Chapter 1

An integrated overview of channels and approaches for mobilising institutional investment in sustainable energy

This chapter provides an integrated overview of the structure of the report, which delves into the various channels (financing instruments and investment funds) and approaches (risk mitigants and transaction enablers) for mobilising investment by institutional investors for sustainable energy infrastructure. To assist policy makers in visualising investments and their defining characteristics, the chapter introduces a framework for understanding investment channels which includes a classification system (elaborated in Chapter 3). The chapter provides definitions for the key issues covered in the report and provides an introduction to a number of tabular and visual devices which are used to illustrate how the classification works for individual transactions and groups of transactions. It provides an introduction to the diverse actors involved in sustainable energy financing and concludes by proposing where in the broader literature the report makes its contribution.

The principal goal of this report is to provide policy makers with an integrated overview of the various channels (financing instruments and investment funds) and approaches (risk mitigants and transaction enablers) for mobilising investment by institutional investors[1] for sustainable energy infrastructure (see Box 1.1). Building on and updating previous OECD analysis on institutional investors and green infrastructure investment (Kaminker

Box 1.1. **Sustainable energy infrastructure and costs**

"Sustainable energy" infrastructure as defined in this report includes the following sectors: power generation from solar, wind, small hydro,* geothermal, marine, biomass and waste-to-energy, biofuels, carbon capture and sequestration and energy smart technologies (such as smart grids, inter-connectors, energy efficiency, storage and electric vehicles). However, the focus of this report is on commercially scalable sustainable electricity generation technologies such as wind (on/offshore), solar (PV/CSP), small hydro (less than 50MW), biomass and geothermal as this is where the majority of institutional investment activity tracked by the OECD is occurring. Future work could look towards a post grid-parity (see glossary) world for sustainable energy as many of the technologies are decreasing in cost and increasing in efficiency, some much more rapidly than others, e.g. solar PV (IEA, 2014a). The Global Commission on the Economy and Climate (NCE, 2014) finds that in some markets, the average cost of energy from many sustainable energy sources is approaching that of new conventional generation, when levelised over the life of a new energy project. In some cases, the cost of sustainable energy is lower than for conventional generation. More detail on the increasing competitiveness of many forms of sustainable energy is provided in Annex 2.A1 (Levelised Cost of Electricity chart). It is also worth noting that investment in grids, transmission and distribution is also needed to compensate for the variability of sustainable energy (IEA, 2014b).

A stylised fact that has been described recently is that as technologies decrease in cost and become less subsidy-dependent, more conservative investors feel more comfortable allocating capital to these projects (Clean Energy Pipeline, 2014). An economic rationale for optimising the capital structure of sustainable energy financing exists (Bradford and Hoskins, 2013, Nelson, 2014) and places the focus of interventions on lowering the cost of capital for sustainable energy (Nelson and Pierpont, 2013, Nelson 2014). In a world of low cost components and falling installation and "soft costs", the cost of financing is the major driver of the long term levelised cost of electricity, particularly for those technologies that do not need fuel, such as most sustainable energy. An estimated 50-70% of the costs of electricity generation for sustainable energy are in the financial cost of capital, with only the balance being the physical or operational costs of the installation (Bradford and Hoskings, 2013; Bradford, 2015, forthcoming). Thus, small changes in the weighted average cost of capital (WACC) can have substantial impact on the levelised cost of a generator.

This provides impetus to identifying mismatches between investor and finance needs and finding solutions to optimising financial structures, even in minor ways, if the goal is to continue driving down the cost of outputs of these solutions. For instance, the Global Commission on the Economy and Climate (NCE, 2014) finds that significant, near-term opportunities can reduce the costs of finance by up to 20% for low-carbon energy in all countries through a mix of financial innovation, greater use of national development banks and concessional debt, and increased development capital flows into low-income countries.

