasis compared to other customer categories²⁰⁶. Hydro is the most salient renewable contributing towards power generation (16.1% in 2014 -fell from 24.7% in 2013 due to droughts-) and given Turkey's near and mid-term targets to increase the share of renewables even further, the GFPPs are well placed to be the right complement to Turkey's generation from renewable energy sources especially on "difficult days".

²⁰⁶ Customer categories include large or small-scale industrial users, regional distributors and other small businesses. Differing from distributors, for example, whose maximum daily consumptions are subject to certain thresholds in line with yearly contracts provided to them, the GFPPs enjoy both long- and short-term contracts (daily included) and bargaining power thanks to their vast intake.

Figure 42. Difficult Day (27.07.2012) and Electricity Generation Back Ups in Turkey



Source: Enerji Enstitusu (2014)

Indeed, when the country experienced demand peak (39,000 MW) on 27 July 2012 and it was announced as a difficult day, the NGPPs undertook the base load up to 23,000 MW (with other plants using coal and fuel oils) and were able to back the system up to 26,000 MW alone wherefrom the hydroelectric plants took over. Surprisingly however the system still preferred balancing itself via external options (i.e. export and imports) instead of referring to the perfectly able NGPPs for more back up on that day as Enerji Enstitusu (2014) argued (Figure 42). Understandably, when considering that the country's natural gas demand is satisfied via imports running such plants should not come cheap and the GFPPs in Turkey surely remain distant from being problem-free. Low working hours and cross subsidisation of gas prices are currently the most prevailing problems whilst the Association for GFPPs in the Anatolia and Thrace regions (DOGSANT²⁰⁷) lists the specific issues their members confront as:

• Lack of coordination between gas and electricity markets (i.e. misalignment between 'gas day' (08.00-08.00) and 'electricity day' (00.00-00.00); and differences in nomination periods resulting in greater exposure to imbalance charges if gas-fired generator changes output at short notice etc.)

²⁰⁷ DOGSANT website <u>http://www.dogsant.org.tr/faaliyetlerimiz/54-santrallerimizin-sorunlari-ve-</u> <u>cozum-onerilerimiz</u>
- Lack of short-term contracts thus difficulty to foresee daily/monthly demands a year in advance and severe contractual penalties
- Difficulty of finding sustainable suppliers
- Discriminative approach of the system operator towards power plants affiliated to spot power-trading platform (PMUM²⁰⁸)
- Lack of monitoring and reporting
- Compulsory 'primary frequency control capacity (1%)' and extra costs entailed
- Lack of qualified staff and financial support by the government
- Discrepancy of receiving constraint order (mainly during difficult days or force majeure) based on plants' daily takeoffs rather than installed capacity

As regards to such inadequacies in systems such as Turkey's, the GTM firstly suggests a possible way of resolving the capacity products issue by reviewing the existing arrangements, so that within-day capacity products can be promoted. The full unbundling of storage products has been deemed equally important as the efficient use of gas storage whose competitiveness and non-discriminatory availability to all shippers (not least those serving unpredictable loads) are crucial to a cost effective balancing regime and within day obligations. ACER via the GTM recommends an obligatory measure to be put in place so that both gas and electricity TSOs would cooperate on (i) improving information flows between them thus the market participants could better optimise their operational decisions; (ii) developing TYNDPs for both sectors; and (iii) the alteration of industry timelines, before and after gate closures in particular, to reduce the lead times with respect to reserve procurement (2015a). Of course, all these recommendations are to be subject to CBAs.

Despite this, EMRA continues to grant licenses to private companies for the building of more GFPPs leading the public share of power generation to be reduced from 43% in 2003 to 28.1% in 2014. TMMOB (2015) draws attention to the risk of over reliance on natural gas in case all licensed projects are realised, and argues that even if the government stops licensing immediately and only half of the projected plants are built Turkey can in no way reach its target of reducing the gas share in the generation mix to 38% as stated in the MENR Strategic Plan 2015-2019. The interaction between gas and electricity sectors in Turkey should also be looked at from built-operate (BO) and built-operate-transfer (BOT) based power plants which purchase about 20% of country's total

²⁰⁸ From 1 September 2015, Energy Markets Business Corporation (EPIAS) took over PMUM.

import from BOTAS under the guarantee of the Treasury. Not only because of the special price concession provided to both BOs and BOTs, but also the allowance given to them to pass the procurement costs of gas on to customers furnish the critics of GFPPs with abundant ammunition especially due to BOTAS' high price policy towards those plants to cover its losses elsewhere. Thus, the correlation between subsidised end-user gas prices and the pressure of BOs and BOTs on power makes the interaction between the gas and electricity sectors in the case of Turkey more tortuous. On closer inspection, this important issue seems to be addressable with careful consideration of competition policies in the gas market.

6.4.4 New Developments along the Gas Supply Chain

Since the Copenhagen Summit in 2002, which set the prerequisites for Turkey's EU accession including harmonisation of the environmental law providing Turkey with the roadmap for technical and corporate infrastructure, mandatory improvements and regulations (inter alia, better preserved and improved quality of environment and human health as well as rationally utilised natural resources) Turkey has been slowly but steadily shifting towards new alternative fuels and lower pollutant new technologies (UNFCCC, 2009). Surely, the EU factor can be considered as one of the primary contributors towards this shift if one does not consider Turkey's excessive continuing reliance on imported fossil fuels as a source of energy and the cumbersome cost they entail in an economy that is set on a path of dramatic growth.

Being party to the United Nation Framework Convention on Climate Change (UFCCC) and the Kyoto Protocol since 2004 and 2009 respectively, Turkey attaches importance to the adoption and implementation of policies and measures with regards to greenhouse gases (GHG) has mitigations. Responsibilities for pollution control, protection and rehabilitation of the environment and forestry, ensuring the most appropriate and efficient use of natural resources lie with the Ministry of Environment and Urbanisation (MoEU), and the Coordination Board on Climate Change and Air Management (CBCCAM)²⁰⁹ with its seven technical working groups has been responsible for interministerial coordination of climate change related activities in Turkey since 2001 (UNFCCC NC 2009; 2015). Although Turkey, as an upper-middle income country with

²⁰⁹ Formerly the Coordination Board on Climate Change.

responsibilities to sustain its development process, has no binding emissions limitation target under the Kyoto Protocol (as an Annex I Party)²¹⁰ it strives to push for GHG mitigation and utilises international market mechanisms to further achieve its 2030 mitigation target²¹¹ in a cost effective manner (UNFCCC INDC 2015).



Figure 43. CO2 Emissions from Fuel Combustion by Sector

Source: IEA (2014), p.10

Source: TURKSTAT (2012)

During the period 1990–2012 the GHG emission from the energy sector increased by 132.2% in Turkey and like the rest of the world fuel combustion represented the majority of GHGs. In terms of sub-sectors energy industries and transport were the main driving factors for CO_2 emissions, which increased at its fastest by 250.5% and 136% respectively since 1990 (Figure 43). The major impetus for emission growth in transport is Turkey's road-dominated transport system that ascribed 90.5% of emissions to road transportation followed by domestic aviation (6.16%) and water-borne navigation (2.62%) in 2012. By the same token, electricity generation from natural gas was the largest source of GHG emissions in energy industries growing from 24% in 1990 to 48% in 2012. Given this picture, it is not difficult to outline the merits of deploying alternative fuels infrastructure in Turkey in line with the GTM and the

²¹⁰ Turkey has much lower per capita primary energy consumption and GHG emissions in comparison to the EU and OECD averages (UNFCCC INDC 2015).

¹⁹³ In its INDC report in Sep 2015, Turkey sets its emissions reduction target as 21% for 2030 based on Mitigation Scenario (otherwise the Business-As-Usual Scenario is expected to achieve 1,175 Mt CO_2 equivalent instead of 929 Mt CO_2 eq).

Directive 2014/94/EU²¹² provisions.

Although the Turkish government adopted overarching policy frameworks and various cross-sectoral measures to tackle the climate change issues in concert with its Ninth and Tenth Development Plans, the full process of its GHG reduction strategy surprisingly does not include any specific reference to the use of alternative fuels (i.e. LNG and CNG²¹³) or new generation technologies (i.e. power-to-gas) as requested by the GTM. Instead, it rather highlights the forthcoming plans as rehabilitation of public electricity generation power plants, reducing transmission and distribution losses, and the use of renewables and indigenous (clean²¹⁴) coal power.

Turkey is not unfamiliar with the use of LNG and CNG however, although NGVs do not have a very strong position with LPG²¹⁵ being the main alternative fuel for transport. As of 2011, there were some two thousand light duty and one thousandeight hundred and fifty medium and heavy-duty NGVs, and six public CNG refueling stations in operation (NGVA Europe Statistics). Presently, the Turkish CNG & LNG market, estimated to be worth of TRY1.2 bn/year, is operated by one hundred and twelve CNG²¹⁶ and thirty-eight LNG licensees throughout the country (EMRA, 2014). The CNG-powered public transportation networks have been the focus of Istanbul, Ankara and Kocaeli Metropolitan Municipalities in particular.

²¹² The Directive was adopted by the European Parliament and the Council on 29 September 2014 aiming at both reducing the EU's over-dependence of transport on oil and enhancing it's competitiveness and energy security by a more efficient use of resources and energy.

²¹³ The only reference made was in its latest 'Intended Nationally Determined Contribution' submission to the UNFCCC in September 30, 2015 as "Promoting alternative fuels and clean vehicles" under the Plans and policies to be implemented for this INDC (UNFCCC, 2015a, p.4).

²¹⁴ The UNFCCC in its Turkey NC5 report, however, draws attention to this plan of Turkey to boost the clean coal uptake which according to the report would increase the country's emissions notably and cause the GHG mitigation pendulum to swing the other way again (UNFCCC, 2015b).

²¹⁵ Turkey with almost 3.5 million LPG vehicles and 9,419 autogas dispensing sites is seen by many as a pioneer in LPG usage and was ranked first among top ten leading countries around the world in 2011 (AEGPL (2013) based on data from World LPG Association).

²¹⁶ Mainly bulk sales to industrial facilities and commercial consumers without access to natural gas network.

Country	! Vehicles /	Total NC	С	NG stat	ions	Stati				
	1000	ID $MD+HD$								VRA
	human pop.	Vehicles	Buses	Trucks	Public	Priv.	Planned	L-CNG	LNG	
Austria	596 / 1	8,100	167	54	175	5	0	0	0	0
Belgium	600 / 1	1,015	3	15	12	4	19	0	0	17
Bulgaria	467 / 9	61,000	280	40	108	2	7	0	0	0
Croatia	378 / 0	219	78	3	2	1	1	0	0	0
Cyprus	532 / 0	0	0	0	0	0	0	0	0	0
Czech Rep.	472 / 1	6,650	512	81	63	25	30	0	0	123
Denmark	491 / 0	61	26	17	7	0	3	0	0	0
Estonia	550 / 0	300	30	10	5	0	1	0	0	1
Finland	669 / 0	1,600	45	20	22	3	1	0	1	10
France	576/0	10,050	2,400	1,100	40	270	11	0	0	200
Germany	588 / 1	95,708	1,735	176	840	80	0	0	0	0
Greece	589 / 0	280	618	102	0	7	7	0	0	0
Hungary	350 / 1	5,000	86	32	4	15	10	0	0	1,500
Ireland	472 / 0	3	0	0	0	0	9	0	0	3
Italy	670 / 14	880,000	2,300	3,000	990	50	0	8	1	100
Latvia	520 / 0	29	0	0	0	2	0	0	0	1
Lithuania	625 / 0	80	300	0	3	2	4	0	0	5
Luxemb.	742 / 1	230	39	1	6	1	2	0	0	0
Malta	693 / 0	0	0	0	0	0	0	0	0	0
Netherlands	525 / 0	6,498	686	386	134	7	31	0	6	558
Poland	581 / 0	3,050	400	50	26	60	52	1	1	40
Portugal	543 / 0	46	354	86	1	4	1	0	0	0
Romania	235 / 0	0	0	0	0	0	0	0	0	0
Slovakia	389 / 0	1,100	261	65	10	4	4	0	0	20
Slovenia	563/0	29	24	5	2	5	1	0	0	5
Spain	577 / 0	905	1,609	1,322	21	48	12	14	3	0
Sweden	527 / 5	43,795	755	2,163	147	58	0	4	4	21
Turkey	134/0	1,850	2,000	0	6	0	0	0	0	0
UK	543 / 0	20	37	621	1	8	4	9	13	10
EU Total**	547 / 2	1,127,618	14,745	9,349	2,625	661	210	36	29	2,614

Table 43. NGVs and Re-fuelling Stations in Turkey, 2014

LD: Light duty road transport, MD: Medium duty, HD: Heavy duty, VRA: small Vehicle Refuelling Appliance * Excluding ships, trains and aircraft **Total figures does not include Turkey ^aAverage Note: All the data is for 2014 apart from Turkey and the UK (2011)

Source: Natural Gas Vehicle Association (NGVA) Europe

Given that the industry is in the early stages of development, The LNG & CNG Association (SSDGD) has actively been promoting wider and quicker penetration of LNG and CNG especially in Turkey's transport sector since 2009 whilst players in the marine and waterways sector are currently considering LNG as an alternative fuel especially in the aftermath of the tough sulphur restrictions put in the SECAs by the International Marine Organisation effective since January 2015.

Despite the slow progression in raising awareness of the economic potential and deployment opportunities for CNG and LNG, Turkey seems to be putting most emphasis on the potential for fuel cell transport especially for land and sea applications. There are four hundred hybrid and electric cars on the road (about 0.003% of total fleet

of vehicles). Istanbul, Ankara, Antalya²¹⁷ and Gaziantep metropolitan municipalities signed MOUs with Renault-Nissan Alliance to become zero emissions vehicle (ZEV)-ready with necessary installations and plug-in electric vehicles in place. TÜBITAK MRC Energy Institute, Istanbul Technical University (ITU), Okan University and OTAM have been working toward the development of a joint R&D for hybrid and electric vehicle technologies whilst ITU developed Turkey's first hydrogen fuel cell boat (Marti) in 2012²¹⁸ (IA-HEV; Istanbul Enerji; EHA). Additionally, to bolster the greening of transportation, the CO₂-related tax rate ²¹⁹ differentiation has been introduced to the Turkish vehicle taxation system effective from 1 January 2015 although it currently favours diesel-, electric- and LPG-driven vehicles only (Kivanc, 2014; Revenue Administration).

6.5 Conclusion

IEA (2006) discussed that in many countries prior to reform, energy markets were historically organised as a single vertically integrated utility, exclusively owned and operated by the governments. In the case of the Turkish gas market this duty was undertaken by the state-owned BOTAS. The extensive review of the evolution of the Turkish gas market, provided in the preceding pages, reveals that the 2001 Law has affected change to the original structure of monopoly although a great deal of challenges and implementation issues still remain as of 2016 especially in the context of the EU energy legislation. This last section attempts to extract the early discussions on the compliance of the 2001 Law with both the EU natural gas Directives and the Gas Target Model into a concise guide for action and the first two research questions are intended to be answered. The first research question asked was "1) what are the characteristics of the legal framework that has been created to ensure natural gas market liberalisation in Turkey and how effective is it?"

The characteristics of the legal framework created in order to liberalise Turkey's natural gas market is comprehensively given at the beginning of this chapter and the issues that

²¹⁷ Antalya Metropolitan Municipality and Renault signed 'Zero Emissions Partnership' agreement (Renault Press Release, 2012).

²¹⁸ With the funding from the United Nations Industrial Development Organisation (UNIDO).

 $^{^{219}}$ In Turkey the Special Consumption Tax are applied to three categories of engine cylinder volumes which are <1600; 1600-2000; and >2000 cm³ and the old rates for those vehicles are reduced from 37%, 60% and 84% to 3%, 7% and 15% for electric (only) vehicles with <85, 85-120 and >120 kW motor power (IA-HEV website).

are now central and thus dominate the behaviour of all gas market participants are previously outlined. The effectiveness of the legislation, as the research question continues, is where a little something further should be said. As this analysis has shown, Turkey cannot really succeed in its ambitious liberalisation targets without reducing the excessive gas market power of BOTAS, and the question of "how effective, or successful, the 2001 Law has been" cannot really be answered without answering "has the market power of BOTAS been really restricted by the 2001 law?" As of 2016, the ownership of Turkey's natural gas sector is still largely with the state, the infrastructure is owned by BOTAS and despite the Law precluding BOTAS from executing further gas purchase contracts until its import share was gradually reduced to 20% of the national consumption pre-2009 (and minimum 10% volume transfers to private companies every year), BOTAS controls about 78% of the market today. Therefore, in reality, the aim of properly restricting the market power of BOTAS has not really gone beyond a slight reduction of BOTAS' power (22%) which has been over the course of fifteen years. Also given that the provision of the Law that strictly prohibited the sale of gas (more than 20% of Turkey's yearly gas consumption) by a single company has not been so far materialised, it would not be inaccurate to call the realisation of the NGML's competition commitments somewhat failure.

Similarly, the reasons for the delay in attracting private participants into the supply segment, which later led to Russia's downstream expansion in the Turkish gas market, seems to be manifold and the role of the 2001 Law is not trivial in the final outcome. First, by laying obstacles in the way of allowing private entities to import gas from the countries that BOTAS does not have unexpired contracts with; and subsequently switching this to a contract release programme with extra complications at the expense of new entrants has not only slowed down the liberalisation process of Turkey but also paved the way for companies to associate themselves with Russia to obtain the requested documents from EMRA, as discussed in this and the preceding chapter. In defence of BOTAS, this is partly because of the long-term ToP gas purchase contracts BOTAS has with various countries which perhaps force EMRA to condone the monopoly status of BOTAS which has been criticised by many liberalisation apologists. However our ex parte discussions here would not convey sufficiently the breadth of this issue, especially from points of view of BOTAS and EMRA, and so this is delineated with the members of respective organisations during the interviews for further clarification.

The effectiveness of the 2001 Law can also be considered from the standpoint of the EU energy Directives. To begin with, market opening and the notion of an eligible customer which did not exist in Turkish markets before 2001 was introduced by the Law following the 1st Energy Directive. Although some progress appears to have been made in this regard Turkey's progress remains limited. Contributory factors may be listed as (1) still existing eligibility thresholds (though reduced greatly from 15 mcm to 75,000 m³) since the 2nd Directive removed customer differentiation and all consumers independent of their use of gas are now regarded as eligible in Europe since 2003; and (2) the long captivity of numerous non-eligible customers to regional gas distributors. The distribution companies in Turkey are under the watchful eyes of onlookers since most of these companies came to the end of their eight-year fixed tariff period and EMRA regulates the tariffs to prevent abusive behaviour of these regional monopolies. Of course, due to the exclusive rights to all non-eligible customers that were guaranteed to such companies during the franchising process, this subject should not be interpreted per se and thus further investigation with the regulators, taking into account all factors involved, is made during the interviews and discussed in Chapter 7.

Developments notwithstanding, the most highly visible measure to check how effective the market opening is the "switching rates" of eligible customers which is, in line with other EU countries, quite low in Turkey. Including the GFPPs- one of the largest customer groups- the eligible customers do not really switch to other suppliers and the examination of this issue from different perspectives also increases the chances that this case study will be exemplary.

Turkey's energy market regulatory authority does not appear to be completely consistent with the European principles concerning general competition and antitrust policies, and what the future plans are to truly create and maintain the independence of EMRA from both the government and the gas sector interference are discussed with the respondents.

Another impediment to competitive market development in Turkey is the lack of an unbundling regime. With the onset of the natural gas liberalisation process the Turkish government required BOTAS to keep separate accounts for each activity it is involved in and not to continue its vertically integrated structure post 2009. The accounting

unbundling of the transmission and commercial activities of BOTAS was realised shortly after, but despite the EU's continuous prescriptions of even more drastic unbundling regimes as the years went on (i.e. ownership) the restructuring of BOTAS requested by the 2001 Law is yet to be realised. Similarly at the retail level, the difference between distribution and retail is not distinguished in Turkey and hence unbundling is still in accordance with the 1st Directive. Although all distribution companies are now accounting unbundled, neither the designation of DSOs nor CDS operators as per Article 24-28 of the 3rd Directive are currently available in Turkey. The situation is compounded by the fact that Russia has now expanded its activities in the Turkish market and this makes the proper unbundling of such companies as significant as the unbundling of state-owned BOTAS.

With regards to TPA, the transmission network in Turkey is now open to new entrants who want to build, operate or simply use the pipeline systems. One of the most notable successes of Turkey in terms of compliance with the EU energy Directives is the full adaption of E/E systems containing the virtual point, the UDN. The 2001 Law requires regulatory oversight for the accession to networks in line with the Directives and the only issue now looks to be the accession to storage facilities, line-pack and other ancillary services which is, by the Law, left negotiable between parties but due to insufficiency in the storage level EMRA continues to apply regulated TPA. Along similar lines, the uncertainty as to full or partial exemptions of the existing and major new storage infrastructure from TPA needs to be reduced since there is no clear-cut derogations stated in the 2001 Law about Turkey's existing infrastructure. As detailed in Chapter 5, due to the lack of storage and other infrastructure which undermines confidence in Turkey's future commitment to effectively manage the risk of supply disruption and considering the ongoing construction of two storage facilities a further clarification on this issue would help setting the basis for robust market-based price signals for the new infrastructure investments.

The European Commission (2013) stated that Europe has committed itself to the building of an integrated and interconnected gas market allowing all market players to compete on a level playing field whilst gas is generated, transported, and consumed as efficiently as possible, avoiding losses along the value chain. For Turkey to be part of this internal market its gas transmission networks (and storage facilities) need to be able to facilitate trade and accommodate changing flows patterns, or, in other words need to

be harmonised with the gas target model. Accordingly, the second research question was "2) how compliant is the legal framework in Turkey with the Gas Target Model of the European Union?". This analysis has implied that the Turkish gas market is currently not compliant with the GTM. Turkey surely needs to make a considerable effort to harmonise the GTM regulation criteria especially to promote a liquid wholesale market and an efficient price formation across the gas value chain. At a more specific level:

There is no well-functioning wholesale market and the presence of a still overly powerful BOTAS, high market concentration and insufficient interconnection capacity are the leading contributors to this. As a result of a non-liquid market and mainly due to ToP contracts the natural gas volumes of Turkey are tied to the gas prices of BOTAS which dominates the market as the largest importer. As the 2001 Law was prepared on the basis of BOTAS' annual volume transfers pre-2009, its provisions relative to, for example, distributors which require them to procure no more than 50% of their gas from a single supplier or to purchase gas from the most economic source does not really count for much today (unless alternative suppliers and sufficient rivalry between them – over price and non-price elements- exist in the market). There is room for improvement in the market architecture and the development of market centre(s) based on a gas trading hub in Turkey, and consulting the regulators' views in imparting 'how to ensure a well-functioning market' and 'what lessons can be learnt from the European experience' can be a pathway.

Turkey's small level of cross-border cooperation with Greece and Bulgaria has been mentioned earlier and once full EU membership is gained the harmonisation of particular rules, i.e. gas balancing and transmission tariff structures, will gain more importance in Turkey. With regards to gas balancing arrangements, firstly, the STSPs are not sufficiently offered in the Turkish market which is instead substituted more with the use of balancing services. There is now the UDN set and integrated into the E/E system, and Turkey has managed to lessen the prerequisites for the VP access similar to those of the so-called perfectly liquid Dutch and British gas markets. Not impressive as these achievements are, though, Turkey needs to define a new standardised CAM in the form of an auction procedure via which the SCPs (yearly, quarterly, monthly, daily and within-day) can be made available to all network users registered on a central booking platform instead of the pro-rata allocation method it currently applies. Trade notifications, redesign of current (re)-nomination processes, within-day obligation, trading possibilities within an adjacent market for balancing purposes, investment in new IT equipment and metering changes (ACER/ENTSOG, 2014) are other important issues Turkey needs to deal with within the BAL NC framework. Due to the absence of publicly available data, respondents have been interviewed to shed light on the government's consideration of harmonising the transmission sector with the GTM and to identify the challenges for EMRA to implement the BAL NC well.

In terms of transmission tariffs, as this analysis has shown Turkey's current regime is broadly consistent with the ENTSOG's TAR NC, given that the postage stamp is already being used as a primary price methodology. However, neither the secondary adjustments towards the calculation of reference price for annual capacity products nor an explicitly equalised revenue (50:50) from the sale of entry and exit capacity (entryexit split) is implemented in the Turkish market. Worse still, absence of the revenue reconciliation, cash neutrality of the TSO together with the unavailability of a mechanism which is aimed to facilitate the use of earned auction premia for reducing the physical congestion or to decrease the transmission tariffs for the next tariff period, constitute another set of issues to be tackled by Turkey.

The concept of security of gas supply in terms of the GTM has also been contextualised and it is discussed how increasingly alert Turkey should be to the imminent SoS risks it is exposed to. Turkey does not comply with the important GTM metric, Residual Supply Index which is expected to be equal or more than 110%, and thus the largest gas supplier of the country (Russia) remains pivotal and not promptly replaceable. Given that this is important not only for Turkey but, in a broader sense, also for the internal gas market the EU tries to create, Turkey needs to make every effort to solve its SoS issues in view of a future accession to the EU. Equally important, the Turkish gas market being what it is, is the deployment of alternative fuels infrastructure and the increased role of gas in complementing RES electricity generation (with more interaction between both sectors, availability of within-day capacity products and unbundled storage products) will play important roles in the realisation of Turkey's decades-long effort to reach the liberalisation levels of more advanced countries. To do this, both short- and long-term policy responses and prospective roadmaps were discussed with the interviewees. In this chapter, considerable effort has been made to review the most relevant elements of the work that had thus far been carried out on Turkey's natural gas sector reforms and the issues identified here are addressed with governmental officials, policy makers and market players to draw out key policies and to make recommendations in Chapters 7 and 8.

Chapter 7: Discussion and Analysis of Findings

7.1 Introduction

Natural gas is a strategic sector for Turkey and its control, which has been mandated by the state for so long, is shifting. Due to the sector's direct and indirect impacts on economic/social development and growth, the issue of how to restructure the Turkish gas market by reducing, if not fully removing, the dominance of the state monopolist BOTAS and how to handle the concerns regarding the structural changes being imposed on BOTAS such as splitting down its activities into different legal entities remains one of the main interests of the Turkish regulators and the policy makers. Clearly, the participation of private and foreign suppliers in the Turkish gas supply chain poses commercial risks and challenges for BOTAS and a new roadmap for the creation of stimulated import prices with marked reductions; developed infrastructure for imports, transmission, storage and distribution; and setting appropriate tariffs for the use of different components of gas infrastructure hold crucial importance in the timing of the reforms and market developments in Turkey designed to encourage all market players.

