Shifting Private Finance towards Climate-Friendly Investments

"Policy options for mobilising institutional investors' capital for climate-friendly investment"

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Disclaimer

Note on methodology

This report has been reviewed by an advisory panel and discussed in two stakeholder meetings (London and New York) with experts from the financial sector. However the final document is the sole responsibility of the core team of authors.

The report does not always use the same currency, as original sources are not in the same currency. The decision was made not to translate currencies from original sources into Euro for most cases, in the interest of accuracy. We have used the conversion rate of US$1 to EUR0.90 and DKK1 to EUR0.134 (https://www.ecb.europa.eu/stats/exchange/eurofxref/html/index.en.html).

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CONTENTS

List of acronyms

Abstract i

Résumé ii

Executive Summary iii

1 Introduction 1

1.1 Aim: Providing policymakers with an actionable toolbox to tap into institutional investors' capital pool for climate investments 1

1.1.1 Objective 1

1.1.2 Organisation of the report 1

1.1.3 Further defining and justifying the scope 2

1.2 The project in the context of the climate finance debates 5

1.2.1 Parallel research streams 5

1.2.2 Regulatory and policy context 6

1.3 The project in broader European policy context 6

1.3.1 2030 package & other climate /energy streams 6

1.3.2 Financing long-term growth in Europe: Long-term Financing 6

1.3.3 Financing long-term growth in Europe: the Investment Plan for Europe 7

1.3.4 EU changing role in increasing investment: financial instruments rather than direct lending 7

1.3.5 Financial market reform: EU Capital Markets Union 7

1.4 Setting the scene: A climate-friendly infrastructure narrative for financing needs 8

1.4.1 Low-carbon investment challenge 8

1.4.2 The role of low-carbon and infrastructure investment roadmaps 10

1.4.3 The climate investment challenge overlaps strongly with the larger infrastructure investment challenge 11

2 Mapping demand: Institutional investor appetite and requirements 13

2.1 Demand for climate-friendly is there, if the investment also complies with financial requirements 15

2.1.1 Institutional investors increasingly have low-carbon commitments 15

2.1.2 Institutional investors' primary aim remains to meet their financial obligations 15

2.2 Current state of institutional investment in climate 18

2.2.1 Institutional investors' current asset allocation 18

2.2.2 Institutional investors' exposure to climate-related assets 20

2.3 Key takeaways 24

3 Translating appetite to actionable opportunities in the short-term 25

3.1 Discoverability of climate-friendly investment opportunities 25

3.1.1 Climate-friendly investment opportunities in fixed income 26

3.1.2 Climate-friendly investment opportunities in equity 32

3.2 Assessment of the current availability of climate investments 35

3.2.1 Scale of discovery climate opportunities in fixed income: lack of volume 35
3.2.2 Scale of discovery climate opportunities in equities 37
3.3 Risk-return of climate investments 37
3.3.1 There are different components to the overall risk of low-carbon investments 37
3.3.2 Risk-return at project level 38
3.3.3 Risk-return at corporate bond level 40
3.3.4 Risk-return of climate-friendly equities 41
3.4 High transaction costs 42
3.4.1 Small scale of climate investments 42
3.4.2 Transaction costs: lack of common standards and definitions 45
3.5 Summary of barriers 46
4 Next steps: Policymakers role to create climate-friendly supply that matches investor demand 47
4.1 Providing a deal flow of investable opportunities: lessons from non-climate policy priority areas 47
4.2 The policymakers' toolbox for influencing investment flows 50
4.3 Mapping policy tools and instruments to the investment barriers identified 54
4.3.1 Increasing green bonds and other climate investment opportunities 55
4.3.2 Tools to reduce investment risk: addressing climate investment risk 57
4.3.3 Support aggregation and low-carbon securitisation 61
4.3.4 Harmonise standards and disclosure of climate-related investments 65
4.3.5 Balancing climate policy benefits and larger financial market distortions 66
5 Short- to medium-term action plan: Matching supply to existing demand 67
5.1 Action #1: Increase the volume and acceptance of climate-friendly financial products 68
5.2 Action #2: Building on existing credit enhancement initiatives 69
5.3 Action #3: Explore the potential of policy risk insurance 72
5.4 Action #4: Supporting green securitisation 74
5.5 Action #5: Accounting and disclosure of companies and financial products 75
5.6 Additional action for EU policymakers: Convene the finance sector in the context of COP21 76
5.7 How the action plan is relevant for the Capital Markets Union 77
5.8 How the action plan is relevant for the Investment Plan for Europe 78
6 A medium- to longer-term action plan for policymakers: Shifting institutional investors' decision-making framework 79
6.1 Factors in institutional investors' decision-making and their relevance for climate-friendly investments 79
6.1.1 Shortened time frames arise from investment management practices and regulations 79

6.1.2 Lack of methodologies and metrics for climate risks means they are not incorporated into risk-return models 83
6.1.3 Integrating climate into stewardship practices and fiduciary duty 86
6.1.4 Accountability: Measuring climate performance of portfolios to enable asset owners to assess performance of investment managers 87
6.1.5 Summary of barriers 88
6.2 Next steps: Policymakers role to shift institutional investor decision making-frameworks to increase climate-friendly investment 88
6.2.1 Policy tool box to shift investor decision making-frameworks 88
6.2.2 Mapping policy tools and instruments to the investment barriers identified 89
6.2.3 Lengthening the time horizons of investment managers 90
6.2.4 Use convening power on tax incentives 91
6.2.5 Include climate in stewardship best practice 91
6.2.6 Mainstreaming long-term risk accounting and tools for carbon and climate risk 92
6.3 Longer-term action plan: Shifting institutional investors' decision-making 94
6.3.1 Action #6: Lengthening time horizons of institutional investors 94
6.3.2 Action #7: Explore the use of tax incentives on climate-friendly financial products 95
6.3.3 Action #8: Improve governance of institutional investors 96
6.3.4 Action #9: Accounting and disclosure of financial institutions 97
7 Impact analysis of the action plans 98
7.1 Magnitude of impact of the proposed policy actions 98
7.1.1 Impact on institutional investors climate-friendly investment 98
7.1.2 Impact on the ground in the real economy 103
7.2 Location of impacts: within the EU and globally 104
7.2.1 Direct impacts 105
7.2.2 Indirect impacts 105
7.3 Timing of the impacts 105
7.3.1 Timing of the policy actions 106
7.3.2 Timing of policy impacts 106
8 Appendix 1: From climate goals to institutional investors' portfolios 108
8.1 From climate goals to GHG-emissions targets 108
8.2 From GHG-emissions targets to energy-technology roadmaps 109
8.3 From energy-technology roadmaps to capital expenditure roadmaps 110
8.4 From capital expenditure roadmaps to financing needs roadmaps 111
8.5 From financing needs to institutional investor portfolio exposure 112
9 Glossary 114
10 References 123

List of acronyms

ABS - Asset-Backed Securities
AuM - Assets under Management
BAU Investor – Business as Usual Investor
CAPEX - Capital Expenditure
CBI - Climate Bonds Initiative
CCS - Carbon Capture and Storage
CBRC - Chinese Banking and Regulatory Commission
CDP - Carbon Disclosure Project
CEF - Connecting Europe Facility
CFP investor - climate-friendly positioned investor
COP - UN Conference of the Parties
CPI - Climate Policy Initiative
DCF - Discounted Cash Flow
EC - European Commission
ECB - European Central Bank
EIB - European Investment Bank
EIF - European Investment Facility
ELTIF - European Long-Term Investment Fund
ESCO - Energy Service Company
ESG - Environmental, Social and Governance
EU - European Union
GCF - Green Climate Fund
GEF - Global Environment Facility
GHG – Greenhouse Gas
IEA - International Energy Agency
IEA WEO - International Energy Agency World Energy Outlook
IEEP - Institute for European Environmental Policy
IORP Directive - Directive regulating occupational pensions
IPO - Initial Public Offering
LTRA - Long-Term Risk-Aware
NGO – Non-Governmental Organisation
OECD - Organisation for Economic Co-operation and Development
OPIC - Overseas Private Investment Corporation
PACE - Property Assessed Clean Energy
PBCE - Project Bonds Credit Enhancement
PBI - Project Bond Initiative
PE – Private Equity
PFIs - Public Financial Institutions
PRI - Principles for Responsible Investment
PRIPs – Packaged Retail Investment Products
PSRG - Policy Support Risk Guarantee
R&D – Research and Development
REPIN - Renewable Energy Platform for Institutional Investors

RSFF - Risk Sharing Financing Facility
SEC - US Securities and Exchange Commission
SME - Small and Medium-sized Enterprises
SRI - Socially Responsible Investments
TEN-E - Trans-European Energy Networks
TEN-T - Trans-European Transport Networks
UNEP-Fi - United Nations Environment Programme Finance Initiative
VC – Venture Capital
WEF - World Economic Forum

Abstract

The objective of the report is to provide European Union (EU) policymakers with an actionable toolbox for how they can contribute to mobilising private finance for climate-friendly investments. Climate-friendly investments are defined as investments aligned with the transition to a low-carbon economy that limits global warming to 2°C – EU policy. The report aims to highlight how these actions to increase climate-friendly investments can be integrated with the current financial policy agenda in the EU, in particular the Investment Plan for Europe and the Capital Markets Union. A key premise of the report is that it is possible to generate profitable investments that will also have climate change benefits. To do this, an extensive literature review and close cooperation with investment professionals, including workshops in London and New York, were undertaken. Informal discussion with investors, bankers and other finance professionals provided further input. The study looked at the current demand for climate-friendly investment; current channels of supply for climate-friendly investment; barriers to the use of those supply channels; and the policies, tools and instruments policymakers have at their disposal to address these barriers. The report identifies two main types of barriers related to climate-friendly investments: those external to institutional investors' decision-making framework and barriers arising from that framework. The former includes topics like the lack of a liquid market, less favourable risk-return, high transaction costs, small scale projects and the lack of accounting and disclosure. The latter includes short time horizon of decision-making, limited integration of climate in stewardship and fiduciary duty, and the lack of relevant climate-related risk and performance methodologies. An action plan is developed, providing EU policymakers with recommendations to address these barriers and mobilise institutional investors for climate investments, both in the EU and globally. Policies to directly increase return on investment, such as feed-in-tariff, are a key driver of climate-friendly investment, but policy actions in the financial sector can play an important complementary role to increase investment at the large scale and rapid pace required.

Résumé

L'objectif de ce rapport est de fournir aux décideurs de l'Union européenne une boîte à outils expliquant comment contribuer à mobiliser la finance privée dans le but de réaliser des investissements favorables au climat. Les investissements favorables au climat sont définis comme étant ceux allant dans le sens du passage vers une économie pauvre en carbone limitant le réchauffement global à 2°C – politique UE. Le rapport vise à souligner comment les démarches pour accroître ces investissements peuvent être intégrés dans l'agenda politique actuel de l'UE, en particulier le Plan européen d'Investissement pour l'Union des marchés des capitaux. Un des principes de base de ce rapport est qu'il est possible de générer des investissements profitables qui auront également des impacts bénéfiques sur le climat. Dans ce but, il a été procédé à une revue de la documentation et à la mise en place d'une coopération intensive avec les professionnels de l'investissement, notamment au cours de séances de travail organisées à Londres et à New-York. Des discussions informelles avec des investisseurs, des banquiers et d'autres spécialistes de la finance ont également permis d'apporter des contributions complémentaires. L'étude a examiné la demande actuelle en matière d'investissements favorables au climat, circuits actuels de ces investissements, barrières à l'utilisation de ces circuits et les politiques, outils et instruments que les décideurs ont à leur disposition pour traiter ces barrières. Le rapport identifie deux sortes de barrières concernant les investissements favorables au climat: celles extérieures au cadre décisionnel des investisseurs institutionnels et celles issues de ce cadre. Les premières comprennent des sujets comme le manque de liquidité, le mauvais rapport rendement/risque, les coûts transactionnels élevés, beaucoup de projets de petite échelle et le manque de transparence et de divulgation. Les autres comprennent la prise de décision à court terme, l'intégration du climat dans les activités financières et de gestion, et le manque de méthodologies adéquates liées au climat sur les performances et les risques. Un plan d'action est proposé, lequel fournit aux décideurs de l'UE des recommandations afin de gérer ces barrières et de mobiliser les investisseurs institutionnels aux investissements pour le climat, à la fois globalement et au sein de l'UE. Les politiques permettant d'augmenter directement le retour sur investissement, tels que les tarifs de rachat, sont un moteur clé des investissements favorables au climat, mais les démarches stratégiques dans le secteur financier peuvent jouer un rôle complémentaire important afin d'augmenter les investissements à rythme rapide et grande échelle requis.

Executive Summary

The objective of this report is to provide European Union (EU) policymakers with an actionable toolbox for mobilising private finance for climate-friendly investments. Climate-friendly investments are defined here as investments aligned with the transition to a low-carbon economy and society that reaches the policy target of limiting global warming to 2°C. The report aims to highlight how these actions to increase climate-friendly investments can be integrated with the current financial policy agenda in the EU, in particular the Investment Plan for Europe and the Capital Markets Union. A key premise of the report is that it is possible to generate profitable investments that will also have climate change benefits. The findings of the report are based on an extensive literature review and workshops in London and New York with investment professionals. Additional informal discussion with investors, bankers and other finance professionals provided further input.

The report focuses on mobilising institutional investors. Institutional investors are increasingly willing to provide capital for climate-friendly investment: a large share of the investor base has made commitments to climate change and responsible investment and are willing to act on these, provided that they are offered climate investment opportunities that also fit their financial investment criteria and return expectations. The key challenge is then to tap into this *existing* demand for climate-friendly investments by providing a supply of investments that are climate-friendly on top of being financially competitive with non-climate alternative investments. The potential channels of fixed income and equities provide a range of complementary options for where the supply of financially competitive climate investment flow can occur, including amongst others, green bonds. Having a robust understanding of the fundamental financial criteria institutional investors look at to meet with their investments is a first step to understanding how to mobilise their capital for climate-friendly investments.

The share of climate-friendly assets in the portfolios of EU institutional investors is tiny – at best it is between 1-2%. A lack of common definitions for climate-friendly assets and a lack of available data makes it difficult to estimate and track climate-friendly assets. But it is clear that the order of magnitude of climate-friendly investment is too low compared to the size of the climate-related investment needs: in the EU alone, the annual climate investment needs to 2020 are estimated to EUR200bn, significantly more than the EUR120bn that was invested in this area in 2011/2012. Globally, the needs are even larger, with annual investment needs of EUR780bn. There is a lot of untapped potential in terms of capital from institutional investors that can contribute to closing these investment gaps.

There are, however, barriers that mean each of these supply channels are not currently providing a climate investment flow that is attractive to institutional investors at the scale that is needed. Two categories of barriers to investment were identified:

1. **Barriers that are external to institutional investors' decision-making framework**
   - **Availability and volume:** The market is increasingly developing and marketing climate-related investment products, but the overall lack of volume remains an issue; green bonds, for example, are regularly over-subscribed 5-6 times. Equity markets lack "blue-chip" climate-friendly investment opportunities. Liquidity constraints (being able to sell rapidly when required) create a preference for more easily tradable bonds and equities, meaning equities with higher market

capitalisation and bonds with higher issuance levels. This creates a bias against some types of less tradable climate-friendly assets, such as project finance.

- **Risk-return:** Many types of climate-friendly investment opportunities often have – or are perceived to have - lower returns and higher risk compared to carbon-intensive projects in more established sectors. While this is often partially addressed with policy support, such as subsidies or carbon taxes, this introduces policy risk for investors, as there is a risk that the support will be modified in the future in a way that cannot be foreseen and planned for.
- **High transaction costs:** Transaction costs are higher when investing in smaller assets, a typical characteristic of climate-friendly project finance. Tools like securitisation can address this issue by bundling assets, although barriers to securitisation remain. This includes lack of standards for loan contracts for climate-friendly assets and warehousing infrastructure. In addition, for investors seeking climate-friendly opportunities, due diligence transaction costs related to lack of comparability of non-financial, climate-related data and transparency remain.

2. **Barriers arising from institutional investors' decision-making framework**

- **Time horizon of decision-making:** Despite the long-term liabilities of institutional asset owners, most institutional investment managers have a time horizon of 3 years or shorter. The short time horizons partially arise from regulation requiring high degrees of liquidity and fund management issues such as remuneration systems, investment mandate design, and lack of long-term risk assessment models. Short time horizons limit institutional investors' ability to integrate longer-term climate risks and their ability to provide patient capital.
- **Lack of integration of climate in fiduciary duty and engagement practices:** The relationship between climate-related risks and benefits and institutional investors' fiduciary duty is not clearly established. Additionally, assessments of investment managers' engagement practices with companies do not sufficiently include climate-related concerns.
- **Lack of relevant climate-related risk and performance methodologies:** Current climate risks (physical impacts) and carbon risks (structural policy changes) still face methodological shortcomings. The assessments done to date are not easily integrated into mainstream investment tools and practices. In addition, investors can currently not easily measure the climate and carbon performance of their overall portfolios.

There is a role for policymakers to speed up market enablers

There is a role for policymakers to step in to address the barriers that the market has not yet been able to address sufficiently without support. This is not to say the market is unable to address several of these remaining barriers. For example, the risk-return barrier has so far been overcome in the green bond market by the treasuries of issuing entities essentially providing the risk-bridge needed to get higher-risk low-carbon projects and assets to an investment grade rating that meets the need of institutional investors. However, it does limit market growth, as not all issuers are willing, or able to, absorb this risk on their balance sheets.

Many of the barriers will also reduce in the market over time: for example, the technology risk of low-carbon technologies is falling as the technologies mature, and the credit risk of low-carbon projects and pure play companies will also decline as the companies mature. However, minimising the costs of addressing climate change requires action sooner rather than later. Therefore waiting for these processes in the market to occur on their own is costly, as it increases the costs of both mitigating (due

to lock-in of inefficient and non-climate-friendly infrastructure) and adapting to climate change (due to increased emissions). The role of policymakers is to step in to accelerate the market-driven processes.

Financial policymakers and regulators have a range of policy tools that can address these barriers

The role of EU policymakers in leveraging these different types of policy tools is not mainly direct and through hard regulation: recognising the EU's soft power in addressing the barriers that remains for to increase climate-friendly investments is considered of central importance in this report. The policy options presented below are aligned with the short-term EU policy agenda, including the Capital Markets Union, the President of the Commission's new Investment Plan and an increasing shift to the use of financial instruments in public finance. Another set of medium- and longer-term policy options addressing the second set of barriers are also identified. The following provides a summary of the main policy options for the European Commission.

Shorter-term policy options for the EU: Making climate-friendly assets more attractive for institutional investors

1. **Increase the volume and acceptance of climate-friendly financial products**

- European public financial institutions (e.g. European Investment Bank and EBRD) can educate and develop the market and demonstrate their support for climate-friendly financial products, e.g. by issuance of green bonds.
- These institutions can also support proof of concept by expanding their role as cornerstone investors for new structures in the low-carbon investment area.
- Technical support programmes (e.g. the proposed Investment Hub under the Commission President's Investment Plan and municipal support programmes JESSICA and ELENA) can include advice and technical support on green bond issuance.
- "Investing in Europe" workshops proposed under the Investment Plan for Europe, to be held jointly by the EC and the EIB at the national, transnational and regional levels, should include sessions on climate-friendly investment opportunities.
- The EC can convene EU covered bond regulators to explore the development of green mortgage backed covered bonds and the future inclusion of renewable assets in covered bond regulatory frameworks. The EC should work with the European Banking Authority (EBA) to integrate issues related to green covered bonds in their next best practice guidelines.

2. **Improve the risk-return profile of climate-friendly assets through credit enhancement initiatives.**

- The proposed European Fund for Strategic Investments (EFSI), the Project Bond Initiative and the SME Initiative can focus on climate-friendly assets in particular. Renewable energy investments should be brought into the eligibility criteria for an extended Project Bond Initiative.
- For the EFSI, we recommend that the investment guidelines, that are under development for the Fund, set out a priority for low-carbon investments. This is particularly relevant for the 75% of the fund that is intended to leverage long-term investments to avoid lock-in of high emissions infrastructure.
- Policymakers should also explore setting up a separate Green Project Bond Initiative specifically designed for climate-friendly investments, as the need to comply with CEF/TEN criteria limits the climate-friendly investment possible under the existing PBI.

3. **Explore the potential of policy risk insurance**

- EU policymakers should, together with member states, explore the potential for policy risk insurance to mitigate the perceived policy-risk – specifically the risk of retroactive changes - for investors in climate-friendly projects. This risk is a significant concern for investors, yet the real risks for governments are very low – hence the insurance arbitrage opportunity for those governments. But policy risk insurance ideas are still at an early conceptual stage.

4. **Supporting green securitisation**

- The focus on 'high-level securitisation' in the context of the Capital Markets Union agenda should place a particular emphasis on climate-friendly securitisation. This includes supporting the development of industry standards for loan contracts for climate-friendly assets, a necessary prerequisite for securitisation.
- Policymakers can support warehousing structures that enable pooling of climate-friendly assets across different originators. An example is the municipal debt aggregators operating in many EU countries, such as Kommunalinvest in Sweden. The Commission could work with the EIB to further develop the proposed Renewable Energy Platform for Institutional Investors.
- The model used for the SME Initiative, which combines securitisation and credit enhancement, can be adopted for climate-friendly assets.

5. **Accounting & disclosure of companies and financial products**

- EU policymakers can make climate-friendly assets easier to discover for investors by standardizing the accounting and disclosure rules of non-financial data from companies as part of the EU Directive on the disclosure of non-financial and diversity information.
- Policymakers can similarly contribute to standardizing accounting and definitional frameworks associated with financial products, including for Packaged Retail and Insurance-related investment products (PRIIPS) and green bonds.

Medium- and longer-term policy options targeting investors' decision-making framework

6. **Lengthening time horizons of institutional investors**

- The EC can support research on risk models with financial support for technical development and through promoting best practice in the market through knowledge sharing platforms. The EC can subsequently explore reforming the rules around the time horizon of risk accounting and the nature of risk models.
- EU policymakers can promote best practice of asset owners by designing investment mandates to facilitate lengthening time horizons of their investment managers.
- Policymakers should review how the use of cap-weighted equity indices as an investment tool for broad diversification can reinforce the direction of institutional investors' capital to non-climate- friendly investments.

7. **Explore the use of tax incentives on climate-friendly financial products**

- Convene national policymakers and investors to roundtables to develop best practice guidelines on tax incentives for low-carbon investment. This can be associated with an EC best practice guide for finance sector tax incentives designed to mobilise climate-friendly investment.

8. Improve governance of institutional investors

- We recommend the discussion of engagement policy with institutional investors, as currently proposed under the Shareholder Rights Directive. We recommend the proposal be extended to report on climate-friendly investments. However, as the window to influence the current situation changes to the Shareholder Rights Directive is closing, this is considered a longer-term action. In the first instance, this can be done with existing or non-standardised methodologies, with subsequent adoption of the standards proposed in Action #6 and 9.
- The Commission can use its convening power to facilitate a discussion on best practice stewardship codes and consider the potential for a European Union level best practice stewardship code that integrates climate-related risks and adopts the comply and explain policy.
- The European Commission should follow up on their commissioned study on fiduciary duty and environmental resource challenges (due to complete late 2015) by engaging with market actors how asset owners and investment managers can act upon the findings. The Commission can then subsequently promote best practice in this area.

9. Accounting and disclosure of financial institutions

- Accounting and disclosure requirements for financial institutions, such as those regulated by the IORP Directive, can be strengthened to include climate performance metrics and carbon risk assessment.
- Policymakers can integrate 2° investing criteria, such as the ones currently being explored in the context of the G7, into investment mandates for public financial institutions to ensure their investing and loan book are broadly aligned with climate policy goals.

The EU and international climate discussions

In addition to policy recommendations developed at EU level, a key role for the EU on mobilising the private sector for climate investments relates to their role in the global negotiations. For example, COP21 represents an opportunity for the EU to promote the issue of mobilising private capital for climate-friendly investment on the agenda. The European Commission can use their convening power to support a global initiative under an existing organisation to promote the alignment of the financial sector with climate goals, support global standardisation around defining climate-friendly financial products, and support a policy exchange around policy options to mobilise private capital for climate-friendly investment.

Impact assessment

Impact analysis helps ensure effective use of public funds. Providing a robust quantitative climate-specific investment impact analysis of how much capital is mobilised from institutional investors, and what this means for investment on the ground in the real economy, from each of the proposed actions is currently challenging. This is primarily due to lack of data. However, based on extrapolating from the impacts similar policies, tools and instruments have had in other policy priority areas in the past, is was concluded that Action 2 on credit enhancement is expected to have the largest direct impact in the short-term. Action 4 on green securitisation, and Action 5 covering accounting and disclosure are also expected to have large-scale impacts.

The impacts of the proposed Action Plans can be global, and have a significant positive impact on increasing climate-friendly investment in developing and emerging economies. This is an important conclusion of this report, as the vast majority of climate investment needed globally is outside the EU.

The actions from EU policymakers can provide a blueprint to follow for other regions, countries and multilateral development banks to copy.

In addition, more general qualitative conclusions can inform EU policymakers' evaluation of the action plan:

- **The proposed financial sector policies are complementary to policies to address risk-return in the real economy**. Financial policies on their own will not have enough impact, in terms of mobilising private capital. Improving the risk-return profile through subsidies, carbon price and other policies in the economy remains a key factor for success. Workshops with finance professionals, including institutional investors, held in London and New York for the purpose of this project stressed this point.
- **It is expected that there is a synergy between many of the different policies, meaning that the impact of an individual action increase if it is implemented in conjunction with another action.** Therefore, it is crucial that European policymakers do not interpret the proposed list of actions from this report as a menu of options: it should be read as a basket of complementary actions, not a menu of alternatives.

Further analysis is needed to fully assess the impact and comparable efficiency of different measures, both on their own as well as when combined and implemented simultaneously.

Organisation of the report

Chapter 1 sets out the scope of the report; the policy context and the scale of the investment challenge. Achieving climate goals will require large-scale investments in excess of what constrained public finances can provide alone. Therefore, tapping into the vast capital pools of institutional investors is necessary. Chapter 2 maps the existing demand from institutional investors for climate-friendly investments. Chapter 3 sets out the potential channels of fixed income and equities to provide a range of complementary options for where the supply of financially competitive climate-friendly investment flow can occur. This overview of supply channels is particularly useful to non-financial policymakers. Chapter 4 maps the toolbox policymakers can use to address the identified barriers to climate-friendly investment, working with institutional investors' existing decision-making framework. A short-term action plan for EU policymakers to do this is provided in chapter 5. The short-term action plan is complemented with an action plan with medium- to long-term options to further increase institutional investors' demand for climate-friendly investments by supporting them to change their decision-making frameworks (chapter 6). Impact assessment of the different policy actions proposed, both in the shorter-term and medium- to longer-term, is discussed in chapter 7.

Table 0.1 Summary of shorter-term policy actions, key enablers and relevant barriers

Barrier type	Barrier	Area for policy intervention	Key enabler for policymakers	Actions
Availability/liquidity	Lack of volume of climate investment opportunities	Scaling green bonds and other climate investment opportunities	Demonstration issuance, credit enhancement, securitisation, standards, technical support, making climate-friendly assets eligible in covered bond regulations	1. Increase the volume and acceptance of climate-friendly demonstration issuance, investment and technical support
Risk-Return	Credit risk (including technology and performance risk)	Tools to reduce investment risk	Providing public finance credit enhancements, demonstration issuance and investment, technical support	2. Building on existing credit enhancement initiatives; Investment Plan, European Fund for Strategic Investment, Project Bond Initiative, SME Initiative.
Risk-Return	Policy risk	Tools to reduce investment risk	Policy risk insurance	3. Explore the potential of policy risk insurance
Transaction cost	Small scale of climate projects, securitisation potential solution but they are also barriers to securitisation	Support aggregation and securitisation	Support green securitisation: standardisation of contracts, warehousing/aggregation, asset-purchasing programmes, technical support	4. Support green securitisation; development of standards for climate-friendly assets (green bond standards) as well as standard loan contracts for the climate-friendly assets, warehousing, credit enhancement (SME Initiative model, REPIN)
Transaction cost	Lack of standards and disclosure	Harmonise standards and disclosure	Support market-led disclosure initiatives and standards development and the dissemination of standards once developed.	5. Accounting and disclosure of companies and financial products

Table 0.2 Summary of medium- to longer-term policy actions, key enablers and relevant barriers

Barrier type	Barrier	Area for policy intervention	Key enabler for policymakers	Actions
Short investment time horizons	Shortened time frames arising from the investment management practices (performance review cycles, investment mandate periods and asset owners review periods)	Lengthening portfolio time horizons	Rules on risk models and investment mandates	6. Lengthening time horizons of institutional investors
Stewardship	Lack of integration of climate-related risk in stewardship practices. Fiduciary duty, voting and engagement processes do not sufficiently include climate	Stewardship code, best practice guidelines and fiduciary duty concept	Include climate in stewardship best practice	8.Integrate climate-related factors in stewardship practices
Lack of relevant climate-related risk and performance methodologies	Lack of tools and metrics for climate and carbon risk; uncompetitive risk-return of climate investments today when climate-related risks are not integrated	Mainstreaming long-term risk accounting and tools for carbon and climate risk; tax incentives	Accounting and disclosure requirements; tools to increase financial returns on climate assets	7. Explore the use of tax incentives on climate-friendly assets 9.Accounting and disclosure of financial institutions

1 Introduction

1.1 Aim: Providing policymakers with an actionable toolbox to tap into institutional investors' capital pool for climate investments

1.1.1 *Objective*

The objective of the report is to provide European Union (EU) policymakers with an actionable toolbox for contributing to mobilising private finance for climate-friendly investments. Climate-friendly investments are defined here as investments aligned with the transition to a low-carbon economy and society that reaches the policy target of limiting global warming to 2°C. The report aims to provide an action plan with practical next steps for policymakers to support market developments and ensure that they are scaled up at the rapid pace that the climate change challenge requires.

The report aims to highlight how these actions to increase climate-friendly investments can be integrated with the current financial policy agenda in the EU, in particular the Investment Plan for Europe and the Capital Markets Union. A key premise of the report is that it is possible to generate profitable investments that will also have climate change benefits.

1.1.2 *Organisation of the report*

This report identifies two approaches to increase investment from institutional investors;

1. First, to work with asset owners' and investment managers' existing decision making framework. In this approach, the strategy for policymakers then becomes to increase the amount of climate-friendly investments that is attractive to institutional investors within this framework
2. The other approach is to change the existing decision-making framework of asset owners and investment managers to alter what institutional investors are looking for when they analyse investments

Considering the current EU agenda, particularly the Capital Markets Union and the Investment Plan, the first of these two approaches is considered to have more short=term potential and is, therefore, explored most in-depth. This approach is covered in chapter 3, 4 and 5, while the second approach will be explored in chapter 6.

Chapter 1 sets out the scope of the report; the policy context and the scale of the investment challenge. Achieving climate goals will require large-scale investments in excess of what constrained public finances can provide alone. Therefore, tapping into the vast capital pools of institutional investors is necessary. Chapter 2 maps the existing demand from institutional investors for climate-friendly investments. Chapter 3 sets out the potential channels of fixed income and equities have to provide a range of complementary options for where the supply of financially competitive climate investment flow can occur, including amongst others, green bonds. This overview of supply channels is particularly useful to non-financial policymakers. Chapter 4 maps the tools, instruments and policies policymakers can use to increase climate-friendly investment by creating actionable investment opportunities and financial regulations to address barriers to investment. A short-term action plan for EU policymakers to do this is provided in chapter 5. The short-term action plan is complemented with an action plan with medium- to long-term plays to further increase institutional investors' demand for

climate investments by supporting them to change their decision-making frameworks (chapter 6). Impact assessment of the different policy actions proposed, both in the shorter term and medium- to longer-term, is discussed in chapter 7.

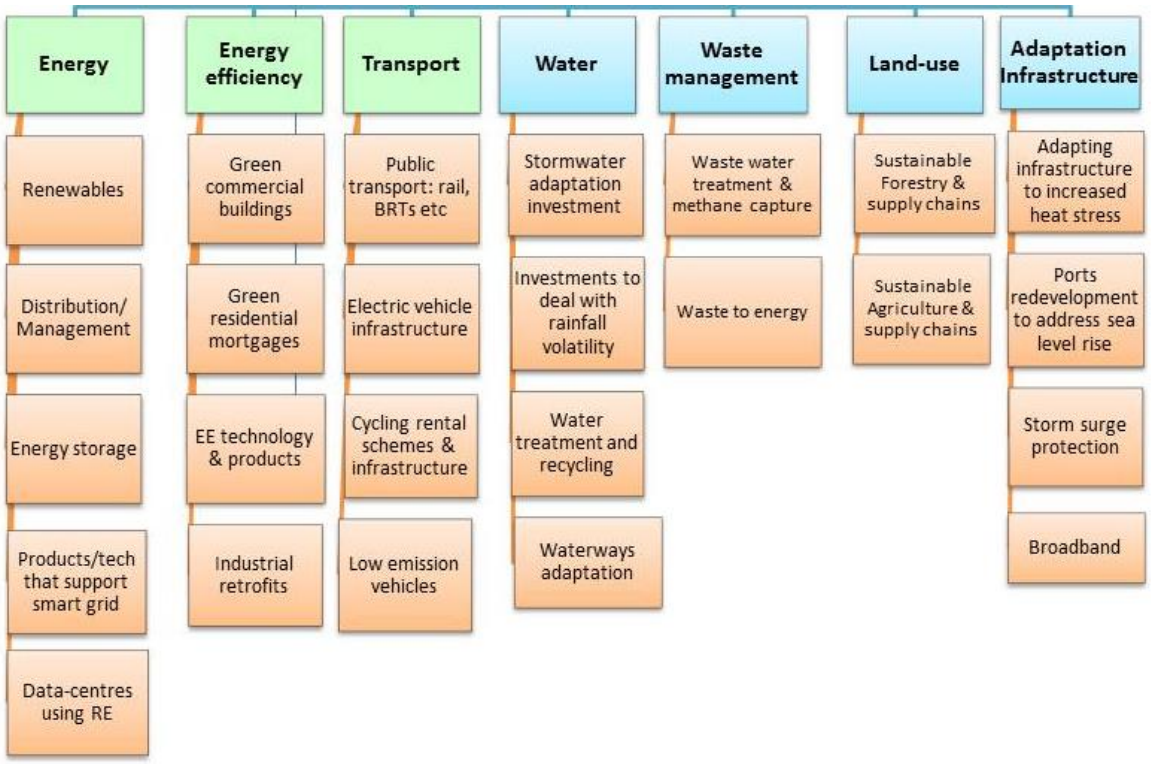
1.1.3 *Further defining and justifying the scope*

The report will look at increasing low-carbon and climate-resilient investments from institutional investors by using financial tools, instruments and policies. A more detailed analysis of the type of investment, policy intervention and market players in the report are laid out below.

Focus: low-carbon climate-resilient investment that is aligned with limiting global warming to 2°C

Investments that have a positive climate impact are known by many terms; climate-friendly, climate-smart, low-carbon, climate-resilient – to name a few. The difficultly is that there is no one group of definitions or standards used across climate finance. For the purposes of this report climate-friendly investments are defined as low-carbon or climate-resilient investments that are aligned with the emissions reductions required to meet the EU policy target of limiting global warming to 2°C. This means climate investments must not just have a positive climate impact but must be ambitious enough to deliver emission cuts that can put the EU onto a trajectory compatible with 2°C. Categories for such investments are shown below in Figure 1.1.

Figure 1.1 Climate asset taxonomy: assets considered low-carbon and climate-resilient investments



[Source: Climate Bonds Initiative]

Out of scope: environmental investments with no low-carbon or climate-resilient impacts

Green investments that have a positive environmental outcome but no low-carbon or climate-resilient impact are not in scope for this report. An example of a green, but non-climate-friendly, investment would be investments for clean water that do not take into consideration emissions reductions or

climate adaptation. While beneficial from an environmental perspective through reducing environmental pollution such investments can have a negative impact on climate change. Another example of green non-climate investments is investments for land to be used by a municipality for community parks and recreational use. Although there may be social and aesthetic benefits to such investments there is little climate mitigation or adaptation benefits. Instead, this report focuses on climate-friendly investments. Although green bonds have green, and not climate, in the name, the vast majority are climate related. The original aim of the green bond market was to be climate-friendly; therefore they are within scope for this report.

Focus: financial policies, tools and instruments to support market-driven initiatives

The discussion will focus on policies, tools and instruments that directly target the financial sector. The report recognises that capital allocation decisions are primarily driven by risk-adjusted returns, which in turn depend on market factors and industrial policies. At the same time, finance sector policies have a significant role in shifting private capital to climate-friendly investments. This area to date has been under-explored relative to industrial policies, which is the main rationale for it being the focus of this report.

Out of scope: industrial policies in the real economy

Industrial policies to improve risk-return ratio of climate friendly investments, linked to project development, such as emission trading schemes and carbon taxes, feed-in tariffs and renewable energy mandates in electricity markets, are key to deliver profitable projects that are attractive to finance. However, in-depth analysis of these are excluded from this report, as they have already been explored extensively in existing literature and policymakers are already using many tools in this area.

Focus: institutional investors

This report focuses on mobilising capital from institutional investors. Institutional investors can be broken down into asset owners and investment managers. Asset owners pool money from individuals and organisations (beneficiaries) to act as professional investors on behalf of others. They include insurance companies,[1] pension funds,[2] investment managers,[3] foundations and endowments,[4] sovereign wealth funds,[5] and non-fund pension assets.[6] Investment managers undertake the day-to-day management of these assets, either in-house or through external asset management companies. This process is set out in Figure 1.2.

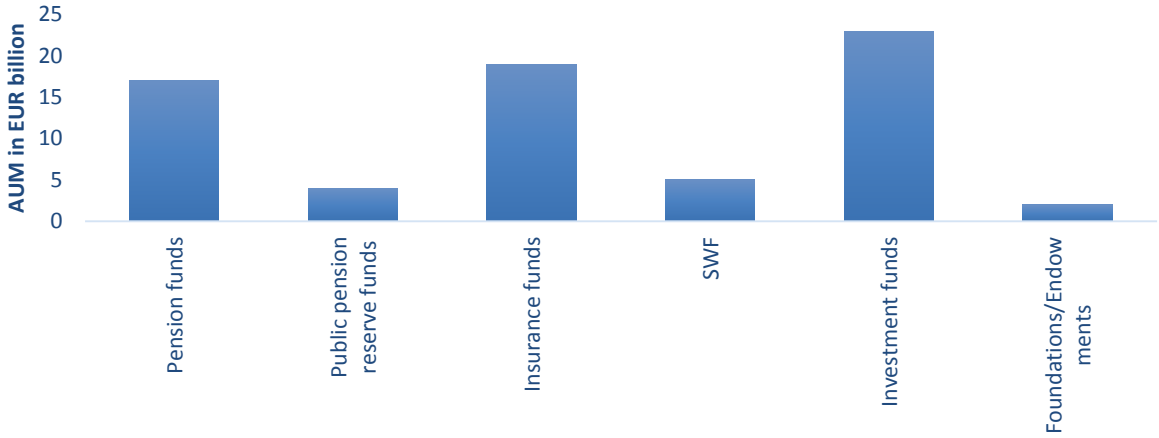
[1] (i) Life insurance companies: provide life insurance, annuities and pension products and (ii) Non-life or property insurance companies.
[2] Collect money/contributions and invests it to generate stable growth over the long term, and provide pensions for employees when they reach the end of their working years and commence retirement.
[3] Intermediaries managing assets for pension funds, insurance companies or individual investors, use of segregated or co-mingled funds (e.g. mutual funds).
[4] Typically quite small, supporting activities of organisations over the long-run.
[5] Typically quite small; almost all assets are managed by Norges Bank Investment Management (NBIM) in Norway.
[6] Pension related assets that do not fit in the above categories, are not managed by traditional pension fund. Some assets function as short-term liquidity or represent double counting of assets from the above categories. E.g. pension reserve funds, security reserves in risk-free assets, investment retirement accounts (IRAs), insurance contracts.

Figure 1.2 Linking institutional investors to the real economy

[Source: FtF 2015]

Institutional investors are one of the largest sources of private and public capital with roughly EUR 63 trillion[7] of assets under management versus global financial assets of around EUR 190 trillion.[8] In Europe, institutional investors' assets under management amount to roughly EUR 13.5 trillion.[9] While institutional investors are not the only relevant source for providing the capital needed for the low-carbon transition, their significant share of financial assets means they play a key role as a source of capital for achieving climate goals. The assets under management are distributed unevenly between different institutional investors (Figure 1.3).

Figure 1.3 Total assets under management by institutional investor in OECD in 2012[10]



[Source: SWF = sovereign wealth fund. OECD (2012)]

Out of scope: retail investors

Retail investors also play an important role in financing the low-carbon transition, and several of the policy actions recommended in this report in relation to institutional investors are also relevant for retail investors. However, explicit recommendations on how to mobilise retail investors is outside the scope of this report, as their capital pool is much smaller than that of institutional investors, and investment scale is crucial for climate finance. It is, however, recognised that many retail investors are included indirectly, as they have delegated responsibility for managing their funds to institutional asset owners.

[7] Kaminker, Ch. et al. (2013), "Institutional investors and green infrastructure investments: selected case studies", OECD Working Papers on Finance, Insurance and Private Pensions, No.35, OECD Publishing.
[8] Estimates from the McKinsey Global Institute based on 2012 trends.
[9] OECD Institutional Investor database.
[10] There is an estimated double counting between different assets of US$15 trillion (EUR13.5trn).

Although retail investment is out of scope for this report it can improve financing access particularly for smaller scale low-carbon investments. Such small scale projects have the added benefit of building community support for low-carbon investment, which has played an important role in renewable energy deployment in several countries, including Denmark and Germany. It is therefore recommended that the European Commission explore how to mobilise retail investors in a separate project, as there are different challenges in tapping into the retail market compared to the institutional investor market, for example in relation to consumer marketing of financial products.

Focus: upstream stage of capital pipeline

The midstream stage between capital expenditure decisions of companies and institutional investors will be explored only to the extent that it has implications of institutional investors' investments. For example, the role of banks will be referenced in this context, as originators of investment opportunities for institutional investors, such as asset-backed securities.

Out of scope: Banks and corporate investment

Beyond its role as an originator for investment opportunities for institutional investors, the role of banks is largely out of scope. While banks continue to provide the majority of financing in Europe, and mobilising their funds for the low-carbon transition is important, it is already on the EU policy agenda to reduce the economy's reliance on bank lending. Securitisation of loans is one strategy here, and so this, in the guise of green asset-backed securitisation, is covered in this report. This report seeks to be aligned with on-going policy changes, which further warrants the focus on institutional investors alone, with banks out of scope. Similarly, corporate investment, which is considered one-step removed from institutional investors, is also out of scope.

1.2 The project in the context of the climate finance debates

1.2.1 Parallel research streams

The research behind this report is connected to a number of associated, parallel research streams:

- ***Research on carbon risk:*** There is growing research on carbon risk and increasing translation of this research into practice. Notable in this regard is the Bloomberg *Carbon Risk Valuation Tool* and Mercer's review of the implications of carbon and climate risk for strategic asset allocation.[11] In addition, the work of the Carbon Tracker Initiative, subsequently also taken up by the Oxford University Stranded Assets Research Programme, has also contributed significantly on this topic. This report references this work and tries to identify the potential implications of the carbon risk narrative.
- ***Understanding the role of institutional investors:*** OECD[12] and CPI[13] research highlight the significant role that institutional investors play in the context of climate finance. The research also demonstrates the barriers to climate-friendly investment institutional investors are currently facing. This report seeks to build on this work to focus on European institutional investors and policy frameworks.
- ***Defining climate-friendly assets and portfolios:*** Research initiatives are under way to improve the measurement of financial institutions' climate performance, at data level (CDP),

[11] Mercer (2011) "Climate Change Scenarios: Implications for Strategic Asset Allocation".
[12] OECD (2012) "The Role of Institutional Investors in Financing Clean Energy Infrastructure" *OECD Working Paper 23.*
[13] CPI (2013) "Challenge of institutional investment in renewable energy"

physical assets (Climate Bonds Initiative), and portfolio level (consortium led by the 2° Investing Initiative). This study references the state-of-the-art in this field and maps the way forward.