*Although large hydro-electric power generation is a form of renewable energy and has attracted significant institutional investment, it is outside the scope of this version of the report as this report relies primarily on the BNEF database for investment transactions and its associated definition of "clean energy" which excludes large hydro. BNEF excludes large hydro arguing that this technology has been mature for decades and is at a very different stage of its roll-out than Solar PV.

and Stewart, 2012; Kaminker et al., 2013; Eklin et al., 2015, forthcoming), the report also provides recommendations on what governments can do to facilitate greater investment by:

- supporting the development of investment channels through which institutional capital can flow to sustainable energy infrastructure;
- using different approaches to mitigate risks and reduce transaction costs associated with sustainable energy infrastructure investments; and
- addressing key barriers to investment by institutional investors.

By analysing and presenting 67 recent examples of investments using the various channels, the report also provides an update of the state and trends of institutional investment in sustainable energy (Chapter 2). It extends previous OECD analysis on this topic by proposing a classification framework of financing instruments and investment funds, risk mitigants and transaction enablers for mobilising institutional investment in sustainable energy (see Table 1.1). The report is a contribution[2] to a broader G20/OECD project to develop a Taxonomy of Long-term Investment and Infrastructure Financing. It is designed to complement this overarching analysis by providing an in-depth examination of sustainable energy as a discrete sector within the broader category of economic infrastructure (see glossary provided in Annex A).

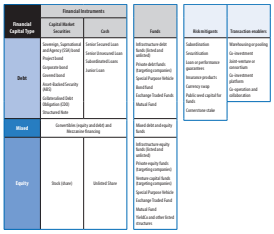
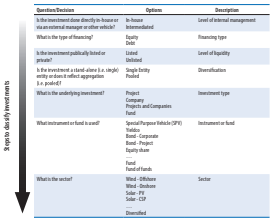
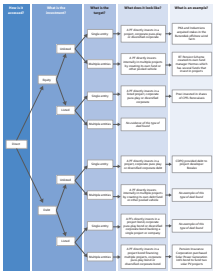
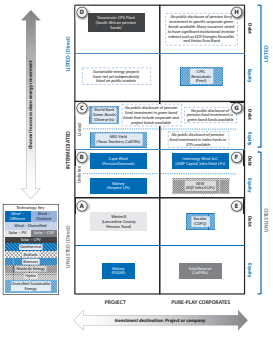
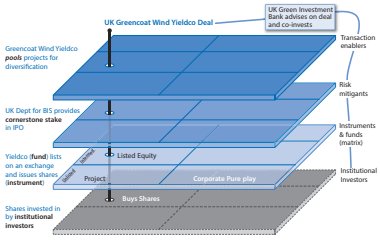
This report provides a framework through which policy makers can better understand how institutional investors make sustainable energy investments (in projects or companies) through financing instruments (see glossary, hereafter "instruments") and investment funds (see glossary, hereafter "funds"). It is also intended to help promote more clarity and the consistent and standardised use of terms. As Hambrick (1984, p. 27) observes, "to classify things is to bring parsimony and mental order to one's view of them." It is hoped that this effort to develop a focused, in depth classification framework as part of a broader taxonomy will provide similar benefits to policy makers, institutional investors and other parties interested in facilitating investment in sustainable energy infrastructure.

The report makes use of several graphics to discuss and illustrate different steps that have been used to classify investments. As a first step terms are defined and the different characteristics of investments are analysed. By examining investment traits steps can be created to classify transactions. Investment pathways show how a given transaction can be classified based on its characteristics. These pathways epitomise the classification framework. As a way to visualise the classification of all of the investments analysed, matrix frames are created to collectively plot these examples and highlight trends. Finally, a schematic overview provides a visual inspection of a single transaction to highlight how instruments, funds, risk mitigants and transaction enablers have all come together in a specific investment example.

Figure 1.1 is the component of the sustainable energy classification framework which provides an overview of the definitions of terms for the purposes of this report; illustrating for instance the difference between the categories of instrument, fund, tool and technique. For policy makers with a background in finance, this classification will be familiar, as it is inspired by recognised accounting standards.

