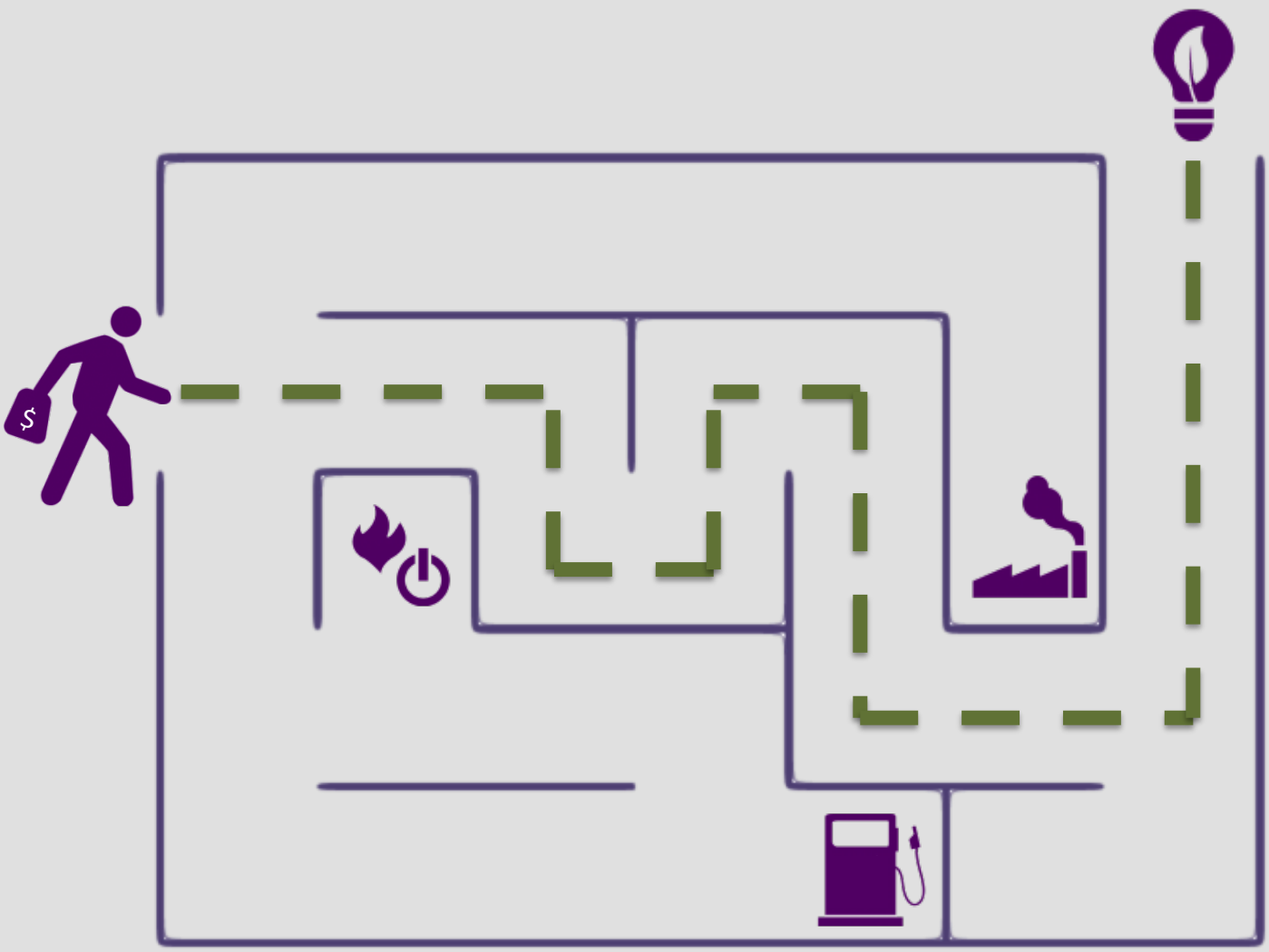
CLIMATE STRATEGIES AND METRICS

Exploring Options for Institutional Investors



FINAL DRAFT FOR DISCUSSION – MAY 2015

2° Investing Initiative

UNEP FINANCE INITIATIVE

GREENHOUSE GAS PROTOCOL

GLOSSARY

Carbon asset risk **–** Carbon asset risks are the financial risks associated with an asset or company due to climate mitigation policies and techno-economic trends.

Carbon metrics **-** Indicators based on the GHG emissions of financial assets and portfolios, including 'carbon footprints', 'financed emissions', and energy efficiency-related GHG emissions reductions indicators.

Climate friendliness **–** Climate friendliness is the intent of an investor to contribute to GHG emissions reductions and the transition to a low-carbon economy through investment activities.

Climate impact **-** The reduced GHG emissions in the real economy from an established business-as-usual baseline scenario achieved as a direct or indirect result of an investor's climate friendliness.

Climate scores **-** Climate-related scores aim to inform on the overall climate-friendliness of companies. They are composite qualitative indicators assembled and provided by specialized ESG analysts based on quantitative and qualitative corporate data, including carbon and green / brown metrics (see above).

Critical mass **–** For the purposes of this report: The number of investors needed for the 'climate friendly' strategy of an individual investor to achieve GHG emissions impact (or 'climate impact').

Green / brown exposure metrics **–** Segmentation indicators distinguishing between climate solutions and climate problems at technology, industry, or sector level.

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TABLE OF CONTENTS

EXECUTIVE SUMMARY

Background. Climate change is an increasingly prominent issue for institutional investors. In September 2014, two investor climate pledges were announced: UNPRI's Montreal Pledge focuses on mobilizing investors to measure and disclose the carbon footprint of their portfolios and the Portfolio Decarbonization Coalition (PDC), led by CDP and UNEP-FI, focuses on decarbonization commitments. These initiatives are complemented by a range of unilateral investor actions. This report reviews the strategies and metrics available to investors seeking to measure and improve the *climate friendliness* of their portfolios, defined as the intent to reduce GHG emissions and aid the transition to a low-carbon economy through investment activities (Fig. 0.1). The report distinguishes this objective from carbon risk (Ch. 1). It then explores different approaches by asset class (Ch. 2) and ways investor can position themselves to achieve a *climate impact,* defined as GHG emissions reductions in the real economy (Ch. 3). Finally, the report assesses the landscape of available metrics and their suitability metrics for each strategy (Ch. 4).

CHAPTER 1: DISTINGUISHING CLIMATE-RELATED OBJECTIVES.

There are two key objectives behind investor mobilization on climate issues:

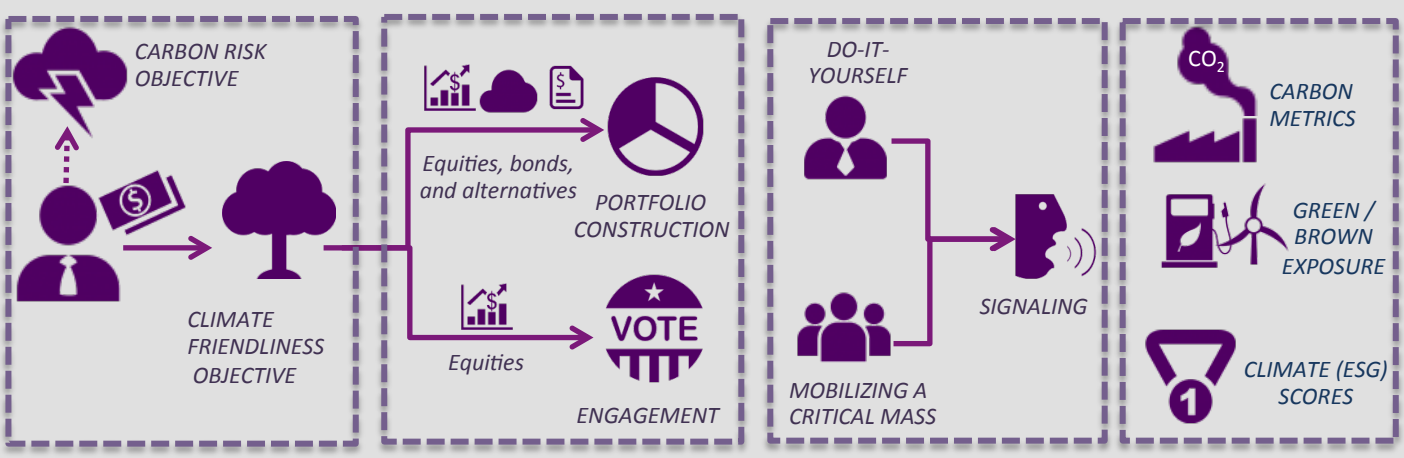
- *Carbon risk* is the concept that the low-carbon economy may create financial risks and opportunities for portfolios, which investors may seek to manage.
- *Climate friendliness* is the concept that investors seek to contribute to reducing GHG emissions and accelerating the transition to a low-carbon economy by engaging in climate friendly investment activities.