- ***Role of policymakers:*** The research on mobilising private finance is increasingly being seen through a policy prism, with growing research on the role of policy in greening financial markets, notably by the UNEP Inquiry on the Design of a Sustainable Financial Systems.[14]
- ***Private sector initiatives:*** There have been a number of private sector initiatives on this topic, notably the Institutional Investor Group on Climate Change and the Investor Network on Climate Risk (INCR). Notable as well have been the Montreal Carbon Pledge, led by the PRI,[15] and the Portfolio Decarbonisation Challenge, led by UNEP-FI.[16]

1.2.2 *Regulatory and policy context*

The policy analysis presented in this report appears in the context of growing momentum around the mobilising financial regulation and policy for climate goals. International examples include the Green Credit Guidelines developed by the Chinese Banking and Regulatory Commission (CBRC), and the US Securities and Exchange Commission (SEC) guidance on carbon and climate risk disclosure. In Europe, initiatives related to climate change issues in financial regulation have appeared in the context of the Packaged Retail Investment Products (PRIPs) regulation, Institutions for Occupational Retirement Provision (IORP), and others. The regulatory context, particularly in Europe, will be referenced throughout the report.

1.3 The project in broader European policy context

1.3.1 *2030 package & other climate /energy streams*

On October 24, 2014 the European Council concluded on the EU's midterm climate and energy targets under the 2030 Climate and Energy Framework: 40% domestic reduction in GHG emissions, minimum 27% of energy consumed from renewable sources and reduced energy consumption due to increased energy efficiency of at least 27% by 2030 (compared to 1990). [17] Additionally, the EC Energy Roadmap models five decarbonisation' scenarios based on different technology choices up to 2050 and compares additional investment needs.[18] However, spatial disparities across the EU in relation to costs of capital and investment needs remain unexplored under these scenarios and targets.

1.3.2 *Financing long-term growth in Europe: Long-term Financing*

The broader question of financing long-term growth has been identified by the current European policy agenda as a key challenge. The Communication on Long-Term Financing by the European Commission (EC), published in March 2014, serves as the roadmap for addressing these issues.[19] It addresses a broad range of measures, including the facilitation of securitisation for long-term assets, fiduciary duty, increased disclosure of environmental, social and governance (ESG) criteria, role of public financial institutions and national development banks, and the creation of an EU savings account. A key issue related to financing long-term growth includes the financing of infrastructure, where there are massive

[14] UNEP (forthcoming) Inquiry into the Design of a Sustainable for Financial System: Policy Innovations for a Green Economy
[15] http://montrealpledge.org
[16] http://www.unep.org/newscentre/Default.aspx?DocumentID=2796&ArticleID=10991
[17] Council Conclusion on 2030 Climate and Energy Policy Framework.
http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/ec/145356.pdf
[18] EC (2011) 'Energy 2050 Roadmap', COM/2011/0885 final
[19] EC (2014) Communication on Long-term financing of the European economy, COM(2014) 168 final

investment needs for transport, energy and broadband networks. The EC's estimates from 2011 is that EUR 1.5 trillion to EUR 2 trillion are required to meet the Europe 2020 Strategy goals for smart, sustainable and inclusive growth.[20] **This study seeks to build on this agenda: first, a shift to institutional investors – which is the focus of this report - can increase long-term investments compared to alternative investment sources, such as banks, as they have long-term liabilities. Second, this report will explore how to increase the time horizons of investments from institutional** investors.

1.3.3 Financing long-term growth in Europe: the Investment Plan for Europe

In November 2014, a three-pronged Investment Plan for Europe was launched. First, the plan includes a EUR 315 billion, 5-year investment plan, which is focused on leveraging private capital.[21] This is done by the EC collaborating with the EIB to set up a European Fund for Strategic Investments, created by a EUR 21 billion reserve for infrastructure projects, which is estimated to enable the EIB to fund EUR 63 billion of loans. This is planned to mobilise EUR 252 billion of private capital. About three-quarters of the capital is planned for long-term investments, such as infrastructure, with the other quarter focused on small-and-medium enterprises (SMEs) and mid-caps. The Fund will complement existing initiatives offering risk-bearing financial instruments, with the difference being that the new Fund for Strategic Investments will be able to take on higher risks than other programmes. In addition to the Fund, the Investment plan includes an increase in technical assistance through an Investment Hub (strand 2) and improving regulatory predictability (strand 3). **How policymakers can incorporate low-carbon development considerations into each of the three strands of the Investment Plan for Europe to align it with EU's wider policy priorities for climate is explored in this report.**

1.3.4 EU changing role in increasing investment: financial instruments rather than direct lending

The Investment plan for Europe from November 2014, set out in detail above, also proposed changing the way EU institutions drive investment, with an increasing focus on mobilising private capital rather than providing funds directly. **More specifically, the plan proposes to double the use of financial instruments under the European Structural Investment Funds for the 2014-2020 budget period compared to the 2007-2013 period.**

1.3.5 Financial market reform: EU Capital Markets Union

The legacy of the financial crisis appears as an on-going financial reform process. This reform process creates an opportunity to integrate climate change goals and a broader sustainability agenda into the financial policy and regulatory framework. While this dynamic is currently prominent, this window will eventually close. For some regulatory changes such as Basel III and Solvency II, this window may have already closed. Another key financial market reform that has been proposed in the last year is the development of a EU Capital Markets Union (CMU), which aims to integrate capital markets across Europe to reduce the reliance on bank lending: the share of bank lending in the economy is much higher in Europe than in for example the US, where capital markets are much more developed. By diversifying the sources of finance the European Union can increase the resilience of the financial system. Lack of access to finance for businesses that is currently being experienced in Europe arises partly from the fact that businesses, especially smaller businesses, are mainly reliant on only one source of finance for their investments: banks. If there were more options for businesses to finance investment, the reduction in lending from banks would not have such a severe impact on their access to finance. The

[20] http://ec.europa.eu/economy_finance/financial_operations/investment/europe_2020/investment_needs_en.htm
[21] http://europa.eu/rapid/press-release_SPEECH-14-2160_en.htm, http://www.eib.org/about/invest-eu/index.htm

dominance of one source of finance can also lead to less transparency in the financial system, which is not beneficial to investors for the wider economy. The options presented in this report to mobilise institutional investors to finance the low-carbon transition can also address these other financial issues of financial vulnerability.

The aim of development of an integrated capital market is to increase investments and reduce cost of capital. The Capital Markets Union is specifically looking to boost access to finance for small- and medium enterprises.[22] A green paper providing more details on a EU Capital Markets Union was published in February 2015. Throughout 2015, more topic-specific papers on the CMU are expected: proposals for high-quality securitisation of debt, followed by a paper on potential changes to prospectus requirements for SMEs to enable their access to capital markets.[23] **How policymakers can incorporate climate change considerations into the Capital Markets Union to align it with EU's wider policy priorities for climate is explored in this report. Particularly, the short-term action plan and how each proposed action is relevant for the Capital Markets Union is set out in chapter 5.**

1.4 Setting the scene: A climate-friendly infrastructure narrative for financing needs

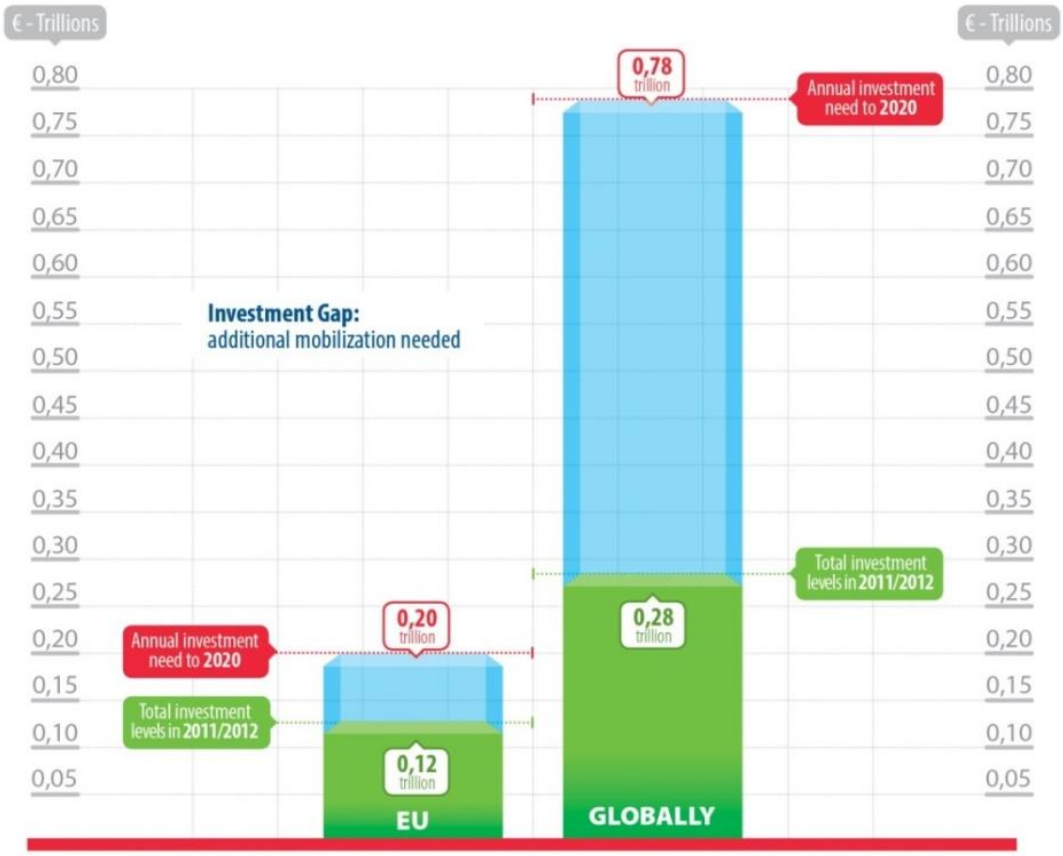
1.4.1 Low-carbon investment challenge

The most prominent organisations currently developing investment roadmaps for the low-carbon transition are the IEA[24] and the World Energy Council[25] (energy investment needs), the OECD (infrastructure investment),[26] and Frankfurt School/ Bloomberg New Energy Finance (low-carbon energy investments) (Figure 1.4)[27]

At the EU level, the Commission's Impact Assessment of the 2030 Climate and Energy Framework estimates investment needs at EUR 193 billion per year for the period 2011-2030 (excluding transport).[28] This estimate refers to investments needed to modernise ageing infrastructure and avoid lock-in of inefficient technologies that would hamper reaching the Union's 2030 climate and energy targets.[29] Further, the EC (2014) impact assessment on the 2030 climate and energy package[30] finds that annual investment needs to finance the 40% emission reduction target differ substantially between Member States: additional investments in the range of EUR3.1bn to EUR7.6bn per year will be needed in wealthier States, and up to three times more (EUR11bn to EUR21bn) in EU Members States with lower GDP per capita (<90% of EU average). As evident from the figure below, there is a large gap between the amount of climate investment needed and current investment levels.

[22] http://ec.europa.eu/priorities/docs/pg_en.pdf
[23] http://www.reuters.com/article/2015/01/27/us-eu-markets-reform-idUSKBN0L00ZW20150127
[24] IEA (2014). Special Report: "World Energy Investment Outlook".
http://www.iea.org/publications/freepublications/publication/WEIO2014.pdf
[25] World Energy Council (2013) "World Energy Scenarios: Composing Energy Futures to 2050"
[26] OECD (2011) "Strategic transport infrastructure needs to 2030"
[27] Frankfurt School / BNEF (2014) "Global Renewable Energy Investment Trends 2014"
[28] EC (2014) Impact Assessment: A Policy Framework for Climate and Energy in the Period from 2020 up to 2030.
http://ec.europa.eu/clima/policies/2030/docs/swd_2014_xxx_en.pdf
[29] Council Conclusion on 2030 Climate and Energy Policy Framework.
http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/ec/145356.pdf
Note that this figure does not include funding needs for the whole range of energy efficiency measures needed to meet the EU-wide energy efficiency target of 27% as set by the Council Conclusion on Oct 23, 2014.
[30] EC (2014) Impact Assessment: A Policy Framework for Climate and Energy in the Period from 2020 up to 2030.
http://ec.europa.eu/clima/policies/2030/docs/swd_2014_xxx_en.pdf

Figure 1.4 Global and European climate finance levels versus future investment needs



[Source: FtF consortium based on CPI, IEA, EC data[31]]

A challenge is not just availability of capital at the necessary scale, but accessing the capital at lower cost. For high capital expenditure projects, as low-carbon projects typically are, the cost of capital has a strong influence of the economic viability of the project. This is particularly the case in developing countries and emerging markets where interest rates are much higher than in developed countries. For example in India, a study found that two-thirds of the full lifetime cost of a solar project came from interest rate payments.[32] Increased access to capital from institutional investors could markedly decrease the interest rate for low-carbon projects, which again would have a material impact on the financial viability of the overall project.

The relevance of institutional investors in closing the low-carbon investment gap varies by sector, as the extent to which different sectors rely on the finance sector for capital varies. For example, the oil and gas sector relies significantly on retained earnings and only limited bond issuance,[33] but a substantial part of renewable energy financing in Europe is achieved through project financing.[34]

[31] CPI (2013) The Global Landscape of Climate Finance 2013; IEA (2012) Energy Technology Perspectives 2012: Pathways to a clean energy system; EC (2014) Impact Assessment: A Policy Framework for Climate and Energy in the Period from 2020 up to 2030. http://ec.europa.eu/clima/policies/2030/docs/swd_2014_xxx_en.pdf
[32] Shrimali, Konda and Srinivasan (2014) Solving India's Renewable Energy Financing Challenge: Instruments to Provide Low-cost, Long-term Debt
[33] IEA (2014) World Energy Investment Outlook 2014
[34] KPMG (2010). Powering ahead: 2010. An outlook for renewable energy M&A. https://www.kpmg.com/PT/pt/IssuesAndInsights/Documents/Powering-Ahead-2010.pdf

1.4.2 The role of low-carbon and infrastructure investment roadmaps

Investment roadmaps can help investors to fully understand the low-carbon investment needs and how it relates to their investments. Conversely, lack of roadmaps for low-carbon and climate-resilient investments is a large risk for institutional investors as it increase uncertainty. The roadmaps provided must provide information relevant to investors, which requires roadmaps to be available for all sectors relevant to a low-carbon and climate-resilient economy, and for all countries globally. Two main types of roadmaps have been identified: technology roadmaps and capital expenditure roadmaps.

Technology roadmaps

For technology roadmaps in Europe, the EC has published an energy-technology roadmap for 2050.[35] Similar to other scenarios at international level, the EC roadmap provides two trend scenarios (Reference scenarios and Current Policy initiatives scenarios, updated for changes in policies following Fukushima) and five 'decarbonisation scenarios' (High Energy Efficiency, Diversified supply technologies, High renewable energy sources, delayed CCS, low nuclear). Specific scenarios are also sometimes developed at country level, but are not available for all EU Member States.[36]

These detailed technology roadmaps provided by the EU for the energy sector are, however, less developed in other regions and for other sectors. The Oxford Smith School Stranded Assets Research Programme has identified nearly 80 different scenarios that set out the energy-technology roadmaps either at national or international level.[37] The scenarios show a wide degree of divergence on the level of granularity (country, sector, company), time horizon (from less than <7 years to >51 years), and approach (quantitative or qualitative).[38] The most prominent global scenarios are those of the IEA,[39] although alternative global scenarios have also been developed by environmental NGOs and research organisations such as Greenpeace,[40] WWF/Ecofys,[41] and the World Energy Council.[42] These usually distinguish themselves by challenging the prominent role that Carbon Capture and Storage (CCS) and

[35] EC (2011) Energy Roadmap 2050, COM(2011) 885/2

[36] For example, the Energy Research Centre of the Netherlands (ECN) established several scenarios to discuss the different routes towards a 'clean' Dutch economy (reducing carbon emission in 2050 compared to 1990 with 80%). The "Gone Green" scenario produced by the UK National Grid simulates the transition pathway of UK's energy system with the same emission target by 2050. The National Energy Board of Canada started the project "Canada's Energy Technology Future" in 1998 and revises it every two years. The aim is to provoke strategic thoughts about the range of possible futures in energy technologies and systems, and improve the government's long-term planning capabilities. There are also several scenarios built around China. The prominent examples are the Bloomberg New Energy Finance "The future of China's power sector", which estimates China's energy mix under different scenarios in 2030; the CITI "Peak Coal in China" with focus on China's coal consumption by 2030; and Scenarios produced jointly by the Lawrence Berkeley National Laboratory and the China Energy Group which analyse the role of energy efficiency policies in transitioning China to a lower emission trajectory and meeting its intensity reduction goals. References: World Energy Council, *World Energy Scenarios: Composing Energy Futures to 2050*, 2013 ; ECN & PBL, (2011), Verkenning van routes naar een schone economie in 2050, Hoe Nederland klimaatneutraal kan worden, Energieonderzoek Centrum Nederland (ECN) en Planbureau voor de Leefomgeving (PBL), Den Haag, rapport ECN-O- -11-076 ; National Grid: *UK Future Energy Scenarios* (annual report); Natural Resources Canada (2000), *The Energy Technology Futures Project: Scenarios to 2050*
Bloomberg New Energy Finance (2013), *The Future of China's Power Sector*; Citi Research (2013): *The Unimaginable: Peak Coal in China*, LBNL & China Energy Group (2011), *China's Energy and Carbon Emissions Outlook to 2050*

[37] Oxford Smith School Stranded Assets Research Programme. http://www.smithschool.ox.ac.uk/research/stranded-assets/

[38] Caldecott, Ben et al. (2014) "Stranded Assets and Scenarios"- Discussion Paper. http://www.smithschool.ox.ac.uk/research/stranded-assets/Stranded%20Assets%20and%20Scenarios%20-%20Discussion%20Paper.pdf

[39] The IEA has developed two scenarios in line with 2° C climate goals, the 450 scenario for the World Energy Outlook, covering 2014-2035 and the 2DS for the Energy Technology Perspectives, covering 2014-2050.

[40] Greenpeace (2012) "Energy (R)evolution".

[41] WWF/Ecofys (2011) "Energy Report"

[42] World Energy Council (2013) World Energy Scenarios

nuclear power plays in the IEA scenarios, the impact of energy savings, and putting emphasis on the relative contribution of shifts in transportation patterns.

Technology roadmaps are increasingly being turned into capital expenditure roadmaps, focused on defining the investment needs to implement the infrastructure of a 2°C world as set out in the technology roadmaps.

Capex roadmaps

The most prominent organisations currently developing investment roadmaps are the IEA[43] and the World Energy Council[44] (energy investment needs), the OECD (infrastructure investment),[45] and Frankfurt School/ Bloomberg New Energy Finance (low-carbon energy investments).[46] The following briefly summarises some of the major issues with current capital expenditure roadmaps:

- *Missing sectors and timeframes*: many capital expenditure roadmaps exclude sectors that are significant from both a climate change and finance sector perspective. For instance, according to this study's estimations, roughly 30% of the climate-relevant market capitalisation is not covered by the IEA roadmaps (e.g. airports, road infrastructure, agriculture). [47]
- *Most investment roadmaps do not distinguish different types of capital*: providing an indication of the breakdown by asset class (debt, equity) of capital expenditure roadmaps could be helpful to investors.
- *Uncertainties:* A big challenge for capital expenditure roadmaps is the high degree of uncertainty associated with issues such as the changes in capital costs and technology.

1.4.3 The climate investment challenge overlaps strongly with the larger infrastructure investment challenge

Financing the shift to a low-carbon and climate-resilient economy is not the only investment challenge Europe, and the rest of the world, is facing. The investment needs for infrastructure more broadly are also extensive: As set out above, the EC's estimates that EUR 1.5 trillion to EUR 2 trillion are required to meet the Europe 2020 Strategy goals for smart, sustainable and inclusive growth. The US also have massive infrastructure upgrade needs; while developing countries and rapidly growing emerging market economies face a need to build extensive infrastructure from scratch to keep up their economic growth rates.

Economies are faced with a development choice: strong economic growth with little respect for environment and climate (leading to poor air quality in cities, polluted waterways and water supply and traffic jams. Or develop in a more climate-friendly way, investing in climate friendly infrastructure and stricter regulations delivering clean air, clean water and more liveable cities. The challenge is that the climate-friendly route is a higher capital expenditure route. It will likely pay higher dividends in the long run, and will have as bonus avoided fossil fuel costs – but in high-interest rate environments fossil fuel dependent infrastructure, with about half the capex but higher running costs, can look more attractive to governments and investors.

[43] IEA (2014). Special Report: "World Energy Investment Outlook". http://www.iea.org/publications/freepublications/publication/WEIO2014.pdf
[44] World Energy Council (2013) "World Energy Scenarios: Composing Energy Futures to 2050"
[45] OECD (2011) "Strategic transport infrastructure needs to 2030"
[46] Frankfurt School / BNEF (2014) "Global Renewable Energy Investment Trends 2014"
[47] 2° Investing Initiative (2014) UNEP Inquiry study

The world's economies would benefit from better marrying these two agendas of climate and infrastructure, as they are complementary, not competing. The majority of low-carbon and climate resilience investments can be seen as infrastructure investments; with the added requirement that they also have to be climate-friendly.

In *World Energy Outlook 2013*, the International Energy Agency (IEA) cited the need for a long list of climate-friendly infrastructure investments: solar energy, wind, hydroelectric energy, carbon capture and sequestration for coal, and gas transition in some countries.[48] Low-carbon transportation needs to increase through a ramp-up of railway usage, electric vehicles, hybrids, and other climate-friendly modes of transportation. Climate-friendly buildings with lower energy profiles that save everyone money need to be constructed and retrofits completed. Energy efficiency investments in buildings and industry are in fact a huge part of the capital investments the IEA says we need to make through 2050. It's worth noting that the payback period for the average energy efficiency investment is usually no more than three to five years – this is a highly investible sector that simply needs a massive educational and regulatory kick along to make sure emissions are cut quickly.

A key part of the climate-friendly infrastructure narrative is that the projects, like any other infrastructure project, represent investment opportunities, not costs. The IEA estimates that if an additional US$36 trillion (EUR32.4trn) of capital is invested on energy systems – above business as usual – between now and 2050[49], worldwide temperature increases may be contained at 2–2.5 degrees, which is the increase climate scientists agree will already happen due to already released emissions – that's too late to avoid. Ancillary investments in such areas as transportation would bring the amount of capital needed to US$53 trillion (EUR47.7trn). "Above business as usual" means in addition to capital expenditures already expected to be needed for global energy infrastructure development.

The US$36 trillion (EUR32.4trn) or capital the IEA estimate that is needed globally for climate-friendly investments will yield long-term *bonus* dividends that many are still largely unaware of. In *World Energy Outlook 2013*[50], the IEA calculated that the world would save US$100 trillion (EUR90trn) in fossil fuel imports as a result of funding climate-friendly infrastructure. On top of that, the cost reduction curve for solar, wind, and other alternative energy technologies is of such a large scale that experts predict that most alternative energy sources will be much cheaper than fossil fuel energy sources by 2025–2030.

The climate-friendly infrastructure narrative helps to marry up policy agendas with significant potential for synergies. Moreover, thinking of the transition to a low-carbon and climate-resilient economy as an infrastructure challenge allows policymakers to tap into the expertise they already have in terms of mobilising private capital: there is a long track record of public support to mobilise private finance for infrastructure, both in Europe and in other countries.

[48] IEA, *World Energy Outlook 2013* (International Energy Agency, 12 November 2013): http://www.iea.org/publications/freepublications/publication/weio2013.pdf.
[49] ibid
[50] ibid

2 Mapping demand: Institutional investor appetite and requirements

The first step to mobilising institutional investors' capital for climate-friendly investments is to establish the starting point of their current investments in this area, and what factors determines their demand for these investments.

Traditionally, the analysis of climate investments in institutional investors' portfolios has distinguished between the different types of investors (life insurer, pension fund, etc.). This study takes a different approach by also differentiating based on the climate change positioning. This approach is chosen due to the recognition that investors' positioning relative to climate goals determines the specific obstacles the investors face in meeting their climate change commitments while still meeting their fundamental financial requirements.

Three main investor types based on this climate positioning are identified (Figure 2.1). Understanding the share of each of these type of investors in the market is useful for policymakers to understand the impact of various policies to mobilise climate-friendly investments from institutional investors: for example, some policies would enable policymakers to tap into the capital pool of the business as usual investor, while other policies would appeal to the climate-friendly investor only, which would limit its impact as the climate-friendly investor only accounts for a relatively small share of the market. However, currently the data is not available to provide a robust quantitative estimate of the actual split between the different types of investors in the market, as survey-based reviews of investors, such as the asset owner disclosure project, have low response rates. A rough estimate, given the order of magnitude of the share institutional investors' assets under management, is provided.

Figure 2.1 Positioning of institutional investors relative to climate goals

[Source: FtF]

Understanding the decision-making framework of each type of investor allows policymakers to tailor the tools and instruments they put in place to maximise the impact in terms of capital raised.

- **Business-as-usual Investor (Today's market share: c.95%):** The BAU Investor accepts the significant uncertainty and risks that future scenarios may bring, but questions around these risks do not impact investment strategies today. The potential implications of different climate scenarios are simply not on the radar screen, because the issue is too complex, not material enough and/or not a concern for trustees and beneficiaries. BAU investors' strategy is largely driven by mainstream investment frameworks, in which the exposure to long-term risks is, to a large extent, assessed based on historical data and index structure. The climate-friendly share in BAU Investors' portfolio is largely the climate-friendly shares in mainstream financial products, or is made up of climate-friendly investments where there are no credit or yield differentiators compared to other investments. There is, therefore, room for BAU investors to invest in climate-friendly investments when the investment also delivers on financial criteria and can be easily analysed within current frameworks e.g. green bonds.

- **Long-term, Risk-Aware Investor (Today: c.5%):** A long-term, risk-aware (LTRA) investor seeks to actively integrate future long-term risks, including the potential financial risks associated with the low-carbon transition. This may be a result of more long-term liabilities, a more cautious interpretation of the fiduciary duty of or external pressures from asset owners. The LTRA investor seeks to do more to assess and integrate climate and carbon risks into investment decisions, based on a forward-looking analysis of these risks. To do so the LTRA requires new risk tools, data and investment frameworks. There may also be reputational or marketing drivers.

- **Climate-friendly Investor (Today <1%):** These investors distinguish themselves by seeking to make the 2°C scenario happen, through the alignment of their Investment strategy with that scenario. This type of investor is either driven by a belief that this investing strategy is optimal, driven by a public mandate, as is the case for some public asset owners, or by ethical considerations as for endowments and mutual funds with a climate mandate. The climate-friendly investors are still primarily concerned with optimising risk-adjusted returns, but alignment with climate goals is added as an additional constraint in the portfolio optimisation process.

The business as usual institutional investor is the investor type that the main part of the report will focus on (chapter 3.5); as this investor type accounts for the majority of the market, scaling up investment rapidly requires tapping into this capital pool primarily. Tapping into the capital pools of long-term risk-aware investors and climate-friendly investors is also worthwhile, however, as they account for a much smaller share of the market this will not be sufficient on its own to mobilise investment at the necessary scale. Climate-friendly investors and long-term risk-aware investors can play important roles in showcasing and demonstrating the viability of climate-friendly investments. For example, although the green bonds market is suitable for business-as-usual investors, climate-friendly/socially responsible investors first championed it. For the LTRA and climate-friendly investor types the aim of policymakers should not just be to mobilise them but also to increase their share of the overall investor mix to increase their impact. However, as this involves changing investors' decision making framework it is a longer-term play for policymakers (chapter 6).

2.1 Demand for climate-friendly is there, if the investment also complies with financial requirements

2.1.1 *Institutional investors increasingly have low-carbon commitments*

The integration of environmental, social and governance (ESG) factors into the institutional investors' investment process has seen a rapid increase over the past few years. For example, the Principles for Responsible Investment (PRI), for investors committed to the integration process of ESG, has grown from 20 initial members in 2006, to the current 1,260 members representing US$45 trillion (EUR40.5trn) of assets under management. The PRI increasingly features 'mainstream' asset owners and managers, particularly from North America and Europe. A number of initiatives are taking place in the context of the UN climate negotiations process as well with increasing attention related to mobilising investors for climate goals before a global climate agreement will be negotiated at COP21 in Paris.[51] The UN Climate Summit in New York City saw a number of specific investors' commitments, notably the Portfolio Decarbonisation Coalition committing to reduce the carbon footprint of US$100 billion (EUR90bn) of institutional investments worldwide, and the Montreal Carbon Pledge, led by the PRI.[52] Three big pension funds[53] announced they would grow their investments in low-carbon assets to more than US$31 billion (EUR27.9bn) by 2020. In addition, two insurance industry associations[54] representing the majority of global insurance companies announced they would double the industry investment in climate investments to US$84 billion (EUR75.6) by the end of 2015.

2.1.2 *Institutional investors' primary aim remains to meet their financial obligations*

Although the increase in environmental commitments from institutional investors and other relevant market actors is positive, institutional investors have financial criteria that their investments must comply with before they can layer in the increasingly articulated preference for climate investments. Climate benefits must come as an additional feature does not make them compromise on the financial returns of the investment. What we are seeing is that for climate-friendly investment options to be attractive to investors today, they must be competitive on financial risk-return i.e. without adjusting for climate-related risks. Providing low-carbon investment with a higher financial risk in the business as usual sense, but with the argument that it has a lower climate risk, and therefore in the long term will be the best financial investment is not an attractive proposition to mainstream institutional investors, as it is not an investment proposition that works with the decision-making framework investors are currently using, although there is a possibility for this to be the case in the future.

This is not a choice that an individual institutional investor makes. Firstly, both asset owners and investment managers have a fiduciary duty to their beneficiaries that means they cannot compromise on financial returns. The fundamental investment rules for asset owners and asset managers are developed by policymakers to ensure that the organisations' investors achieve societal objectives; that is, provision of insurance and pensions for the population, with consequential management of the

[51] The initiatives identified are the UN Global Compact & World Bank – Business Leadership on Carbon Pricing ; World Bank – Put a Price on Carbon ; Global Investor Coalition on Climate Change – Low-carbon Investment Registry; IIGCC, INCR, IGCC, AIGCC, UNEP-FI, PRI – Global Investor Statement on Climate Change; PRI & Corporate Knights Capital – The Montreal Portfolio Carbon Pledge; French business organisations and networks – Statement in light of the COP21 in Paris. The 2014 Global Investors Statement on Climate Change as one example incudes 6 regional or global investors groups. The 6 investors group are: the Asia investor Group on Climate Change, The Investor Group on Climate Change, the Institutional Investors Group on Climate Change, The Investors Network on Climate Risk, The UN Principle for Responsible Investment and the UNEP Finance Initiative

[52] UNEP-FI (2014) The Portfolio Decarbonisation Challenge"
http://www.unepfi.org/fileadmin/documents/PortfolioDecarbonisationCoalition.pdf

[53] APG, PensionDenmark, CalSTERS

[54] International Cooperative and Mutual Federation (ICMIF) and the International Insurance Society

resulting asset pools at arm's length from government to ensure the money is invested to benefit the beneficiaries, and not used to achieve political objectives. Secondly, current fund management practices – such as relatively short-term performance review cycles between asset owners and investment managers - also influence investment managers' decision-making. The challenge in the short-run is to operate within this framework to direct capital to the different societal challenge of climate change – within the constraints that the financial system for institutional investment provides.

Having a robust understanding of the fundamental financial criteria institutional investors look to meet with their investments is a first step for policymakers to understanding how to mobilise their capital for low-carbon.

Investment frameworks determine the asset and sector allocation at three levels:

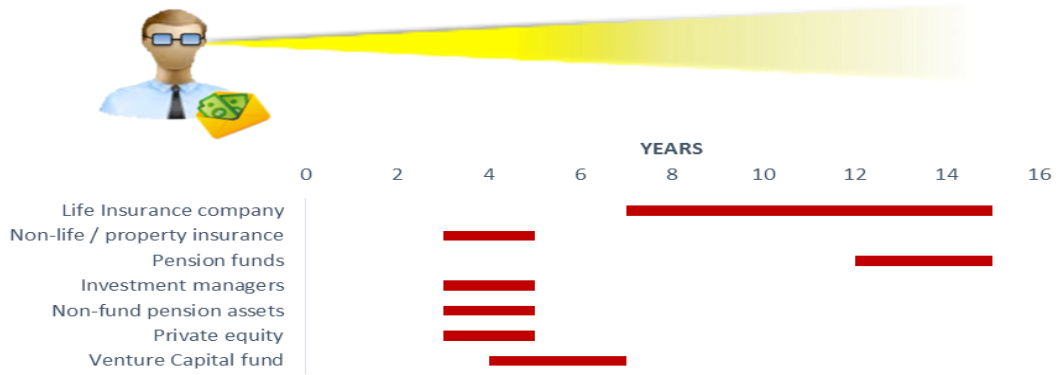
- *Policy level*: The asset owner determines the investment objectives and strategy to reach these objectives. This is the investment policy framework.
- *Strategic asset allocation and mandate determination*: The asset owner then determines the asset allocation; the mix of equities, fixed income and alternatives that is aligned with the investment objectives and strategy. Subsequently, the asset owner determines an investment mandate for the investment managers on how to implement this.

Portfolio management: Investment managers, appointed by asset owners, engage in the day-to-day management.

Drivers of the investment policy frameworks and strategic asset allocation of asset owners

For large institutional investors such as pension funds and insurance companies, the return on investment that can be achieved is only secondary to the fact of being able to safely meet liabilities (pension paid out at retirement age,[55] payments to life insurance policyholders, etc.). As the liability structure varies between different types of institutional investors, their investment preferences also vary. In a nutshell: the more short-term the liabilities (time horizon of the asset owners they represent), the shorter the investment horizon of investment managers (Figure 2.2). In practice, the actual investment time horizons of investment managers are frequently shorter than required by liabilities; this will be discussed in more detail in chapter 6.

Figure 2.2 Expected time horizon of various institutional investors based on liability structure



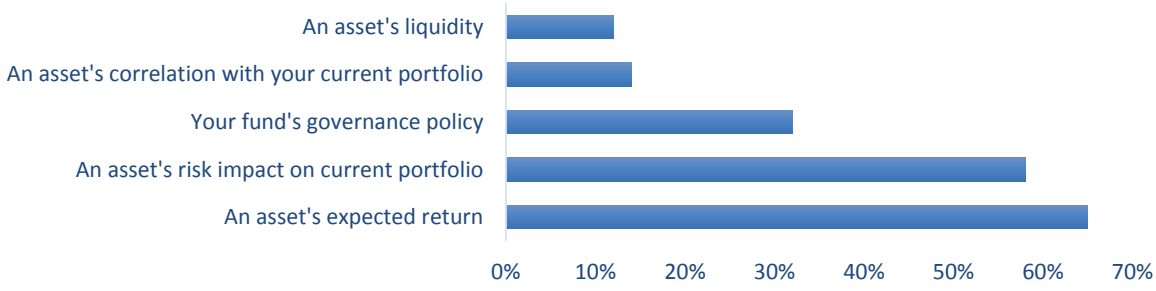
[Source: FtF]

[55] This is especially the case for "defined benefit" types of pensions where contributions are calculated to provide a pre-agreed level of pension.

Drivers of the portfolio management of investment managers

A crucial driver of portfolio management is the academic literature on optimal diversification, based on modern portfolio theory.[56] According to modern portfolio theory, the market portfolio represents the optimal portfolio from a mean-variance perspective – in other words, it maximises returns for a given level of risk. By extension, either directly mirroring the market portfolio or minimising the tracking error (the deviation) to the market portfolio is a key driver of modern portfolio management (see box 2.1). Figure 2.3 highlights some of the key factors driving portfolio management.

Figure 2.3 AMP Capital Survey Response: Which are the two most important factors in constructing your portfolio (two choices possible)?



[Source: AMP Capital 2014[57]]

Box 2.1 The role of passive investing in equities and fixed income

Passive investing plays an increasingly prominent role in asset management, with projections expecting an increase to 22% of assets under management by 2020 (Figure 2.4). This growth suggests that increasing drivers of asset allocation are financial market indices used by investors as investment guidelines. These indices are relevant for passive investors directly, but also for investors exhibiting a decreasing share of active management (Figure 2.5). It also appears relevant in terms of the qualitative evidence that many active investors, while they do not replicate the index components, replicate the sector allocation of financial market indices – demonstrating an increasing trend to external drivers of asset allocation.

Figure 2.5 Evolution of active share in US mutual funds' assets 1983-2009

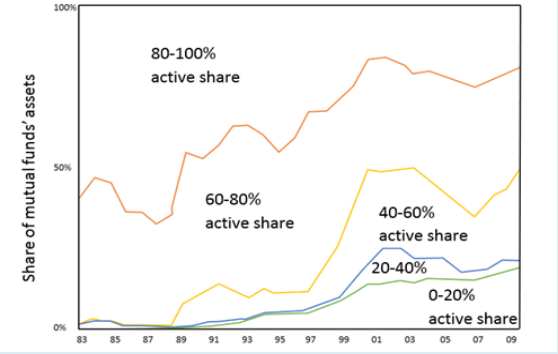
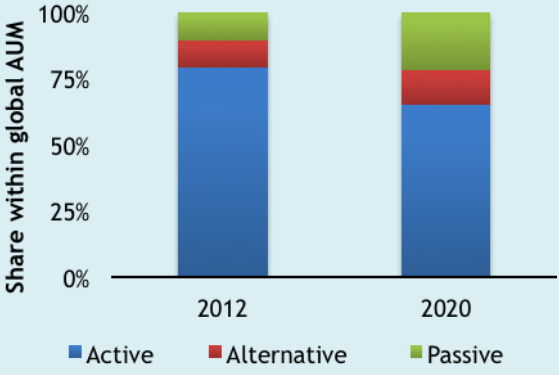


Figure 2.4 Projections of passive share in assets under management by 2020



[56] Developed prominently by Markowitz, Sharpe, and others.
[57] AMP Capital (2014). "Building a Better Portfolio", *Institutional Investor Research Report*, Volume 3, May 2014. http://www.ampcapital.com/AMPCapitalGlobal/media/contents/Campaign/IIR/Issue3/AMP-Capital-Institutional-Investor-Custom-Research-Group-Issue3.pdf

In sum, institutional investors have a preference for a certain risk-return profile of investment and timeframe of investment to meet their liabilities.

Table 2.1 offers an overview of additional characteristics of different types of institutional investors. This understanding of the decision-making drivers of different types of institutional investors provides an important foundation for policymakers to develop climate-friendly investments that will be attractive to investors.

Table 2.1 Characteristics of institutional investors

Type of Investor	Governance structure	Risk preferences	Climate-friendly investment potential
Asset owners			
Insurance company	In-house investment management, or through external asset managers	General insurance with shorter term liabilities have a lower risk appetite, Life- and pensions have greater risk appetite	Some insurance companies are active participants in renewable project finance markets
Pension fund	Often external asset managers; some large pension funds employ in-house investment managers	Varying risk appetite, reducing over time as pensions matures	Leading European pension funds are increasingly considering such investment
Foundations and Endowments	Often external asset managers; some large organisation have in-house investment managers	Varies, generally relatively high risk appetite	Mission-oriented organisations have often led the way in considering climate-related issues
Sovereign Wealth Funds	Mainly managed internally, but also some use of external managers	Varying risk appetite	With a long-term horizon they have a capacity to invest in climate-friendly
Investment Managers	Direct investment	As specified by mandate	Led by asset owners

[Source: FtF, based on CPI 2013[58]]

2.2 Current state of institutional investment in climate

2.2.1 *Institutional investors' current asset allocation*

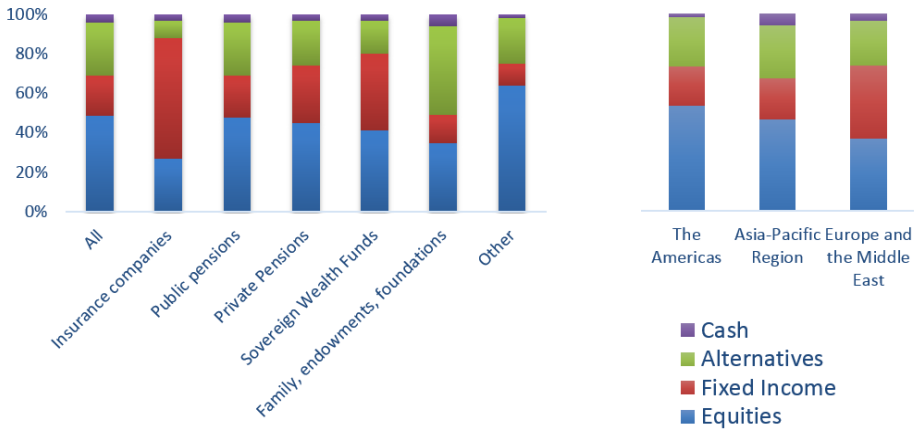
Having now mapped out what institutional investors are looking for: climate investments that are financially competitive in terms of risk-return and tenor so that they fit their liability structure, the next piece of the puzzle is to establish through what different channels these investors' climate investments currently flow. This informs policymakers about the foundations available to build on to provide institutional investors with climate-friendly investments that fit their demand criteria. Moreover, it is useful to provide investors with information saying that they already have exposure to

[58] CPI (2013). The Challenge of Institutional Investment in Renewable Energy.

climate investments, as this makes them less sceptical towards these investments. Scaling up investments in a category of assets they are already investing in is a much more attractive proposition to mainstream institutional investors than pitching them the idea of investing in a completely unknown territory. This bias towards the status quo is well accepted in behavioural economics and is an important determinant of investor behaviour.

The main channels for climate investments, as for any other investments, are the three asset classes of alternatives, fixed income and equity. Figure 2.6 shows a recent review of the asset allocation of different types of institutional investors[59].

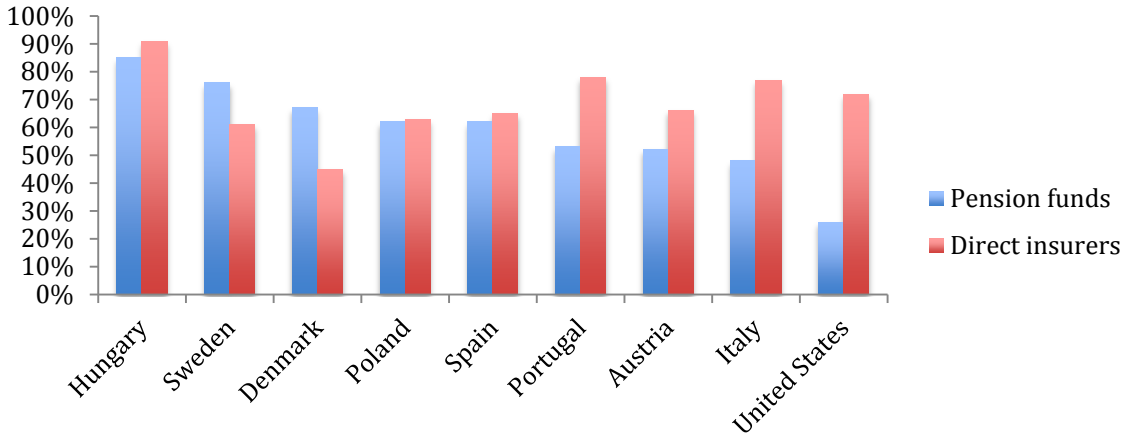
Figure 2.6 Breakdown of institutional investors' portfolio by type of investor and region (2014)



[Source: AMP Capital 2014[60]]

The breakdown presented here in Figure 2.4 is largely in line with other literature; however, a review by the OECD shows that there is wide divergence in asset allocation both between investors and between countries (Figure 2.7).

Figure 2.7 Share of equity in the portfolio of pension funds and insurers in selected OECD countries in 2011



[Source: OECD 2011]

[59] AMP Capital (2014). "Building a Better Portfolio", *Institutional Investor Research Report*, Volume 3, May 2014. http://www.ampcapital.com/AMPCapitalGlobal/media/contents/Campaign/IIR/Issue3/AMP-Capital-Institutional-Investor-Custom-Research-Group-Issue3.pdf

[60] AMP Capital (2014). "Building a Better Portfolio", *Institutional Investor Research Report*, Volume 3, May 2014. http://www.ampcapital.com/AMPCapitalGlobal/media/contents/Campaign/IIR/Issue3/AMP-Capital-Institutional-Investor-Custom-Research-Group-Issue3.pdf

A major trend in asset allocation is a reweighting to fixed income, and a reduction in equities[61] since the 2008 financial crisis - although the majority of institutional investors' assets under management are still in equities (Figure 2.6). Corporate finance is re-weighting to the use of bonds for the part that is not financed by retained earnings. Fixed income investing among the US$13 trillion (EUR11.7trn) of "Socially Responsible Investors" was minimal pre-2008 crash; that sector has since seen a shift to bonds as a risk mitigation diversification strategy.[62] This relative shift from equities to bonds is mirrored across the institutional investment sector, with the share of bonds returning from its unusual low levels pre-2008 to its historical average. There are other studies (AMP Capital 2014[63]) that are identifying a shift to equities in the context of low interest rates, however, this is largely a shift from cash, built up post-crash, to equities, and is therefore not a contradictory finding to the identified shift of institutional investors into bonds.