In addition to providing this framework, the report incorporates and updates information and perspectives gained from five years of OECD work in the area of institutional investment in green infrastructure. This body of work includes consultations with institutional investors and financial intermediaries at workshops, in committee meetings[3] and interviews.[4]

Table 1.1. **Guide to components of the classification framework for institutional investment in sustainable energy**

Component	Graphic used in report	Function
1. Definitions (Figure 1.1)		Provides an overview of the definitions of terms for the purposes of this report; illustrating for instance the difference between the categories of instrument, fund, risk mitigant and transaction enabler.
2. Classification steps (Figure 3.2)		Describes foundational logic and steps taken to classify investments for the pathways.
3. Investment pathways (Figures 3.3 – 3.7)		Illustrates how specific transactions can be classified based on the steps, their characteristics and fundamental decisions to make an investment internally or externally and to invest in projects or companies.
4. Matrix frame (Figures 3.8 and 3.9)		Plots transactions on a matrix frame which is created using the logic, steps, classifications and decisions described previously.
5. Detailed transaction schematic (Figure 3.10)		Provides an in-depth look at an individual transaction to highlight the different instruments, funds, risk mitigants and transaction enablers used.

In discussions on climate finance and financing sustainable energy, it can be a challenge for policy makers to speak the same language as investors. Institutional investors are by their nature technically-oriented (and sustainable energy infrastructure investments feature their own specialised terms). In contrast, there is an understandable desire in many climate finance discussions to provide relatively simple answers to complex questions that may require specialised knowledge of finance and investments. Policy makers also may speak generically about mobilising capital from institutional investors for sustainable energy, but fail to realise the sheer diversity of such investors. These dynamics, and the tendency to

Figure 1.1. **Defining instruments, funds, risk mitigants and transaction enablers to facilitate sustainable energy investment**

Financial Capital Type	Financing instruments: Capital Market Securities	Financing instruments: Cash	Funds	Risk mitigants	Transaction enablers
Debt	Sovereign, Supranational and Agency (SSA) bond Project bond Corporate bond Covered bond Asset-Backed Security (ABS) Collateralised Debt Obligation (CDO) Structured Note	Senior Secured Loan Senior Unsecured Loan Subordinated Loans Junior Loan	Infrastructure debt funds (listed and unlisted) Private debt funds (targeting companies) Special Purpose Vehicle Bond fund Exchange Traded Funds Mutual Fund	Subordination Securitisation Loan or performance guarantees Insurance products Currency swap Public seed capital for funds Cornerstone stake	Warehousing or pooling Co-investment Joint-venture or consortium Co-investment platform Co-operation and collaboration
Mixed	Convertibles (equity and debt) and Mezzanine financing		Mixed debt and equity funds		
Equity	Stock (share)	Unlisted Share	Infrastructure equity funds (listed and unlisted) Private equity funds (targeting companies) Venture capital funds (targeting companies) Special Purpose Vehicle Exchange Traded Fund Mutual Fund YieldCo and other listed structures		

Note: This figure does not map relationships between instruments, funds, risk mitigants and transaction enablers and presents them as separate from each other although in fact direct relationships exist among them (e.g. CDO, Special Purpose Vehicle, Securitisation and Pooling). Analysis of derivatives such as swaps, options, futures and forwards are outside the scope of this report; however Chapter 4 discusses currency swaps. "Other listed structures" include Master Limited Partnerships and Real Estate Investment Trusts and are discussed in the report as potential structures for sustainable energy investment.

Source: OECD analysis.

search for "silver bullet" solutions, create communication barriers between investors and non-technical policy makers. They also can leave policy makers with a fragmented sense of the range of investment channels available to investors, how investors consider investments in these channels, and barriers to the development of these channels.