Key messages:

DON'T TRY TO KILL TWO BIRDS WITH ONE STONE • Investor rhetoric on climate change references both carbon risk and climate impact. Investors may decide that they are pursuing only one of the two objectives, or both. Available strategies do not always achieve both objectives (cf. p. 10-11) and thus investors may need to identify two parallel strategies. In their communications, positioning, and signaling. Investors should be clear about whether and how they are following a risk-driven strategy, a friendliness-driven strategy, or both.

DO CONNECT THE DOTS BETWEEN CLIMATE FRIENDLINESS AND CARBON RISK AT PORTFOLIO LEVEL • Achieving a carbon risk or climate friendliness objective in a portfolio may require different approaches. Differences are likely to be particularly pronounced when looking at financial assets, but may converge when assessing the two objectives from a portfolio or strategic asset allocation perspective.

FIG 0.1: CLIMATE FRIENDLY STRATEGIES (ACTIVITIES, POSITIONING, AND SIGNALING) AND METRICS (SOURCE: AUTHORS)



CHAPTER 2: CLIMATE FRIENDLY INVESTOR APPROACHES

The report identifies two climate friendly approaches that can contribute to a a climate friendliness objective:

- **Portfolio construction** integrates climate-related constraints into asset allocation and investment decisions. This could involve increasing investment in renewable project finance or implementing negative screens.
- **Engagement** seeks to change the corporate management practices and investment decisions of investees. This approach focuses in particular on listed and private equity.

Key messages:

DON'T FOCUS EXLUSIVELY ON LIQUID MARKETS • Climate friendly approaches in equity and bond portfolios often depend on reaching a critical mass of investors in order to achieve impact (cf. p. 13-14). Investors should thus also consider less liquid assets to maximize impact (cf. p. 21-23).

DON'T IGNORE SECTOR DIVERSIFICATION • Today's mainstream benchmarks are poor guides to appropriate climate friendly sector diversification (cf. p. 24-25). Investors should advocate for the development of relevant climate friendly indices.

DO ENGAGE • For listed equities, engaging with companies to influence their investment plans, coupled with portfolio construction strategies, is the most direct approach for impact (cf. p. 26-27).

DO FOCUS ON ENERGY TECHNOLOGY DIVERSIFICATION • Climate impact is essentially determined by production processes, products, and the corresponding choices in energy technology. Beyond sector diversification, investors should focus on energy technology exposure across all asset classes, via green / brown exposure metrics (cf. p. 50)

FIG 0.2: IMPLEMENTING CLIMATE FRIENDLY INVESTOR APPROACHES (SOURCE: AUTHORS)

	ASSET CLASS	APPROACHES
PORTFOLIO CONSTRUCTION	**Corporate Bonds**	• Set negative screens for corporate bonds associated with high-carbon technologies, industries, or sectors • Increase exposure to green bonds • Explore activities that provide preferential financing conditions or higher transaction costs (e.g. through reporting, monitoring, and verification mechanisms for green bonds)
	Project Finance / Real Estate	• Set a minimum target share of green • Implement a negative screen for high-carbon project finance or a decarbonization approach across all types of project finance • Explore strategies that accept higher transaction costs or above-market financing conditions (e.g. through smaller deal size in the project finance space).
	Listed / Private Equity	• Apply negative screening and / or best-in-class approaches, ideally using both carbon as well as green / brown metrics exposure metrics • Explore climate-related indices that use both carbon and green / brown metrics • Explore managing both sector and energy technology diversification
ENGAGEMENT	**Listed / Private Equity**	• Engage on reducing high-carbon capital expenditure and increasing climate friendly investment, including investment related to energy efficiency. • Engage on corporate GHG emissions targets and strategies, including on disclosure and transparency

The impact of climate friendly strategies in the real economy will depend on the investor's positioning and signaling. There are two options for investor positioning:

- **Do-it-yourself** positioning may have a climate impact in illiquid markets, when investors are willing to incur transaction costs or lower returns, or when combined with effective signaling (cf. p. 30).

- **Mobilizing a critical mass** is usually required for impact in liquid markets and engagement strategies in listed equities, where individual investors have less power than in groups (cf. p. 31).

While not every climate friendly investment strategy will lead to an immediate climate impact, every climate friendly investment activity will feature a signaling effect, whether purposeful or not. Investors can use this to communicate their strategy to investor peers, companies, beneficiaries, and / or to attempt to influence policy makers (cf. p. 32-33).

Key messages:

DON'T EQUATE EXPOSURE & IMPACT • Modifying a portfolio's exposure to different sectors, companies, technologies, or themes does not directly have the same effect in the real economy. The extent to which a climate friendly objective translates into impact depends on the investor's positioning and signaling.

DON'T SEEK A "FREE LUNCH" • Achieving real climate impact without a critical mass will likely require offering capital with better-than-market terms: higher risk, lower return, higher transaction costs, etc. However, accepting these terms in the short term can mobilize other investors and create benefits over the long-term.

DO FOCUS ON MOBILIZING A CRITICAL MASS • When individual action is insufficient to achieve impact, investors should focus on mobilizing a critical mass as part of investor approaches and / or to coordinate a policy signal. Platforms like the Portfolio Decarbonization Coalition (PDC) and Montreal Pledge help achieve this.

INVESTOR POSITIONING

DO IT YOURSELF

Investors have an impact at individual level in certain cases. For instance, investors can influence the cost and availability of capital by providing financing at below-market conditions for green activities. However, outside of very large investors, influencing companies' investment decisions as individual investors likely only works in the private equity space. A do-it-yourself strategy can be seen as the first step to mobilizing a critical mass or be combined with signaling to increase impact.

MOBILIZING A CRITICAL MASS

Common action by investors is key to achieving impact for engagement and for portfolio construction in liquid markets. Investors can contribute to achieving a critical mass through a number of different avenues including investor platforms, shareholder advocacy coalitions, and / or demonstration effects related to specific investment strategies. In the short-term, success relies on 'crowding-in' investors through approaches that are compatible with existing investor constraints.

SIGNALING

Achieving global climate goals will depend on strong and reliable climate policies. Investment in the real economy will depend on households, corporates, and governments responding to these policies. While investors' role is limited in this respect, they can influence the broader policy and market environment by sending a political signal. Investors can also see the activities around measuring and managing climate-friendliness as contributing to the broader societal and political actions on climate change. Investor statements, pledges, and actions, such as portfolio decarbonization and divestment, can contribute to putting pressure on international climate and domestic policymakers.

CHAPTER 4: CLIMATE FRIENDLY METRICS

Climate friendly metrics. Different metrics will be applicable for different approaches. Fig. 0.3 provides an overview of the climate friendliness metrics reviewed in this report, organized into three general types: carbon metrics (cf. p. 37-43), green / brown exposure metrics (p. 44-49), and climate (ESG) scores (p. 50-53). The categories help organize the plethora of non-financial data currently available on the market.

Key messages:

DON'T RELY EXCLUSIVELY ON CARBON METRICS • Carbon metrics have certain advantages: companies are generally familiar and have experience with the concepts, vocabulary, and methodology. They enable a general comparison across sectors. They also have shortcomings: emissions profiles are based on historical data, which may disregard investments in emissions reductions, they do not always capture cradle-to-grave emissions, and they do not directly capture exposure to green technologies. For non-equity asset classes, green / brown exposure metrics likely capture a more complete picture of climate. For listed equity, reporting should involve a mix of carbon metrics, green / brown exposure metrics, and climate (ESG) scores.

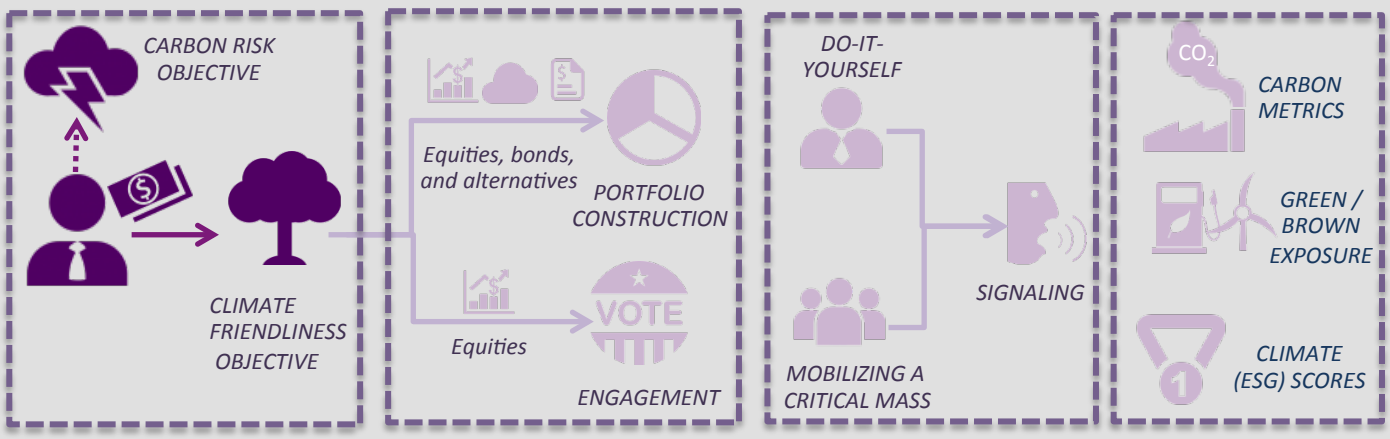
DO CONSIDER THE EXPOSURE TO GREEN TECHNOLOGIES • One shortcoming of carbon metrics is their inability to measure the exposure to green technologies. The shift to a low carbon economy is largely a shift toward green technologies, and a climate friendly strategy should therefore utilize metrics that can measure this shift.

