**Responsible Investment**

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**Abstract**

This chapter discusses how energy economics intersects with the practice of responsible investment. It outlines common definitions of responsible investment and the investment needed for an energy transition that will contribute to mitigating the challenges of climate change. Areas for future research within energy economics given this background are highlighted.

**Introduction**

The investment needs within global energy markets over the next few decades are enormous. Estimates vary but broadly coalesce around the need for an additional $1 trillion per annum in investment required in energy infrastructure over the next thirty years. The need to target policy and business interventions to enable capital to flow into these investments is clear. Responsible investment, as a niche, potentially plays an important role in demonstrating markets for these types of investment. Further, responsible investment approaches could underpin future investment growth and provide tools, metrics and processes that allow new investments to be as effective and efficient as possible. The use of economic theory and tools to better explore responsible investment should ensure that the capital flows are better managed and produce maximum impact when deployed.

This chapter firstly outlines the definition of responsible investment before going on to outline the investment needed for the anticipated energy transition. It then explores the sources of capital in current responsible investment vehicles before briefly discussing the role of energy economics and potential areas for future research.

**Definitions of Responsible Investment**

Responsible Investment has its origins in religious groups who screened out investments, and became more mainstream when taken up through political campaigns such as the anti-Vietnam War and anti-apartheid movements (Sparkes, 2002, Renneboog et al., 2008a). This early phase of responsible investment activism focussed on divestment from companies who supported or profited from activities that were not aligned with the beliefs and values of the investors.

The idea of bringing non-financial criteria into investment decision making (Hiss, 2013) frames the approach to responsible investing, however, Responsible Investment is not a well-defined term (Sandberg et al., 2009). While generally speaking it covers any investment that includes non-financial information in the decision making process it is often used to describe a niche market of particular firms and investment vehicles.

The perception of investment managers towards responsible investing depends on whether they view this as a particular investment product or a general approach to investing (Berry & Junkus, 2013). Investment managers tend to view specific responsible investment products sceptically (Berry & Junkus, 2013, Apostolakis et al., 2015). Using the formal Socially Responsible Investing (SRI) definition, a survey of the American Association of Individual Investors (AAII) found that general investors prefer to reward positive practices while SRI investors focus more on excluding investments they deem to be not aligned with the responsible investing (Berry & Junkus, 2013). Therefore, formal Responsible Investment products may be seen as a way of prioritising companies with good environmental or social policies whereas the ethos of responsible investment is more aligned with transitioning the economy towards an overall solution to environment and social challenges. Both approaches have their merits and challenges, and both require an informed engagement between all stakeholders.

If pension beneficiaries are asked about responsible investment, while there may be a preference towards the approach of responsible investment (Apostolakis et al., 2015), there is a lack of financial skills and acumen to be able to make such financial decisions (Borgers & Pownall, 2014), as well as a lack of non-financial technical knowledge (Gatzert & Kosub, 2016). Even where investors have experience of direct investing in projects such as local onshore wind (Gamel & Decker, 2016), they still require a positive environmental attitude to consider such investments.

Initiatives such as the United Nations Principles for Responsible Investment (PRI), whilst being voluntary, have strong backing within the investment community and therefore demonstrate some salience of the issues within responsible investing to that community (Majoch et al., 2017). Although there is no evidence that they view this as an urgent issue. Within the insurance sector, one of the most exposed sectors to the impacts of climate change, there is still limited evidence that an overall approach to responsible investment is being made (Jones & Phillips, 2016).

In this chapter an attempt to define Responsible Investment is therefore not made, rather both specific Responsible Investment products and the broad approaches to investing when environmental, social and governance issues are considered.

**Investment requirements for energy transitions**

The scale of opportunity to invest in solutions that address global sustainability challenges, such as climate change (see Chapter 9 of this book for an exploration of climate change economics), is often seen as a new technology revolution (Linnenluecke et al., 2016). For example, the requirements for capital investment into energy infrastructure, both supply and consumption, over the next few decades are huge. US$270 trillion is due to be invested into the energy system between 2007 and 2050 (IEA, 2009). To meet the climate change targets laid out in the United Nations Framework Convention on Climate Change (UNFCCC) agreements, $1 trillion per annum is required over that timescale.