As such, this report endeavours to illuminate for policy makers the myriad investment channels (instruments and funds) that can be used for sustainable energy infrastructure. Central to an institutional investor's choice of investment channel is its decision to make the investment directly ("in-house") or to create a contract with an intermediary ("out-source") to make the investment on their behalf (see Chapter 3 for a more detailed explanation).

This report also provides further analysis and stocktaking of the risk mitigants that policy makers and other intermediaries can apply to the instruments and funds to enhance their effectiveness or appeal to institutional investors. In addition, the 67 sustainable energy investments by pension funds examined in this report highlight the innovative transaction enablers that the investors themselves are developing (sometimes along with governments) to deploy capital more effectively in this sector and reduce transaction costs. These tools and techniques are often discussed in the climate finance and sustainable energy literature in a disparate way. This report endeavours to align them so that they can be understood alongside instruments and funds.

The definitions, classification steps and investment pathways lead to the matrix frame which is intended to provide an integrated framework that can be used to: *1)* understand and compare different instruments and funds available in practice and in theory; *2)* illuminate where investment is or is not flowing; *3)* highlight potentially promising instruments or funds in which policy makers may consider the use of risk mitigants or transaction enablers to address investment barriers and mobilise flows; and *4)* target and undertake data collection on investments in different channels and conduct subsequent empirical analysis. A map of updated policy recommendations matched with barriers is provided to advise governments on what can be done to open the channels up for enhanced capital flows.

While this report focuses primarily on institutional investors, financial intermediaries play a critical role in the "ecosystem" of climate finance and investment. They come in private (e.g. monoline insurers and investment banks – see glossary) and public forms (e.g. national or multilateral development banks or other public financing institutions such as domestically focused green investment banks). These financial intermediaries have as a common objective the engagement and mobilisation of private finance (including from institutional investors). They deploy an assortment of instruments,[5] funds,[6] and risk mitigants[7] to finance sustainable energy infrastructure. Their activities have been examined in other OECD reports.[8]

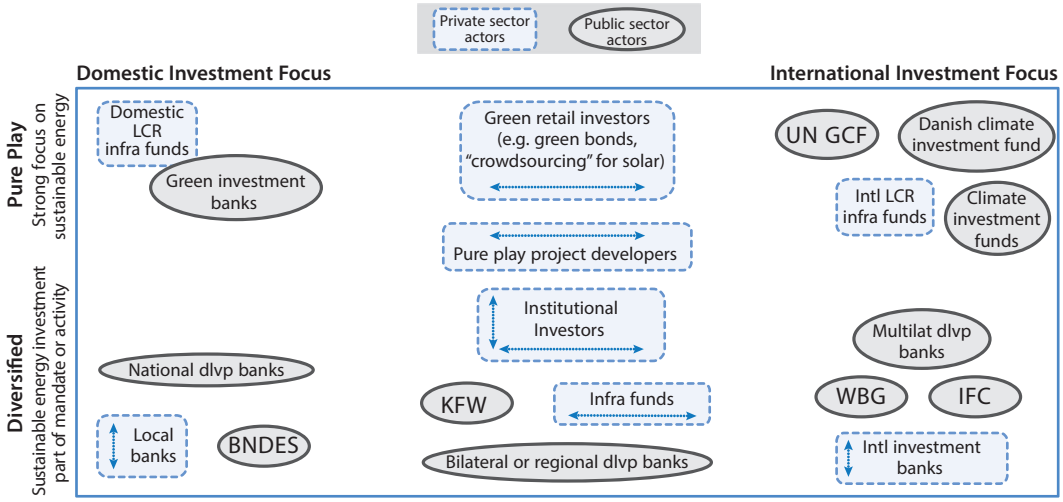
Drawing on related OECD work (Eklin et al., 2015, forthcoming), this report describes how "green investment banks" (GIBs) have sought to engage institutional investors. In recent years, at least a dozen special-purpose GIBs have been established. These are "domestically-focused public institutions that use limited public capital to leverage or crowd-in private capital, including from institutional investors, for sustainable energy infrastructure investment" (Eklin, at al., 2015, forthcoming, p. 1). A separate and very important question is how can institutional investors interact with and participate in sustainable energy investments in emerging markets and developing economies.