A key trend driving this reweighting to fixed income for pension funds in developed economies is demographics, in particular the ageing membership of rich country pension regimes, which requires a shift to more predictable investments for shorter-term pay-outs: investment strategies are increasingly driven by liabilities.[64] This leads to the reduction in demand for capital appreciation securities such as equities and high volatility securities such as private equity and venture capital, and increased demand for fixed income instruments - bonds.

For alternatives, an increase was expected for 2014 compared to 2013. [65] The trend is most pronounced for private equity and real estate. Mercer's 2014 survey also found increased interest for real estate investment amongst institutional investors.[6667]

The shift to fixed income and alternatives indicate which investment channels warrant most attention from policymakers seeking to mobilise the institutional investors for low-carbon investments.

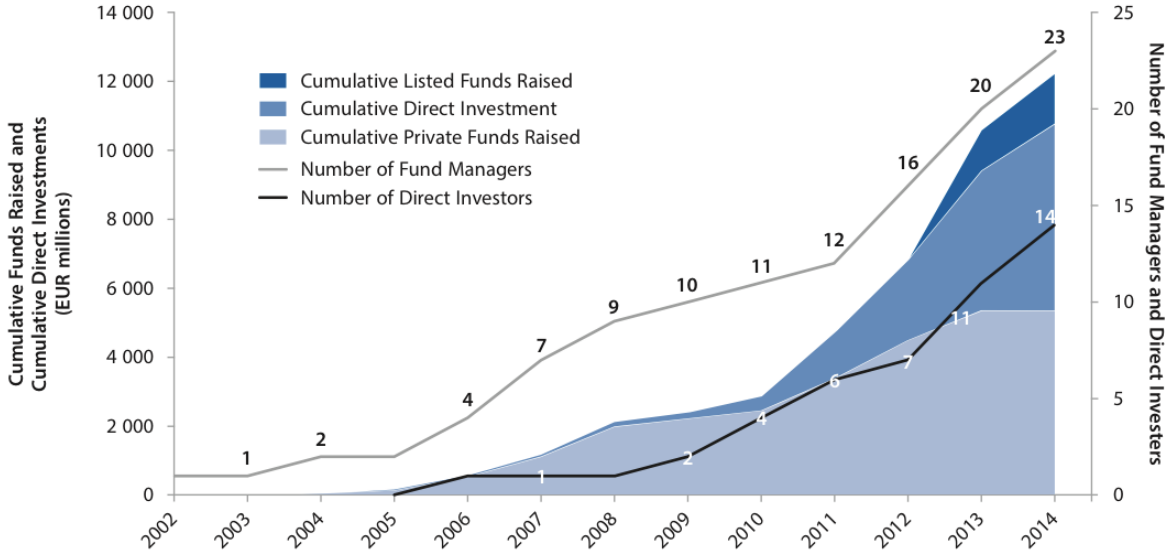
2.2.2 Institutional investors' exposure to climate-related assets

This study found that it is currently difficult to provide robust analysis on how much institutional investors have invested in climate-friendly investments in each of these asset classes due to lack of data and metrics, and common definitions on what assets are considered climate-friendly in alternatives, fixed income and equities.

A subset of low-carbon investment is renewable energy; exposure here is easier to measure. As the figure below (Figure 2.8) shows, institutional investment for renewable energy in Europe has increased markedly the last decade, although from a very low base.

[61] The Actuary (2013) European pension funds 'moving away from equities'
[62] Ongoing analysis from Climate Bonds Initiative.
[63] AMP Capital (2014). "Building a Better Portfolio", Institutional Investor Research Report, Volume 3, May 2014. http://www.ampcapital.com/AMPCapitalGlobal/media/contents/Campaign/IIR/Issue3/AMP-Capital-Institutional-Investor-Custom-Research-Group-Issue3.pdf
[64] The Actuary (2013) European pension funds 'moving away from equities'
[65] AMP Capital (2014). "Building a Better Portfolio", Institutional Investor Research Report, Volume 3, May 2014. http://www.ampcapital.com/AMPCapitalGlobal/media/contents/Campaign/IIR/Issue3/AMP-Capital-Institutional-Investor-Custom-Research-Group-Issue3.pdf
[66] Mercer (2014) 2014 European Asset Allocation Survey - Infographic
[67] There is a range of different studies in this regard with in part significant deviations in results. This is partly the result of normal fluctuations, biases in surveys, or different geographic focus.

Figure 2.8 Institutional investors are increasing their investment in renewable energy in Europe

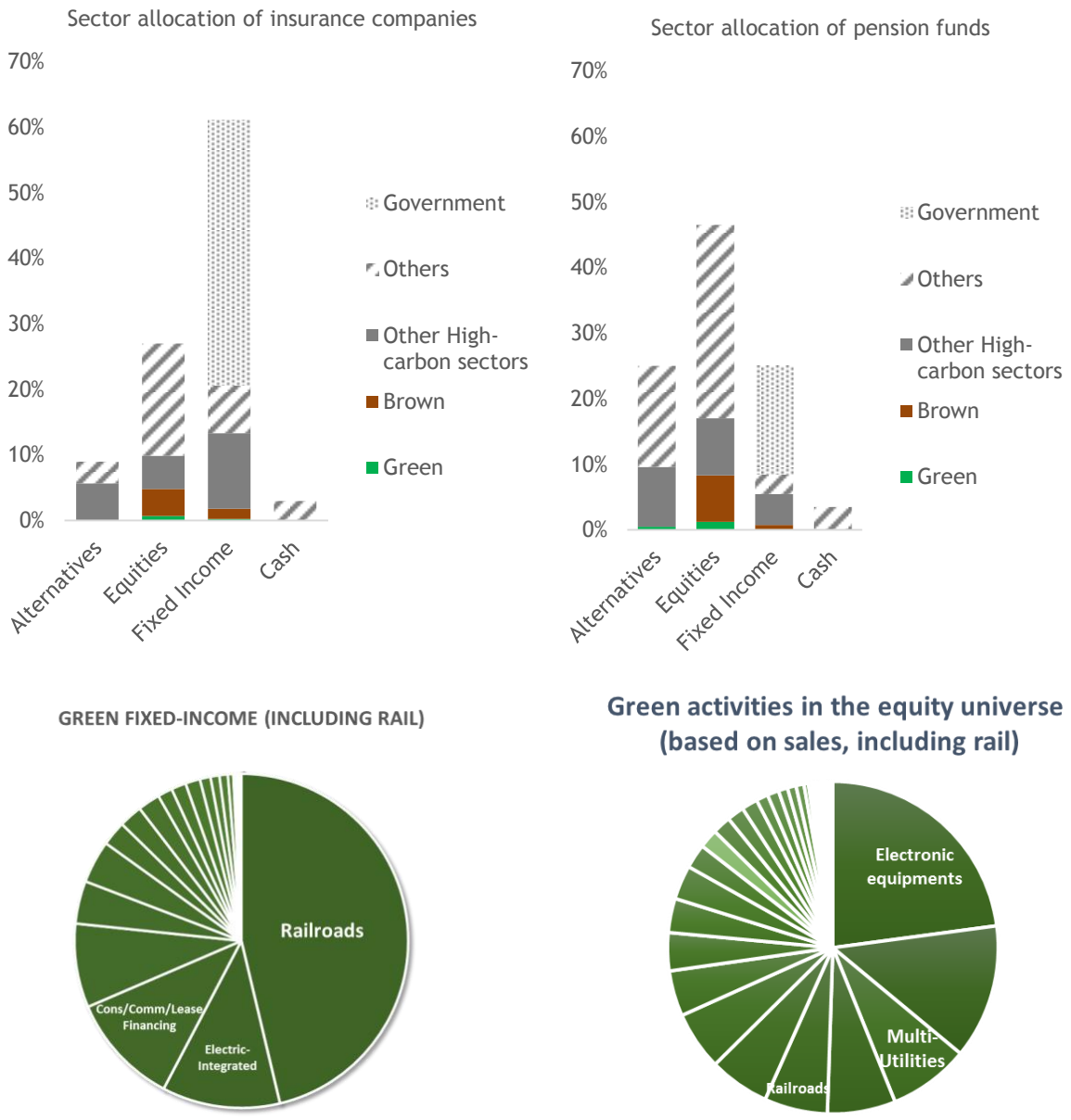


[Source: OECD (2014), Mapping Channels to Mobilise Institutional Investment in Sustainable Energy, Green Finance and Investment, OECD Publishing citing Murley (2014)]

However, despite this a significant increase in absolute terms, sustainable energy investment – and investment in the broader category of low-carbon and climate-resilient investment - still accounts for a very small share of institutional investors' assets under management; although how minor is difficult to quantify: Using the limited data available, analysis find that the share of climate-friendly investment in the portfolios of pension funds and insurance companies is around 1-2% for green, between 5-10% for brown, and for high-carbon sectors around 20-25% (Figure 2.9 below).[68] The rest of the portfolio was classified as "other". The highest share of climate-friendly is in the infrastructure funds of the alternative parts of institutional investors' portfolios, the lowest share in the bond portfolio. The high share of "other" - assets with an unknown climate impact - illustrates the difficulty in providing a full picture of institutional investors' current exposure to climate-friendly assets. What type of climate-friendly assets investments flow to also varies by asset class.

[68] The sectors used for the capital expenditure analysis come from the International Standard Industrial Classification of All Economic Activities (ISIC), Rev 3.1. The following categories were created:
Green includes the green share of the green innovators list computed and published by MSCI. The rest of the 'green innovators' sales is included in those companies' own industry sector. Green also contains railroads.
Fossil Fuels & Power: Multi-utilities, Oil Equipment. & Services, Integrates Oil & Gas, Oil & Gas Exploration & Production, Gas Distribution, Coal, Pipelines.
Highly exposed to energy-efficiency challenges: Commodity Chemicals, Iron & Steel, Heavy Construction, Building Mat. & Fix., Electrical Equipment, Automobiles, Speciality Chemicals, Auto Parts, General Mining, Home Construction, Aluminium, Paper, Plat.& Precious Metal, Gold Mining, Electrical Office Equipment, Nonferrous Metals, Diamonds & Gemstones, Forestry, Transport Services, Bus. Train & Employment, Airlines, Communication Vehicles, Trucks, Trucking.
Other sectors: All other sectors not listed above.

Figure 2.9 The share of climate-friendly investment in institutional investors' portfolios by asset class



[Source: FtF, based on approach from 2° Investing Initiative 2014,[69] Data from DataStream[70], Towers & Watson 2014,[71] Thomson Reuters 2014,[72] AMP Capital 2014,[73] MSCI ESG Research[74]]

[69] 2° Investing Initiative (2014). "Alignment of investment strategies with climate scenarios: Perspectives for Financial Institutions"
[70] ThomsonReuters Datastream Professional – one source for complete cross-asset data and analysis. https://forms.thomsonreuters.com/datastream/
[71] Towers & Watson (2014). Global Pension Asset Study. http://www.towerswatson.com/en/Insights/IC-Types/Survey-Research-Results/2014/02/Global-Pensions-Asset-Study-2014
[72] http://share.thomsonreuters.com/PR/IB/Quarter_End/1Q2014_Global_Project_Finance_Review.pdf
[73] AMP Capital (2014). "Building a Better Portfolio", *Institutional Investor Research Report*, Volume 3, May 2014. http://www.ampcapital.com/AMPCapitalGlobal/media/contents/Campaign/IIR/Issue3/AMP-Capital-Institutional-Investor-Custom-Research-Group-Issue3.pdf
[74] MSCI ESG Research data and analysis available at http://www.msci.com/products/esg/about_msci_esg_research.html

While there are large uncertainties with the estimates presented in the figures above, we can conclude from the analysis that:

- A robust definition for what is defined as a climate investment is not available. This makes it difficult to make an estimate of the share of climate-friendly assets in an institutional investor's portfolio.
- The order of magnitude of climate investment as a share of the overall portfolio is likely in the low single digits. Compared to the level of overall climate investment required this share is too low and there is a lot of untapped potential in terms of capital.

The following briefly presents the assumptions behind the analysis presented above. The breakdown by asset class (alternatives, fixed income, equities and cash) from AMP Capital, presented in Figure 2.9, was used as a foundation.

- **Equity:** The breakdown of equity by climate-friendly and brown was developed based on the breakdown of the MSCI World, one of the most significant global equity indices. While European investors frequently lean towards national indices, this report's analysis suggests that there is no significant divergence in the share of climate-friendly assets, based on a sample of four cap-weighted indices.[75]
- **Fixed income:** The breakdown of the fixed income portfolio is constructed on the basis of the Barclays Global Bond Aggregate and MSCI ESG data. The analysis does not account for the potential climate-friendly share of public sector-related bonds (i.e. public utilities, etc.) and asset-backed securities in the real estate and transport (i.e. car loans) sector. For the moment, the asset-backed securities in these sectors were all defined as highly exposed, although some of these assets may be climate-friendly. While this may create a bias in the analysis, there is to date no method to measure the climate share for these financial assets. Labelled green bonds are also excluded from this estimate.
- **Alternatives:** Alternative investments generally include funds of funds (private equity and other), direct hedge funds, direct private equity funds, and direct investments in commodity, real estate, and infrastructure. This study estimates a share of 24% climate-friendly assets in infrastructure financing.[76] Commodity and real estate investments are excluded from this analysis due to data constraints, however, it is recognised that efforts have been made in the real estate sector to address climate change.[77] For the share of these various assets, we use Towers Watson's survey.[78]

[75] S&P500, MSCI World, FTSE100, Stoxx600

[76] *Thomson Reuters (2014) Global Project Finance Review - Managing Underwriters First Quarter 2014.* Infrastructure project finance in Europe in 2013 can be broken down as follows: 33% oil and gas, 36.1% transport, 15.2% power, 1.2% mining, 5.7% leisure and property, 0.2% water & sewage, and 0.% telecommunications. . It will be assumed that power, transport, and property are the only sectors that contain green investments. Based on KPMG data, roughly 80% of project finance in Europe in the power sector is renewable. For transport, based on review of a Thomson Reuters sample, we estimate the share of green is roughly 33% (the equivalent of the rail share in transport investments). The definition of rail as green is in line with the definition of the Climate Bonds Initiative. To simplify, it will be assumed that all alternative infrastructure investments are in Europe.

[77] For the real estate sector, the assumption of zero is based on GRESB data that suggests that between 2012 and 2013, the GHG-emissions of a sample of real estate investments by institutional investors remained constant. For commodity funds, given the small share of agriculture and timber, potential green sectors, and the ambiguous role of these investments relative to climate change, the assumption here is similarly a green share of zero.

[78] Towers and Watson 2014. Global Alternatives Survey 2014

2.3 Key takeaways

- Institutional investors are generally increasingly investing more in fixed income and alternatives, and less in equities.
- The exercise to measure the current investment levels of climate-friendly investment of institutional investors found that it's difficult to provide a robust estimate due to the lack of common definitions, and lack of data.
- Using the limited data available, analysis find that the share of climate-friendly investment in the portfolios of pension funds and insurance companies is around 1-2% for, between 5-10% for brown, and for high-carbon sectors around 20-25%. However, as the climate impact of the majority of the assets under management was unidentifiable, there is a significant level of uncertainty tied to these estimates.
- The exercise showed that any analysis of the climate-friendly share of institutional investors' portfolios should distinguish by asset class, as the methodologies for defining climate-friendly will vary for direct investments, fixed income and equity.
- The order of magnitude of climate-friendly investment as a share of the overall portfolio is likely in the single digits. Compared to the level of overall climate-friendly investment required, this share is too low; there is a lot of untapped potential in terms of capital.
- Considering the context of increased climate change commitments from institutional investors, this implies that institutional investors are finding it difficult to find investments that are climate-friendly and also comply with their financial investment criteria, across all asset classes.
- There is vast untapped potential in terms of institutional capital that could be mobilised for climate-friendly investment provided that the financial investment criteria are satisfied.

3 Translating appetite to actionable opportunities in the short-term

From the last chapter, it is evident that there is vast scope to increase institutional investors' investment in climate-friendly assets. The challenge now is to translate investor attention into actual investment. Institutional investors need to be provided with a huge pipeline of investible deals to deliver the climate-friendly infrastructure projects needed and kick along the transition to a green economy.

To translate institutional investors' appetite for climate-friendly financially competitive investments four criteria have been identified. First, investors must be able to easily discover the climate investment opportunities (section 3.1). Once this foundational requirement is met the next step is that enough investment opportunities are available (section 3.2). This volume of easily discoverable and available opportunities must also be financially competitive in terms of risk-return (section 3.3). Finally, the transaction costs of the opportunities must not prohibit institutional investor uptake (section 3.4).

3.1 Discoverability of climate-friendly investment opportunities

The process of matching the supply of climate-related investment products to investor demand is slow: currently, investors often are not sure what the relevant investments are, or the investments aren't presented in a way that investors can connect to their over-arching climate prioritisation. Discovery can be surprisingly difficult in what is a relatively new and immature market. Simplifying this discovery process will fuel climate-friendly market growth.

Climate-friendly opportunities are available to investors through two supply channels that can be grouped into the assets types of equity and fixed income (Table 3.1) that institutional investors already invest in. There are existing climate-friendly products and tools available for investors in each of these channels. For example, a key opportunity in fixed income has been the rapid growth and development of green bonds – though the market is still in early development at EUR47bn outstanding when compared to the EUR88 trillion overall debt market – showing a potential to greatly expand its reach. An equivalent innovation for equity is investing in yieldcos (see Box 3.3). Equity investors can also buy into specialist funds (for example ESG, sustainable, carbon themed) or use sustainable/carbon/ESG indices to identify individual climate-friendly stocks. There are equivalent indices for fixed income, however, these are more limited due to low climate-related disclosure in bond markets.

Table 3.1 Mapping supply channels for institutional investors' investment

Financial Capital Type	Financial Instruments		Funds
	Capital Market Securities	Cash	
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
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

[Source: OECD (2014), Mapping Channels to Mobilise Institutional Investment in Sustainable Energy, Green Finance and Investment, OECD Publishing]

3.1.1 Climate-friendly investment opportunities in fixed income

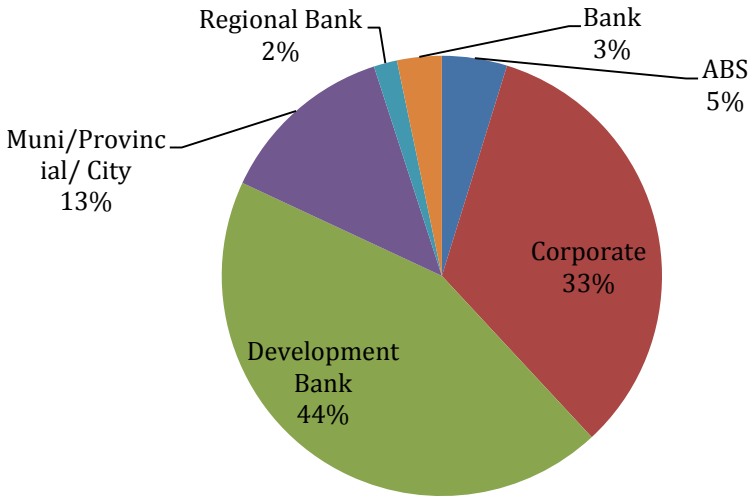
Key products that provide climate exposure in fixed income are bonds where the proceeds fund climate focused projects or assets. The bonds fall into three categories: green labelled bonds, unlabelled climate bonds, or public bonds.

Normally, bonds' use of proceeds is typically not disclosed at more granularity than the issuer level. This means investors looking for climate-friendly fixed income investments are limited to investing in pure play companies – i.e. those that are fully focused on low-carbon, such as a solar developer. This is problematic, as this also exposes investors to the full risk of low-carbon investments (see section below on unlabelled climate bonds). Moreover, these investments are typically smaller scale, which makes them less attractive due to investors' liquidity requirements. The concept of a labelled green bond is a response to this.

Green labelled bonds

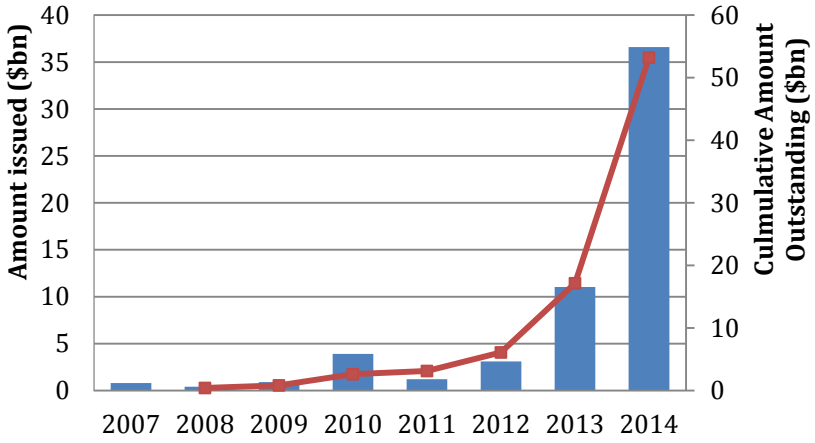
In practice, labelled green bonds are no different from normal bonds in the wider market; the difference is that proceeds are transparently channelled for climate-friendly purposes and that they must meet certain reporting requirements around the use of the proceeds. It thus facilitates a managing of the fixed income exposure to climate-friendly investments. Green bonds can be issued by multi-national development banks, national development banks, national and sub-national governments (cities and municipalities), commercial banks, and corporations (Figure 3.1). They can be issued in two main forms: First, bonds issues by institutions where proceeds are earmarked for climate-friendly investment. As the bond is backed by the full balance sheet of the issuing entity investors don't have any direct exposure to the risk of the underlying assets, and the bond's credit rating is that of the issuing institution. Second, green bonds are issued as asset-backed securities and project bonds, where the return of the bonds is reliant on the performance of the underlying climate-friendly assets.

Figure 3.1 2014 green bonds by issuer type globally



[Source: The Climate Bonds Initiative (2015)]

Figure 3.2 Global labelled green bond issuance by year



[Source: The Climate Bonds Initiative (2015)]

The green bonds market has grown rapidly (Figure 3.2), but is in an early stage of development, with the bulk of issuance made up of tailored debt issuance for marketing purposes. While this means that labelled green bond issuance to date has largely been a relabeling exercise of an existing pipeline of activities, this needs to be seen as a necessary pre-condition for a large and liquid green bonds market, which in itself is a pre-condition for the bond market being a channel for creating additional financing for climate-friendly development in the real economy.

Box 3.1 Bonds as a refinancing instrument: linking bonds to capital expenditure

Only 5% of the US$350 billion (EUR315bn) in global project and infrastructure debt raised in 2011 were in bonds; the bulk took the form of bank lending. Because of the risk assessment expertise required for pre-completion project lending, this is unlikely to change. With regard to institutional investors, bonds should therefore be seen less as tool to raise money for a specific project and more as a tool for re-financing — and exit strategy for equity investors and bank lenders.

Refinancing allows organisations to take on short term bank lending for the construction phase of a project and then pay the loan back by issuing bonds once the construction phase is over. As construction is usually the highest risk part of a project, a bond provides a longer-term lower cost of capital once the construction phase is passed. This provides borrowers with an exit strategy. Moreover, given that few investors are willing to take on construction risk, this allows the smaller pool of investors with a higher risk appetite and banks to more quickly recycle their funds into new projects. Refinancing and obtaining lower-costs debt is particularly attractive for low-carbon infrastructure assets as they have a particularly low operating risk post-construction compared to the construction phase. This means that the difference between the cost of capital for low-carbon projects before and after construction could be significant. The need for improving the refinancing opportunities for banks lending to low-carbon projects was highlighted by the Confederation of British Industry in a 2011 paper.

For institutional investors, refinancing of debt post-construction phase is attractive because this allows them to take on a lower risk and obtain stable return. The result of refinancing through bonds is a re-ordering of the capital pipeline where each market participant focuses on risk levels they have the capability to deal with – for example, banks taking on short-term construction risk and pension funds taking on long-term post construction risk. Banks can use asset-backed securities to flip their longer-term project loan portfolios to long-term investors and indeed, have an incentive to create an increased pipeline for these types of loans. The easier it is for loans to be offloaded, the more likely they are to lend more and for longer terms. Case in point is the mortgage sector, where mortgages can be very long-term. Equally, there is limited academic literature on quantifying the potential impact of refinancing.

Current policy practice supports the arguments set out here on the importance of refinancing to drive investment in the real economy. Post financial crisis, several policy initiatives for refinancing for banks have been put in place with the aim of boosting lending to the real economy. At the EU level, the ECB has put in place several programmes on refinancing for banks, for example the Long-Term Refinancing Operation implemented in 2014. Similar initiatives have been put in place also at the member state level, for example the Bank of England's initiative "Funding for Lending", initiated in 2012. While it's recognised that more studies quantifying the impact of refinancing on investment in the real economy is needed, the rationale policy makers apply generally that refinancing is a route to revive investment in the real economy suggests that is can be a route also to increase climate-friendly investment on the ground.

One key instrument for re-financing of smaller loan portfolios is securitisation. This is especially important for bank operating under re-capitalisation pressures that limit their allocation to project lending – a re-financing exit strategy

via securitisation allows limited allocations to be quickly recycled, effectively allowing more to be done with less.

A challenge relates to the current share of these bonds in the institutional investor portfolio. Based on the Barclays Global Bond Aggregate, the average share of securitised bonds in the European institutional investors' bond portfolio is 16%, of which roughly ~85-90% are residential and commercial mortgage-backed. Thus, while there is significant room for refinancing of green mortgages associated with green buildings, the share (excluding bonds related to student loans, credit cards, etc.) for other infrastructure that would today be relevant is roughly 1-2%.

The re-ignition of investor appetite for securitised bonds will require trust-building steps by governments. One key step would be the issuance of such bonds from state-backed institutions such as development banks. The EIB's Renewable Energy Platform for Institutional Investors (REPIN) platform, for example, could structure bonds with an explicit aim of developing investor appetite. Trust-building can also occur on the demand-side, through cornerstone investments in asset-backed securities from public finance institutions; as the private sector see that the public institutions are also exposed to the investments, it can be perceived as less risky.

[Source: FtF]

As investors become comfortable with green bonds, appetite grows for lower-rated bonds and different products, such as asset-backed securities, enabling an increased opportunity for investors' to manage their fixed income exposure through green bonds.

The emergence of thematic indices has further improved the discoverability of green bonds. By November 2014, Solactive, S&P, Barclays and MSCI, and Bank of America Merrill Lynch had all launched green bond indices, with Solactive being the first mover. These financial products are still in their infancy and thus it remains to be seen to what extent investors will adopt them. In principle, green bond indices operate as thematic indices. Thus, there is no particular difference to these indices relative to thematic equity indices.

Importantly, the potential for green bonds is global, and suitable both in developed countries and emerging markets. While the majority of green bond issuers and investor to date have been in Europe and the US, green bonds can provide a solution to the climate-friendly infrastructure investment challenge all over the world, albeit in different forms in developed and emerging economies.

An example: In India solar developers typically pay 13-14% interest on development loans. Over a 20 year financing period that means that two-thirds of the lifetime project cost goes in interest payments. If they could get loans at 7% it would save one- third the lifetime cost of the project.[79] Institutional investors in very low-interest rate environments could help provide finance at that level of return through the bond market and still beat the returns available elsewhere.

The potential of green bonds in this context is increasingly being recognised in emerging markets. China's central bank's recent policy documents include specific proposals for green bonds.[80] The Minister of Finance in India has expressed support for growing a green bond market in India, as part of the country's reforms of their corporate bond market. It is on the agenda in Brazil as well; and

[79] Data from the Climate Bonds Initiative (2015)
[80] http://www.climatebonds.net/2014/11/report-beijing-pboc-chief-economist-ma-jun's-green-finance-workgroups-close-finish-line

Johannesburg in South Africa has already issued a green bond to finance their low-carbon urban development plans, as the first emerging market issuer of labelled green bonds.[81]

There are, however, a number of barriers remaining to use green bonds to fully tap into the debt capital markets: volume (see section 3.2), risk-return of low-carbon projects (see section 3.3) and lack of standards around what qualifies as green, which increases transaction costs for issuers and investors (see section 3.4).

Unlabelled green bonds

According to the Climate Bonds Initiative, labelled bonds in 2014 comprise only 10% of the EUR404bn universe of bonds clearly related to climate –related investments. In the absence of clear green or climate labelling, institutional investors can still manage their fixed income exposure to climate-friendly through non-labelled bonds. In industrial sectors with climate-friendly and non-climate-friendly assets, such as energy, investors can seek to increase their exposure to companies with a higher share of renewables in the fuel mix. There are a number of challenges in this regard however, notably with regard to limits in existing sector classifications, forward-looking data, and the current rating structure.

Unlabelled bond issuance from the public sector

It follows from the discussion on labelled green bonds above that the ability for investors to manage their exposure to climate-friendly for non-labelled bonds from public sector issuers, such as municipalities and sovereigns, is low, unless they are relatively easily identifiable as climate-friendly (for example through labelling). For some municipal bonds, use of proceeds is disclosed, which could in theory enable investors to identify unlabelled municipal bonds as climate-friendly. However, the municipal bond market in Europe is much less developed than in the US.

The largest opportunity for institutional investors to gain exposure to both green labelled bonds and the other bonds described above is through the public bond markets, however, the private placement markets can also provide an avenue for institutional investors to increase climate-friendly exposure (Box 3.2).

[81] http://www.climatebonds.net/2014/06/just-out-first-emerging-market-green-city-bond-city-johannesburg-green-bond-approx-r15bn

Box 3.2 Accessing institutional investors through the private placement debt markets

In private placement markets, companies looking to raise finance issue debt directly to selected investors. The sizes of bond issuance required for the private placement market are smaller than in the public market. This is beneficial for low-carbon investments, of which many are smaller size (see section 3.4.1). Private placements are also suitable for low-carbon investments due to the tenor of investments being relatively long, typically 7-12 years, but up to 20 and 30 years. Other benefits are that no rating is required, which can be an important cost saving for smaller issuers, and the long-term relationships with investors. The combination of these factors can allow investors to understand the different investment profiles of low-carbon investments, and become familiar with them over time.

Investors in the private placement are typically attracted because of diversification, longer tenor investments and long-term relationships with issuers. Low-carbon investments are a good fit with these investment preferences, and there are many examples of low-carbon and green bond issuances being placed privately.

Europe does not yet have a consolidated private placement market, although there are smaller disaggregated private placement markets in Germany (Schuldschein) and France (Euro Private Placement). Developing a pan-European private placement market is on the European Commission's agenda through the proposed plans for a Capital Markets Union. There is evidence of demand from European companies for raising finance through private placements beyond these national markets: In 2013, 34% of issuance in the US private placement market, the largest globally with annual issuance is US$50bn (EUR45bn), was from European issuers. The evidence from European involvement in the US market implies that the demand for European companies for private placements is at least US$17bn (EUR15.3bn) per year.

[Source: FtF]

Box 3.3 EU proposed Joint SME Initiative and EIB EIF Initiative in the asset-backed securities market: credit enhancement can be combined with securitisation

Under the proposed joint SME Initiative, the senior tranches of asset-backed securities of SME loans are expected to achieve credit ratings desirable for institutional investors. This is achieved through credit enhancement, as the European Structural and Investment Funds (ESIF) provides guarantees for the junior tranche, and a combination of ESIF, EU funds (COSME and Horizon 2020) and European Investment Fund covers the mezzanine tranche. Although this initiative is not designed for low-carbon investments, it provides an example of how financial instruments and tools could be used for small-scale low-carbon investments. The joint SME initiative is a good fit with the priority areas set out so far for the EU Capital Markets Union (CMU), as both SME access to finance and the revival of high quality securitisation markets have been explicitly put on the agenda for the CMU.

Additionally, the European Investment Bank (EIB) and the European investment Fund (EIF) has a joint initiative in the asset-backed securities market, which combines EIB investment in senior tranches of ABS issuance with guarantees from the EIF for the mezzanine tranches.

[Source: EIB[82]]

[82] http://www.eib.org/attachments/strategies/cop_2014_en.pdf

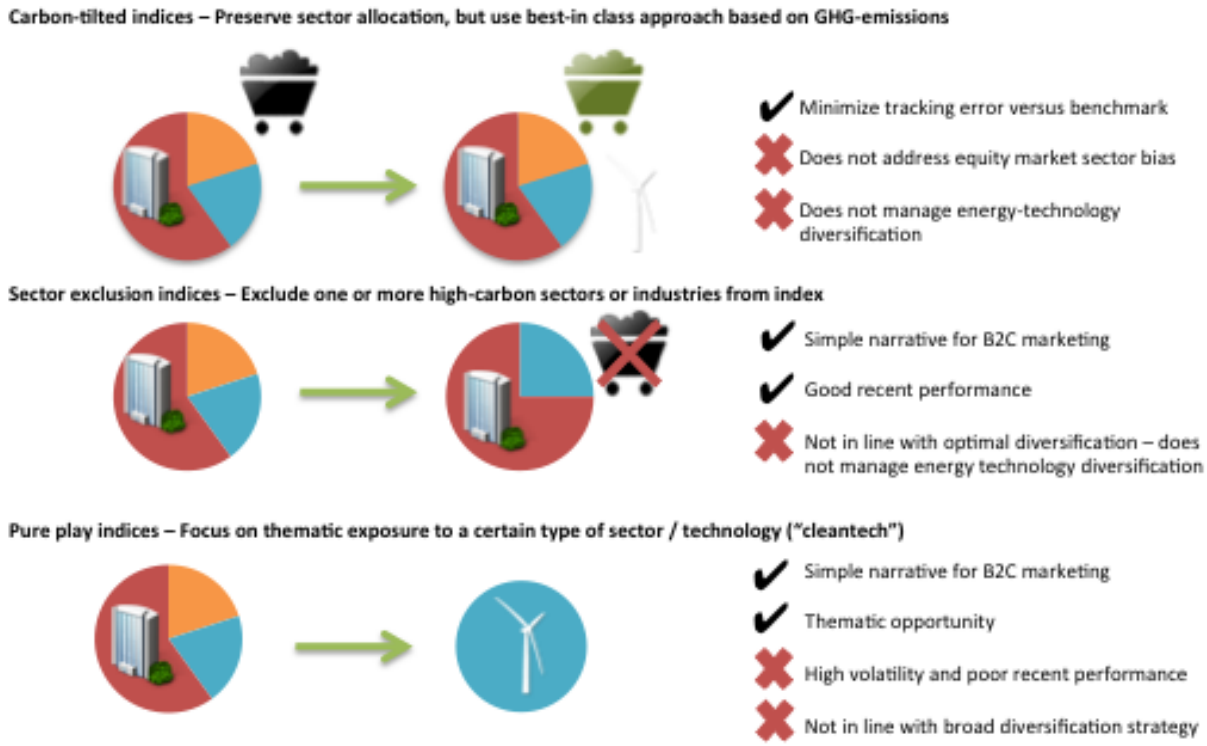
3.1.2 *Climate-friendly investment opportunities in equity*

Investors can deploy equity capital in climate-friendly listed equities and/or invest in specialised private equity investment vehicles. Investments in listed equities can be done directly or via specialised asset managers who select and manage thematic portfolios of corporate stocks. Direct climate investment in the listed equities market is being made easier by the development of indices, which track specific stocks and/or climate-friendly sectors.

Listed equity: thematic indices and specialist fund managers

There are different approaches to create climate-friendly equity indices as an alternative for institutional investors: best-in class for carbon performance, sector exclusion indices and pure play indices (Figure 3.3). At a conceptual level, these types of indices has been getting increased attention in the context of COP21 and a number of investor initiatives related to portfolio decarbonisation. In response, MSCI has recently launched a 'low-carbon leaders' index that uses annual GHG-emissions data on carbon reserves of fossil fuel companies to select the top performers. FTSE and S&P, two other major index providers, have similarly launched new equity indices at the end of 2014.

Figure 3.3 Approaches for climate-related indices



[Source: 2° Investing Initiative (2014)[83]]

The market for climate and sustainable asset managers is growing, though from a relatively low level. For example, Generation Investment Management and Impax Asset Management are two of the leading UK-based specialist asset managers in the sector, with combined Assets Under Management of approximately US$15 billion (EUR13.5bn). Investors can elect to commit capital that will be managed by

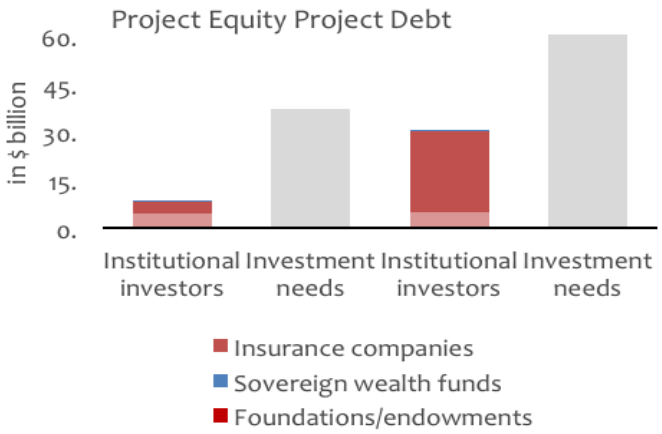
[83] 2° Investing Initiative (2014). Optimal diversification and the energy transition: Implications of benchmark equity investing for climate finance.

such asset managers under pooled funds, or have a dedicated investment strategy implemented by asset managers under a Managed Account relationship. Separately, specialised asset managers can enter into "white labelling" agreements with third party managers to invest a portion of their assets under management, thus expanding their investor base. This is a particularly relevant strategy for specialised asset managers entering new markets and geographies.

Non-listed equity: private equity funds and direct investment

Aside from investing in listed equities, investors can also deploy capital in non-listed equity products. These comprise direct investments in projects and investments in specialised private equity investment vehicles. The alternative investments of institutional investors, in real estate, project finance, and private equity, operate as a direct source of capital. While impact is significant here, the ability for institutional investors to absorb the investment needs in terms of project equity and debt is limited, although the ability is larger for debt than equity (Figure 3.4).[84] Direct investments also require in-house project appraisal and structuring expertise, which to date has only been developed by a limited number of large pensions funds and sovereign wealth funds.

Figure 3.4 Potential annual investment in project equity and debt by institutional investors versus OECD project investment needs



[Source: CPI (2013)]

The bulk of investments in non-listed equities is done via private equity or infrastructure funds. The larger and more generic private equity investment platforms tend to invest in companies across sectors, and only occasionally deploy capital in climate-related assets. The past 10 years have however seen the growth of specialised funds focused on clean energy and other climate-friendly investments. These comprise both venture capital funds, which typically invest in start-up clean technology companies; and renewable energy funds that invest in project development companies and/or in renewable energy projects directly. Institutional investors provide capital as Limited Partners of such funds, with the specialist asset manager acting as the General Partner. It is worth noting that investment returns for renewable energy projects in Europe for example have stabilised now that the underlying sector has achieved a certain degree of maturity; a typical return for LPs in such funds is in the 10-12% per annum range over the life of the underlying assets, assuming that capital is deployed during the construction stage of projects.

[84] CPI (2013)

Yieldcos

An interesting development is the rise of yieldcos. Yieldcos are listed companies that pool projects and infrastructure assets in their operational phase that generate stable cash flows. Their use has grown rapidly since 2013, particularly in the US, but also to a certain extent in Europe (Box 3.4). They offer investors a similar type of exposure to real assets as investment in an infrastructure fund, but via a liquid instrument. The key investment thesis of a yieldco is to guarantee an annual dividend yield, typically around 6% in the UK (much less in the US) and inflation-linked.

Box 3.4 Accessing institutional investors through yieldcos

The infrastructure assets pooled into yieldcos are typically sustainable energy plants with cash flows in the form of long-term Power Purchase Agreements (PPAs), which are agreements with utilities that have agreed to buy electricity from the yieldco at set prices. Yieldcos are often spun out from parent companies in the power sector, either by utilities or developer companies; sometimes they are special purpose vehicles designed to buy assets from utilities (e.g. Greencoat in the UK). Yieldcos allow companies to separate their safe assets in the operation phase from their assets in the construction-phase that are more risky. This allows access to a different investor segment and cheaper capital for the less risky assets. It has been found that yieldcos can attract equity investment for renewable energy at a 2% lower cost per year compared to investment through traditional utilities.[85] Another benefit is that yieldcos are not subject to the corporate tax a typical company must pay. Shareholders pay tax on the received dividends; but due to depreciation, tax payments can be avoided during the initial years.

Returns for investors arise from the stable cash flows from operations, and are paid out in the form of dividends to shareholders in the yieldco. Almost all annual cash-flow is distributed to investors in the form of dividends. The stability in cash flows is typically filtered through to fixed dividend flows outlined in an original prospectus, which makes yieldcos similar to bonds from an investor perspective. Yieldcos also offer investors liquidity, as they can buy and sell yieldco shares. Moreover, as yieldcos pool a number of assets, they diversify technological and geographical risk; meaning that they are a tool to reduce exposure to regulatory risk.

The growth of yieldcos is expected to continue, although because yieldcos are new and tied to specific tax advantages, to what extent the structure will be attractive to investors during a period of rising interest rates is unknown. Moreover, yieldcos' growth is reliant on securing new projects with long-term power purchase agreements, and being able to access relatively cheap capital to finance construction or acquisition of new cash generating assets. Yieldcos typically require an asset base of at least USD 500 million and an IPO value of USD 150-200 million. In Europe, the structure has been used by developers in the low-carbon space, but not yet utilities, except indirectly in the UK as buyers of some assets.

To set up a yieldco, a utility company or renewable energy developer must have a relatively large book of renewable energy assets. This is because of the transaction costs to set up a yieldco entity, and to be able to feed it operating assets over time. This effectively limits the use of yieldcos to larger utilities or renewable energy developers. [86] There is also a concern that transferring a large share of stable cash generating assets from the parent company to a yieldco is detrimental for the parent's credit profile.[87] The yieldco model is relatively new, making it challenging for investors to know how it will perform over time as there is no long-term data available on yieldcos' performance.[88]

[85] New Climate Economy report
[86] http://www.bloomberg.com/news/articles/2014-04-04/renewable-yieldcos-offer-cheapest-equity-abengoa-says
[87] https://www.moodys.com/research/Moodys-YieldCos-Typically-Credit-Negative-for-Bondholders--PR_286254?WT.mc_id=NLTITLE_YYYYMMDD_PR_286254
[88] http://www.bloomberg.com/news/articles/2014-04-04/renewable-yieldcos-offer-cheapest-equity-abengoa-says

3.2 Assessment of the current availability of climate investments

The current availability of climate investments has an impact on institutional investors demand for climate-friendly investments. The overall availability of climate investments in a given asset class has an impact on how attractive those climate investments are from an investor perspective due to liquidity constraints. Liquidity constraints mean investors want to be able to sell rapidly when required, creating a preference for more easily tradable bonds and equities. This means project finance, which is one channel for climate-friendly investments, becomes less attractive. The same applies to equities with lower market capitalisation and bonds with lower issuance levels.

3.2.1 Scale of discovery climate opportunities in fixed income: lack of volume

Green labelled bonds

The total amount outstanding in the labelled green bond market per November 2014 is EUR47bn.[89] While this is a significant increase from previous years, the labelled green bond market still only accounts for roughly 0.05% of the total amount outstanding in the global bond markets. This means it provides a very small pool for investors to expose their bond allocations to climate-friendly investments. The total amount outstanding in non-labelled climate bonds per June 2014 is EUR404bn, but even this only amounts to 0.5% of the total bond market. Comparing the EUR31.8bn of green-labelled bond issuance for 2014 to the total amount issued by corporates and financial institutions the green labelled issuance accounts for 1.6%.[90]

Having a broad labelled green bonds market rather than individual markets (for example, solar bonds, wind bonds and energy efficiency bonds) has the potential to create a larger market achieved by encompassing both multiple types of bonds, as well as bonds backed by multi-asset pools of investments. It has allowed the bringing together of different types of asset silos such as renewable energy and energy efficiency. Access to a large pool of investments that can be used to issue green bonds also allows a longer-term pipeline of bonds to be suggested. For most institutional investors a liquidity narrative requires this predictability and the confidence in a longer-term market: liquidity is not just about the size of the individual bond issuance. The labelled green bonds market has started seeing cases of issuance at lower ratings and with different structure, such as asset-backed securities; the signs of a maturing market set out above.