The existing NGML of Turkey has, undoubtedly, delivered some significant results and the market has witnessed high levels of investment and a certain level of competition since 2001. However, the recent gas market liberalisation history of Turkey demonstrates, many of the measures that have been initially considered for adaption are now either postponed or have never been adapted especially during the last decade when the liberalisation of energy markets was thought to be the answer for the sectors' most problems. Also, it has been observed that there is some uncertainty over future developments in the Turkish gas market and more importantly the pursuit of reforms within. A review of the Turkish gas market from the operational and legal aspects has already been undertaken in Chapters 5 and 6, and a number of institutional factors existing in the market which reduce its effectual operation have been discussed. To address these factors and to analyse the barriers to efficient market functioning, liquidity and the GTM this chapter utilises the third and distinctive part of the primary data collection technique of this study "interviews" to provide an in-depth understanding of the stakeholders' views and opinions of Turkey's liberalisation experience. The range of interviewees who responded included representatives from the vertically integrated

incumbent, the regulatory authority and the new entrants. The opinions that were expressed were divergent especially on BOTAS' past, present and future although the focus was generally on the best way forward.

This chapter intends to answer the third research question "What are the major obstacles encountered by Turkey so far during its reform process and how should Turkey's progress towards liberalisation and competition proceed?", and begins with presenting the findings from the results. It delves into three problematic areas that the respondents referred to namely barriers to efficient market functioning and liquidity, key challenges in pricing and attracting investments, and technical infrastructure and market/trade operations. The final section concludes.

7. 2 Findings from Interviews

As highlighted in both the introduction and literature review chapters the patterns of institutional change across countries and the performance and/or willingness of countries to adopt liberalisation in the natural gas markets have been widely diverged despite the European Commission guidelines to conduce uniformity in regulatory instruments. In the case of Turkey in this thesis, by pursuing case study research, the aim is to pose extensive and more compelling evidence. The analyses in Chapters 5 and 6 set out a number of developments and issues that are now central to the Turkish gas market. Evidence in those chapters indicated that albeit Turkey intended to introduce liberalisation through the NGML of 2001 and since then has been trying to pursue the reforms a great deal of challenges and implementation issues still remain which inevitably result in gaps in the sector's future progression. Since this exploratory research concentrates on the EU's Gas Target Model and the four main instruments of the energy Directives, enacted by the member states at the discretion of the European framework regulation, the aim is to critically review Turkey's progress towards natural gas liberalisation in order to explore why the completion of the gas market reforms has been prolonged, and what are the major challenges standing in the way of complete liberalisation and a well-functioning wholesale market in Turkey. With the emphasis of this thesis on how natural gas liberalisation has been implemented in Turkey and what challenges have hitherto been experienced in different segments of the market during this ongoing process, qualitative research offers a valuable and powerful method via

interviewing technique to better understand the liberalisation issues where the respondents' understanding and weighing of the information can give the research a real context.

There are twelve participants in this research all of who identified as stakeholders taking an active part in the Turkish gas market (namely, five from the Turkish Energy Market Regulatory Authority - EMRA, three from the Petroleum Pipeline Corporation -BOTAS, and four from private gas companies). Sampling was purposive as the participants met certain criteria for this research and a gatekeeper letter was obtained to get access to EMRA (See Appendix E for the letter of solicitation sent to EMRA). It is worth highlighting that both EMRA and BOTAS are strictly closed organisations and their participation to (critical) research such as this are likely to be subject to a decision by the Council of Ministers. Indeed, and perhaps expectedly, BOTAS rejected being part of this research based on the Council's decision, whereas access was granted to EMRA as the first academic researcher to be officially allowed in to the institution after a lengthy and onerous accession process -mainly due to the research being executed abroad. EMRA itself selected who was to be interviewed and following the letter of introduction sent to them interested interviewees then contacted me about their interest in participating. Whilst two BOTAS staff agreed not to answer the research questions in their official capacity one ex-staff was keen to be actively involved nevertheless.

Since, I considered each interviewee as a 'unit of analysis' -following the termination of Yin (2009)- to understand the opinion of each participant regarding gas market liberalisation (based on their experience) the views of the informants from these critical institutions have been particularly vital for the authenticity of this study given their tasks for the former to operate a very large part of the regulation apparatus and for the latter to hold the monopolistic position with its price setting power. Together with private sector players asking those key individuals, as insiders, directly for their views on the reasons of why the liberalisation has so far been successful or unsuccessful in Turkey, why the differences in adoption of liberalisation model do still persist amongst different segments of the Turkish gas market and what the optimum way is for Turkey to proceed towards liberalisation and the gas target model carry a lot of weight especially in an environment where the natural gas policies of Turkey have been little discussed in academic literature. It is also expected to further illuminate the energy market liberalisation phenomenon and help us to understand the mechanisms in which

individuals and institutions interact (see Appendix F for interview questions). It is agreed that there is merit in giving further consideration, particularly in terms of gas target model dynamics and how to ensure a well-functioning Turkish gas market. Since the interview questions aim to also help understand participants' interpretations of the GTM, the incorporation of respondents' (mainly the new entrants) views and experiences, in this regard, has been highly informative. To the best of my knowledge, this thesis is the only comprehensive research done in the English language on compliance of the 2001 Law with the GTM.

This research will contribute to knowledge by bringing to light the market players' views on the sector's past, current and potential future problems that have been identified in the preceding chapters, and aim to provide stakeholders and regulators in Turkey with a useful reference and policy recommendations. To distinguish specific themes that are central to my respondents, the third research question asks *"What are the major obstacles encountered by Turkey so far during its reform process and how should Turkey's progress towards liberalisation and competition proceed?"* Below presents the informants' views and self-concepts regarding the problems of the sector and potential solutions to increase the ability of the Turkish gas market to respond in a way that best meets the interests of stakeholders, consumers and the wider society. Given the length limitations of this thesis and the myriad of information collected through the interviews the most relevant comments, which interviewees chose to provide on specific issues, are embodied in three main sections and each of which defines a number of hurdles that Turkey must overcome for a properly functioning gas market and fully implemented liberalisation, i.e.:

- 1. Managing the transition from monopoly to liberalisation: barriers to efficient market functioning and liquidity
- 2. Key challenges in pricing and attracting investments
- 3. Technical infrastructure and market/trade operations

Since the central emphasis of this research is also on the confidentiality and anonymity of the primary data collected, the interviewees were categorised into three groups for expository convenience and identified as:

A: Representatives of Energy Market Regulatory Authority of Turkey (EMRA)

- B: Representatives of Petroleum Pipeline Company (BOTAS)
- C: Representatives of Private Gas Companies in Turkey

7.2.1 Managing the Transition from Monopoly to Liberalisation: Barriers to Efficient Market Functioning and Liquidity

In this section, the main controversial issues the respondents commented on regarding Turkey's liberalisation process are presented and many of them will be revisited in the concluding chapter. However, before moving to a brief summary of each, it is worth mentioning that the Turkish government has been carrying out some revisions to the 2001 Law and there have already been two official drafts of the Law presented to the Council of Ministers and the Parliament in 2013 and 2014. Since no definitive information regarding the possible timeframe for the passing of the draft(s) Law from the parliament (there is also a chance they never will be or will be further postponed) has been obtained, it has been decided not to discuss them in detail at this stage. Occasional references are made to the most recent draft Law (2014) when it is relevant in later sections of the chapter.

7.2.1.1 Cause for Concern: The Market Dominance of BOTAS and It's Unbundling

The literature review chapter delved into the concept of natural monopoly from the traditional regulatory perspective and reviewed the body of regulation literature that focused on the dynamic evolution of monopolistic industries. The review presented that there had been suggestions from scholars that the introduction of competitive reforms for naturally monopolistic industries was feasible and they were believed to provide long-term benefits to the society and to ensure a reasonable share of these benefits are passed on to consumers through market prices which, in other words, would reflect the efficient economic cost of gas²²⁰ and service quality attributes that echo consumer valuations as discussed in Joskow (2008). Whilst the likelihood of reasonable sharing of these benefits, particularly on the basis of the economic cost of gas, and their passing onto consumers through market prices are left to the next section, the focus of this section is on whether the introduction of (competition) reforms to Turkey's naturally monopolistic gas industry was really as feasible and effective as it was thought to be.

²²⁰ And similarly electricity supplies.

Almost all the respondents (A, B, and C) ascribed Turkey's somewhat unsuccessful attempts to finalise the gas market reforms to (...) the general reluctance to reduce BOTAS market dominance and its restructuring'. This may have been part of the problem, but the lack of success was generally also taken by many to demonstrate "the weakness and partiality of the regulator to solve these issues across time". For the majority (A, B, C) the failure to unbundle BOTAS or to reduce its market dominance is "the explicit outcomes of political maneuverings in the country" whilst a (C) respondent delineated the main reasons for being unsuccessful in diminishing BOTAS' market power as "the political will that use BOTAS as an instrument to intervene in the gas market and again its reluctance to rescind the Statutory Decree No. 233 about the state economic enterprises that (still) allows a legal entity like BOTAS to handle at least ten different market activities." For others, particularly those who represented the interests of the incumbent (B) "(...) keeping BOTAS' unbundled status and (its) high market share has just been the necessity which is guided by their good fit with the national context." Undoubtedly, market arrangements for industries especially those to be liberalised are in great need of refinement to reflect increased competition to ensure that all competitors have access to the market and are served the opportunity for the delivery of market price signals and consumer choice as significant tools to match supply and demand. In achieving this in Turkey the implementation failures of the 2001 Law were the most complained about issues throughout the interviews. Not least in this regard, informants from private sector stated, "For us, an understanding of the possible conflicts between stakeholders especially regarding neutrality in decision-making, lack of clear transparent reporting to third parties -such as unsorted balance sheets due to absence of unbundling- and adverse effects caused by the dominance of BOTAS are particularly essential". They continued, "The sector's main problems should particularly be considered on the grounds that prevalence of BOTAS' terms of gas sales which are currently being taken as reference hinders the formation of a well-functioning market. Likewise, due to being subject to legal and political restrictions BOTAS follows uniform gas sale and supply policies which again stand in the way of market liquidity in Turkey."

For many years, the main argument of BOTAS and the Turkish politicians has been that unless there is really a valid reason to do otherwise BOTAS' high market share should be retained or it will be subjected to stringent ToP provisions of its long terms gas purchase contracts. However, a (C) respondent drew a sharp distinction between BOTAS' and the private sector's views on this and by refuting this main theory of BOTAS he argued "The long-term contracts can always be renegotiated and the most important ingredient of these contracts open to renegotiation is price when certain terms and conditions occur. If they occur, and the gas becomes uncompetitive when compared to its substitutes, and hence you cannot sell the gas, then you have the right to return to seller and ask for a price revision. Receiving the revision right away is highly unlikely, I accept, but then you have the right to seek international arbitration. It is all about being confident about the uncompetitiveness of the gas you are buying. Should it really be that you are ineligible to sell it, and then you will most likely win the arbitration anyway. As a matter of fact, Turkey won arbitration against Iran twice and if it went against its other suppliers the likelihood it would win again is high. That is not even something specific to the gas market. ToP-involved agreements are everywhere, in every sector, at every level. ToP is nothing -and certainly not a penalty- but a combination of risks reciprocally undertaken by both sellers (price risk) and buyers (volume risk). Nevertheless, this is the very fact that we have failed to explain to politicians for so long and even others who are (not) familiar with gas markets. We are pretty certain that this is something that can be solved at the negotiation table and Turkey has actually done it with Russia and Iran during the 2001 crisis, as it was force majeure. Of course, if you are adamant you are going to hamper the entrance of (any) commodity to your country then you would not really want a liberal market, would you?"

Confirming this, another private sector representative expressed his burgeoning dissatisfaction with regard to the import/export restrictions placed on private companies by EMRA and said "The second big mistake made by the law-maker, subsequent to withholding BOTAS' power, is to put a restriction on the import and export of gas in the interests of the local monopolist rather than in the national interest. The legislator mentions a liberal market but blocks free entry/exit of the main commodity of that market into/from the country. Vis-à-vis import, the legislator initially thwarted new entrants from signing purchase contracts with suppliers that already sell gas to BOTAS as there are tens of other gas rich countries around Turkey. In fact, for me, that is the main market entry existing in Turkey. Then EMRA was empowered to issue procedures and principles of gas importation and its memorable board decision (No. 725) which made import licensing conditional on tendering procedure. Phrased differently, this meant there were limits to who can bring gas into the country and anybody could win

the tender for which you have made all the arrangements for. Hence, this is the legal barrier put in front of us. A similar approach towards exportation has also shaken the confidence of the private sector in EMRA since there is no standard licensing procedure for exporting gas and thus licenses issued by the regulator differs according to export destinations."

Admittedly, finding a balance between the restrictive rules set, which are a clear illustrations of the decades long monopolistic structure, and the adoption of a liberal framework for countries/sectors is not easy and taking into account the international experience and the existing contractual obligations of BOTAS the private sector foresees more frequent use of gas release programmes, particularly in the form of volume transfers²²¹, as the most appropriate way of easing the effects of concentration at hands and ensuring liquidity in the Turkish market. On the contrary, interviewees representing the incumbent (B) have made their mark on the discussion by their entirely different views about reducing BOTAS' market power and stated that "The plans to further diminish its market share (either via contract or volume transfers) are no longer on the agenda of BOTAS given the current political landscape in and around the country. Due to reasons based on past experience, the political situation of Turkey's gas suppliers²²² and the national priorities which currently outweigh the overall gains to be obtained from the gas market liberalisation BOTAS is re-considering being the single competent authority to handle gas importation as before and by drawing back from trade segment of the industry completely it plans to ensure that liquidity of the market is secured by the private sector only." Without a doubt, this is an important piece of information not for this research alone but for all stakeholders in the market²²³ and if it is indeed to happen, this will have a wide range of profound and intricate consequences for the different groups of market players. How adaptable it would be once it is in place is discussed in later sections of the chapter and below evaluates the competitive environment for eligible customers.

7.2.1.2 Market Opening and Eligible Customers

As discussed in the preceding chapters, liberalisation is generally expected to serve the

²²¹ As already required by the 2001 Law.

²²² At least three of which are classified as politically risky (see Section 6.4.2).

²²³ Since there has been no indication of such a plan in neither drafts Law (2013 and 2014).

interests of household and industrial customers positively as long as such consumers are fully aware of their options and the benefits that they can reap from switching between alternative suppliers. The picture that emerged in Chapter 6 showed however that due to the landscape of the Turkish retail gas market which was introduced to franchising via 'the competition for the market' approach in 2003, the residential sector of the market is closed to competition and only eligible customers with certain amounts of gas consumption are allowed to choose their suppliers. Despite EMRA's trials to continually reduce the eligibility limits²²⁴ and to remove the regional differences in terms of threshold levels, household customers are still not able to capture the benefits that an open market would purportedly bring unlike other European countries wherein a full market opening or retail choice for "all" customers was required as early as July 2007.

Thus, in Turkey both captive residential customers and eligible customers (who do not switch) purchase gas from their franchised distributors at regulated prices whereas other large customers and their choice of suppliers freely determine the prices and transaction conditions between them as long as the regional distributor is notified within fifteen days (NGML, Art. 8a). It is worth reiterating that the actual switching experiences of Turkish industrial customers remain low, in line with other European countries, and the rate of switching amidst them has rarely exceeded 15% since the entry of seven private suppliers into the market. Whilst varying in type, formidable barriers that preclude the possibilities of the expansion of market opening in Turkey are manifold according to each of my respondents. One of the (C) respondents argued for example that "For us, the transportation and delivery contracts -being compulsorily signed between distribution companies and switched suppliers- and the restriction of a two week distributor notification period have been and still are the two unsolved issues between all parties for many years, and do pose a serious obstacle to switching in Turkey". Another went further: "Respective provisions of the Law, as they are, raise many possibilities that distribution companies impede new suppliers during the switching process even if an agreement is reached between eligible consumers and suppliers (us) and they quite often pave the way for the addition of extra terms and conditions put on switching customers by the distributors which are not even within the scope of the Law or secondary legislation such as use-or-pay clause for capacities". Another (C) respondent stated that "We find the lack of unity in terminology, standardisation and

²²⁴ From 1 mcm down to 700,000 m³ in 2011, to 300,000 m³ in 2013 and finally to 75,000 m³ in 2015.

minimum required gas pressure levels between the contracts ²²⁵, and confusing definitions (such as entry and exit points, judicial delivery point, commercial delivery point, station and so on) discouragingly rampant in the market. We find ourselves, most of the time, tackling with these least important problems to clarify our liabilities/commitments rather than concentrating on the main issues".

What is more, they noted, "Switching contracts that are based on 'calendar year' by Law thwarts both our and the consumers' ability to materialise short term, periodic and/or spot purchases when needed, like our counterparts in more liquid markets elsewhere. We strongly believe that removal of such restrictions would contribute greatly to the liquidity of the market". Another (C) respondent continued to exemplify the barriers as he observed: "There exists also another contractual issue that the consumers willing to switch have to undertake the burden of proof to demonstrate their indebtedness (to their prior gas suppliers) to the new suppliers. We suggest that this should be restricted to due debts only. And as per NGML Art 16 we, as new suppliers, should not be held liable (just like distributors) for supply disruption in the case of emergency/difficult day situations." In fact, in their view, preparation of a dedicated "Eligible Customers Regulation" to establish standard mechanisms for switching customers would not only help the removal of the current uncertainties and confusions the Law creates but would also prevent distribution companies from abusing their dominant positions.

Perhaps the most important barrier to switching, another (C) respondents suggested, was that the investment burden on customers to replace their meters with remote reading meters²²⁶ and to establish an automatic volume corrector system (if they consume 300 mbar gas or higher) once they obtained eligibility. By and large, they discussed this issue from two perspectives stating the first important point as "From the customers' point of view we find these investments unnecessary and by far outweighing the profit they could have made by switching when specifically compared. But the second factor, which is often neglected, is the difficulties created for distributors in making bulk supply agreements with more than one supplier. Thus distributors, who are also considered eligible, would rather sign voluminous agreements with a single

²²⁵ E.g. Connection Contracts, Transportation and Delivery Contracts, and Standard Transportation Contracts.

²²⁶ It is left to the discretion of distributors to require switching customers to replace their existing meters with the remote reading meters to make the instant information flow reachable in real time.

supplier (preferably BOTAS) due to absence of daily-measurable meters use amongst eligible customers that make the identification of their daily supplies near impossible and so does daily gas allocation of residential customers. As a result, this limits our supply options."

Not all (A) respondents from the regulatory authority did however share the view that the above was a complete list of reasons for fewer switching since one of them argued that "Most suppliers (and wholesalers) in the Turkish gas market already have a number of affiliations and subsidiaries in varying sectors and hence by preference they prioritise/ensure regular supply of their companies over others by pushing the liquidity concerns of the market into the background." BOTAS respondents did not comment on this.

7.2.1.3 Storage Requirement

It is stressed throughout the thesis that storage sites are referable as a rescuer under difficult/emergency circumstances but, needless to say, they are capital intensive, prohibitively costly to build and Turkey, alas, has only a few of them. Acknowledging the absolute need for further investment in storage capacity, respondents (new supplier entrants in particular) drew attention to the hardship of assuming the 10% storage liability the 2001 Law requires classifying it as another entry barrier. They were critical saying that "It is neither fair nor realistic to expect from us (or future newcomers) who assume the market risks to fulfill this obligation in an environment where principal applications of the NGML are still not fully performed and the dominant player, BOTAS, itself fails to meet this requirement occasionally". This argument will not be resolved quickly since this particular provision was not revised in the draft Law and the mandatory natural gas storage requirement looks to remain imposed upon private suppliers for some time.

Our respondents from BOTAS and EMRA tended to take the view that "Some regulatory changes in relation to storage would be due once the lack of storage stops being a problem/vulnerability for Turkey and most regulations applicable today could be either softened or lifted so that access to storage facilities could be under negotiated terms. We envisage, storage-related decisions would be taken according to market needs and not what the incumbent or the Law or other country specific reasons require."

However, as expected, this is not envisaged in very near future.

7.2.1.4 Stamp Duty

All stakeholders, without exception, agreed on the stamp duty requirement for all contracts made in the natural gas market (based on the financial regulations) on having by far the most detrimental effect on the market's development and liquidity independent of all other elements. (C) respondents said: "In Turkey, stamp duties are applicable to (even) compulsory systemic contracts signed between shippers and transporters and that brings about a 1% cost burden on the sector". Indeed, ICIS' special Turkey presentation termed the stamp duties in Turkey as a "market killer" which not only jeopardises security of supply and deters investors but also fractures the market, driving financial trading to other jurisdictions that are not covered by the tax. Most importantly, perhaps, they seriously affect Turkey's ambition of becoming an energy and financial hub (Boddy and Sabadus, 2013, Slide 29).

Stakeholders were in agreement with the importance placed on the removal of the duties from contracts signed in the transmission and distribution segments of the industry as an initial step and then gradually full abrogation of them for all types of gas contracts. Especially (C) respondents claimed that "(...) this would raise the handover ratio of gas significantly."

7.2.1.5 Off Spec Gas

As explained by the (C) respondents, there have been frequent occurrences of planned repairs and maintenance in networks outside the national transmission system (mostly at the transporter's knowledge/approval but not the shippers') resulting in entries of contingent "off spec" gas to the national network²²⁷. According to the respondents "This is being occasionally considered as a serious problem or in contrast ignored by the transporter (BOTAS) depending on the demand by the market. In anyhow it leads to unplanned alterations in our daily contract quantities (DCQs) in particular and thus gets us fined". They expect the transporter, BOTAS "(...) to address these problems and ensure a healthy network by taking a set of currently available technical measures and

²²⁷ Between April 2009 and February 2013, shippers were exposed to pressure related penalties 198 times and its cost to private sector was TRY111.4 million in total (PETFORM DIVID, 2013).

more importantly the responsibility of BOTAS has to be clearly specified in the network code as a rule."

BOTAS representatives tended to take the view however: "That the transporter is only responsible for ensuring operation of the network by providing a standard set of services²²⁸ -the scope of which is determined as per Standard Transportation Contractsand obtaining pre-determined income in accordance with the tariff legislation. Required service, in our view, is beyond the standard services outlined to be given by us and we believe information flow regarding any off spec gas occurrence should be carried out between the relevant shippers and suppliers/system operators." Taking this into account and the comments and prioritisation of the stakeholders, this frequentative incident²²⁹ certainly deserves further analysis in greater detail but is presently beyond the scope of this research.

7.2.1.6 Electricity-Gas Sector Interactions

Although the review in Chapter 6 showed that the natural gas demand of Turkey is predominantly satisfied via imports and thus running the GFPPs does not only become relatively expensive, but also contradicts the country's mid- and long-term strategic targets, most respondents did not comment on all relevant sections of the review but focused instead on the issues they considered were a priority. Private sector members said "We agree that there is lack of coordination between gas and electricity markets especially a misalignment between the industry timelines (before and after gate closures); there are differences in nomination periods resulting in greater exposure to imbalance charges. Another problematic area is the underdeveloped information flows between both sectors preventing market participants (including us) to better optimise their operational decisions."

Many stakeholders also highlighted the importance of the completion of contracts between BOTAS and GFPPs (on BO and BOT basis) from 2018-2019, and the development of a strategy to accommodate the demand increase these plants would create. Whereas (A) respondents were confident that "(...) the BO and BOT plants will most likely consider alternative suppliers once their contract with BOTAS ends and this

²²⁸ Starting from the national entry points and finishing at the domestic exit points.

²²⁹ Taking place particularly at the Malkoclar entry.

would, in turn, force BOTAS to find alternative sales channels" the (B) respondents said the opposite "We believe, under the current political and economic landscape, those plants would continue to buy gas from BOTAS for some time."

7.2.1.7 Supplier of Last Resort

The last issue linked to the market's efficient structuring is who should be the supplier of last resort (SoLR)²³⁰. This is a question that, according to the respondents, has important implications, particularly in situations when there is uncertainty for distribution companies in knowing exactly from whom and under what terms they will buy the gas. There is no designation of SoLR in the existing Law except a single Board Decision (No. 4169) which indirectly confers the responsibility of serving eligible customers who do not have a supplier to distribution companies. The private sector respondents said "we support the notion that the responsibility of being the SoLR of distributors should be with BOTAS and not us because of BOTAS' dominance and the existing market realities in Turkey." BOTAS respondents did not comment on this.

In the draft Law, however, this issue seems to be dealt with and the selection of SoLR(s), its/their duties and the tariffs to be used are left to the regulatory authority's decision.

7.2.2 Key Challenges in Pricing

Undoubtedly, one of the essential characteristics of competitive markets is cost-based pricing. It was discussed in Chapter 6 that BOTAS adapted cost-based pricing for energy products following the High Planning Council (HPC) decision²³¹ of 14 February 2008, however this practice was discontinued from the last quarter of 2009 and BOTAS presently uses an all-inclusive pricing which, according to the respondents, undermines the goal of developing a competitive gas market. As the segments of Turkey's gas industry are at very different levels of development this affects the market players'

²³⁰ In the event that customers' gas suppliers fail to maintain normal conditions of gas supply, the designated Supplier or Suppliers of Last Resort ensure(s) ensure continuity of gas supply for non-domestic and domestic customers connected to the gas network (Utility Regulator, 2012)

²³¹ Based on the High Planning Council Decision No. 2008/T-5 "Procedures and Principles of Cost Based Pricing Mechanism to be Applied by the State Economic Enterprises (SEEs) of Energy" to be effective from 01.07.2008.

ability to manage this pricing method. There are three pricing-related issues considered to be major barriers to the development and liberalisation of the Turkish gas sector during the interviews:

7.2.2.1 Predatory Pricing of BOTAS

The most frequently referenced argument regarding the obstacles that have been standing in the way of Turkey's gas market achievements was the BOTAS' predatory price policy. The (C) respondents argued "Despite its invitation to private participants into the sector in 2005, BOTAS has not been reflecting the real costs and differences in exchange rate to its gas prices, and thus leaving the other market players confronted today with serious challenges if not almost inoperability." As noted in Chapter 5 it is now known that the Russian, Iranian, Algerian, Nigerian and Azeri gas to Turkey are contracted under long-term oil-indexed agreements by the Take-or-Pay principle. BOTAS attains the monopoly of purchase of gas from these countries that have typically more stringent and high ToP commitments in comparison to, say, the highswing contracts the UK and Netherlands have²³² (Melling, 2010). As of 2015, seven private companies have the right to import natural gas along with BOTAS and the only way they can compete with the incumbent is by offering their customers lower prices. The crux of the matter here, again according to the respondents, "(...) is that although the wholesale tariffs have been left to sector players to set freely since 2008 (Board Decision No. 1439/2) the market prices have been kept artificially low by BOTAS being the biggest player with its almost 80% market share (due mainly to its allpricing which hardly reflects inclusive the true costs of storage and transmission/dispatch control) and there is no way that us or new supplier entrants can compete with such prices." Additionally, my discussions with the interviewees reflected many uncertainties on pricing, for example, BOTAS prices remain stable even though the storage and transmission tariffs change over the years (Figure 43) and the gas prices bear a very little relevance to seasonal balancing costs which lead to uneconomical and infeasible storage utilisation of the private sector.