To date, institutional investment in sustainable energy projects has been predominantly in OECD countries and this is highlighted in Chapter 3 which provides details on the distribution of investments geographically across the sample of large pension fund investments. In addition to identifying promising channels for sustainable energy investments

in OECD countries, it will be very important to explore how institutional investors can interact with international climate finance mechanisms targeted at emerging economies and developing countries.[9] For instance in January 2014 Danish pension funds PensionDanmark, PKA and Paedagogernes Pensionskasse invested in the Danish Climate Investment Fund (a public-private fund backed by the Danish state to finance greenhouse gas emission-reduction projects in developing countries).[10] An examination of the role of institutional investors in the emerging international "climate finance" architecture is outside the scope of this analysis but these issues currently arise in discussions around international climate finance and fund mechanisms (see for instance the work of the Global Innovation Lab for Climate Finance).

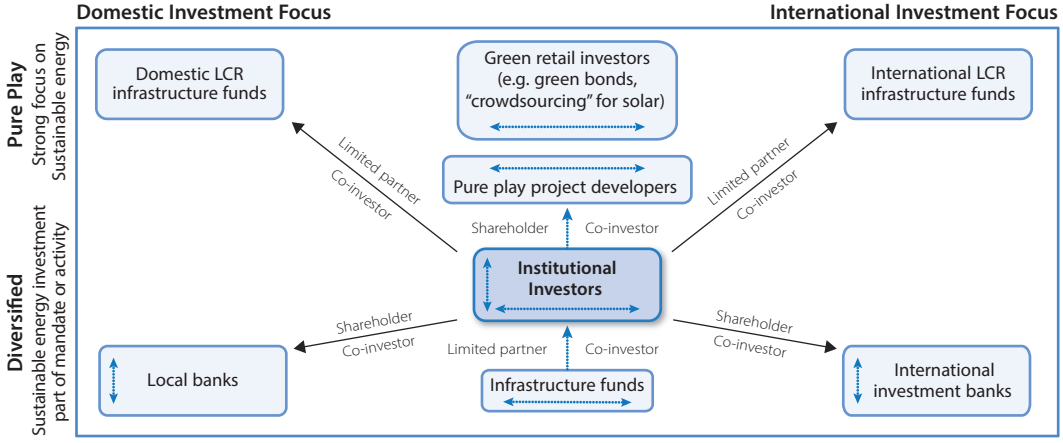
Figure 1.2 illustrates a number of the diverse actors involved in sustainable energy financing, their respective focus on domestic vs. international investment and on "pure-play" sustainable energy investment vs. diversified sustainable infrastructure investment (where sustainable energy is part of the mandate). For an additional illustration of the interactions among private actors active in sustainable energy investment, including institutional investors, see Figure 1.3.

Figure 1.2. **Existing public and private entities that finance sustainable energy**



Source: Adapted from Eklin et al. (2015, forthcoming).

Figure 1.3. **Institutional investor interactions with private sustainable energy finance providers**



Source: Adapted from Eklin et al. (2015, forthcoming).

This report is a contribution to a deepening body of policy and academic literature examining the potential role of institutional investors in financing green growth and the transition to a low-carbon economy (see for instance: G20/OECD, 2012; Inderst et al., 2012; Kaminker and Stewart, 2012; IFC, 2013; Kaminker et al., 2013; Nelson and Pierpont, 2013; Fulton and Capalino, 2014). It also contributes to literature examining the role of institutional investors in financing infrastructure more broadly and "financialisation" (see glossary) and product evolution (Clark et al., 2011; Clark and Monk, 2013; Sharma, 2013). Lastly, the report contributes to other literature identifying barriers to low-carbon investment, and analysing the potential for innovative financing instruments and risk mitigants to use limited public funds to catalyse private investment in support of climate action (see for example; Doornbosch and Knight, 2008; Ward, 2010; Kennedy and Corfee-Morlot, 2013; Frisari et al., 2013).

