

An exploration of low carbon investment by Institutional Investors: The case of Germany, Ireland and the UK

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Abstract

The transition to a low carbon economy in line with climate change agreements gives rise to an investment gap of \$480 billion per year up to 2030. Meeting such commitments will require increased investment from institutional investors who currently provide less than 1% of total global finance directed towards the climate change agenda, despite having long-term funds at their disposal. Exactly why this large investor class accounts for such a tiny portion of low carbon investment remains largely unexplored.

This research seeks to explore key influences underpinning institutional investing in low carbon assets using a conceptual framework which incorporates strands of behavioural finance, traditional finance and institutional theory. The study will be conducted across Germany, Ireland and the UK capturing a diverse mix of jurisdictions. Documentary analysis will be used to gain insights into policy and practitioner literature to low carbon investing while semi-structured interviews will be carried out with policy makers and managers from the investment community. Our analysis includes three levels: national/political/EU, industry associations and institutional investors to get a holistic insight into the influences/forces shaping low carbon investment.

This research will contribute to the literature on low carbon investment which to date has mostly been confined to the renewable energy sector. Incorporating behavioural factors as a theoretical lens is new and provides a fresh and largely unexplored insight into the decision-making process of institutional investors. Moreover, fusing the behavioural dimension alongside the more traditional finance and institutional theories in probing investors' attitudes and behaviour is novel. Finally, this research will contribute to policy by enhancing our understanding of the interplay of forces at work in the eyes of investors, an unexplored area of research to date. This greater understanding of what influences investors should serve as a basis for improving low carbon policies.

Keywords: institutional investor; low carbon investment; behavioural finance; institutional theory.

EFM Classification: 320,370

Abbreviations Used

AUM	Assets under Management
DB	Defined Benefit
DC	Defined Contribution
ESG	Environment, Social and Governance
ESRB	European Systemic Risk Board
EU	European Union
EU-ETS	European Union Emissions Trading Scheme
GHG	Greenhouse Gas Emissions
IAAM	Irish Association of Asset Managers
IEA	International Energy Agency
RE	Renewable Energy
R&D	Research and Development
RD&D	Research, Development and Deployment
SDGs	Sustainable Development Goals
SRI	Socially Responsible Investment
SWF	Sovereign Wealth Funds
UN	United Nations
UNFCCC	UN Framework Convention on Climate Change
UNPRI	UN Principles of Responsible Investment

Research Focus

This study aims to explore the decision-making processes of institutional investors in the low carbon agenda in Europe; in particular, institutional investors in Germany, Ireland and the UK. A unique conceptual framework has been devised which draws on theories from behavioural finance, traditional finance and institutional theory which will enhance our understanding of ‘why’ and ‘how’ institutional investors invest/do not invest in the low carbon agenda. This study will thus provide insights into the drivers and motivations that will push future investment by the private sector and the challenges that they face.

This research will use a mixed methods approach to answer four specific questions:

1. What is the extent of low carbon investment by institutional investors in Germany, Ireland and the UK?
2. How do institutional investors in Germany, Ireland and the UK invest in low carbon assets?
3. Why do institutional investors in Germany, Ireland and the UK invest, or not, in low carbon assets?
4. What are the influences and forces driving low carbon investment?

Firstly, documentary analysis will draw on national and international policy and practitioner literature in the low carbon investment field to explore both the extent and the methods of investment in low carbon by institutional investors. Secondly, semi-structured interviews will be used to garner the influences on institutional investors and their perceptions of low carbon investment. Institutional investors are heterogeneous with different investment objectives and approaches. Semi-structured interviews will allow us to gather insights into how they view the economics of sustainability, what are the opportunities they envisage and any fears and concerns that they hold for low carbon investing. Research question one and two will be answered for the most part by the documentary analysis but will use the semi-structured interviews to clarify the results. Research question three and four will be answered using an analysis of the semi-structured interviews.

The analysis will be conducted across three jurisdictions, Germany, Ireland and the UK. Germany represents a mature market with low carbon featuring there since the 1970s while the UK was the first country to set a legally binding emissions target with the introduction of the UK Climate Change Act in 2008. This act requires the UK government to set legally binding carbon budgets every five years with the latest recommendation to be net zero carbon emissions

by 2050 (Committee on Climate Change, 2019); they are included as having a rapidly changing low carbon regime. The third country, Ireland is included as an emerging market. The first Irish green sovereign bond was issued in October 2018. The Irish Strategic Investment Fund (ISIF), Ireland's SWF became the first SWF to divest from fossil fuels following the introduction of the Fossil Fuel Divestment Bill to the Dail in July 2018 (O'Sullivan, 2018).

Rationale and motivation

Climate change affects the quality of life and disrupts national economies (UN, 2017) as the last three decades has seen successively warmer temperatures; sixteen of the seventeen warmest years on record have occurred since 2001 (NASA, 2017). This has the potential to cause catastrophic events (US EPA, 2016; IPCC, 2014). Reducing greenhouse gas emissions (GHG) is crucial to addressing climate change. Central to this is limiting carbon dioxide (CO_2) and in particular, carbon which is emitted from the burning of fossil fuels such as oil, gas and coal. Efforts to mitigate against climate change have culminated in international agreement to limit global warming this century to $1.5^\circ C$ above pre-industrial levels (UNFCCC, 2015).

Table 1 overleaf outlines the timeline of international action from its starting point in the 19th century through to the Paris climate agreement in 2015. Three significant points of note in this history are;

1. The 1997 Kyoto protocol; the first commitment by nations to reaching outlined targets recognising that people and their actions were responsible for the increased levels of carbon emissions leading to global warming and climate change.
2. The launch of the European Union – Emissions Trading Scheme (EU-ETS) in January 2005; this foundation of the EU's climate change policy is still the largest emissions trading scheme in the world.
3. The Paris Agreement in 2015; adopted by 197 nations and ratified by 185 nations as of April 2019 (UNFCCC, 2019). The central aim of this agreement is to limit global warming this century to $1.5^\circ C$ above pre-industrial levels.