²³² E.g. the Dutch local Groningen sales contracts in return for a substantial capacity charge payable regardless of the gas consumed and UK high-swing contracts from the fields developed for seasonal supply (Melling, 2010, p. 128).



Figure 44. BOTAS Prices versus Brent 6 Months Average

As it is in China natural gas demand is chiefly supply-driven (IEA, 2006) in Turkey and although differences exist between sectors and regions the industry sector is given a particular importance in terms of prices due to their overall impact on the economy. Comparatively, the Turkish gas prices are not very low and actually could be critisised for being relatively high as using the purchasing power standard for the gas prices in Europe illustrate (Table 43). Most EU countries support their industrial consumers with lower prices than their household consumers (apart from Croatia, Hungary and Romania) and between 2013-2015 European industrial consumers paid gas prices ranging from €0.027/kWh to €0.038 kWh in developed countries whilst Turkish customers paid the lowest prices (€0.027-€0.029) after Romania. When considered in the context of the purchasing power standard (PPS), however, the final price of gas for the Turkish industrial consumers has almost always been higher with respect to prices prevailing in other EU countries and a similar picture can also be drawn for the household prices which have been amongst the lowest in €/kWh terms but amongst the highest in PPS terms.

Source: PETFORM

	Domestic Consumers*							Industrial Consumers**							
	EUR/kWh			Purchasing Power Standard]	EUR/kWh		Purchasing Power Standard				
	2013S1	2014S1	2015S1	2013S1	2014S1	2015S1		2013S1	2014S1	2015S1		2013S1	2014S1	2015S1	
Austria	0.0570	0.0554	0.0539	0.0510	0.0501	0.0488	ľ	0.0349	0.0339	0.0306		0.0312	0.0307	0.0277	
Belgium	0.0523	0.0513	0.0478	0.0465	0.0462	0.0430		0.0386	0.0303	0.0276		0.0342	0.0273	0.0249	
Bulgaria	0.0427	0.0409	0.0398	0.0898	0.0867	0.0843		0.0356	0.0342	0.0311		0.0749	0.0725	0.0659	
Czech Rep.	0.0530	0.0453	0.0474	0.0767	0.0704	0.0739		0.0324	0.0304	0.0285		0.0469	0.0473	0.0445	
Denmark	0.0441	0.0367	0.0357	0.0324	0.0272	0.0265		0.0345	0.0274	0.0276		0.0253	0.0204	0.0205	
Germany	0.0496	0.0510	0.0509	0.0472	0.0490	0.0488		0.0438	0.0409	0.0355		0.0416	0.0392	0.0341	
Estonia	0.0412	0.0386	0.0358	0.0565	0.0517	0.0480		0.0358	0.0339	0.0341		0.0491	0.0454	0.0457	
Ireland	0.0545	0.0562	0.0555	0.0494	0.0505	0.0499		0.0389	0.0376	0.0359		0.0353	0.0338	0.0322	
Greece	0.0626	0.0583	0.0545	0.0734	0.0703	0.0657		0.0478	0.0436	0.0357		0.0560	0.0526	0.0431	
Spain	0.0582	0.0598	0.0581	0.0646	0.0669	0.0650		0.0383	0.0368	0.0365		0.0426	0.0412	0.0408	
France	0.0565	0.0581	0.0560	0.0499	0.0529	0.0511		0.0397	0.0373	0.0345		0.0351	0.0340	0.0314	
Croatia	0.0372	0.0371	0.0378	0.0585	0.0585	0.0596		0.0457	0.0411	0.0385		0.0719	0.0647	0.0607	
Italy	0.0564	0.0532	0.0504	0.0559	0.0530	0.0502		0.0379	0.0345	0.0328		0.0376	0.0344	0.0327	
Latvia	0.0401	0.0383	0.0392	0.0578	0.0559	0.0572		0.0358	0.0333	0.0330		0.0516	0.0485	0.0481	
Lithuania	0.0498	0.0462	0.0350	0.0812	0.0754	0.0567		0.0440	0.0414	0.0280		0.0718	0.0675	0.0455	
Luxembourg	0.0564	0.0478	0.0435	0.0465	0.0401	0.0365		0.0506	0.0422	0.0386		0.0417	0.0354	0.0323	
Hungary	0.0340	0.0288	0.0278	0.0589	0.0505	0.0489		0.0394	0.0385	0.0350		0.0681	0.0675	0.0615	
Netherlands	0.0478	0.0461	0.0429	0.0436	0.0422	0.0392		0.0303	0.0295	0.0271		0.0277	0.0270	0.0248	
Poland	0.0382	0.0398	0.0407	0.0662	0.0686	0.0696		0.0362	0.0371	0.0352		0.0627	0.0639	0.0602	
Portugal	0.0657	0.0713	0.0753	0.0842	0.0917	0.0969		0.0413	0.0419	0.0411		0.0529	0.0538	0.0528	
Romania	0.0152	0.0160	0.0150	0.0303	0.0312	0.0292		0.0207	0.0213	0.0207		0.0412	0.0416	0.0403	
Slovenia	0.0509	0.0499	0.0452	0.0632	0.0624	0.0565		0.0446	0.0383	0.0321		0.0554	0.0479	0.0402	
Slovakia	0.0415	0.0423	0.0413	0.0611	0.0635	0.0620		0.0356	0.0357	0.0334		0.0523	0.0535	0.0502	
Sweden	0.0671	0.0652	0.0611	0.0491	0.0493	0.0482		0.0461	0.0410	0.0361		0.0337	0.0310	0.0285	
Turkey	0.0337	0.0269	0.0313	0.0545	0.0503	0.0565		0.0297	0.0236	0.0271		0.0481	0.0441	0.0489	
UK	0.0505	0.0571	0.0604	0.0465	0.0500	0.0471		0.0337	0.0355	0.0339		0.0310	0.0311	0.0265	

Table 44. Gas Prices for Domestic and Industrial Consumers in Europe, 2013-2015

Note: Excluding taxes and levies.

* Annual consumption: 20 GJ < consumption < 200 GJ

**Annual consumption: 10,000 GJ < consumption < 100,000 GJ

Source: Eurostat

According to the interviewed market players BOTAS does not pass the competitive advantage it has in the international market onto final consumers. It was articulated in Yardimci (2012) that the cost components of BOTAS' average national gas tariff include gas price and wholesalers' margin aggregately accounting for 74.3%, average transmission and dispatch control fee (3.2%), average distribution fee (2.9%), storage fee (0.8%) and taxes and levies²³³ (18.9%). This being the case, the (C) respondents said: "We find it hard to offer lower prices to our customers with respect to the incumbent except for the fall in transmission and storage costs resulting from regulation" as similarly argued in Cavaliere (2007). Based on views expressed as well as on other information collected, the private sector proposes a pricing reform to be implemented in a way that the minimum selling price of BOTAS (excluding transmission and dispatch costs) will not risk both the commercial sustainability of other market players and the security of supply. Following BOTAS' renouncement of all-inclusive pricing, (C) respondents advocated that "Each customer should bear the cost they cause to the system and that, in turn, should require explicit reflection of storage, balancing and capacity costs on the selling price of each profile."

7.2.2.2 Energy Subsidies

The second most referenced discontent was BOTAS' subsidised prices decisions which again tend to be more politically based in Turkey. Perhaps the most competent comment regarding subsidies and its consequences for the Turkish market came from one of the (C) respondents. He delineated: "Everybody complains about BOTAS' cheap subsidised prices but not many are aware that the situation is now exactly the opposite. As known, gas prices are globally on the decline depending on decreasing oil prices but the sales prices of BOTAS are still the same with those of three years ago. Currently, Turkish consumers are using the world's most expensive gas and this arises the question of how, then, will industrial companies survive if their most important competitive advantage lies in the input of energy? Nonetheless, when these companies were heavily subsidised by the Turkish tax-payers) and exported to countries like Libya, Iraq and Iran between 2010-2014, this issue was not worthy of attention. Actually, those manufacturing companies seriously thought that they were competing with China. This is where we are with subsidies in Turkey and sadly the same is true with the GFPPs.

²³³ VAT (15.3%) and special consumption tax (3.6%).

They were those who bought cheap BOTAS gas when gas purchase prices were expensive elsewhere and now due to higher prices look for ways to sell their plants to African countries like Ghana. So in sum, interventions into a liberal market always erupt if not today then does tomorrow or ten years later. And then the market's reaction to it -or its losses- can be much more than its gains in the past." Whilst (B) respondents did not want to comment on this issue, most (A) respondents simply commented: "The political will sets natural gas prices in Turkey".

7.2.2.3 Price Signals for Investments and TPA Exemptions

Given its size and demand which nears 50 bcm, Turkey is already one of the largest gas markets in Europe. As is presented in Chapter 5 however, the minimum 10% storage requirement of the 2001 Law can hardly be met and unless the issue of new storage capacity is dealt with Turkey's gas industry would neither take off nor the seasonal gas demand fluctuations could be easily compensated. As expected, lack of investment incentives and right price signals for investors in storage were, too, quoted by the interviewees and the issue was articulated from two main perspectives.

The first is the absence of new investments. Apart from the ongoing constructions of Tuz Gölü UGS and the capacity expansion of Silivri UGS there is no investment in storage²³⁴ (including LNG) to complement Turkey's existing facilities to meet the demand fluctuations during winter and to offset the increase/disruption of gas imports although geographically UGS potential of the country seems to be plenty²³⁵ (Section 5.4.7.1). According to one of the (C) respondents: "The question of why there is a weak (if not no) storage investment in Turkey is closely linked to the investors' lack of confidence regarding recovering their costs and securing an agreeable return on their investment coupled with the absence of adequate market set-up which could have been better able to keep prices in line with costs." For them, lack of price signals due to BOTAS' limited price-differentiation (which also stems from BOTAS' all-inclusive price policy) constitutes one of the problems.

²³⁴ I have been informed by the interviewees that the Tarsus UGS project is still at the stage of licensing process and despite the 30-year underground natural gas storage license issued by EMRA to Bendis Energi in February 2, 2014 no nail has been pounded to the project as of 2016 and its not clear whether the project will be realised without any delays.

²³⁵ Thanks to inherently appropriate geological structure with many available caverns suitable to be converted into storage sites.

Most (C) respondents who commented on lack of storage were of the view that "Limited price-differentiation does preclude the right price signals to storage investors and Europe's wide range of gas prices (by type of user) is a useful example to look at. To put this in context, BOTAS has three categories presenting natural gas prices charged to final customers namely eligible customers (who are chiefly industrial customers consuming more than 300,000 m³ gas²³⁶), non-eligible customers (consuming less than 300,000 m³ gas) and organised industrial zones. In the European Union countries, on the other hand, household and industrial gas consumers are divided into at least five categories in themselves²³⁷. This represents an efficient framework to create adequate price signals for investors and should be promptly adapted by BOTAS." Designing efficient and cost reflective pricing systems is truly not an easy task and regulatory reforms in this area seem to be still some time away for Turkey. Whilst this needs more work, the 2014 draft Law aims at supporting LNG investments in particular and introduces an 85% reduction as to real property (e.g. authorisation, lease and easement) to be applied for the first ten years of investment and operating period.

The second is the absence of exemption from third party access to storage facilities. Article 22 of the 3rd Directive does allow, upon request, cost regulation obligations and the full and partial TPA exemption to major new gas infrastructures and significant increases of capacity in existing infrastructure (Section 4.2.1.4). That clear-cut derogation for Turkey's existing and prospective infrastructure is however not provided under the provisions of the 2001 Law (and the BUPPs) and the lack of control under these options makes investing into Turkey's infrastructure unattractive for potential local and foreign investors, as many comments pointed out. Whilst a number of interviewees suggested that "Such investments can be made jointly with a contribution from both state and private entities", an interesting criticism came from certain (A) respondents regarding the dilatory and reluctant proceedings of the state towards the financing of such investments itself. They argued that "If the state was able to finance some major disruptions abruptly caused by technical/price/terror related conflicts by

 $^{^{236}}$ This can be subject to another criticism that BOTAS still classifies the customer groups based on their use of gas being more or less than 300,000 m³ although the eligibility levels, as of 2016, are reduced to 75,000 m³.

²³⁷ According to Eurostat data, for example, household consumers are divided into five categories as D1 representing those who use gas up to 8.37 gigajoule (GJ), D2 up to 16.74 GJ, D3 up to 83.70 GJ, D3b up to 125.60 GJ and lastly D4 up to 1047 GJ. In European Union standards industrial customers are even more articulated and divided into seven categories. Whilst I1 type of consumers use gas up to 418.6 GJ, I2 up to 4,186 GJ, I3-1 and I13-2 up to 41,860 GJ, I4-1 and I4-2 up to 418,600 GJ, and finally I5 type of industrial consumers up to 4,186,000 GJ (1 GJ=277.77 kWh).

supplier countries since 2004 (which cost the government million dollars a day in return for emergency LNG imports from abroad) that amount should have been directed to storage investment in the first place and Turkey would have already been in the centrepiece of energy world today."

The interviewees from EMRA were in consensus that although almost all the existing storage capacity in Turkey was integrated into BOTAS' other infrastructure (and thus still bundled) and the regulated TPA are applied to these facilities, the regulations would be softened or removed once the country had enough capacity. Whilst this would lead to commercial terms/conditions to be agreed freely between facility operators and their primary capacity holders it would also make passing on the storage costs to end users on the segment basis for providing necessary market-based price signals for new infrastructure investments relatively easier.

7.2.3 Technical Infrastructure and Market/Trade Operations

To complete the analysis of Turkey's transition from monopoly to liberalisation, having already commented on the particular features of the market, an important step was also to look at Turkey's technical infrastructure in this regard and comprehend how Turkey could improve its technical ability including data collection and analysis which clearly have broad repercussions for the supply/demand developments, smooth market/trading operations and thus the GTM.

In this vein, a (C) respondent summarised why the harmonisation of Turkey's gas legislation with Europe's, especially in terms of the GTM, has lagged behind for so long: "From the beginning, Europe had realised that gas is in fact a commodity. With this 'commodity' philosophy in mind, the EU has been constructing a system by removing the demarcation between its members so that the commodity can freely flow, say, from Germany to Belgium, to the Netherlands, to France or from France to Germany. Yes, it had encountered resistance from the big statist companies (French in particular), but especially after 2008 almost all of Europe except Germany realised the significance of setting up a liberal gas market against the political games Russia started playing with gas through Ukraine. By establishing gas trade centres –hubs- they saw the potential of consuming cheaper gas (e.g. US\$7-US\$9 MMBtu) despite other prices

impacted by rising oil prices elsewhere (e.g. US\$12-US\$14 MMBtu). In Turkey, on the other hand, the gas market has never been thoroughly understood. In fact the commodity phenomenon has not really been understood in either its gas sector or in the electricity. Hence, the electricity crisis in 2006 was a result of the government's resistance (or perhaps populist approach) to pass the rapid rise in international energy prices to the domestic market. Luckily, the severe impacts of this crisis forced us to establish a balancing power market and today we have a comparatively more liberalised electricity market than gas despite the widespread belief to the contrary. Every year since 2009 we have experienced Russia-Ukraine related gas supply issues and especially after the downing of a Russian warplane in Turkey²³⁸ we finally had the opportunity to see the hazards to which Turkey is exposed to. We legislated quite a liberal NGML in May 2001 and sadly put a full stop there. That dot still stands there today as we have not even fixed the failures/shortcomings in the law whereas the EU learnt from its mistakes and went remarkably further with its second and third generation Directives."

In order to align Turkey's natural gas sector reforms with the country's new market framework, adequate technical infrastructure and properly functioning EBB have already proven their value during the interviews. Almost all respondents noted that "the Turkish natural gas market evolves and so do its needs", and emphasised the importance of incorporating new market structure and sufficient technical infrastructure. The (C) respondents on the other hand argued: "We expect a constant evolution from the market which, in this context, calls for a more open exchange of information. Moving to what needs to be done for a smooth operation of the market in Turkey, removal of information asymmetries which currently prevent us to be aware of potential risks and opportunities in the market due to BOTAS dominance/non-unbundling- overcoming deficiencies in the SCADA system -which is ongoing for over ten years- used in both distribution and transmission segments of the industry for measurement and communication purposes, and incompetency of the EBB to provide good quality real time information are to name but a few."

On the operational side, for the existing traders and entrants to trade effectively in the

²³⁸ On 24 November 2015, Turkey shot down a Russian warplane in return of its violated airspace whereas Russia said plane was over Syria. See <u>http://www.bbc.co.uk/news/world-middle-east-34912581</u> [accessed on 9 April 2016].

transmission system respondents consistently pointed out that the aim should be improving the EBB at once in which fair accession of shippers to information regarding, inter alia, capacity programs and allocations, existing system inventory and internal gas stock at all entry and exit points is ensured. Meticulous rearrangement of the EBB was advocated in many responses, and a range of views expressed from those strongly against its current structure to those who recommended certain changes only. To exemplify, certain (C) respondents complained about the EBB by saying: "Although according to the BOTAS Network Code the EBB should automatically validate the last approved Transportation Quantity Notification (TQN) if we, as shippers, fail to timely submit our up-to-date TQNs, there occurs some unwanted virtual trade (at our expense) as a result of this". Some were cautious about virtual trading on the EBB stating: "Sellers' TQNs are automatically being reflected on our portfolio and this should be based on bilateral approval of both parties to prevent potential exploits." Other respondents, who represent more diverse interest (namely B), tended to be against this and said "In order to discipline the system we insist on the sufficiency of unilateral approvals and urging both parties to strengthen communication between them²³⁹ instead." Discussions also focused on the impossibility of making certain booking (including storage) modifications on the EBB but since the designation of the EBB platform solely lies on the provision of the 2001 Law and the BNC, the vast majority of complaints received are relatable to the absence of a daily trade regime in the gas market. This adds to the badly functioning wholesale market and worsens the imbalance charges shippers are exposed to, as (C) respondents argued, and under this umbrella several proposals were made by them supporting the analysis that is made under the GTM sections in Chapter 6 and 7 (Sections 6.4.1-3 and Sections 7.2.1.3,1.6,2.3 and 7.2.3), including:

- "The TSO need to establish short term capacity products -at least daily products to start with- although the GTM requires even shorter options i.e. within-day
- The TSO should align the daily capacity regime across the market (not least storage) and remove the factors applied to idle capacity bookings²⁴⁰
- Remove the existing overcapacity rights given to shippers (currently eight times) at storage facilities

²³⁹ Or by means of binding contracts if necessary.

 $^{^{240}}$ The factors (1.30 for winter, 1.20 for mid-term and 0.80 for summer periods) are applicable only to shippers willing to book idle capacities (for less than a year) at certain E/E points where they do not have prior primary capacity bookings.
- Reduce seasonal factors applied to daily imbalance charges (if negative beyond the tolerance level) at least until the unbundling of BOTAS is finalised
- Offer shippers allocation rectifications which are made in the absence of data flow²⁴¹ and exemption from the costs related to distributors' measuring errors
- Re-transfer of capacities (to different E/E points) between shippers within the same month needs to be allowed
- Regional and national long-term power outages need to be added to the scope of force majeure."

7.3 Analysis of Findings

This thesis has attempted to investigate some of the key challenges persisting in Turkey's institutional landscape, regulatory reforms and gas pricing mechanisms that have impacted the country's natural gas market liberalisation within the European Union context. Following the findings of Chapter 1, this research has firstly discussed that the drivers behind natural gas reform programmes have been widely divergent between developed and developing countries, and between those who produce/export gas and those who do not. As shown in later sections of the thesis, in Turkey the primary push for natural gas market reforms came from the fiscal crises in the 1990s so that investments to provide the country's vast population with access to energy resources were (inevitably) seen as a huge burden on the state budget whilst private participation into energy sector through liberalisation was considered to be the remedy.

The deployment of liberalisation in energy markets induces changes, in extensive and pervasive ways, which impact the way energy (re)sources are handled, traded or offered to consumers. As is frequently advocated by bodies like the International Energy Agency, the World Bank and the European Union, harnessing the right liberalisation and competition tools is crucial to, inter alia, contribute to the protection of final consumers and for elimination of potential discrimination in gaining access to infrastructure. In Chapter 2, both political and economic arguments for the liberalisation phenomenon were reviewed and in order to objectively gauge the underpinnings of the controversial approaches towards this phenomenon three theoretical perspectives within

²⁴¹ This is already being offered in the event of measuring errors.

the institutional literature, were discussed namely the public choice theory, the natural monopoly theory, and the economic theory of regulation. From the standpoint of natural monopoly theory, the discussion and surveying of the "natural monopoly concept" laid out the consideration that these monopolies had generally been caused by government interventions via franchises, protectionism and other means due to the large-scale production and economies of scale as DiLorenzo (1996) stated. The Turkish gas market, within this context, is monopolistic nevertheless, the industry has been also introduced to liberalisation through different avenues since 2001 and now private companies import, store, distribute and sell natural gas along with BOTAS although limited in numbers. Although the tasks and objectives defined in its 2001 NGML constitute Turkey's formal baseline today the (AKP) government has not yet managed to fully implement either the provisions of the country's first and only Law or the EU natural gas Directives. Therefore, a fully-fledged liberalisation is not yet a reality and the overshadowing role of the government is obvious as a means of regulation. Thus, using the "natural monopoly", "public choice" and "economic theory of regulation" as the theoretical construct of this research has offered a useful way to understand the country's liberalisation progress from controversial perspectives and to establish a level playing field for the liberalisation research on the Turkish gas market to be built upon.

The use of monopoly can be daunting since they may be considered to be for the public benefit, or otherwise, involve economic/social disadvantage to it. According to Gunton (1888, p.388) "[...] If by monopoly is meant merely the exclusive power to produce a commodity, this exclusive power may be either an evil or a great benefit, depending entirely upon the way it is obtained. If it is procured through the arbitrary exclusion of competitors, it will surely be an evil; but if derived from the capacity to make the article more cheaply than others, through the use of large capital and superior methods, then it is a positive advantage to the community." A notable degree of vertical integration and foreclosure on upstream and downstream activities has been seen in the Turkish gas market and it is confirmed by the interviewees that due to long-term gas purchase contracts, severe ToP restrictions and political circumstances of the supplier countries the incumbent, BOTAS, is not yet totally willing to abandon its historical monopolistic position for the years to come. This being the case, it is appropriate to question the magnitude and strategic significance of the natural monopoly theory, as advocated by its extant apologists, that economies of scale cause declining average costs or market prices would really be achieved without governmental subsidies. Due to lack of data and

transparency, any assessment of the cost and potential for development becomes almost impossible in the Turkish gas market. Notwithstanding the limitations in publicly available data, however, approximate prices for BOTAS gas imports are available which are linked to oil prices and claimed to be high compared to other countries that use market or hub-based prices. It is also known that private companies strive to compete with BOTAS prices by constantly negotiating with Russia to get lower prices than the ones BOTAS is given. There is also the question concerning what is the private companies' contribution is to the market or competition if they are not able to bring cheaper gas to the country.

Gunton (1888, p.390) is also against the notion that a large concentration of capital tends to destroy competition and he argues "[...] the reverse is true. It tends to raise the plane and increase the intensity of competition, and minimise the margin of profits." However, this analysis has shown that some of the new entrants have chosen to associate themselves with Turkey's principal gas supplier, Russia, to solve their price issues and due to the extent of the relinquishment of equity in their companies to Russia (up to 70%) they have become the subject of another concern for the market as this research argues. The monopoly's predatory prices continue to cause serious concerns among private companies and they are claimed to have destructive impacts on the wholesale market implying numerous limitations over the way natural gas is sold and bought. As Michael Porter discussed in his seminal book, Competitive Strategy: Techniques for Analyzing Industries and Competitors, that is because skills, resources, technological developments and orientation of firms -either existing or considering entry into the industry- are very vital to industries' evolution towards competition, competition may not always translate into structural change in the industry. And he continued "because no firm happens to discover a feasible new marketing approach; or potential scale economies may go unrealised because no firm possesses the financial resources to construct a fully integrated facility or simply because no firm is inclined to think about costs" (Porter, 1980, p.163). In the Turkish case the private firms may be aware of the costs but not necessarily be resourceful or financially able to construct a mechanism via which they can compete with BOTAS.

The Turkish gas industry is inherently monopolistic and like other markets, where competition within the market is not possible/desirable, its distribution segment has adopted an alternative administrative principle 'competition for market' to keep the existing monopolistic structure and allocated the running of the services to private firms through franchise bidding. As discussed in Harstad and Crew (1999), franchising in network industries arguably provides attractive efficiency properties that, for example, price- cap regulation or rate of return could not achieve. Or as Demsetz (1968), Braeutigam (1989), Dnes (1995) and Joskow (2006) argued franchise bidding is appealing since it suggests competition into the industries where substantial economies of scale prevail, and is free from the usual regulatory apparatus and regulation-related incentives for firms to behave in an economically inefficient manner. At this point, almost all regions are being distributed gas by private companies in Turkey and it is hard to establish benchmarking between the state- and privately-distributed areas in terms of tariffs, service quality and efficiency measures in Turkey. IGDAS is the only remaining public gas distributor (partially serving Istanbul) and although it is not quite comparable with other small distribution companies, due to its size, this has not stopped some of the respondents commenting about IGDAS more positively than its private counterparts particularly in terms of service quality and prices.