Over the past few decades resource and energy efficiency have dominated environmental finance (Chapter 5 of this book discusses energy efficiency). Efficiency can be considered a part of a responsible investment approach. Often corporate investment into best practice was done for cost saving purposes rather than any external or specifically environmental driver. However, additional incentives, such as the creation of a trading scheme to put a price on carbon (Convery & Redmond, 2007), have driven more investment into efficiency than would otherwise have occurred.

The challenge of transforming the investment landscape from one based on fossil fuels to a low carbon economy has led many to explore the path dependent nature of those investments (Lovio et al., 2011). There needs to be a significant and active process of driving the required change in investment landscape to move away from this ‘carbon lock in’ (Kemp-Benedict, 2014). One aspect that is helping drive this change is the increased perception of risk that is now demonstrated by a lack of shift away from the high carbon pathway. Theoretical approaches, such as the social cost of carbon (see Chapter 16 of this book), also contribute to a better incorporation of future risks into current economic valuations. Impacts from climate change, biodiversity loss, resource depletion (Jones et al., 2013) that have already occurred have all contributed to an increase in the perception of material financial risk.

Globally, clean energy investment passed US$200 billion in 2010 (Frankfurt School-UNEP Centre, 2013; PEW Charitable Trust, 2010; WEF, 2011) with investments in infrastructure accounting for over half. China saw the highest proportion of this investment at $54 billion. Investments reached almost $350 billion in 2015 although this fell 18% in 2016 (Bloomberg New Energy Finance, 2017) as shown in Figure 1. Investments in Asia still dominate and were just under half of the total investment in 2016. Renewable energy capacity investments in 2016 reached $227 billion with the vast majority being in wind and solar technologies (Bloomberg New Energy Finance, 2017). These investments represent a substantial market and a significant portion of all responsible investment.



Figure 1: Investment in clean energy between 2004 and 2016 (Bloomberg New Energy Finance, 2017)

Despite this large investment market there is clearly a gap between what is required and what is being delivered. In particular developing countries’ requirement for investment is estimated to be in the region of $240-$640 billion per annum by 2030 with only 40% of that currently being invested by both public and private sources (Vivid Economics, 2014b). Private finance is relatively smaller in developing countries than in developed countries. Estimates put private investment at 88% of the total in developed countries and 57% in developing countries (Vivid Economics, 2014b). Additionally, the current global focus in investments is towards energy infrastructure while transport requirements are equally as challenging (see Figure 2). Many scenarios for combating climate change also have a significant role for carbon capture and storage or biofuel (to enable biomass carbon capture and storage) and both of these solutions are also underinvested.

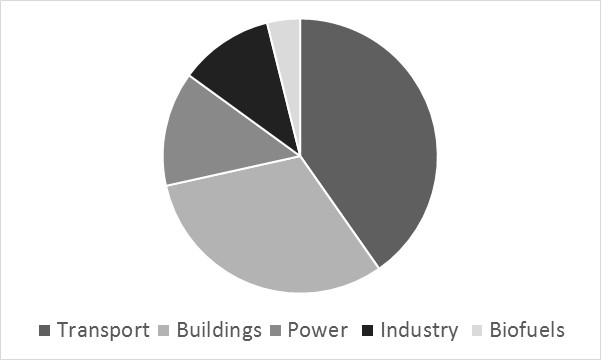


Figure 2: Share of investment needs, by sector, to meet international climate targets (IFC, 2011)

**Sources of responsible investment**

Over the past few years the level of capital flowing into responsible investment has increased dramatically with a six fold increase in SRI funds between 1995 and 2005 to over $3.5 trillion (Renneboog et al., 2008a). The majority of this investment is from institutional investors such as pension funds and insurance companies. Some of this growth has been enabled through the introduction of SRI related regulations (Renneboog et al., 2008a) such as the tax deductions available in the Netherlands for green investments or the 1995 Pensions Act in the UK which requires pension trustees to disclose their engagement with social, environmental and ethical issues. A particular advantage of including such risks into decision making may be an increased portfolio diversification (Wustenhagen & Menichetti, 2009).