DO DISTINGUISH METRICS BY SECTOR AND APPROACH • Certain climate metrics are more appropriate for some sectors than others; the same goes for investment approaches and objectives. Similarly, some metrics can make more or less sense in different situations, such as an investor's sustainability report or an investment approach.

FIG 0.3: CLIMATE FRIENDLY METRICS FOR INVESTORS (SOURCE: AUTHORS)

	DESCRIPTION & EXAMPLES	APPLICATION	PROS	CONS
CARBON METRICS	Indicators related to GHG emissions including carbon foot-printing, financed emissions methodologies (i.e. carbon footprint of financial institutions' financial services), and energy efficiency-related GHG emissions reductions indicators.	• Connecting the dots between portfolios and climate change • Project finance screens • Real estate energy efficiency measures • Engagement on short-term corporate emissions reduction • Portfolio construction for listed equities ideally together with green / brown exposure metrics • Public communication & reporting	• Broad information on climate intensity of sectors • Prominence among corporates and experience • Standardization of corporate reporting across sectors enables portfolio reporting	• High uncertainty associated with data at financial asset level • Incomplete coverage • Lack of accounting standard • Data volatility associated with external factors when normalizing
GREEN / BROWN EXPOSURE	Segmentation indicators distinguishing between climate solutions and climate problems at technology, industry, or sector level.	• Negative / positive screening for project finance • Negative screening and 'green' targets for corporate bonds (ex. Green bonds) • Portfolio construction for listed equities together with carbon metrics • Engagement on investment in different technologies	• Quantitative indicator with high data transparency • Relevant indicator for corporate management	• Only applicable for a number of key sectors • Challenge of distinguishing relative climate friendliness within categories (e.g. gas vs. coal) • Currently no format to aggregate data across sectors
CLIMATE (ESG) SCORES	Climate-related indicators / scores are qualitative indicators based on quantitative and qualitative climate indicators, including carbon and green / brown exposure metrics.	• Engagement with companies on corporate strategies • Engagement on climate issues together with non-climate issues	• Summary indicators capturing a range of different factors • Established frameworks	• Black box • Risk of greenwashing • Not directly linked to a specific strategy

CHAPTER 1:
DISTINGUISHING CLIMATE-RELATED OBJECTIVES



KEY MESSAGES

DON'T TRY TO KILL TWO BIRDS WITH ONE STONE • Investor rhetoric on climate change references both carbon risk and climate impact. Investors may decide that they are pursuing only one of the two objectives, or both. Available strategies do not always achieve both objectives and thus investors may need to identify two parallel strategies. In their communications, positioning, and signaling. Investors should be clear about whether and how they are following a risk-driven strategy, a friendliness-driven strategy, or both.

DO CONNECT THE DOTS BETWEEN CLIMATE FRIENDLINESS AND CARBON RISK AT PORTFOLIO LEVEL • Achieving a carbon risk or climate friendliness objective in a portfolio may require different approaches. Differences are likely to be particularly pronounced when looking at financial assets, but may converge when assessing the two objectives from a portfolio or strategic asset allocation perspective.

1. DISTINGUISHING CLIMATE-RELATED OBJECTIVES

1.1 OVERVIEW

Context. In May 2015, over 266 investors with over $20 trillion in assets under management (AUM) had implemented some form of climate change strategy in their investment framework (Novethic 2015). Over 50 asset owners and asset managers have signed up to public 'investor pledges' to report on the carbon footprint of their portfolios. These pledges, coordinated by UNEP-FI, CDP, and the UN Principles for Responsible Investment (UNPRI), seek to improve investor transparency on climate change and to mobilize 'decarbonization' commitments by COP21 in December 2015 in Paris. There are two key and distinct objectives behind the momentum around investor pledges and setting climate -related targets: **carbon risk** and **climate friendliness.** (Fig. 1.1). The purpose of this report is to provide technical recommendations for institutional investors seeking to define and implement climate friendliness strategies at the portfolio level. Specifically, it responds to the following three questions:

- *What activities can investors implement to increase the climate friendliness of their portfolios?* **(Chapter 2)**
- *How can investor positioning and signaling ensure that climate friendly activities have an impact in the real economy?* **(Chapter 3)**
- *What are the metrics that can help inform and track the approaches, positioning, and signaling?* **(Chapter 4)**

Defining the investor objective. Investor action on climate change can be associated with two objectives:

- **The carbon risk / climate opportunity objective** suggests that the transition to a low-carbon economy may create financial risk to and / or investment opportunities for portfolios. These risks and opportunities are driven by changes in climate policies, the associated economic value-chain, changes in technology, and investment decisions that ultimately impact financial portfolios. The short-term materiality of this risk for investors is still unclear, given the expected long-term timeframe of these risks and portfolio diversification (cf. p. 11). Moreover, materiality relies on the assumption that public policy will drive large-scale decarbonization.

- **The climate friendliness objective** suggests that investors seek to contribute to GHG emissions reductions and the transition to a low-carbon economy as a result of internal or external pressures such as mandates, fiduciary duty, etc. (cf. p. 10). Climate friendly strategies will not necessarily lead to immediate GHG emissions reduction impacts in the real economy. The extent to which they do will depend on the asset class as well as the positioning and signaling chosen by the investor to complement its strategies (cf. Chapter 3). This report distinguishes between investor climate friendliness, the *intended* contribution to the transition in the real economy, and climate impact, the *actual* contribution to climate mitigation in the real economy.

This chapter provides an overview of existing investor action and these two underlying objectives.

FIG 1.1: GLOBAL CLIMATE GOALS AND INVESTOR PORTFOLIOS (SOURCE: AUTHORS**)**

*"**Carbon risk":** 2°C climate goals are translated into policies, which may create financial risk. If investors anticipate these policies and associated constraints, their investment strategies might speed up the transition to a low-carbon economy.*

*"**Climate friendliness**": Investors pursuing a climate friendliness objective can influence the cost and availability of capital in the real economy and corporate investment decisions, which in turn can influence the ability to achieve climate goals.*

1.2 INVESTOR ACTION ON CLIMATE CHANGE

Overview. The past year has seen significant growth in investor rhetoric on climate change. The steady increase of signatories of climate-related investor platforms is evidence to that effect (Fig. 1.2). To date, it is unclear to what extent this rhetoric has translated into action. Estimates suggest roughly 1% of assets under management (AUM) in Europe, North America, and Australia, are managed with an explicit sustainable strategy, of which climate change can be a part (Financing the Future 2015). A higher share of investors use some form of non-financial climate-related data, without an explicit sustainability strategy. Novethic reviewed a panel of 266 European, North American, and Australian investors representing $20 trillion in AUM. While 48% of these investors reported some form of 'green' investment strategy, only 1% invested in low-carbon indices (Fig. 1.3).

There is limited data on climate-related investment strategies in Asia. The Association for Sustainable and Responsible Investment in Asia (ASrIA) estimates that $44.9 billion of assets in Asia (exc. Japan) are managed using one or more sustainable investment strategies. However, these numbers are not climate-specific. Strategies are largely pursued by multilateral development institutions' in Africa and Latin America.

Investor pledges. Investors are starting to coordinate action. This coordination is also starting to extend to concrete investment "pledges". In September 2014, two investor pledges were announced:

- The Montreal Pledge, led by UNPRI, focuses on mobilizing investors to commit to measuring and disclosing the carbon footprint of their portfolios. Over 40 investors have signed up to the pledge to date.

- The Portfolio Decarbonization Coalition (PDC), led by CDP and UNEP-FI, aims to mobilize investors to commit to decarbonize a total of USD 100 billion. 7 asset owners have joined the PDC, with 4 members from Europe and 3 from Australia.

The recent investor pledges are driven by both risk and climate friendliness objectives (cf. box on right). The pledges suggest that portfolio disclosure and investment strategies on climate change provide a response to what are perceived as growing risks associated with the transition to a low-carbon economy. Investor pledges also operate as a response to the broader momentum around global action on climate change, in particular the December 2015 COP21 climate change negotiations in Paris.