Date	Action	Major outcome/effect
1873	International Meteorological Organisation (IMO) established	The first body to focus on climate information
1950	IMO transformed into the World Meteorological Organisation (WMO)	Facilitated the exchange of weather-related information across national borders and aimed to foster international co-operation
1972	United Nations Environment Program (UNEP) established	Set the global environmental agenda and was to advocate for the global economy
1988	Intergovernmental Panel on Climate Change (IPCC) established by UNEP and WMO	An international body tasked with assessing the science related to climate change
Nov 1990	IPCC published its first report	Declared that emissions resulting from human activities are increasing the levels of greenhouse gases (GHG) in the atmosphere (IPCC, 1990).
Dec 1990	UN General Assembly formed the Intergovernmental Negotiating Committee (INC)	Tasked with establishing a framework convention on climate change
1994	United Nations Framework Convention on Climate Change (UNFCCC) established	
1995	The first meeting of the Conference of the Parties (COP 1)	Berlin mandate established a process to negotiate firm climate-related commitments for developed countries
1997	Kyoto protocol	First commitment by members to reaching outlined targets
July 2001	Breakthrough achieved in Bonn	Governments reached a broad political agreement on the operational rulebook for the Kyoto agreement
Nov 2001	Marrakesh Accords	Formalised agreements on operational rules for the three market-based mechanisms International emissions trading, Clean Development Mechanism (CDM) and Joint Implementation leaving the way clear for ratification of the Kyoto agreement
Jan 2005	European Union Emissions Trading Scheme (EU-ETS) launched	The first and still the largest emissions trading scheme in the world (European Commission, 2016)
Feb 2005	Kyoto protocol enters into force	
2007	4 th IPCC report is published	Stated that global warming is unequivocal and later that year the IPCC is jointly awarded the Nobel Peace Prize with Al Gore
2011	Durban meeting	Governments commit to a new universal climate change agreement
2012	Doha meeting	Governments agree to find ways to scale up efforts before 2020 on their climate pledges
2015	Paris agreement is adopted	195 nations agree to combat climate change and invest towards a low carbon sustainable future

Table 1: Evolution of climate change action.

Source: UNFCCC (2014)

Europe is at a critical juncture in meeting these ambitious Paris 2015 agreement targets; Eurostat (2018) find that the European Union (EU) share of renewable energy (RE) is at 17%, 3% below this 2020 target of 20% with only 11 member states reaching this target – managing

the additional requirements to transition to a low carbon society in an era of sluggish economic growth has been challenging (Campiglio, 2016).

Further investment is fundamental to achieving these targets with an estimated investment gap of \$480 billion per year up to 2030 (McCollum et al., 2018). Furthermore, the European Systemic Risk Board (ESRB) warn that if there is a “late and sudden transition to a low carbon economy” it will lead to increased costs (Advisory Scientific Committee, 2016, pg. 5). However, climate finance investment levels remained largely static between 2010 and 2016 (Buchner et al., 2012, 2017). A slight bounce in investment levels in 2015 may be attributed to the Paris 2015 international climate accord putting the issues front and centre in media and information sources. The heart of the issue is that if the Paris agreement is to succeed, then the levels of investment need to increase dramatically.

Exactly how the scale of this investment will be financed is currently a matter for debate especially given a landscape of diverse actors with differing motives. Della Croce, Kaminker, and Stewart (2011) assert that public investment in the low carbon agenda will not suffice. Curtin, McInerney and Ó Gallachóir (2017) claim that traditional forms of finance, namely financial institutions, utility companies and other businesses, will not fill the low carbon investment gap meaning new sources of investment are warranted. The European Commission (2018a) echo the assertions of Della Croce *et al.* (2011) that private investors, particularly institutional investors, are vital in increasing investment levels.

The term institutional investor is wide-ranging, but they do share common features; they invest on behalf of others, and they have substantial funds for investment with regular inflows adding to their investment pool (Ahmad, Ibrahim and Tuyon, 2017). This study uses the definition by Nelson and Pierpont (2013, p. 6) of institutional investors that includes insurance companies, pension funds, foundations, endowments, sovereign wealth funds, and investment managers. However, the exploratory nature of the research will allow for an adaptation of key concepts as data is analysed.

Institutional investors are estimated to have \$96 trillion in assets with \$51.7 trillion of this available for long-term investment (Huxham et al., 2017). Although these investors invested an extra \$2 billion in 2015, this represents less than 1% of total new investment in climate finance globally (Buchner et al., 2017). Precisely why this large investor class accounts for such a minor portion of the climate change investment to date remains largely unexplored.

Hence, in exploring institutional investment in low carbon assets, this study bridges an important research gap and is timely given the recognition that transition to a low carbon economy cannot happen without involving institutional investors (Polzin et al., 2015).

Proposed Contribution/s

This research will generate findings relevant to a wide range of stakeholders including academics, practitioners, policymakers, and society as a whole and will serve as the basis for interdisciplinary research in environmental finance in the future. The contribution is threefold as follows;

First, it will contribute to existing body empirical work by focusing on an investor class which has largely been neglected i.e. the institutional investor (Bergek, Mignon and Sundberg, 2013). Few studies to date focus on institutional investors in the context of low carbon investment apart from della Croce, Kaminker and Stewart (2011) who examine global pension funds in financing green growth, Kaminker and Stewart (2012) who consider institutional investors in financing clean energy globally and Masini and Menichetti (2012) who consider behavioural factors in renewable energy investment decisions by investors in European countries.

Second is a contribution to theory. Incorporating behavioural factors in the low carbon agenda is new and facilitates the provision of a more holistic insight into the decision-making process of institutional investors. The approach is novel as behavioural dimensions are incorporated alongside traditional finance frameworks in probing investors' attitudes and behaviour. Furthermore, it responds to Nilsson *et al.* (2011) and Lane and Montgomery (2014) who call for the inclusion of institutional theory into the study of the low-carbon transition. Additionally, the combination of theories can in itself be "an important source of theoretical rejuvenation" (Modell, Vinnari and Lukka, 2017, p. 63).

Third is the contribution to policy development. This research will enhance our understanding of the interplay of forces at work via the lens of investors, an unexplored area of research to date. This greater understanding of investors perceptions will be of interest to governments, EU officials, the investment community and society as a whole. This study will gain insights into the incentives and motives which are pushing investment by the private sector in low carbon projects. Furthermore, it will help provide an understanding of the barriers and deterrents to low carbon investing by institutional investors.

Finally, this research is timely especially given the increasing focus on sustainable finance particularly at EU level. Recently the EU High-Level Expert Group developing the EU action plan for financing sustainable growth argued that the incorporation of Environment, Social and Governance (ESG) factors into the decision-making process for investors were an urgent imperative (EC HLEG, 2018). Furthermore, legislative proposals were tabled by the EU in 2018 (Q4) to clarify the duties of institutional investors concerning incorporating ESG factors. They further propose to examine the inclusion of climate-related risks into the prudential requirements of the insurance industry in late 2019.

Conceptual Model and Theoretical Perspective

To date, a literature review has been carried out resulting in the proposed conceptual framework illustrated in Figure 1 below.