As shown in Chapter 5 there was fierce competition for the franchise of certain regions that resulted in bids with zero USDCs and connection fees, and it was attempted to uncover what may possibly bring the potential franchisees to accept investing into infrastructure and to supply gas in return for no cost recovery nor any profit for the first eight year period. The latest analysis of Okan Yardimci about distribution tariffs, at this juncture, has aided this research in understanding how the natural gas tariffs evolved after the compulsory fixed-tariff period for end users²⁴² and the study showed that the distribution tariffs have increased for all regions but the growth rate has so far been less strong in Istanbul. This is coupled with the outcomes of Yardimci's other study "Efficiency and Service Quality Analyses of the Natural Gas Distribution Companies: A Case Study of Turkey" proving that neither the service quality nor efficiency measures the private distribution companies have taken thus far properly met the early expectations of Turkey regarding gas market liberalisation. It is illustrated in Chapter 5 that today franchisees like Aksa Gaz Dagitim A.S., Enerva Gaz Dagitim A.S and Akmercan Group hold distribution licenses for up to twenty regions²⁴³ and this couples with the findings of Viscusi, Vernon and Harrington (2005) that certain advantages of the current franchisee(s) i.e. readily made necessary capital investment, better

²⁴² Which is, to the best of my knowledge, the only up-to-date tariffs comparison between the state- and privately-distributed cities.

²⁴³ Out of over sixty companies; joint ventures and other entities distributing natural gas in Turkey.

knowledge in technology and better information on market demand can disincline other firms to compete with the incumbent realising the trivial chance of winning the competition. Whilst confirming Klemperer's (2001) study which investigated the case of collusive bidding and opportunistic behaviour of single firms that enjoy strategic advantages for franchise competition, the interviews with EMRA staff also indicated that complexity of contractual arrangements were ignored at the outset of franchising and today the regulator occasionally faces some difficulties such as accountancy ambiguities and the possibility of a franchisee exploiting the accounting data as a threat of bankruptcy to disincline the franchising agency to fail him as argued in Williamson (1976). In summary, although franchise or competitive bidding has been used as an effective tool to construct, enhance and operate distribution networks in regions wherein no access to natural gas existed in Turkey, their final implications on the Turkish market has not been free of flaws contrary to what was expected.

Overall, this fragmented structure causes the Turkish gas market to be caught between the old monopolistic structure and a new liberal approach without direction and no clearly articulated strategy. Both the analysis undertaken in this research and the interviews conducted show that Turkey's gas market policies have been mostly shaped by political incentives (including Turkey's official candidacy to the EU and a range of other factors including strategic energy security considerations, geopolitical factors and the politicians' own initiatives), although it began with economic objectives. According to public choice theorists, the apologists of the natural monopoly theory fall short of covering the relationships between expanded roles for governments and their impacts on entry barriers and social costs whilst Chang (1997), for example, drew attention to the deadweight welfare losses that stemmed from allocative and productivity inefficiency due to lack of competitive pressures, high likelihood of predatory pricing or pre-emptive investments. Ha-Joon Chang articulated how governments protect the natural monopolies and decide to operate the services at a price equal to marginal cost by providing a lump-sum subsidy to keep the incumbent company in operation since allowing otherwise would create Pareto inefficiency and negative profits (in Kim and Horn, 1999, p.2). The careful assessment of the industry has showed that political actors in Turkey have indeed had a critical role in retaining BOTAS' monopolistic position thus far.

It is worth taking a brief sideways glance at international experiences here and as

expected Turkey is not the only country that has failed to work out its decades long structural immobility in its energy sector. In almost ten EU countries²⁴⁴ incumbents were controlling between 90 and 100% of the gas market up until 2007 (EC, 2007), but due to the full EU membership of those countries, the abilities of political actors to keep the incumbents as powerful were mitigated greatly and the EU legislation (and thus the Directives) remained as the prevailing framework over their national legislations. Germany is perhaps the country Turkey could be most likened to, although there exists some numerical differences in the ownership of incumbents ²⁴⁵. According to Lohmann (2006, p.6) Germany's gas market liberalisation process started in 1999 with no groundbreaking results up until mid-2006 after long negotiations with the EU. This was firstly due to the difficulties in breaking up the gas market's "family structure" backed by demarcation and long-term contracts and second the absence of a clear political commitment to market liberalisation in the country. That is, although there had been a few changes in market structure the established ties and interconnections of the German gas industry was strong enough to prevent any substantial change in the traditional business model unless forced to do so by the EU (ibid, p.178). Since the Turkish government has already signaled its intention to postpone for too long particular reforms which are key to the achievement/finalisation of the liberalisation process, what might seem the obvious solution -to provide the necessary push to Turkey's crucial structural reforms- is facilitating the EU as an imperious agent of change (via its compelling acquis) in the same direction. Approvingly, the respondents from EMRA stated that "should Turkey finds itself under such obligations (i.e. by the EU) then we (EMRA) would stand ready to take required legal and technical actions just within months not years."

Taking over the market dominance of BOTAS would definitely help Turkey in encouraging vertically integrated BOTAS' unbundling, too. Presently, only the accounts of BOTAS' transmission and commercial activities are unbundled and since no action has been taken over the last fifteen years to change this despite a few revisions proposed to the existing Law it would not be wrong to say that the authorities are satisfied with

²⁴⁴ Austria, Belgium, Czech Republic, Denmark, France, Germany, Hungary, Poland and Slovakia.

²⁴⁵ The main difference was that the German gas market comprised of three tiers and each tier had more than one incumbents in power. Whilst on the top tier, at the outset of liberalisation, there were five importing companies (also involved in gas wholesale trading and operating interregional transmission network) and six main producers (some of which were also importers simultaneously) the second tier was formed by ten transmission companies (also able to trade gas). The third tier consisted about 700 distribution companies many of which were also selling gas to other distributors as well as end users (Lohmann, 2006, p.7-8).

the current situation thinking perhaps there is not necessarily any legal basis for a radical ownership unbundling. And thus an efficiently implemented legal unbundling, at the most, should be enough for a market like Turkey's²⁴⁶. Again, this view reiterates the general perception of the European stakeholders in 2007, when they expressed their views on the energy Directives in the DG COMP's Energy Sector Inquiry questionnaire, that the expected impacts of ownership unbundling on more competition, a higher degree of transparency and network optimisation were not empirically proven since the countries that adopted such unbundling were those with already large gas resources and well-developed distribution networks, and so the negative effects of separation were not felt as much let alone the cumbersomeness and uncertainty it would create in the market (p.211). Although the reaction to ownership unbundling was more negative, the respondents, in particular those speaking on behalf of the incumbent, were positive about the legal unbundling of BOTAS and did not see it as a major problem as long as all legal entities to be established (i.e. transmission, wholesale, storage) worked under one holding company and was run by BOTAS. Conveying the views of Turkey's Competition Authority on the subject matter, Soysal et al. (2012) rightly underlined, however, that concentrating only on the unbundling of BOTAS' transmission and wholesale activities and ignoring BOTAS' position, which runs the risk of competitive advantages in the wholesale market, would not solve the market's urgent problems, and quite the contrary to the order of unbundling routines elsewhere. They recommended the authorities prioritise the separation of BOTAS' import and wholesale activities, and limit the type of customers the new wholesale entity (to be established) could sell gas to eligible customers only²⁴⁷ for the most effective results. Meanwhile, they foresee BOTAS, as an importer, to continue gas sales to distribution companies and GFPPs (BO and BOT based) some more time given its ToP obligations.

Chiming with the descriptions of the Energy Sector Inquiry of EC (2007) regarding how the concept of vertical foreclosure could impact the competitiveness of a market, it was found that most customers in Turkey meet their entire demand, or a large part of it, on the basis of long-term contracts with BOTAS and this may thwart new entrants from finding suitable outlets for their products. Cavaliere (2007, p.35) argued that incumbents could obtain supplementary mark-up if they choose to import gas

²⁴⁶ Legal unbundling is yet to be realised at the time of writing.

²⁴⁷ It is foreseen for BOTAS to carry on gas sales to BO and BOT based GFPPs, and distribution companies some more time.

themselves benefitting from a lower cost of imports²⁴⁸ and sell gas to new entrants whose profit margins are much lower whilst Polo and Scarpa (2002) looked at the issue at the retail level and asserted that because the retail suppliers buy gas directly from the producers/importers also under long-term contracts with ToP clauses, which modify their cost structure confronted with a zero marginal cost and a huge fixed cost up to the ToP obligations²⁴⁹ this makes the firms' competing for the same customers very unprofitable. They provide a way to tackle this issue by recommending the creation of a wholesale market where the suppliers, burdened with ToP obligations, sell the gas and a single pool price for the aggregated demand side (i.e. eligible customers and retailers) is determined. This way, they stated, their marginal cost could reflect all the cost components and the equilibrium price if competing for the same costumers allowed them to cover costs and make profits (ibid, p.17). But as said above, competition at the retail level does not really exist in Turkey and no attention seems to have been devoted so far to this problem in the policy debate.

In Chapter 3, the importance of choosing semi-structured interviewing for this exploratory research was stressed following Gray (2014) in order to enable both the interviewer to add additional questions that were not anticipated at the outset of the interview and for the respondents to expand their answers for better probing of views and opinions. Indeed, the views of informants from the private sector and the Turkish Energy Market Regulatory Authority have been vital for this study and these interviews have particularly helped the researcher to realise how centralised the power structure in Turkey is -meaning almost no part of government is truly independent of others- and in fact how little genuine independence the energy regulator of Turkey actually has. It is observed that not only the regulator acts as another branch of the government with remarkably little autonomy indeed, but also more astonishingly, how inured EMRA staff have actually been to this widely accepted "new regulatory culture" which is becoming increasingly prevalent in the country. As one respondent from EMRA frankly summarised "Today, do you think private sector is 100% independent from the state? This shall bring us to a deeper reflection on the nature of these processes that we cannot really expect an administrative authority to operate independently in an environment where no sector/company is truly 100% independent from the government. So, in here (EMRA) we encounter what any institutional structure in Turkey is experiencing,

²⁴⁸ Due to their first mover advantage in the international market.

²⁴⁹ Or, phrased differently, their (zero) marginal cost does not reflect the total cost for the purchase of gas.

nothing more nothing less. But one must also remember that we are talking about a conjuncture that cannot be considered separately from internal and foreign policy affairs. It would be an ideal situation to have it otherwise but we are currently far away from it." In light of these relevations, it is useful to look at the traditional view of the economic theories of regulation which holds that regulation tackles market failures and externalities. Glaeser and Shleifer (2003) argue, however, that the theory is unable to explain why neither contract nor tort law successfully addresses these problems in the first place. Along similar lines, the findings of this research shows that regulation has been and still is an efficient strategy of law enforcement in Turkey but not necessarily an efficient solution to the problem of market failure given its vulnerability to special interests groups and political pressure. The absence of EMRA's detectable effect on the reduction of price discrimination is a clear illustration of this. It was stressed during the interviews that institutions like EMRA were under pressure from interest groups, private companies and the government itself. And that is to say, in other words, the policy makers concerning particular sectors do face strong pressure from well-organised special interest groups in Turkey in line with the study of Olson (1965) 'The Logic of Collective Action' which considers the behaviour of interest groups from the perspective of rational choice theory into the focal point within the public choice literature.

Since many stakeholders see EMRA as nothing but as an institution that inspects enforcement of the secondary legislation only, this research suggests that something more significant and urgent than developing/changing the legal framework is the restructuring of governance institutions to ensure the stakeholders and EMRA itself grasp the role of a fully independent authority in moving Turkey away from the old monopolistic traditions for development of competition and in establishing a strong set of sector players in the Turkish market. The regulatory authority seems to be picking and choosing the implementation of the minimum requirements of the EU Directives, and according to some respondents it is under pressure from both political actors and stakeholders. When the literature concerning why regulation of markets was needed and what should be regulated was reviewed in Chapter 2, the economic theory of regulation (Section 2.2.3) provided useful insights about the fact that regulation was directed by the exchange for political support chiefly for the attainment of re-election of politicians who set up income transfers in favour of the industries (Den Hertog, 1999). In fact the literature as to both theory of public choice and economic theory of regulation has made its mark on academic analysis by their experiments of introducing rational actor models into the study of politics and emphasised that individuals whether voters, politicians or regulators would facilitate political mechanisms in accordance with their own self-interest since it is electoral votes that counts in the political process. It is known that, the period of fully monopolistic Turkish gas market has now passed, the national champion -being responsible for all operational activities within the entire market- has become remote, and there has come a regulatory authority eventually evolving the market into a movement of regulation. But, has the evolution finished?

The answer is most certainly not and the regulator's growth in experience may go a long way to creating a well-functioning market and effective competition. Whilst the interviewees in this research were generally in favour of EMRA and its works on the one hand, some were undecided as to whether the conditions were right for providing distribution franchises the way it was done. For example at the time of which, they commented, neither party was aware of what they were getting into nor informed of long-term consequences of the whole process. This was seen with the increasing distribution tariffs once the first wave of 'liberalisation' excitement was over and the market regulator is now thought to be under growing pressure regarding how to ensure that both distributors and customers are kept satisfied with appropriate tariffs. There are also long-term exclusivities guaranteed to franchisees to serve non-eligible customers which efficiently foreclose new entrants from this market and has made the residential customers' switching rights go unused. Equally important, since transparency is not entirely in place in the Turkish gas industry pointing out specific reasons for the gap in the current rules regarding the designation of both distribution system operators²⁵⁰ and closed distribution system operators (as required by the 3rd Directive) for example is also as hard. At this juncture, it was brought to the researcher's attention that EMRA attempted to collaborate with the Public Procurement Authority to insert a "public service" provision into the Public Procurement Law in 2009-2010²⁵¹ which they believed should be sufficient to regulate forms of procurement in natural gas market (regardless whether by BOTAS or private companies) in terms of service quality, valuefor-money, industrial relations and investment shortfall. This, if happened, would have perfectly coincided with the discussion of Morton (2012, p.5) that "the role of public

²⁵⁰ Distribution system operators (DSOs) are generally responsible for metering their customers' consumption, and therefore in competitive markets often have a vital role in ensuring the availability of accurate consumption data and in ensuring a smooth customer transfer between suppliers (Energy Sector Inquiry, 2007, p. 234).

²⁵¹ Which is still a gap in the legislation of Turkey.

procurement goes to the very heart of both public service provision and the economic goals of market-making so central to the Single European Market." However, the attempts of both institutions were suppressed and eventually stopped. This may, as has been suggested, indicate the shape and scope of lobbying activities and bureaucratic obstacles exist in Turkey.

Vis-à-vis the GTM, as comprehensively reviewed in Chapters 4 and 6, both Turkey's energy relations with the EU grow in importance and cross-border cooperation with individual European countries provide a strong rationale for promoting harmonisation of the GTM regulation criteria and ultimately integration of the gas markets. For that, however, there has not been much preparation and commitment on the ground despite significant potential economic benefits of regional cooperation. Against this backdrop, the harmonisation of particular rules not least gas balancing and transmission tariff structures could make a significant contribution towards creating a level playing field for the Turkish stakeholders to generate, transport, sell, and consume gas (with minimum losses along the value chain possible) together with the rest of Europe. The main factor inhibiting the effective harmonisation of the GTM rules did not seem to be reluctance or resistance against it, but has been primarily due to the fact that there are wide inadequacies in technical resources to meet the GTM standards. To tackle this, improvement and fine-tuning of both the SCADA system and the EBB platform need to be swiftly finalised and the frequency of information the TSO provides to shippers should be upgraded to daily and intraday. To consider the broader strategic issues of integration since the magnitude of potential gains from it is substantial harmonisation of the GTM rules should be extended to other specific points including charges for imbalances; use of short-term standardised products; cash neutrality of the TSO with regards to balancing activities and the use of earned auction premia towards reduction of physical congestion or decrease of transmission tariffs for the next tariff period which, as of 2016, lack in the Turkish market. Finally this thesis suggests, unless addressed promptly these challenges (together with the lack of promotion coming from the BOTAS side) will most likely delay Turkey's aim to be a trading hub for at least 3 to 5 years.

7.4 Conclusion

This chapter has presented the main factors influencing both functioning of the Turkish natural gas market and the success of its liberalisation. Although examined from historical and legal perspectives in the preceding chapters, semi-structured interviews were conducted with the stakeholders for about one month to gauge participants' views on their experience with gas market liberalisation for this chapter and the major themes emerging from these data are distinguished. Also in regards to the third research question which asked, "What are the major obstacles encountered by Turkey so far during its reform process and how should Turkey's progress towards liberalisation and the GTM proceed?", the interviews informed a large part of the analysis in order to answer this question. The main conclusion reached in this chapter is that there exist clear distinctions between the main stakeholders (EMRA, BOTAS and private sector) who interpret the "liberalisation" phenomenon in Turkey. As described in this thesis, Turkey's gas market liberalisation has been far from successful and based on this analysis, the essence of the liberalisation challenge is that the enthusiasm to go ahead with the remaining gas reforms is no longer there. Instead of the regulator, strong encouragement for further reforms/liberal market comes from the country's private sector and this does not sit alongside the fact that NRAs must ensure/monitor nondiscrimination, effective competition and the efficient functioning of markets as the EU energy Directives have required. BOTAS remains silent or extremely economic with words to comment about the failures in the gas market, and unless some changes take place a five to ten year future perspective on the functioning of gas market (and in fact on security of supply) may provide a rather pessimistic picture. The next chapter revisits the questions of the thesis and concluding remarks. The thesis finishes by a set of policy recommendations and future directions.

Chapter 8: Conclusion and Future Research

8.1 Introduction

One of the main objectives of this study was to examine the liberalisation process in the Turkish natural gas market and to understand the limitations and key challenges the country has encountered in its transition from monopolistic to (semi) liberalised gas market. Evolution of the Turkish gas market has been examined in the last three chapters and this thesis argues that although the reform process, which officially started in 2001, has delivered considerable achievements and it could have gone further via carefully managed strategy, and has somewhat deviated from its main purpose. The political will in Turkey has predicted a deliberate and controlled liberalisation instead of a rapid one extending it over a period of time. Interviewing the stakeholders who have been and are still being impacted by Turkey's liberalisation experience and gathering their interpretation of why the country is still far from having a fully liberalised and competitive market despite a better success in the electricity market liberalisation has certainly contributed greatly to the understanding of how and why the (Turkish) government's actions to natural gas reforms has differed.

In this concluding chapter, firstly the concluding remarks are provided and the three research questions are also revisited. It is followed by a set of policy recommendations given in section two where an attempt is made to distill both the discussions of the preceding chapters and the opinions of the interviewees. Section three highlights the issues which were beyond the scope of this thesis, but requires further research.

8.2 Concluding Remarks

For a strategically important country like Turkey, energy plays a key role both economically and politically. With remarkable consumption rates, it is perhaps the only member of OECD that foresees over 80% increase in its TPES by 2023 and despite other fuels natural gas -a relatively new fuel in the energy portfolio- is expected to supply almost a quarter of the energy used in the country. Not only does gas continue to be the backbone of energy supply within Turkey, but it also offers Turkey the opportunity to be a potential major transit country for the energy markets of the West.

However, having unearthed the fundamental facts in Chapters 5, 6 and 7, the history of Turkey's gas market shows that some key challenges persist within Turkey's institutional landscape, regulatory reforms and gas pricing mechanisms that impact the country's natural gas market liberalisation negatively within the European Union context, and put the spotlight on immediate needs.

The significance of focusing on this particular topic is attributable to two main reasons. First, there is a notable gap in the existing literature with regards to the Turkish gas industry and the role(s) it plays in both domestic and international markets. Second, on account of Turkey's commitment to EU accession and for academic discussions, it is important to understand the country's overall level of preparation for the European Union energy framework, and key challenges the country has experienced in its transition from monopolistic to (semi) liberalised gas market. Aside from frequently published reports or discussions in energy markets literature, little is known of the link between the EU gas market liberalisation process -including the compulsory regulatory instruments- and the extent of Turkey's adaptability skills for these reforms. Given the poor representation of market-specific analyses of candidate countries to EU, this research aims to contribute to the scant literature by systematically investigating the energy market of Turkey with marked importance given to historical sequences and the unfolding processes over time. Careful examination of Turkey's specific conditions and its interpretation of natural gas liberalisation in the context of a successful reform performance is a step towards generating a better understanding of how and why government actions to natural gas reforms differ internationally.

The research questions (see Section 1.3) that this thesis sought to address are revisited below.

8.2.1 Have the Research Questions Been Answered?

One fact that has become increasingly clear in recent years is that Turkey's full membership to the EU strictly lies with the success of the transposition of EU laws into the national law and its readiness to start accession negotiations on the energy chapter is closely linked to its successful management of the gas sector at home. To do this, it needs to fully address the challenges in the implementation of gas market law, exploiting the potential of barriers to efficient market functioning and liquidity as a development enabler, and ultimately strengthen its cooperation with other European countries. Thus:

1) What are the characteristics of the legal framework that has been created to ensure natural gas market liberalisation in Turkey and how effective is it?

The characteristics of the legal framework for Turkey's natural gas market is comprehensively defined in Chapter 6. This is a topic upon which energy literature surprisingly rarely touches upon and the chapter has revealed much about the structural limitations of Turkish natural gas policy and the tools at its disposal. Accordingly, it was found that the NGML:

- Is the outset of transition for Turkey's gas sector governance and institutional framework with which the liberalisation reforms started to be predominantly driven by the EU energy Directives.
- Was a liberal law under conditions of the early 2000s.
- Targeted to revoke governance of the sector consecutively from BOTAS authorisation and it is succeeded to certain extent.
- Although initially precluding BOTAS from executing any more gas purchase contracts until its import share was gradually reduced to 20% of the national consumption by 2009, via various amendments BOTAS has been reinstated. Presently, new entrants are prohibited from importing gas from countries with which BOTAS has unexpired gas sales agreements.
- Made storage of 10% of imported gas in the national territory for 5 years compulsory for all importers although lack in storage/other infrastructure undermine confidence in Turkey's future commitment to effectively manage the risk of supply disruption.

The answer to whether the Law has been effective is certainly no. The researcher came to this conclusion by examining the Law's compliance with the EU Directives and found that:

- Market openness remains to be problematic given the market power of BOTAS has not been effectively restricted. Eligibility limits are yet to be removed and

switching rates maintain low;

- Turkey's energy market regulatory authority does not appear to be consistent with the European principles concerning general competition and antitrust policies;
- Lack of unbundling regime impedes competitive market development since the restructuring of BOTAS requested by the Law is yet to be implemented;
- Full adaption of E/E systems (including VP) and TPA to transmission networks are notable successes although uncertainty as to full/partial exemptions of the existing and major new storage infrastructure from TPA still persists.

These challenges partially generate the answer to the second thesis question which is:

2) How compliant is the legal framework in Turkey with the Gas Target Model of the European Union?

This analysis has shown that Turkey's current legal framework is not compliant with the GTM. There is a need for considerable effort to harmonise the NGML with the GTM regulation criteria especially to promote a liquid wholesale market and an efficient price formation across the gas value chain. In summary, there is a strong rationale for:

- A well-functioning wholesale market but the legal barriers pave the way for presence of overly powerful BOTAS, high market concentration and insufficient interconnection capacity;
- Improving the level of cross-border cooperation with other EU countries but harmonisation with particular Network Codes of EU namely capacity allocation management, congestion management procedures, gas balancing and transmission tariff structures lacks at present;
- Short- and long-term policy responses to solve Turkey's security of supply issues but the Law thwarts private companies from importing gas from the nearest sources;
- Deployment of alternative fuels infrastructure and the increased role of gas in complementing RES electricity generation but there is a lack of an attractive legal and fiscal regime and poor governance institutions.

3) What are the major obstacles encountered by Turkey so far during its reform

process and how should Turkey's progress towards liberalisation and competition proceed?

The immediate answers to this question came from the interviewees which included:

- Politicisation of the Turkish energy market and state interference in market activities;
- Lack of transparent and cost-based gas pricing mechanism;
- Lack of devoutness to curtail the exercise of monopoly power and to eliminate forms of price discrimination;
- Power of interest groups in the political decision-making process;
- Lack of investment and technical ability;

Vis-à-vis how should Turkey's progress towards liberalisation and competition proceed, a set of policy recommendations in the light of interviews the researcher executed with key stakeholders of the Turkish gas market have been listed.

8.3 Policy Recommendations

This research has two major findings. The first is that Turkey's interpretation of natural gas market liberalisation has been somewhat different than other European countries and there is still less clarity in the country regarding how to make certain reforms happen and the speed at which the transition needs to be finalised. Deeper understanding of the Turkish gas market and how to relate it to the EU energy market (and legislation) was thus particularly vital and that was one of the key reasons of developing this research. The second is that the timely creation of a liquid well-functioning wholesale gas market. Moving further with a consolidated reform strategy sooner rather than later appears to be compellingly needed should Turkey genuinely wants to take a leadership position in the regional race to be the gas 'hub'. It is still not too late for Turkey to become one if the challenges identified in this thesis are overcome together with some fresh thinking by the (AKP) government, EMRA and the competition authority. Thus, this researcher provides her recommendations as below:

After fifteen years of experience as a regulator in the market, EMRA must now move directly to a fully independent authority expediting the development of primary functions of effective regulation like NRAs of other countries that faced similar reform challenges.

Vis-à-vis its independence from the government in particular, EMRA's liabilities, powers and institutional features need to be properly established since EMRA reports directly to the Council of Ministers.

Although EMRA is well-staffed²⁵² a competence of its board members currently does not include any industry or consumer experts. Whilst this gap should be filled as soon as possible legal actions should also be taken to vest the responsibility of selection and recruitment procedure of these members²⁵³ on the Grand National Assembly of Turkey (TBMM) for ultimate transparency.

EMRA's new independent role, capacity and enforcement power as an energy market regulator and well-defined mandate need to be communicated to all stakeholders in the Turkish gas market.

Turkey must allow an adequate price formation for natural gas by going back to the application of cost-reflective pricing methodologies that was tried in 2008²⁵⁴.