FIG 1.2: INVESTOR SIGNATORIES
(SOURCE: CDP 2015, PRI 2015)

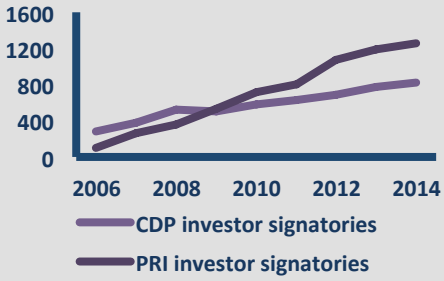
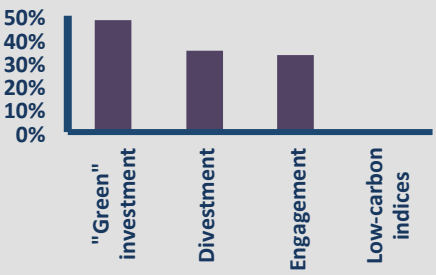


FIG 1.3: SHARE OF SURVEYED INVESTORS EMPLOYING CLIMATE-RELATED INVESTMENT STRATEGIES
(SOURCE: NOVETHIC 2015)*



* 266 investors representing $20 trillion in AUM in the UK, USA, Canada, Australia, Netherlands, France, and Sweden.

PORTFOLIO DECARBONIZATION COALITION (PDC)

"Between September 2014 and COP21 the PDC will support the convening of a community of institutional investors measuring and disclosing the carbon footprint of a total of at least USD 500bn of assets under management (AUM). PDC members may choose to disclose: the portfolio exposure to GHG-related risks, and/or the portfolio alignment with the low-carbon economy (…) The second goal is to assemble a coalition of investors who in aggregate will commit to decarbonizing at least USD 100bn in institutional investment."

THE MONTREAL CARBON PLEDGE

"We have a duty to act in the best long-term interests of our beneficiaries. In this fiduciary role, we believe that there are long-term investment risks associated with greenhouse gas emissions, climate change and carbon regulation. We commit, as a first step, to measure and disclose the carbon footprint of our investments annually, beginning with our equities portfolios by September 2015, with the aim of using this information to develop an engagement strategy and/or identify and set carbon footprint reduction targets."

FIG 1.4: PROVED OIL RESERVES AND HIGH-COST CAPEX (SORCE: AUTHORS, BASED ON CTI 2014 & EY 2013)

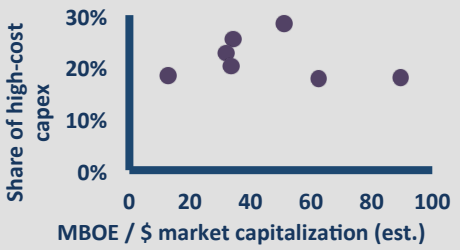


FIG. 1.5 EBIT AND FUEL ECONOMY (SOURCE: AUTHORS, BASED ON DUDENHOEFFER 2013 & EPA 2015)

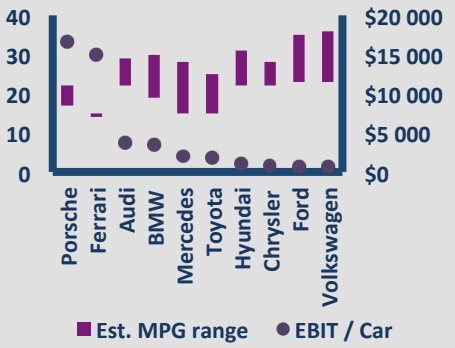
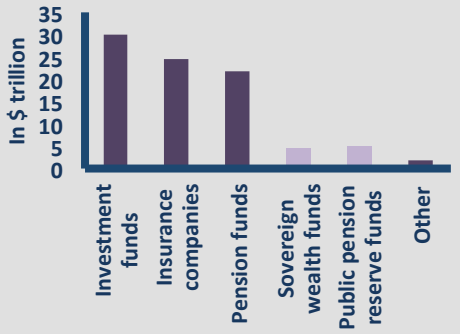


FIG. 1.6: TOTAL ASSETS BY TYPE OF INSTITUTIONAL INVESTOR IN OECD (SOURCE: OECD 2014)*



FRENCH PENSION FUND ACT 2000 ARTICLE 135

"The Management Board (…) regularly reports on the way the general guidelines of the Fund's investment policy took into account social, environmental and ethical considerations."

SWEDISH PENSION FUNDS

The Swedish Pension Fund Act 2000 mandates that Swedish AP funds must take environmental and ethical issues into account without compromising the goal of best possible return.

1.3 CARBON RISK / CLIMATE OPPORTUNITY AND CLIMATE FRIENDLINESS OBJECTIVES

Overview. Investor action on climate change can have a carbon risk / climate opportunity objective or a climate friendliness objective, or a combination of the two (cf. p. 8).

The carbon risk objective. Recent reports, including the forthcoming UNEP-FI / GHG-Protocol Carbon Asset Risk Discussion Framework, identify two types of potential risks for investors associated with climate change: physical risks to assets and financial risks associated with climate mitigation policies and techno-economic trends. There is growing evidence that these latter risks, often termed 'carbon asset risks' may become material. Equity research analysts from Kepler-Cheuvreux, HSBC, Carbon Tracker, and Mercer, among others, are demonstrating the potential impact of the energy transition on the valuation of high-carbon companies. Climate related activities may be seen as a response to these risks.

The climate friendliness objective. Climate change is also becoming an issue on investors' agendas beyond the question of financial risk. This is largely a function of internal and external pressure to contribute to the transition to a low-carbon economy. Climate change is increasingly being seen as a norms-based issue among investors, and some see COP21 in Paris in 2015 as an opportunity to take a public stand. In addition, public investors with roughly $10 trillion of AUM (Fig. 1.6) frequently have environmental, including climate, objectives in their mandate (cf. box on side). Beyond, investors are increasingly seeing public pressure, through NGOs like 350.org and the associated "Divestment" movement, and the Asset Owner Disclosure Project (AODP).

Implications for investors. The Montreal Pledge and the Portfolio Decarbonization Coalition both explicitly mention the issue of carbon risk as one potential driver behind increased investor disclosure and focus on climate change. Feedback from the workshops and references to public statements suggest that these two objectives are frequently used interchangeably. The two narratives have frequently reinforced each other and worked in parallel (cf. next page).

Equally, this report suggests that two objectives likely imply two different strategies to achieving these objectives. As outlined on the next page and see in Fig. 1.4 and Fig. 1.5, indicators relevant from a carbon risk perspective (e.g. net margins, exposure to high-cost, high-carbon capital expenditure) may not be correlated with indicators usually associated with climate objectives (e.g. fossil fuel reserves, fuel efficiency of cars). The remainder of this report considers the climate friendliness objective exclusively.

DISENTANGLING CLIMATE FRIENDLINESS AND CARBON RISK

Interwoven narratives. The concepts of climate friendliness of investments and their exposure to carbon risks is not new. An active debate took place within the Socially Responsible Investment (SRI) community in the wave of the Kyoto Protocol and the decision to introduce an emissions trading system (ETS) in Europe. The debate reached a new level with the publication of the Meinshausen et al. article in 2009 showing that the carbon content of fossil fuel reserves exceeds the carbon budget available in a 2°C scenario. Two years later, the Carbon Tracker Initiative added to this message a financial risk dimension, warning about a potential asset bubble related to energy companies if 2°C policies are eventually implemented.

Recent momentum. Since then, this risk dimension has been explored by various financial analysts, showing potential material impact under a (potentially unlikely) 2°C policy scenario. The evidence however is not conclusive about the existence of an asset bubble. In 2015, the Bank of England decided to further investigate this question. The G20 put this question on the agenda of the Financial Stability Board. The media buzz initiated by Meinshausen and Carbon Tracker Initiative reached a new step with Bill MckKibben's article "Global Warming's Terrifying New Math", sparking the fossil fuel divestment movement, primarily on moral grounds. A recent research paper (Griffin et al. 2015) suggests that only the publication of the Meinshausen paper has had a significant, albeit small, impact on the share price of oil & gas companies.

The financial sector has picked up both the risk and the moral narratives. Announcements made on the road to COP21 refer to both challenges interchangeably. Feedback received in the context of the consultation process for this report suggest that this phenomenon might be amplified by two factors: First, due to the lack of specific metrics, carbon intensity tend to be used as a one-size-fits all proxy for both dimensions. Second, in order to get internal buy-in on their climate friendly initiatives, sustainability departments develop a strong risk / return narrative.

Distinguishing the two objectives. The following two examples, shown in Fig. 1.4 and Fig 1.5 on p. 10 demonstrate why the two narratives may require different responses:

- **Automobile:** The climate friendliness of car manufacturers may be measured by the average miles per gallon (MPG) of their fleet. When it comes to assessing their exposure to carbon risk, financial analysts have looked at the manufacturers' ability to pass on regulatory costs (e.g. carbon tax) to consumers. These two indicators don't appear to be correlated and may potentially be negatively correlated with high margins on luxury/sport cars and low margins on small cars.

- **Oil & gas:** The exposure to high-cost (>$85 / barrel) projects is commonly seen as an indicator of an oil company's exposure to carbon risks. However, this indicator is not correlated with the carbon intensity an oil & gas company (carbon content of reserves / market cap), a commonly used indicator to respond to climate friendliness objectives (cf. p. 25) .