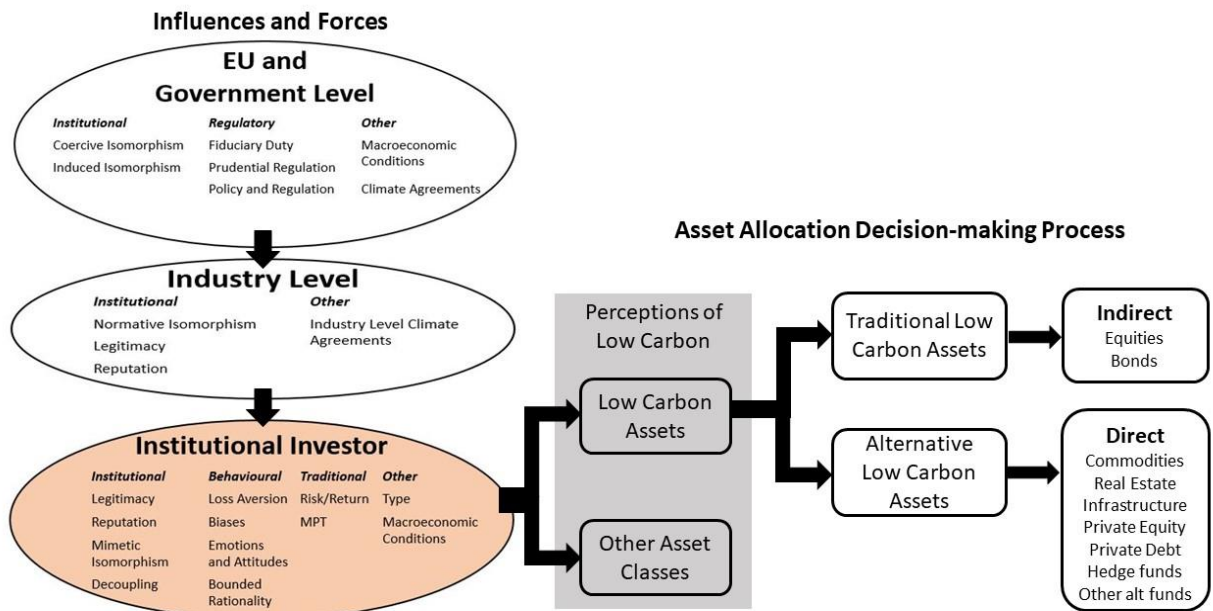


Figure 1: Proposed Conceptual Model

This conceptual framework has been devised around three pillars, traditional finance, behavioural finance and institutional theory as illustrated in Figure 2.

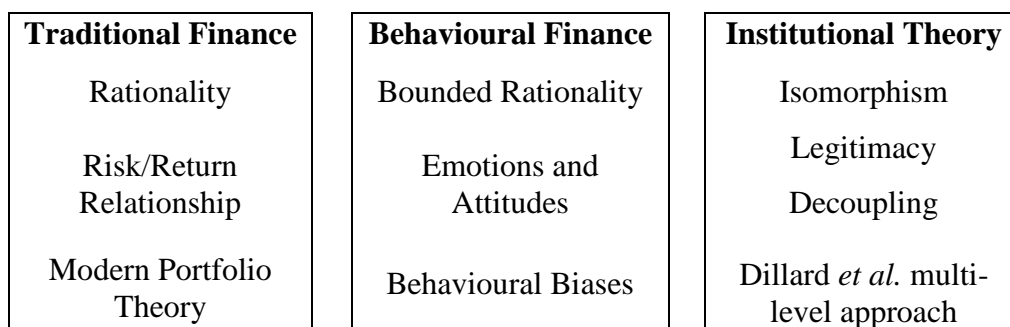


Figure 2: Proposed Theoretical Framework

Rationality is a mainstay of the first pillar, Traditional Finance. Underpinning this theory is a rational economic agent who has all the information required to rank and make choices to maximise their utility (Simon, 1955). These agents can update their beliefs arising from any new information leading the market to settle at an equilibrium position providing an efficient market. Investment decisions in an efficient market are based on a risk-return relationship. Low carbon assets can suffer from augmentation to risk profiles due to factors including the capital-intensive nature of projects, the relative immaturity of the industry, the dependence on support, both political and public, and a lack of availability or pipeline of projects (Campiglio, 2016; Huxham et al., 2017). However, direct investments in low carbon projects have long-term payback periods and are relatively illiquid; thus they may hold a greater appeal for some institutional investors.

Modern Portfolio Theory (MPT) proposed by Markowitz (1952) considers the risk and return of an overall portfolio rather than individual investments. The overall picture of risk and return for an entire portfolio is generated given the degree of correlation between assets. Thus, correlations are crucial, and a significant advantage of low carbon assets is that they exhibit low correlation to traditional assets such as bonds and equity.

Some anomalies present in the real-life behaviour of investors that are not recognised per se under the traditional theory. In reality, investors make decisions that at the very least question the idea of rationality while in some cases contradicting it completely. Thus, the second pillar, Behavioural Finance does not assume investors are rational but instead proposes a situation of bounded rationality where decisions are made in a limited sphere, the convergence between psychology and economics (Simon, 1955). This limited sphere is generated by the attitudes, emotions and biases of the investor.

Investment in low carbon assets is filled with uncertainty and investors are making investment decisions while trying to minimise the perceived risks associated with this uncertainty. Work

by Aren, Aydemir and Şehitoğlu (2016), Suto and Toshino (2005) and Sewwandi (2016), on low carbon investment show the biases which prevail include home bias, overconfidence, a disposition effect and herding. These biases, along with loss aversion, colour the perceptions that investors hold on risk and return for investments. Further empirical work on RE illustrate that these biases, along with the uncertainty of the environment and investors attitudes and experiences impact the risk-return relationship proposed by traditional finance (Wüstenhagen and Menichetti, 2012; Masini and Menichetti, 2012; Buerer et al., 2009; Bergek, Mignon and Sundberg, 2013).

The third pillar, Institutional Theory considers the social rather than the economic influences to explain behaviour that challenges rationality (Suddaby, 2013). Di Maggio and Powell's (1983) seminal work proposed that isomorphism, the situation whereby organisations appear to converge to a state of sameness, can be explained by three differing forces, namely, coercive, mimetic and normative. Scott (1987) provided a fourth force of inducement.