The previous OECD report examining this topic (Kaminker et al., 2013) was delivered to the G20 Study Group on Financing for Investment and annexed to the Communiqué of the G20 Finance Ministers and Central Bank Governors at their meeting of 10-11 October 2013. The report introduced approaches to mobilising institutional investment in "green infrastructure" including sustainable energy and elaborated policy conclusions based on four case studies. It provides a foundation of analysis for this report and can be referred to for more detailed explanations and examples of the issues discussed in this report such as securitisation for sustainable energy infrastructure.

However, a few important conclusions from the previous report are worth recalling. One finding was that "direct" investment in [sustainable energy] infrastructure projects, if properly structured, may have the potential to deliver attractive risk-adjusted returns [see glossary] with many of the other attributes sought by institutional investors, who have an interest in the long-term investment horizon (Kaminker et al., 2013, p. 45). The report also confirmed that an indispensable condition to increasing investments by institutional investors (or the "allocations" they make in their investment portfolios) to sustainable energy infrastructure is to make sure that these investments compete on a risk-return basis over different time horizons. This condition is essential because institutional investors have varying risk appetites, liability profiles, investment preferences, and constraints. Investors with fiduciary responsibilities to their clients or beneficiaries will not make an investment just because it is "green" – their primary concern is its (risk-adjusted) financial performance. Pension funds and insurers also have to invest in accordance with the "prudent person principle". Assets have to be invested in the best interest of members and beneficiaries and policyholders and in such a manner as to ensure their security, profitability, liquidity and quality (Kaminker et al., 2013).

Notes

1. Though the term "institutional investor" covers a wide range of organisations (including endowments, foundations, etc.), the focus of this report is on pension funds, public pension reserve funds, insurance companies and sovereign wealth funds, as the OECD is the leading organisation collecting statistics on these institutions and has been undertaking extensive analysis on their investments and their regulatory environments.
2. This report is a contribution to the OECD's broader work on institutional investors and long-term investment: see www.oecd.org/finance/lti.
3. Including the OECD Committee on Insurance and Private Pensions, OECD Working Party on Private Pensions, OECD Committee on Financial Markets and G20/OECD Taskforce on Institutional Investors and Long-Term Investment

4. Interviews were conducted using "close dialogue" as proposed by Clark (1998); a mode of case study research that uses structured and unstructured interviews in the context of relationships between nominal equals to reveal the actual logic of decision making.

5. E.g. World Bank Group or European Investment Bank green bonds in which institutional investors invest.

6. E.g. European Investment Bank (EIB) layered funds for institutional investment or the Renewable Energy Platform for Institutional Investors (REPIN).

7. E.g. EIB's Project Bond Initiative credit enhancement tool which has attracted institutional investors. See Chapter 4 for a discussion of this initiative.

8. See for example Cochran et al. (2014) for a review of five public financing institutions' activities to support the transition to a low-carbon economy and Eklin et al. (2015, forthcoming) for a review of green investment banks.

9. This report does not endeavour to cover all of the possible channels for investments in developing countries and the risk mitigants that can be deployed to de-risk those investments to overcome additional barriers. It is necessarily limited in its analysis by the sample of investments covered which focus predominantly on OECD countries. Future work could explore these issues in greater depth, e.g. analysis of the further options that may be unique to Sovereign Wealth Funds and developing country institutional investors.

10. See press release for more details www.pension.dk/en/english/About-PensionDanmark/News/PD-news/PensionDanmark-investing-DKK-200m-in-new-climate-in-vestment-fund1/.

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