FIG 1.7: THE INTERWOVEN NARRATIVES OF CARBON RISK AND CLIMATE FRIENDLINESS (SOURCE: AUTHORS)

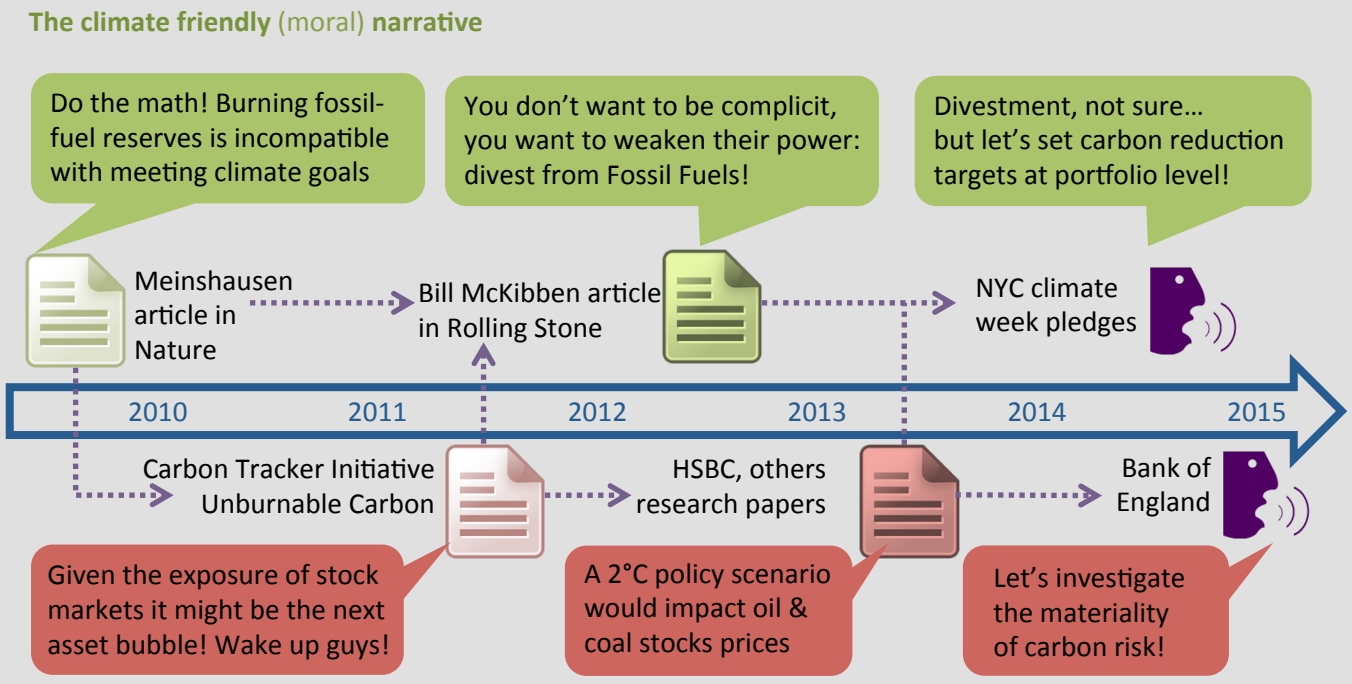
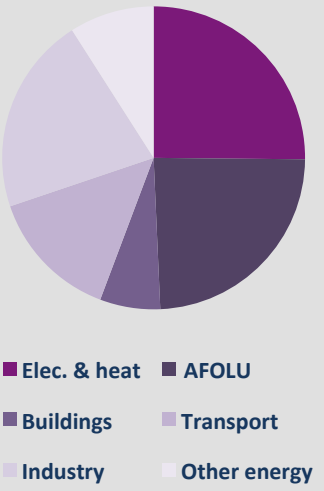
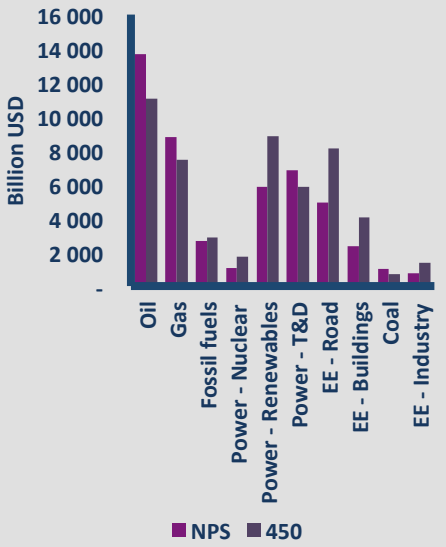


FIG. 1.8: BREAKDOWN OF GHG EMISSIONS BY SECTOR IN 2010 (SOURCE: IPCC 2014)*



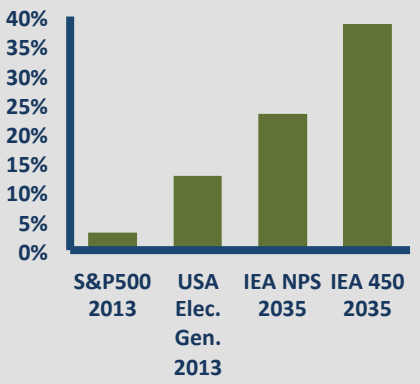
*AFOLU = Agriculture, Forestry and Other. Land Use

FIG. 1.9: IEA INVESTMENT FORECAST BY SCENARIO AND TYPE (SOURCE: IEA WEIO 2014)*



* EE = Energy Efficiency

FIG. 1.10: SHARE OF US RENEWABLE ELECTRICITY GENERATION OF S&P500, ECONOMY, AND IEA FORECAST (SOURCE: 2° ii 2014)



1.4 DEFINING CLIMATE FRIENDLINESS OF PORTFOLIOS

Overview. Investor pledges and activities show a growing interest in contributing to climate mitigation. At the same time, there is a lack of consistency in defining what this means. In this report we use the term "climate friendliness" to describe *the intent of an investor to contribute to GHG emissions reductions and the transition to a low-carbon economy through investment activities*. This objective requires investors to connect the dots between climate change and financial portfolios. At the global scale, the political objective is a limit of 2° C above pre-industrial levels, but it is not immediately clear what this political objective means for an individual investment portfolio. The first step in 'connecting the dots' is to define exactly the roadmap to a low-carbon economy.

A low-carbon economy. GHG emissions associated with human activities are the key driver of climate change and they are emitted through activities such as electricity and heat consumption; the use of buildings; transport; industry; and agriculture and forestry (Fig. 1.8). Achieving the 2°C climate goals requires reducing GHG emissions to roughly zero between 2050-2070. A number of organizations have published research defining the implications for high-emitting sectors, and their work can be used as a benchmark to understand the implications for each sector. The International Energy Agency (IEA) published a World Energy Investment Outlook, highlighting the changes in investment needs between the New Policy Scenario (e.g. the scenario associated with current policy commitments) and the 450 scenario (e.g. the scenario aligned with 2°C climate goals). The results show the investment needs both for energy supply and energy demand (e.g. energy efficiency, EE) (Fig. 1.9). A review of the such roadmaps provide insight into a number of factors:

- **Energy efficiency (EE)** is a key driver of decarbonization, providing opportunities across all sectors.

- **Zero-carbon technologies** are needed to achieve climate goals. Energy efficiency thus faces a ceiling above which GHG emitting technologies must be replaced by zero carbon technologies, like renewable electricity generation (Fig. 1.10), cement, or transport (cf. p. 16).

- **Modal shifts** may be associated with this switch in technologies, for example from road transport to rail transport.

- **A lack of consensus** around some technologies (e.g. nuclear) may lead some low-carbon solutions to be avoided, even in a zero-carbon economy.

The climate friendliness objective of investors implies that they seek to contribute to GHG emissions reductions and the transition to a low-carbon economy. Fig 1.11 presents a framework through which investors can realize this contribution: i) designing and implementing investor activities needed for such a contribution; ii) linking investor activities to positioning and signaling approach that determines the impact; iii) using portfolio level metrics to measure and communicate on progress.

Linking climate friendly investor activities to impact in the real economy. A necessary condition for investor impact is that the investor implements climate-friendly investment activities. However, investment activities, by themselves, will not necessarily lead to immediate GHG emissions reduction impacts in the real economy. Often they will be a required, but insufficient condition for impact. For instance:

- Through **climate friendly portfolio construction**, investors can act as a source of capital for GHG emissions reduction in the real economy. However, this impact will only be achieved if their investment decision is not immediately off-set by other investors, even in primary markets. This can be avoided through asset allocation decisions in illiquid markets, a willingness of the investor to incur transaction costs or lower returns, or by mobilizing a critical mass of investors to follow the same or similar approach.