Without market scale, bond issuance suffers from an illiquidity premium. However, the potential for the green bonds market is larger than what is currently seen. There is significant potential for unlabelled climate-friendly bonds to become labelled and for existing climate-friendly assets to be refinanced with the issuance of labelled green bonds. An important feature of the bond market is it role for refinancing; it's not primarily a tool for the development phase of new climate-friendly assets, as they are too risky for institutional investors (see Box 3.1).

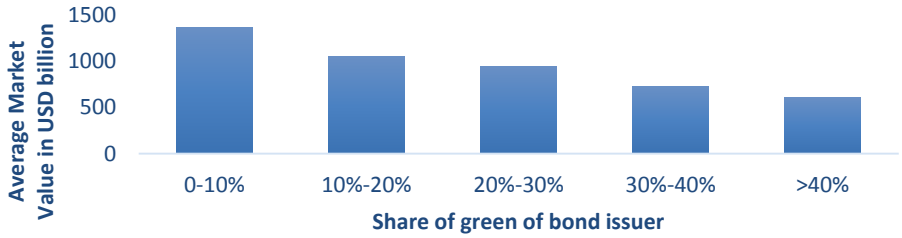
There are issuer benefits to green bonds which could drive this refinancing through labelled green bonds and an increase in market volume, notably investor base diversification, deeper engagement with existing investors and longer tenors; but these benefits are difficult to measure.

[89] Climate Bonds Initiative (2014) "Bonds & Climate Change: State of the Market 2014".
[90] As reported by Dealogic for 2013. http://www.dealogic.com/media/market-insights/dcm-statshot/

Unlabelled bonds from relatively climate-friendly companies

In addition to the relatively low volume of labelled green bonds currently available in the market, analysis found that the average market value of corporate unlabelled bond issuance from companies with climate-friendly assets accounting for 0-10% of the asset base is twice the size of that of companies with climate-friendly assets accounting for more than 40%. This finding was based on looking at the Barclays Global Bond Aggregate by share of green of the corporates, using MSCI ESG data. This finding is expected to hold for the broader corporate bond universe, as the Barclays Global Bond Aggregate already requires a certain size to be included.

Figure 3.5 Companies in Barclays Global Bond Aggregate with a higher share of green assets tend to have smaller average market value of their corporate bond issuance



[Source: FtF, based on MSCI ESG Research[91] data and the Barclays Global Bond Aggregate[92]]

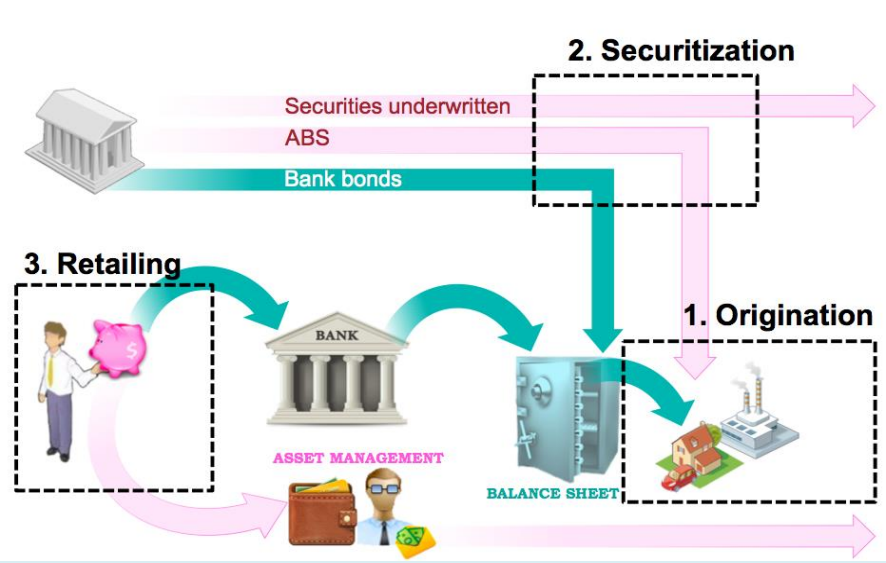
Box 3.5 The role of banks to create climate-friendly investment opportunities for institutional investment

Banks play an important role in mobilising institutional investors for climate-friendly investments. As set out in Box 3.1, banks are an important part of the capital pipeline for low-carbon projects, like any other project, as institutional investors typically only invest at a later stage of the project once the climate-friendly assets are operational: institutional investors most often provide refinancing, while banks are still the initial lender to projects. A large share of the investment opportunities for institutional investors is originated by banks, which means they are instrumental in creating a flow of investment opportunities that are financially attractive to investors while also being climate-friendly: which projects banks choose to lend to define what investment opportunities will subsequently be available to institutional investors in the low-carbon space. This applies both to fixed income and equities.

The overall allocation is primarily determined by a combination of the risk-return profile of investment opportunities in the real economy (i.e. the demand for capital) and the framework governing banks' financing decisions. In other words, like with institutional investors, banks will only be willing to originate climate-friendly investments for institutional investors provided that it is also financially attractive for the banks to do so. In this context, policy makers can play an important role.

[91] MSCI ESG Research data and analysis available at http://www.msci.com/products/esg/about_msci_esg_research.html
[92] Barclays Global Bond Aggregate available at https://index.barcap.com/Benchmark_Indices/Aggregate/Bond_Indices

Figure 3.6 Pathways for banks to impact the climate-friendly share of institutional investors



[Source: 2° Investing Initiative (2014)[93]]

3.2.2 *Scale of discovery climate opportunities in equities*

In the equity space, scale primarily matters for the volume of equities of an individual company. Pure play climate-friendly companies often have a smaller market capitalisation, which reduces their liquidity.

3.3 Risk-return of climate investments

Low-carbon investments often have a higher risk profile than high-carbon investments when assessed in the current institutional investor risk-framework. As seen in Figure 2.3 the risk-return profile of an investment is a key factor in the pricing and selection of assets for investment portfolios. Investment managers will not buy climate-friendly assets unless they also meet their financial objectives.

3.3.1 *There are different components to the overall risk of low-carbon investments*

The reason why these climate-friendly investments are currently not as price competitive as other similar projects (in more established sectors such as oil and gas) is the same as for any market in early stages of development; unknown risks associated with new technology, its production and operation and uncertainty in the policy backdrop.

- **Technological risk:** This is one of the key risks that institutional investors care about, for example the risk that an offshore wind farm will not work as intended.[94]
- **Production risk:** There is also a production risk beyond technical risk, as even if the offshore wind farm has no technical problems, there is a risk that there will not be enough wind to ensure expected production levels.
- **Policy risk:** This is another key risk investors attach to low-carbon investments; a high reliance on policy driven investment – e.g. feed-in-tariffs - introduces the risk to investors that the policy will be removed.

[93] 2° Investing Initiative (2014). "Alignment of investment strategies with climate goals: Perspectives for financial institutions".
[94] OECD (2014). *Mapping Channels to Mobilise Institutional Investment in Sustainable Energy*, Green Finance and Investment, OECD Publishing.

Like any investment there is also credit risk. However, this may be higher due to the lack of history for low-carbon companies and their small scale. There can also be an element of perceived, rather than actual, risk due to unfamiliarity with the low-carbon assets. The unfamiliarity of the various financial actors with climate-friendly assets and technologies, and lack of track record on performance, can mean that rating agencies give them a lower rating and consequently, institutional investors consider the risk too high for their mandates for them to invest without credit enhancements. In addition to these risk components, which are specific to low-carbon investments, political risks and currency risks apply, as with any other investment. However, these will not be the focus of this report as they are not specific to the low-carbon investment challenge. Understanding risk-return profiles of various types of low-carbon investments is useful for policymakers, as it will help them understand where and to what extent support to reduce risks to investors might be needed.

Integrating climate-related risks into existing investment frameworks is largely not done by mainstream institutional investors today, and therefore is excluded from the analysis in this section. Risk-return of low-carbon assets within such a changed decision-making framework is discussed further in chapter 6.

The risk-return of climate-friendly investments compared to non-climate-friendly investments is explored by asset type in the next sections. An important caveat is attached to this analysis: the analysis is limited to the investments that are available in the capital markets. Investments with very high risk and low return are not financially attractive enough to enter the capital markets, which means this analysis only looks at climate investments that have already entered the capital markets provide a positive bias. The risk-return performance of climate-friendly projects overall is logically much higher than what is shown by the analysis in the coming sections.

3.3.2 Risk-return at project level

Comparing the risk-return of climate-friendly and non-climate-friendly project bonds cannot provide robust results at this stage due to the small sample size. First, outside the more mature bond-issuing sector of rail, the sample of project bonds for climate investments is relatively small. The sample size further shrinks because there are two types of project bonds:

1. Riskier climate-friendly project bonds that are issued for projects in their early stages when there is still construction risk and other risks. These bonds, therefore, have a higher risk profile and are frequently not investment-grade.
2. Mature climate-friendly project bonds that are issued for projects that are past the higher risk construction period. These bonds therefore have a lower risk profile and can more easily achieve investment-grade.

For project bonds, investors' returns are reliant on the performance of the specific climate-friendly project. As the project bonds market for climate-friendly investment matures and if policy support for these project bonds is put in place (Box 3.6 and 3.7), both climate-friendly segments of the climate-friendly project bond market are expected to grow, and a comparative analysis of the climate-friendly and non-climate-friendly project bond market would be feasible. However, as Nelson and Pierpont have shown[95], institutional investor appetite is likely to remain weak for project development bonds; unless the issuer puts in place a structure to protect investors from the construction and development risk

[95] CPI (2013). *The Challenge of Institutional Investment in Renewable Energy*, by David Nelson and Brendan Pierpont.

(Box 3.7), lower-risk bonds used to refinance mature projects will be much more attractive. This still has an important effect on project finance, in that it opens up a clear exit strategy for both equity investors and bank lenders – knowing they have the opportunity to recover their capital quickly through re-financing encourages both use and recycling of capital.

Box 3.6 Credit enhancement for project bonds: EU Project Bond Initiative

In the EU, for project bonds, the European Union's 2020 Project Bond Initiative (PBI) is part of the toolbox of the Connecting Europe Facility (CEF) and the Europe 2020 growth strategy. It is a joint initiative between the European Commission and the European Investment Bank (EIB) designed to catalyse additional capital markets debt financing for trans-European transport networks (TEN-T), trans-European energy networks (TEN-E), ICT and broadband. Given the focus on TENs, the PBI currently excludes energy generation projects, including renewable energy generation projects.

Through the Project Bonds Credit Enhancement (PBCE) facility of the European Investment bank, the PBI provides credit enhancement to raise the ratings of project bonds to comply with risk-return demands of institutional investors. A subordinated instrument supports senior project bonds issued by infrastructure project companies, acting as a protective layer to the senior tranche, thereby enhancing the credit rating of the bonds issued by the project companies. This takes the form of either a funded (provision of a subordinated credit line) or unfunded (guarantee provision) subordinated debt position to raise the likelihood of timely repayment of principal and interest to bond holders during the lifetime of the senior debt issued through project bonds. The funding for the EIB to take on this role is provided from the EU budget through CEF, which, as mentioned above, restricts the investment areas. The credit enhancement is not necessarily a first loss position, as on the project level there is typically an equity tranche that takes the first loss role.

The PBI aims to credit enhance project bonds to achieve at least A rating to meet demand from institutional investors[96]. Within the pilot phase (2012-2013), €230 million was budgeted, with leverage of up to 20 times expected. As of November 2014, the initiative has supported nine infrastructure projects in six Member States; while principally used for roadway projects, this nevertheless includes the financing of the transmission link for the Greater Gabbard offshore wind project. Currently only approved Projects of Common Interest within the "Connecting Europe Facility" and "TEN" programmes are eligible for the PBI, however the 2014 mid-term evaluation of the programme recommended an expansion beyond its existing scope to include more explicitly renewable energy and social sector projects[97].

[96] Deutsche Bank (2013): Project Bonds Initiative.http://www.dbresearch.com/PROD/DBR_INTERNET_EN-PROD/PROD0000000000320937/Project+Bond+Initiative%3A+Project+selection+the+key+to+success.pdf
[97] EY (2014) Ad-hoc audit of the pilot phase of the Europe 2020 Project Bond Initiative – Final Report, http://ec.europa.eu/dgs/economy_finance/evaluation/pdf/mid_term_eval_pbi_pilot_phase_en.pdf

Box 3.7 Private finance innovation to attract institutional investors to construction-phase finance[98]

There are examples of private finance innovations to get institutional investors involved already in financing already at the construction phase, and avoid that they only get involved in the post-construction phase, as is more common. The Danish company DONG Energy provides one example. To finance a DKK10bn (EUR1.34bn) offshore wind project, DONG Energy set up a special purpose vehicle (SPV) that would invest and get the revenues from the project. DONG Energy took 50% ownership in the SPV, selling the remaining 50% share to pension funds. Pension funds were willing to pay DKK6bn (EUR0.8bn) for this share, due to contracts put in place between DONG and the SPV for construction, operations and management, which effectively translated these risks to DONG. While not a bond issuance, this example shows how institutional investors can get involved at the construction-phase. The same structure has since been replicated for a biomass project in the UK. It is also worth noting that using such a contract structure with one type of finance only and number of investing entities can reduce the transaction costs compared to a typical project finance structure that relies on a mix of equity, mezzanine and debt finance from a range of commercial banks, each of which has to undertake their own due diligence and legal documents.

3.3.3 Risk-return at corporate bond level

Understanding the risk-return at bond level requires looking at a specific sector. Unlike for equities where equity indices provide data on risk-return and aggregate similar equities in thematic indices, there is no straightforward analysis available between different types of bond indices. Moreover, given the range of factors driving the main forces behind risk-return at bond level, notably the time to maturity of the bond, comparing between sectors is likely to yield inaccurate results. As a result, it is more appropriate to focus on one sector.

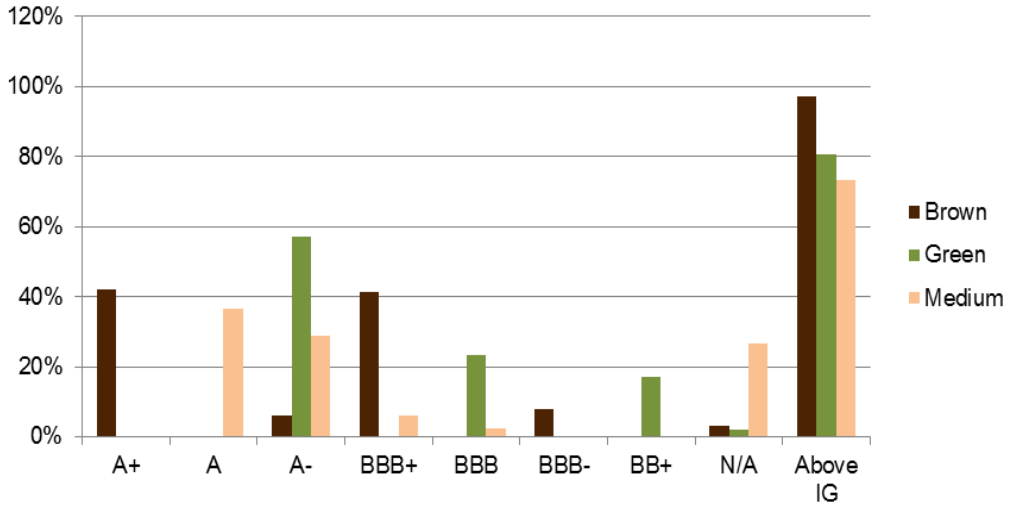
The utility sector is chosen as a case study, as there is a relatively large sample of bonds from the sector in Europe, and as data on the fuel mix of the utilities is available. This allows a sector specific comparison of risk-return between climate-friendly and non-climate-friendly corporate bonds. [99] The analysis looks at utilities listed in the Stoxx600.[100] Utility firms with a high share of low-carbon energy in the mix are classified as green (>20%), those with an average green share as medium (10-20%), and the ones with a low share of renewables in their mix are labelled as brown (<10%).

Figure 3.7 shows the distribution of S&P bond ratings for each group (green, medium, brown) by volume for all bonds emitted from 2008 to Q2 2014. 97% of brown firms' bonds are above investment grade. This falls down to 81% for green companies' bonds and 73% for medium. Based on this case study utilities with a lower share of clean energy receive on average better ratings than those with a higher share of clean energy.[101] However, the small sample size and limited use of controlled variables in the analysis means the results cannot be widely generalised to make a conclusion on the risk-return of climate-friendly corporate bonds compared to non-climate-friendly corporate bonds.

[98] Mostert, W. (2012): International Experiences with Public Finance for Renewable Energy
[99] While the fuel mix may be restrictive (it acts as a backward-looking indicator and does not inform on the future), it is the most accessible data point across a range of utilities.
[100] Utility firms listed in Stoxx600: Centrica Plc (United Kingdom), Cez As (Czech Republic), Electricité de France (France), Enel Spa (Italy), Energias de Portugal (Portugal), Fortum OYI (Finland), GGF Suez (France), RWE AG (Germany), Snam Spa (Italy), SSE Plc (UK).
[101] It was also tested whether country, time to maturity, or year of issue cause a bias in the ratings, but no systematic correlation could be found. Indeed, there is no significant difference in maturity between different 'types' of utilities.

Figure 3.7 Ratings of European Utility Bonds Listed in the Stoxx600

(2010-2014, 130 bonds by 10 Firms, distribution by volume)



[Source: FtF]

The relatively climate-friendly utility firms' bonds have the greatest distribution among rating classes with 57% rated A-, 23% BBB, and 17% BB- (% by volume). The spread within the groups of brown and medium firms is somewhat lower. The only bonds that are rated below investment grade are those of the climate-friendly Italian utility firm Enel. However, the same analytical limitations as for the ratings analysis above apply.

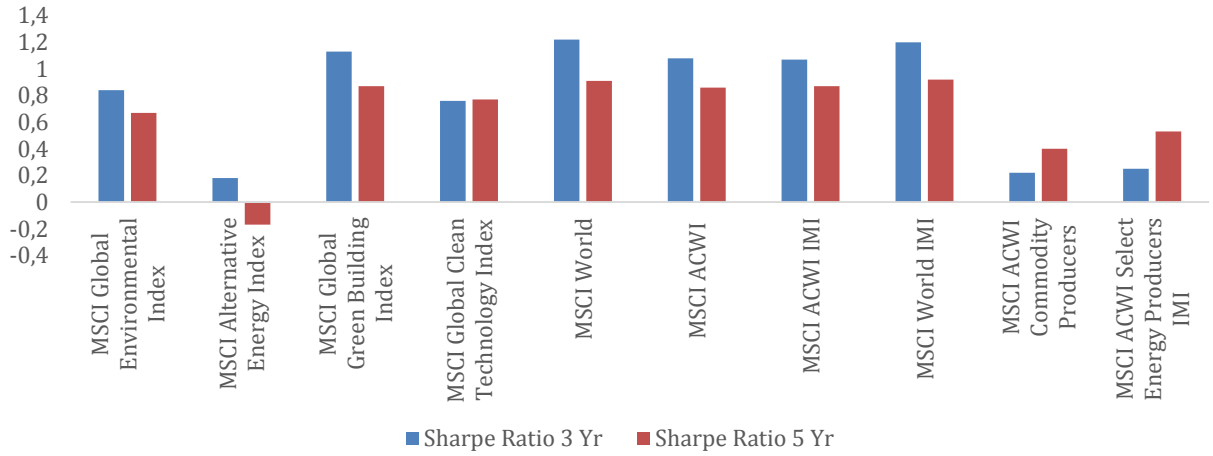
3.3.4 Risk-return of climate-friendly equities

There are a number of different indicators to analyse the risk-return of climate-friendly equities versus the market. The first relates to the Sharpe ratio.[102] Figure 3.8 demonstrates the differences in Sharpe Ratio between the main MSCI cap-weighted and thematic indices. The figure suggests substantial differences between climate-friendly equities, with alternative energy indices performing significantly worse and global green buildings performing better than the non-thematic indices.[103] The graph suggests that there are no particular risk-return barriers for climate-friendly equities as a whole, albeit perhaps for specific types of climate-friendly companies. The analysis demonstrates that from a simple stock-picking view of choosing different types of equities, there don't appear to be consistent differences between climate-friendly and non-climate-friendly equities.

[102] A ratio developed by Nobel laureate William F. Sharpe to measure risk-adjusted performance. The Sharpe ratio is calculated by subtracting the risk-free rate - such as that of the 10-year U.S. Treasury bond - from the rate of return for a portfolio and dividing the result by the standard deviation of the portfolio returns.

[103] The MSCI World Index captures large and mid-cap representation across 23 Developed Markets (DM) countries. MSCI ACWI captures large and mid-cap representation across 23 Developed Markets (DM) and 23 Emerging Markets (EM) countries*. With 2,446 constituents, the index covers approximately 85% of the global investable equity opportunity set. The MSCI Global Green Building Index includes developed and emerging market large, mid and small cap companies that derive 50% or more of their revenues from products and services in Green Building. The MSCI Global Clean Technology Index includes developed and emerging market large, mid and small cap companies that derive 50% or more of their revenues from products and services in Clean Technology. The MSCI Global Alternative Energy Index includes developed and emerging market large, mid and small cap companies that derive 50% or more of their revenues from products and services in Alternative energy.

Figure 3.8 Sharpe ratio of major cap-weighted and thematic indices



[Source: FtF, based on MSCI Index factsheets[104]]

Interestingly, the dividend yield, a factor that may be important for some institutional investors, is actually highest for the MSCI Alternative Energy Index and generally higher for the thematic indices than for the cap-weighted indices (exception being the Global Clean Technology Index).

3.4 High transaction costs

In addition to risk-return, transaction costs influence whether institutional investors find climate-friendly investments attractive. Two main types of transaction costs are identified: first, small scale of projects means transaction costs are significant for investors and second, lack of standards and definitions for climate-friendly investments also increases transaction costs for investors as time consuming analysis to determine climate impact is required. The small scale projects also poses transactions costs for issuers, however, a detailed discussion on this is out of scope of this report as the focus is on the institutional investor.

3.4.1 Small scale of climate investments

The fragmented nature of many low-carbon investments e.g. household energy efficiency and distributed generation of renewable energy means individual projects do not comply with the minimum size of investments required by institutional investors: in the bond markets, typically, around EUR100m is the minimum size institutional investors will be interested in.[105] Only around EUR500m and above is considered benchmark issuance. To put this in context using an example recently seen in the market: around 16,000 rooftop solar panels can fit into a bond issuance for EUR200m.[106] In the absence of well-developed aggregation vehicles, the small scale of many low-carbon projects is therefore an obstacle to increase investor portfolio exposure to climate-friendly.

Securitisation provides a solution to address this issue, by bundling loans and selling the package of loans onto institutional investors. The use of securitisation as a response to the barrier of size adds to

[104] MSCI Index Factsheets are available at https://www.msci.com/resources/fact_sheet/
[105] The Challenge of Institutional Investment in Renewable Energy (2013). Available at: http://climatepolicyinitiative.org/wp-content/uploads/2013/03/The-Challenge-of-Institutional-Investment-in-Renewable-Energy.pdf
[106] SolarCity's New US$201m (EUR180m) Securitised Solar Portfolio Keeps the Capital Flowing, Available from: http://www.greentechmedia.com/articles/read/SolarCitys-New-201M-Securitised-Solar-Portfolio-Keeps-the-Capital-Flowing

the rationale for securitisation to be implemented to enable increased bank lending to climate projects as set out in the discussion on refinancing in Box 3.1. Historically, securitisation has played an important role in increasing finance to investments with public benefits. Securitisation grew as a funding source in the 1940s and 1950s because governments actively encouraged it (through tax breaks, guarantees etc.) for housing as the economic multiplier effect of housing investment. Banks responded by dramatically increasing lending to housing.

The role asset backed securities played in the financial crisis of 2007-2008 reduced their use; however, there are several arguments for reviving a securitisation market in Europe. First, there are many different types of ABS with varying complexity and quality. A key problem of the asset backed securities that contributed to the crisis was that the extensive use of re-securitisation i.e. asset backed securities themselves were pooled together to create new products, which made it difficult for investors to evaluate the quality of the underlying assets in the real economy. Such re-securitisation is now more scrutinised in the market.[107] In addition to improved practices in the market, regulatory requirements have been strengthened post-crisis; in particular there are higher risk retention requirements that means banks originating their asset backed securities must retain some of the risk, which incentivises them to originate higher quality securities. [108] The economic benefits of high-quality securitisation are recognised by EU policymakers, for example, it plays a central role in the proposed reforms for a Capital Markets Union.[109]

However, although securitisation of climate-friendly assets can be beneficial to mobilise institutional investors, barriers to climate-friendly securitisation remain.

Barriers to securitisation of climate-friendly assets

The potential role to make securitisation of climate-friendly assets a significant part of the green bond market is increasing. As the concept of green bonds becomes more familiar, the interest in green bonds can spread to lower ratings and different structures such as asset-backed securities and covered bonds. This development in the green bond market is coinciding with securitisation becoming attractive again more broadly. Green securitisation relates to both covered bonds[110] and asset-backed securities.[111]
A barrier to green securitisation is the lack of standardisation on contracts and project evaluation structures. The rationale for this is that without standardisation there is a high cost for structuring and due diligence when including low-carbon assets in securitisation pools.[112] Standardisation has been

[107] http://www.economist.com/news/finance-and-economics/21593424-much-maligned-financial-innovation-early-stages-comeback-back
108 http://www.economist.com/news/finance-and-economics/21593424-much-maligned-financial-innovation-early-stages-comeback-back
[109] Capital Markets Union Green Paper, Available at: http://ec.europa.eu/finance/consultations/2015/capital-markets-union/docs/green-paper_en.pdf
110 The dual recourse nature of covered bonds differentiates them from pure asset-backed finance where bondholders are fully reliant on the performance of the underlying specific asset (renewable energy projects with respect to green bonds). Covered bonds have 100% risk retention, which lowers the ability of banks to recycle capital compared to securitisation, which allows banks to take the loans off balance sheets, the global covered bond market is currently larger than US$3 trillion (EUR2.8trn).
[111] It is important to note that there are two main types of asset-backed securities relevant for low-carbon investments. First, there is ABS of green loans from bank or other financing entities. Second, there is ABS of green assets from utilities, who can aggregate larger low-carbon assets such as wind and solar farms once they are in an operational, less risky phase. This allows utilities to cycle the capital raised from the securities' issuance into new low-carbon projects. Providing an alternative to balance sheet financing is useful for utilities, particularly in Europe, as their financial positions have deteriorated the last decade. This type of ABS issuance is an alternative to yieldcos (see Box 2.6).
[112] Schwabe et al (2012). Mobilizing public markets to finance renewable energy projects. Insights from expert stakeholders. http://www.nrel.gov/docs/fy12osti/55021.pdf; Ceres (2014) "Investing in the Clean Trillion: Closing

important to drive the large securitisation markets in auto loans and credit card loans. The important role of standardisation for green securitisation was highlighted in the recent report from the Global Commission on the Economy and Climate in September 2014, and by an expert roundtable in the US.[113] Standardisation of contracts is not considered a barrier for ABS issuance from utilities, given that fewer assets are included in a utility ABS issuance (given the larger size of assets).

Another barrier that applies both to green securitisation issuance backed by green loans and backed by utilities' assets is that the banks or utilities might not individually have adequate renewable energy or energy efficiency asset books to support repeated issuance of green ABS. Shared warehousing solutions for each category of green ABS (i.e. one warehousing solution for green loans, another for utilities' issuance) could address this problem, as explained in Box 3.8. Finally, there is of course the larger barrier of the risk-return profile of climate-friendly investment reviewed previously.

Box 3.8 offers an illustrative overview of policies addressing the fragmentation of investments. In addition to policies enabling aggregation, utilising structures such as yieldcos (Box 3.4) and issuing in the private placement market (Box 3.2) are options to access institutional investors despite the barrier of small project sizes. Third-party financing companies (Energy Service Companies - ESCOs) can also provide aggregation to a certain level, both for distributed renewable energy generation and energy efficiency.

Box 3.8 Examples of policies implemented to address fragmented nature of climate projects

One solution that stands out to address the fragmented nature of climate projects is the warehousing of loans. Existing initiatives in this regard are the Green Deal Warehouse (UK) and the Warehousing for Energy Efficiency (WHEEL) (US).[114] WHEEL is a public-private partnership (public entities engaged: US Department of Energy, state treasuries) to buy residential energy efficiency loans originated by approved local contractors, aggregate them into securities, and sell these to institutional investors through medium-term notes. The Initiative was launched in 2014, and aims to go nationwide in 2015. The process is that a designated private company (Renewable Energy Facility) buys the loans, with credit for this provided by Citigroup, a private bank, and the state treasury. The WHEEL initiative builds on Pennsylvania's Keystone HELP energy efficiency loan programme.

A structure that has not been used for climate-friendly projects, but nevertheless has potential to be applied here, is issuance of mini bonds with subsequent aggregation of these into asset-backed securities. Italian legislation had approved the use of mini bonds and this structure was used by a group of 8 water companies in Italy in 2014, which issued over EUR 150m of mini bonds to finance annual infrastructure investments. The European Investment Bank and institutional investors purchased the bonds.

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the Energy Investment Gap". *Ceres Report*. Accessed 17.04.2014 from http://www.ceres.org/resources/reports/investing-in-the-clean-trillion-closing-the-clean-energy-investment-gap.

[113] See The Global Commission on the Economy and Climate (2014): The New Climate Economy & Schwabe et al (2012): Mobilising public markets to finance renewable energy projects. Insights from expert stakeholders. http://www.nrel.gov/docs/fy12osti/55021.pdf

[114] Citigroup (2014): http://www.citigroup.com/citi/news/2014/140409b.htm

3.4.2 Transaction costs: lack of common standards and definitions

Currently, there is no common definition in the market for a climate-friendly investment, as discussed in Chapter 1 and 2. This is the case for both fixed income and equity. A lack of definitions and standards increase transaction costs for investors as it increases the need for them to undertake ad-hoc analysis to identify how climate-friendly various investments are. The potential of the commoditisation of descriptions, i.e. standards, to fuel a larger climate investment market was explicitly recognised by Aviva, an asset manager and insurer, in the context of a sustainable Capital Markets Union in the EU.[115]

Lack of common standards for green bonds

Both policy makers and climate-friendly investors need to be assured that green bond investments are genuinely climate-friendly to identify where to place supporting policies and funds, respectively. Transparency around the underlying assets for which proceeds are used enables investors to efficiently mandate green bond allocations in their fixed income portfolios and governments to support green bond issuance through policies. Many, institutional investors deploying large amounts of capital do not possess the in-house capacity to assess such credentials. This leads to the need for new tools.

The Green Bond Principles, launched in January 2014, have begun establishing best practice guidelines for the processes and structures around green bond issuance; however, they do not provide definitions or standards around what is climate-friendly. The only industry effort to address this challenge at present is the Climate Bonds Standard and Taxonomy,[116] with some 40 international organisations involved in its development. The Taxonomy lists investments that would qualify as climate-friendly for the purposes of bond issuance. The taxonomy however focuses on physical assets and doesn't provide a comprehensive assessment of the alignment of a company with climate goals. This is a different approach to the method used in the equity market to analyse the climate-friendliness of investments.

Lack of disclosure standards in equity markets

In equity markets, the climate-friendliness is evaluated at the company level based on disclosure from companies. While an increasing share of companies provide climate-relevant information in their company reports, this disclosure is not standardised. This makes due diligence costly and difficult for investors because the data available is not comparable across sector and geography.

There are several initiatives that exist in the market that are working to improve this and develop standardised approaches to accounting and disclosure of extra-financial data, such as the Global Reporting Initiative and the International Integrated Reporting Council. Another is CDP, the world's largest database of environmental data for companies. The number of companies disclosing environmental information on climate change to CDP now accounts for over half the world's companies by market capitalisation, including over 80% of the largest 500 companies and 70% of the S&P 500.

The integration of climate-related data in the data platforms used by investment analysts, such as Bloomberg and Thomson Reuters, also contributes to standardising the disclosure available to investors. Bloomberg now provides data on more than 120 environmental, social and governance indicators for

[115] Aviva (2014) Sustainable Capital Markets Union Manifesto
[116] http://climatebonds.net/projects/taxonomy

around 5,000 publicly listed companies globally.[117] Thomson Reuters' environmental, social and governance database contains information on over 4,000 global companies and over 500 data points.[118]

3.5 Summary of barriers

Based on the discussion in this chapter, there are barriers preventing institutional investors to fully use the channels for discovery set out in section 3.1 (green bonds, yieldcos etc.) to translate their climate-friendly investment preferences into practice:

Key barriers:

- Discoverability of climate-friendly investment opportunities
  - Low disclosure in bond markets
  - Non-standardised disclosure in equity markets
- Availability: lack of volume of climate investment opportunities
  - Low volume leads to lower liquidity
- Unfavourable risk-return profile of climate investments today
  - Credit risk, technology and performance risk is often higher for climate
  - Policy risk as a background for climate investment opportunities
- High transaction costs:
  - Small size of climate-friendly investment opportunities
  - No EU (or global) standards for defining climate

There are also additional barriers that arise from institutional investors current decision-making framework – short investment horizons and failing to incorporate climate risk appropriately into their decisions - but changing this is considered a longer-term play given the current priorities of the Commission. Although these barriers are also important for policymakers to pursue, they have a different timeframe and are therefore distinguished from the barriers that can be addressed to have a more immediate impact. They are explored in chapter 6.

An overview of the key barriers identified that are external to institutional investors' current decision-making framework – i.e. removing the barriers would enable increased investment without changing the decision-making factors of investors – is set out in Table 3.2. Discoverability barrier discussed in chapter 3.1 are already being addressed through existing investment products and tools.

Table 3.2 Mapping barriers requiring policy intervention

Barrier type	Barrier
Availability/liquidity	Lack of volume of climate investment opportunities
Risk-Return	Credit risk (including technology and performance risk)
Risk-Return	Policy risk
Transaction cost	Small scale of climate projects, securitisation potential solution but they are also barriers to securitisation
Transaction cost	Lack of standards and disclosure

[117] http://www.bloomberg.com/professional/markets/equities/
[118] http://thomsonreuters.com/en/products-services/financial/company-data/esg-research-data.html

4 Next steps: Policymakers role to create climate-friendly supply that matches investor demand

This chapter will explore the options that policymakers have to step in to address the barriers that the market has not yet been able to address sufficiently without support, as set out in Table 3.2. This is not to say the market is unable to address several of these remaining barriers. For example, so far in the green bond market, the treasuries of issuing entities have essentially been providing the risk-bridge needed to get higher-risk low-carbon projects and assets to an investment grade rating that meets the need of institutional investors. That a development bank or a blue-chip corporation uses the strength of its balance sheet to borrow at low cost and invest in the high-priority areas of climate-friendly development where it has special expertise is an efficient way to fund risky projects. However, it does limit market growth, as not all issuers are willing, or able to, absorb this risk on their balance sheets.

Many of the barriers will also reduce in the market over time: for example, the technology risk of low-carbon technologies is falling as the technologies mature, and the credit risk of low-carbon projects and pure play companies will also decline as the companies mature. However, minimising the costs of addressing climate change requires action sooner rather than later. Therefore waiting for these processes in the market to occur on their own is costly, as it increases the costs of both mitigating (due to lock-in of inefficient and non-climate-friendly infrastructure) and adapting to climate change (due to increased emissions). The role of policymakers is to step in to accelerate the market-driven processes.

4.1 Providing a deal flow of investable opportunities: lessons from non-climate policy priority areas

A historical perspective on the challenge can provide useful insights. The challenge to increase climate-friendly investments from institutional investors is essentially about directing private capital to a policy priority area that the market is not investing sufficiently in on its own. Typical policy priority areas where this has been the case, historically and currently, are infrastructure, SMEs and innovation. Where societies need rapid action in a given investment area governments generally have found ways to push them along. Governments around the world have engaged in various forms of risk bridging for the past 75 years; infrastructure investing has always been a product of active government.

One example can be found in the US housing market. Because the economic multiplier of housing investment has a critical benefit for the national economy, in the 1940s and 1950s the US government expanded Freddie Mac and Fannie Mae's capacity to provide guarantees for mortgages, creating a boom in the housing industry — and successfully stimulating the economy. Although these institutions have gained a negative reputation in the wake of the financial crisis, the underlying structure of these financial institutions has proved a good model provided it is used in a prudential manner: as with asset-backed securitisation, the model of government-supported lending applied by Freddie Mac and Fannie Mae is not inherently problematic in itself – it was the non-prudential application of the model that contributed to the financial crisis. This distinction is important. Yet another example of financial sector policy support is from the German government, who used targeted regulatory support for special bank

financial instruments (covered bonds or *Pfandbriefe*) to boost bank lending to public sector institutions in the former East Germany during the 1990s.

There have also been a number of examples to try to embed non-infrastructure related economic goals into financial policies. Examples include India's priority sector lending portfolio requirements including a minimum exposure to agriculture and the SME sector.[119] In Europe, the European Central Bank has recently announced changes to the collateral framework in an explicit attempt to increase lending to SMEs. Although these examples are not directly related to low-carbon investment, they create a precedent for embedding climate goals in financial regulatory frameworks.

Broader strategies for policymakers to increase investment in policy priority areas can also be drawn from historical experiences. The box below sets out key strategies used by the US state to increase investment in technology innovation in certain areas of military importance in the decades since World War II.

Box 4.1 Three strategies for action: learning from the US' state support for shifting private capital to innovation

How the US state has provided support to increase private investment in innovation necessary for the US defence industry highlights three areas of action that apply readily to how EU policymakers can mobilise institutional investors for climate investments:[120]

1. Use assured demand for innovations to drive R&D spend

From capacity remuneration to cost-plus contracting, governments use demand guarantees as a means to ensure private capital will be deployed. In the EC's case this would mean leading Member State consortia in aggregating purchasing power for investments prioritised, as well as public financial institutions using new risk and measurement methodologies. Having assured demand for these methodologies will incentivise market actors to develop them.

2. A focus on engineering deployment at scale to drive down costs

This generally involved competitive tendering for large-scale contracts; it also involved managing a pool of suppliers large enough to be able to take on major projects. Although the focus here was in the real economy a similar demand-pull strategy is relevant for climate-friendly investment products as EU policymakers can buy these products and through this scale the market, improve liquidity and, therefore, drive down cost of capital.

3. Use convening power and innovation networks

The US military in the 1960s worked to bring together potentially collaborating actors at different points in the innovation chain. In the EU, this translates as the EC using its convening power in key areas to bring together different parties, for example, the development of EU-wide standards for solar rooftop loan contracts, to facilitate later securitisation.

Harmonisation of standards, from setting qualifying criteria in different climate-friendly investments sectors to loan contracts that can be securitised, is an essential task and one very consistent with the EC's usual role.

Government support to drive investment into policy areas can also be more indirect at a more structural scale. For example, most modern bond markets have initially been engineered by

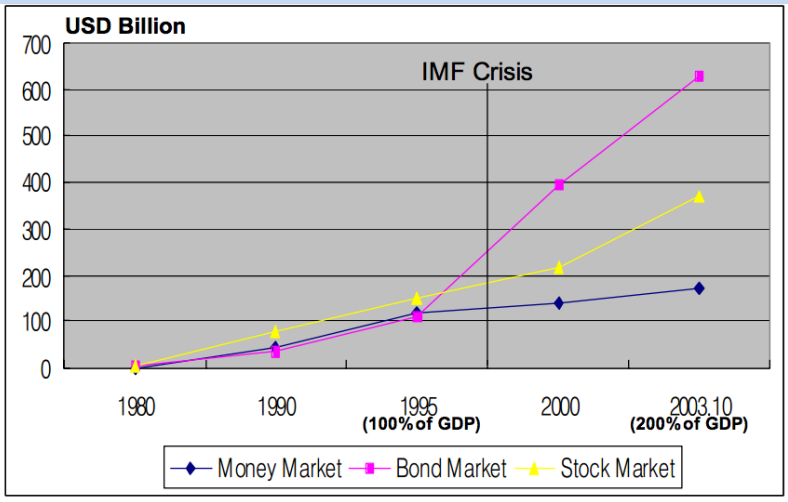
[119] Reserve Bank of India (2014) Priority Sector Lending - Targets and Classification. Available at: http://www.rbi.org.in/scripts/FAQView.aspx?Id=87.
[120] Weiss, L. (2014) *America Inc*

governments who see capital cost benefits in diversifying the financing instruments available to domestic industry. An example is the development of the South Korean bond market in the 1990s.

Box 4.2 The development of the South Korean Bond Market in the 1990s

The government decided that a larger corporate bond market would be important, at that stage of Korea's economic development, in diversifying sources for finance[121]; this became urgent at the time of a financial crisis in 1997. They increased issuance of government bonds to finance government deficits, providing greater liquidity in the market, and, because bank finance had been squeezed, pressed their big companies to issue corporate bonds. Bond issuance by large companies had the benefit of educating investors and developing the service sector needed to support a bond market. In the initial years of corporate bond market development to government provided guarantees to make bond issuance attractive for those big companies, ensuring low interest rates; after 1997 guarantees began to be withdrawn. South Korea had a lively bond market with a substantial proportion of non-guaranteed corporate bonds (see Figure 4.1). Similarly, the US state engineered the emergence of the venture capital industry after World War II to connect a supply of higher-risk technology investments with investors with a demand for product with this risk profile.[122]

Figure 4.1 Development of South Korean Bond Market: History[123]



[121] Lee, M-J. and Kim, S-H. Developing the corporate bond market: the Korean experience. *Bank of Korea*. BIS Papers No. 26 - http://www.bis.org/publ/bppdf/bispap26o.pdf
[122] Weiss, L. (2014) *America Inc*
[123] Oh, G. Bond Market Development: The Case of South Korea. Available at: http://www.adbi.org/files/2005.06.21.cpp.bond.market.korea.pdf

4.2 The policymakers' toolbox for influencing investment flows

Policies here are about making the investment flows of climate-friendly assets more attractive to investors. This can be done by altering the characteristics of an investment, e.g. by reducing its risk, or by making investments with given characteristics more attractive, e.g. preferential capital requirements for certain assets.

There are several types of finance sector related policy tools available to do this. The main types identified by this report are:

- Financial regulations;
- Public incentives;
- Accounting and disclosure requirements;
- Monetary policy.

EU policymakers are already applying these tools; the question is how to use them and alter them to increase institutional investors' climate investments.

Financial regulatory changes relevant for climate investments includes adjusting capital reserve requirements – as is currently being explored in China (Box 4.3) - and expanding the rules for covered bond markets including the potential to allow renewable energy assets in cover pools.

Public incentives include demonstration issuance and the direct channelling of public capital, notably through public financial institutions. Multilateral institutions, sovereign, or municipal bodies can issue general obligation bonds, earmarking portion of funds for climate investments. In addition, credit enhancement mechanisms through public banks, such as guarantees and subordinated debt, can improve the risk-return profile of climate-friendly investments.

Accounting and disclosure requirements for climate related information could be applied to non-financial companies, stock exchanges and credit rating agencies. Policymakers can also take a less prescriptive role in approving accounting and disclosure by developing standards for climate-friendly financial products that can be made available to market actors. Both these would reduce the transaction costs of a climate investment to investors by making information they need more readily available.

For monetary policy, instruments for policymakers include quantitative easing with a preference for climate-friendly products and preferential treatment of climate assets in collateral frameworks to improve the liquidity of these assets. This idea is currently being explored in China for climate-friendly assets (Box 4.3), and the ECB already has collateral adjustments in place for SME loans. While these policies are getting traction in the public debate, to date there has been no rigorous analysis on their impact or potential negative effects. They are therefore not developed further in this report.

Box 4.3 Example of using banking regulations and monetary policy for climate-friendly investments: China[124]

Recent policy proposals in China around climate-friendly finance propose the use of both banking regulations and monetary policy to support climate-friendly investment. In terms of banking regulation, Chinese policy makers propose two actions. First, providing a range of preferential risk weights to banks' green credit for banks that meet certain capital treatment criteria. Second, reduce their capital requirements for green credit. An alternative to the latter is to exclude green credit from the deposit-to-credit ratios that are presented in banks' performance evaluations. Conversely, instead of providing these preferential treatments for climate-friendly, the regulators can set higher risk weights and capital requirements to brown credit. These regulatory changes incentivise banks to originate more climate-friendly products, which increase climate-friendly deal flow for institutional investors.