Coercive isomorphism explains how external factors such as government policy and regulations force an organisation to adapt its internal structures and procedures (Moll, Burns and Major, 2006). Mimetic isomorphism results from copying structures and procedures adopted by other organisations (Di Maggio and Powell, 1983). Jalaludin *et al.* (2011) propose that mimetic processes are a standard response to uncertainty. In particular, climate change creates uncertainty leading organisations to copy those that they feel are coping with this increased uncertainty. Di Maggio and Powell (1983) note that modelling, the practice of borrowing from another organisation, may be unintentional and can occur via the turnover and transfer of staff between organisations. Normative isomorphism explains how umbrella organisations or professional bodies impose standards into their member organisations forcing them to become more alike (Di Maggio and Powell, 1983). Finally, isomorphism that is forced by inducement. Incentives are often linked to the conformity of an organisation towards an agent's conditions, such as funding agencies. The longevity of the conformity can be related to the number of agencies to which an organisation is answerable, the proportion it takes of the overall funding of the organisation and the length of time of the support itself. Scott (1987) argues that the conformity is more likely to be visible in the output of an organisation such as their accounts rather than in its organisational structures.

These different levels of influence are one compelling reason to use the multilevel framework of Dillard *et al.* (2004). The investment landscape in the field of low carbon comprises diverse

actors with differing motives; “investment decisions ... do not depend only on the investor” (Ozorhon et al., 2018, p. 219). These stakeholders are split into three levels of influence. At the upper level is the public influence of the EU, national governments and development banks. Under this sits the professional and umbrella organisations. The final level is that of the private investor who in this study is the institutional investor. This framework allows for institutional theory to be expanded into a socio-economic and political context as the original theory neglected the “role of power and interest groups” (Dillard *et al.*, 2004, p. 510). In low carbon investment coercive and induced isomorphism results from pressures at EU and national governments including macroeconomic conditions, regulation, policy, climate agreements and nationally determined contributions. Normative isomorphism arises as pressure from industry level organisations, and mimetic isomorphism occurs at the institutional investor level.

Legitimacy, “a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions” may be a significant influencer in low carbon investment decisions (Suchman, 1995, p. 574). Studies have shown legitimacy to be valuable, organisations perceived as environmentally illegitimate exhibit greater share price volatility (Bansal and Clelland, 2004) while those appearing more legitimate have access to cheaper equity financing (Mazzi et al., 2017; Zhou, Simnett and Green, 2017). The idea of mimetic isomorphism can also be tied to legitimacy; the adopting organisation is attempting to show society that they are trying to address issues that form part of the social debate; “Organisations tend to model themselves after similar organisations in their field that they perceive to be more legitimate or successful”, (Di Maggio and Powell, 1983, p. 152). Bebbington *et al.* (2008) illustrate that legitimacy and reputation are interlinked; they share the same antecedents. Furthermore, management of reputational risk leads to an increase in voluntary disclosures and thus legitimacy is attained. Institutional investors such as pensions and insurance companies rely heavily on a corporate image to attract new business.

Meyer and Rowan (1977) suggest that the conformity of organisations to the social rules and norms may be ceremonial; this is called decoupling. A situation where there may be a gap between sustainability talk and practice. Cho *et al.* (2015) maintain that organisations are subjected to conflicting demands arising from heterogeneity in stakeholder groups. This leads the organisation to “construct and maintain several discrepant facades” (Cho *et al.*, 2015, p. 90). Lyon and Delmas (2018, p. 1) point to the “corporate hypocrisy” of “talking green while lobbying brown”. Lyon *et al.* (2018, p. 8) go further by stating that Corporate Political

Responsibility (CPR) “may be the most important element of a company’s sustainability strategy”. The problems that arise are not necessarily the actions of the lobbying but rather the lack of transparency, this lack of transparency is an attempt to keep shareholders and citizens in the dark about the true intentions of a corporations view on sustainability (*ibid*).

Added to this theoretical framework are the additional influences related to types of institutional investor. The term institutional investor as defined earlier, is wide-ranging and refers to legal entities involved in collective investment vehicles rather than individuals. Institutional investors have different investment objectives and approaches to how they invest. Table 2 overleaf summarises the main characteristics of institutional investors along with how they typically invest and their theoretical fit for investment in the low carbon agenda.

The rightmost column in Table 2 suggests that there are institutional investors who may be more suited to low carbon investing. Firstly, life insurance companies have long-term realistic predictions of liabilities making it an ideal fit for low carbon investment. Secondly, Pension schemes; defined benefit schemes have long-term horizons and lower liquidity requirements making them an ideal fit. Pension funds are further characterised by location, size, ownership and the age of its members, all which impact on investment strategies. Schemes with older members will have reduced appetites for risk, well-funded schemes may have a greater appetite, and underfunded schemes may be chasing higher returns thus face increased risks. Finally, Sovereign Wealth Funds (SWF) have mandates that give them a different position in the market. While the risk/return relationship is still the critical factor, they do have the ability to provide direct funding at the early stages of development. This contrasts with most other institutional investors who become involved in the commercialisation phases. However, for SWF to be successful in low carbon, it is necessary for them to build up the expertise that allows them to fully understand and incorporate risk into return within the sector (Tonkonogy et al., 2018). SWF are classified by Petrova *et al.* (2011, p. 3) as “stabilization funds, savings funds, pension reserve funds or reserve investment corporations” with the majority of funds falling into the first two categories. The type of SWF will have implications on both investment objectives and investment horizons; reserve funds tend to hold more liquid assets; savings funds are expected to have longer horizons than stabilisation funds and pension funds need to match horizons with expected future liabilities (*ibid*).

Institutional Investor type	Investment Objective	Typical size of funds	Investment style	Return requirement or Risk tolerance	Liquidity Requirements	Asset allocation	Theoretical fit for low carbon investment?
Insurance Companies	Lowering insurance costs and improving profits	Dominated by large companies	Large insurance companies use direct investment teams Smaller firms rely on external asset managers and collective investment vehicles	Low to Mid	Non-life insurance has higher requirements Life insurance has low requirements	Dominated by fixed income including large allocations to sovereign fixed income	Non-life insurance has high liquidity needs and short-term horizons so not a good fit Life insurance have long-term horizons and fewer liquidity constraints making them an ideal fit
Pension Funds	Providing pensions for members	A mix of large and smaller fragmented funds	Large pension funds have direct investment teams, but most firms rely on external asset managers and collective investment vehicles	Low to Mid	Defined contribution have higher requirements Defined benefit have low requirements	Allocation leans towards equities	Defined contribution schemes have a higher liquidity requirements. Defined Benefit schemes have long-term horizons and lower liquidity requirements making them an ideal fit
Endowments and Foundations	Supporting the activities of the organisation or institution in the long-term	Relatively small funds	Largely rely on external asset managers and collective investment vehicles	Mid to High	Low	Allocation leans towards equities	Time horizons vary as do liquidity requirements however they may be a fit through third-party funds
SWF	Providing benefits to current and future residents Stabilising national wealth and stimulating economic growth	Varies by location, small but growing class	A mix of direct investment and use of external asset managers.	Depends on Context	Depends on Context	Allocation leans towards equities	Time horizons can vary, their mandate of supporting economic growth and early-stage projects make them an ideal fit for low carbon investment.
Investment Managers	Exceed (or at least track) benchmarks Objectives can vary based on the representative funds	A mix of funds and sizes, several large asset management firms with a variety of funds	Direct investment consistent with fund objectives	Depends on Context	High	Mix reflects market demands	Liquidity needs are relatively high thus they tend not to be a good fit for low carbon investments for most funds