Inclination to determine politically biased gas prices must be stopped urgently. Costbased prices should be adapted for the best prospects for enhancing demand-side management²⁵⁵ and creating additional financial resources for the incumbent to increase its (needed) grid investments which will act as a barrier to the construction of a competitive/liquid market²⁵⁶.

EMRA's strong role in the development of gas pricing policy/methodology should also

²⁵² Almost five hundred staff.

²⁵³ Currently executed by triple government orders (by the president, prime minister and minister of energy and natural resources).

²⁵⁴ Especially since there is no distinction between wholesale tariffs of BOTAS and private companies, and likewise the gap between city gate prices between domestically produced gas and imported gas sold by BOTAS or others is null.

²⁵⁵ By enabling customers to re-consider their gas consumptions.

²⁵⁶ Currently gas networks of most European countries have capacity that is three to five times more than their maximum (realisable) peak demands (e.g. the UK) whereas the Turkey's remain considerably limited, and thus best and most relevant experiences in this vein should be reviewed and adapted.

be expanded to enforcement of pricing regulation and implementation of the legally mandated methodology.

For accountability purposes, (when needed) EMRA's decisions should be made challengeable with appropriate safeguards laid out against its misuse attempts.

EMRA and the Competition Authority of Turkey must be fully equipped with special expertise on technical/managerial issues to deal with anti-competition disputes when an agreement cannot be reached between parties.

The work of the authorities must be complementary to one another and they need to provide the maximum degree of policy guidance possible towards reduction of BOTAS' market share with careful reviews of Turkey's specific circumstances²⁵⁷.

The investment environment should be strengthened, and more private sector involvement/foreign investment must be encouraged for storage facilities. Options as full and partial TPA exemption to major new gas infrastructures should also be considered once the investments reach optimum levels.

To mitigate/eliminate public funding from the sector, subsidies must be either phased out or made targeted which would thus shift the Turkish gas sector away from paying for all, towards a system that protects only the poor and vulnerable members of the society. For this, inserting definition of a "vulnerable customer" notion to the current natural gas legislation may be an initial step.

Prevalence of inefficiency, dissatisfaction of (certain) customers and the wide divergence in the prices paid by geographically segmented customer groups (not least after the fixed tariffs period) must be supervised by EMRA at all times²⁵⁸ and intervened when necessary.

²⁵⁷ If not 20% as the Law requested, around 50% mark should be reached²⁵⁷ and it is the view of this thesis that this level would not only boost confidence to existing sector players and new comers but will also unlock the potential which exists for a moderately competitive market.

²⁵⁸ Although, simultaneously, gasification of all of Turkey via franchise biddings ("Competition For Market") since 2003 can be considered one of the stable and successfully executed projects in its own right.

Alternative less costly metering investments need to be actively explored and offered to market players in order to remove barriers to switching.

It is important that the distinction between retail and distribution of gas is made and residential customers are allowed and encouraged to switch. Relevant experiences elsewhere may be useful to draw on.

There is a need to ensure that the lack of coordination between gas and electricity markets, and underdeveloped data flow between them is mitigated, and market participants are bolstered to better optimise their operational decisions.

Investments in technical infrastructure must be given the utmost importance and all complex challenges identified throughout this thesis must be worked through. Further investments in skills will need to be also indispensable.

Stamp duty must be fully removed from the natural gas sector of Turkey.

Instead of focusing solely on its transitional role between Europe and other gas rich regions, Turkey's main focus should be on becoming a natural gas trading hub itself and to be involved in bi-directional capacity trade with other European hubs.

8.4 Future Research

This thesis has aimed to provide an analysis of the Turkish gas market and the country's journey on the road to gas sector liberalisation. One, and perhaps the most difficult, way to do so was to offer a holistic analysis to reflect a panoply of Turkey's historical, economic and legal issues and to understand how all these have impacted the country's determination on the next steps to be taken in continuing to liberalise its natural gas market. Albeit, this research has undergone this difficult task to cover all notable issues influencing the development of the sector at a broad level, there still remain a number of issues identified throughout Chapters 5, 6 and 7 which now require further studies due especially to the size and complexity of the sector.

First of all, researchers would be willing to explore the legal constraints put on gas

import (and export) in Turkey which opens up many issues in the country leading to the question of how Turkey can/should deal with potential security of supply risks given the current political, regional and economic factors, and either develop the current market design or propose alternative ones. Another possible extension in future research may be working on the economics of potential supply options to and through Turkey whilst an alternative approach would be analysing whether or not alternative regulatory frameworks would be better suited for Turkey. These two aspects would allow researchers to shed light on the potential and the challenges for Turkey to become a gas trading hub.

Due to lack of data the impact of subsidies on the energy market -or indeed on the Turkish economy overall- has not been comprehensively investigated in this thesis. Thus, the history of energy subsidies and pricing mechanisms in Turkey, justifications for their reform, design and implementation of alternative reforms (and their employability), and lessons to be drawn from best practices elsewhere is also worth additional study²⁵⁹. Also, in this thesis many market entry barriers have been identified and each of which is a separate subject that deserves more research and far more detailed analysis, which is beyond the scope of this research.

²⁵⁹ In order to carry out such a research, however, data-related problems need to be overcome first.

Bibliography

Accenture, 2013. Türkiye doğalgaz ticareti üssünün/borsasının geliştirilmesi (Developing a natural gas hub/exchange in Turkey). Turkey: Accenture.

Agency for The Cooperation of Energy Regulators (ACER), 2014. A bridge to 2025 conclusions paper: Recommendation of the Agency on the regulatory response to the future challenges emerging from developments in the internal energy market. Slovenia, 19 September 2014.

ACER, 2015. European Gas Target Model review and update. Slovenia, January 2015.

ACER, 2015a. European Gas Target Model - review and update. Annex 6- tools for gas market integration and connection. January 2015.

ACER, 2015b. European Gas Target Model – review and update Annex 3- calculation specification for wholesale market metrics. January 2015.

ACER/CEER, 2012. ACER/CEER annual report on the results of monitoring the internal electricity and natural gas markets in 2011. Luxembourg: Publication Office of The European Union.

ACER/CEER, 2013. ACER/CEER annual report on the results of monitoring the internal electricity and natural gas markets in 2012. Luxembourg: Publication Office of The European Union.

ACER/CEER, 2014. ACER/CEER annual report on the results of monitoring the internal electricity and natural gas markets in 2013. Luxembourg: Publication Office of The European Union.

ACER/ENTSOG, 2014. ACER-ENTSOG report on the early implementation of the Balancing Network Code (BAL NC). Final Version.

Adeniji, G., 2013. Boom or Bust: The PIB and Gas Sector Liberalisation in Nigeria. The 2nd ESQ Oil & Gas Summit 2013, Lagos, 10 April 2013. AEGPL, 2013. Autogas in Europe: The sustainable alternative an LPG industry roadmap. 2013 ed. European LPG Association.

Akcollu, F. Y., 2006. Major challenges to the liberalisation of the Turkish natural gas market. Oxford Institute for Energy Studies NG 16. Oxford: OIES.

Akturk, A. A., 2014. Liberal dogalgaz piyasasi, arz guvenligi ve dogalgaz borsasi (Liberal gas market, security of supply and gas exchange). Turkey International Underground Gas Storage Conference (TUGS 2014). Ankara, 30 October 2014.

Albanese, R. and Van Fleet, D. D., 1985. Rational behaviour in groups: The free-riding tendency. Academy of Management Review, 10(2), pp. 244-55.

Alchian, A. A. and Allen, W. R., 1964. University economics: Elements of inquiry. California: Wadsworth Publishing Company.

Alessandri, E. and Altunişik, M. B., 2013. Unfinished transitions: challenges and opportunities of the EU's and Turkey's responses to the "Arab Spring". Working Paper. Istituto Affari Internazionali (IAI), Stiftung Mercator (SM) and The Istanbul Policy Centre (IPC). January 2013. Available at: <u>http://pubblicazioni.iai.it/pdf/GTE/GTE_WP_04.pdf</u> [Accessed 29 April 2015].

Allport, G., 1942. The use of personal documents in psychological science. New York: Social Science Research Council.

Altunsoy, I., 2011. Gazprom 'Mavi Akım'da Kontrat Devri Olmaz' dedi, ihale Kördüğüm (Gazprom said 'Contract transfer from the Blue Stream cannot happen', bidding is deadlock). Today's Zaman Newspaper, [online] 19 July. Available at:: <u>http://www.zaman.com.tr/ekonomi_gazprom-mavi-akimda-kontrat-devri-olmaz-dedi-ihale-kordugum 1159812.html</u> [Accessed 28 May 2015].

Altunsoy, I., 2013. Rusya doğalgaza yüzde 8 değil, yüzde 4 indirim yaptı (Russia reduced gas prices by 4% not 8%). Zaman Newspaper, [online], 30 March. Available at:

http://www.zaman.com.tr/ekonomi_haber-inceleme-rusya-dogalgaza-yuzde-8-degilyuzde-4-indirim-yapti_2071769.html [Accessed 21 October 2015].

Andrew-Speed, P. and Dow, S., 2000. Reform of China's electric power industry: Challenges facing the Government. Energy Policy, 28(5), pp. 335-47.

Apergis, N. and Payne, J. E., 2010. Renewable energy consumption and economic growth: Evidence from a panel of OECD countries. Energy Policy, 38(1), pp. 656-60.

Arrow, K. J., 1950. A difficulty in the concept of social welfare. The Journal of Political Economy, 58(4), pp. 328-46.

Arrow, K. J., 1951. Social choice and individual values. New York: John Wiley & Sons, Inc.

Arun, T. G. and Nixson, F. I., 1998. The reform of the power sector in India: 1991-1997. Journal of International Development, 10(4), pp. 417-26.

Asafu-Adjaye, J., 2000. The relationship between energy consumption, energy prices and economic growth: Time series evidence from Asian developing countries. Energy Economics, [e-journal] 22(2000). pp. 615-25. Available through: Anglia Ruskin University Library website <u>http://libweb.anglia.ac.uk</u> [Accessed 31 May 2016].

Atiyas, I., Çetin, T. and Gülen, G., 2012. Reforming Turkish energy markets: political economy, regulation and competition in the search for energy policy. [e-book] New York: Springer Science+Business Media. Available at Springer eBook and <u>https://wiki.zirve.edu.tr/sandbox/groups/economicsandadministrativesciences/wiki/80ca</u> 2/attachments/99eaa/Reforming%20Turkish%20Energy%20Markets.pdf?sessionID=2f 78617d94f0913a79812dcb5690927bedc199f4 [Accessed 21 November 2015].

Atkinson, P. and Delamont, S., 1985. Bread and dreams or bread and circuses? A critique of 'Case Study' research in education. In: M. Shipman, ed. 1985. Educational research: Principles, policies, and practices. Oxon: Routledge Falmer, pp. 26-45.

Auberbach, C. F. and Silverstein, L. B., 2003. Qualitative data: An introduction to coding and analysis. New York: New York University Press.

Aydemir, A., Corbacioglu, H., Guzel, A., Bozdogan, N. and Beser, P., 2010. Potential unconventional reservoirs in different basins of Turkey. AAPG Search and Discovery Article, AAPG European Region Annual Conference, 17-19 October 2010, Kiev, Ukraine.

Ayres, R. U. and Warr, B., 2009. The economic growth engine: How energy and work drive material prosperity. Cheltenham: Edward Elgar.

Bailey E. E. and Baumol W. J., 1984. Deregulation and the theory of contestable markets. Yale Journal on Regulation 1(111), pp. 111-137. Available at: http://digitalcollections.library.cmu.edu/awweb/awarchive?type=file&item=576088 [Accessed 21 Oct 2014].

Bailey E. E. and Panzar, J. C., 1981. The contestability of airline markets during the transition to deregulation. Duke University School of Law, 44(1), pp. 125-45.

Bartok, C., Moonen, S., Lahbabi, P. and Paolicchi, A., 2006. A combination of gas release programmes and ownership unbundling as remedy to a problematic energy merger: E.ON / MOL. Competition Policy Newsletter 2006/1. Available at: <u>http://ec.europa.eu/competition/publications/cpn/cpn_2006_1.html</u> [Accessed 3 May 2015].

Bartok, C., 2010. Third package and other changes in gas regulation. 5th Gas Forum of The Energy Community. Brdo, 14 September 2010.

Bast, E., Makhijani, S., Pickard, S. and Whitley, S., 2014. The fossil fuel bailout: G20 subsidies for oil, gas and coal exploration. Washington: Oil Change International.

Bastitat, F., 1850. Selected essays on political economy. Translated by S. Cain, 1995. New York: The Foundation for Economic Education, Inc.

Baumol, W.J., Panzar, J.C. and Willig, R.D., 1982. Contestable markets and the theory

of industry structure. New York: Harcourt Brace Jovanovitch.

BBC, 2015. Turkey's downing of Russian warplane – what we know. [online] Available at: <u>http://www.bbc.co.uk/news/world-middle-east-34912581</u> [Accessed 9 April 2016].

Becker, G. S., 1983. A theory of competition among pressure groups for political influence. The Quarterly Journal of Economics, 98(3), pp. 371-400.

Bel, N., 2011. The unbundling rules of the third energy package. Directorate-General for Energy. Brussels: European Commission.

Bergasse, E., 2013. The relationship between energy and economic and social development in the Southern Mediterranean. MEDPRO Technical Report No. 27. Available at: http://www.medpro-foresight.eu/ar/system/files/MEDPRO%20TR%20No%2027%20WP4b%20Bergasse.pd f [Accessed 3 January 2015].

Bernstein, S., 1988. Competition, marginal cost tariffs and spot pricing in the Chilean electric power sector. Energy Policy, 16(4), pp. 369-77.

Beyer, S. E., 2011. Energy infrastructure package and infrastructure financing. 20th Meeting of The European Gas Regulatory Forum, Madrid, 26-27 September 2011.

Bhattacharyya, S. C., 1995. Power sector privatisation in developing countries: Will it solve all problems? Energy Sources, 17(3), pp. 373-89.

Bilgin, M., 2009. Geopolitics of European natural gas demand: Supplies from Russia, Caspian and The Middle East. Elsevier Energy Policy, 37, pp. 4482–92. Available at: https://wiki.zirve.edu.tr/sandbox/groups/economicsandadministrativesciences/wiki/78a0 https://wiki.zirve.edu.tr/sandbox/groups/economicsandadministrativesciences/wiki/78a0 https://wiki.zirve.edu.tr/sandbox/groups/economicsandadministrativesciences/wiki/78a0 https://wiki.zirve.edu.tr/sandbox/groups/economicsandadministrativesciences/wiki/78a0 https://wiki.zirve.edu.tr/sandbox/groups/economicsandadministrativesciences/wiki/78a0 https://wiki.zirve.edu.tr/sandbox/groups/economicsandadministrativesciences/wiki/78a0 https://wiki.zirve.edu.tr/sandbox/groups/economicsandadministrativesciences/wiki/78a0 https://wiki.zirve.edu.tr/sandbox/groups/economicsandadministrativesciences/wiki/78a0 https://wiki.zirve.edu.tr/sandbox/groups/economicsandadministrativesciences/wiki/78a0 https://wiki.zirve.edu.tr/sandbox/groups/economicsandadministrativesciences/wiki/78a0 https://wiki.zirve.edu.tr/sandbox/groups/economicsandadministrativesciences/wiki/78a0 https://wiki.zirve.edu.tr/sandbox/groups/economicsandadministrativesciences/wiki/78a0 <a href="citatachments/87b

Birch, M. Miller, T., Mauthner, M. and Jessop, J., 2012. Ethics in qualitative research. 2nd ed. Croydon: Sage Publication.

Black, D., 1948. On the rationale of group decision-making. Journal of Political Economy, 56 (1), pp. 23-34.

Blaug, M., 1993. Pieter Hennipman on Paretian welfare economics: A comment. De Economist, 141(1), pp. 127-9.

Boddy, L. and Sabadus, A., 2013. ICIS gas market pricing. 7th Shippers Forum, Bursa, 26 April 2013.

Bodislav, D. A., 2015. The impact of privatisation on regulated energy markets: a Great Britain's case study in industrial ecology. Progress in Industrial Ecology–An International Journal, 9(1), pp.13-8.

Boltz, W., 2010. Vision for European Gas Target Model. 1st CEER Workshop, Vienna, 3 Dec 2010.

Boltz, W., 2011. CEER Vision for a European Gas Target Model state of discussion.4th CEER Workshop, Brussels, 28 June 2011.

Boltz, W., 2013. Problem identification - recent changes in the legal framework, market dynamics and system requirements. 1st ACER GTM Workshop, Vienna, 8 October 2013.

Boltz, W., 2014. Review of The GTM and the integration of gas markets. 26th Madrid Forum, 15-16 October 2014.

Boltz, W., 2015. Security of supply and upstream competition. ACER Workshop on The Launch of The Updated Gas Target Model, pp. 5-11. Brussels, 16 January 2015.

BOTAS, 2010. Annual Report 2010. Ankara.

BOTAS, 2011. Annual Report 2011. Ankara.

BOTAS, 2013. Annual Report 2013. Ankara.

BOTAS, 2014. Annual Report 2014. Ankara.

BOTAS, 2015. Annual Report 2015. Ankara.

Brauetigam, R., 1989. Optimal policies for natural monopolies. In: R. Schmalensee, R.D. Willig, eds. 1989. Handbook of industrial organisation Volume II. pp. 1290-346.

Brenner, M., Brown, J. and Canter, D., 1985. The research interview. London: Academic Press Inc.

British Petroleum, 2011. BP energy outlook 2030. London. Available at: <u>http://www.bp.com/content/dam/bp/pdf/energy-economics/energy-outlook-2016/bp-energy-outlook-2011.pdf</u> [Accessed 20 May 2015].

British Petroleum, 2013. BP statistical review of world energy 2013. London.

British Petroleum, 2015. BP energy outlook 2035. London. Available at: <u>http://www.bp.com/content/dam/bp/pdf/energy-economics/energy-outlook-2015/bp-energy-outlook-2035-booklet.pdf</u> [Accessed 30 May 2015].

British Petroleum, 2015. BP statistical review of world energy. London.

Bromley, D. B., 1986. The case study method in psychology and related disciplines. Chichester: John Wiley.

Buchanan, J.M., Tullock, G., 1962. The calculus of consent: Logical foundations of constitutional democracy. Ann Arbor: University of Michigan Press, Ann Arbor.

Bulut, M. F., 2014. Toptan satis sirketleri acisindan dogal gaz depolama (Gas storage from the standpoint of wholesalers). Turkey International Underground Gas Storage Conference (TUGS 2014), Ankara, 30 October 2014.

Burns, N. R, 2012. The rise of Turkey as a superpower. The Boston Globe, 27 April 2012.

Cameron, P. D., 2007. Competition in energy markets: Law and regulation in the European Union. 2nd ed. Oxford: Oxford University Press.

Campodónico, H., 1999. The natural gas industry and its regulation in latin America. CEPAL Review 68, pp. 137-54. Available at: <u>http://repositorio.cepal.org/bitstream/handle/11362/10691/68137154I_en.pdf;jsessionid</u> <u>=9F51FD4835AE469D501D12C5163CDAC5?sequence=1</u> [Accessed 3 November 2013].

Cariello, F., 2015. Self-evaluation process and market integration tools GTM recommendations. ACER Workshop on The Launch of The Updated Gas Target Model, pp. 25-33. Brussels.

Caruso, G. F. and Chen, X., 1997. Experiences of electricity: Sector restructuring in Asia. The Journal of Energy and Development, 22(1), pp. 1-16.

Cavaliere, A., 2007. The liberalisation of natural gas markets: regulatory reform and competition failures in Italy. Oxford Institute for Energy Studies NG 82, OIES; Oxford.

CBRT, 2001. Strengthening the Turkish economy: Turkey's transition program. Ankara: Central Bank of The Republic of Turkey.

CBRT, 2001. Balance of payments report 2014-II. Ankara: Central Bank of The Republic of Turkey.

CEER, 2011a. Draft vision for a European Gas Target Model: A CEER Public Consultation Paper. Ref: C11-GWG-77-03. Brussels: Council of European Energy Regulators ASBL.

CEER, 2011b. CEER vision for a European Gas Target Model: Summary of responses. Ref: C11-GWG-81-03. Brussels: Council of European Energy Regulators ASBL.

CEER, 2011c. CEER Vision for a European Gas Target Model: Conclusions paper. Ref: C11-GWG-82-03. Brussels: Council of European Energy Regulators ASBL.

CEER, 2012. Market-based investment procedures for gas infrastructure: Issues and

approaches: A CEER Public Consultation Paper. Ref: C12-GWG-87-03. Brussels: Council of European Energy Regulators ASBL.

CEER, 2013. Status review on the transposition of unbundling requirements for DSOs and closed distribution system operators. Ref: C12-UR-47-03. Brussels: Council of European Energy Regulators ASBL.

Chadwick, E., 1859. Results of different principles of legislation and administration in Europe; of competition for the field, as compared with competition within the field of service. Journal of The Statistical Society of London, 22 (3), pp. 381-420.

Chang, H. J., 1997. Critical survey: The economics and politics of regulation. Cambridge Journal of Economics, 21(6), pp. 703-28.

Cheng, B. S., 1996. An investigation of cointegration and causality between energy consumption and economic growth. The Journal of Energy and Development, 21(1), pp. 73-84.

Cheng, B. S., 1997. Energy consumption and economic growth in Brazil, Mexico and Venezuela: A time series analysis. Applied Economics Letters, 4, pp. 671-74.

Clingendael International Energy Programme, 2011. CIEP vision on the Gas Target Model. Netherlands Institute of International Relations: Clingendael.

Coady, D., El-Said, M., Gillingham, R., Kpodar, K., Medas, P. and Newhouse, D., 2006. The magnitude and distribution of fuel subsidies: Evidence from Bolivia, Ghana, Jordan, Mali, and Sri Lanka. International Monetary Fund Working Paper WP/06/247. Washington, DC.

Coase, R. H., 1937. The nature of the firm. Economica. New Series, 4(16), pp. 386-405.

Coase, R. H., 1960. The problem of social cost. Journal of Law and Economics 3(Oct. 1960), pp. 1-44.

Coffey, A. and Atkinson, P., 1996. Making sense of qualitative data: Complementary research strategies. California: Sage Publications.

Cohen, L., Manion, L., and Morrison, K., 2000. Research methods in education. London: Routledge Falmer.

Comision Nacional de Energia (CNE), 2012. Report on the development of competition in gas and electricity markets, part 1: Executive summary and regulatory proposals, period 2008-2010 and preview 2011. Spain.

Commission of the European Communities, 1999. 1999 Regular report from the commission on Turkey's progress towards accession. Brussels. Available at: http://ec.europa.eu/enlargement/archives/pdf/key_documents/1999/turkey_en.pdf [Accessed 18 July 2015].

Commission of European Communities, 2001. Regular report on Turkey's progress towards accession. SEC (2001) 1756, Brussels.

Contanza, R., 1980. Embodied energy and economic valuation. [online] Science, New Series, 210(4475), pp. 1219-24. Available at: https://www.pdx.edu/sites/www.pdx.edu.sustainability/files/Costanza%201980%20Scie nce.pdf [Accessed 18 January 2016].

Conte, F. and Irlam, L., 2005. Horses for courses? Cross-country comparison of European gas market liberalisation. Master MEDEA 2004-2005 Scuola Superiore Enrico Mattei, June 2005. Available at: <u>www.eni.com/it_IT/attachments/lavora-con-noi/pdf/Conte-Irlam-EU-Gas-liberalisation.pdf</u> [Accessed 24 April 2015].

Corbeau, A-S, Volk, V., Sinton, J., Jiang, J., Ping, J., Teng, T., Boshu L. and Fen, Y., 2012. Gas pricing and regulation China's challenges and IEA experience. France: OECD/IEA.

Cornell, S. E., Tsereteli, M. and Socor, V., 2005. Geostrategic implications of the Baku-Tbilisi-Ceyhan pipeline. In: S.F. Starr and S.E. Cornell, eds. 2005. The Baku-Tbilisi-Ceyhan pipeline: Oil window to the West. Central Asia-Caucasus Institute & Silk Road Studies Program. pp. 61-85.

Corsini, C., Heiligtag, S., Moretti, M. and Raunig, J., 2014. Europe's wholesale gas market. [pdf] McKinsey Working Papers on Risk, Number 54. Available at: http://www.google.co.uk/url?q=http://www.mckinsey.com/~/media/mckinsey/business http://www.google.co.uk/url?q=http://www.mckinsey.com/~/media/mckinsey/business http://www.google.co.uk/url?q=http://www.mckinsey.com/~/media/mckinsey/business http://www.mckinsey.com/~/media/mckinsey/business
Council Directive 91/296/EEC of 31 May 1991 on the transit of natural gas through grids. OJ L 147/37 (''Transit Directive'')

Council Directive 1998/30 of 22 June 1998 concerning rules for the internal market in natural gas. OJ L 204/1 (''First Gas Directive'')

Council Regulation 1/2003 of 16 December 2002 on the implementation of the rules on competition laid down in articles 81 and 82 of the treaty.

Council Directive 2003/55/EC of 26 June 2003 concerning common rules for the internal market in natural gas and repealing Directive 98/30. OJ L 176/57 (''Second Gas Directive'')

Council Directive 2004/67/EC of 26 April 2014 concerning measures to safeguard security of natural gas supply. OJ L127, 29/04/2004 P. 0092 – 0096.

Council Regulation 1775/2005 of 28 September 2005 on conditions for access to the natural gas transmission networks.

Council Directive 2009/72/EC of 13 July 2009 concerning common rules for the internal market in electricity and repealing Directive 2003/54/EC. OJ L211/55.

Council Directive 2009/73/EC of 13 July 2009 concerning common rules for the internal market in natural gas and repealing Directive 2003/55/EC. OJ L211/94.

Creswell, J. W., 1998. Qualitative inquiry and research design: Choosing among five traditions. London: Sage Publications.

Crew, M. A., Kleindorfer, P. R. and Sumpter, J., 2005. Bringing competition to telecommunications by divesting the RBOCs. In: M.A. Crew and M. Spiegel, eds. 2005. Obtaining the best from regulation and competition. Kluwer Academic Publishers. pp. 21-40.

Cudahy, R. D., 1993. The coming demise of deregulation. Yale Journal on Regulation, 10(1), pp. 1-16.

Cudahy, R. D., 2002. Electricity deregulation after California. Administrative Law Review, 54(1), pp. 333-63.