In terms of monetary policy, two main actions are proposed for China. First, that the central bank lowers the requirements of deposit reserve ratio for the financial institutions with a certain share of green credit. Exceptions to the base deposit ratio requirements for specific banks are common in China, as the banking regulator (CBRC) does not have legislative power to change the set base requirement. Second, under the Standing Lending Facility, which provides short-term loans to banks on an ad-hoc basis can implement special re-lending rates for climate-friendly investments, or entities that lend to climate-friendly projects. Similarly to the banking regulations described above, this impacts on institutional investors, as banks are incentivised to originate more climate-friendly products.

An interesting point to note here is that China's regulators have recognised that preferential risk and capital treatments, and deposit ratio requirements are tools that are already being provided to boost lending to SMEs. For example, in June 2014, People's Bank of China reduced the reserve requirement by 0.5% for banks that mainly lend to SMEs and rural development, defined as at least 50% of loans last year or 30% of total outstanding loans.[125]

A key point to emphasise is that the role of EU policymakers in leveraging these different types of policy tools is not mainly direct and through hard regulation: recognising the EU's soft power in addressing the barriers that remains for to increase climate-friendly investments is considered of central importance in this report. The EU can utilise its convening power to get central market actors to the table; to educate the market on remaining barriers, spur discussions on solutions and showcasing and promoting best practice. Moreover, the EU can play an important role in harmonising existing practices in the market, and promote best practice in this harmonisation process. The EU's PFIs can play a key role (Box 4.4).

[124] Development Research Centre of the State Council of the People's Republic of China (2014). Problems in the Development of China's Green Finance and Policy Recommendations, November 2014; People's Bank of China Green Finance Working Groups (2014): Suggestions on establishment of green financial system. November 2014

[125] http://www.ft.com/cms/s/0/25592974-efd2-11e3-bee7-00144feabdc0.html#axzz3K69z7VNR

Box 4.4 The role of public financial institutions[126]

Public financial institutions (PFIs) are publicly created and/or mandated financial institutions that often correct for the lack of market-based finance through the provision of missing financial services. PFIs in Europe[127] are well positioned to act as a key leverage point for governments' efforts to mobilise private investment in low-carbon projects and infrastructure. These institutions and special-purpose funds are typically established to meet broad objectives serving the public good as defined by existing national, regional or international policy objectives. Given the direct or implicit policy-oriented mandates under which these institutions operate, PFIs are, under certain circumstances, both able and willing to provide financing at below-market returns, typically paring with commercial investors to draw in additional financing.

PFIs often have means to provide high volumes of stable, long-term finance while minimising cost to national budgets. Depending on the institution, they can use their initial capitalisation and balance sheet, State guarantees, and strong credit ratings to leverage low-cost funding from the international capital markets or through the use of household savings. They also channel both EU and national funds placed within their management into target parts of the economy. This allows these institutions to provide concessional financing for projects without the use of public subsidies or funds. Furthermore, PFIs often explore and test a broad range of approaches and instruments to use the public resources at their disposal to mobilise private finance. These range from the European Investment Bank's experimentation with new investment and finance instruments (such as layered-debt funds and the Project Bond Initiative), to the development of holistic approaches that consider both the financing of individual projects and broader capacity-related and market-development issues.

Table 4.1 Overview of the main functions, tools and instruments of PFIs to support low-carbon projects

Role	Functions	Tools and instruments
Facilitate access to capital	• Providing long-term capital • Facilitating access to private capital	- Concessional and non-concessional lending - Equity investment - International climate funds - Public private partnerships
Reduce risk	• Risk sharing • Credit enhancement mechanisms	- Structured finance: Guarantees - Public private partnerships - Junior debt/Mezzanine financing
Fill the capacity gap	• Aiding project development • Reducing project risks	- Technical assistance - Capacity building - Information tools (GHG quantification, energy certificate tracking)

[Source: after Cochran et al. (2014).]

To support low-carbon projects, PFIs can deploy a broad range of instruments and programmes (Figure 4.2). In some cases, these take the form of dedicated programmes and facilities focusing on a specific (sub) sector (such as off-shore wind). In other cases, PFIs combine both traditional investment tools (equity investments, concessional loans, junior debt) with more innovative tools (layered debt funds, credit enhancement, etc.). In most instances, PFIs' use of instruments, which increase access to capital and share risk, and their dedicated programmes to build capacity,

[126] Based on Cochran et al. (2014). Public Financial Institutions and the Low-Carbon Transition: Five Case studies on Low-Carbon Infrastructure and Project Investment, OECD publication, Paris. Authors' definition after Ratnovski, Lev, and Narain (2007) "Public Financial Institutions in Developed Countries—Organisation and Oversight". WP/07/227. IMF Working Paper.

[127] This includes National Promotional Banks as defined by the European Union, the European Investment Bank, as well as different dedicated public investment and equity fund structures with development mandates.

are intended to leverage private finance in projects.[128] PFIs are principally involved in supporting the development of low-carbon projects, with the provision of corporate debt and equity typically confined to small and medium-sized companies or those deemed of national strategic importance.

Figure 4.2: Avenues for public financial institutions to mobilise climate finance

[Source: after 2° Investing Initiative (2013) Shifting Private Capital to Climate-Friendly Investments: The Role of Financial Regulatory Regimes & Cochran et al. (2014) Public Financial Institutions and the Low-Carbon Transition: Five Case studies on Low-Carbon Infrastructure and Project Investment, OECD Publications, Paris]

[128] Cochran et al. (2014) Public Financial Institutions and the Low-Carbon Transition: Five Case studies on Low-Carbon Infrastructure and Project Investment, OECD publication, Paris

4.3 Mapping policy tools and instruments to the investment barriers identified

The barriers set out in chapter 3 provide a guide for where action from policymakers is required to enable increased low-carbon investment from institutional investors. Combining these findings with the policymakers financial sector toolbox set out in Table 4.1 above, the table below map the barriers to the relevant policy tools and instruments for policymakers.

Table 4.2 Mapping remaining barriers to key enablers for policymakers

Barrier type	Barrier	Area for policy intervention	Key enabler for policymakers
Availability/liquidity	Low volume of climate investment opportunities	Increasing green bonds and other climate investment opportunities	Demonstration issuance, credit enhancement, securitisation, standards, technical support, making climate-friendly assets eligible in covered bond regulations
Risk-Return	Credit risk (including technology and performance risk)	Tools to reduce climate investment risk	Providing public finance credit enhancements, demonstration issuance and investment, technical support
Risk-Return	Policy risk	Tools to reduce climate investment risk	Policy risk insurance
Transaction costs	Small scale of climate projects, securitisation potential solution but they are also barriers to securitisation	Support aggregation and securitisation	Support green securitisation: standardisation of contracts, warehousing/aggregation, asset-purchasing programmes, technical support
Transaction costs	Lack of standards and disclosure	Harmonise standards and disclosure	Support market-led disclosure initiatives and standards development and the dissemination of standards once developed.

[Source: Ftf]

The areas for policy intervention identified in the table are now explored in turn.

4.3.1 *Increasing green bonds and other climate investment opportunities*

Challenge: The first step to mobilise investment from institutional investors is that they need to have various channels to gain exposure to climate-friendly product. As set out in chapter 4, channels exist across asset classes, but barriers remain to making these channels large, mainstream, and easy to discover and invest in. Like for growing any nascent market, the challenge can be seen as both a demand and supply side challenge: policymakers can support both on the demand side – buying products, providing a pull factor for product to be put to market – and on the supply side by directly providing product to the market and technical support for market actors to provide product (push factor). The demand side challenge includes demonstration of the financial and technical viability of different types of investment structures. Public institutions can help address by taking a cornerstone investor role in certain demonstration projects and deals. This challenge is not a low-carbon specific challenge; it is the challenge of growing a new market.

Technical development: The developments here can be divided into demonstration issuance, demonstration investment (cornerstone investor) and technical assistance. These tools for PFIs to enable the growth of new markets and investment structures are not new, or specific to low-carbon investments. The technical development needed is how to apply existing tools and instruments to low-carbon projects. One key actor in this space is the European Investment Bank.

Market response: a certain level of market response is evident without policy support. As mentioned, institutional investors are increasingly committed to addressing change with their investment. In the context of COP21 in Paris this year there's been a proliferation of increasing commitments. Where climate related investment products are available — that are also financially attractive — investors are following commitments with actions. Witness for example the rapid growth of the green bond market, where the demonstration effects of climate related bond issuance by the European Investment Bank and the World Bank has led directly to a blossoming of a corporate green bonds market.

Public financial institutions and national development banks have a number of means of promoting or leveraging private sector investment. This PFI investment in climate-friendly financial products can also have a "halo effect." This means that the involvement of a PFI with a good reputation in a deal by extension gives the deal an improved reputation as well.[129] The effect of this is that institutional investors can be willing to take on a higher risk than they would normally accept. However, it is worth noting that many institutional investors have strict risk restrictions of the investments they are allowed to select, which can imply the halo effect becomes less impactful in guiding their investments. The halo effect of the European Investment Bank was for example reportedly seen with the Castor Gas Project, one the projects financed by the Project Bond Initiative.[130] The Project Bond Initiative itself has had a demonstration effect by making institutional investors more alert to the opportunities of investing in infrastructure.[131]

Role of policy: Policymakers can harness and build on the commitment seen from investors in the context of Paris. Policymakers in Europe can ensure that the different commitments are aligned and that they'll push in the same direction.

[129] http://www.eib.org/attachments/ev/ev_regional_development_en.pdf
[130] http://ec.europa.eu/dgs/economy_finance/evaluation/pdf/mid_term_eval_pbi_pilot_phase_en.pdf
[131] Ouaki (2013): Connecting Europe – Infrastructure Investment strategies, DG Mobility and Transport. 27 November 2013. Available from: http://inea.ec.europa.eu/download/events/2013PPPworkshop/presentations/3ouaki.pdf

Policymakers can also take a more direct role in providing climate-friendly financial products. The EIB has been involved in the development of the green and climate bonds markets through demonstration issuance; the associated slow expansion of issuance provides an example for other potential issuers, in particular showing up the scale of investor demand. Other EU lending institutions issuing bonds can be encouraged to support the fledgling green bond market. For example, bonds from Eurofima to fund rail investments could help support a sense of liquidity in the green bond market if they had some minor adjustments to address the reporting requirements green bond investors require.

In addition to direct demonstration issuance of climate-friendly financial products, as the EIB has done with green bonds, PFIs can take on a similar demonstration role on the demand side by becoming a cornerstone investor in climate-friendly deals suitable for institutional investors. For example, KfW, the German development bank, has done this. This provides a signalling effect that attracts private investment by showing institutional investors the viability of certain investment structures for low-carbon projects by setting an example to follow. In addition to the EIB, the UK Green Investment Bank has taken such an investor role in refinancing large-scale renewable energy projects in the United Kingdom.

The demonstration effect appears to be particularly significant in relatively new investment areas within the low-carbon investment area. There can be overlap with this PFI investment positioning and the risk-reducing role of government and PFIs set out in the next section, as investment structures can mean the cornerstone investor positioning of the PFI reduces the risk for other private institutional investors.

In addition to demonstration issuance and investment, PFIs can use existing expertise to provide technical assistance and project appraisal support to project developers and other actors to improve the preparation of a robust project pipeline for institutional investors to pick up. A recent, non-European example is the IFC setting up a function for climate-friendly investment where entities looking for finance can get advice on the support IFC can offer on climate-friendly investment, simplifying the process. This technical support connects to the role of PFIs in addressing low-carbon risk (see next section). The IFC also has now a dedicated officer assigned to developing green bond markets in developing countries.

PFIs should explicitly include low-carbon and climate-related investment and finance as a priority action for these institutions. Formal mandates will structure both the institutions' priorities as well as performance assessment, thus prioritising low-carbon activities. This can be seen in the case of the EIB, which has a clear mandate from its Member State stakeholders to invest 25% of new annual finance commitments in climate-related projects.

The EU and Member States typically play a role in establishing eligibility criteria of projects to be financed both under traditional programmes and mechanisms as well as through low-carbon targeted instruments. Aligning these criteria with climate objectives has the potential to expand both traditional and targeted financial flows. EU lending institutions should also adopt an energy lending criteria such as the EIB's Emissions Performance Standard of at least 550g/kwh required for energy projects. This, for example, de facto excludes any new financing of coal projects that do not have functioning carbon capture and storage systems by the EIB.

The EIB and national public financial institutions may, however, be limited by the capacity of the local private banking networks to absorb and channel financial flows to projects. Therefore, actions to improve national financial systems can improve the ability of PFIs to partner with commercial banking networks for targeted programmes.

Finally, EU Competition and State Aid regulations may, if not properly calibrated, limit the ability of these institutions to support investment and provide financing for low-carbon sectors subject to market failures. Given that PFIs administer public support programmes for targeted sectors, ensuring that State Aid rules are both in line with EU-long term climate and energy policy objectives and are clearly formulated to maximise their potential as guiding policy signals is an important element to support national programmes targeting private actors and investors.

4.3.2 *Tools to reduce investment risk: addressing climate investment risk*

Challenge: In the current environment, low-carbon investment is seen as high-risk (section 4.2.2), which can restrict access to capital; increase cost of capital and/or limit debt tenor.[132] There are market driven responses addressing some of the risks of low-carbon investment. Particularly performance risk and technology risks are addressed to a certain extent by market-provided guarantee mechanisms.

Credit risks historically were, addressed by monoline insurance providers, but these have largely disappeared since the financial crisis. While there is currency and political risks that apply to all investments, not just low-carbon, many low-carbon investments are capital-cost disadvantaged by their paucity of credit history, especially at the scale being deployed in Europe and elsewhere, and by the perception of significant *policy* risk.

Potential renewable energy investors, for example, cite a perception that governments might at any time retrospectively change feed-in tariffs as a reason to be very cautious with renewable investments; governments on the other hand argue that this risk is now negligible as the financially unsustainable schemes in the EU were revamped some years ago.

If policymakers wish to see a rapid growth in financing of such investments, credit support will be required for a transitional period to ensure capital costs are at least equal to competing fossil fuel investments with their long credit histories. Policy led risk reduction is however not intended as a permanent solution. A credit support tool to bridge this *perception* gap would be a Member State backed policy support risk guarantee product. That would allow investors to own a redeemable instrument to cover their sense of risk.

Technical development: Although there are numerous examples of policies in the real economy to improve the risk-return of low-carbon investments, there are few examples of financial tools and instruments, i.e. credit enhancements and financial investor incentives, implemented specifically to this end. One example are guarantees specific to climate-friendly assets put in place by the US development finance institution, the Overseas Private Investment Corporation (OPIC), in September 2014, to credit enhance bond issuance from a solar project in Chile.[133] However,

[132] Mostert, W. (2012). Institutional Experiences with Public Finance for Renewable Energy

[133] http://www.whitehouse.gov/the-press-office/2014/09/23/fact-sheet-president-obama-announces-new-actions-strengthen-global-resil

there are many tools and instruments policymakers use to improve the risk-return ratio of investments in other areas, and so the only technical development that is required is how to apply existing tools and instruments, such as tax incentives and credit guarantees, to low-carbon projects. A less established tool is to develop an insurance scheme to underwrite the risk of retroactive policy changes made by governments to address the public/private risk perception gap.[134].

Market response: It is necessary here to distinguish between: credit enhancements that lower risk achieving improved access to institutional investors; and credit enhancements that permit a lower cost of capital. To improve access to institutional investors, investors need to view the credit enhancement mechanisms put in place by public actors as credible, following the points made above about policy risk. As the institutional investors with limited experience on the financial risk of low-carbon investments will rely heavily on credit rating agencies in their decision-making, credit enhancements measures need to be targeted at and developed in consultation with credit rating agencies.

To see market demand for the credit enhancement schemes from the issuer side, the increase in credit rating, and subsequent increased access to institutional investors and potential reduction in cost of capital, must be sufficient to at least cover the fees required to obtain credit enhancement. Although guarantees can increase access to capital, market demand for support schemes is often hampered by a failure of credit support schemes to reduce cost of capital due to PFIs providing credit support at commercial rates that do not deliver net savings for bond issuers. However, evidence from the EIB suggests that there are several cases where the PBI has led to a lower cost of capital.

To ensure an impact of the credit enhancement goes beyond access to investors to reduce cost of capital, policy makers must engage banks, institutional investors and credit rating agencies on how the improved rating impact on interest rates and investment appetite respectively. Anecdotal evidence from the market suggest credit enhancement initiatives could have a positive impact on climate-friendly investments: Aviva, asset manager and insurance company with EUR300bn of assets under management, has suggested using credit enhancement tools to grow the green bond market as part of the sustainable Capital Markets Union.[135]

Role of policy: To date, there are limited responses from policymakers in terms of financial sector policy, tools and instruments to mitigate credit risk for investors – public institutions in particular can play a role here. There are responses by public institutions to mitigate risk in other investment areas such as SMEs and infrastructure that can be applied, with modifications, to low-carbon investments. The risk can be mitigated either by reducing risks, by providing investor incentives to compensate for the risk.

The use of the existing EU budget and financial instruments was explored by IEEP in their 2013 report, including the existing Project Bond Initiative.[136] The role of the public sector in addressing low-carbon investment risk is to credit enhance climate-friendly products for institutional investors to reduce their

[134] Climate Bond Initiative, Climate Policy Initiative (2012). "Renewable Energy Policy Risk Insurance: a way forward.". Report from roundtable held at Bank of America Merrill Lynch (BoAML) on 27 June 2012, London. Note that this differs from political risk insurance, which addresses discriminatory behavior by governments.
[135] Aviva (2014) Sustainable Capital Markets Union Manifesto
[136] IEEP (2013) Optimal Use of the EU Grant and Financial Instruments in the Next Multiannual Financial Framework to Address the Climate Objective. Institute for European Environmental Policy. Report DG CLIMA.A.2/ETS/2012/0002r.

risks and provide assurance for investors that these support policies are stable. Additionally, banking regulators can assign preferential risk weights to climate-friendly assets: This provides an incentive for banks to originate more climate-friendly products, which again filter through to institutional investors' exposure to climate-friendly investments (box 3.1). The public sector can also play a role in encouraging private finance solutions that emerge to reduce risks, and ensure knowledge transfer of these across both public and private actors in the EU. Although outside the scope of this report, it is worth reiterating that policies in the real economy, such as feed-in tariffs, can also play an important role to improve the risk-return profile for investors, complementary to the instruments and tools proposed in the financial sector.

In terms of direct credit enhancement from PFIs, there are several tools that apply:

Guarantees: In addition to loan guarantees at the project finance stage, PFIs can provide partial-risk guarantees at the bond issuance stage (often called "wrappers"). This implies they lend their credit rating to the project. The European Union has most often used full guarantees with its support programmes; partial guarantees have the benefit of extending the reach of limited public sector capacity, leveraging a greater amount of private capital. Multinational development banks such as the IFC have made extensive use of the tool. An example of the use of partial guarantees that would be relevant to renewable energy financing is providing partial guarantees to contingent cost overrun facilities, a structure that has been used in the oil sector.[137] In addition to credit guarantees, PFIs can also provide liquidity guarantees to facilitate the extension of debt tenor. While most applicable to bank lending, it is also relevant for institutional investors. Liquidity guarantees can be structured so that the PFI guarantees payment of the outstanding debt payments in the latter years of the tenor beyond what the institutional investors are willing to offer. [138] Liquidity guarantees can become a more attractive instrument with the increased capital requirements under Basel III decreasing debt tenor.

Subordinate equity or debt (accepting losses before private investors): PFIs can invest in a project or portfolio, and take the position of accepting loss before private institutional investors. By the PFI taking a lower position in the repayment pecking order (a subordinated equity or debt position), the parts of the investment that sits above the PFI in this pecking order (senior equity or debt) is protected from losses to a certain extent, which makes this part of the investment lower risk and can be issued at a higher rating. This can be necessary to attract private institutional investors in a transition phase to certain low-carbon investments, to meet institutional investors' risk-return requirements they are bound to comply with.

This instrument is used under the Project Bond Initiative of the European Commission and the EIB (Box 3.6) where the EIB takes a subordinate debt position.

An example of a subordinate equity position from the EU budget and the EIB is the European Energy Efficiency Fund (EEEF), a public-private partnership initiated by the EC. The fund aims to attract institutional investors with different risk-return profiles by incorporating a layered structure of payments (waterfall structure).[139] EUR125m of EU budget funds was injected as risk capital (junior tranche) in addition to initial mezzanine tranche investment from the EIB, CDP[140] and Deutsche Bank.

[137] Mostert, W. (2012) International Experiences with Public Finance for Renewable Energy
[138] Mostert, W. (2012) International Experiences with Public Finance for Renewable Energy
[139] http://www.eeef.eu/shareholder-structure.html
[140] CDP is a joint-stock company with the Italian government as majority shareholder

The EIB and CDP also invest in the senior tranche of shares. This multi-layered structure of payment and risk exposure protects the super-senior tranche of notes, which therefore has a low enough risk to attract institutional investors.[141] Such a layered structure ensures that unnecessary risks are not taken and that the public sector absorption of risk does not incentivise poor private sector management. Moreover, when the public sector takes an investment position, rather than providing a grant, there is an opportunity for government to obtain returns as well if the investment does not default. For example, the UK government recently sold their stake in a renewable energy company they invested in in 2013 to make the investment more attractive to the private sector: the government made a profit of GBP51.75m. [142]

Insurance: A climate-friendly monoline would be a government, or multi-government, supported enterprise that insured climate-friendly securities. The potential role of the public sector in providing support here has increased after the financial crisis, as the private monoline insurance companies that used to provide insurance to credit enhance renewable energy bond issuances saw a reduction in their own AAA-ratings and could therefore no longer provide the necessary level of insurance.[143] The monoline insurers guaranteed payment of interest and principal in the event of default. The reduction in monolines provided one of the rationales for the development of the EU PBI, and influenced how the PBI was structured (see box 4.2). While the use of monoline insurance is now more limited than the other risk-reducing tools in the climate-friendly space, some initiatives are emerging. One such climate-friendly monoline venture, AMF, is currently being developed with a mixture private and public sector capital. Insurance would be especially useful in the higher interest rate environments of developing countries. In addition to climate-friendly monoline insurance, resource insurance is a relevant tool for renewable energy technologies whose cash flows are dependent on fluctuating resources, such as wind and solar; however, there is less need for PFIs to provide this, as there are commercial alternatives available.[144]

Policy risk insurance: [145]An EU wide policy risk insurance scheme could address the policy risk that is currently a barrier to investment. This follows the principle that the risk should be taken by those actors who have the best capabilities to influence the origin of the risk. For policy, that is policymakers not investors, the scheme could take the form of co-insurance, in which participating governments would cover the risk of national policy changes by their own administrations that adversely affect investors - specifically retroactive changes. Investors that suffer losses would be compensated from the insurance pool of Government contributions and investor premiums, to be managed either by a multilateral institution, a private (re)insurer or both. In designing the scheme, it will be essential both to convey the benefits to host governments, playing to the political important role of pension funds, to ensure that uptake will be extensive; otherwise the risk-pooling benefits of an insurance scheme will be lost. In order to mitigate moral hazard, the scheme will adopt one or more approaches common in the insurance industry - e.g. host government pays excess or a penalty for claims to ensure that governments are dis-incentivised from making policy changes that may result in material losses for

[141] http://bpie.eu/uploads/lib/document/attachment/88/Case_study___European_Energy_Efficiency_Fund_-_Zarpana_Signor__Deutsche_Bank__.pdf
[142] https://www.environmental-finance.com/content/news/bis-sells-cornerstone-stake-in-greencoat.html?utm_source=fri206na&utm_medium=email&utm_campaign=alert
[143] Mostert, W. (2012). International Experiences with Public Finance for Renewable Energy
[144] Ibid.
[145]DECC (2014). Policy risk in renewable energy investments in developing countries: a study by Cambridge Economic Policy associates for the department of energy and climate change (DECC).
Link: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/380928/DECC_PRI_FINAL.pdf

investors in climate-friendly projects. While policy risk insurance is a relatively unproven policy tool one example that has implemented policy risk insurance is the US government's Overseas Private Investment Corporation (OPIC); they provide policy risk insurance relevant to low-carbon investments, e.g. that covers material changes in feed-in-tariffs, under their political risk insurance.[146]

The risk-reducing tools and investor incentives best placed to leverage private investment varies by project and company, implying that a facility with the mandate to choose which instrument to use on a project-by-project basis would be valuable. This is being done by the newly launched European Fund for Strategic Investments (EFSI), which envisages provision of a range of financial instruments: subordinated debt, equity, loans and guarantees.[147] The Fund's mandate is for wider infrastructure investments, which means it also includes renewable energy and energy efficiency as investment areas alongside other priorities. However, in order to make best use of the funds, it is recommended that the EFSI prioritises low-carbon investments through a robust definition of such investments in its investment guidelines.

4.3.3 *Support aggregation and low-carbon securitisation*

Challenge: Many low-carbon investments have a relatively small-scale and fragmented nature making them less attractive to institutional investors who typically look for larger investments. The challenge of investment size and fragmentation occurs at different levels of scale: At one end, there are residential and small commercial loans for distributed renewable energy or energy efficiency. Additionally, without aggregation, banks or other loan originators do not have the means to involve institutional investors in the financing process and free up capital for further investment. At the larger end of the scale, there are utilities and project developers with larger scale renewable energy assets, such as wind parks and solar farms. Even at this large scale, the assets individually are often too small for institutional investor interest. Typically, about EUR100m is the minimum size institutional investors will be interested in.[148] Only about EUR500m and above is considered benchmark issuance. For debt, it is also worth noting that the challenge of investment size varies by market: The requirements for size are smaller in the private placement market than in the public debt market.

Technical development: Since the challenge related to size varies by different entities, as set out above, there are also different technical developments necessary to address the issue. For utilities and project developers, where the asset scale is larger, there are several options to address the sizing issue. Individual utilities can spin off their safer assets, which have entered the operation phase, into a yieldco, a publicly traded company, which then owns the assets and the cash flows produced from these. This allows the utilities to get these operational assets off their balance sheet - with certain risk-retention required to incentivise prudential origination of assets - while still obtaining the electricity output from the assets through long-term power purchase contracts. For a more in-depth discussion on yieldcos see Box 3.4.

Utilities and developers can also issue climate-friendly asset-backed securities, either in the public or private markets. In addition, groups of utilities can also issue mini bonds, and subsequently issue asset-backed securities backed by the bonds (see Box 3.8) – whether this model would be suitable for project

[146] http://www.opic.gov/what-we-offer/political-risk-insurance/types-of-coverage/regulatory-risk
[147] http://ec.europa.eu/priorities/jobs-growth-investment/plan/docs/factsheet2-where-from_en.pdf
[148] The Challenge of Institutional Investment in Renewable Energy (2013). Available at: http://climatepolicyinitiative.org/wp-content/uploads/2013/03/The-Challenge-of-Institutional-Investment-in-Renewable-Energy.pdf

developers in the private sector is unknown, as there are no examples in the market. Technical development is not necessarily required to see growth in these solutions; however, it is worth noting that all these solutions are most suitable once the assets have reached the operational, less-risky phase.

There are more technical developments needed to scale securitisation of green loans, the climate-friendly assets at the smallest end of the spectrum. Issuers can be project owners, rooftop solar leasing and consumer loan companies, and banks holding portfolios of qualifying loans. Securitisation transforms the pool of smaller-scale, homogeneous assets such as mortgages – or in the climate-friendly space, energy efficiency loans for example - into more tradable securities. Subject to standard loan agreements, securitisation can be a good fit with renewable energy projects, as after their construction, they typically have a stable income profile. Energy efficiency loans can be backed by monetising the stable energy savings they provide, as done in Energy Service Company (ESCO) contracts, or simply by standard equipment leasing agreements. The standardised assets will then be aggregated in a special asset holding entity called a warehouse. Such standards on loan agreements and other contracts related to the asset performance do not yet exist in the market. The development of these standards comes in addition to the development of definitions of what qualifies as climate related investments.

Another complication, also applicable to securitisation by utilities, is that utilities, developers, banks or others might not have adequate renewable energy or energy efficiency asset books to support repeated issuance of green ABS. Shared warehousing solutions would address this problem by allowing the pooling of relatively modest pools of climate-friendly assets across different entities. For both types of ABS, credit enhancement might be necessary, in a transition period, to improve the risk-return profile of green securities, to fit institutional investors' mandates.

Market response: For utilities' climate-friendly assets, the growth in use of yieldcos generally is expected to continue without new policy support, however, the yieldco market is Europe is smaller than in the US, and no utilities in Europe, only developers, have made use of the structure to date. Market development for ABS backed by aggregated mini bonds is uncertain without policy support, as there has only been one example of this structure in the European market, and this issuance had policy support with EIB taking the role of majority investor, as explained in detail in Box 3.8.

For green loan securitisation, in the US, some progress has been with the securitisation of solar rooftop loans and leases, with asset-backed securities having been issued by SolarCity and HannonArmstrong. An industry working group, chaired by the US Government's National Renewable Energy Laboratories, is developing and promoting standard terms and contracts for solar loans. This could be emulated in Europe. The US has also seen securitisations of energy efficiency loans, facilitated by existing Property Assessed Clean Energy (PACE) legislation, however, no such supporting legislation exist in Europe under the leadership of the European Commission. In terms of private placement as a financing avenue for smaller investments, work is also underway to support the growth of a private placement market in Europe, both in the market (documentation templates under development by ICMA and the Loan Market Association) and by policymakers (e.g. European Commission 2014 study Capital Markets Union proposal).

Role of policy: For PFIs and dedicated green banks, there is a role to facilitate aggregation of loans. Public aggregation facilities (warehouses) can also play an important role in driving standardisation of contracts and features of loans by setting out minimum requirements for securitisation. The PFI could do the warehousing directly, or the PFI could collaborate with private warehousing offerings. An example of this is offered by the New York State Green Bank, which is providing credit to a warehouse for energy efficiency loans set up by CitiBank and Renewable Financing. Covered bonds can be supported by explicit legislation and regulations governing the security; or they can be bonds issued in the absence of explicit covered bond legislation but instead reliant upon general laws (such as contract law). It will be necessary to create a consensus on what type of assets will be eligible and how these will be managed. It includes agreeing which institutions could issue covered bonds, if any, apart from banks; identification of regulatory authorities; agreement on loan-to-value ratios; cover pool management standards; requirements for enforceability. Regulators could treat climate-friendly securities and covered bonds differently for capital ratio purposes. PFIs can also play a role in credit enhancing ABS to ensure that it complies with the risk-return requirements of investors.

These reforms fit very well into the existing regulatory and policy initiatives (Table 4.3). For example, in early 2014, the European Central Bank and Bank of England published a joint report, "The case for a better functioning securitisation market in the European Union".[149] A challenge to note, however, is that there are no overarching actors or regulations for asset-backed securities or covered bonds in the EU. Relevant actors for securitisation regulation and policy EU level include EC, ECB, European Systemic Risk Board, European Supervisory Authorities (EBA, EIOPA, ESMA).[150]

[149] Bank of England/ ECB (2014). The case for a better functioning securitisation market in the European Union, A Discussion Paper
[150] http://www.ecb.europa.eu/press/key/date/2014/html/sp140611_1.en.html

Table 4.3 Regulatory changes and policies around securitisation in the EU

Policy/regulation	Description
EC: Solvency II; Capital requirements for insurance and re-insurance companies (decision made October 2014)[151]	Decision made to have lower capital requirements for high-grade securitisations, equivalent to unrated loans (3% risk factor). This is significantly lower than initially proposed in EIOPA's recommendations. [152]
ECB: Purchases of ABS and covered bonds (decision made September 2014)	Announced that the ECB will 'buy outright ABS, the senior tranches, and the mezzanine tranches only if there is a guarantee'. The definition of 'High Quality Securitisation' is necessary to be added in the European regulation, along with a differentiated and beneficial regulatory treatment.[153]
EC: Application of Basel III Liquidity Coverage Ratio in the EU (original deadline June 2014, decision made October 2014)[154]	The EC has adjusted High Quality Liquid Asset classifications of covered bonds, more specifically ECAI 1 covered bonds are re-classified as tier 1, ECAI 2 covered bonds are classified as level 2a. This implies these categories of covered bonds can account for a larger share of bank's liquidity buffers than proposed under Basel rules. Moreover, ABS from a wider range of assets is included as High Quality Liquid Assets (auto loans and leases, small business loans and consumer debt, in addition to Basel's proposed mortgage backed securities).
ESMA: Disclosure of transaction and performance information (timeline not known)	Further disclosure of transaction and performance information is envisaged. May also be scope for standardisation of prospectuses and reporting for investors.[155]
Capital Markets Union	Boosting high-quality ABS market

[Source: FtF]

The underlying role of industrial policies applies also to yieldcos. The policy support for yieldcos is slightly different than the support for asset-backed securitisation. To address the challenge of limited book size of relevant assets at the individual entity level, instead of warehousing, development banks or green investment banks could play a role to connect yieldcos with sustainable energy projects that are smaller than utility scale but larger than residential to increase the yieldcos' potential asset pools. This would also address the concern that transferring a large share of stable cash generating assets from the parent company to a yieldco is detrimental for the parent's credit profile.[156] In the place of credit enhancement, policymakers can make low-carbon yieldcos more attractive by allowing accelerated depreciation, to reduce the yieldcos' income tax liability.

[151] http://europa.eu/rapid/press-release_MEMO-14-578_en.htm?locale=en
[152] http://www.reuters.com/article/2014/08/13/abs-regulations-insurance-eu-idUSL6N0QJ2WD20140813
[153] http://uk.reuters.com/article/2014/09/12/uk-ecb-abs-idUKKBN0H712H20140912
[154] http://europa.eu/rapid/press-release_MEMO-14-579_en.htm
[155] http://www.bankofengland.co.uk/publications/Documents/news/2014/paper300514.pdf
[156] https://www.moodys.com/research/Moodys-YieldCos-Typically-Credit-Negative-for-Bondholders--PR_286254?WT.mc_id=NLTITLE_YYYYMMDD_PR_286254

4.3.4 *Harmonise standards and disclosure of climate-related investments*

Challenge: Investors currently do not have ready access to information about what are climate mitigation or adaptation investments (beyond solar and wind energy), the relative carbon efficiency of different investments. Ease of access to data is an important means of reducing friction in investment decision-making and ensuring the flow of capital. Data frameworks are disconnected from the investor needs.[157] For example, investors from ACTIAM to Zurich Insurance have been calling for common standards around green definitions and reporting to grow the market. For policymakers, a lack of metrics means they are unable to easily set targets and develop associated incentives and verification.

Another related challenge, which will be addressed in chapter 6, is how the low disclosure levels in capital markets and lack of metrics of climate makes it difficult to then assess the carbon and climate risk in institutional investors' portfolios.

Technical development: To date, the climate-friendliness of assets is usually defined relative to its GHG-emissions with the associated methodological shortcomings. Developments by organisations such as the Climate Bonds Initiative with its taxonomy of the low-carbon and climate-resilient investments and CDP with its company-based carbon and water risk disclosure are seeking to close the gaps. At the company level, in addition to providing investors with data on emissions and another mitigation factors, it is increasingly important to investors to have disclosure on adaptation measures. This is particularly important in the water utilities sector, agriculture and infrastructure.

Market response: There are different approaches in the market to define climate-friendly investment. One approach is to define climate-friendly at the company level. This is the ESG approach used particularly in the equity space. Another approach that is increasingly being used in fixed income is to focus at the asset level rather than the entity level. This is that the approach used in the green and climate bonds market.

The Climate Bond Standards Scheme, backed by investors representing US$34 trillion (EUR31 trillion) of assets under management, is developing standard definitions for this market. For carbon disclosure at the company level, the Carbon Disclosure Project is the global entity collecting and providing data to the market.

While they are not sufficient on their own, market responses have a role. The first relates to the road testing of metrics by climate-friendly investors, leading to improvements and creating demonstration effects. A second area relates to the voluntary commitments articulated in the context of COP21 in Paris by asset owners, where climate performance metrics can help quantify these commitments. Finally, available data can be used by index providers to develop vehicles for investors to track a particular market or theme, an important step in attracting the large pools of passive capital available.

The next stage of development is adoption at a regulatory level: for example, the United Kingdom has already moved to making carbon disclosure mandatory at a company level.
What is perhaps missing in the market is policy support to ramp up these market initiatives.

[157] 2° Investing Initiative (2014). Carbon and climate-related data needs for investors.

Role of policy: Policymakers can support and promote suitable industry standards and measurement activities, can promote the adoption by Member States of mandatory measures as appropriate and can contribute actively to the development of harmonised measurement and disclosure standards across the EU and with other countries.

Due to the normative power the EU has globally, the uptake of standards, metrics, and disclosure in the EU would be expected to influence developments elsewhere, particularly in emerging markets. Policymakers' engagement with the private sector, in the context of COP21 and otherwise, can help to deliver increased uptake of the metrics by market actors. Finally, policymakers can use climate performance metrics as the basis for developing targeted climate-related incentives for institutional investors.

4.3.5 Balancing climate policy benefits and larger financial market distortions

A common response to proposals to preference climate related investments is that this would introduce market distortions and significant risk transfer between private and public actors. However, significant market distortions already exist in favour of high carbon investments in terms of various hidden subsidies, notably the absorption of the cost of carry of fossil fuel induced environmental damage by the broader society, and in terms of capital markets regulation prioritising shorter term investment at the expense of longer term climate-friendly investments for stability reasons when long-term economic stability is intrinsically tied to long-term environmental stability.

Europe is faced with an enormous challenge to rapidly shift its economy to a low-carbon - and climate-resilient – footing while ensuring economic development that effectively addresses the needs of its citizens.

As reports such as from the New Climate Economy[158] show, this is not a choice of achieving one or the other. Rather, economic prosperity is intimately tied to the job creation and stimulatory investments needed for energy efficiency in property, for climate-friendly infrastructure and for clean energy with its high employment ratios compared to more traditional energy generation activities.

Investment and capital markets have always been subject to regulation and management for policy purposes. The challenge now is to revamp that regulation and management in the EU to ensure it is fit for purpose to deliver both the EU's climate goals and economic goals.

[158] http://newclimateeconomy.net/

5 Short- to medium-term action plan: Matching supply to existing demand

Based on the mapping of barriers and corresponding policy enablers, an action plan for EU policymakers has been developed. The action plan should be read as a basket of complementary actions, not a menu of alternatives. An overview of the actions and how they fit with the categories of barriers and enablers is provided in Table 5.1 below. The action plan aims to be relevant and provide recommendations that are a good fit with on-going financial policy changes – in particular the Capital Markets Union (Box 5.2) and the Investment Plan for Europe (Box 5.3).

Table 5.1 From barriers to enablers to actions

Barrier type	Barrier	Area for policy intervention	Key enabler for policymakers	Actions
Availability/liquidity	Lack of volume of climate investment opportunities	Scaling green bonds and other climate investment opportunities	Demonstration issuance, credit enhancement, securitisation, standards, technical support, making climate-friendly assets eligible in covered bond regulations	1. Increase the volume and acceptance of climate-friendly demonstration issuance, investment and technical support
Risk-Return	Credit risk (including technology and performance risk)	Tools to reduce investment risk	Providing public finance credit enhancements, demonstration issuance and investment, technical support	2. Building on existing credit enhancement initiatives; Investment Plan, European Fund for Strategic Investment, Project Bond Initiative, SME Initiative.
Risk-Return	Policy risk	Tools to reduce investment risk	Policy risk insurance	3. Explore the potential of policy risk insurance
Transaction cost	Small scale of climate projects, securitisation potential solution but they are also barriers to securitisation	Support aggregation and securitisation	Support green securitisation: standardisation of contracts, warehousing/aggregation, asset-purchasing programmes, technical support	4. Support green securitisation; development of standards for climate-friendly assets (green bond standards) as well as standard loan contracts for the climate-friendly assets, warehousing, credit enhancement (SME Initiative model, REPIN)
Transaction cost	Lack of standards and disclosure	Harmonise standards and disclosure	Support market-led disclosure initiatives and standards development and the dissemination of standards once developed.	5. Accounting and disclosure of companies and financial products

[Source: FtF]

5.1 Action #1: Increase the volume and acceptance of climate-friendly financial products

Challenge to address: There are limited investment channels for investors that offer simple discovery of climate-friendly investments. On the equity side, climate-friendly indices are still a niche product that is typically not attractive to mainstream investors. Climate-friendly investments are not well represented on cap-weighted market indices, which many equity investors rely on. Yieldcos, publicly traded companies that formed to own operating assets that produce a predictable cash flow, are a potential channel for climate-friendly investment that has emerged in the last few years. However, that market has grown mainly in US, not Europe.

On the fixed income side, green bonds offer an opportunity for investors around easily discoverable, climate-friendly products; however, the overall market size is still a small share of the overall bond market.

General idea: Policymakers can support the provision of different climate-friendly financial products for institutional investors, particularly green bonds. The main tools available to do this are:

- Demonstration issuance to grow the market and provide liquidity to new climate-friendly financial products
- Demonstration investment (anchor investment) to provide assurance for investors that new climate-friendly financial products are commercially viable. This can also provide a halo effect, as the stellar financial reputation of PFIs improves the reputation of an investment deal
- Technical support to educate suppliers of climate-friendly financial products and institutional investors
- Regulatory support for green securitisation and for green covered bonds.

Activities proposed (for EC unless otherwise noted):

a. European public financial institutions (e.g. European Investment Bank and EBRD) can educate and develop the market and demonstrate their support for climate-friendly financial products, e.g. by issuance of green bonds. The EC and EIB should also encourage other EU actors, such as Eurofima, to do the same.

b. **Support private finance innovations to reduce risks of low-carbon investments** by putting in place knowledge-sharing platform to spread the use of successful structures, both across member states and outside the EU. This would complement the provision of public finance credit enhancements.

c. **Expand EIB and other European PFIs' role as cornerstone investor for new structures in the low-carbon investment area to provide proof of concept** as a way of supporting private finance innovations. This is something EIB is already doing, but a preference for low-carbon investments should be considered to ensure relatively stronger support for these.

d. **Integrate low-carbon-specific advice in existing and proposed technical support mechanisms**, e.g. in the Investment Hub proposed under the Investment Plan for Europe.

e. **Include advice and technical support on green bond issuance at the municipal level**, for cities and city-affiliated entities such as utilities, in existing technical support programmes providing advice on how to raise finance for municipalities and cities, such as the JESSICA and ELENA programmes.

f. **Include sessions on low-carbon investment opportunities in workshops on investing in Europe proposed under the Investment Plan for Europe**, to be held jointly by the EC and the EIB at the national, transnational and regional levels.

g. **Convene EU covered bond regulators to explore the development of green mortgage backed covered bonds and the future inclusion of renewable assets in covered bond regulatory frameworks**. While the rules governing covered bonds vary by Member State[159], the European Banking Authority does have indirect influence on national level legislation for covered bonds: for example the EBA expects its recommendations for best practice guidelines for covered bonds to be considered in changes to national legislation on covered bonds.[160] The EC should work with the EBA to integrate issues related to green covered bonds in their next best practice guidelines, including:
   - The EC can commission a study to validate findings from recent research reports in the US, which have found evidence for differential valuation performance of energy efficient homes.[161] If confirmed, work with banks and regulators to see differential performance reflected in differential mortgage rates, either through bank loan valuation mechanisms or through regulatory measures around capital ratio risk weighting of different assets.
   - Expand the rules for covered bond markets to increase the issuance of green covered bonds. As climate related asset pools grow, convene Member State discussions about the potential to bring such assets into national qualifying criteria for covered bond pools.

Overall assessment: This action area is considered to have a limited additional impact on the EU budget, as many of the activities focus on including support for climate-friendly investments in existing programmes and schemes.

5.2 Action #2: Building on existing credit enhancement initiatives

Challenge to address: Lack of investment from institutional investors due to high risk, perceived or real, is a challenge for wider infrastructure investments in Europe. This is particularly true post financial crisis, as the private monoline insurance providers that previously provided credit enhancements for infrastructure investments are no longer providing this. Within this context, climate-friendly projects are additionally often perceived to have an even more insufficient risk-return ratio to comply with institutional investors' mandates. Current initiatives by the European Union to mobilise private capital for investments - such as the Project Bond Initiative (PBI) (box 3.6) - are not incentivising the investments needed for a 2°C world to a sufficient extent.