There is in addition a number of voluntary actions that have been set up by the finance sector. The UN Principles for Responsible Investment (PRI), for example, can be seen as an organisation which facilitates and mobilises collective action (Gond & Piani, 2012). However, when examining the $216 billion (UNEP, 2018) of climate change related investments globally in 2017, institutional investors (for example, pension funds) are found to be a negligible source of total investment. The majority of investments, over $120 billion, is on balance sheet investment by utilities and energy companies (UNEP, 2018), with a further $90 billion coming from project finance (mainly through equity from project developers such as Invenergy and Ørsted).

As part of the United Nations Climate Summit, led by the United Nations Secretary General, several private investment funds made commitments to increase their investments into low carbon sectors by 2020. Substantive progress was made in the first year (see Table 1).

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| --- | --- | --- | --- |
| Organisation | Original commitment/target | Progress over the last year | Assessment |
| International Cooperative and Mutual Insurance Federation (ICMIF)/ International Insurance Industry | Doubling of ‘climate-smart’ investments to reach $84 billion by COP21, and a tenfold increase by 2020 | $109 billion by July 2015 expected to reach $130 billion by October | Reached initial target |
| Portfolio Decarbonisation Coalition | To mobilize investors to commit to collectively carbon footprint $500 billion of AuMs and to decarbonize $100 billion | Decarbonisation commitment of $63 billion reached, expected to increase to $75 billion by October  Investors have committed via the UNPRI-organised Montréal Pledge to carbon footprint $3 trillion | On track |
| CalSTRS, APG, Pension Danmark | To allocate more than $31 billion to ‘low-carbon’ investments by 2020 | Currently around $29 billion allocated, an increase of $11 billion over the year | On track |
| Swiss Re | Advise 50 sovereigns and sub-sovereigns on climate risk resilience and to have offered them protection of $10bn against this risk | Advice to 9 sovereigns and sub-sovereigns (7 from developing countries) and offered protection to more than $1.5 billion (of which $1.1 billion offered to developing countries) | On track |
| Bank of America | Catalytic Finance Initiative (CFI) - $10 billion of new investment in high-impact clean energy products by 2022 | Closed around 10 deals totalling $1.5 billion (of which $250m from its balance sheet). $400m of deals in emerging markets. | On track |

Table 1: Private sector commitments made during the UN Climate Summit in 2014 and their delivery during the first year (UN, 2015).

The evidence for how SRI funds perform in comparison to other investments is mixed. Some studies show an outperformance (Mallin et al., 1995; Gregory et al., 1997; Sparkes, 2001), while others find that they perform no better than market norms (Bauer et al., 2005) or only outperform when dividend payments are taken into account (Brzeszczynski et al., 2016). There is also some evidence, from US and European SRI funds, that investors may be willing to invest in assets with lower returns if they also meet SRI criteria (Renneboog et al., 2008b). However, there is some degree of scepticism that current responsible investments (Scholtens, 2014) are in fact responsible. Therefore, there appears to be a move towards considering climate risk and other aspects of responsible investment into investment decisions but this has not directly translated into a substantive change in real investment into assets or infrastructure.

There are fiduciary duty related arguments that trustees of institutional funds cannot take social or environmental considerations into account (Sandberg, 2011) other than in very specific cases although there are counter arguments that they are already legally required to do so (Sethi, 2005). Sixty per cent of asset owners, representing $27 trillion in investment, now incorporate some level of climate risk in their decision making processes (Asset Owners Disclosure Project, 2017). This represents a significant change between 2016 and 2017 with 45 asset owners adding climate risk considerations. However, within US asset owners only 0.5% of investment is into low carbon assets (Asset Owners Disclosure Project, 2017).

The private sector will continue to invest significant capital into energy projects over the next few decades and so the issue facing policy makers is how to influence strategic choices towards renewable energy investments and away from conventional energy investment (Wustenhagen & Menichetti, 2012). To really scale up investment into renewable infrastructure long term and stable policy is required (IIGCC, 2011, UNEP & Partners, 2009) and this is seen as lacking by investors (Jones, 2015). Low carbon investments currently offer both opportunities and risks which require a different approach in policy development (Foxon, 2011; Hilden, 2011; Safarzynska et al., 2012). Policy design is critical (Wustenhagen & Menichetti, 2009) with many examples of energy policy to encourage investment in renewables resulting in badly designed markets which in turn leads to retrospective policy changes undermining trust in the investment climate (Jones, 2015).