Cudahy, R. D., 2009. The coming demise of deregulation ll. Administrative Law Review, 61(3), pp. 543-56.

Darbouche, H., 2013. Natural gas and Arab energy transition. In: l. Abdel Gelil, I, M. El-Ashry and N. Saab, eds. 2013. Arab environment sustainable energy prospects, challenges, opportunities. Arab Forum for Development (AFED). Ch.2.

De Hauteclocque, A. and Glachant, J. M., 2009. Long-term energy supply contracts in European competition policy: Fuzzy not crazy. Energy Policy, 37(12), pp. 5399-407.

Deloitte, 2012. Turkey's natural gas market expectations and developments 2012. April 2002.

Deloitte, 2013. The energy sector: A quick tour for the investor. Republic of Turkey Prime Ministry Investment Support and Promotion Agency. November 2013.

Demircan, Z., 2008. Natural gas market tariffs regulation. United States Agency International Development. 21-25/07/2008.

Demsetz, H., 1968. Why regulate utilities? Journal of Law and Economics, 11(1), pp. 55-65.

Den Hertog, J., 1999. General theories of regulation. Economic Institute, CLAV, Utrecht University, 1999.

Den Hertog, J., 2010. Review of economic theories of regulation. Tjalling C. Koopmans Research Institute, Discussion Paper Series No. 10-18. The Netherlands: Utrecht University.

Denzin, N.K., 1970. The research act in sociology: A theoretical introduction to sociological methods. London: Butterworth.

Denzin, N., 1983. Interpretive interactionism. In: G. Morgan (Ed.), Beyond method: Strategies for social research. California: Sage Publications.

Denzin, N.K.1989. The research act. 3rd ed. Englewood Cliffs: Prentice Hall.

Dickel, R., Hassanzadeh, E., Henderson, J., Honoré, A., El-Katiri, L., Pirani, S., Rogers, H., Stern, J. and Yafimava, K., 2013. Reducing European dependence on Russian gas: Distinguishing natural gas security from geopolitics. OIES Paper NG 92. Oxford: OIES.

DiLorenzo, T. J., 1996. The myth of natural monopoly. The Review of Austrian Economics, 9(2), pp. 43-58.

Dnes, A. W., 1995. Franchising and privatisation: Public policy for the private sector. Note no. 40. Washington: The World Bank, pp. 5-8.

DNV-KEMA, 2013. Study on entry-exit regimes in gas part A: Implementation of entry-exit systems. The Netherlands, July 19 - 2013 (updated 11 December 2013).

Downs, A., 1957. An economic theory of democracy. New York: Harper and Row.

Dressman, M., 2008. Using social theory in educational research: A practical guide. London: Routledge.

Drew, J. and Nash, C. A., 2011. Vertical separation of railway infrastructure: Does it

always make sense? Institute for Transport Studies Working Paper 594. Leeds: University of Leeds.

Duffy, J. F., 2005. Intellectual property as natural monopoly: Toward a general theory of partial property rights. Centre for Law, Business & Economics, University of Texas.

Duncan, C. A., 2015. Lessons from the United States and Texas: Market liberalisation of the natural gas and electricity markets in Europe. [pdf] Texas Journal of Oil, Gas, and Energy Law. 10(2), pp. 328-84. Available at: http://tjogel.org/journalarchive/Issue10/MarketLiberalization_Duncan.pdf [Accessed 1 June 2016].

Dunkerley, J., 1995. Financing the energy sector in developing countries. Energy Policy, 23(11), pp. 929-39.

Düzgit, S. A. and Tocci, N., 2009. Transforming Turkish foreign policy: The quest for regional leadership and Europeanisation. Centre for European Policy Studies Commentary. 12 November 2009.

EC, 2000. Opening up to choice: launching the single European Gas Market. Luxembourg: Office for Official Publications of The European Communities.

EC, 2002. First benchmarking report on the implementation of the electricity and gas Market, Commission Staff WP.

EC, 2004a. Note of DG Energy & Transport on Directives 2003/54/EC and 2003/55/EC on the internal market in electricity and natural gas: The role of the regulatory authorities.

EC, 2004b. Note of DG Energy & Transport on Directives 2003/54/EC and 2003/55/EC on the internal market in electricity and natural gas: The unbundling regime.

EC, 2005. Energy Sector Inquiry - Issues Paper. Version 15.11.2005

EC, 2007. DG Competition Report on energy sector inquiry. European Commission, 10
January 2007.

EC, 2010. Interpretative note on Directive 2009/72/EC concerning common rules for the internal market in electricity and Directive 2009/73/EC Concerning Common Rules for The Internal Market in Natural Gas: The Unbundling Regime. European Commission, Brussels.

EC, 2013. Establishing a network code on gas balancing of transmission networks. commission staff working document: Impact assessment. O029318/01. European Commission, Brussels.

EC, 2014. Country Reports, Accompanying the document communication from the commission to the european parliament, the council, the european economic and social committee and the committee of the regions: progress towards completing the internal energy market. SWD(2014) 311 final. Brussels.

EIA, 1996. Privatization and the globalisation of energy markets. Washington: U.S. Department of Energy.

EIA, 2011. World shale gas resources: An initial assessment of 14 regions outside the United States. Washington: U.S. Department of Energy.

EIA, 2013. Technically recoverable shale oil and shale gas resources: An assessment of 137 shale formations in 41 countries outside the United States. Washington: U.S. Department of Energy.

EIA, 2014. International energy outlook 2014. [pdf] Washington: U.S. Department of Energy. Available at: <u>http://www.eia.gov/forecasts/ieo/pdf/0484(2014).pdf</u> [Accessed 9 March 2015].

Eisenhardt, K. M., 1989. Building theories from case study research. The Academy of Management Review, 14(4), pp. 532-50.

El-Banbi, H., 1998. Growing energy needs of emerging economies: Challenges and ambitions. The Journal of Energy and Development, 23(2), pp. 269-80.

303

Elliot, D., 2006. Regulating prices and service quality. In: M. Crew and D. Parker, eds. 2006. Handbook of economic regulation. Cornwall: Edward Elgar Publishing. pp. 82-106.

EMRA, 2010. Annual sector report natural gas market: 2009. Ankara: Energy Market Regulatory Authority Natural Gas Market Department.

EMRA, 2011. Annual sector report natural gas market: 2010. Ankara: Energy Market Regulatory Authority Natural Gas Market Department.

EMRA, 2012. Annual sector report natural gas market: 2011. Ankara: Energy Market Regulatory Authority Natural Gas Market Department.

EMRA, 2013. Annual sector report natural gas market: 2012. Ankara: Energy Market Regulatory Authority Natural Gas Market Department.

EMRA, 2014. Annual sector report natural gas market: 2013. Ankara: Energy Market Regulatory Authority Natural Gas Market Department.

EMRA, 2015. Annual sector report natural gas market: 2014. Ankara: Energy Market Regulatory Authority Natural Gas Market Department.

EMRA, 2016. Annual sector report natural gas market: 2015. Ankara: Energy Market Regulatory Authority Natural Gas Market Department.

Energy Charter Secretariat, 2010. The role of underground gas storage for security of supply and gas markets. Brussels.

Enerji Enstitusu, 2014. Doğalgaz tüketim kapasitesi ve doğalgaz yakıtlı elektrik santralleri (Gas Consumtion capacity and gas fired power plants). Enerji Enstitusu Makale, 16 December 2014. Available at: <u>http://enerjienstitusu.com/2014/12/16/makale-dogalgaz-tuketim-kapasitesi-ve-dogalgaz-yakitli-elektrik-santralleri/</u> [Accessed 10 June 2015].

Erdogdu, E., 2009. A review of Turkish natural gas distribution market. Renewable and Sustainable Energy Reviews, 14(2), pp. 806-13.

Erdogdu, E., 2013. Essays on electricity market reforms: A cross-country applied approach. PhD. University of Cambridge.

ERGEG, 2005. European Regulators Group for Electricity and Gas final 2005 report on monitoring the implementation of the guidelines for Good TPA Practice for Storage System Operators (GGPSSO). Ref: E05-STO-06-03, 7 December 2005.

ERGEG, 2007. European Regulators Group for Electricity and Gas Guidelines for Good Practice on Open Seasons Procedures (GGPOS), Ref: C06-GWG-29-05c, 21 May 2007. Available at: <u>http://www.energy-</u> regulators.eu/portal/page/portal/EER_HOME/EER_PUBLICATIONS/CEER_PAPERS/ Gas/2007/C06-GWG-29-05c_GGPOS.pdf [Accessed 15 June 2015].

ERGEG, 2010. Gas balancing rules on European gas transmission networks draft pilot Framework Guideline. Ref: E10-GNM-13-03. 18 August 2010.

ERGEG/FG, 2010. Revised pilot framework guideline on capacity allocation mechanisms. E10-GWG-71-03, 7 December 2010.

ERRANET, 2013. Tariff Regulation in Natural Gas Market of Turkey.

Ertorun, S., 2013. Liberalisation process of Turkish natural gas market. EMART Turkey 2013. Istanbul, 21 May 2013.

Ertürk, M., 2014. Case study: Price regulations in Turkish natural gas market. VI. WFER Conference, Istanbul, 25-28 May 2015.

Estache, A., 2002. Argentina's 1990s utilities privatization: a cure or a disease? Draft. World Bank.

European Bank for Reconstruction and Development, n.d. EBRD Turkey country profile. Available at: www.ebrd.com/downloads/legal/irc/countries/turkey.pdf

[Accessed 7 May 2015].

Europex, 2011. Europex views on the Gas Target Model. 4th Gas Target Model Workshop. Brussels, 28 June 2011.

EU Regulation 713/2009 REGULATION (EC) No 713/2009 OF THE COUNCIL of 13 July 2009 on establishing an agency for the cooperation of energy regulators. OJ L211/1 (''Gas Regulation 713'').

EU Regulation 714/2009 REGULATION (EC) No 714/2009 OF THE COUNCIL of 13 July 2009 on conditions for access to the network for cross-border exchanges in electricity and repealing Regulation (EC) No 1228/2003. OJ L211/15 (''Gas Regulation 714'').

EU Regulation 715/2009 REGULATION (EC) No 715/2009 OF THE COUNCIL of 13 July 2009 on conditions for access to the natural gas transmission networks and repealing Regulation (EC) No 1775/2005. OJ L211/36 (''Gas Regulation 715'').

EU Regulation 994/2010 REGULATION (EC) No 994/2010 OF THE COUNCIL of 20 October 2010 concerning measures to safeguard security of gas supply and repealing Directive (EC) 2004/67 [2010]. OJ L 295/1 ("Security of Supply Regulation 994").

EU Regulation 312/2014 REGULATION No 312/2014 OF THE COUNCIL of 26 March 2014 on establishing a Network Code on Gas Balancing of Transmission Networks. OJ 91/15.

EU, 2013. Proposal for a Directive of the European Parliament and of the Council on the deployment of alternative fuels infrastructure. COM(2013) 18 final -2013/0012 (COD). Brussels.

Eysenbach, G. and Till, J. E., 2001. Ethical issues in qualitative research on internet communities. BMJ, 323(1), pp.1103–5.

Farchy, J., 2016. Global gas market braced for price war. Financial Times Newspaper, [online] 3 February. Available at: <u>http://www.ft.com/cms/s/2/c9c44750-ca50-11e5-</u>

a8ef-ea66e967dd44.html#axzz4AWeIK100 [Accessed 2 June 2016].

Flick, U., 2009. An introduction to qualitative research. 4th ed. London: Sage Publications.

Flyvbjerg, B., 2011. Case Study. In: N.K. Denzin and Y.S. Lincoln, eds. 2011. The SAGE handbook of qualitative research. . 4th ed. California: Sage Publications. pp. 301-16.

Foreman-Peck, J. and Millward, R., 1994. Public and private ownership of British industry, 1820-1990. OUP Catalogue, Oxford University Press.

Foss, M. M., 2011. The outlook for U.S. gas prices in 2020: Henry Hub at \$3 Or \$10? Oxford Institute for Energy Studies NG 58. Oxford: OIES.

Foster, C.D., 1992. Privatisation, regulation and the control of natural monopoly. Oxford: Blackwell.

Framework Guidelines on Gas Balancing in Transmission Systems. Agency for The Cooperation of Energy Regulators, FGB-2011-G-002. 18 October 2011 (''Framework Guidelines Balancing'').

Framework Guidelines on Capacity Allocation Mechanisms for The European Gas Transmission Network. FG-2011-G-001. 3 August 2011 (''Framework Guidelines CAM'').

Framework Guidelines on Rules Regarding Harmonised Transmission Tariff Structures for Gas. FG-2013-G-01, 29 November 2013.

Freeman, M., deMarrais, K., Preissle, J., Roulston, K. and St. Pierre, E. A., 2007. Standards of evidence in qualitative research: An incitement to discourse. Educational Researcher, 36(1), pp.25–32.

Frontier Economics, 2014. Wholesale market functioning: GTM1 Criteria. 2nd ACER

Workshop on Gas Target Model Review and Update. Ljubljana, 19 March 2014.

Gabriele, A., 2004. Policy Alternatives in reforming power utilities in developing countries: A critical survey. United Nations Conference on Trade and Development, Discussion Papers No. 168. Geneva: UNCTAD/OSG/DP/2004/2.

Gas Storage Europe (GSE), 2014. Gas infrastructure Europe (GIE) publications, European Commission.

Geertz, C., 1973. Thick Description: Toward an interpretive theory of culture. In: C. Geertz, ed. The interpretation of cultures. New York: Basic Books, pp. 3-30.

Giamouridis, A. and Paleoyannis, S., 2011. Security of gas supply in south eastern Europe: Potential contribution of planned pipelines, LNG, and storage. Oxford Institute for Energy Studies NG 52. OIES; Oxford.

Gil-Molto, M. J., Poyago-Theotoky, J. and Zikos, V., 2010. R&D subsidies, spillovers and privatisation in mixed markets. Available at: <u>http://www.le.ac.uk/economics/research/RePEc/lec/leecon/dp10-</u> <u>19.pdf?uol_r=d307e306</u> [Accessed 1 June 2016].

Girbig, P., 2015. Case studies in compressor reliability and efficiency LNG plant in China and pipeline compressor station in Turkey rely on Siemens. Siemens AG 2015. Available at: <u>http://www.energy.siemens.com/ru/pool/hq/energy-topics/tradeshows/otc/pdf/Siemens_Reliable-compressors_by-Paul-Girbig.pdf</u> [Accessed 18 July 2015].

Girod, J. and Percebois, J., 1998. Reforms in sub-Saharan Africa's power industries. Energy Policy, 26(1), pp. 21-32.

Giuli, M., 2015. Gazprom's evolving strategy in a new commercial and political context: How should the EU react? Policy Brief. European Policy Centre, 27 April 2015.

Glachant, J. M. and Perez, Y., 2008. Regulation and deregulation in network industry.

In: E. Brousseau and J.M. Glachant. eds. 2008. New Institutional Economics: A Guide Book. Cambridge: Cambridge University Press. Part V, Ch.16.

Glachant, J. M., 2009. Regulating networks in the new economy. European University Institute Working Papers. Italy: RSCAS Publications.

Glachant, J. M., 2011. A vision for the EU target model: The Meco-S model. Italy: RSCAS Publications.

Glachant, J. M. and Ascari, S., 2011. A target model for the European natural gas market: Preliminary outline. 2nd CEER Workshop on Target Model for The European Gas Market. Bonn, 22 February 2011.

Glaiser, E. L. and Shleifer, A., 2003. The rise of the regulatory state. Journal of Economic Literature XLI (June 2003), pp. 401-25.

Glaser, B. G. and Strauss, A. L., 1967. The discovery of grounded theory: Strategies for qualitative research. New York: Aldine.

Glasure, Y. U. and Lee, A. R., 1997. Cointegration, error-correction, and the relationship between GDP and energy: The case of South Korea and Singapore. Resource Energy Economics, 20(1), pp. 17-25.

Goldberg, V. P., 1976. Regulation and administered contracts. Bell Journal of Economics, 7(2), pp. 426-48.

Goldthorpe, J. H., 1997. Current issues in comparative macrosociology: A debate on methodological issues. Comparative Social Research, 16, pp. 1-26.

Gourvish, T. R., 1995. Public and private ownership of British industry, 1820-1990 by J. Foreman-Peck and R. Millward reviewed in Business History Review 69(3), pp. 460-461.

Gray, D. E., 2014. Doing research in the real world. 4th ed. London: Sage Publications.

Grätz, J., 2009. Energy relations with Russia and gas market liberalisation. IPG 3/2009, pp. 66-80.

Greenstein, S., McMaster, S. and Spiller, P. T., 1995. The effect of incentive regulation on infrastructure modernization: Local exchange companies' deployment of digital technology. MIT Journal of Economics & Management Strategy, 4(2), pp. 187-236.

Groebel, A., 2013. Unbundling models in the EU and certification of TSOs in Germany. 10th EU-US Energy Regulators Roundtable – Session V. The Hague, 8-9 April 2013.

Guislain, P., 1997. The privatisation challenge: A strategic, legal, and institutional analysis of international experience. Washington: The World Bank.

Gunton, G., 1888. The economics and social aspects of trusts. Political Science Quarterly, 3(3), pp. 385-408.

Gürer, M., 2009. Her yil ayni kriz (The same crisis every year). Turkiye Mimarlar ve Muhendisler Odasi Baskanligi Elektrik Muhendisleri Odasi, Enerji Dergisi, p. 10.

Hamilton, J. D., 1983. Oil and the macroeconomy since World War II. The Journal of Political Economy, 91(2), pp. 228-48.

Harmsen, R. and Jepma, C., 2011. The gas hubs in north western Europe: Already integrated? [online] European Energy Review, 27 January 2011. Available at: <u>http://europeanenergyreview.com/site/pagina.php?id=2695</u> [Accessed 14 March 2015].

Harstad, R. M. and Crew, M. A., 1999. Franchise bidding without holdups: Utility regulation with efficient pricing and choice of provider. [pdf] Journal of Regulatory Economics, 15, pp. 141-63. Available at: <u>http://harstad.missouri.edu/papers/FranchiseBidJRE.pdf</u> [Accessed 21 May 2014].

Heather, P., 2012. Continental European gas hubs: Are they fit for purpose? Oxford Institute for Energy Studies NG 63. Oxford: OIES.

Heddenhausen, M., 2007. Privatisations in Europe's liberalised electricity markets - the

cases of the United Kingdom, Sweden, Germany, and France. [pdf] Research Unit EU Integration, German Institute for International and Security Affairs, Berlin. Available at: <u>https://www.swp-</u>

berlin.org/fileadmin/contents/products/projekt_papiere/Electricity_paper_KS_IIformatie rt.pdf [Accessed 1 March 2016].

Heidelberger, J., 2012. ENTSOG response to ACER tariff scoping consultation. TAR058-12_Final. Brussels, 6 March 2012. Available at: <u>http://www.entsog.eu/public/uploads/files/publications/Tariffs/2012/TAR058-</u> <u>12_120306_ENTSOG_Response_ACER_tariff_consultation.pdf</u> [14 March 2015].

Helm, D., 2003. Auctions and energy networks. Utilities Policy, 11(1), pp. 21–5.

Henderson, D.R., 1995. Antitrust busters. Reason (August/September), pp. 62-4.

Henderson, J., 2012. The potential impact on Europe of Russia's evolving domestic gas market. [online] Oxford: OIES. Available at: <u>http://www.biee.org/wpcms/wp-content/uploads/The-Potential-Impact-on-Europe-of-Russia's-Evolving-Domestic-Gas-Market.pdf</u> [Accessed 1 January 2014].

Hennipman, P., 1992. The reasoning of a great methodologist: Mark Blaug on the nature of Paretian welfare economics. De Economist, 140 (4), pp. 413-45.

Hesseling, D., 2015. New developments in the gas supply chain. ACER Workshop on The Launch of The Updated Gas Target Model, Brussels, 16 January 2015. pp. 44-65.

Hillman, A. L., 2004. Trade liberalisation and globalisation. In: C.K. Rowley and F. Schneider, eds. 2004. The Encyclopedia of public choice volume I. Dordrecht: Kluwer Academic Publishers. pp. 312-20.

Hoa, T. V., 1993. Effects of oil on output growth and inflation in developing countries: The case of Thailand from January 1966 to January 1991. International Journal of Energy Research, 17(1), pp. 29-33.

Honore, A., 2011. Economic recession and natural gas demand in Europe: What

happened in 2008-2010? [pdf] Oxford Institute for Energy Studies NG 47. Oxford: OIES. Available at: <u>https://www.oxfordenergy.org/publications/economic-recession-and-natural-gas-demand-in-europe-what-happened-in-2008-2010/</u> [Accessed 22 December 2014].

Hoyos, C., 2010. Algeria calls for united gas supply action. [Online] Financial Times,
16 March. Available at: <u>http://www.ft.com/cms/s/0/c74cc0b8-311a-11df-8e6f-00144feabdc0.html?siteedition=uk#axzz3Mp7rwypn</u> [Accessed 22 December 2014].

Hyett, N., Kenny, A. and Dickson-Swift, V., 2014. Methodology or method? A critical review of qualitative case study reports. International Journal of Qualitative Studies on Health Well-being, 9 (2014). Available at: <u>http://www.ijqhw.net/index.php/qhw/article/view/23606/33591</u> [Accessed 17 February 2015].

IAEA, 2015. Country Nuclear Power Profiles: Turkey. [online] Available at: <u>https://cnpp.iaea.org/countryprofiles/Turkey/Turkey.htm [Accessed 13 May 2015]</u>.

ICIS-Heren, 2010. European Gas Hub Report. Full Report, Winter 2010.

Ida, T., 2004. Bottleneck monopolies and network externalities in network industries: Introduction to network economics. [online] Kyoto University. Available at: <u>http://www.econ.kyoto-</u>

<u>u.ac.jp/~ida/3Kenkyuu/3Workingpaper/WPfile/2003/040229COE1.pdf</u> [Accessed 22 November 2014].

IEA, 2006. China's power sector reforms: Where to next? France: OECD/IEA.

IEA, 2009. Energy policies of IEA countries: Turkey 2009 review. France: OECD/IEA.

IEA, 2010. World energy outlook 2010. France: OECD/IEA.

IEA, 2011. Energy policies of IEA countries: Greece 2011 review. France: OECD/IEA.

IEA, 2014. Energy supply security: Emergency response of IEA countries 2014. France:

OECD/IEA.

IEA, 2014. Energy policies of IEA countries: The United States 2014 review executive summary. France: OECD/IEA.

IEA/OPEC/OECD/World Bank, 2010. Analysis of the scope of energy subsidies and suggestions for the G-20 initiative: IEA, OPEC, OECD, World Bank joint report prepared for submission to the G-20 Summit Meeting Toronto (Canada), 26-27 June 2010. Available at: <u>https://www.oecd.org/env/45575666.pdf</u> [Accessed 20 December 2015].

IGDAS, 2014. Security of natural gas supply to Istanbul and importance of gas storage. Turkey International Underground Gas Storage Conference (TUGS 2014), Ankara, 30-31 October 2014.

IGU, 2013. Wholesale gas price survey - 2013 Edition: A global review of price formation mechanisms 2005-2012. International Gas Union Annual Report 2013. [online] Available at:

http://www.igu.org/sites/default/files/node-page-field_file/IGU%20-

<u>%20Wholesale%20Gas%20Price%20Survey%20-%202013%20Edition.pdf</u> [Accessed 20 December 2014].

IGU, 2014. Wholesale gas price survey- 2014 Edition: A global review of price formation mechanisms 2005-2013. International Gas Union Annual Report 2014. [online] Available at: <u>http://www.igu.org/sites/default/files/node-page-field_file/IGU%20Wholesale%20Gas%20Price%20Survey%20Report%20-%202014%20Edition.pdf</u> [Accessed 20 December 2014].

IMF, 1999. IMF Approves US\$4 Billion Stand-By Credit for Turkey. Press Release. Available at: <u>https://www.imf.org/external/np/sec/pr/1999/pr9966.htm</u> [Accessed 2 December 2013].

Incedalci, S. 2014. Dogal Gaz Depolamasi (Gas Storage). Turkey International Underground Gas Storage Conference (TUGS 2014). Ankara, 30 October 2014.

Independent Evaluation Group, 2008. Climate Change and The World Bank Group. Phase 1—An Evaluation of World Bank Win-Win Energy Policy Reforms. Washington: World Bank.

International Monetary Fund, 1999. Letter of intent of the government of Turkey. [online] Available at: <u>https://www.imf.org/external/np/loi/1999/120999.htm</u> [Accessed 22 November 2015].

Jalilvand, D. R., 2013. Iran's Gas Exports: Can Past Failure Become Future Success?. Oxford Institute for Energy Studies NG 78. Oxford: OIES.

Jenkinson, T. and Mayer, C., 1996. The Assessment: Contracts and Competition. Oxford Review of Economic Policy, pp.1-10.

Jewell, J., 2011. The IEA Model of Short-term Energy Security (MOSES) Primary Energy Sources and Secondary Fuels. International Energy Agency Working Paper. France: OECD/IEA.

Jordan, F., 2014. Tarsus Underground Gas Storage Project. Turkey International Underground Gas Storage Conference (TUGS 2014), Ankara, 30 October 2014.

Joskow, P. L., 1998. Regulatory priorities for reforming infrastructure sectors in developing countries. The World Bank Annual Bank Conference on Development Economics, April 20-21, Washington, D.C.

Joskow, P. L., 2005. Supply security in competitive electricity and natural gas markets (2005 Beesley Lecture). In: C. Robinson, ed. 2007. Utility regulation in competitive markets: Problems and progress. Cheltenham: Edward Elgar.

Joskow, P. L., 2006. Regulation of natural monopolies. In: A.M. Polinsky and S. Shavell, S. eds. 2007. Handbook of law and economics. North-Holland. Ch.16.

Joskow, P. L., 2008. Lessons learned from electricity sector liberalisation. Energy Journal, 29(1), pp. 9-42.

Juris, A., 1998. Development of competitive natural gas markets in the United States. Public Policy For the Private Sector Note No. 141. Washington: The World Bank Group-Finance, Private Sector, and Infrastructure Network.