Table 2: Institutional investor characteristics. Source: Nelson and Pierpont (2013) and Tonkonogy et al. (2018)

In summary, what is evident is the heterogeneity among institutional investors. This heterogeneity relates to their characteristics thus informing their investment style. The characteristics that inform investment decisions include; size, the appetite for risk, time horizons, liquidity needs and mandates. The size of the institutional investor has important implications for the decision to develop in-house expertise or to outsource to investment managers.

Institutional investors do not operate in a vacuum. Like all other members of the investment community, they are subject to a range of necessary regulations. Differences in the duties and responsibilities of institutional investors may arise based on the economy within which they operate. The orientation of an economy towards either capital markets or banks has significant implications for investors. Antoniou *et al.* (2008) advise that capital market-oriented economies provide a higher level of transparency and investor protection than the corresponding bank-oriented economies. Differing legal traditions often accompany the differences in the orientation of the markets; common law or code law. The reality of these two distinct systems is evident in the tax systems, corporate governance practices and insolvency rules (Antoniou *et al.*, 2008). Both fiduciary duty and prudential standards are frameworks within which financial stability and the regulation of the sector can occur.

Despite differences in contexts, fiduciaries face the same trials; when one person is acting on behalf of another, they cannot act out of self-interest, irresponsibly or recklessly. The fundamentals of fiduciary duty as it has evolved are applicable in both common law and civil law societies (Hawley, Johnson and Waitzer, 2011). The OECD (2017) asserts that although institutional investors are not subject to the same legal concept of fiduciary duty in all jurisdictions, they face similarity in their obligations. They stress that these similarities manifest themselves in three ways; a “duty of care and a duty of loyalty” towards beneficiaries; a focus on “behaviour” and practices rather than “outcomes”; and an understanding of fiduciary duty that is “flexible and adaptable” (OECD, 2017, pg 45). The legal position in consideration of fiduciary duties has been to look only to the financial interests of beneficiaries. This interpretation, however, is dynamic and rapidly evolving (Hawley *et al.*, 2011). Institutional investors are increasingly looking beyond the economic data in an attempt to integrate ESG factors into their decision-making processes (OECD, 2017). The Fiduciary Duty in the 21st Century project by the UNEP –Finance Initiative (UNEP-FI) “reflects on the changing landscape of fiduciary duty” in a bid to “achieve full incorporation of Environmental, Social

and Governance (ESG) issues” (UNPRI, 2017, p. 2). They state that old-fashioned views of fiduciary duty need to make way for progress towards a low carbon economy.

In addition to fiduciary duty obligation, all investment firms operating in the EU are subject to prudential standards or rules. The goal of prudential standards is to provide a level of stability to the financial sector and is achieved by EU regulations and directives (Remac, 2017). These regulations and directives require that investment firms have enough finance in reserve to meet obligations, thus managing risk in a financially responsible manner (*ibid*). The prudential rules for investment firms at an EU level are part of an overall prudential framework, and they aim to ensure that investment firms (including institutional investors) set their investment strategies to meet current and future financial commitments (European Commission, 2018b).

Moving to the right-hand side of the conceptual framework involves a consideration of the mechanics of how institutional investors create a portfolio of investments. Some factors appear to encourage or ‘push’ investors towards low carbon investments as well as those that appear to discourage or ‘pull’ investors away from these investments. These factors colour the perceptions that institutional investors have of low carbon investments. These are summarised below in Figure 3.

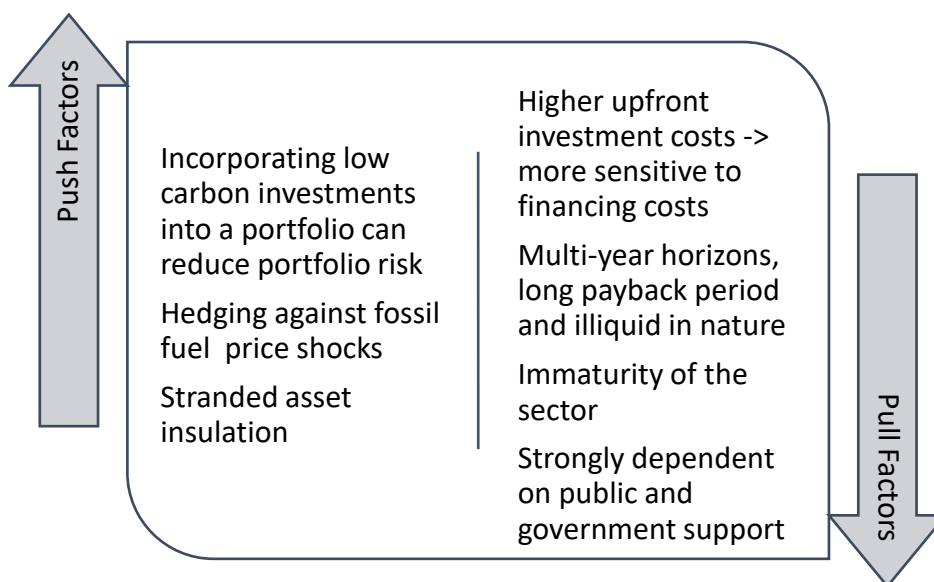


Figure 2: The ‘Push’ and ‘Pull’ Factors for Low Carbon Investment

Source: Bhattacharya and Kojima (2012); Baron and Fischer (2015); Grant (2018); Nelson and Shrimali (2014); Liu and Zeng (2017); Schmidt (2014); Frisari et al. (2013); Hall, Foxon and Bolton (2017); Campiglio (2016); Boomsma and Linnerud (2015)

In order to answer the four research questions presented in the opening section of this paper they are linked to the proposed conceptual framework as follows;

Question one and two measuring the extent and how institutional investors invest in low carbon assets will be answered in the processes on the right hand side of the proposed framework. These will be measured primarily via documentary analysis but will be supplemented by the semi-structured interviews. Questions three and four will be answered in the analysis of the semi-structured interviews and will test the influences and forces that are illustrated on the left hand side of the model.