General idea: The action area of building on existing credit enhancement includes (i) integrating with existing initiatives at the EU level by allocating a share of support to climate-friendly investments (ii) establishing new climate-friendly specific credit enhancement initiatives applying proven models, and (iii) encouraging both these actions to occur also at national level.

To address technological and commercial risks existing credit enhancement initiatives employed by the EIB have the potential to be an effective tool in leveraging public capital and credit ratings to access institutional investors' capital for low-carbon projects. The Project Bond Initiative model is particularly

[159] PGGM/ PFZW (2013) European Commission Green Paper Long-Term Financing of The European Economy [OFFICIAL RESPONS FROM PFZW AND PGGM]
[160] ECBC (2014): Covered bonds factbook. http://ecbc.hypo.org/Content/Default.asp?PageID=501
[161] UNC (2013) Home Energy Efficiency and Mortgage Risks

beneficial to increase the access to institutional investor capital for public-private partnership (PPP) infrastructure projects. To achieve credit enhancement of climate-coherent projects, the PBI itself should be adjusted to take EU's low-carbon policy targets into account in the project selection process. There are opportunities for the PBI to provide credit enhancement to low-carbon projects despite the restrictions that only TEN projects qualify, evidenced by the PBI being used to mobilise finance for the grid connection for the Greater Gabbard offshore wind farm in the UK. However, a more systematic integration of climate priorities is warranted given the current focus in the selection process on road infrastructure projects. If the EIB has a range of projects to choose from, low-carbon projects should be prioritised in the selection process.

The idea to adjust existing initiatives applying credit enhancement tools to prioritise low-carbon investment is also relevant for other initiatives than the PBI, particularly the recently announced European Fund for Strategic Investments. However, many of the credit enhancement initiatives in the EU are less tailored to institutional investors, with support focused on smaller scale, innovation investments and are therefore not relevant for this report. For example, the InnovFin programme of the European Commission, EIB and European Investment Facility (EIF), the successor of the Risk Sharing Financing Facility (RSFF) provides guarantees, in addition to loans and equity, however, these are offered to SMEs or to banks lending to SMEs and is not therefore designed to tap the institutional investors.

In addition to integrating climate preferences into existing initiatives, new credit enhancement initiatives specifically designed only for climate-friendly investment can be established using the models used under existing initiatives. For example, a Green PBI could be established.

Complementary to these actions at the EU level, the subordinated investment positions and guarantee tools used by existing initiatives such as the PBI and European Structural and Investment Funds should be studied to identify its potential adaptability for use by national public financial institutions to provide credit enhancements for low-carbon projects at a national level.

Activities proposed (for EC unless otherwise noted):

a. **Align the proposed European Fund for Strategic Investments with climate goals:** We recommend that the investment guidelines, that are under development for the Fund, set out a priority for low-carbon investments. This prioritising of low-carbon in particularly relevant for the ¾ of the fund that is intended to leverage long-term investments to avoid lock-in of high emissions infrastructure.
b. **Align the PBI with climate goals and expand the facility as a result:** We recommend that the PBI and associated project-selection criteria be reviewed by the EC and the EIB to align the implementation of the Connecting Europe and TEN programmes with European low-carbon development objectives. This includes bringing renewable energy into the investments allowed for credit enhancement (as recommended in the IEEP's 2013 report commissioned by the EC). This process could include earmarking a minimum percentage of funds (potentially aligned with the EIB's current activity-wide 25% climate action objective, or up to 50%) that must be used for renewable energy, sustainable transport, forest, waste, water and projects supporting efficiency gains. This could ensure that the PBI supports European climate goals.
c. **Align other existing EC, EIB and EIF credit enhancement programmes with climate goals:** We recommend that the EC commissions a review, similar in structure to the one undertaken by the

IEEP in 2013, mapping existing programmes (e.g. PBI, Structured Finance Facility, European Fund for Strategic Investments) providing credit enhancement and how climate policy goals can be integrated for each of these programmes and tools. This review would differ from the report by focusing on which credit enhancement structures are more suited to facilitate low-carbon investments' access to institutional investors specifically. This would be a value add to the IEEP study, where a significant share of the financial instruments covered are not related to institutional investors and financing of operational, lower-risk assets, but more geared towards R&D and higher-risk, smaller scale investments.

d. **Create a Green Project Bond Initiative:** We recommend the European Investment Bank study the feasibility and potential of using the PBI model to set up a similar Green Project Bond Initiative, but with criteria targeted to the breadth of climate change investment priorities. This action is complementary to changing the existing PBI adding criteria to align it with green, as for the Green PBI, selected projects are not necessarily coherent with the development objectives of the Connecting Europe and TEN programmes, as is the case under the PBI. Rather it supports selective credit enhancements for eligible climate-friendly projects. There is potential connection here with the development of standards for green bonds (Action 5) to define project eligibility criteria for a Green PBI. Having clear eligibility criteria is crucial for a transparent process and effective use of public finances.
e. **Use the model applied in the joint SME Initiative** (Box 4.3) **to establish a Green Securitisation Initiative**, which provides both securitisation and credit enhancement through guarantees to securitise, and provide guarantees when necessary, smaller scale low-carbon investments (see Action 4). This could either be support at loan level, with subsequent aggregation and warehousing processes to access institutional investors or at the bond level, after aggregation and warehousing. The resultant lower costs of re-financing can be passed on to loan recipients.
f. **Prioritise low-carbon SMEs within the joint SME Initiative**, a joint initiative by ESIF, COSME, Horizon 2020, EIF and the EIB (as a complement action to (e)).
g. **Transfer credit enhancement models and capacity to national public financial institutions (medium-term measure):** We recommend the European Investment Bank in partnership with national public financial institutions explore how Member States could establish similar initiatives to ones such as the Project Bond Initiative, SME Initiative and other relevant initiatives emerging from the study proposed. These would use national and institutional credit ratings to provide credit enhancement through subordinated debt positions or guarantees. Given the large amount of actors involved, this action is also not expected to show effects until the medium- to long term.

Overall assessment: A qualitative review suggests limited implications for the EU budget, as public financial resources are only used in the event of a default on debt by the project in question. For the action points that relate to integrating a climate preference in existing credit enhancement initiatives, there would be no additional impact on the EU budget.

5.3 Action #3: Explore the potential of policy risk insurance

Challenge to address: Policy risk is another key risk investors attach to low-carbon investments; a high reliance on policy driven investment – e.g. feed-in-tariffs - introduces the risk to investors that the policy will be removed. Perceived policy risk depends on the history of support policy in a member country and the budgetary situation. Policy risk might be perceived as substantial by investors particularly in cases where there have been ex-post adjustments to climate support policies, such as feed-in-tariffs in the past. In this scenario, the Member State government does not have many options to increase its credibility.

General idea: To address policy risks, an EU-wide policy risk insurance scheme could provide a member state with the option to borrow the credibility from the Institutions at EU-level to mitigate the risk associated with the potential removal by member states of their climate support policies. However, it should be noted that this study does not attempt to suggest a specific scheme nor does it claim that an additional policy risk insurance scheme is necessary to increase climate-friendly investments. We rather suggest exploring the potential of such a scheme.

The general aim would be to limit the guarantee to those risks which are created by member state climate policy, and which therefore individual member states are not well-placed to deal with, as concluded by the UK's Department of Energy's paper on national policy risk insurance.[162] A policy risk insurance scheme will only improve the situation if the investor considers the guarantee to be more reliable than the original member state policy. Therefore, the EU would be well positioned to issue such a guarantee through a consortium made up of supportive Member State participants. An investor would then have a possibility to hedge the major risks originating from the discontinuation of support.[163]

A number of challenges to implementing an EU-wide policy risk insurance is, however, identified; of political, technical and legal nature. Policy risk insurance will requires the most technical development, as there are political, technical and legal challenges to such as scheme at this stage:

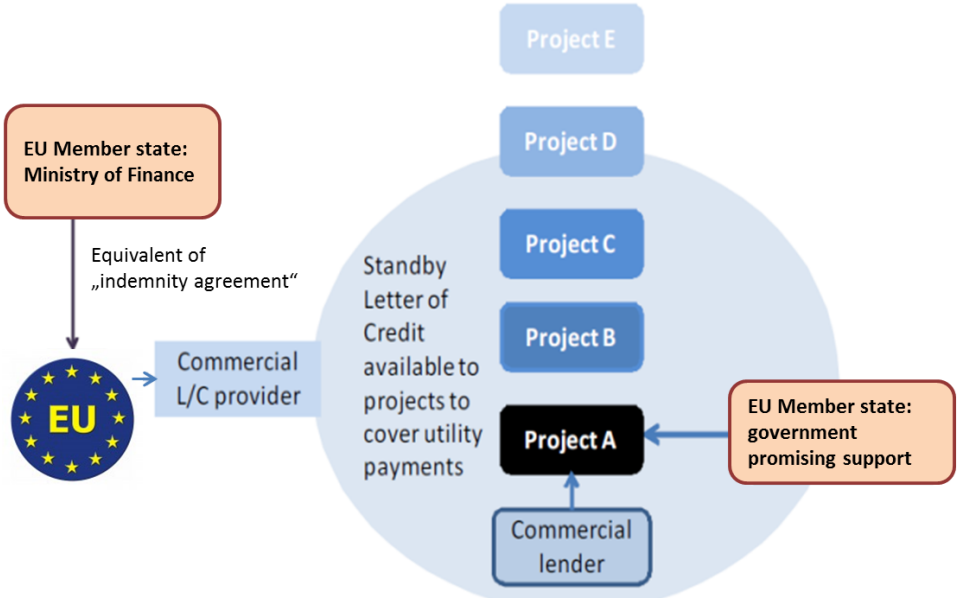
- Technically, the implementation of any guarantee or insurance mechanism has to consider incentive compatibility and the problem of moral hazard. One example would be to avoid incentives for member state governments to announce support which it is not realistically backed by budget or political will in the expectation that the EU guarantee will jump in and cover the (budgetary) costs of the support. In other words, the implementation of such a scheme should at least potentially be budget-neutral for the European institution.
- Legal challenges would occur related to the question of how to define an act of (ex-post) policy discontinuation, which would then trigger the guarantee. Only one of the issues would be how to treat cases where countries legally change their laws governing the support schemes perhaps as opposed to what some politicians may have said in public.

Thinking about concrete models for implementation, one scenario might be to structure the EU-policy risk insurance along the lines of a World Bank Political Risk Guarantee Scheme. Major design elements

[162] Policy risk in renewable energy investments in developing countries: a study by Cambridge Economic Policy associates for the department of energy and climate change (DECC) July 2014.
Link: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/380928/DECC_PRI_FINAL.pdf
[163] In the light of policy uncertainty created by State Aid Guidelines, it might be consistent to think as well of a policy risk guarantee that covers risks created by EU regulation.

are displayed in Figure 5.1 and include a commercial provider of a letter of credit (L/C) in order to ensure a credible and quick payment in case the guarantee is drawn. Furthermore, it requires an agreement with the Ministry of Finance of the member state announcing the support in order to minimise moral hazard and (potentially) implement budget neutrality for the EU.

Figure 5.1 Potential structure of an EU-internal Policy Support Risk Guarantee Scheme (EU-PSRG).



[Source: Frankfurt School for FtF]

Activities proposed (for EC unless otherwise noted):

a. **Convene a Member State working group to look at the design options and respective consequences related to a policy risk insurance scheme**. The issues to be explored in a preliminary study on the potential of policy risk insurance include:
   - The appropriate institutions on the side of the EU (Commission, Council, Structural Funds, EIB etc.) and the major functions, such as who defines and who decides about an event of policy default, dispute settlement, reimbursement channel between member state and EU, pricing of the guarantee, and other issues identified by stakeholders.
   - Research is also required to determine who would pay into this fund, and if there would be one fund per country or an EU-wide fund.
   - There are potential lessons to be drawn from the World Bank Policy Risk Guarantees Scheme - this scheme is relevant as it covers feed-in tariffs to renewable energy.

Overall assessment: Reducing policy risk has been identified as one of the major enablers to increase private climate finance. While policy risk insurance is not explicitly on the EU policy agenda, lowering investment risk to leverage private finance is firmly on the agenda, e.g. evidenced by the proposed European Fund for Strategic Investments. Therefore, starting to explore policy risk insurance is considered a short-term option. Given the existing questions around implementation however, significant further review of this action is needed. There is not sufficient information for this action plan to recommend details for the implementation of such a guarantee scheme at this stage.

5.4 Action #4: Supporting green securitisation

Challenge to address: Green securitisation addresses the barrier of size of low-carbon investments, as it enables climate-friendly smaller scale assets such as renewable and energy efficiency assets to be packaged to reach a size, liquidity and risk-return profile that improves their attractiveness to institutional investors. This is achieved by transforming the pool of smaller-scale, homogeneous climate-friendly assets into more tradable green securities. The other key challenge securitisation addresses is the constrained balance sheets of entities financing low-carbon projects, such as banks and utilities. Securitisation allows the entities to get these assets off their balance sheets by selling them onto institutional investors, which frees up capital for new projects. This refinancing function of securitisation is valuable in creating new low-carbon investment on the ground. Refinancing, rather than financing new projects, is the key role of securitisation, and the bond markets more generally, as discussed in detail in Box 3.1. However, barriers to securitisation remain: lack of standards for loan contracts; warehousing facilities for aggregation and too high risks in the absence of credit enhancement.

General idea: Using securitisation for low-carbon investments is timely, as reviving the securitisation markets more generally is currently strongly supported by EU policymakers. As set out in Table 5.4, there are currently several regulatory changes and policies under way that are expected to support the European securitisation market, and therefore by extension the green securitisation market. There is also investor support to re-ignite a high quality securitisation market and use it for climate-friendly investment: Aviva, asset manager and insurance company with EUR300bn of assets under management, highlighted the potential of green securitisation to scale-up low-carbon investments in Europe.[164]

This policy momentum can be taken advantage of to facilitate green securitisation. To this end, we recommend facilitating green securitisation as one of the identified six policy actions. Securitisation was identified as a potentially important area for low-carbon investment also in the IEEP study in 2013, but was there out of scope for in-depth analysis and recommended actions, which this report seeks to provide. The lack of an overarching actor or regulations for asset-backed securities or covered bonds in the EU implies that there are a range of actors that could undertake activities to boost securitisation including EC, ECB, European Systemic Risk Board, European Supervisory Authorities (EBA, EIOPA, ESMA).

Activities proposed (for the EC unless otherwise noted):

a. **Convene an EU-wide group of relevant stakeholders from the finance, legal, and relevant industry sectors, as well as regulators and policymakers, to develop standards contracts and agreements related to green securitisation of loans**. The working group could follow the example set in the US where the Department of Energy's National Renewable Energy Laboratory set up a Solar Access to Public Capital initiative that works on improving data and developing standards for solar securitisation.[165] Standardised loan contracts for energy efficiency upgrades are being applied in the UK's Green Deal programme; these could provide a basis for this work on EU level standardisation for energy efficiency.[166]

b. **Draft or commission a report on avenues to facilitate or integrate green securitisation issues in key pieces of legislation covering ABS in the EU**, notably The Prospectus Regulation (809/2004, implementing the Prospectus Directive 2003/71/EC), the Regulation on prudential requirements

[164] Aviva (2014) Sustainable Capital Markets Union Manifesto
[165] NREL (2013) NREL Assembles Industry Working Group to Advance Solar Securitisation
[166] http://www.managenergy.net/lib/documents/868/original_3-221-13_Bullier_-_Alternative_financing.pdf

for credit institutions and investment firms (575/2013, and The Markets in Financial Instruments Regulation (Regulation 600/2014). This action would facilitate both securitisation of green loans as well as securitisation of climate-friendly assets from utilities.

c. **EIB provide technical support related to the aggregation of green loans from banks and other non-bank financiers or climate-friendly assets from utilities and developers along the lines of the proposed Renewable Energy Platform for Institutional Investors (REPIN) pooled transaction vehicle.**[167] Currently, under REPIN, EIB is in discussions with renewable energy debt providers, institutional investors and other market actors, working to structure pilot schemes. Aviva, asset manager and insurance company with EUR300bn of assets under management, supported this recommendation in their recent sustainable Capital Markets Union paper.[168]
d. **Consider giving preference to low-carbon investments under existing credit enhancements specific to securitisation**, such as the SME Initiative where the senior tranches of asset-backed securities are expected to achieve credit ratings desirable for institutional investors (see box 3.3).

Overall assessment: Green securitisation can have a significant role in overcoming finance sector barriers. Actions in this context can be developed step by step, with pilot phases, linking actions to other actions (including potentially those recommended in this report). Given the range of measures referenced under this section, the impact of this proposal on the EU budget is unclear.

5.5 Action #5: Accounting and disclosure of companies and financial products

Challenge to address: Investors currently do not have ready access to information about what are climate mitigation or adaptation investments (beyond solar and wind energy), the relative carbon efficiency of different investments. Ease of access to data is an important means of reducing friction in investment decision-making and ensuring the flow of capital. Data frameworks are disconnected from the investor needs.[169] For policymakers, a lack of metrics means they are unable to easily set targets and develop associated incentives and verification.

General idea: Policymakers can support the development of climate-friendly asset definitions based on climate change goals. There is also a role for policymakers to encourage disclosure at the company level, and the financial product level. Harmonisation of disclosure and standards across the EU is a strategy to improve the investment environment that is recognised in EU's Capital Markets Union development. An effective way to do this for climate investments is for the EU to support existing initiatives in the market.

Activities proposed (for the EC unless otherwise noted):

a. **Improve climate-related company data availability and quality by standardising the accounting and disclosure rules of non-financial data from companies.** This can be done as part of the EU Directive on the disclosure of non-financial and diversity information.
b. **Improve climate-related data associated with financial products by standardising accounting and definitional frameworks**. This taps into the focus of the Capital Markets Union on harmonising standards across the EU for financial products, and is recommended to include harmonising

[167] CPI (2014) Renewable Energy Platform for Institutional Investors (REPIN) is currently at the concept stage, it has not been fully developed yet. The vehicle is intended to work both in the EU and in developing countries. For more details: http://climatepolicyinitiative.org/ideas/renewable-energy-platform-for-institutional-investors-repin/
[168] Aviva (2014) Sustainable Capital Market Union Manifesto
[169] 2° Investing Initiative (2014). Carbon and climate-related data needs for investors

standards for green bonds. It can also include Packaged Retail and Insurance-related Investment Products (PRIIPs).

c. **Provide financial support to standard-setters working on developing climate performance indicators and organisations modelling energy-technology roadmaps**. There are several existing initiatives in the market that policymakers can support and scale to avoid duplicating efforts: CDP is the leading source for emissions performance and carbon risk data and metrics on companies, the Asset Owner Disclosure Project for similar data on asset managers, while the Climate Bonds Initiative is developing standards on green for the bond market.

Overall assessment: Disclosure related actions are considered to have a limited impact on the EU budget. These actions fit well with the push for EU-wide standardisation on financial information that has been proposed in the recently published Capital Markets Union Green Paper.

5.6 Additional action for EU policymakers: Convene the finance sector in the context of COP21

Challenge: There is a proliferation of international investor initiatives in the context of the momentum around COP21 that could be harnessed to further boost the impact of several of the actions proposed in this report. However, the initiatives face a number of challenges. The initiatives related to decarbonisation and increasing climate-friendly investment cannot rely on accepted market definitions and tools (Action 5). They also are not connected to policy responses.

General idea: In addition to policy recommendations developed at EU level, a key role for the EU on mobilising the private sector for climate investments relates to their role in the global negotiations. For example, COP21 represents an opportunity for the EU to promote the issue of mobilising private capital for climate-friendly investment on the agenda.

Activities proposed (for EC unless otherwise noted):

a. **Use convening power to support a global initiative under an existing organisation to promote the alignment of the financial sector with climate goals, support global standardisation around defining climate-friendly financial products**.

b. **Support a global policy exchange around policy options to mobilise private capital for climate-friendly investment**.

Overall assessment: COP 21 in Paris 2015, gives a real window of opportunity to create a collaborative partnership between the investment community and the public sector. Such collaboration on climate finance could be used to speed up the expansion of climate-friendly financial products, e.g. issuance of green bonds (Action 1) and green securitisation (Action 4); development of standards, metrics and data (Action 5) and more broadly to create commitment and a more proactive mind-set towards low-carbon and climate-resilient investment in the investor community.

5.7 How the action plan is relevant for the Capital Markets Union

The development of a Capital Market Union for the EU provides an opportunity to consider climate investment in the market design from the beginning. This is a lot easier, and less costly, than making retrospective changes to a well-established system. The following table provides an overview of how to integrate the actions proposed in this report to increase climate-friendly investment with the recently published priority areas for the Capital Market Union.[170]

Table 5.2 How the action plan is relevant for the Capital Markets Union

Action Area	Relevant Capital Market Union priority area	Relevant action points from this report to integrate in the Capital Market Union (CMU)
1	Boosting long-term investment	(a) To *"increase environmental, social and corporate government investment, such as green bonds"* is mentioned in the CMU green paper. Demonstration issuance of green bonds from the EIB and other EU actors can contribute to this aim. (g) Establishing an integrated European covered bonds market is on the CMU agenda, with a consultation planned for 2015. Exploring the development of green mortgage backed covered bonds and the future inclusion of renewable energy assets for cover pools could be included under the consultation.
2	Boosting long-term investment	(a) The European Fund for Strategic Investments announced under the Investment Plan for Europe is also included in the CMU context. We recommend that the investment guidelines that are under development for this fund prioritise climate-friendly investments.
3	N/A	N/A
4	Building sustainable securitisation	"*A sustainable EU high quality securitisation market relying on simple, transparent and standardised securitisation instruments*" is central for the proposed CMU. We recommend that the work to this end included: (a) Standardisation of loan contracts for renewable energy installations and energy efficiency upgrades (b) Draft or commission a report on avenues to facilitate or integrate green securitisation issues in key pieces of legislation covering ABS in the EU (c) Provide technical support to the aggregation of green loans for securitisation, along the lines of the proposed Renewable Energy Platform for Institutional Investors (REPIN)
5	Standardisation as a mechanism to kick-start markets	The CMU green paper recognises that markets can be kick-started with a common set of standards providing transparency on product features. This can include standardisation of climate-friendly products and related disclosure in the following areas: (a) Non-financial data from companies (b) Accounting and definitional frameworks for climate-friendly financial products. This includes harmonisation of standards for green bonds. (c) Provide financial support to standard setters in the market working in these areas

[170] http://ec.europa.eu/finance/consultations/2015/capital-markets-union/docs/green-paper_en.pdf

5.8 How the action plan is relevant for the Investment Plan for Europe

Table 5.3 How the action plan is relevant for the Investment Plan for Europe

Action Area	Relevant Investment Plan area	Relevant action points to integrate in the Investment Plan
1	Investment Hub; improving technical assistance	(d) The Investment Plan for Europe includes an Investment Hub aiming to provide technical support as a mechanism for increasing investments. We recommend that this Investment Hub includes technical support specific to climate-friendly investments. (f) Workshops on "investing in Europe" as proposed under the Investment Plan should include specific discussions and advice on climate-friendly investments for institutional investors.
2	European Fund for Strategic Investments	(a) The European Fund for Strategic Investments, which aims to mobilise EUR315bn through the application of various credit enhancement mechanisms, such as subordinated debt, is a key component of the Investment Plan for Europe. We recommend that the investment guidelines that are under development for this fund prioritise climate-friendly investments.
3	Increase regulatory predictability	Although policy risk insurance is not explicitly on the agenda of the Investment Plan the suggested action point of this report to explore policy risk insurance is a means to address the objective of improving the investment environment and increasing the predictability and stability of regulations. Improving regulatory predictability and stability of climate policies in the real economy in Europe, such as feed-in tariffs, was found to be crucial to increase institutional investment in climate-friendly assets.
4	Boosting sustainable securitisation (covered through CMU)	See Table 5.2
5	Standardisation as a mechanism to kick-start markets (covered through CMU)	See Table 5.2

6 A medium- to longer-term action plan for policymakers: Shifting institutional investors' decision-making framework

As a complement to the shorter-term actions for policymakers in chapters 5 there is a role for medium- to longer-term policy intervention to shift institutional investors' decision-making framework.

This chapter sets out the factors in institutional investors' decision-making framework that impact their demand for climate investments and the barriers this creates (section 6.1). This is followed by a mapping of the policies, tools and options policymakers have to influence institutional investors decision-making (section 6.2), and which of these are considered particularly relevant to address the barriers identified (section 6.2). Lastly, these key policy enablers are translated into a concrete action plan for EU policymakers (section 6.3).

6.1 Factors in institutional investors' decision-making and their relevance for climate-friendly investments

There are several factors influencing institutional investors' allocation of capital to climate-friendly investments that arise from their current decision-making frameworks. The common denominator for these factors is that they determine to what extent institutional investors can integrate climate-related risks into their investment evaluation. Facilitating the integration of climate-related risks is a strategy to increase climate-friendly investment, as it would make climate-friendly investment relatively more financially attractive compared to non-climate-friendly investment. The main factors identified that relate to how institutional investors incorporate climate-related risks are:

a. Time horizon structures of both asset owners and investment managers;
b. Risk-return models used by investment managers;
c. Application and perception of fiduciary duty for asset owners and stewardship for investment managers; and
d. Ability to assess the climate characteristics and performance of portfolios.

6.1.1 Shortened time frames arise from investment management practices and regulations

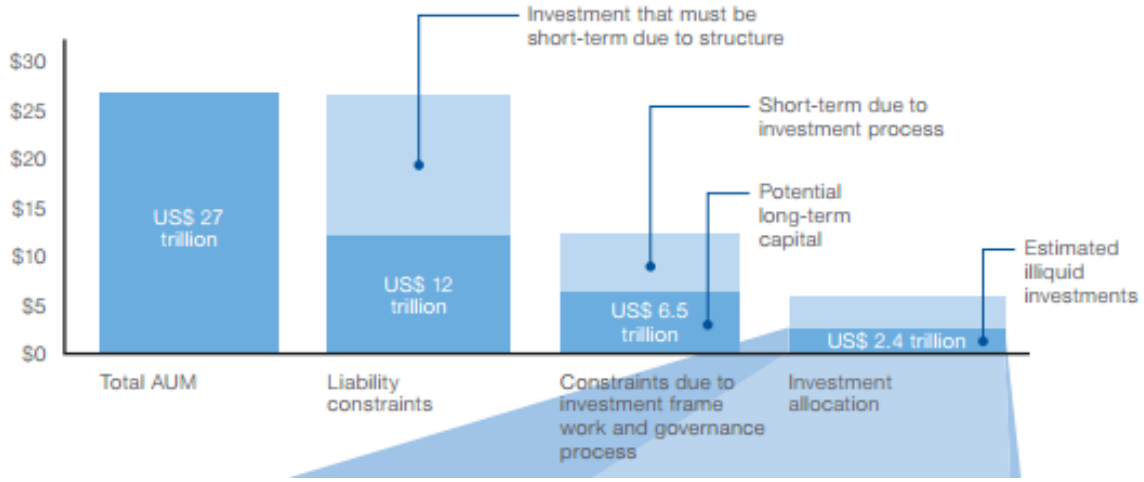
The time frames of institutional investors matter for climate-friendly investment in two ways. First, short holding periods can be a challenger, as the majority of climate assets, especially climate-friendly infrastructure, are by nature long-term because of the high capex and long term costs associated with their development. Second, short time horizons make climate-related risks less relevant, as the majority are future risks. Although asset owners In Europe have EUR13.5 trillion of assets under management,[171] not all can be invested in long-term climate investments. The liabilities of asset owners need to be matched through investments for different time frames, as asset owners have both short-term and long-term liabilities. For example, pension funds will have some pensions holders retiring now and others not for another 50 years. Consequently, the amount of capital that can be allocated to long-term investments is only a section of the total assets under management. This matters

[171] OECD Institutional Investor database.

because it provides the upper bound of how much capital can be allocated to long-term climate investments.

The World Economic Forum analysed this by reporting on institutional investors with US$27trn (EUR23.6trn) assets under management and how they allocated investments. Only US$12trn (EUR10.8trn) of this total is for long-term liabilities; less than half. Figure 6.1 shows that, of this, only around half (US$6.5trn / EUR5.8trn) is actually allocated to long-term investments. Short-term investment processes are the key driver for the large share of assets under management that is being allocated away from long-term investments, despite the theoretical potential for this capital to be inserted long-term.

Figure 6.1: Long-term institutional investors have both short and long term time horizons; but part of their long term liabilities are matched by short-term assets due to the investment process



[Source: WEF (2012)[172]]

Short-term incentive structures in fund mandate structure create short term frames

A major driver for this short-termism distortion is the structure of fund management services for institutional investors. Investment managers are the agents that make the buy-sell decisions and are either in-house or external agents of asset owners. There is a range of factors that drive short-termism amongst investment managers: the performance cycles of investment managers, the time frame of investment mandates from asset owners and the regulatory framework. These will now be explored in turn.

Short-term performance review cycles of investment manager performance: Asset owners have a fiduciary duty to their end beneficiaries and therefore must monitor the performance of their investment managers. Beneficiaries can in turn require asset owners to provide them with information on investment managers' performance in the short-term; this pressure will filter down to investment managers.

Quarterly investment manager review cycles create strong incentives for investment managers to perform to short-term time horizons – across all mandates including long-term. [173] Although some asset

[172] WEF (2012) Measurement, Governance and Long-term Investing
[173] WEF (2012) Measurement, Governance and Long-term Investing

owners are "extremely vague about the time horizons over which managers' performance will be judged, managers will, perfectly rationally, assume that they could be dismissed after any quarter's performance".[174] Short-term incentives are not beneficial for long-term climate investments.

Regulatory frameworks can also drives short-term review cycles of fund managers. For example, even though many pension fund liabilities are long-term, in the UK, funding assessments are required at least every three years, with less detailed updates at least annually, and consultancies increasingly provide clients with access to daily updates on their funding position. This all encourages a short-term horizon for performance measurement. In addition, UK pension funds are reliant on the sponsoring companies' ability to provide funding, so there is a focus on securing additional funding in the short to medium term, which also reduces time horizons.

Short time frames of investment mandates from asset owners to investment managers: During the asset allocation the asset owners will agree an investment mandate for a fund with the investment manager. These mandates are agreed as part of the procurement and selection process of investment managers. Once the mandate of the fund is set the investment manager can only operate within that structure. An important factor in the driver of investment management performance is therefore defined by the mandate provided.

One driver of short-termism in investment management is that those investment mandates, for long-term liabilities, have short-time frames. The UK Department for Business Innovation and Skills (BIS) published a report suggesting that asset owners need "to more explicitly articulate an investment time horizon"[175]. In other words, although asset owners may want a longer time frame investment mandate there is evidence that this is not being communicated sufficiently to the investment manager. Longer time frame mandates are required for long-term climate investments to be eligible for investment.

Regulatory framework can also drive short-term investment horizons

Solvency II is a notable example where incentives for short-termism are created through unintended consequences of financial regulations. Solvency II is a regulatory reform programme for the insurance industry, initiated by the EC with the EU Directive 2009/138/EC and is set to come into force January 2016. Its relevance to short-termism arises out of the fact that the capital reserve requirements associated with Solvency II give preferential treatment to liquid assets, which excludes many long-term infrastructure investments.

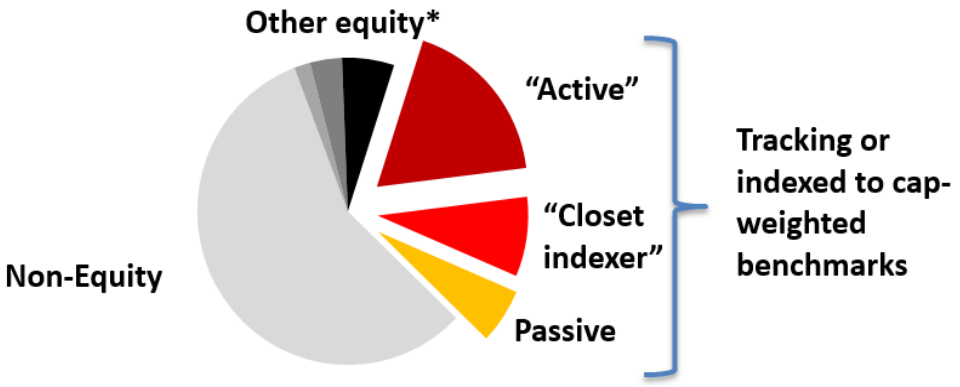
The use of cap weighted indices in investment mandates can exacerbate short-termist trends

Cap-weighted equity indices are the most prominent driver of investment in equity markets (Figure 6.2) because of their use in the construction of investment mandates.[176] As the valuations determining the market capitalisation of stocks are typically relatively short-term (see section 6.1.2), a reliance on cap-weighted indices imports this short-term valuation into investments.

[174] Myners - "Institutional Investment in the United Kingdom: A Review" (2001)
[175] BIS (2014) Research paper on metrics and models used to assess company and investment performance
[176] Estimates based on literature review conducted by the 2° Investing Initiative.

In addition to exacerbating shortening of investment horizons, cap weighted equity indices are weighted towards high carbon assets. As they represent the market, cap-weighted equity indices currently have a bias in favour of high carbon sectors. Moreover, analysis suggests that high-carbon sectors account for a larger share of cap-weighted equity indices than is warranted by their share of the listed equity markets overall[177], which again is much larger than their share in the real economy (Figure 6.2) although this in part reflects the global nature of companies listed in the composition of the UK/US domestic economies.

Figure 6.2 Influence of cap-weighted equity indices on the representative institutional investors portfolio



* Equity investments run against Libor, alternative benchmarks, or no benchmarks.

[Source: 2° Investing Initiative 2014[178]]

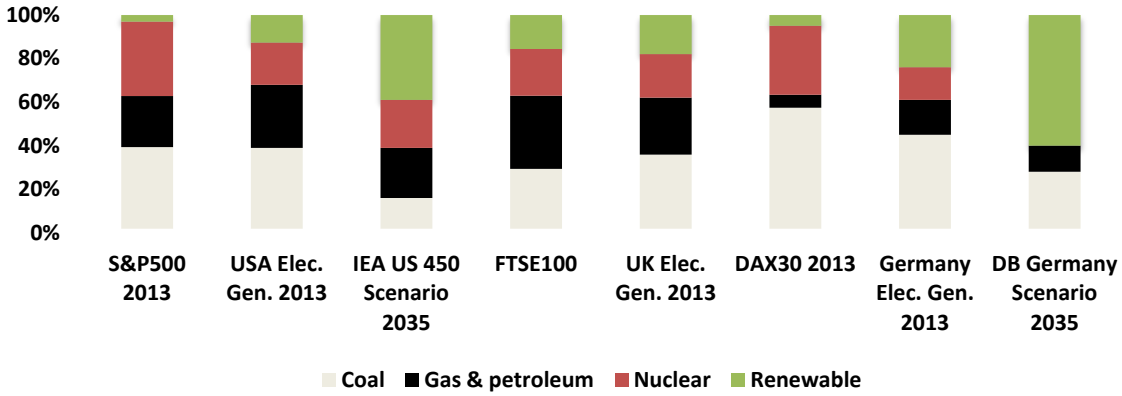
Figure 6.3 Share of oil and gas in FTSE100 and S&P500 versus listed equity universe and real economy.

[Source: 2° Investing Initiative (2014), [179] based on index factsheets, US BEA data, and UK ONS data]

Also within sectors, there is a bias to high carbon in indices used by investors: for example, the S&P500 and DAX30 indices for the utility sector give low exposure to renewable energies. Similar trends can be seen in the automobile sector with regard to sustainable propulsion technologies.[180] Passive investors seeking broad diversification and long-term risk aware investors using mainstream tools as benchmarks are likely under-exposed to climate-friendly investments.

[177] In the case of the FTSE100 and the CAC40T.
[178] 2° Investing Initiative (2014) Optimal diversification and the energy transition
[179] Ibid.
[180] Ibid.

Figure 6.4 Diversification of the utility sector in mainstream indices and the real economy



[Source: 2° Investing Initiative (2014), [181] based on US EIA data, Bundesnetzagentur data, the Deutsche Bank 2013, and annual reports]

Since asset owners rely heavily on indices to set benchmarks and strategic asset allocation guidelines for new mandates, the development of strategic climate-friendly indices will enable more investment in climate-friendly assets.

6.1.2 Lack of methodologies and metrics for climate risks means they are not incorporated into risk-return models

Measuring climate-related risks is difficult for portfolio managers partly due to the insufficiency of existing quantitative climate-related risk methodologies. This is made more difficult by the short-term structure of credit and equity research that is often based on short-term valuations.

Short-term risk-return models do not fit with long term climate-friendly investment opportunities

The models of credit and equity research analysts for the risk-return of financial assets in the short-term are quite sophisticated. Beyond 3-5 years however, these models usually extrapolate current trends.[182] Most current mainstream methods do not include all relevant forward-looking indicators from a risk perspective (e.g. company carbon risk reporting). The limited ability to complete long-term risk analysis applies to all investment, however, it is particularly problematic for climate investments: it means time horizons of the overall risk assessment models are too short for climate risks to be fully integrated (section 6.1.5).

Climate-risk methodologies are not sufficiently developed to enable integration with risk-return models

In addition to the motivation to integrate climate-related risks, investment managers need to then have the ability to do so. The availability of risk methodologies that quantify climate-related risks, therefore, influences to what extent investment managers can integrate these risks into their decision-making to buy or sell.

[181] 2° Investing Initiative (2014). Optimal diversification and the energy transition.
[182] This can at least in part be attributed to companies reporting using single scenario impairment tests and little discussion of long-term risks under various scenarios.

There are different types of climate-relevant risks that can influence decision-making. Typically they are divided into two categorise:

- Climate risk refers to the financial risks of an investment arising from the physical impacts of climate change.
- Carbon risk refers to financial risks of an investment arising from the greenhouse gas -emissions of assets. Carbon risk is a result of climate policies, market changes, and/or reputational factors that negatively affect the financial return.

Quantifying climate and carbon risks first requires the development of sufficient metrics, see Box 6.1.

Box 6.1 A perspective on developing carbon risk metrics

Despite the growing narrative around carbon risk for financial institutions, associated methodological developments have not kept pace. This of course raises the question of the direction this methodological development should take. To date, there are two paths that appear relevant – a bottom-up approach or a top-down approach.

In the bottom-up approach, the existing methodological developments by Carbon Tracker Initiative and others are expanded to allow for an aggregation of risks at portfolio management level. While this bottom-up approach has the advantage of building on existing practices, challenges include the potential cost of implementation and required expertise, as well as the issue of addressing the different risk horizons of companies and their assets versus the short-term time horizon of investors. The alternative could appear as a top-down approach. Such a top-down approach however would likely require a change in the articulation of risk metrics – from metrics designed to measure cyclical risks and financial market shocks, to metrics capturing the risks from what are likely to be gradual, secular trends in the economy. One such approach could relate to exploring the extent to which risks can be measured through an alignment or disconnect indicator that informs on the alignment of a portfolio with economic trends. This idea builds on both the notion that financial market bubbles are partly a result of a finance sector disconnected from the real economy, and the narrative and concept of stranded assets, which in turn are likely to be a function of capital misallocation. Capital misallocation by financial institutions can partly be measured by the disconnect of capital allocation decisions with real economic trends. More research and analysis on this and how it relates to climate-friendly investment is required.

Carbon risks can lead to high carbon assets becoming stranded assets. This is particularly applicable to long-term investments, as investing in these assets locks in high emission intensity for decades; if a carbon prices is applied in the future they can become financially uncompetitive and therefore stranded assets. The growing narrative about carbon risk and the potential for stranded assets that arises from this, has given rise to a proliferation of carbon risk assessment frameworks (box 6.2).

Box 6.2 Carbon risk methodologies

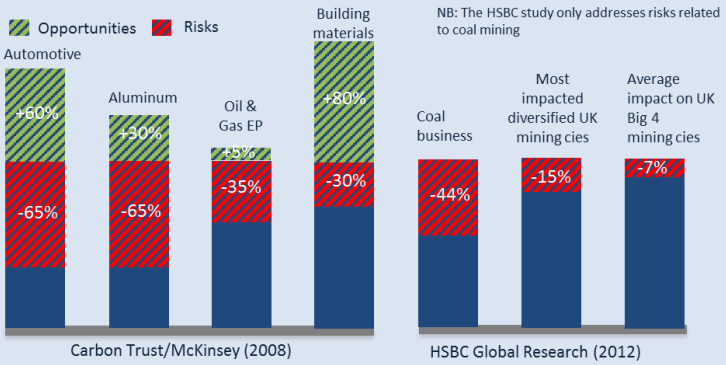
Risk at asset level: The risk assessment frameworks at the asset level rely on adjusting discounted cash flow (DCF) calculations to account for higher carbon prices on CO_2 emissions. These approaches have been pilot-tested by brokerage houses and researchers on carbon-sensitive industries. According to several studies, the impact of a 2°C scenario on companies' valuations can reach up to 35% for oil companies, 44% for pure players in coal mining, and 65% for car manufacturers and aluminum producers (Figure 6.5). The beta Bloomberg Carbon Risk Valuation Tool applies this approach to equities.[183]

[183] http://about.bnef.com/white-papers/bloomberg-carbon-risk-valuation-tool-2/

Despite their proliferation, significant challenges remain, notably, with regard to modeling the cost ability of companies to pass on costs to their customers and the relative exposure to risks as a result of different exposure to high-cost capital expenditure.[184]

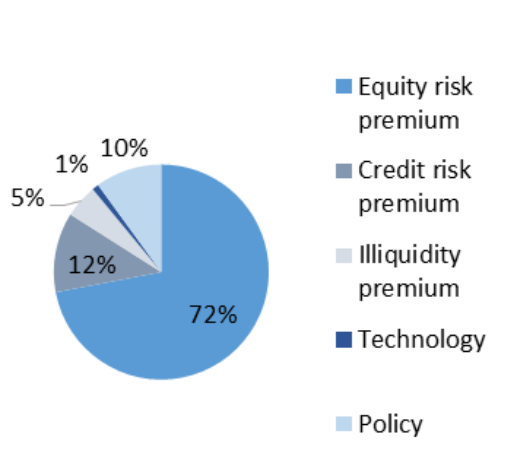
Risk at portfolio level: In 2011, Mercer translated climate scenarios into economic impacts to simulate impact on the risk-adjusted return of various asset classes.[185] The results show that climate risks represent about 11% of a balanced portfolio's risk exposure (Figure 6.6). This approach is currently being updated with a new publication expected in 2015.

Figure 6.5 Carbon risks at asset level



[Source: 2° Investing Initiative 2012]186

Figure 6.6 Contribution to risk for a representative portfolio mix in default case



[Source: Mercer 2011[187]]

[184] Carbon Tracker (2014). Carbon Supply Oil Cost Curves.
[185] Mercer (2011). Climate Change Scenarios – Implications for Strategic Asset Allocation.
[186] 2° Investing Initiative (2012). Connecting the dots between climate goals, financial regulation, and portfolio allocation.
[187] Mercer (2011). Climate Change Scenarios – Implications for Strategic Asset Allocation.

6.1.3 *Integrating climate into stewardship practices and fiduciary duty*

As discussed in chapter 2, fiduciary duty is an integral part of institutional investors' decision-making process. Asset owners have a fiduciary duty to beneficiaries (such as pension holders and savers). When an asset owner allocates assets through fund mandates to investment manager, the investment manager has contractual obligations towards the asset owner. This can include stewardship.

Fiduciary duty has traditionally been perceived to exclude extra-financial factors, such as climate and carbon risk, from inclusion in decision making processes

Fiduciary duty has been perceived as excluding factors that are not strictly financial based on current financial models. However, a report in 2005 from UNEP FI and law firm Freshfields Bruckhaus Deringer found that fiduciary duty does not explicitly exclude the inclusion of material extra financial risk such as climate-related risks.[188] The report considered both common and civil law jurisdictions, across several different European countries: France, Germany, Italy, Spain and UK.

The report went beyond allowing for inclusion of extra financial risks in fiduciary duty to conclude that: "it may be a breach of fiduciary duties to fail to take account of environmental, social and governance considerations that are relevant and to give them appropriate weight, bearing in mind that some important economic analysts and leading financial institutions are satisfied that a strong link between good environmental, social and governance performance and good financial performance exists."[189] This clears the way for greater inclusion of climate and carbon risks into asset owner's decision-making, as explored in section 6.1.3.