Kapusuzoglu, A. and Karan, M. B., 2010. An analysis of the co-integration and causality relationship between electricity consumption and gross domestic product (GDP) in the developing countries: An empirical study of Turkey. Business and Economics Research Journal, 1(3), pp. 57-68.

Karan, M. B. and Kazdagli, H., 2011. The development of energy markets in Europe. In: Dorsman et al. eds. 2011. Financial aspects in energy. Berlin: Springer-Verlag. pp. 11-32.

Kaufmann, R. K., 2004. The mechanisms for autonomous energy efficiency increase: A cointegration analysis of the US energy/GDP ration. Energy Journal, 25(1), pp. 63-86.

Kessides, I., 2004. Reforming Infrastructure: privatisation, regulation, and competition. [pdf] The World Bank Policy Research Reports. Washington: World Bank and Oxford University Press. Available at: <u>http://www.rrojasdatabank.info/refor04/complete.pdf</u> [Accessed 22 May 2014].

Keuchel, M., 2014. Natural gas in Turkey – today and tomorrow. EBC Working Committee "Energy". Athens, 30 May 2014.

Kim, S. R. and Horn, A., 1999. Regulation policies concerning natural monopolies in developing and transition economies. DESA Discussion Paper No. 8. New York: United Nations.

Kinnander, E., 2010. The Turkish-Iranian gas relationship: Politically successful, commercially problematic. [pdf] Oxford Institute for Energy Studies NG 38. Oxford: OIES. Available at: <u>https://www.oxfordenergy.org/wpcms/wp-content/uploads/2010/11/NG38-TheTurkishIranianGasRelationship-ElinKinnander-2010.pdf</u> [Accessed 31 April 2015].

Kivanc, A., 2014. Bu araçlar daha az vergi verecek! Maliye: 2015'te başlayacak! (These

cars will be taxed less! The Treasury will start in 2015!). HT Newspaper, [online] 25 October. Available at: <u>http://www.haberturk.com/ekonomi/otomobil/haber/1003073-bu-araclar-daha-az-vergi-verecek</u> [Accessed 13 August 2015].

Klein, M., 1996, Competition in network industries. Policy Research Working Paper, No.1591. Washington: The World Bank.

Klemperer, P., 2001. Collusion and predation in auction markets. [pdf] Centre for Economic Policy Research, Oxford University. Available at: <u>http://papers.ssrn.com/sol3/Papers.cfm?abstract_id=260188</u> [Accessed 3 May 2015].

Kraft, J. and Kraft, A., 1978. Note and Comments: On the relationship between energy and GNP. The Journal of Energy and Development, 3, pp. 401-3.

Krane, J. and Wright, S., 2014. Qatar 'rises above' its region: Geopolitics and the rejection of the GCC gas market. [pdf] Kuwait Programme on Development, Governance and Globalisation in the Gulf States No 35. London: LSE. Available at: http://eprints.lse.ac.uk/55336/1/ lse.ac.uk storage LIBRARY Secondary libfile shar ed_repository_Content_Kuwait%20Programme_Krane_2014.pdf [Accessed 3 June 2016].

Küsmüs, A., 2014. Dogalgaz iletiminde gelismeler – beklentiler (Developments and expectations: Gas transmission in Turkey). 8th Shippers Forum. 18 September 2014.

Laffont, J. J and Tirole, J., 1993. A theory of incentives in procurement and regulation. Cambridge: The MIT Press.

Lassource, A., 2013. European energy markets transparency report – 2013 Edition: Overview of progress in Europe. Florence School of Regulation. Italy: RSCAS Publications.

Lee, C-C., 2005. Energy consumption and GDP in developing countries: A cointegrated panel analysis. Energy Economics, [e-journal] 27(2005), pp. 415–27. Available through: Anglia Ruskin University Library website <u>http://libweb.anglia.ac.uk</u> [Accessed 31 May 2016].

Letherby, G. and Bywater, P., 2007. Extending social research: Application, implementation and publication. Berkshire: Open University Press.

Levy, B. and Spiller, P. T., 1996. A framework for resolving the regulatory problem. In:B. Levy and P.T. Spiller, eds. 1996. Regulations, institutions and commitment:Comparative studies of telecommunications. Cambridge: Cambridge University Press.pp. 1-36.

Lieberson, S., 1991. Small N's and big conclusions: An examination of the reasoning in comparative studies based on a small number of cases. Social Forces, 70(2), pp. 307-20. Oxford: Oxford University Press.

Lieberson, S., 1994. More on the uneasy case for using mill-type methods in small N's comparative studies. Social Forces, 72(4), pp. 1225-37. Oxford: Oxford University Press.

Lieberson S., 1998. Examples, submerged statements, and the neglected application of philosophy to social theory. In A. Sica. 1998. What is social theory? The Philosophical Debates Malden. Massachusetts: Blackwell Publishers Inc. Ch.7.

Lohmann, H., 2006. The German path to natural gas liberalisation: Is it a special case? Oxford Institute for Energy Studies NG 14. Oxford: OIES.

Lowe, P., Pucinskaite, I., Webster, W. and Lindberg, P., 2007. Effective unbundling of energy transmission networks: Lessons from the energy sector inquiry. European Union Competition Policy Newsletter No. 1(Spring 2007).

Macwhinnie, N., 2015. Measuring the status quo and metrics quantitative analysis. ACER Workshop on The Launch of The Updated Gas Target Model, pp.13-24. Brussels, 16 January 2015.

Madrid Forum, 2010. Conclusions of the 18th meeting of the European gas regulatory forum. Madrid, 27-28 September 2010.

Madrid Forum, 2011. Conclusions of the 19th meeting of the European gas regulatory forum. Madrid, 21-22 March 2011.

Madrid Forum, 2011. Conclusions of the 20th meeting of the European gas regulatory forum. Madrid, 26-27 September 2011.

Mahoney, J. and Rueschemeyer, D., 2003. Comparative historical analysis in the social science. New York: Cambridge University Press.

Malthus, T.R., 1815. An inquiry into the nature and progress of rent. London: John Murray.

Masih, A. M. M. and Masih, R., 1996. Energy consumption, real income and temporal causality: Results from a multi-country study based on cointegration and error-correction modelling techniques. [online] Energy Economics, 18(3), pp. 165-83. Available at: <u>http://ac.els-cdn.com/0140988396000096/1-s2.0-0140988396000096-main.pdf?_tid=55cbd46c-2770-11e6-9320-</u>

<u>00000aab0f02&acdnat=1464727591_be2a6694b7fd78e7fd3464ea025ec620</u> [Accessed 13 May 2016].

Maxwell, J. A., 1992. Understanding and validity in qualitative research. Harvard Educational Review, 62(3), pp. 279-300.

Meadway, J., 2013. Economics in policy-making: Markets, market failure, and regulation. [pdf] The New Economics Foundation. Available at: <u>http://www.neweconomics.org/page/-/Economics_Briefing_8.pdf</u> [Accessed 13 November 2014].

Melling, A. J., 2010. Natural gas pricing and its future Europe as the battleground. Washington: Carnegie Endowment for International Peace.

Mendas, Z. A., 2010. Ambiguities and complexities of obtaining value for money in the National Health Service: Storytelling approach. PhD. Kingston University.

Merriam, S., 2009. Qualitative research: A guide to design and implementation. 3rd ed.

California: Jossey-Bass.

Miles, M.B. and Huberman, A.M., 1994. Qualitative data analysis: A sourcebook of new methods. 2nd ed. California: Sage Publications.

Mill, J.S., 1848. The principles of political economy with some of their applications to social philosophy. 7th ed. London: Longmans, Green and Co.

MENR, 2011. Annual Report 2011 Faaliyet Raporu. Ankara: Ministry of Energy and Natural Resources.

MENR, 2012. Annual Report 2012 faaliyet raporu. Ankara: Ministry of Energy and Natural Resources.

MENR, 2013. Annual Report 2013 faaliyet raporu. Ankara: Ministry of Energy and Natural Resources.

MENR, 2014. 2015 yili bütçe sunumu (Submission of the 2015 budget). [online] Available <u>http://www.enerji.gov.tr/File/?path=ROOT%2F1%2FDocuments%2FBütçe+Konuşması</u> %2F2015+Yılı+Plan+Bütçe+Komisyonu+Konuşması.pdf [Accessed 3 May 2015].

MENR, 2015. Dünya ve ulkemiz enerji ve tabii kaynaklar görünümü: 01 Ocak 2015 itibarıyla (Energy and natural resources outlook: World and Turkey as of 1 Jan 2015). Sayi 07. Ankara; Ministry of Energy and Natural Resources.

MENR, 2015. Stratejik plan 2015-2019 (Strategic plan 2015-2019). [online] Available at: <u>http://www.enerji.gov.tr/en-US/Activity/MENR-Strategic-Plan-2015-2019-</u> <u>Presentation</u> [Accessed 3 May 2015].

Mitrova, T., 2012. Potential Russian responses to pessimistic European gas demand scenarios. The Gas Advisory Council Meeting, 18 October 2012.

Mizutani, F. and Uranishi, S., 2012. Does vertical separation reduce cost? An empirical analysis of the rail industry in European and East Asian OECD countries. Journal of

Regulatory Economics 43(1), pp.31-59.

Mork, Knut A., 1989. Oil and the macroeconomy when prices go up and down: An extension of Hamilton's results. Journal of Political Economy, 97(3), pp. 740-44.

Morton, A., 2012. European Public Services Briefings 4: European Union Public Procurement Law, the public sector and Public Service Provision. [pdf] European Services Strategy Unit. Available at: <u>http://www.european-services-strategy.org.uk/news/2012/european-public-services-briefing-4-european-u/</u> [Accessed 13 March 2016].

Moselle, B., 2011. Some issues with merging entry/exit zones. 5th CEER Workshop. Vienna, 14 September 2011.

Moselle, B., 2011a. Market design for natural gas: The target model for the international market. LECG Report. London: LECG.

Moselle, B. and White, M., 2011. Market design for natural gas: The target model for the international market. [online] FTI Consulting/Insight Economic Consulting. Summer 2011. Available at: <u>http://www.ceer.eu/portal/page/portal/EER_HOME/EER_CONSULT/CLOSED%20PU</u> <u>BLIC%20CONSULTATIONS/GAS/Gas_Target_Model/5th_GTM_WKSHP/FTI_LEC</u> <u>G%20GTM%20Article_0.pdf</u> [Accessed 5 February 2015].

Mueller, D. C., 2003. Public choice III. Cambridge: Cambridge University Press.

Mulder, M., Shestalova, V. and Lijesen, M. G., 2005. Vertical separation of the energy distribution industry: An assessment of several options for unbundling. CPB Netherlands Bureau for Economic Policy Analysis, No 84.

Nachane, D. M., Nadkarni, R. M. and Karnik, A. V., 1988. Co-integration and causality testing of the energy-GDP relationship: A cross-country study. Applied Economics, 20(11), pp. 1511-31.

Natural Gas Market Law (NGML), 2001. Natural Gas Market Law No. 4646, Adoption

Date: 18/04/2001, Published in The Turkish Official Gazette No. 24390 of 2 May 2001. Available at: <u>http://www.emra.org.tr/index.php/naturalgas-market/legislation</u> [Accessed 3 October 2014].

Natural Gas Market Draft Law (2014) No 31853594-101-855-3207. Submission date to the Presidency of the Grand National Assembly of Turkey: 4 August 2014. Available at: <u>http://www2.tbmm.gov.tr/d24/1/1-0963.pdf</u> [Accessed 14 September 2015].

Network Code on Capacity Allocation Mechanisms. ENTSOG CAM Network Code CAP291-12, 17 September 2012.

Network Code on Harmonised Transmission Tariff Structures for Gas. ENTSOG TAR NC for Re-Submission to ACER, TAR0500-15, 31 July 2015.

Neuhoff, K. and von Hirschhausen, C., 2005. Long-term vs. short-term contracts: A European perspective on natural gas. [pdf] CWPE 0539 and EPRG 05. Available at: <u>https://www.repository.cam.ac.uk/bitstream/handle/1810/131595/eprg0505.pdf?sequenc</u> <u>e=1</u> [Accessed 7 November 2015].

Neumann A., Siliverstovs, B. and von Hirschhausen, C., 2006. Convergence of European spot market prices for natural gas? A real-time analysis of market integration using the Kalman filter. Applied Economic Letters, 13(11), pp. 727-32.

Neumann, W. L., 2014. Social research methods: Qualitative and quantitative approaches. 6th ed. USA: Pearson Education Limited.

Neveling, S., 2011. Implicit auctions / market coupling as a possible element of a target model? CEER Gas Target Model Workshop, Bonn, 22 February 2011.

Newbery, D. M., 1997. Rate-of-return regulation versus price regulation for public utilities. In: P. Newman, ed. The new Palgrave dictionary of economics and the law. London: Macmillan. pp. 205-210.

Newbery, D. M., 2001. Privatisation, restructuring, and regulation of network utilities. USA: The MIT Press.

Newbery, D. M., 2002. Regulating unbundled network utilities. Economic and Social Review. 33(1), pp. 23-41.

Noll, R. G., 1989. Economic perspectives on the politics of regulation. In: R. Schmalensee and R.D. Willig, eds. Handbook of industrial organisation. [pdf] Elsevier Science Publisher. Ch.22, pp. 1253-87. Available at: http://gspa.grade.nida.ac.th/pdf/Dr_Nutta/PA.640nattha_MPA_3-49/5.%20Generic%20policies%20Correcting%20market%20and%20government%20fa iluees/5.3%20Economic%20Perspectives%20on%20the%20Politics%20of%20Regulati on.pdf [Accessed 3 October 2015].

O'Brien, K., 2014. Gas Target Model. Electricity and Gas Interactions Workshop. CER, 3 July 2014.

OECD, 2009. Turkey: Inventory of estimated budgetary support and tax expenditures for fossil-Fuels. France: OECD

OECD, 2015a. Drivers of logistics performance: A case study of Turkey. OECD/ITF 2015.

OECD, 2015b. OECD economic outlook No. 97. Edition 2015/1. [online] Available at: <u>https://data.oecd.org/gdp/real-gdp-forecast.htm</u> [Accessed 14 July 2015].

Ofgem, 2013. The retail market review– final domestic proposals. [pdf] Reference: 40/13. Available at: <u>https://www.ofgem.gov.uk/ofgem-publications/39350/retail-market-review-final-domestic-proposals.pdf</u> [Accessed 21 December 2014].

Ofgem, 2014. State of the market assessment. Available at: <u>https://www.ofgem.gov.uk/ofgempublications/86804/assessmentdocumentpublished.pdf</u> [Accessed 21 December 2014].

Ogus, A., 1994. Regulation: Legal form and economic theory. Oxford: Clarendon Press.

Oil Change International, 2015. The cost of subsidizing fossil fuel production in

Turkey: Why Turkey should implement the G20 commitment to phase out fossil fuel subsidies. [pdf] Available at: <u>http://priceofoil.org/2015/09/08/the-cost-of-subsidizing-fossil-fuel-production-in-turkey/</u> [Accessed 19 March 2016].

Olson, M., 1965. The logic of collective action: Public goods and the theory of groups. Cambridge: Harvard University Press.

Orb, A., Eisenhauer, L. and Wynaden, D., 2001. Ethics in Qualitative Research. Journal of Nursing Scholarship, 33(1), pp. 93-96.

Panebianco, G., 2013. Gas spot market: How does it work and who are the players? [pdf] CEPMLP Annual Review 2012/2013, 2. Dundee: University of Dundee (The Centre for Energy, Petroleum and Mineral Law and Policy Gateway) Available at: <u>http://www.dundee.ac.uk/cepmlp/gateway/index.php?news=32778</u> [Accessed 19 May 2016].

Parker, D., 1998. Privatisation in the European Union: Theory and policy perspectives. London: Routledge.

Parker, D., 1999. Regulation of privatised public utilities in the UK: Performance and governance. International Journal of Public Sector Management, 12(3), pp. 213-36.

Peker, H., Haksal, B., Kurtkaya, N. and Soylu, S., 2007. Petrol ve doğal gaz calişma grubu: Doğal gaz alt calişma grubu raporu. [pdf] World Energy Council- Turkish National Committee. Ankara. Available at: <u>http://www.dektmk.org.tr/upresimler/2007calismagrubu/dogalgaz_raporu_304.pdf</u> [Accessed 19 May 2014].

Peltzman, S., 1976. Toward a more general theory of regulation. Centre for EconomicAnalysis of Human Behaviour and Social Institutions. NBER Working Paper Series No.133. Stanford.

Peltzman, S., Levine, M. E. and Noll, R. G., 1989. The economic theory of regulation after a decade of reregulation. Brookings Papers on Economic Activity, Microeconomics, 1989(1989), pp.1-59.

PETFORM/DIVID, 2013. Çok tedarikçili Türkiye doğal gaz piyasası (Multi supplied Turkish gas market). II. Istişare Toplantısı, 6-7 Eylül 2013, Bolu.

Pigou, A. C., 1932. The economics of welfare (1920). 4th ed. London: Macmillan.

Polo, M. and Scarpa, C., 2002. The liberalisation of energy markets in Europe and Italy.[pdf] Paper prepared for The Conference "Monitoring Italy" organised by ISAE inRome,10.1.2003.Availableat:ftp://ftp.igier.unibocconi.it/homepages/polo/ISAE%20Polo%20Scarpa.pdf[Accessed 13April 2015].

Porter, M. E., 1980. Competitive strategy techniques for analyzing industries and competitors. New York: The Free Press.

Posner, R. A., 1974. Theories of economic regulation. The Bell Journal of Economics and Management Science 5(2), pp. 335-58.

Posner, R. A., 1975. The social costs of monopoly and regulation. Journal of Political Economy 83(4), pp. 807-28.

PRISMA-EFET, 2015. Putting users before the product: PRISMA and EFET join forces to deliver the most efficient gas capacity booking. [online] Media Information, 7 July 2015. Available at: <u>https://corporate.prisma-capacity.eu/wp-content/uploads/2015/08/Putting-users-before-the-product-PRISMA-and-EFET-join-forces-to-deliver-the-most-efficient-gas-capacity-booking_7.7.15.pdf</u> [Accessed 4 May 2015].

Privatisation Administration, 2014. Idare faaliyet raporu 2014 (Administrative activity report 2014). Ankara: The Privatisation Administration of Turkey.

Radikal, 2014. 2 aylık tasarruf 600 milyon TL (Savings of 2 months: 600 million TRY).
Radikal Newspaper, [online] 12 April. Available at: http://www.radikal.com.tr/ekonomi/2-aylik-tasarruf-600-milyon-tl-1186225/ [Accessed 15 June 2015].

Ragin, C.C., 1994. Constructing social research. California: Pine Forge Press.

Renault, 2012. Antalya metropolitan municipality and Renault signed an agreement to
deploy a program to prepare a zero emissions partnership. Press Release, 12 September
2012. Available at: http://media.renault.com/global/en-
gb/alliance/media/pressrelease.aspx?mediaid=33333

Rogers, H. V., 2010. LNG Trade-flows in the Atlantic basin: Trends and discontinuities. Oxford Institute for Energy Studies NG 41. Oxford: OIES.

Rondella, E., 2014. GTM: New challenges and obstacles for CCGTs. 2nd ACER Workshop on Gas Target Model. Ljubljana, 19th March 2014.

Rosellón, J. and Halpern, J., 2001. Regulatory reform in Mexico's natural gas industry: Liberalisation in the context of a dominant upstream incumbent. [pdf] The World Bank Policy Research Working Paper No. 2537. Available at: <u>https://www.hks.harvard.edu/hepg/Papers/Rosellon_reg_reform_gas_industry_1-01.pdf</u> [Accessed 7 December 2014].

Rowley, C.K., 2004. Public choice and constitutional political economy. In: C.K. Rowley and F. Schneider, eds. 2004. The Encyclopedia of public choice volume I. Dordrecht: Kluwer Academic Publishers. pp. 3-32.

Runciman, W. G., 1983. A treatise on social theory vol 1: The methodology of social theory. Cambridge: Cambridge University Press.

Rzayeva, G., 2014. Gas in the Turkish domestic energy market: Policies and challenges. Oxford Institute for Energy Studies NG 20. Oxford: OIES.

Sabadus, A., 2015. Reforming Turkey's Natural Gas Sector: A Bureaucratic Problem. [online] ICIS, 20 August 2015. Available at: <u>http://www.icis.com/resources/news/2015/08/20/9916126/reforming-turkey-s-natural-gas-sector-a-bureaucratic-problem/</u> [Accessed on 22 November 2015]. Sabah, 2006. Tartışmalı ihaleye BOTAŞ'tan onay (BOTAS approval to the contradictive tender). Sabah Newspaper, [online] 14 April. Available at: <u>http://arsiv.sabah.com.tr/2006/04/14/eko117.html</u> [Accessed 28 May 2015].

Saluz, S., 2011. Liberalisation of the European gas market: Are oil-linked gas contracts on their way out? Master Thesis University of St. Gallen. Available at: http://www.unisg.ch/~/~/media/644AA283B4F8468A8ABCAF077F411BEA.ashx [Accessed 2 June 2016].

Samuelson, P. A., 1947. Foundations of economic analysis. Cambridge: Harvard University Press.

Sanjari, M., Bahramnezhad, F., Fomani, F. K., Shoghi, M. and Cheraghi, M. A., 2014. -Ethical challenges of researchers in qualitative studies: the necessity to develop a specific guideline. [online] Journal of Medical Ethics and History of Medicine, 7(14). Available at: <u>https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4263394/</u> [Accessed 9 January 2016].

Sappington, D. E. M., 2005. Regulating service quality. Journal of Regulatory Economics, 27(2), pp. 123-54.

Saunders, M., Lewis, P. and Thornhill, A., 2012. Research methods for business students. 6th ed. London: Pearson.

Schram, G., 1993. Issues and problems in the power sector of developing countries. Energy Policy, 21(7), pp. 735-47.

Seale, P., 2012. The collapse of Turkey's Middle East policy. [online] Middle East Online, 5 September 2012. Available at: <u>http://www.middle-east-online.com/english/?id=54209</u> [Accessed 19 September 2014].

Seidman, I., 2013. Interviewing as qualitative research: A guide for researchers in education and the social Sciences. 4th ed. New York: Columbia University.

Sethuraman, D., 2010. LNG storage off Fujairah equals three months China demand.

[online] Bloomberg, 29 June. Available at: <u>http://www.bloomberg.com/news/2010-06-29/lng-tankers-off-fujairah-store-fuel-equivalent-to-3-months-china-demand.html</u> [Accessed 22 December 2014].

Shleifer, A., 1985. A theory of yardstick competition. The RAND Journal of Economics, 16(3). pp. 319-27.

Shughart, W.F., 2004. Regulation and antitrust. In: C.K. Rowley and F. Schneider, eds. 2004. The encyclopedia of public choice volume I. Dordrecht: Kluwer Academic Publishers. pp. 263-84.

Silve, F. and Saguan, M., 2011. Regulating natural gas retail prices in France: The absence of a magic indexation formula and other implementation issues. [pdf] Available at: http://www.city.ac.uk/__data/assets/pdf_file/0016/107512/Silve-Saguan_GasRetailPricesFrance.pdf [Accessed 6 January 2015].

Simons, H., 2009. Case study research in practice. London: Sage Publications.

Stake, R. E. (1995). The art of case study research. California: Sage Publications.

Soysal, C., Yücel, C. Ö., Koyuncu, T. and Tokgöz, E., 2012. Doğal gaz sektör araştirmasi (Natural gas market research). Ankara: Competition Authority.

Soytas, U. and Sari, R., 2003. Energy consumption and GDP: Causality relationship in G-7 countries and emerging markets. Energy Economics, [e-journal] 25(1), pp. 33-7. Available through: Anglia Ruskin University Library website <u>http://libweb.anglia.ac.uk</u> [Accessed 31 May 2016].

Starr, P., 1987. The limits of privatisation. Proceedings of the Academy of Political Science, 36(3), pp.124-37.

Stern, J., 2002. Security of European natural gas supplies: The impact of import dependence and liberalisation. London: Royal Institute of International Affairs.

Stern, D. I., 2004. Economic growth and energy. Encyclopedia of energy, 2, pp. 35-51.

[online] Available at: <u>http://sterndavidi.com/Publications/Growth.pdf</u> [Accessed 6 January 2015].

Stern, J. P. ed., 2012. The Pricing of internationally traded gas. Oxford: OIES.

Stern, D. I. and Cleveland, C. J., 2004. Energy and economic growth. [online] Rensselaer Working Papers in Economics No 0410, New York. Available at: <u>http://www.economics.rpi.edu/workingpapers/rpi0410.pdf</u> [Accessed 6 January 2014].

Stern, J. P. and Rogers, H. V., 2011. The transition to hub-based gas pricing in continental Europe. Oxford Institute for Energy Studies NG 49. Oxford: OIES.

Stern, J. P. and Rogers, H. V., 2014. The dynamics of a liberalised European gas market: Key determinants of hub prices, and roles and risks of major players. Oxford Institute for Energy Studies NG 94. Oxford: OIES.

Stevens, P., 1998. Energy privatisation: Sensitivities and realities. The Journal of Energy and Development, 23(1), pp. 1-14.

Stevens, P., 2015. Prospects for Iran's Oil and Gas Sector. [pdf] Middle East and NorthAfrica Programme & Environment, Energy and Resources Department Research Paper.London:ChathamHouse.Availableat:https://www.chathamhouse.org/sites/files/chathamhouse/field/field_document/20150305IranOilGasStevens.pdf[Accessed 2 June 2016].

Stigler, G. J., 1968. The organisation of industry. USA: R. D. Irwin.

Stigler, G.J., 1971. The theory of economic regulation. The Bell Journal of Economics and Management Science, 2(1), pp. 3-21.

Stigler, G. J. and Friedland, C., 1962. What can regulators regulate? The case of electricity. [pdf] Journal of Law and Economics, 5(Oct., 1962), pp. 1-16. Available at: <u>http://hsecon.tripod.com/Stigler62.pdf</u> [Accessed 13 February 2015].

Strauss, A. and Corbin, J., 1998. Basics of qualitative research. Thousands Oaks, CA: Sage Publications.

Sullivan, J. B., 1990. Private power in developing countries: Early experience and a framework for development. Annual Review of Energy and the Environment, 15(1), pp. 335-63.