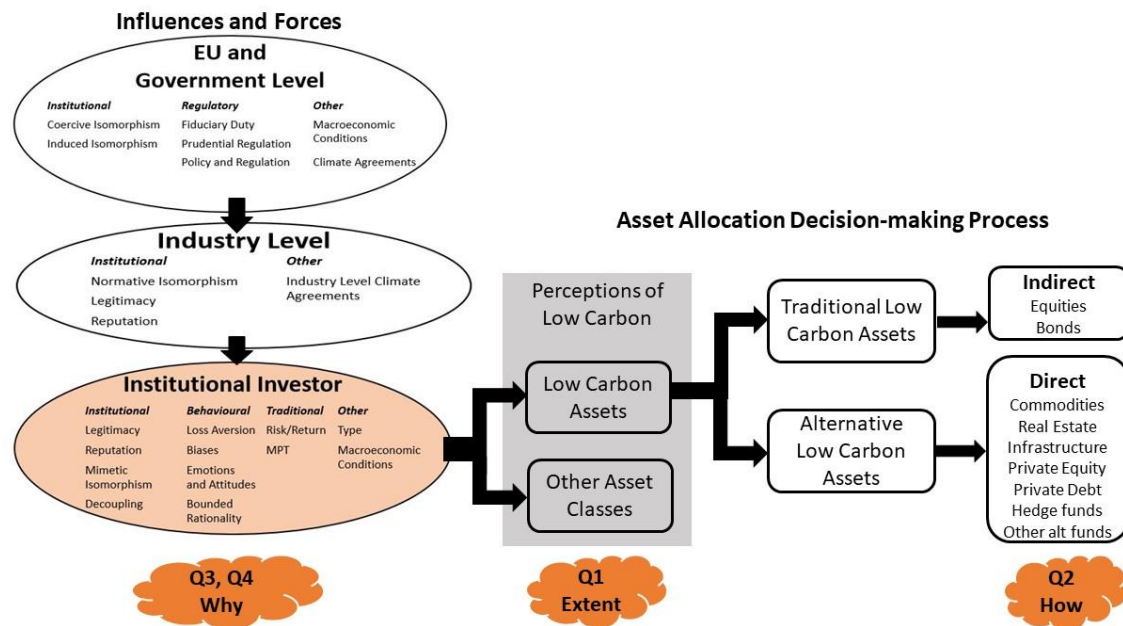


Figure 3: Proposed Conceptual Model with Research Questions

Next Steps

Indicative Start Date	Task	Subtask
May/June 2019	Data Collection	Exploratory and pilot interviews
June 2019	Data Analysis	Transcription of interviews and analysis of exploratory and pilot interviews in NVivo
June 2019	Documentary Analysis	
September 2019	Confirmation Panel	
October 2019	Data Collection	Interviews with institutional investors
October/November 2019	Data Analysis	Transcription of interviews and analysis of interviews in NVivo
2019/2020	Chapter completions	

Table 3: Indicative timetable moving forward 2019/2020

References

- Advisory Scientific Committee, 2016. Too late, too sudden: Transition to a low-carbon economy and systemic risk. *European Systemic Risk Board Advisory Scientific Committee*, [online] (6). Available at: <https://www.esrb.europa.eu/pub/pdf/asc/Reports_ASC_6_1602.pdf>.
- Ahmad, Z., Ibrahim, H. and Tuyon, J., 2017. Institutional investor behavioral biases: syntheses of theory and evidence. *Management Research Review*, 40(5), pp.578–603.
- Antoniou, A., Guney, Y. and Paudyal, K., 2008. The Determinants of Capital Structure : Capital Market-Oriented versus Bank-Oriented Institutions. *The Journal of Financial and Quantitative Analysis*, 43(1), pp.59–92.
- Aren, S., Aydemir, S.D. and Şehitoğlu, Y., 2016. Behavioral biases on institutional investors: a literature review. *Kybernetes*, 45(10), pp.1668–1684.
- Bansal, P. and Clelland, I., 2004. Talking Trash : Legitimacy , Impression Management , and Unsystematic Risk in the Context of the Natural Environment. *The Academy of Management Journal*, 47(1), pp.93–103.
- Baron, P.R. and Fischer, D., 2015. *Divestment and Stranded Assets in the Low-carbon Transition*. [online] Available at: <[https://www.oecd.org/sd-roundtable/papersandpublications/Divestment and Stranded Assets in the Low-carbon Economy 32nd OECD RTSD.pdf](https://www.oecd.org/sd-roundtable/papersandpublications/Divestment%20and%20Stranded%20Assets%20in%20the%20Low-carbon%20Economy%2032nd%20OECD%20RTSD.pdf)>.
- Bebbington, J., Larrinaga, C. and Moneva, J.M., 2008. Corporate social reporting and reputation risk management. *Accounting, Auditing & Accountability Journal*, 21(3), pp.337–361.
- Bergek, A., Mignon, I. and Sundberg, G., 2013. Who invests in renewable electricity production? Empirical evidence and suggestions for further research. *Energy Policy*, 56, pp.568–581.
- Bhattacharya, A. and Kojima, S., 2012. Power sector investment risk and renewable energy: A Japanese case study using portfolio risk optimization method. *Energy Policy*, 40(1), pp.69–80.
- Boomsma, T.K. and Linnerud, K., 2015. Market and policy risk under different renewable electricity support schemes. *Energy*, 89, pp.435–448.
- Buchner, B.K., Falconer, A., Hervé-Mignucci, M. and Trabacchi, C., 2012. *The Landscape of Climate Finance 2012*. [online] Available at: <<https://climatepolicyinitiative.org/wp-content/uploads/2012/12/The-Landscape-of-Climate-Finance-2012.pdf>>.
- Buchner, B.K., Oliver, P., Wang, X., Carswell, C., Meattle, C. and Mazza, F., 2017. *A CPI Report Global Landscape of Climate Finance 2017*. [online] Available at: <<https://climatepolicyinitiative.org/wp-content/uploads/2017/10/2017-Global-Landscape-of-Climate-Finance.pdf>>.
- Buerer, M.J., Wuestenhagen, R., Buerer, M.J. and Wuestenhagen, R., 2009. Which renewable energy policy is a venture capitalist's best friend? Empirical evidence from a survey of international cleantech investors. *Energy Policy*, 37(12), pp.4997–5006.
- Campiglio, E., 2016. Beyond carbon pricing: The role of banking and monetary policy in financing the transition to a low-carbon economy. *Ecological Economics*, 121, pp.220–230.
- Cho, C.H., Laine, M., Roberts, R.W. and Rodrigue, M., 2015. Organized hypocrisy,

organizational façades, and sustainability reporting. *Accounting, Organizations and Society*, 40, pp.78–94.