Stewardship practices of investment managers do not sufficiently include engagement on climate-related concerns

Investment managers that run equity mandates for asset owners have an important role as stewards. The investment manager will often take on the engagement and voting at shareholder meetings to influence the management of companies. By integrating climate-related concerns in the process, stewardship can have a positive impact on climate-friendly investments on the ground. This is an important complementary action to seeking to increase investment that is already classified as climate-friendly. Instead, engagement allows institutional investors to increase the climate-friendliness of their investments after they have already made the investment. There is scope for asset owners to include stewardship responsibilities in investment mandates. The National Association of Pension Funds advocates for greater inclusion of stewardship into investment mandates for its pension fund members. A key initiative to encourage the uptake in stewardship is the development of best practice stewardship codes, however, these typically do not sufficiently set out how to address climate-related issues in the stewardship process.

[188] Freshfields Bruckhaus Deringer (2005). A legal framework for the integration of environmental, social and governance issues into institutional investment.
[189] Freshfields Bruckhaus Deringer (2005). A legal framework for the integration of environmental, social and governance issues into institutional investment.

6.1.4 *Accountability: Measuring climate performance of portfolios to enable asset owners to assess performance of investment managers*

Institutional investors' climate-friendly investment is also influenced by their ability to measure their climate impact. This requires them to be able to measure how climate-friendly their overall portfolios are. The difficultly is that there is a lack of metrics and established methodologies that fund managers can use to do this.

At this stage, this is particularly relevant for mission-oriented institutional investors who are concerned with the climate impact of their investments in addition to financial returns – defined as climate-friendly in this report's investor typology (see chapter 2). Examples of such climate-friendly investors are public financial institutions with a specific climate mandate, such as being the Caisse des Depôts in France and KfW in Germany. Business-as-usual investors will not necessarily be interested in measuring their climate performance at this stage; but if they were encouraged by external actors – beneficiaries or policymakers - to start measuring the climate performance of their portfolios, this increased transparency could be an enabler to increase their climate-friendly investments. The rationale here is that when an actor has to disclose on behaviour, that itself can be a driver for behaviour change.

Currently, there are four potential types of tools that can be used by these institutional investors and their fund managers to measure their climate performance, as set out in the table below.

Table 6.1 Summary of state-of-the-art of climate performance metrics available to investors

Methodology	Approach	Shortcomings
ESG / SRI scoring and screening	Evaluation of assets and portfolio based on environmental criteria	Based on investment process, rather than actual impact on capital expenditures; not just focused on climate change issues
Carbon footprint of investment portfolios	Measuring financed emissions of financial activity	Lack of forward-looking analysis on emissions, doesn't inform on assets not directly producing emissions
Green / brown ratios	Measures the exposure to 'green' (climate-friendly) and 'brown' (non-climate-friendly) assets	Lack of wide agreement on a robust definition of 'green' and 'brown'.
Alignment of portfolios with climate goals	Measures the alignment of portfolios with investments required to reach 2°C climate goals	Currently only theoretical approach with no practical application, complex methodology[190]

[Source: 2° Investing Initiative 2014[191]]

These four identified tools are currently inadequate for investors to easily measure the alignment of their portfolio with climate goals due to the multiple current shortcomings identified in the table above. A conclusion on which method has more promise has not yet been made.

[190] A consortium led by the 2° Investing Initiative, including the Climate Bonds Initiative, SMASH, Frankfurt School of Finance, University of Zurich, WWF Germany, WWF European Policy Office, Kepler-Cheuvreux, and CDP are currently involved in a three year research programme, funded by H2020.

[191] 2° Investing Initiative (2014). "Measuring climate performance and risk: Data needs for tomorrow's investors".

6.1.5 *Summary of barriers*

It is evident that increasing the climate-friendly investment from institutional investors' by changing their decision-making framework faces several barriers. All of the barriers explored in this chapter arising from institutional investors' current decision-making framework were identified to require policy intervention. An overview of the key barriers is set out in the table below.

Table 6.2 Mapping barriers requiring policy intervention

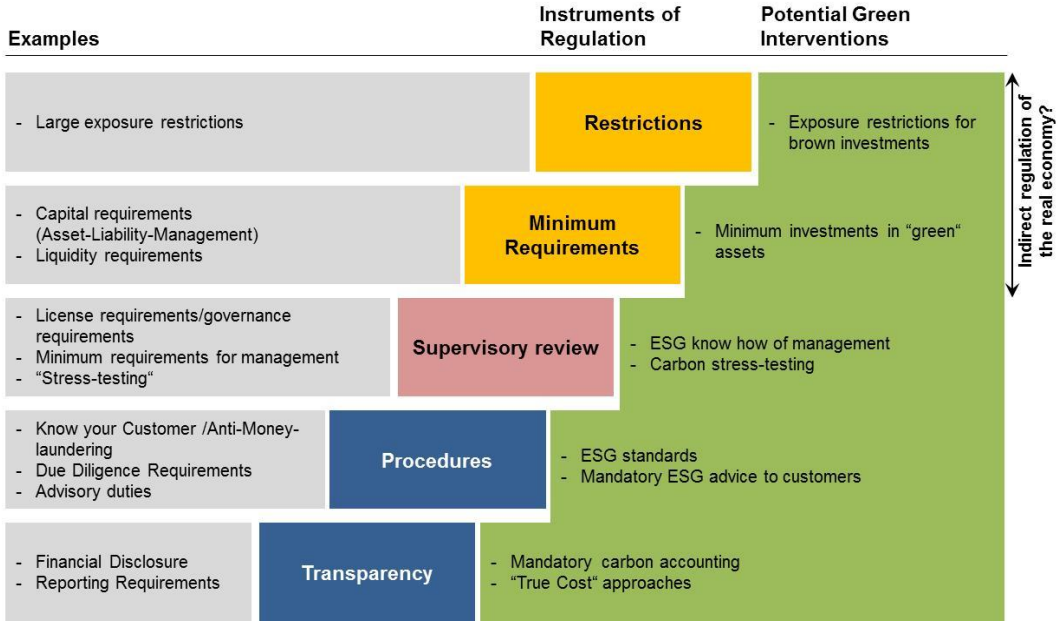
Barrier type	Barrier(s)
Short investment time horizons	Shortened time frames arising from investment management practices, (performance review cycles, investment mandate periods and risk models) regulations and use of cap weighted equity indices
Stewardship	Lack of integration of climate-related risk in stewardship practices. Fiduciary duty, voting and engagement processes do not sufficiently include climate
Lack of relevant climate-related risk and performance methodologies	Lack of tools and metrics for climate and carbon risk; uncompetitive risk-return of climate investments today when climate-related risks are not integrated

6.2 Next steps: Policymakers role to shift institutional investor decision making-frameworks to increase climate-friendly investment

6.2.1 *Policy tool box to shift investor decision making-frameworks*

There is a range of options available to policymakers to influence the decision-making framework of institutional investors to better facilitate climate investments through financial sector policies, tools and instruments. The channels of potential policy options may be grouped in five types: restrictions, minimum requirements, supervisory review, procedures and transparency (Figure 6.7).

Figure 6.7 Instruments of Financial Regulation and Potential Green Interventions



[Source: Frankfurt School Technical Paper for UNEP Enquiry]

Restrictions and minimum requirements for climate investment, while powerful, are less suitable at an early stage when there is uncertainty around definitions. Moreover, for EU policymakers such strict regulations are often outside the legislative power of the European Commission. Interventions for procedures and transparency can create awareness and provide information to customer of financial institutions and asset owners and allow them to make an informed choice. In addition, policymakers can contribute to the more systemic change of a shift in narratives.

Creating attention around the relevant climate issues can play an important role in market momentum, which again is an important factor for growth in new markets. An example of this is the impact green labelling has had in the green bond market. The labelling of the bonds as green has helped create attention around the opportunities climate-friendly investment can offer, and importantly, this has helped create a more positive climate-friendly growth narrative amongst market players. Such a narrative has been lacking in Europe. With an increased awareness among asset owners, a stronger pull for shifting their decision-making to take into account climate-related factors, and subsequently increases their climate investments can be expected.

As set out in chapter 4, the key levers for policymakers can also be split into:

- Financial regulations;
- Public incentives;
- Accounting and disclosure requirements; and
- Monetary policy.

To date, the application of these policy options for climate goals has been limited, although there are some relevant initiatives that have proposed their use. For example, Norwegian policymakers have announced they are considering mandating a share for renewable investment for their sovereign wealth fund, which is the world's largest.[192] That said, EU policymakers are already applying these tools in other, non-climate specific areas; the question is how to use them and alter them to increase institutional investors' climate investments.

In the context of changing institutional investors decision-making to increasingly integrate climate, financial regulations that are relevant include stress-testing, capital reserve requirements and lending guidelines. Public incentives include tax incentives for investors holding climate-friendly investments. Accounting and disclosure requirements relate to carbon impact and climate-related risks of institutional investors, and the road testing of these portfolio-level accounting and disclosure tools and metrics by public financial institutions.

6.2.2 *Mapping policy tools and instruments to the investment barriers identified*

The barriers set out in Table 6.2 provide a guide for where action from policymakers is required to enable increased climate investment from institutional investors. Combining these findings with the policymakers financial sector toolbox set out in section 6.2.1, the table below (Table 6.3) connects the barriers with the relevant tools and instruments for policymakers.

[192] http://wwf.panda.org/wwf_news/?217710/Move-by-Norway-sovereign-wealth-fund-to-invest-in-renewables-could-have-global-impact

Table 6.3 Mapping policy options to relevant barriers

Barrier type	Barrier	Area for policy intervention	Key enabler for policymakers
Short investment time horizons	Shortened time frames arising from the investment management practices (performance review cycles, investment mandate periods and asset owners review periods)	Lengthening portfolio time horizons	Rules on risk models and investment mandates
Stewardship	Lack of integration of climate-related risk in stewardship practices. Fiduciary duty, voting and engagement processes do not sufficiently include climate	Include climate in stewardship best practice	Stewardship code, best practice guidelines and fiduciary duty concept
Lack of relevant climate-related risk and performance methodologies	Lack of tools and metrics for climate and carbon risk; uncompetitive risk-return of climate investments today when climate-related risks are not integrated	Mainstreaming long-term risk accounting and tools for carbon and climate risk; tax incentives	Accounting and disclosure requirements; tools to increase financial returns on climate assets

6.2.3 Lengthening the time horizons of investment managers

Challenge: The time frames of institutional investors matter for climate-friendly investment, as the majority of climate assets, especially climate-friendly infrastructure, are by nature long-term because of the high capex and long term costs associated with their development. Institutional investors' time horizons are shortened through investment managers' practices due to: short-term performance review cycles of investment manager performance, short time frames of investment mandates from asset owners to investment managers, regulatory frameworks and investment tools, such as market cap weighted indices, having a short-term bias.

Technical development: New methods and practices for performance reviews of investment managers and asset owners, and for investment mandates, are required. How to integrate climate-risks into these should be considered. Equity and credit analysts can do more to highlight long-term risks and, coupled with market demand by investors, adjust their discounted cash flow away from trend extrapolation to long-term assessments. Accounting methodologies that take longer-term risks and returns into account is another necessary technical development.

Market response: The success of new methods, practices and tools depends on their adoption by institutional investors and associated market responses in the finance sector ecosystem. Market responses can come from the Board of Trustees of asset owners for example or from even further up the investment chain from beneficiaries, placing a bigger emphasis on long-term investing. This can in turn translate into requirements for equity and credit research analysts to provide a more long-term analysis on the risk-return of financial assets. Index providers need to respond by integrating forward-looking data into index construction.

Role of policy: EU policymakers recognise that they have a role to play in facilitating longer-term investments in the EU, and that this has relevance particularly for infrastructure investments. In 2014 the European Commission published a communication on long-term finance, which firmly established the issue of investment time horizons on the European policy agenda. However, this focused on increasing the role of institutional investors as a means to

increase longer-term investment, as they tend to have a longer holding period. This report takes this one step further by seeking to extend the time horizons of institutional investors decision-making, by enabling them to factor in longer-term risks and returns, and explore how this relates to climate-related risks.

Policymakers can use financial regulations, accounting and disclosure requirements, technical support and convening power on best practice to lengthen the time horizons of institutional investment managers. Policymakers can also address accounting practices that may have a negative impact on the integration of climate-related risks in institutional investors' decision-making, by commissioning studies to investigate which type of accounting (historical, mark-to-market and fair value) is best suited for integrating longer-term risks and returns, including climate-related risks.

6.2.4 *Use convening power on tax incentives*

Challenge: Addressing the unattractive risk-return profile of low-carbon investments is a key role for policymakers, as also set out in chapter 4. As climate and carbon risk methodologies are not widely used in the market many climate-friendly investments are currently financially uncompetitive as the mainstream risk-return models that do not incorporate climate-related risks are relied upon in investment analysis. Tax incentives can alter institutional investors' decision-making to compensate for lower risk-adjusted returns.

Technical development: It is necessary to identify which types of tax incentives are suitable for different types of climate investments to attract institutional investors in Europe; this can vary by country. It is also necessary to make it easy for institutional investors to identify how the tax incentives applies to them to facilitate them incorporating the tax benefits – effectively an additional return – into their decision-making process.

Market response: Making investments more attractive by providing an additional return to investors will shift their decision-making, as they expand their investment analysis to also consider tax benefits of a climate investment in addition to its direct risk-return. The municipal bond market in the US provides an example of the successful use of tax incentives to increase investments into policy priority areas; in the case of the US that has been municipal infrastructure.

Role of policy: While the EC does not have direct power to provide tax incentives for investors to improve the risk-return profile of climate investments, the EC has strong convening power: it can get relevant national policymakers and market actors together. Additionally, it can issue and promote best practice guidelines. The EC is aiming to address the divergent tax regimes in Europe's capital markets under the Capital Markets Union agenda, illustrating the relevance of the EC addressing tax incentives for climate-friendly despite the lack of direct power.

6.2.5 *Include climate in stewardship best practice*

Challenge: The performance of fiduciary duty by asset owners, and the stewardship performance of investment managers is becoming increasingly important and is known as stewardship. Best practice stewardship codes are setting expectations and promoting good behaviours. However, initiatives are at the country-level and often, large investment managers will run mandates for asset owners across Europe, which makes European-wide best practice guidelines desirable. Moreover,

current guidelines do not sufficiently incorporate guidance on how to address climate-related concerns. There is also concern about the lip service in comparison to stewardship codes, where practical adherence can diverge from theoretical commitments.

Technical development: Best practice stewardship codes across Europe have been developed. The codes are typically comply or explain, meaning institutional investors provide a statement with details of each point in the code detailing how internal policies and practices comply with best practice or provide explanation as to why they differ. The next step required is to integrate climate-related factors in these best practice guidelines on a comply-or-explain basis. The relationship between extra-financial risks, such as climate-risks, and fiduciary duty asset owners must be fully explored.

Market response: Addressing this challenge is highly reliant on market actors responding and picking up the best practice guidelines to implement them in practice. In the UK, the Stewardship Code has 200 institutional investor responses. Institutional investors are also adopting equivalent codes across Europe.

Regarding fiduciary duty and how it relates to climate-related risks, there have been several market related developments of note. The Freshfields report in 2005 from the UNEP FI first explored this topic[193]; in 2015 the UNEP FI is putting together a new update of this work.[194] It has been argued across jurisdictions with differing law frameworks including several European countries that applying extra-financial risks such as climate-risks into asset owners' decision making is considered part of the fiduciary duty to their beneficiaries.

Role of policy: Policymakers can play a role in integrating climate considerations into stewardship best practice and facilitate a discussion on aligning stewardship codes (best practice) with climate issues across Europe. Integrating climate risks into engagement policies for investment managers in the Shareholder Rights Directive would support this. Regarding fiduciary duty and climate-related risks, there is a role for policymakers to support the market-led initiatives to explore this agenda. EU policymakers can also consolidate the conclusions on discussion in different jurisdictions in Europe to seek to harmonise best practice. The Commission has already recognised this: in 2014, they commissioned a study to look at fiduciary duty in the context of environmental resource challenges.[195]

6.2.6 *Mainstreaming long-term risk accounting and tools for carbon and climate risk*

Challenge: Current long-term risk assessment – particularly with regard to carbon and climate risk – still face methodological shortcomings. The assessments done to date are not integrated into investment tools and practices in a meaningful way, which means long-term carbon and climate risks are not seen as financially material by investors. Without these tools to measure climate-related risks, institutional investors are not able to measure the climate impact of portfolios and institutions; being able to measure this can be a driver for increased climate-friendly investment.

[193] http://www.unepfi.org/fileadmin/documents/freshfields_legal_resp_20051123.pdf
[194] http://www.unepfi.org/fileadmin/publications/investment/complying_with_fiduciary_duty.pdf
[195] https://www.ecn-eu.com/news/05/05/2014/856

Technical development: For long-term climate risk accounting to become a meaningful enabler in shifting capital to climate-friendly investments, they need to be associated with methodologies that can be (at least in parts) seamlessly integrated in existing mainstream Asset and Liability Management[196] tools. This is particularly challenging given the non-linearity and non-parametric nature of these risks. Risk accounting needs to become meaningful at asset- and portfolio level.

Market response: Market actors have a key role to play in integrating risk assessment. This applies at all levels. Investors need more tools. The initiative by Bloomberg in developing a beta *Carbon Risk Valuation Tool* leads the way in this regard and the goal to further develop this is promising. UNEP-Fi / GHG-Protocol are currently developing a guidance document, co-authored by the 2° Investing Initiative, Energy Transition Advisors, Calvert Investments, and others, on managing carbon asset risk for financial institutions. The current initiatives by Mercer in updating their strategy asset allocation and climate risk work, and broader research programmes such as the one under way by the Oxford University Smith School Stranded Assets Research Programme in the UK and CDC Climat in France are good examples.

Another market development for carbon risk accounting is provided by the Carbon Tracker Initiative, a UK-based think tank, who is publishing a series on 'carbon supply cost curves' for oil, gas and coal. The work identifies the potential high capital cost- high carbon projects and the companies linked to these projects. This enables investors to pinpoint the companies with which they wish to engage around capital management. This enables a dialogue around should the project be deferred or cancelled and the capital used for higher payouts to shareholders (see previous enabler on stewardship and engagement).

The availability of smart tools, coupled with a potential lengthening of investment horizon, could change the decision-making framework of institutional investors. However, if this shift will occur depends on the values these tools spit out: if the tools show investors that climate and carbon risks do not significantly impact financial performance they will not be incentivised to integrate climate and carbon risk in their decision making framework.

Policy response: Policy can influence the growth in long-term risk accounting in a number of different ways. First, policy makers can provide support to technical development in the area of long-term risk accounting. In addition, policymakers can play a role in the application of these risk tools. Here, it is worth noting the normative power the EU has globally, which implies that uptake of risk tools in the EU would be expected to influence developments elsewhere, particularly in emerging markets. This could extend to integrating carbon and climate risks into stress-testing requirements, such as IORP, although this is considered a longer-term play, as preliminary developments in climate-related risk methodologies are required. It also relates to integrating these risks into the own macro prudential policy framework, including regulation related to capital reserve requirements, collateral risk, the stress-testing of financial institutions by the Central Bank, and other related financial stability policy areas.

[196] Asset and Liability Management: managing risks that arise due to mismatches between the assets and liabilities to maximise return while being prudent in keeping assets to face liabilities.

6.3 Longer-term action plan: Shifting institutional investors' decision-making

The action plan for EU policymakers should be read as a basket of complementary actions, not a menu of alternatives. An overview of the actions and how they fit with the categories of barriers and enablers is provided in the table below. The action plan aims to be relevant and provide recommendations that are a good fit with on-going financial policy changes.

Table 6.4 Mapping policy options against relevant barriers

Barrier type	Barrier	Area for policy intervention	Key enabler for policymakers	Actions
Short investment time horizons	Shortened time frames arising from the investment management practices (performance review cycles, investment mandate periods and asset owners review periods)	Lengthening portfolio time horizons	Rules on risk models and investment mandates	6. Lengthening time horizons of institutional investors
Stewardship	Lack of integration of climate-related risk in stewardship practices. Fiduciary duty, voting and engagement processes do not sufficiently include climate	Stewardship code, best practice guidelines and fiduciary duty concept	Include climate in stewardship best practice	8.Integrate climate-related factors in stewardship practices
Lack of relevant climate-related risk and performance methodologies	Lack of tools and metrics for climate and carbon risk; uncompetitive risk-return of climate investments today when climate-related risks are not integrated	Mainstreaming long-term risk accounting and tools for carbon and climate risk; tax incentives	Accounting and disclosure requirements; tools to increase financial returns on climate assets	7. Explore the use of tax incentives on climate-friendly assets 9.Accounting and disclosure of financial institutions

6.3.1 Action #6: Lengthening time horizons of institutional investors

Challenge to address: The time frames of institutional investors matter for climate-friendly investment, as the majority of climate assets, especially climate-friendly infrastructure, are by nature long-term because of the high capex and long term costs associated with their development. Institutional investors' time horizons are shortened through investment managers' practices, financial regulations and available tools.

General idea: Policymakers can lengthen time horizons by influencing the performance review cycles of investment manager performance, investment mandates from asset owners to investment managers, review periods for asset owners and investment tools, such as market cap weighted indices and risk models. This can involve showcasing and promoting best practice in the market, and supporting the technical development of longer-term risk models and accounting rules that are designed to facilitate the integration of climate-related risks. Policymakers can also aim to ensure that they limit the shortening of institutional investors' time horizons in financial regulation.

Activities proposed (for EC unless otherwise noted):

a. **Support research on risk models with financial support for technical development and through promoting best practice in the market through knowledge sharing platforms**. The EC can subsequently explore reforming the rules around the time horizon of risk accounting and the nature of risk models.
b. **Promote best practice of asset owners by designing investment mandates to facilitate lengthening time horizons of their investment managers**.
c. **Explore the extent to which accounting rules**, particular the use of fair value compared to mark-to-market and historical approaches, **can be extended to integrate long-term factors**. This can be done through commissioning a study or organising discussion roundtables with leading accounting firms and associations, as at this stage, there is no exact recommendation on the nature of the recommended changes in accounting rules.
d. **Review how the use of cap-weighted equity indices as an investment tool for broad diversification can reinforce the direction of institutional investors' capital to non-climate-friendly investments**.
e. **Aim to avoid unintentional shortening of time horizons**, learning from the recent experience of Solvency II, **when developing future financial regulations**.

Overall assessment: The overall impact of this action on the EU budget is expected to be relatively small, as the action mainly focuses on using EU's convening power to promote best practice and provide technical and research support.

6.3.2 *Action #7: Explore the use of tax incentives on climate-friendly financial products*

Challenge to address: Addressing the unattractive risk-return profile of low-carbon investments is a key role for policymakers, as also set out in chapter 4. As climate and carbon risk methodologies are not widely used in the market many climate-friendly investments are currently financially uncompetitive as the mainstream risk-return models that do not incorporate climate-related risks are relied upon in investment analysis. Tax incentives can alter institutional investors' decision-making to compensate for lower risk-adjusted returns.

General idea: Tax incentives can complement the provision of technical support and demonstration investment (Action 1), credit enhancements (Action 2) and policy risk insurance (Action 3). Tax incentives have for example been a factor driving the large municipal bond market in the US; they can be provided to investors. While the EU does not have direct power to provide green tax incentives for investors to improve the risk-return profile of green investments, the EU has strong convening power: it can get relevant national policymakers and market actors together. Additionally, it can issue and promote best practice guidelines. The EU is aiming to address the divergent tax regimes in Europe's capital markets under the Capital Markets Union agenda, illustrating the relevance of the EC addressing tax incentives for climate-friendly despite the lack of direct power. Aviva, asset manager and insurance company with EUR300bn of assets under management, has suggested using tax incentives to grow the green bond market as part of the sustainable Capital Markets Union.[197]

[197] Aviva (2014) Sustainable Capital Markets Union Manifesto

Activities proposed (for the EC unless otherwise noted):

a. **Convene national policymakers and investors to roundtables to develop best practice guidelines on tax incentives for low-carbon investment**.
b. **Commission, publish and promote a best practice guide on low-carbon tax incentives for investors**; e.g. tax credits for green bond investors, or tax-free interest/earnings on climate-friendly investments

Overall assessment: As the tax incentives are not provided at the EU level, they would not have a direct budgetary impact. Moreover, by tapping into activities already occurring, the additional cost of this action is limited.

6.3.3 Action #8: Improve governance of institutional investors

Challenge to address: Best practice stewardship practices are becoming more prolific across Europe. These stewardship practices have potential to include climate considerations and become standardised between countries.

General idea: Policymakers can play a role in establishing stewardship best practice that integrates climate issues. This can include the use of convening power in the EU on industry best practice guidelines, as well as exploring how to integrate this in current EU-wide regulatory changes on governance, such as the Shareholder Rights Directive

Activities proposed (for the EC unless otherwise noted):

a. **Discuss engagement policy with institutional investors, as currently proposed under the Shareholder Rights Directive**. We recommend the proposal be extended to report on climate-friendly investments. However, as the window to influence the current situation changes to the Shareholder Rights Directive is closing, this is considered a longer-term action. In the first instance, this can be done with existing or non-standardised methodologies, with subsequent adoption of the standards proposed in Action #6 and 9.
b. **Use convening power to facilitate a discussion on best practice stewardship codes and consider the potential for a European Union level best practice stewardship code that adopts the comply and explain policy** (action relevant once standards have been adopted for investors to report on climate investments).
c. **Follow up on commissioned study on fiduciary duty and environmental resource challenges** (due to complete in late 2015) **by engaging with market actors how asset owners and investment managers can act upon the findings**. The Commission can then subsequently promote best practice in this area.

Overall assessment: The impact on the EU budget of this action is expected to be relatively small. As the proposed actions relate to regulatory changes and research efforts already underway, fixed costs of initiating new regulatory changes and research efforts are avoided.

6.3.4 *Action #9: Accounting and disclosure of financial institutions*

Challenge to address: The current lack of easily usable long-term risk assessment (action 6), particularly of carbon and climate risk, combined with the lack of standardised disclosure of climate metrics (Action 5) makes it challenging for financial institutions and investment managers to account for and disclose on their climate performance. This again makes it challenging for asset owners to hold investment managers to account for the climate performance of their portfolios.

General ideas: Policymakers can promote accounting and disclosure of the climate performance of portfolios and financial institutions through demonstrating the use of nascent methodologies; promoting of best practice in the private sector and integrating climate-related information in accounting and disclosure regulations.

Activities proposed (for the EC unless otherwise noted):

a. **Strengthen accounting and disclosure requirements for financial institutions**, such as those regulated by the IORP Directive, **to include climate performance metrics and carbon risk assessment**.
b. **Integrate 2°C investing criteria**, such as the criteria currently being explored in the context of the G7, **into investment mandates for public financial institutions to ensure their investing and loan book are broadly aligned with climate policy goals**.

Overall assessment: The impact on the EU budget of this action is expected to be relatively small, as the main costs of these actions arise from developing regulations and there are few costs to the EU at the implementation stage. Moreover, as the proposed actions relate to integrating with existing regulations, the fixed costs of initiating the development of new regulation are avoided. Tapping into efforts already underway in this area in the context of the G7 further minimises additional costs to the EU budget.

7 Impact analysis of the action plans

Impact analysis helps ensure effective use of public funds. Understanding the impact of policy actions on mobilised private finance is particularly relevant in the context of international climate negotiations.

Considering the current situation in the EU it would be desirable for policymakers to be able to analyse the impact on economic growth and employment. However, this is out of the scope of this report: the impact analysis here will focus only on the mobilised investment from institutional investors for climate-friendly assets.

This study identifies three dimensions for impact analysis that are considered of interest to policymakers:

1. Magnitude: how much capital is mobilised from institutional investors, and what this means for investment on the ground in the real economy;
2. Location: within the EU and globally; and
3. Timing.

The following sections discuss the magnitude, location and timing of the impacts in more detail.

7.1 Magnitude of impact of the proposed policy actions

Increased investment in climate-friendly assets on the ground in the real economy is the aim of increasing private finance for climate. There are two different layers of analysis required to link the proposed policy actions:

1. Analyse the impact of the proposed actions on increasing the amount institutional investors are allocating to climate-friendly fixed income and equity investments.
2. Analyse how much this increase in capital flow increase capital expenditure for climate-friendly assets.

7.1.1 Impact on institutional investors climate-friendly investment

The analysis in chapter 2 on the current share of climate-friendly investments in Europe's institutional investors' portfolios provides a starting point for this impact analysis.

Impact of policy actions on capital from institutional investors can be seen in two main ways:

- Impact on the decision to invest or not
- Impact on the amount invested

Method 1: Using existing data on climate-friendly investments and policy actions

Methodological approaches to do this can either rely on qualitative case studies or studies using quantitative econometrics.[198] At this stage, there are difficulties in both these approaches relying on

[198] OECD (2015). Public Interventions and Private Climate Finance Flows: Empirical Evidence from Renewable Energy Financing. Available from: http://www.oecd-ilibrary.org/environment/public-interventions-and-private-climate-finance-flows-empirical-evidence-from-renewable-energy-financing_5js6b1r9lfd4-en

existing data, particularly for quantitative econometric studies, as few of the proposed actions have been implemented previously in the climate sector to provide a sufficient sample size for such studies. Moreover, due to difficulty in measuring institutional investors' exposure to climate-friendly investments – as established in chapter 2 of this report - it is particularly difficult to tease out the impact of the policies on institutional investors alone because of the additional granularity of data required to do this rather than analyse the impact of policies on overall investment.

A recent study from the OECD (2015) [199] supports this conclusion, stating that: "at this stage, further disaggregation of the analysis [of the impact of public finance and public policy interventions on renewable energy investments globally and for developing countries] and its results for individual public finance instruments (grants, loans, equity) and/or individual countries or group countries (e.g. low-, lower middle-, upper middle-, high income) is not possible. This is because the sample size (number of observations) for such sub-categories would be too small to produce statistically significant results." Moreover, the report concluded that analysing the impact for other categories of climate investment than renewable energy was not possible due to data limitations.

In sum, although providing a robust quantitative climate-specific investment impact analysis of each of the proposed actions of this report would add great value, it is difficult to do so in practice. The primary reason for this is the lack of data.

Method 2: Extrapolating from existing data in non-climate priority investment areas

Extrapolating from existing data in non-climate priority investment areas is the other possibility for estimating impact for the proposed actions, as the actions proposed in this report – particularly the short-term actions - mainly rely on extending well-proven financial sector tools, instruments and policies to climate-friendly investments. As policymakers, in the European Union and elsewhere, have applied these tools, instruments and policies to other policy priority areas for decades there is a lot of historical data on impact.

Additional, climate-specific analysis might not be required if the climate-friendly investments offered on the back of the use of these policy tools and instruments are financially competitive. For example, a climate-friendly investment that is credit enhanced by the European Investment Bank (EIB) to an AA-rating should be equally attractive – or more - to an investor as any other EIB credit enhanced AA-rated investment. Experience from the green bonds market in particular suggest the demand for such policy-supported climate-friendly investment opportunities, and therefore the impact of the policy on increasing investment, might even be larger for climate-friendly than for non-climate-friendly investment with the same financial characteristics: green bonds are typically more oversubscribed than other bonds with equal financial characteristics.

Despite its limitations, this methodology is considered the most robust option for impact analysis of the proposed Action Plan.

[199] OECD (2015). Public Interventions and Private Climate Finance Flows: Empirical Evidence from Renewable Energy Financing. Available from: http://www.oecd-ilibrary.org/environment/public-interventions-and-private-climate-finance-flows-empirical-evidence-from-renewable-energy-financing_5js6b1r9lfd4-en

Extending existing impact analysis of policy actions to this report's climate-friendly action plan

Action 1: Increase the volume and acceptance of climate-friendly financial products

Demonstration issuance has proven successful for green bonds: scaling up the effort of the EIB and spreading the practice to other institutions is expected to continue to have an impact. Cornerstone investors, promotion of private sector best practice and technical support programmes are all well proven actions the EU, and the EIB in particular, uses to drive investment. Anecdotal evidence supports this general finding. The halo effect of the European Investment Bank was for example reportedly seen with the Castor Gas Project, one the projects financed by the Project Bond Initiative.[200] The Project Bond Initiative itself has had a demonstration effect by making institutional investors more alert to the opportunities of investing in infrastructure.[201]
The Investment Plan illustrates that EU policymakers recognise the impact of technical support, as the Plan includes setting up an Investment Hub.

Action 2: Building on existing credit enhancement initiatives
Various credit enhancement initiatives are widely used by EU policymakers, illustrating that they are considered to have a significant impact on increasing investment to policy priority areas by attracting private finance. For example, the main rating agencies (Moodys, S&P, Fitch) have stated that the Project Bond Initiative has a positive impact on credit ratings.[202]

More specific estimates of the impact of this for climate-friendly investment can be found by looking at the quantitative estimates for existing credit enhancement initiatives in the EU. This is easiest for actions that propose to integrate existing initiatives; in particular the Project Bond Initiative and the European Fund for Strategic Investments. Alignment of the Project Bond Initiative is expected to have a leverage ratio of 5-7, using leverage estimates published for the pilot phase of the Project Bond Initiative.[203] This same leverage ratio would be applicable for a Green Project Bond Initiative.

Aligning the European Fund for Strategic Investments with the EIB's climate policy would require 25% of the Fund to be allocated to climate investments. Considering the total of EUR315bn of expected mobilised investment, this should mobilise EUR80bn for climate.[204] The Commission expects the Fund to have a leverage ratio of 1:15. [205] Integrating with existing initiatives is considered crucial to shift institutional investor capital at the required scale, as solely relying on specific initiatives for climate is considered to be too small scale: however, the latter can be an important complement.

Action 3: Explore the potential of policy risk insurance
It is too early to estimate how much climate-friendly investment could be mobilised through this action point, as policy risk insurance is at an early conceptual stage and there is no available instrument in the market to directly extrapolate from. The proposed action in this report only relates to exploring the potential of policy risk insurance for the EU – rather than proposing the implementation of policy risk insurance – this level of impact analysis is not yet relevant. Based on feedback from finance

[200] http://ec.europa.eu/dgs/economy_finance/evaluation/pdf/mid_term_eval_pbi_pilot_phase_en.pdf
[201] Ouaki (2013). Connecting Europe – Infrastructure Investment strategies, DG Mobility and Transport. 27 November 2013. Available from: http://inea.ec.europa.eu/download/events/2013PPPworkshop/presentations/3ouaki.pdf
[202] Deutsche Bank (2013) Project Bonds Initiative. http://www.dbresearch.com/PROD/DBR_INTERNET_EN-PROD/PROD0000000000320937/Project+Bond+Initiative%3A+Project+selection+the+key+to+success.pdf
[203] Moody's (2014). Pilot phase of the Project Bond Initiative.
[204] http://ec.europa.eu/priorities/jobs-growth-investment/plan/financing/index_en.htm
[205] http://ec.europa.eu/priorities/jobs-growth-investment/plan/financing/index_en.htm

professionals and investors, however, policy risk is one of their main concerns, which suggests that the impact of a future policy risk insurance scheme for climate policies in the EU could have a highly significant impact.

Action 4: Supporting green securitisation

The impact of the parts of this action area that focus on standardisation and developing structures and frameworks for market actors to subsequently use is difficult to measure as it is indirect. As it can be subsequently used widely in the market it is expected to have a significant impact. It is, however, possible to estimate the expected impact of the action points that will have a more direct impact, particularly the proposed aggregation and credit enhancement facility for green asset-backed securities. The leverage ratio depends on the structure adopted for an aggregation and credit enhancement vehicle for green securitisation. Using the estimates published for the joint guarantee and securitisation initiative for SMEs suggest a leverage ratio between 1:5 and 1:10.[206] The potential for leverage is more significant than for the Project Bond Initiative.

Action 5: Accounting and disclosure of companies and financial products

The potential impact of improved lower transaction costs on accounting and disclosure on increasing investment is recognised amongst financial policymakers in the EU, as evidenced by the focus of streamlining accounting and disclosure for SMEs and harmonisation of various standards under the recent proposals for the Capital Markets Union. [207] Quantitative estimation of the impact of improved accounting and disclosure and standardisation is, however, difficult as it is highly reliant on market uptake in the absence of mandatory regulation of these and addresses transaction costs rather than risk-return directly.

While policymakers can play a role in facilitating this, the ultimate impact depends on the response from institutional investors; whether they will use the tools provided by policymakers or not.

Action 6: Lengthening time horizons of institutional investors

Extrapolating from existing policies is difficult for this action as it is a systemic change with lack of equivalent precedence in the market. The absolute theoretical maximum lengthening of time horizons is, however, identifiable. Based on the previously cited study from the World Economic Forum, this report estimate that the maximum amount this action area can have on long-term investment is to roughly double the amount of capital in institutional investors' portfolios available for long-term investment. [208] The rationale for this is that this is the share of assets under management the WEF study found was allocated to shorter-term investments than what was required by asset owners' liabilities and regulatory requirements. However, it is considered unrealistic for the proposed policy actions to completely alleviate short-termist tendencies by investment managers; therefore, the impact is expected to be significantly smaller.

This action area has an indirect impact on increasing climate-friendly investment; it facilitates integration of climate-related risks (Action 9) and can make climate-friendly investment possible, but it is not a sufficient, on its own, to increase climate-friendly investment.

[206] http://ec.europa.eu/europe2020/pdf/eib_en.pdf
[207] http://ec.europa.eu/finance/consultations/2015/capital-markets-union/docs/green-paper_en.pdf
[208] WEF (2012). Measurement, Governance and Long-term Investing.

Action 7: Explore the use of tax incentives on climate-friendly financial products

As the EU would only play a convening role on the proposed tax incentives for climate-friendly investments, it is difficult to estimate an impact, as this would depend on the magnitude of the tax incentives adopted by member states. Once an estimate of this can be obtained there is potential to estimate how much it could impact investments by extrapolating from the use of tax incentives for municipal bonds in the US.

Action 8: Improve stewardship of institutional investors

The impact of this action on increasing climate-friendly investment from institutional investors takes a different route than the other proposed actions. The integration of climate concerns into engagement and voting practices allows institutional investors to increase their exposure to climate-friendly investment *after* the investment decision is made by influencing companies to become more climate-friendly. Extrapolating from existing policies is difficult for this action as it is a systemic change with lack of equivalent precedence in the market.

Action 9: Accounting and disclosure of financial institutions

The potential impact of improved lower transaction costs on accounting and disclosure on increasing investment is recognised amongst financial policymakers in the EU, as evidenced by the focus of streamlining accounting and disclosure for SMEs and harmonisation of various standards under the recent proposals for the Capital Markets Union. [209] Quantitative estimation of the impact of improved accounting and disclosure and standardisation is, however, difficult as it is highly reliant on market uptake in the absence of mandatory regulation of these and addresses transaction costs rather than risk-return directly.

The proposed action points here will impact on investment allocations only indirectly by enabling institutional investors to integrate climate-related risks into their decision making. While policymakers can play a role in facilitating this the ultimate impact depends on the response from institutional investors; whether they will use the tools provided by policymakers or not. Extrapolating from existing policies is difficult for this action as it is a systemic change with lack of equivalent precedence in the market.

Comparative analysis of the impact of the individual actions

In sum, the extrapolation approach can give an indication of order of magnitude of impact for some of the shorter-term actions with more of a direct impact. For the more structurally changing actions, this is not possible. Comparing the potential impact across different actions is difficult due to the lack of ability to comparatively estimate impact: some are by their nature more uncertain and more indirect (action 6, 8 and 9) – although this does not ultimately imply a lower impact.

In terms of direct impact of the proposed actions, Action 2 on credit enhancement is expected to have the largest impact in the short-term. This is justified by risk-return being cited to be investment managers' key concern in portfolio management (Figure 2.3). A potentially large impact of credit enhancement initiatives to drive climate-friendly investments in the EU at this point in time is further justified by the availability of relatively large-scale credit enhancement initiatives, such as the PBI and EFSI, into which a climate-friendly preference can be integrated. Action 4 on green securitisation, and

[209] http://ec.europa.eu/finance/consultations/2015/capital-markets-union/docs/green-paper_en.pdf

Action 5 covering accounting and disclosure are also expected to have large-scale impacts. The key rationale behind this is that they are topics on the Commission's agenda that are also systematic enablers that provide structures that can be picked up by the market. They also address a structural constraint to bank lending for climate-friendly investments.

In addition, more general qualitative conclusions can inform EU policymakers' evaluation of the action plan:

- **A key conclusion of this report's impact analysis is that the proposed financial sector policies are complementary to policies to address risk-return in the real economy**. It became clear that they will not have enough impact, in terms of mobilising private capital, on their own. Workshops with finance professionals, including institutional investors, held in London and New York for the purpose of this project stressed this point. The OECD (2015) provided a similar conclusion stating that: "renewable energy policies in destination countries (here represented by [feed-in tariffs]) play an important role (…) for both the investment decision and the volume of investment" and "in some cases the effect of such measures is greater than the impact of public finance". [210]
- **It is expected that there is a synergy between many of the different policies, meaning that the impact of an individual action increase if it is implemented in conjunction with another action.** Therefore, it is crucial that European policymakers do not interpret the proposed list of actions from this report as a menu of options: it should be read as a basket of complementary actions, not a menu of alternatives.
- **It is also worth highlighting the potential difference between theoretical impact of policy and the actual impact of policies once they are implemented.** This is particularly applicable to more incentive-based policy actions; for example the category of accounting and disclosure (actions 5 and 9). The potential impact but the development of climate standard can differ markedly from the actual if the market does not follow on with uptake of the developed standards. This is recognised by the European Commission also for other non-climate-related initiatives: "the leverage will depend on the final choices made by Member States and on the take up by private sector financial institutions." [211]
- **The indirect impacts of the proposed action plan can be much more extensive.** The actions from EU policymakers can provide a blueprint to follow for other regions, countries and multilateral development banks to copy. For example, although the direct impact of the European Investment Bank taking a cornerstone investor role in a green bond deal is limited to the size of that specific deal, it can have a much larger indirect impact if other similar public finance institutions copy this model and start providing cornerstone investment to green bond deals in their countries or regions (see more in section 7.2).

7.1.2 Impact on the ground in the real economy

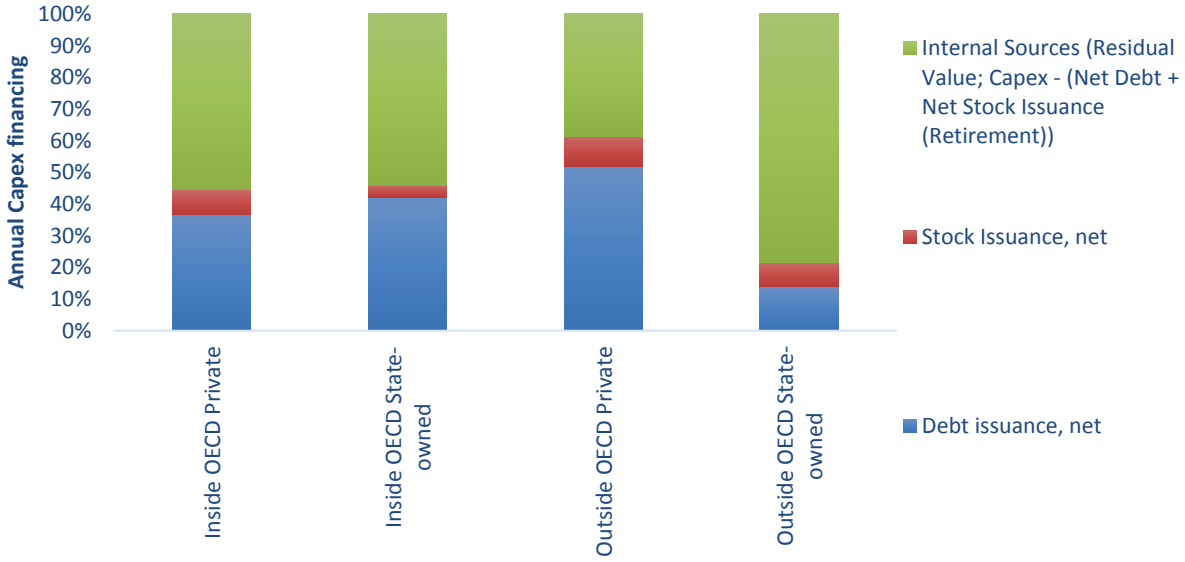
Investment in financial assets does not translate directly into investment on the ground in the real economy, the end goal of policymakers mobilising climate investment from the private sector. How direct or indirect the link is between investment in a financial asset and the real economy varies across different asset categories:

[210] OECD (2015). Public Interventions and Private Climate Finance Flows: Empirical Evidence from Renewable Energy Financing. Available from: http://www.oecd-ilibrary.org/environment/public-interventions-and-private-climate-finance-flows-empirical-evidence-from-renewable-energy-financing_5js6b1r9lfd4-en

[211] http://ec.europa.eu/europe2020/pdf/eib_en.pdf

- *Alternatives* (direct investments; private equity, infrastructure projects etc.) investment translate almost directly into investment on the ground in the real economy;
- *Fixed income*: investment in the primary bond market translates almost directly to investment in the real economy; in the secondary bond markets, the impact in the real economy is indirect;
- *Equity:* investment in equity – unless in special purpose vehicles dedicated to projects - has an indirect impact on investment in the real economy, both in primary and secondary markets. However, equity investors can also influence investees' capital through voting power. This applies mostly to listed equities portfolios, for which shareholders have their say on the corporate strategy including the allocation of retained earnings.