An important policy request from investors has consistently been for a price to be put on carbon (IIGCC, 2011). As yet there has been no real move towards a global carbon price although various regions have adopted policies to create local markets for carbon. Emissions trading schemes have been set up in various regions and countries around the world. The largest is the European Emissions Trading Scheme (ETS) and, despite issues with allocation of emissions, demonstrates that it is possible to create a carbon market after being launched in 2005 (Convery & Redmond, 2007). However, some have questioned the effectiveness of trading schemes in either achieving the required emissions reductions or carbon price levels (Phelan et al., 2010) to enable a transition to an economy that would solve the climate change challenge. Indeed additional measures have been introduced into the European ETS to stabilise the carbon price (Grubb & Neuhoff, 2006) and proposals for floor prices and other stabilisation mechanisms (Mo et al., 2016) are increasingly put forward for these types of markets.

In the absence of a carbon price the private sector has expressed some hesitation in significantly increasing investments due to a perception of increased risk (Jones, 2015). To counter some of this perception the public and private sectors are working in partnership, creating public-private partnerships and opportunities for blended finance (Vivid Economics, 2014a). By investing alongside the public sector SRI funds should see lower risk and increased market opportunities. However, the majority of these public-private partnerships focus on institutional investors while the largest portion of current investments come from energy companies and project developers (Vivid Economics, 2014a).

**Responsible investment and energy economics**

Classical economic theory (Renneboog et al., 2008a) states that both shareholder value and social value would be maximised together – both financial return and social welfare is maximised. In equilibrium, with fully efficient financial markets, it is also not possible for responsible investments to outperform (or underperform) the market (Knoll, 2002). However, in real markets and modern economic theory, where assumptions on social welfare do not hold, profit maximisation does not lead to social welfare maximisation. Indeed, the use of ‘popular’ models that take into consideration issues including responsibility, as opposed to economic models, could provide some insights into company performance that would allow a degree of market outperformance (Winnett & Lewis, 2000).

Current financial markets operate in such a way that the majority of environmental and social challenges are external (not measured or monetised). While there are moves to monetise environmental capital (Costanza et al., 2014) and bring it into economic theory and financial markets, there are many problems with being able to accurately monetise ecosystem services (Kallis et al., 2013, Temel et al., 2018), in particular where they may be near, or at, a tipping point and thereby exhibit the properties of inelastic demand (Farley, 2008).

Energy economics, in particular econometric methods, is increasingly used to assess approaches to responsible investment. This ranges from understanding the requirements for full energy system transitions to more specific modelling of particular investment opportunities. For example, econometric tools have been used to explore individual’s willingness to invest in green shares in Austria (Getzner & Grabner‐Kräuter, 2004). Econometrics is also used to explore the need for targeted investment alongside other policy interventions such as carbon prices (Kemp-Benedict, 2014).

However, as already discussed, the scale of change required to meet climate change targets represents a transition from a fossil fuel based economy to one predominantly supported by low carbon technologies. This scale of change has been compared to another industrial revolution and as such it requires substantial interventions into policy as well as changes to investment structures. This may represent a challenge for standard economic theory. To counter this new techniques are being developed that can explore this transition. In particular, the study of this transition has incorporated economic understanding by building on evolutionary economics (Nelson & Winter, 1982) as a discipline.

**Research areas for the future**

There is an urgent need to better understand, model and capture lessons from the global shift in energy sources that is needed, and underway. The field of energy economics is of course an important part of developing this understanding. Other chapters in this book outline considerations across the field of energy economics and so this chapter will reflect on the need for specific research that builds on the responsible investment community rather than the wider need for a holistic understanding of the whole energy transition. However, it is important when considering the whole energy transition that any research that really contributes to the necessary solution will, by its very nature, require an interdisciplinary approach. In particular, there is a need to bring together expertise from science and engineering to better understand the technological solutions together with knowledge from social sciences and humanities to better understand the actual mechanisms of transition. Energy economics can contribute to this interdisciplinary endeavour.