Committee on Climate Change, 2019. *Net Zero The UK 's contribution to stopping global warming*.

della Croce, R., Kaminker, C. and Stewart, F., 2011. *The Role of Pension Funds in Financing Green Growth Initiatives - Papers - OECD iLibrary*. Finance, Insurance and Private Pensions. [online] *OECD Publishing*. Paris. Available at: <http://www.oecd-ilibrary.org/finance-and-investment/the-role-of-pension-funds-in-financing-green-growth-initiatives_5kg58j1lwdjd-en>.

Curtin, J., McInerney, C. and Ó Gallachóir, B., 2017. Financial incentives to mobilise local citizens as investors in low-carbon technologies: A systematic literature review. *Renewable and Sustainable Energy Reviews*, 75, pp.534–547.

Dillard, J.F., Rigsby, J.T. and Goodman, C., 2004. The making and remaking of organization context: Duality and the institutionalization process. *Accounting, Auditing & Accountability Journal*, 17(4), pp.506–542.

European Commission, 2016. *The EU Emissions Trading System (EU ETS) | Climate Action*. [online] Available at: <https://ec.europa.eu/clima/policies/ets_en>.

European Commission, 2018a. *Capital Markets Union - Banking and finance - European Commission*. [online] Newsletter. Available at: <http://ec.europa.eu/newsroom/fisma/item-detail.cfm?item_id=632028&newsletter_id=166&utm_source=fisma_newsletter&utm_medium=email&utm_campaign=Finance &utm_content=Sustainable finance&lang=en>.

European Commission, 2018b. *Prudential rules for investment firms | European Commission*. [online] Available at: <https://ec.europa.eu/info/business-economy-euro/banking-and-finance/financial-supervision-and-risk-management/managing-risks-banks-and-financial-institutions/prudential-rules-investment-firms_en>.

European Commission the High-Level Expert Group on Sustainable Finance, 2018. *Financing a Sustainable European Economy. European Commission*, [online] pp.1–100. Available at: <https://ec.europa.eu/info/sites/info/files/180131-sustainable-finance-final-report_en.pdf>.

Eurostat, 2018. *Share of renewables in energy consumption in the EU*. [online] Eurostat. Available at: <<https://ec.europa.eu/eurostat/web/products-press-releases/-/8-25012018-AP>>.

Frisari, G., Hervé-mignucci, M., Micale, V. and Mazza, F., 2013. Risk gaps: a map of risk mitigation instruments for clean investments. *Climate Policy Initiative Brief*, [online] (January). Available at: <<https://climatepolicyinitiative.org/wp-content/uploads/2013/01/Risk-Gaps-A-Map-of-Risk-Mitigation-Instruments-for-Clean-Investments.pdf>>.

Grant, A., 2018. *Mind the gap : the \$16 trillion energy transition risk*. [online] Available at: <www.carbontracker.org/reports/mind-the-gap>.

Hall, S., Foxon, T.J. and Bolton, R., 2017. Investing in low-carbon transitions: energy finance as an adaptive market. *Climate Policy*, 17(3), pp.280–298.

Hawley, J., Johnson, K. and Waitzer, E., 2011. Reclaiming Fiduciary Duty Balance - Overview of Key Points. *Rotman International Journal of Pension Management.*, 4(2), pp.1–14.

Huxham, M., Varadarajan, U., O 'connell, B. and Nelson, D., 2017. *Mobilising low-cost*

- institutional investment in renewable energy: Major barriers and solutions to overcome them.* [online] Available at: <<https://climatepolicyinitiative.org/wp-content/uploads/2017/08/August-2017-CPI-Energy-Finance-CEIT-Barriers-report-final.pdf>>.
- IPCC, 1990. *Scientific Assessment Report on Climate Change*. [online] Cambridge University Press. Available at: <https://www.ipcc.ch/ipccreports/far/wg_I/ipcc_far_wg_I_full_report.pdf>.
- IPCC, 2014. *Climate change 2014, summary for Policymakers*. [online] Available at: <https://www.ipcc.ch/pdf/assessment-report/ar5/syr/AR5_SYR_FINAL_SPM.pdf>.
- Kaminker, C. and Stewart, F., 2012. *The Role of Institutional Investors in Financing Clean Energy*. Finance, Insurance and Private Pensions. *OECD Working Papers on Finance, Insurance and Private Pensions*.
- Lane, L. and Montgomery, 2014. An institutional critique of new climate scenarios. *Climatic Change*, 122(3), pp.447–458.
- Liu, X. and Zeng, M., 2017. Renewable energy investment risk evaluation model based on system dynamics. *Renewable and Sustainable Energy Reviews*, 73(February), pp.782–788.
- Lyon, T. and Delmas, M. (Maggie), 2018. When corporations take credit for green deeds their lobbying may tell another story. *The Conversation*. 17 Jul.
- Lyon, T.P., Delmas, M.A., Maxwell, J.W., Tima Bansal, P., Chiroleu-Assouline, M., Crifo, P., Durand, R., Gond, J.P., King, A., Lenox, M., Toffel, M., Vogel, D. and Wijen, F., 2018. CSR needs CPR: Corporate sustainability and politics. *California Management Review*, 60(4), pp.5–24.
- Di Maggio, P.J. and Powell, W.W., 1983. The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational. *American Sociological Review*, 48(2), p.147.
- Markowitz, H.M., 1952. Portfolio selection. *The Journal of Finance*, 7(60), pp.77–91.
- Masini, A. and Menichetti, E., 2012. The impact of behavioural factors in the renewable energy investment decision making process: Conceptual framework and empirical findings. *Energy Policy*, 40(1), pp.28–38.
- Mazzi, F., André, P., Dionysiou, D. and Tsalavoutas, I., 2017. Compliance with goodwill-related mandatory disclosure requirements and the cost of equity capital. *Accounting and Business Research*, 47(3), pp.268–312.
- McCollum, D.L., Zhou, W., Bertram, C., De Boer, H.S., Bosetti, V., Busch, S., Després, J., Drouet, L., Emmerling, J., Fay, M., Fricko, O., Fujimori, S., Gidden, M., Harmsen, M., Huppmann, D., Iyer, G., Krey, V., Kriegler, E., Nicolas, C., Pachauri, S., Parkinson, S., Pobleto-Cazenave, M., Rafaj, P., Rao, N., Rozenberg, J., Schmitz, A., Schoepp, W., Van Vuuren, D. and Riahi, K., 2018. Energy investment needs for fulfilling the Paris Agreement and achieving the Sustainable Development Goals. *Nature Energy*, 3(7), pp.589–599.
- Meyer, J.W. and Rowan, B., 1977. Institutionalized Organizations: Formal Structure as Myth and Ceremony. *American Journal of Sociology*, 83(2), pp.340–363.
- Modell, S., Vinnari, E. and Lukka, K., 2017. On the virtues and vices of combining theories: The case of institutional and actor-network theories in accounting research. *Accounting, Organizations and Society*, 60, pp.62–78.
- Moll, J., Burns, J. and Major, M., 2006. Institutional Theory. In: Z. Hoque, ed., *Methodological Issues in Accounting Research*, First. London, pp.183–205.