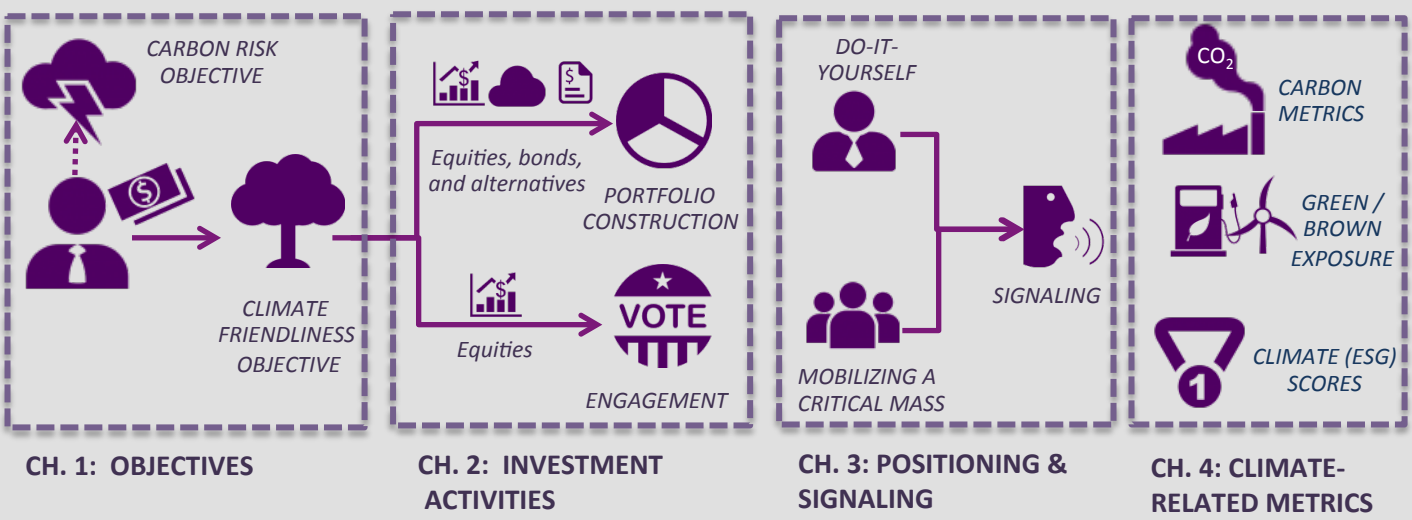
- Through **engagement** or through **portfolio construction** decisions that change incentives for corporate decision-making, investors can influence the corporate management and capital allocation decisions of their investees. In addition, portfolio construction approaches can impact security prices and, hence, the cost of capital. In the case of equities, share prices are frequently linked to corporate management incentives. Demonstrating a clear preference for 'climate performers' puts pressure on companies to improve relative to peers. Companies may change their strategy to 'woo' investors back into purchasing the stock. However, such investor activities are unlikely to lead to a strong enough influence unless they are realized in concert with a larger group, a critical mass, of investors. The critical mass required for portfolio construction activities to lead to an impact will typically have to be (much) larger than for engagement.

The above implies the following 'rule of thumb' on the relationship between investor activities and investor impact:

- Climate friendly investor activity in the form of successful shareholder engagement or portfolio construction in illiquid asset classes are both a required as well as (usually) sufficient conditions for investor impact in the real economy.

- Climate-friendly investor activity in the form of portfolio construction in liquid asset-classes is a required but (likely) insufficient condition for investor impact in the real economy. Additional conditions need to be fulfilled to lead to impact, typically in the form of **positioning and signaling**.

FIG 1.11: CLIMATE-RELATED OBJECTIVES, ACTIVITIES, POSITIONING, AND SUPPORTING METRICS (SOURCE: AUTHORS)



Positioning and signaling. The extent to which climate friendly investment activities lead to an impact will depend on the liquidity of the asset class at hand, as well as the investor positioning chosen by the investor to complement its climate-friendly strategy. Investors can position themselves adopting a do-it-yourself (DIY) approach or they can seek to mobilize a critical mass on a specific portfolio construction and / or engagement activity:

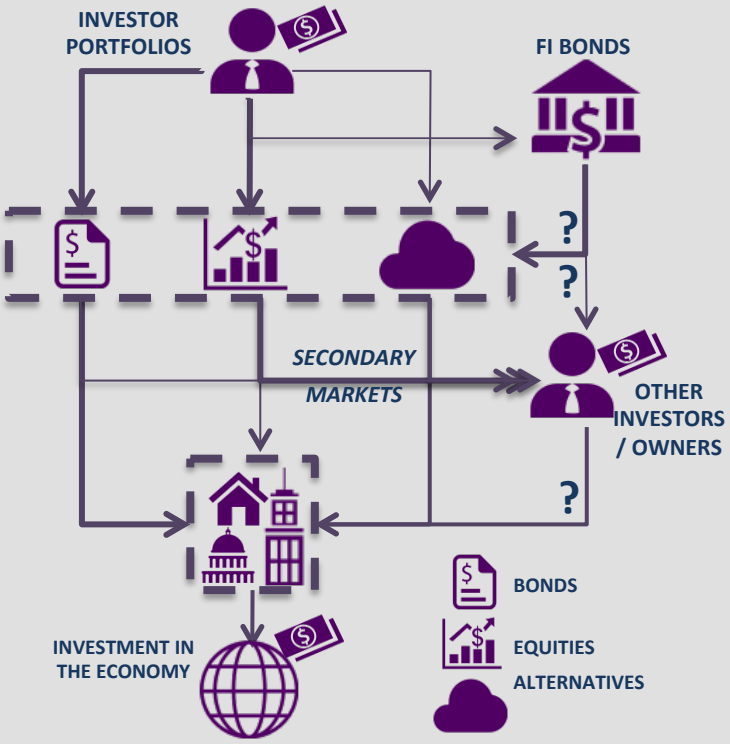
- **Do-it-yourself positioning**. Here, the impact hinges on the extent to which portfolio construction is not simply offset by another investors. Two critical factors for do-it-yourself strategies are the liquidity of the respective asset class and the extent to which the investor is willing to incur transaction costs (cf. p. 30) or lower returns.

- **Mobilizing a critical mass**. This positioning seeks to address the risk that strategies may be offset by other investors. Investors can thus mobilize larger groups of investors to act in concert and, hence, to ensure the influence, and ultimately impact, of the underlying investor activity.

Investor positioning is accompanied in most cases by a **signaling effect** to companies, civil society, beneficiaries, other investors, and / or policy makers (cf. p. 32). This signaling can influence the climate friendliness of these actors, which in turn may lead to impact in the real economy. Part of the signaling strategy may involve using portfolio level metrics to measure and communicate on activities. Signaling can materialise either as a result of investors communicating on their past activities (e.g. via reporting and disclosure) or by investors communicating on their future activities and positioning (e.g. via pledges).

Measuring climate friendliness and impact. There are a range of approaches to measure the climate friendliness of an investor (cf. next page). At the same time, there is currently no methodological framework to measure impact. Developing this concept requires translating exposure indicators into impact indicators (e.g. the 'financing footprint', cf. box below). Despite these constraints, there may be first steps to understanding impact. In the case of successful shareholder engagement as well as portfolio construction in illiquid asset classes, the metrics discussed in this report are likely to approximate impact. In the case of portfolio construction in liquid asset classes, portfolio level metrics, including changes in their values over time, will, by themselves say little about an investor's impact in the real economy. There are research initiatives under way to address these gaps (cf. p. 54-55). The emphasis will be on measuring exposure, in other words the climate friendliness of portfolios and associated investor activities.

FIG 1.12: FROM PORTFOLIOS TO INVESTMENT IN THE REAL ECONOMY (SOURCE: AUTHORS)



CLIMATE FRIENDLINESS VERSUS IMPACT

Fig. 1.12 provides a crude map of the link between the portfolio of an institutional investor and investment in the real economy. It uses 'impact' logic to trace capital through the assets in the portfolio; the thickness of the arrows provide a rough measure of the 'size' of the flow. In the figure, assets that are bought in primary markets from households, governments, and companies can be directly traced to investment in the real economy. The capital flow becomes unclear when it comes to financial institutions, given the uncertainty around the financing footprint of financial institutions, and when buying assets in secondary markets. This is particular concern for equities and bonds bought in secondary markets.

The 'impact' logic is key to understanding the climate 'impact' of a portfolio, measured by the investment in the real economy that is financed by a portfolio. An alternative, more simple approach, is to focus on the 'exposure' of a portfolio to various investments, without necessarily tracing the impact that portfolio had. This logic is simpler to calculate and track, and can for example relate to an exposure to various energy technologies or the carbon footprint of investees.

1.5 MEASURING CLIMATE FRIENDLINESS

Measuring the climate friendliness of portfolios. The first step to understanding the interplay between climate change and financial portfolios is measuring climate relevant indicators as they appear in financial portfolios. Climate relevant indicators will primarily involve non-financial data informing the non-financial (e.g. climate) performance of financial assets and the portfolio more generally. While these indicators may be complemented by financial data (cf. p. 49), it is primarily non-financial, climate-relevant data that will inform on the climate friendliness of financial portfolios. Frequently, a combination of data needs to be explore (cf. next page) The report groups these non-financial, climate indicators into three distinct categories (cf. Chapter 4):.