As already outlined, responsible investment is not a well-defined term although it often refers to a niche part of the investment community. This niche community has a parallel in the business sector – that of corporate social responsibility. Further research to explore the links between corporate approaches to responsibility and those of investors is required. Over the last few years while the Responsible Investment community has evolved, so too has the Corporate Social Responsibility (CSR) field. The link between Responsible Investment and CSR is still emerging (Sparkes & Cowton, 2004) and it should be noted that both have had criticism for their protective stance. As an approach to business or investment there should be many parallels and lessons to be drawn.

As the clean energy investment market grows we need to gather evidence on the various risks, either real or perceived, of these investments. A key area for research is whether marketing energy infrastructure projects for their ‘green’, or responsible investing credentials, increases or decreases the cost of capital for those projects (Knoll, 2002, Getzner & Grabner-Krauter, 2004).

The use of responsible investment metrics is increasing. Occasionally these are driven by individual firms but often they form part of a wider community level approach. For example, several groups have been set up to facilitate access to data and metrics including the Global Reporting Initiative (GRI), the Asset Owners Disclosure Project (AODP) and the Carbon Disclosure Project (CDP). Such voluntary initiatives allow those within Responsible Investment to collaborate and form a coalition with a much larger voice than individual organisations. The Carbon Disclosure Project (CDP) represents investments of over $100 trillion. However, there is less evidence that these initiatives have driven real change (Kolk, Levy & Pinske, 2008) although there is some evidence that there is a learning effect around how firms report on the greenhouse gas emissions by taking part (Matisoff, Noonan & O’Brien, 2013). Much more research is required to investigate the effectiveness of such initiatives in creating both common standards of practice in responsible investment as well as a real change in energy investment.

Building on the common approach to responsible investment, it is also important to understand how real financial decisions are made. Economic theory and real financial decisions are very different and it is important to understand this difference (Wustenhagen & Menichetti, 2012). While this is a growing field for research we need to explicitly examine responsible investment to expand on the additional aspects of decision making that come to the fore in energy infrastructure investment including risk perceptions associated with new technology and different operational models for running renewable energy infrastructure projects.

The processes involved in responsible investment decisions operate within an ever changing political landscape. A clear picture is needed of how this political landscape influences and interacts with investment and how this may change over the next few decades. For example, Kemp-Benedict (2014) concludes that targeted investment is also required above and beyond carbon prices in particular if investors hedge against the uncertainty of transitioning from ‘brown’ to ‘green’ investment.

Additionally an important area for further research is around the effectiveness and efficiency of public-private partnerships. As the scale of individual investments and capital flows reaches billions of dollars and becomes more globally exposed, particularly in developing countries, it is likely that governments will need to invest alongside private sector capital. There are now some examples of these types of partnerships being set up and operationalised and capturing the new knowledge created in this process to increase both effectiveness and efficiency of public sector funding in future is needed.

**Conclusions**

This chapter has explored responsible investment and the interrelationship between responsible investment and energy infrastructure. Responsible investment, as a term, is most used to indicate a niche part of the investment community which is engaged with a values led approach to investment. Often the responsible investment community is linked to voluntary networks or codes of practice. This type of responsible investment faces a significant challenge, and critique, in being able to scale up investment to meet the challenges of climate change and rising non-renewable energy costs.

However, responsible investment as an approach can be seen as a way to incorporate future risk and economic change into investment decisions. If the responsible investment community can share its learning, and embed its approaches, across all investments then the business as usual landscape looks very different and may support the changes demanded by the challenges that the physical world is now putting onto our financial systems.

New research within the field of energy economics is required to broaden our understanding of economic behaviours, inter-linkages between policy, society and business decisions, as well as the speed of change required to enable the energy transition to a zero carbon world within a few decades. As new investments are made and the sector for low carbon energy infrastructure starts to reach one trillion dollars per year the need to capture lessons, learn from mistakes and develop policy that will underpin and not undermine this shift, will be vital. Creating public-private partnerships for sharing risks, investments and, importantly, knowledge is a key requirement to unlock this future.

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