Figure 7.1 From the issuer side - raising debt is the biggest opportunity for investors – Share of capital expenditure financed through debt, equity, and internal sources of top 25 listed power companies 2002-2012



[Source: 2° Investing Initiative analysis for the World Energy Investment Outlook]

In addition to the difficulty of translating financial investment to investment in the real economy, being able to estimate the impact on increased financial investment (section 7.1.1) is a requirement to be able to measure the impact on investment in the real economy. Therefore, the latter is considered not to be feasible at this stage, as a robust quantification of the impact of the proposed policies on financial investment for institutional investors is not yet feasible.

A key point to note is that having indirect impacts on investments in the real economy does not mean it is less important. Refinancing is a key role of bonds – this is how the capital pipeline works. It is important that policy makers recognise this when seeking to mobilise investment in the capital markets in order to increase investment on the ground, so that investment channels whose impacts are less direct and therefore more difficult to measure and prove additionality for, are excluded from policy support.

7.2 Location of impacts: within the EU and globally

The analysis of where impacts of the proposed actions are expected to occur is split into direct and indirect impacts, as where they are expected – within the EU or globally – differs.

The majority of climate investment needed globally is outside the EU, as set out in figure 1.4 in the introduction to this report. This implies that the extent to which the proposed actions in this report for EU policymakers can have an impact on climate-friendly investment also outside the EU is important. A key conclusion of this report is that the impact of the proposed Action Plans can be global, and have a significant positive impact on increasing climate-friendly investment in developing and emerging economies.

7.2.1 Direct impacts

The location of the direct impacts of the policy action depends on whether it works on the investment level (short-term action plan, chapter 5) or more on the investor side (medium to long-term action plan, chapter 6). The policy actions that impact at the investment level will primarily have an impact within the EU, as most of the supported investments are located in the EU. This applies to increasing acceptance of climate-friendly financial products (Action 1), building on existing credit enhancement initiatives (Action 2), exploring the potential of policy risk insurance (Action 3), supporting green securitisation (Action 4), accounting and disclosure of companies and financial products (Action 5) and exploring the use of tax incentives on climate-friendly financial products (Action 7). The policy actions occurring at the investment level, lengthening time horizons of institutional investors (Action 6), improving governance of institutional investors (Action 8) and accounting and disclosure of financial institutions (Action 9), will have more of a global impact as the EU's institutional investors invest globally.

7.2.2 Indirect impacts

Indirect impacts are expected to occur both within the EU and globally. The indirect impact on mobilising institutional investors capital for climate-friendly investments is expected to go beyond EU level, as the EU has strong normative power globally, and can therefore take an active role in spreading policy practices to other regions. Moreover, this diffusion of policy practices can occur without the EU actively seeking to distribute its policy practices, as other countries look to the EU for examples of policy actions to replicate. Although the specific actions in the action plan are strongly tailored to the European context, the broader action areas have relevance globally. However, quantifying how significant this, more indirect, global impact of the proposed action plan will be, is difficult.

The largest impact is expected outside of Europe for actions related to accounting and disclosure, both at the company level (action 5), financial product level (action 5) and portfolio level (action 9). The EU's strong normative power globally means it can play a key role in ensuring that the standards proposed to be developed for climate-friendly investment in the EU, such as standards for green bonds, are used also outside of Europe. The proposed action for green securitisation could also have a significant global impact, as also here it is proposed that the EU develop standards (for loan contracts). Securitisation is especially important in developing countries where the size of low-carbon investment even smaller than in the European Union.

7.3 Timing of the impacts

Another point to highlight is that concluding on the timing of impact over the proposed actions differs from the conclusion made on the timing of policy actions for the Commission.

7.3.1 Timing of the policy actions

The timing of each of the proposed action areas – short-term or medium-long term – are set out in the main body of the report, based on the current EU policy agenda. Policy risk insurance (action 3) is in this respect somewhat of a divergence, however, as de-risking climate-friendly is on the EU agenda, and policy risk emerged from consultations with stakeholders as a main risk holding back investment, exploring/not implementing policy risk insurance was considered a short-term opportunity.

7.3.2 Timing of policy impacts

The timeline of the impacts depends on their nature. This report identifies three categories of timing depending on whether the policy action point relates to an incremental or systemic change:

1. **Integrating climate into existing structures**: these action points are identified as having the shortest time period from policymakers picking up the action point to impact. This applies to action points such as the European Investment Banks taking a cornerstone investor role, and aligning the PBI, EFSI, joint SME Initiative and existing technical support programmes, such as the Investment Hub, with EU climate goals.
2. **Setting up new structures specific for climate support**: These action points are considered to have a slightly longer time period from policy decision to impact, as the implementation period will be longer than for the action points that seek to integrate climate in existing structures. This applies to action points such as a green securitisation initiative that follows the model used for the SME Initiative, and a Green Project Bond Initiative that follows the model used for the Project Bond Initiative.
3. **Structural changes**: These action points are considered to have the longest time period from policy decision to impact, as structural changes are more extensive and do not have a blueprint model to follow as is the case for the new structures (point 2 above). This applies to Action 6 of lengthening time horizons of institution investors; Action 8 of improving stewardship of institutional investors; and Action 9 of accounting and disclosure of financial institutions. It is also considered to apply to Action 3 of policy risk insurance.

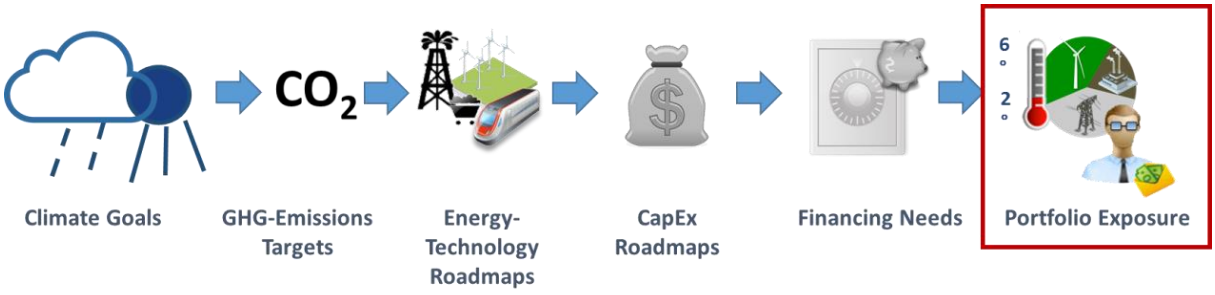
This split of timings implies that the timing of impacts will also vary within a given action area. For example, within Action 2 of building on credit enhancement initiatives there are action points both for integrating climate into existing structures and for setting up new structures specific for climate support.

8 Appendix 1: From climate goals to institutional investors' portfolios

Key messages:

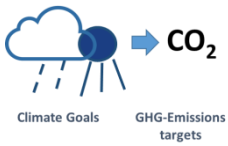
- Global and EU climate goals can be linked to institutional investors' portfolios by connecting climate goals with GHG-emissions and energy-technology roadmaps. These roadmaps can then be translated into capital expenditure roadmaps, which in turn can be associated with financing needs by asset type.
- There are currently a number of gaps in this chain. This arises from low granularity and limited coverage of technology and capital expenditure roadmaps, and a difficulty in translating an increase in financial investments to impacts in the real economy.

Figure 9.1 A conceptual framework for connecting climate goals to institutional investors' portfolios



[Source: FtF]

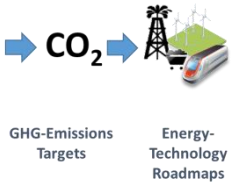
8.1 From climate goals to GHG-emissions targets



In the context of the 2° C global climate goal, the EU has set itself targets for GHG-emissions reduction, renewable energy and energy efficiency targets.[212] For 2020, the target is to reduce overall greenhouse gas emissions from its Member States by 20% compared to 1990 levels, increase the share of renewables to 20%, and increase energy efficiency by 20%.[213] On October 24, 2014 the European Council concluded on the EU's midterm climate and energy targets under the 2030 Climate and Energy Framework: 40% domestic reduction in GHG emissions, minimum 27% of energy consumed from renewable sources and reduced energy consumption due to increased energy efficiency of at least 27% by 2030 (compared to 1990). [214] In its Roadmap to 2050, the EC formulated a goal of GHG-emissions reduction by 80-95% (base year 1990) and presented for the first time a comprehensive, economy-wide vision for how Europe can carry out the transformation to a clean, competitive and climate-friendly society.[215]

[212] EC webpage (2014). The 2020 climate and energy package. Available at: http://ec.europa.eu/clima/policies/package/index_en.htm
[213] These targets build on the first round of targets were articulated in the context of the Kyoto Protol in 1997, with an 8% target below base year levels (1990 in most cases).
[214] Council Conclusion on 2030 Climate and Energy Policy Framework. http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/ec/145356.pdf
[215] EC (2011). A Roadmap for Moving to a Competitive Low-carbon Economy in 2050, COM(2011) 112 final.

8.2 From GHG-emissions targets to energy-technology roadmaps[216]



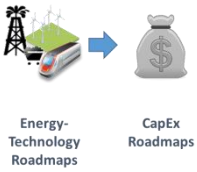
Implementing GHG-emissions targets in practice requires an understanding of the associated energy, industrial, and technology mix that enable GHG reductions. The Oxford Smith School Stranded Assets Research Programme has identified nearly 80 different scenarios that set out the energy-technology roadmaps either at national or international level.[217] The scenarios show a wide degree of divergence on the level of granularity (country, sector, company), time horizon (from less than <7 years to >51 years), and approach (quantitative or qualitative).[218]

The most prominent global scenarios are those of the IEA,[219] although alternative global scenarios have also been developed by environmental NGOs and research organisations such as Greenpeace,[220] WWF/Ecofys,[221] and the World Energy Council.[222] These usually distinguish themselves by challenging the prominent role that Carbon Capture and Storage (CCS) and nuclear power plays in the IEA scenarios, the impact of energy savings, and putting emphasis on the relative contribution of shifts in transportation patterns. For Europe, the EC has published an energy-technology roadmap for 2050.[223] Similar to other scenarios at international level, the EC roadmap provides two trend scenarios (Reference scenarios and Current Policy initiatives scenarios, updated for changes in policies following Fukushima) and five 'decarbonisation scenarios' (High Energy Efficiency, Diversified supply technologies, High renewable energy sources, delayed CCS, low nuclear). Specific scenarios are also sometimes developed at country level, but are not available for all EU Member States.[224]

[216] The term energy-technology roadmaps is based on the terminology of the IEA and also encompasses non-energy related sectors (i.e. agriculture etc.). While it may be misleading, the term was chosen here to ensure a consistent terminology with the understanding that it also refers to non-energy related technologies and sectors.
[217] Oxford Smith School Stranded Assets Research Programme. http://www.smithschool.ox.ac.uk/research/stranded-assets/
[218] Caldecott, Ben et al. (2014). "Stranded Assets and Scenarios"- Discussion Paper. http://www.smithschool.ox.ac.uk/research/stranded-assets/Stranded%20Assets%20and%20Scenarios%20-%20Discussion%20Paper.pdf
[219] The IEA has developed two scenarios in line with 2° C climate goals, the 450 scenario for the World Energy Outlook, covering 2014-2035 and the 2DS for the Energy Technology Perspectives, covering 2014-2050.
[220] Greenpeace (2012) "Energy (R)evolution".
[221] WWF/Ecofys (2011) "Energy Report".
[222] World Energy Council (2013) World Energy Scenarios.
[223] EC (2011) Energy Roadmap 2050, COM(2011) 885/2
[224] For example, the Energy Research Centre of the Netherlands (ECN) established several scenarios to discuss the different routes towards a 'clean' Dutch economy (reducing carbon emission in 2050 compared to 1990 with 80%). The "Gone Green" scenario produced by the UK National Grid simulates the transition pathway of UK's energy system with the same emission target by 2050. The National Energy Board of Canada started the project "Canada's Energy Technology Future" in 1998 and revises it every two years. The aim is to provoke strategic thoughts about the range of possible futures in energy technologies and systems, and improve the government's long-term planning capabilities. There are also several scenarios built around China. The prominent examples are the Bloomberg New Energy Finance "The future of China's power sector", which estimates China's energy mix under different scenarios in 2030; the CITI "Peak Coal in China" with focus on China's coal consumption by 2030; and Scenarios produced jointly by the Lawrence Berkeley National Laboratory and the China Energy Group which analyse the role of energy efficiency policies in transitioning China to a lower emission trajectory and meeting its intensity reduction goals.

References: World Energy Council, *World Energy Scenarios: Composing Energy Futures to 2050*, 2013 ; ECN & PBL, (2011), Verkenning van routes naar een schone economie in 2050, Hoe Nederland klimaatneutraal kan worden, Energieonderzoek Centrum Nederland (ECN) en Planbureau voor de Leefomgeving (PBL), Den Haag, rapport ECN-O- -11-076 ; National Grid: *UK Future Energy Scenarios* (annual report); Natural Resources Canada (2000), *The Energy Technology Futures Project: Scenarios to 2050*
Bloomberg New Energy Finance (2013), *The Future of China's Power Sector*; Citi Research (2013): *The Unimaginable: Peak Coal in China*, LBNL & China Energy Group (2011), *China's Energy and Carbon Emissions Outlook to 2050*

8.3 From energy-technology roadmaps to capital expenditure roadmaps



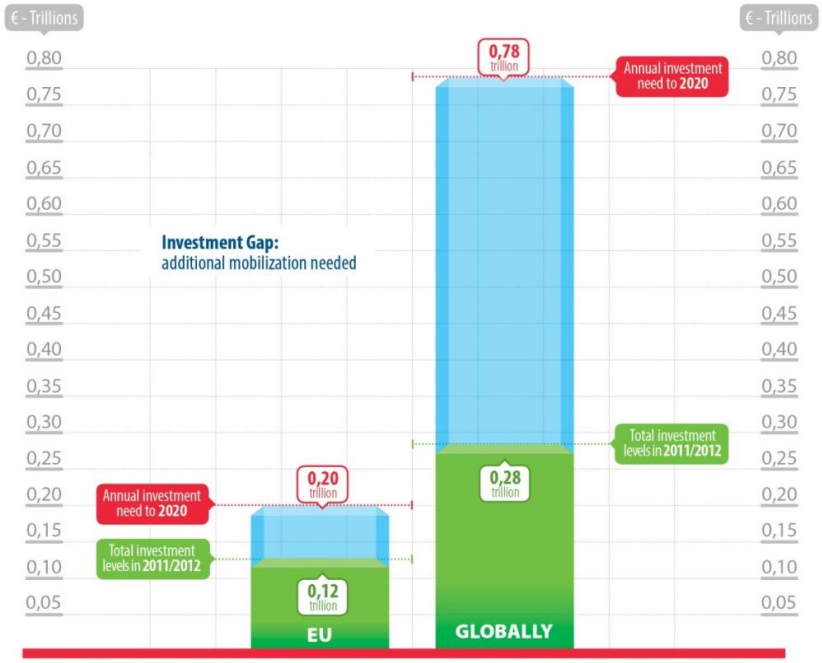
Energy-technology roadmaps are increasingly being turned into capital expenditure roadmaps, focused on defining the investment needs to realise the energy infrastructure of a 2° C world. The most prominent organisations currently developing investment roadmaps are the IEA[225] and the World Energy Council[226] (energy investment needs), the OECD (infrastructure investment),[227] and Frankfurt School/ Bloomberg New Energy Finance (low-carbon energy investments) (Figure 9.2).[228]
The following briefly summarises some of the major issues with current capital expenditure roadmaps:

- *Missing sectors and timeframes*: many capital expenditure roadmaps exclude sectors that are significant from both a climate change and finance sector perspective. For instance, according to this study's estimations, roughly 30% of the climate-relevant market capitalisation is not covered by the IEA roadmaps (e.g. airports, road infrastructure, agriculture). [229]
- *Most investment roadmaps do not distinguish different types of capital*: providing an indication of the breakdown by asset class (debt, equity) of capital expenditure roadmaps could be helpful to investors.
- *Uncertainties:* A big challenge for capital expenditure roadmaps is the high degree of uncertainty associated with issues such as the changes in capital costs and technology

At the EU level, the Commission's Impact Assessment of the 2030 Climate and Energy Framework estimates investment needs at EUR 193 billion per year for the period 2011-2030 (excluding transport).[230] This estimate refers to investments needed to modernise ageing infrastructure and avoid lock-in of inefficient technologies that would hamper reaching the Union's 2030 climate and energy targets.[231] Further, the EC (2014) impact assessment on the 2030 climate and energy package[232] finds that annual investment needs to finance the 40% emission reduction target differ substantially between Member States: additional investments in the range of EUR3.1bn to EUR7.6bn per year will be needed in wealthier States, and up to three times more (EUR11bn to EUR21bn) in EU Members States with lower GDP per capita (<90% of EU average). As evident from the figure below, there is a large gap between the amount of climate investment needed and current investment levels.

[225] IEA (2014). Special Report: "World Energy Investment Outlook".
http://www.iea.org/publications/freepublications/publication/WEIO2014.pdf
[226] World Energy Council (2013). "World Energy Scenarios: Composing Energy Futures to 2050".
[227] OECD (2011). "Strategic transport infrastructure needs to 2030".
[228] Frankfurt School / BNEF (2014). "Global Renewable Energy Investment Trends 2014".
[229] 2° Investing Initiative (2014). UNEP Inquiry study
[230] EC (2014). Impact Assessment: A Policy Framework for Climate and Energy in the Period from 2020 up to 2030.
http://ec.europa.eu/clima/policies/2030/docs/swd_2014_xxx_en.pdf
[231] Council Conclusion on 2030 Climate and Energy Policy Framework.
http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/ec/145356.pdf
Note that this figure does not include funding needs for the whole range of energy efficiency measures needed to meet the EU-wide energy efficiency target of 27% as set by the Council Conclusion on Oct 23
[232] EC (2014) Impact Assessment: A Policy Framework for Climate and Energy in the Period from 2020 up to 2030.
http://ec.europa.eu/clima/policies/2030/docs/swd_2014_xxx_en.pdf

Figure 9.2 Global and European climate finance levels versus future investment needs



[Source: FtF consortium based on CPI, IEA, EC data[233]]

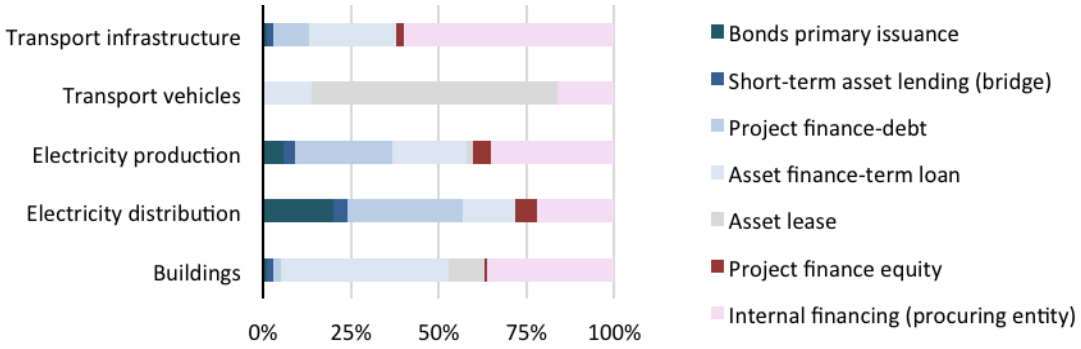
8.4 From capital expenditure roadmaps to financing needs roadmaps

Capital expenditure roadmaps do not provide sufficient guidance for the financing and investment decisions of institutional investors. Turning capital expenditure roadmaps into roadmaps for financing needs requires that capital expenditure volumes are broken down by types of capital requires – seed funding, public equity, public debt and so on. This can be estimated based on the different stages of technology development.

There have been attempts in the market to provide such roadmaps for financing needs. Barclays and Accenture (2011) developed a European scenario for dealing with the financing of a sample of technologies in power production, road transport, and buildings efficiency until 2020.[234] The scenario is based on the analysis and extrapolation of past transactions on these technologies. The authors identified cumulated financing needs of €350 billion in technology development and €1.65 trillion in technology procurement (Figure 9.3 and Figure 9.4) Equity issuance plays a key role in financing development, while retained earnings, loans, and bonds are the primary sources of financing for procurement. To deliver, the finance sector is expected to develop green seed capital, venture capital, and private equity funds to finance innovation, mobilise equity and bonds underwriting businesses to provide expansion and procurement capital, and develop the capacity to originate loans for small-scale projects.

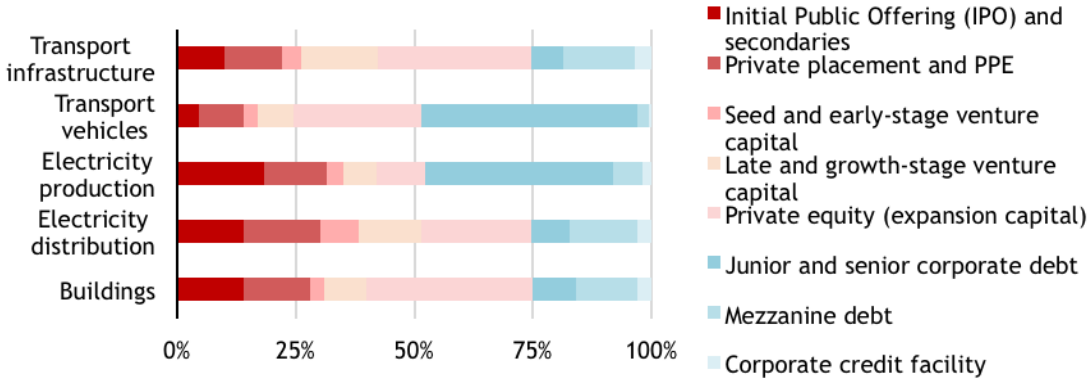
[233] CPI (2013) The Global Landscape of Climate Finance 2013; IEA (2012) Energy Technology Perspectives 2012: Pathways to a clean energy system; EC (2014) Impact Assessment: A Policy Framework for Climate and Energy in the Period from 2020 up to 2030. http://ec.europa.eu/clima/policies/2030/docs/swd_2014_xxx_en.pdf
[234] Accenture & Barclays (2011) Carbon Capital – Financing the Low-carbon economy

Figure 9.3 Cumulative procurement capital (2011-2020) needs in EU25 by sources of financing



[Source: Barclays / Accenture 2011]

Figure 9.4 Cumulative development capital (2011-2020) needs in EU25 by sources of financing



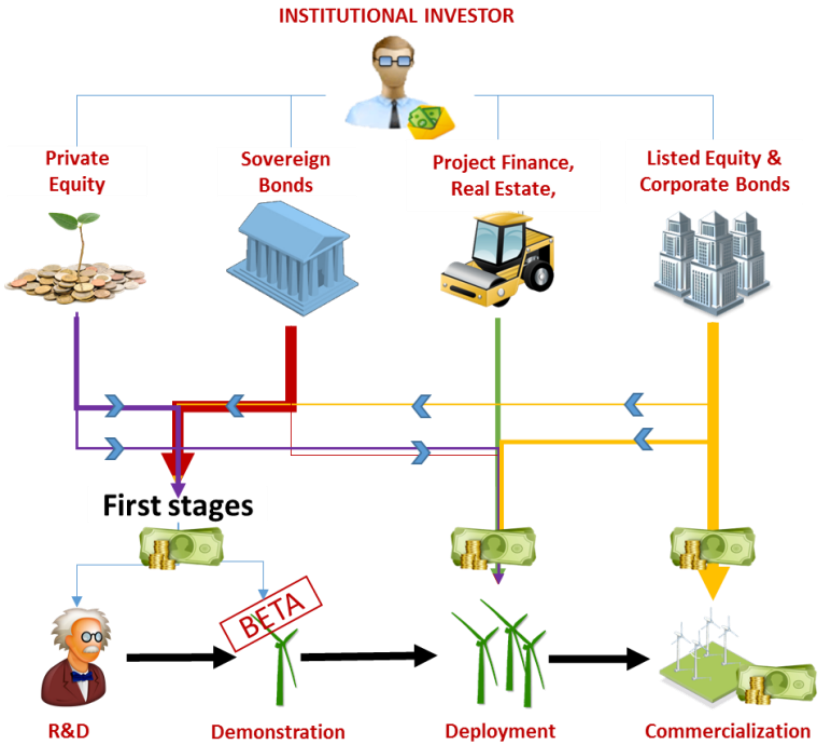
[Source: Barclays / Accenture 2011]

At a global scale, the IEA World Energy Investment Outlook from 2014 attempted to extend their capital expenditure roadmaps to investment scenarios to understand the sources of financing by equity, debt, and retained earnings for the key energy sectors. While this work lacks the granularity of the research by Barclays and Accenture, it provides the first mapping of this sort at global level.

8.5 From financing needs to institutional investor portfolio exposure

The final step is to connect financing needs to institutional investors. Institutional investors are either directly or indirectly involved in all four stages of technology development through exposure to different asset classes (Figure 9.5).

Figure 9.5 Funding options for different stages of technology development



[Source: FtF[235]]

Connecting financing needs to institutional investors is done through looking at their portfolios, and their share of climate-friendly investments in different asset classes.

[235] Based on 2° Investing Initiative working group on green financing by SME, venture capital, and private equity.

9 Glossary

Alternative investments: an investment in asset classes other than stocks, bonds, and cash. Here this includes mainly real estate, private equity, project finance, hedge funds, forestry, etc.

Assets: An asset is anything that is owned by a company, person or institution, such as shares or property. If a company holds onto cash, that is also an asset. In banking and the shadow banking system, debts are also treated as assets because they generate interest. The promise of future revenue is the asset underlying asset-backed securities.

Asset allocation: investment strategy that attempts to balance risk versus reward by adjusting the percentage of each asset in an investment portfolio according to the investor's risk tolerance, goals and investment time frame.

(Strategic) Asset allocation frameworks: A portfolio strategy that involves setting target allocations for various asset classes, and periodically rebalancing the portfolio back to the original allocations. In strategic asset allocation, the target allocations depend on the investor's risk tolerance, time horizon and investment objectives. Strategic asset allocation is compatible with a "buy and hold" strategy

Asset class: An 'asset class' is a grouping of assets by type. The main types are: equities (shares), bonds (fixed-income), cash (or money market equivalents), real estate and commodities.

Asset backed or securitised bonds: similar to ordinary bonds but have specific assets whose revenues pay the interest and principal. The company that issues them generally guarantees an ordinary bond's payments. In asset backed or securitised bonds a set of revenue generating assets are put into a special purpose company and these assets pay the bond holder their interest and principal.

Barclay's Global Aggregate Bond Index: is a broad base index, maintained by Barclays Capital, which is often used to represent investment grade bonds being traded in United States.

Basel III: a global, voluntary regulatory standard on bank capital adequacy, stress testing and market liquidity risk. It was agreed upon by the members of the Basel Committee on Banking Supervision and was scheduled to be introduced from 2013 until 2015; it has been extended to 31 March 2019. Following other Basel Accords, Basel III should strengthen bank capital requirements by increasing bank liquidity and decreasing bank leverage.

Bonds: can variously be described as IOUs, loans or debts. They are similar to bank loans, but generally last longer (from one year to over 30 years). When institutions, companies, governments and other entities want to raise long term finance but do not want to dilute their shareholdings (or can't issue share capital), they turn to the bond markets. The biggest investors are generally insurance companies and pension funds. They buy bonds to generate return, offset their liabilities, generate income or diversify their portfolios.

Bond Index: A bond index or bond market index is a method of measuring the value of a section of the bond market. It is computed from the prices of selected bonds (typically a weighted average). It is a tool used by investors and financial managers to describe the market, and to compare the return on specific investments.

CapEx: Short for "capital expenditure" - expenditure creating future benefits. A capital expenditure is incurred when a business spends money either to buy fixed assets or to add to the value of an existing fixed asset with a useful life extending beyond the taxable year.

Capital: Capital has various meanings. In financial terms, a company's capital is the total of the assets that it owns. However, the term 'capital' might also be used to refer to the total value of these assets minus liabilities (unpaid bills, un-repaid borrowing, etc.) Capital pipeline: flow of capital - capital pipeline process means that institutional investors' investment opportunities are defined by the deal flow originated by banks in their role as a financial intermediary

Cap-weighted equity indices: a "capitalisation-weighted" index is a stock market index whose components are weighted according to the total market value of their outstanding shares.

Carbon price: the method of reducing global-warming emissions favoured by economics, charges those who emit carbon dioxide (CO2) for their emissions. That charge, called a carbon price, is the amount that must be paid for the right to emit one tonne of CO2 into the atmosphere.

Carbon risk: Carbon risks can be defined as the family of risks correlated with the GHG--emissions associated with an asset. Generally, these risks exclude climate change--related physical and macroeconomic consequences, such as variation in temperature, the rise of the sea level, and their impacts on national economies.

Climate finance: refers to financing channels being public sources (national, regional and international public entities) and private sources (institutional investors, banks, multinational companies, etc.) for climate change mitigation and adaptation projects and programmes.

Climate-friendly investments: investment contributing to climate change mitigation or adaptation. This comprises especially the production of renewable energy, low-carbon transport, energy efficiency and other low-carbon innovation activities.

Climate Performance Metrics: objective measures of the performance of the alignment of a financial portfolio with climate goals.

Concessional Lending: sometimes called a "soft loan," is granted on terms substantially more generous than market lending either through below-market interest rates, by grace periods or a combination of both.

Conventional bond: one that has a fixed maturity date and a fixed coupon. It has few, if any, bells and whistles (like complex formulae for interest payment linked to equity prices, or maturity dates that can be changed). Simply put, it is a bond that will pay a set interest rate over a predetermined time and return the original or par value of the investment at this maturity date. Often called "vanilla" bonds.

Corporate Finance: debt provided by banks to companies that have a proven track record, using "on-balance sheet" assets as collateral. Most mature companies have access to corporate finance, but have limited total debt loads and therefore must rationalise each additional loan with other capital needs.

Cost of Capital: the weighted average of a firm's costs of debt and equity, in turn linked to risk involved in the underlying project or company. From an investment perspective, to be worthwhile, the expected return that an investor receives for putting money at risk must be greater than the cost of capital.

Coupon: the interest payment on a bond: This interest can be paid annually, semi-annually or even every three months, depending on the way the bond is structured. The size of the coupon gives an indication of the credit risk of the bond. The higher the coupon, the more risky the issuer, as an investor will require a higher interest rate to compensate them for the greater likelihood of the issuer defaulting.

Credit enhancement mechanism: mechanism or methods used to improve the credit profiles of a structured products or transactions. For instance, it is a key part of the securitisation transaction in structured finance, and is important for credit rating agencies when rating a securitisation.

Credit line: An amount of credit extended by a lender, which the borrower may use on a revolving basis.

Credit ratings: a rating of the likelihood of credit default (credit-worthiness) of an investment, used by most investors to assess the comparative risk of investment opportunities. Most ratings are provided an "independent" agency, usually one of the three major rating agencies, Moody's, Standard and Poor's (S&P) and Fitch. The three agencies all have similar rating categories. Some of the largest institutional investors (see below) don't use the ratings agencies but instead rely on their own internal risk assessment teams.

Credit risk: The risk that a bond will default on its payments

Deal flow: This is the rate at which investment financiers such as institutional investors, bankers, etc are receiving business proposals or investment opportunities. For instance this includes opportunities or proposals of investment in various types of "climate-friendly" assets such as individual clean or renewable energy companies or group of companies, or in various types of green debts vehicles such as loans or group of loans, or bonds or group of bonds.

Debt: securities such as bonds, notes, mortgages and other forms of paper that indicate the intent to repay an amount owed. A cash payment of interest and/or principal is made at a later date. This is in contrast to an equity investment where there is an exchange of shares of common stock, or ownership of the company.

Disclosure: (climate and carbon risk)

Environmental risk: environmental and social risks associated with the project, often subject to legal requirement for an impact assessment.

Equity: an investment in exchange for ownership of a company entitled to the earnings of a company after all other investors (e.g. debt-holders) have been paid.

EU Budget: European Union budget to pay for policies carried out at European level (e.g. agriculture, environment, research) and for their administrations, (incl. parliament, executive branch, judiciary) which are distinct from those of the member states. According to the European Commission, 6% of expenditure is on administration, compared with 94% on policies.

Export Credits, Insurance, and other Risk Management Instruments: used to transfer specific risks away from the project sponsors and lenders to insurers and other parties better able to underwrite or manage the risk exposure.

Fiduciary duty: A legal obligation of one party to act in the best interest of another. The obligated party is typically a fiduciary, that is, someone entrusted with the care of money or property. Pension providers and insurance companies have fiduciary duties towards their members and policyholders.

Financial instrument: is an asset of any kind; either cash, evidence of an ownership interest in an entity, or a contractual right to receive or deliver cash or another financial instrument. It is materialised by a real or **virtual document representing a legal agreement. In today's financial marketplace, financial instruments can be classified generally as equity based, representing ownership of the asset, or debt based, representing a loan. These instruments may be tradable on organised markets or over the counter. They include derivatives based on such equity or debt or even currencies. Such instrument may include risk sharing mechanisms.** However it cannot be assimilated to services or grants.

Green investments: all investments that generally have a positive contribution to the environment, including to either climate mitigation or climate adaptation. This encompasses among others, the production of renewable energy, low-carbon transport, energy efficient building and other low-carbon innovation activities.

Guarantee: This provides investors with a non-cancellable additional level of comfort that the investment will be repaid in the event that the issuer would not fulfil the contractual obligation to make timely payments. It also lowers the cost of financing for issuers because the guarantee typically earns the security a higher credit rating and therefore lower interest rates.

Industrial policy: climate-friendly policies specific to the industrial sectors, as opposed to financial sector specific or broader macroeconomic policies. These are specific interventionist policies.

Institutional Investors: includes insurance companies and pension funds, which tend to invest large amounts of money over a long time horizon with lower risk appetite.

Internal Rate of Return (IRR): is used for each potential project as a key tool in reaching investment decisions. It is used to measure and compare the profitability of investments. Funds will generally have

an expectation of what IRR they need to achieve, known as a hurdle rate. The IRR can be said to be the earnings from an investment, in the form of an annual rate of interest.

International Finance Institutions (IFIs): A generic term to describe all multilateral financial institutions. These include the World Bank and International Finance Corporation, as well as regional development banks such as the Asian Development Bank.

Investment Grade: Defined by the credit rating agencies usually above BBB-/Baa3/BBB- respectively. A 'good' investment grade rating is A/A2/A.

Issuer: the issuer of the bond (i.e. borrower of the money) defines the credit risk of the bond. That is, the likelihood that the investor will be repaid their initial loan. For example, governments are generally considered to have a low credit risk, although this generally varies between rich countries and developing countries.

Junior debt: Junior debt is usually an unsecured form of debt, meaning there is no collateral behind the debt. It is a debt that is lower in repayment priority than other debts in the event of the issuer's default.

Leverage: 'Leveraging' is used loosely in the context of climate finance, where it refers to public finance (e.g. from international finance institutions) that is used to encourage private investors to back the same project. This can take the form of loans, risk guarantees and insurance, or private equity.

Liabilities: A company's legal debts or obligations that arise during the course of business operations. Liabilities of a pension fund or an insurance company are the potential and pending payments to which they are contractually obligated to their members and policyholders.

Liquidity: Market liquidity (link is external) is an asset (link is external)'s ability to be sold without causing a significant movement in the price (link is external) and with minimum loss of value. Money, or cash in hand (link is external), is the most liquid asset, and can be used immediately to perform economic actions like buying, selling, or paying debt, meeting immediate wants and needs.

Market indices: A bond market index or stock market index is a measurement of the value of a section of the underlying market. It is computed from the prices of selected bonds or stocks (typically a weighted average). It describes the overall market, and compares the return on specific investments. It may not be invested in directly, but may be "tracked" by specific funds (index fund).

Market risk: market specialists who report on topics including future electricity prices, future green subsidy prices, future carbon prices, and the prospect of new competitors typically provide these assessments.

Maturity: the date at which a bond is repaid. There are a number of subtleties around the maturity date, but most bonds have a single fixed date. The further in the future the maturity date (the "longer" the bond), the more risky the debt as there is more time for the issuer to get into trouble. Indeed, some bonds (including the famous war loan from the UK Government) are "undated", which means that the issuer never has to repay the debt. Undated, or perpetual, bonds often have features

that allow the issuer to pay back the debt under certain circumstances: these are called “call options” and give the issuer the right, but not the obligation, to pay the lender.

Mezzanine financing: A hybrid of debt and equity typically used to finance the expansion of companies. This is debt that gives the lender the rights to convert to an ownership or equity interest in the company in case of default. It is often subordinated to debt provided by senior lenders such as banks and venture capital companies.

Monocline: a bond insurer that specifically insures the principal and coupons of bond issuers. The insurers take a fee and allow the insured bond to be rated at levels of up to AAA, whereas the stand-alone bond may be rated at A or below.

MSCI World: is a stock market index of 1,612 'world' stocks, from 23 countries excluding stocks from emerging and frontier economies. It is maintained by MSCI Inc., and is often used as a common benchmark for 'world' or 'global' stock funds.

Policy and Regulatory risk: as the policy or incentive mechanism may be a key part of making renewable energy project economics attractive, changes to these factors pose a risk: a long-term, stable policy regime with a sound legal basis is essential for serious investment to occur. Regulatory risk is also considered for the permits, authorisations and licences required to plan, construct, operate and decommission renewable energy projects. A sound track record of stable and consistent regulation, well-managed price or other reviews, and clarity over the development of regulations or policy to implement new renewable energy legislation, are important.

Portfolio: a holding of investments, which covers a range of securities, such as stocks and bonds, as well as other types of investment vehicles. A diversified portfolio helps spread the risk of possible loss due to below-expectations performance of one or a few investment in securities.

Portfolio exposure: The amount of portfolio funds or percentage of a portfolio invested in climate-friendly particular securities, market sector or industry. This is often expressed as a percentage of total portfolio holdings.

Portfolio management: The art and science of making decisions about investment mix and policy, matching investments to objectives, and balancing risk against performance. Portfolio management is about opportunities and threats in the choice of debt vs. equity, domestic vs. international, growth vs. safety, and many other trade-offs in the attempt to maximise return at a given appetite for risk.

Primary market: (new issue market) A market that issues new securities on an exchange. Companies, governments and other groups obtain financing through debt or equity based securities.

Principal: The amount of a loan, separate from the interest to be paid on it.

Public Financial Institutions (PFIs): are public institutions from one country or a group of countries (e.g. World Bank) that provides financial services such as acting as financial intermediaries.

Public-Private Partnership (PPP): a government service or private business venture which is funded and operated through a partnership of government and one or more private sector companies. PPP involves a contract between a public sector authority and a private party, in which the private party provides a public service or project and assumes substantial financial, technical and operational risk in the project.

Refinancing: this is where a project or a business has already borrowed money but decides, or needs, to replace existing debt arrangements with new ones, similar to refinancing a mortgage. Reasons for refinancing include: more attractive terms becoming available in the market (perhaps as lenders become more familiar with the technology, meaning more money can be borrowed against the asset); or the duration of the loan facility, e.g. loans are often structured to become more expensive over time because of the increasing risk of changes to regulation or market conditions. One of the results of the financial crisis was that banks became extremely reluctant to lend for more than six or seven years, which "forced" projects that required longer-term loans to refinance in the future, and take the risk of the terms available at that time.

Regulated Asset Base (RAB): with privatisation of the utilities, a new mechanism (the RAB) was created to provide credible commitments to investors. An independent regulator with a duty to ensure that the utilities' functions can be financed backs up the RAB. In effect, the RAB receives investments once completed and the capital costs are then remunerated through the RAB and the duty-to-finance functions of the regulator.

Retained earnings: The percentage of net earnings not paid out as dividends, but retained by the company to be reinvested in its core business or to pay debt. It is recorded under shareholders' equity on the balance sheet.

Risk Capital: equity investment that comes from venture capitalists, private equity funds or strategic investors (e.g. equipment manufacturers). Besides the developers' own equity and private finance, risk capital is generally the only financing option for new businesses.

Risk-return profile: Profile of the trade-off between return and risk. Low levels of uncertainty (low-risk) are associated with low potential returns, whereas high levels of uncertainty (high-risk) are associated with high potential returns.

Risk sharing: The risk of a loan is shared with other parties, which have an interest in promoting lending to the sector or beneficiary in question. The other party may or may not be better able to evaluate the risk.

Secondary market: A market where investors purchase securities (equities, bonds) or assets from other investors, rather than from issuing companies themselves. The New York Stock Exchange and the NASDAQ are secondary markets.

Securities: A collective term for bonds, shares or stock, and derivatives.

Securitisation: The process through which an issuer creates a financial instrument by combining other financial assets and then marketing different tiers of the repackaged instruments to investors. The process can encompass any type of financial asset and promotes liquidity in the marketplace.

Senior debt: The highest level in a company's debt structure with most certainty of repayment.

Share: In common usage, 'shares' are the same as 'stocks', and refer to share certificates that denote partial ownership of a company. Investors in shares (or equity) hope to gain from rises in the overall value of a company, thereby increasing the re-sale value of each share. They are also entitled to a claim on part of the company's profit, which is paid out as a 'dividend' at regular intervals. Many (though not all) shares also carry voting rights at the company's annual general meeting. Solvency II: The Solvency II Directive 2009/138/EC is an EU Directive that codifies and harmonises the EU insurance regulation. Primarily this concerns the amount of capital that EU insurance companies must hold to reduce the risk of insolvency. It is currently scheduled to come into effect on 1 January 2016.

Sovereign Wealth Funds: A Sovereign Wealth Fund (SWF) is an investment fund owned and managed by a national government. SWFs were originally created in the 1950s by countries with economies dependent on oil and mineral extraction. Many of the largest SWFs are still financed by oil money, although others are funded by consistent budget surpluses, foreign exchange reserves, or the proceeds of privatisation. The aim of SWFs is to protect the domestic economy against volatile international commodity prices, to build up savings for future generations, and to manage excess liquidity.

Stranded assets: assets which, at some time prior to the end of their economic life (as assumed at the investment decision point), are no longer able to earn an economic return, as a result of changes in the market and regulatory environment (e.g. coal power generation which would have to stop operating under climate change regulations).

Structured finance: A service that generally involves highly complex financial transactions offered by many large financial institutions for companies with very unique financing needs. These financing needs usually don't match conventional financial products such as a loan.

Subordinated debt: The debt below the senior debt, which is, however, senior to equity.

Technological risk: each renewable energy technology will be assessed in the light of its maturity, operating history, fitness for purpose and warranties. Appropriate specialists often working closely with the technology supplier will undertake the assessment.

Theory of change: is a specific concept developed in this document reflecting the various paths and building blocks proposed as solutions to mobilising private, climate-friendly finance required to bring about a given long-term climate change goal. For instance, it describes to what extend BAU Investors may transform into LTRA Investors.

Underwriting and Syndication: A lead bank agrees to provide a large bank debt facility to a client for a particular project, but the loan will be larger than the bank itself can provide on its own for the long term. The bank receives a fee from the client for providing, or underwriting, the whole facility at the outset and taking the risk that it can "sell" pieces of the agreed loan to other lenders required

("syndication"), on terms and pricing already agreed with the client. The underwriting bank takes the risk that it has achieved the right balance of risk and return to attract enough other lenders into the transaction.

Venture Capital: focused on early stage or growth stage (depending on how far from the laboratory and commercial roll out) technology companies.

Wholesale: the sale of securities among broker-dealers and to large institutional investors. Securities sold at wholesale go for slightly lower prices than those paid by individual investors.

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