Carbon metrics (p. 37-43). Limiting climate change requires reducing GHG emissions associated with human activity (cf. next page). Indicators measuring GHG emissions (i.e. carbon metrics) can thus be applied to financial assets. Fig. 1.13 shows this 'carbon footprinting' approach for a range of mainstream and sustainability funds. Carbon metrics can act as a 'heatmap' to understand the key high-carbon sectors and report climate related data across sectors. At the same time, methodological shortcomings suggest that the data does not yet allow for a meaningful comparison across funds or financial assets within a sector, moreover, it does not inform on exposure to 'green' .

Green / brown exposure metrics (p. 44-49). A complementarity way to assess climate friendliness is through green / brown exposure metrics. These involve measuring the exposure or investment in 'green' or 'brown' technologies, industries, or sectors:

- *Sector / industry classification:* Financial assets can be categorized as 'brown' by sector or industry (Fig. 1.14). While ignoring diversification within a standard industry classification, it gives a first impression of the exposure to high-carbon financial assets.

- *Green / Brown technologies:* A more granular approach relates to business segmentation, based on categorizing assets by green / brown technologies. The nature of the data implies that these technologies can only be assessed for certain sectors.

Climate (ESG) scores (p. 50-53). Climate (ESG) scores are qualitative indicators. While these scores cannot be aggregated to report at portfolio level, the Asset Owner Disclosure Project (AODP) has developed an investor score based on climate risk management. While focused on risk, this score integrates elements related to climate friendliness, such as the carbon footprint of the portfolio.

FIG. 1.13: CARBON FOOTPRINT OF DIFFERENT FUNDS IN KGCO_2 / 100 EUR INVESTED (SOURCE: VERBRAUCHERZENTRALE BREMEN 2015, BASED ON SOUTH POLE GROUP DATA)

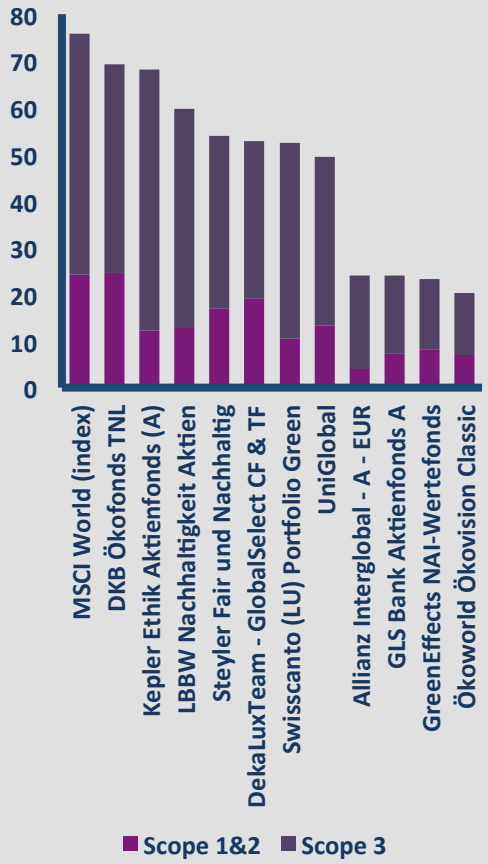
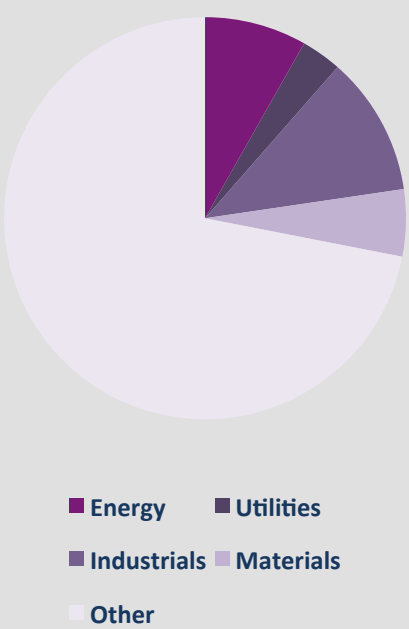


FIG. 1.14: SHARE OF SAMPLE HIGH-CARBON SECTORS MARKET CAPITALIZATION IN MSCI WORLD (SOURCE: MSCI WORLD INDEX FACTSHEET)



ALIGNING PORTFOLIOS WITH 2° C CLIMATE GOALS: EXAMPLE CEMENT SECTOR

Cement is used as a binding material to produce concrete. Its production emits roughly 2.3 GT of CO_2 per year. Climate friendly investors can finance new capacities or retrofitting programs based on best-available technologies, switch to dry-process kilns, away from coal to waste fuels and biomass, and add low-carbon binding materials (e.g. fly-ash) in the product. All together, this can cut emissions by roughly 30% in 2050 compared to a baseline scenario. Alignment with 2°C scenarios however requires almost zero emissions from cement plants in the long term and tripling the emission reductions by 2050. Given the lifetime of a cement plant (40-50 years), a climate friendly investor can explore:

- Advanced concrete helping to improve buildings energy performance (e.g. insulation);
- Construction services and materials based on low-carbon alternatives to concrete (e.g. wood for individual dwellings);
- R&D in low-carbon alternatives to cement (e.g. copying the chemical process producing eggshell or coral reef at industrial scale) and / or carbon capture and storage.

From an investors perspective, the roadmap likely involves a selection of best-in-class cement manufacturers. However, no listed cement group currently invests massively in breakthrough technologies. A diversification to other industry groups and other asset classes such as climate bonds (financing retrofitting programs), private equity, and venture capital (R&D and CCS) may therefore be needed.

ALIGNING PORTFOLIOS WITH 2° C CLIMATE GOALS: EXAMPLE ROAD TRANSPORT

Road transportation emits roughly 6 GT of CO_2 annually. Listed companies contribute to future emissions via investments in fuels, as well as automobile and road construction. In addition, households purchase cars and governments also invest in road construction A climate friendly investor can explore:

- The development of existing low-carbon engines (hybrids, flex-fuel, electric, natural gas, efficient gasoline/diesel) and massive R&D in breakthrough technologies (fuel-cells, new batteries, etc.) in the automotive sector;
- R&D in the next generation of clean fuels including production, transformation and distribution, leading to investments in agriculture, refining, and distribution;
- The modal shift, involving investment in rail companies, and smart multimodal transportation projects.

One challenge relates to the volatility of the relative young market. A review of electric car sales in the USA showed that market shares can fluctuate by over 20% over a 9 month time frame (Fig. 1.15). Beyond the aspects highlighted above, fuel efficiency also plays a key role (Fig. 1.16). An investor will likely need to broaden his or her universe to small caps and private companies, and may need to increase his or her exposure to rail companies and climate bonds to achieve appropriate exposure. Transport has the largest share in the global climate-themed bonds universe (cf. p. 20).

FIG 1.15: SHARE OF US ELECTRIC CAR MARKET (SOURCE: HYBRIDCARS.COM)

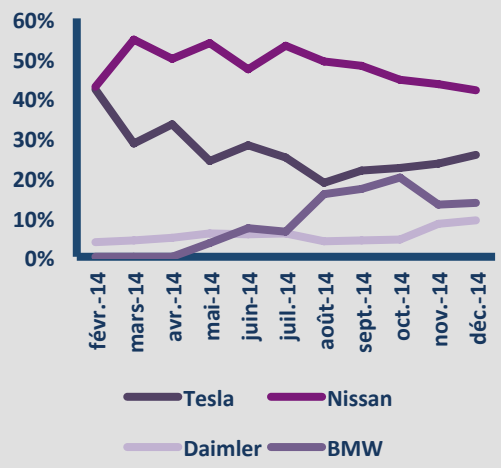
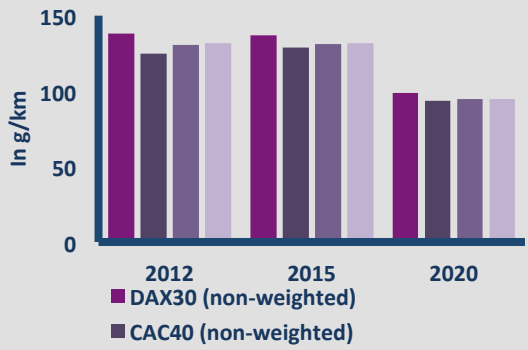
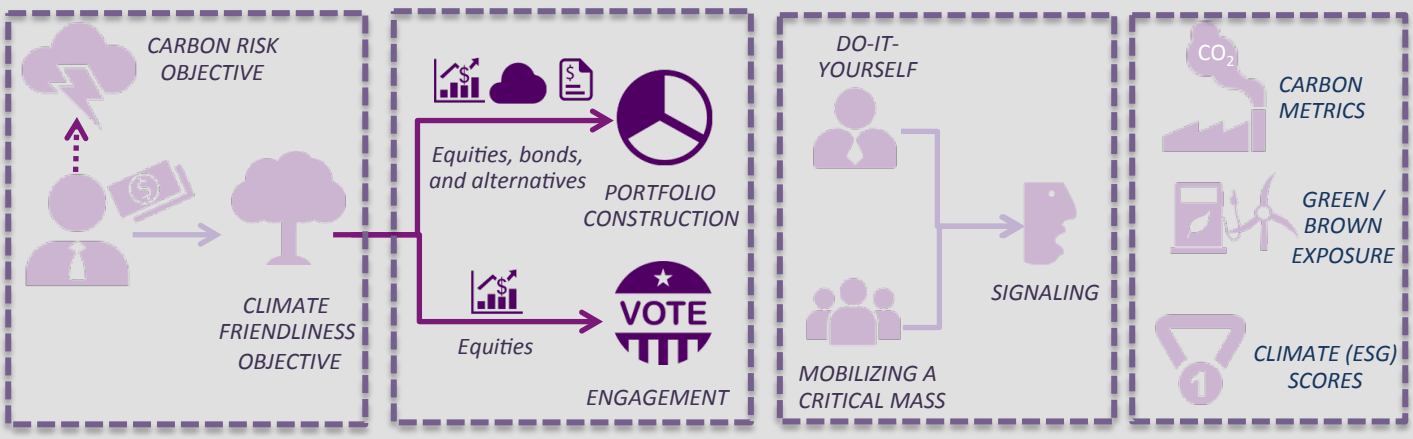