- NASA, 2017. *NASA : Global Climate Change, Vital Signs of the Planet*. [online] California Institute of Technology. Available at: <<https://climate.nasa.gov/evidence>>.
- Nelson, D. and Pierpont, B., 2013. *The Challenge of Institutional Investment in Renewable Energy*. [online] Available at: <<https://climatepolicyinitiative.org/wp-content/uploads/2013/03/The-Challenge-of-Institutional-Investment-in-Renewable-Energy.pdf>>.
- Nelson, D. and Shrimali, G., 2014. *Finance Mechanisms for Lowering the Cost of Renewable Energy in Rapidly Developing Countries*. [online] Available at: <<https://climatepolicyinitiative.org/wp-content/uploads/2014/01/Finance-Mechanisms-for-Lowering-the-Cost-of-Clean-Energy-in-Rapidly-Developing-Countries.pdf>>.
- Nilsson, M., Nilsson, L.J., Hildingsson, R., Stripple, J. and Eikeland, P.O., 2011. The missing link: Bringing institutions and politics into energy future studies. *Futures*, 43(10), pp.1117–1128.
- O’Sullivan, K., 2018. Ireland set to sell off €318 million investments in fossil fuels. *Irish Times*. [online] Available at: <<https://www.irishtimes.com/news/environment/ireland-set-to-sell-off-318-million-investments-in-fossil-fuels-1.3563114>>.
- OECD, 2017. *Investment governance and the integration of environmental, social and governance factors*. [online] Available at: <<http://www.oecd.org/finance/Investment-Governance-Integration-ESG-Factors.pdf>>.
- Ozorhon, B., Batmaz, A. and Caglayan, S., 2018. Generating a framework to facilitate decision making in renewable energy investments. *Renewable and Sustainable Energy Reviews*, 95, pp.217–226.
- Petrova, I., Pihlman, J., Kunzel, P. and Lu, Y., 2011. Investment Objectives of Sovereign Wealth Funds: A Shifting Paradigm. *IMF Working Papers*, [online] 11(19), p.1. Available at: <<http://elibrary.imf.org/view/IMF001/11616-9781455211968/11616-9781455211968/11616-9781455211968.xml>>.
- Polzin, F., Migendt, M., Täube, F.A. and von Flotow, P., 2015. Public policy influence on renewable energy investments-A panel data study across OECD countries. *Energy Policy*, 80, pp.98–111.
- Remac, M., 2017. *Revised framework for investment firms*. [online] Available at: <[http://www.europarl.europa.eu/RegData/etudes/BRIE/2017/611027/EPRS_BRI\(2017\)611027_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/BRIE/2017/611027/EPRS_BRI(2017)611027_EN.pdf)>.
- Schmidt, T.S., 2014. Low-carbon investment risks and de-risking. *Nature Climate Change*, 4(4), pp.237–239.
- Scott, W.R., 1987. The Adolescence of Institutional Theory. *Administrative Science Quarterly*, 32(4), p.493.
- Sewwandi, T., 2016. Behavioral Biases in Investment Decision Making : A Literature Review Behavioral Biases in Investment Decision Making : A Literature Review.
- Simon, H.A., 1955. A Behavioral Model of Rational Choice. *The Quarterly Journal of Economics*, 69(1), pp.99–118.
- Suchman, M.C., 1995. Managing Legitimacy: Strategic and Institutional approaches. *Academy of Management Review*, 20(3), pp.571–610..
- Suddaby, R., 2013. *Institutional Theory*. Sage Publications Inc.

- Suto, M. and Toshino, M., 2005. Behavioural biases of Japanese institutional investors: Fund management and corporate governance. In: *Corporate Governance*. pp.466–477.
- Tonkonogy, B., Brown, J., Micale, V., Wang, X. and Clark, A., 2018. *Blended Finance in Clean Energy: Experiences and Opportunities*. [online] Available at: <<https://climatepolicyinitiative.org/wp-content/uploads/2018/01/Blended-Finance-in-Clean-Energy-Experiences-and-Opportunities.pdf>>.
- UN, 2017. *Climate Change - United Nations Sustainable Development*. [online] Available at: <<http://www.un.org/sustainabledevelopment/climate-change-2/>>.
- UNFCCC, 2015. *Paris Agreement*. [online] *Conference of the Parties on its twenty-first session*, Available at: <http://unfccc.int/files/essential_background/convention/application/pdf/english_paris_agreement.pdf>.
- UNFCCC, 2019. *Paris Agreement - Status of Ratification*. UNFCCC. [online] United Nations Framework Convention on Climate Change. Available at: <<https://unfccc.int/process/the-paris-agreement/status-of-ratification>>.
- UNPRI, 2017. *Fiduciary Duty in the 21st Century: Progress Report*. [online] Available at: <<https://www.unpri.org/Uploads/u/j/z/Fiduciary-duty---progress-report-2017.pdf>>.
- US EPA, 2016. *Climate Change Indicators: Coastal Flooding*. [online] Available at: <<https://www.epa.gov/climate-indicators/climate-change-indicators-coastal-flooding>>.
- Wüstenhagen, R. and Menichetti, E., 2012. Strategic choices for renewable energy investment: Conceptual framework and opportunities for further research. *Energy Policy*, 40(1), pp.1–10.
- Zhou, S., Simnett, R. and Green, W., 2017. Does Integrated Reporting Matter to the Capital Market? *Abacus*, 53(1), pp.94–132.