Sweeney, J., 2002. The California electricity crisis: Lessons for the future. [pdf] The Bridge, 32(2). pp. 23-32. Washington: National Academy of Engineering. Available at: https://www.nae.edu/Publications/Bridge/OurEnergyFuture/TheCaliforniaElectricityCrisisLessonsfortheFuture.aspx [Accessed 19 January 2015].

Teece, D., 1995. Telecommunications in transition: Unbundling, reintegration, and competition. [pdf] Michigan Telecommunications and Technology Law Review, 1(1). Available at: <u>http://repository.law.umich.edu/mttlr/vol1/iss1/3</u> [Accessed 1 March 2015].

Thomas, G., 2011. How to do your case study. London: Sage Publications.

Thomson, S. B., 2011. Qualitative research: Validity. [pdf] JOAAG, 6(1), pp.77-82. Available at: <u>http://joaag.com/uploads/6_1_-7_Research_Method_Thomson.pdf</u> [Accessed 8 January 2015].

Thorbecke, W., 2004. Institutions of trade protection. In: C.K. Rowley and F. Schneider, eds. 2004. The Encyclopedia of public choice volume II. Dordrecht: Kluwer Academic Publishers. pp. 304-7.

TMMOB, 2015. Ocak 2015 itibarıyla Türkiye'nin enerji görünümü raporu (Turkey's energy market outlook as of January 2015). TMMOB Makina Muhendisleri Odasi No. 200.

Torun, Z., 2012. The European Union and change in the Middle East and North Africa: Is the EU closing its theory-practice gap? Ortadoğu Etüdleri, 4(1), pp. 79-97.

TPAO, 2013. 2012 oil and natural gas sector report. Ankara: Turkish Petroleum

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Corporation.

Turkish Atomic Energy Authority (TAEK), 2013. Progress report 2013. Ankara: The Ministry of Energy and Natural Resources.

Turkish Statistical Institute (TURKSTAT), 2012. National greenhouse gas inventory report: 1990-2012. Ankara.

United Nations Economic Commission For Europe (UNECE), 2012. The impact of liberalisation of natural gas markets in the UNECE region efficiency and security. United Nations Economic Commission for Europe Committee on Sustainable Energy. Available at: <u>http://www.unece.org/index.php?id=29309</u> [Accessed 2 September 2013].

United Nations Framework Convention on Climate Change (UNFCCC), 2009. Report of the in-depth review of the first national communication of Turkey. FCCC/IDR.1/TUR.

United Nations Framework Convention on Climate Change (UNFCCC), 2015a. Republic of Turkey Intended Nationally Determined Contribution (INDC). Available at: <u>http://www4.unfccc.int/submissions/INDC/Published%20Documents/Turkey/1/The_INDC_of_TURKEY_v.15.19.30.pdf</u> [Accessed 23 November 2015].

United Nations Framework Convention on Climate Change (UNFCCC), 2015b. Report of The Technical Review of The Fifth National Communication of Turkey. FCCC/IDR.5/TUR.

United States International Trade Commission (ITC), 2001. Natural Gas Services: Recent Reforms in Selected Markets. Washington: ITC Publications.

Ünal, H. H., 2014. Third party access to the Turkish natural gas transmission system 2007-2013. Ankara: Energy Law Research Institute.

Varian, H. R., 1990. Intermediate economics a modern approach. 8th ed. New York: W. W. Norton & Company.

Viscusi, W. K., Harrington, J. E., Vernon, J. M., 2005. Economics of regulation and antitrust. USA: The MIT Press.

Vogelsang, l., 1999. Optimal Price Regulation for Natural and Legal Monopolies. Economía Mexicana. Nueva Época, VIII(1), pp. 5-43. Available at: <u>http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.453.5804&rep=rep1&type=p</u> <u>df</u> [Accessed 23 January 2015].

Von Hirshhausen, C. and Vincentz, V., 2000. Energy policy and structural reform. [e-journal] Eastern European Economics, 38(1), pp. 51-70. Available through: Anglia Ruskin University Library website <u>http://libweb.anglia.ac.uk</u> [Accessed 1 May 2016].

Wagner, A., 2014. Functioning of European gas wholesale markets quantitative study.3rd ACER GTM Workshop. Brussels, 15 May 2014.

Walsh, K. (2003). Qualitative research: Advancing the science and practice of hospitality [Online]. Cornell Hotel and Restaurant Administration Quarterly, 44(2), 66-74. Available at: http://scholarship.sha.cornell.edu/articles/452/ [Accessed 8 January 2015].

Wälde, T. and Gunst, A. J., 2003. International energy trade and access to energy Networks. In United Nations Conference on Trade and Development (2003). Energy and environmental services: Negotiating objectives and development priorities. Geneva: UNCTAD/DITC/TNCD/2003/3. pp. 118-63.

Wells, D. A., 1889. Recent economic changes and their effect on the production and well-being of society. New York: Da Capo Press.

Wieczorkiewicz, J., 2014. Abolishing oil indexation in gas contracts: Is it the cure-all? [pdf] Centre for European Policy Studies. Available at: <u>http://aei.pitt.edu/50131/</u> [Accessed 24 December 2014]. Williamson, O. E., 1976. Bidding for natural monopolies in general and with respect to CATV. The Bell Journal of Economics, 7 (1), pp. 73-104.

Wilson, R., 2002. Architechture of electric power market. Econometrica, 70(4), pp. 1299-340.

World Bank, 2000. Reforming Public Institutions and Strengthening Governance. Washington: International Bank for Reconstruction and Development /The World Bank.

World Bank, 2013. World development indicators, 2013. Washington: International Bank for Reconstruction and Development /The World Bank.

World Bank, 2014. World Bank continues to support gas sector development in Turkey. Press Release. 2 July 2014. Available at: <u>http://www.worldbank.org/en/news/press-release/2014/07/02/world-bank-continues-to-support-gas-sector-development-in-turkey</u> [Accessed 9 May 2015].

Yafimava, K., 2013. The EU third package for gas and the Gas Target Model: Major contentious issues inside and outside the EU. Oxford Institute for Energy Studies NG 75. Oxford: OIES.

Yardimci, O., 2011. Türkiye doğal gaz piyasasi: Geçmis 25 yil, gelecek 25 yil (Turkish gas industry: The past and forthcoming 25 years). Ekonomi Bilimleri Dergisi, Cilt 3(2). [online] Available at: <u>http://enerjiuzmani.blogspot.co.uk/2011/09/turkiye-dogal-gaz-piyasasi-gecmis-25.html</u> [Accessed 9 May 2015].

Yardimci, O., 2012. Price regulation of the natural gas sector in Turkey. ERRA Training Course : Price Regulation & Tariffs, 27 February – 1 March 2012, Budapest.

Yardimci, O., 2015. Türkiye Doğal Gaz Dağıtım Tarifelerine Yönelik Grafikler (Graphs towards Turkey's natural gas distribution tariff). Available at http://enerjiuzmani.blogspot.com.tr/2015/10/july-24-2015-turkish-natural-gas.html#more [Accessed 31 December 2015].

Yarrow, G. and Jsinsky, P. eds., 1996. Privatisation: Critical perspectives on the world economy. New York: Rutledge.

Yazan, B. 2015. Three approaches to case study methods in education: Yin, Merriam, and Stake. The Qualitative Report 2015, 20(2), pp. 134-52.

Yilmaz, A. (n.d). Network ekonomilerinin serbestleştirilmesi ve rekabet sorunlari (Liberalisation of network economies and competition issues). [online] Available at: http://tusiad.org/tr/tum/item/download/2472_a84a71dda56eb30fb553ef6e53cf3d47 [Accessed 31 August 2015].

Yin, R. K., 1994. Case study research: Design and methods. California: Sage Publications.

Yin, R. K., 2009. Case study research: Design and methods. 4th ed. California: Sage Publications.

Yin, R. K., 2012. Case study research: Design and methods. 5th ed. California: Sage Publications.

Yin, R. K. and Davis, D., 2007. Adding new dimensions to case study evaluations: The case of evaluating comprehensive reforms. In: G. Julnes and D. J. Rog, eds. 2007. Informing federal policies for evaluation methodology. New Directions in Program Evaluation, No. 113. San Francisco: Jossey-Bass. pp. 75-93.

Yu, E. S. H. and Choi, J. Y., 1985. The causal relationship between energy and GNP: An international comparison. The Journal of Energy and Development, 10(2), pp. 249-72.

Zachariadis, T., 2007. Exploring the relationship between energy use and economic growth with bivariate models: New evidence from G-7 countries. Energy Economics, 29(6), pp. 1233-53.

Zamani, M., 2007. Energy consumption and economic activities in Iran. [e-journal] Energy Economics, 29(6), pp. 1135–40. Available through: Anglia Ruskin University

Library website http://libweb.anglia.ac.uk [Accessed 10 May 2016].

Zyuzev, R., 2009. Gas market liberalisation as a key driver of change of the European gas market and its influence on the strategies of the main players. Master Thesis. Centre International de Formation Europeenne. Available at: <u>http://www.ie-ei.eu/IE-EI/Ressources/file/memoires/2008/ZYUZEV.pdf</u> [Accessed 3 March 2015].

Legal Resources

BOTAŞ Transmission Network Operation Principles (BNC). Official Gazette No 28159, 31 December 2011 by The Board Decision No. 3617 of 28 December 2011. Energy Market Regulatory Authority Board Decision No 76 Energy Market Regulatory Authority Board Decision No 408 Energy Market Regulatory Authority Board Decision No 725 Energy Market Regulatory Authority Board Decision No 1032 Energy Market Regulatory Authority Board Decision No 1439/2 Energy Market Regulatory Authority Board Decision No 1808/1 Energy Market Regulatory Authority Board Decision No 4169 High Planning Council Decision No. 2008/T-5 Regulation for Transmission System Operations. Official Gazette No. 24918, 26 October 26, 2002. Regulation for The Determination of Underground Natural Gas Storage Facility Basic Operating Procedures and Guidelines. Official Gazette No. 27954, 4 June 2011 Regulation on Liquified Natural Gas Storage Facility Basic Operating Procedures and Guidelines. Official Gazette No. 27230, 16 May 2009. Statutory Decree No. 350, KHK/350, 9 December 1988. Statutory Decree No. 397, KHK/397, 9 February 1990. The Supplementary Law on Mandatory Storage Facility No 30/5/2013-6491/27 The Turkish Commercial Code No 6762 The Turkish Electricity Market Law No 4628 The Turkish Natural Gas Market Law No 4646 The Turkish Petroleum Law No 6326 The Turkish Petroleum Law No 5015 The Turkish Official Gazette

APPENDICES

Appendix A- Participant Information Sheet

PARTICIPANT INFORMATION SHEET

Section A: The Research Project

Title of the project

Natural Gas Market Reform in Turkey: A Critical Review of Progress toward Liberalisation

Brief summary and purpose of the research

Liberalisation of the Turkish energy markets has been in the government policies and progress reports for a long time. But a detailed analysis of Turkish natural gas market reveals that the country is still far from having a fully liberalised and competitive market despite a better success in the electricity market liberalisation. Given the legislative initiatives of liberalisation that have introduced a degree of complexity to the market that has contrarily been characterized by the state monopoly for decades, the thesis is concerned with critically analysing the evolution of Turkish gas market liberalisation process within the EU framework. This research is inspired by the recent attempts of the Turkish government to eradicate the deficiencies in enforcement of the Natural Gas Market Law (NGML) and it provides a comprehensive examination of what the EU legal framework and the respective regulations are and how they are put in place to operate in the Turkish gas market.

This is a PhD project at Anglia Ruskin University, UK and the main objective of this study is to provide stakeholders and regulators in Turkey with a useful reference and policy recommendations.

Name of the supervisors

Dr Craig Duckworth, Dr Chi Kong Chyong and Dr Antonella Zucchella.

Why have I been asked to participate?

The participation of the individuals will allow the researcher to address the research questions and complete the study. The selection of participants is in compliance with the Data Protection Act (1998). All participants will be informed at the outset what personal data will be required from them and what the data will be used for.

What are the likely benefits of taking part?

Given the importance of comprehensive studies that entered into the depths of the regulatory reforms subjects, for example institutions, utility regulations and effects of privatization on pricing policies, and the fact that such critical analyses regarding the evolution of Turkish gas market reforms have remained scarce to date, this research thus aims to fill this gap by providing a comprehensive analysis examining the impacts of reforms on various aspects. And findings from this study are envisaged to indirectly benefit not only the research participants but also other stakeholders and policy makers in Turkey.

Can I refuse to take part?

The researcher would like to clarify that the research participants have the right to refuse to take part in the research before or during the study without giving a reason. If the participant withdraws, he/she will be asked if the researcher may still continue using the data in the study if it is not part of participation, as in the case of this study. Also, the participant will be reassured that disclosing any information to the researcher will not affect his/her professional/personal relationship with other organisational members, even if they refuse to participate or withdraw from the study.

Source of funding for the research, if applicable

Self-funded.

What will happen to the results of the study?

The collected data will only be used for thesis and may be used for academic publications confirming to data protection legislation in the UK. The researcher will possess ownership of the data and might sign over copyright for journal articles to the publisher(s) to publish the findings.

Contact for further information

For further information, please feel free to email the researcher or the researcher's supervisors at:

Onur.demir@student.anglia.ac.uk

craig.duckworth@anglia.ac.uk

k.chyong@jbs.cam.ac.uk

antonella.zucchella@anglia.ac.uk

Section B: Your Participation in the Research Project

What will I be asked to do?

The views of informants from the Turkish Energy Market Regulatory Authority and the Ministry of Energy and Natural Resources are expected to be particularly vital for the authenticity of this study given their task to operate a very large part of the regulation apparatus in subject markets combined with their price setting power. And thus asking those key individuals directly for their views about the real reasons of why has the liberalisation so far been successful or unsuccessful in Turkey, why do the differences in adoption of liberalisation model still persist amongst different segments of the markets between Turkey and other European countries, and what is the optimum way to make the (prospectively) liberalised Turkish market work well and so on, will further illuminate the energy market liberalisation phenomenon and help us to understand the mechanisms in which individuals and institutions interact.

All interviews will be conducted face-to-face and most of which will be held in two phases. After a rigorous corroboration of the first round correspondence from other sources and contrary evidence, we aim to conduct second interviews in an effort to make more sense of (or challenging) respondents' interpretation and experiences on liberalisation dynamics (i.e. why certain events took place? Could it not be prevented? etc.)

Will my participation in the study be kept confidential?

As long as participants permit the interviews will be audio recorded, and all points about confidentiality and anonymity will be made clear as to every attempt to be made to keep their personal identification anonymous and confidential. The participants will be rest assured that the data access will only be available to the researcher in passwordprotected files and the supervisors will only be provided with access to the information in various drafts wherein the identities are kept strictly anonymous.

Will I be reimbursed travel expenses?

Since the interviews will take place in Turkey at pre-arranged (determined by the interviewees) venues, date and time the researcher herself will travel to the interviewees and hence no reimbursement for travel expenses will be provided to the interviewees.

Are there any possible disadvantages or risks to taking part?

Some potential concerns may arise from the fact that the participant's position as a government official may restrict their position to disclose any inside information that they perceive could place them at unease. However, researcher will assure them that their participation is voluntary and they could refuse to give answer to any question and/or not compelled to provide any information that will make them uncomfortable or feel fear of losing the personal/professional relationship.

Since research participants will be interviewed as per their own convenience with complete anonymity and confidentiality, it is believed to be a rare possibility that the participants would suffer from any form of several physical or emotional distresses during the data collection process. The researcher will comply with the ethical code of conduct that is mandatory according to the UK legislation. It will also be ensured that the research complies with the local laws in Turkey, concerning the local culture, customs and traditional beliefs to safeguard the integrity and well being of all participants.

Whether I can withdraw at any time, and how

The researcher would like to clarify that the research participants have the right to refuse to take part in the research before or during the study without giving a reason. If the participant withdraws, he/she will be asked if the researcher may still continue using the data in the study if it is not part of participation, as in the case of this study. Also, the participant will be reassured that disclosing any information to the researcher will not affect his/her professional/personal relationship with other organisational members, even if they refuse to participate or withdraw from the study.
Whether there are any special precautions you must take before, during or after taking part in the study

There are no precautions that the participant has to undertake before, during or after the study.

What will happen to any information/data that are collected from you?

Interview data will be transcribed, stored on the computers/laptops -which will be password protected- and then analysed to report findings. Participants will be asked whether they require the summary of findings. Only the researcher will have access to the data and it will be in an anonymised format, so no identity of the participants will be revealed. Moreover, the researcher will possess ownership of the data and might sign over copyright for journal articles to the publisher(s) to publish the findings.

Contact details for complaints

If participants have any complaints about this study, they can contact the supervisors of this study on:

Dr Craig Duckworth: craig.duckworth@anglia.ac.uk

Dr Chi Kong Chyong: <u>k.chyong@jbs.cam.ac.uk</u>

Dr Antonella Zucchella: antonella.zucchella@anglia.ac.uk

Or alternatively contact the Anglia Ruskin University's complaints procedure as below:

Email address: complaints@anglia.ac.uk

Postal address: Office of the Secretary and Clerk, Anglia Ruskin University, Bishop Hall Lane, Chelmsford, Essex, CM1 1SQ

Appendix B- Participant Consent Form

NAME OF PARTICIPANT:

Title of the project: Natural Gas Market Reform in Turkey: A Critical Review of Progress toward Liberalisation and Gas Target Model

Main investigator and contact details: Onur Demir: Onur.demir@student.anglia.ac.uk

Members of the research team: Dr Craig Duckworth: <u>craig.duckworth@anglia.ac.uk</u> Dr Chi Kong Chyong: <u>k.chyong@jbs.cam.ac.uk</u> Dr Antonella Zucchella: <u>antonella.zucchella@anglia.ac.uk</u>

- 1. I agree to take part in the above research. I have read the Participant Information Sheet for the study. I understand what my role will be in this research, and all my questions have been answered to my satisfaction.
- 2. I understand that I am free to withdraw from the research at any time, for any reason and without prejudice.
- 3. I have been informed that the confidentiality of the information I provide will be safeguarded.
- 4. I am free to ask any questions at any time before and during the study.
- 5. I have been provided with a copy of this form and the Participant Information Sheet.

Data Protection: I agree to the University¹ processing personal data which I have supplied. I agree to the processing of such data for any purposes connected with the Research Project as outlined to me.

Name of participant (print)

Signed

Date

If you wish to withdraw from the research, please complete the form below and return to the main investigator named above.

I WISH TO WITHDRAW FROM THIS STUDY

<u>Title of Project:</u> Natural Gas Market Reform in Turkey: A Critical Review of Progress toward Liberalisation

Signed: _____

Date: _____

¹ "The University" includes Anglia Ruskin University and its partner Colleges.

Appendix C- Questions for CEER Public Consultation July 2011

A) Enabling functioning wholesale markets

Question 1: What are stakeholders" views on the definition of a "functioning wholesale market"?

Question 2: What are stakeholders" views on the three options identified to enable functioning wholesale markets, i.e. (i) creating market areas at national level for Member States able to meet the criteria of a functioning wholesale market; (ii) creating a trading region covering more than one country; or (iii) creating cross-border market areas?

Question 3: What are stakeholders" views on the proposed steps until 2014 for enabling functioning wholesale markets?

B) Connecting functioning wholesale markets

Question 4: What are stakeholders" views on the full implementation of the CAM network code and the CMP guideline at all interconnection points by 2014 at the latest?

Question 5: What are stakeholders" views on the proposed pilot projects to design and trial an implicit capacity allocation mechanism between at least two entry-exit zones in different Member States by 2014?

C) Ensuring secure supply and economic investment

Question 6: What are stakeholders" views on the need for explicit long-term capacity allocation?

Question 7: How should economically-viable projects for cross-border capacity investments be determined?

Question 8: What are stakeholders" views on the proposed development of an economic test to trigger new capacity, based on market demand established through coordinated long-term auctions? If in favour, by whom and how often should such a test be conducted?

D) Pricing of transmission capacity

Question 9: What are stakeholders" views on the pricing of cross-border transmission capacity?

E) Renewable Integration and future challenges

Question 10: Do you think that the elements of the gas target model provide a good framework for the integration of renewable energy?

Question 11: Are there elements missing in the target model that are necessary for the integration of renewable energy at a European level, possibly with a view beyond 2014?

Source: CEER (2011a), p.11

Appendix D- Studies Submitted to CEER re-Functioning of Wholesale Markets, GTM

	LECG	FSR MECO-S	Frontier	FSR American Model	CIEP
2014 target	no	yes	no	no	no
Recommendations for FGs	no – study lists different options	yes	no	no	no
In line with EU legislation	yes	yes	yes	no	yes
Integration of renewables	Has to be considered	-	Must be taken into account	-	Has to be considered
Definition of functioning market		•HHI < 2000 •At least 3 different gas sources •Demand at least 20 bcm	Effectively functioning markets, where different sources of gas can compete freely	-	Any party can trade at any moment with any other party on terms and conditions which are mutually agreeable
Size of zones	•Regional approach •Reduce number of zones in Europe •Merger of zones if contractual congestion	•Subject to CBA •National market areas if able to create a functioning market •Cross-border market areas •Trading regions	•Subject to CBA •Bigger zones are not necessarily good for customers •Source competition in one zone not a goal in itself	•Cross-border market trading may be suitable •Few hubs in Europe	•Regional differences •National or sub- national zones

	LECG	FSR MECO-S	Frontier	FSR American Model	CIEP
Connection of markets	•Efficient use of cross-border capacities •Explicit and implicit auctions	 Implicit auctions for day-ahead markets Enhanced trading arrangements 	•No implicit auctions •Secondary markets	•EU platform for long- term capacities •Secondary markets •Limited role for auctions •Harmonised trading conditions	 Freedom of transactions 2nd markets and interruptible capacities No general, ex-ante rules for wholesale Continuous market coupling pilots
How to ensure that investments take place?	Long-term contracts (to a certain extent)	Integrated Open Season (OS) Process (similar to UK example)	•Long-term contracts •No over- regulation of assets	•Development of ample supply and transportation capacities •Regulation of OS	•Long-term contracts •infrastructure should be exempted (always) •OS •Reduction of lead times
Securing supply	Long-term contracts (to a certain extent)	•Long-term bookings •Link-chain products	Long-term capacity contracts	•Development of ample supply capacities •Long-term and long- distance bookings	•Ensure ample and competitive supplies •Long-term supply and capacity contracts (similar duration)
DSO relevance		Cooperation needed	-	-	-

Source: Boltz (2011), p. 2-3

Appendix E- Letter of Solicitation

To Energy Market Regulatory Authority

Ankara

I kindly request your permission to be able interview energy experts of your institution for my doctoral dissertation themed "Natural Gas Market Reform in Turkey: A Critical Review of Progress toward Liberalisation and Gas Target Model." English text on the subject is presented in the appendix.

I would hereby respectfully submit for your information the text of the reply to be sent to my email address <u>onur.demir@anglia.ac.uk</u> on the subject.

Address: Anglia Ruskin University East Road, Cambridge CB1 1PT, United Kingdom 2016

Appendix: Gatekeeper Letter (ENG)

Appendix F- Interview Questions

- 1) What does natural gas market liberalisation actually mean to Turkey and what is expected from it?
- 2) Given the fifteen years of legal transformation with limited evidence of impact on competition overall, has natural gas market liberalisation been really effective in Turkey?

- Has it really caused any change in industrial/residential natural gas price ratios?

3) What are the major challenges which have prevented Turkey from the fulfillment of natural gas market liberalisation implementation so far?

Restructuring of BOTAS

4) What are the main reasons for being unsuccessful in diminishing BOTAS' market power?

-Does BOTAS plan to further reduce its market share? If so, how? (e.g. volume or contract transfers?)

5) Does EMRA envisage any changes in BOTAS' gas pricing methodology which is criticised by the new entrants to be detrimental to their competitiveness?

Market opening

- 6) What are the market entry barriers?
- 7) Why has the rate of switching amidst eligible customers remained so limited after a decade since the 2001 Law?

Energy Market Regulatory Authority

8) How is the independence of EMRA -from both the interests of the government and the sector- ensured? And will be ensured?

Unbundling

- 9) At present, only the accounts of BOTAS' transmission and commercial activities are unbundled and no step has been taken towards legal separation or ownership unbundling of BOTAS as requested in the NGML. What are the reasons for that? And should we expect any progress on this in near future?
- 10) The 2001 Law has not distinguished between distribution and retail, and thus the designation of distribution system operators and closed distribution system –as per Art 28 of the 3rd Directive is not materialised. Why has this not been done yet? Any plans or specific timetable for the transposition of this Article into the NGML?

-How could an effective competition be created at retail level?

- 11) Has EMRA identified any regulatory response to Russia's downstream expansion in the Turkish gas market (and to potential control of the market in terms of prices and supply security)?
- 12) Whereas EU Directives back up full/partial exemptions of the existing and major new infrastructure from TPA, neither the NGML nor the BUPPs contain any basis for clear-cut derogations for Turkey's existing infrastructure except stating that "the facility owners shall put capacities into service as long as the system is convenient and the operational reasons are justified". Since this is crucial to provide necessary market-based price signals for new infrastructure investments, does EMRA plan to introduce such exemptions?
- 13) Do you think the postage stamp tariffs (used in Turkey) has some drawbacks such as it does not promote efficiency (both economic and energy) and investment?
- 14) The 2001 Law stipulates negotiated access to storage but it is also specified in the same Regulation that until the country's storage capacity reaches a sufficient level the accessions may be regulated. Is this foreseen to change (at least once the Tuz Golu and/or Tarsus UGS starts operating)?

15) Why the use of LNG terminals by private companies has remained negligible despite the TPA provided since 2011? Would the availability of (short term) unbundled storage products help this?

-Does Turkey use any storage facility abroad? Is there any regulatory impediment to do so?

Competition and Liquidity

16) What are the main issues that cause problems to liquidity and competition in the Turkish gas market?

-What roles do take-or-pay contracts, stamp tax, lack of gas exchange play in this?

- 17) In your view what frameworks would be developed to lead to a barrier free trading environment in Turkey for both national and international players?
- 18) Do we expect any market integration between Turkey and adjacent market areas in near- or mid- future?
- 19) What are EMRA's plans in terms of harmonising the NGML with respective Network Codes of EU (CAM, BAL and TAR in particular)?
- 20) In your view, how the response capability of Turkish market players can be enhanced in the event of failure of gas supplies or receiving terminals?