FIG 1.16: EUROPEAN VEHICLE EMISSIONS TRAJECTORY (SOURCE: 2°ii 2014)



CHAPTER 2:
CLIMATE FRIENDLY INVESTOR ACTIVITIES



KEY MESSAGES:

DON'T FOCUS EXLUSIVELY ON LIQUID MARKETS • Climate friendly approaches in equity and bond portfolios often depend on reaching a critical mass of investors in order to achieve impact in terms of limiting the cost or availability of capital (cf. p. #). Investors should thus also consider less liquid assets to maximize impact (cf. p. #).

DON'T IGNORE SECTOR DIVERSIFICATION • Today's mainstream benchmarks are poor guides to appropriate climate friendly sector diversification. Investors should advocate for the development of climate friendly indices.

DO ENGAGE • For listed equities, engaging with companies to influence their investment plans, coupled with portfolio construction strategies, is the most direct approach for impact.

DO FOCUS ON ENERGY TECHNOLOGY DIVERSIFICATION • Climate impact is essentially determined by production processes, products, and the corresponding choices in energy technology. Beyond sector diversification, investors should focus on energy technology diversification.

2. CLIMATE FRIENDLY INVESTOR ACTIVITIES

2.1 OVERVIEW

From measuring climate friendliness to implementing climate friendly strategies. The previous section defined climate friendliness and the parameters needed to measuring it at the portfolio level. Using this as a starting point, this chapter will focus on the activities investors can implement to integrate climate change objectives into investment decisions.

Climate friendliness activities. The report addresses two types of climate friendly strategies:

- **Climate friendly portfolio construction:** Portfolio allocation decisions can impact the cost and availability of capital in favour of lower-carbon and climate-friendlier companies, projects, or assets and can influence investees towards climate-friendlier behaviour.

- **Climate friendly engagement:** Investors can *influence* corporate behavior and capital allocation decisions of their investees through shareholder engagement. Although hypothetically investors can also influence companies and public sector bond issuers through the bond market, the discussion of this strategy in this report is limited to the listed and private equity space.

PORTFOLIO CONSTRUCTION

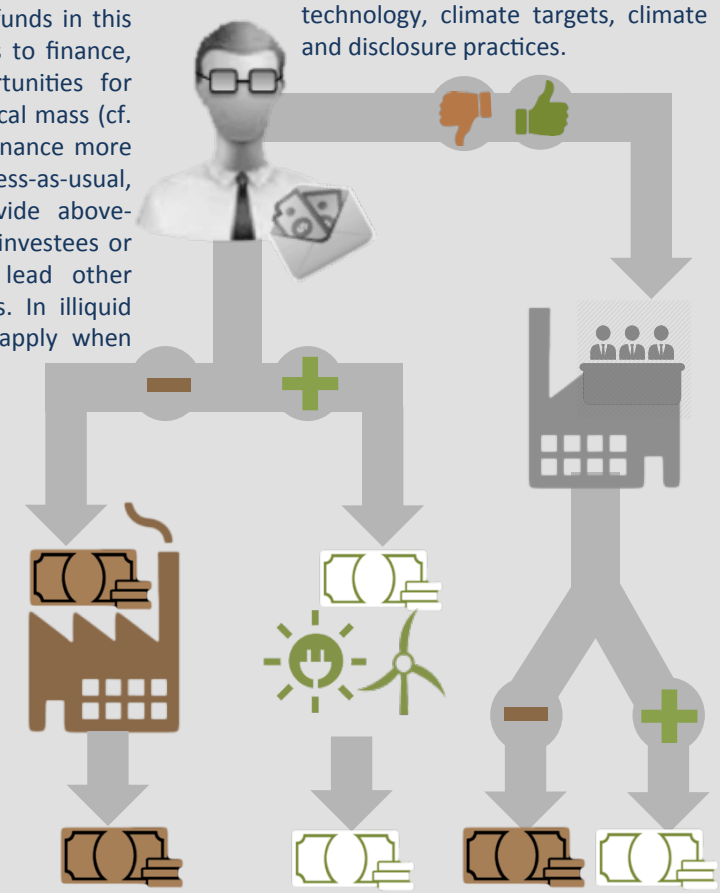
Investors can **INFLUENCE THE COST AND AVAILABILITY OF CAPITAL** by reallocating their portfolio from climate problems (brown) to climate solutions (green). Reallocating funds in this way may improve green access to finance, while limiting financing opportunities for brown activities. Without a critical mass (cf. p. 31), investors In order to finance more green investment than business-as-usual, investors need to either provide above-market financing conditions to investees or create momentum that will lead other investors to favor green assets. In illiquid markets, impact may already apply when financing at market conditions.

The ability of investors to influence brown investments in the real economy using portfolio construction is more limited, especially in liquid markets where rapid exchange of assets cancels out potential impact quickly. In this case, the only way to have an impact is to mobilize critical mass or through signaling.

The strategy will be discussed on p. 20-25.

ENGAGEMENT

As shareholders of companies, financial institutions can seek to **INFLUENCE THE ALLOCATION OF CAPITAL BY COMPANIES**. Engagement can focus on the breakdown of their capital expenditure by green / brown energy technology, climate targets, climate strategies, and accounting and disclosure practices.



To be successful, engagement strategies need to be supported by either the management of the companies, or a majority of shareholders (e.g. again, a critical mass).

Therefore investors implementing shareholder engagement strategies need to form coalitions to leverage their voting power. They can also concentrate their efforts on smaller companies, in which they can take a significant stake (for ex. in the private equity space).

It is important to note that providing and influencing capital strategies can be complementary. Strategies are presented on p. 26-27.

Connecting the dots between investor strategies and asset classes. Fig. 2.1 connects the climate-friendliness strategies summarized on the previous page with the asset classes where these strategies may be most relevant. The strategies focus on portfolio construction and engagement

Structure of the discussion. The following pages will zoom in on each of the strategies and asset classes summarized in this table. In each case, the discussion will provide a brief overview of the asset class, the potential activities, and the associated metrics. The organization of the report reflects the 'sequencing' that investors can use. In broad strokes, it consists of :

i) measuring and eventually disclosing the current degree of their portfolios' 'climate-friendliness' using the appropriate metrics or indicators;

ii) designing and implementing investment activities to increase the degree of their portfolios' climate-friendliness over time;

iii) measuring and eventually disclosing progress over time using the same metrics or indicators.

Whereas the previous section focused on step i, this section focuses on the the investment approaches (step ii). Chapter 3 will address step iii.

Out of scope. The report does not address a number of assets in the typical institutional investor's portfolio, notably cash, sovereign bonds, or other alternatives, such as commodities, hedge funds, etc. The reason behind excluding these asset classes is either their lack of materiality to climate issues, their marginal share in an institutional investor's portfolio, or the inability of existing frameworks to inform investors on how climate friendliness should be understood for these asset classes. This applies in particular to sovereign bonds. The gaps identified in this report highlight the need for further research and metric development (cf. p. 54-55).

FIG. 2.1: IMPLEMENTING CLIMATE FRIENDLY INVESTOR APPROACHES (SOURCE: AUTHORS)

	ASSET CLASS	APPROACHES
PORTFOLIO CONSTRUCTION	**Corporate Bonds**	• Set negative screens for corporate bonds associated with high-carbon technologies, industries, or sectors • Increase exposure to green bonds • Explore activities that provide preferential financing conditions or higher transaction costs (e.g. through reporting, monitoring, and verification mechanisms for green bonds)
	Project Finance / Real Estate	• Set a minimum target share of green • Implement a negative screen for high-carbon project finance or a decarbonization approach across all types of project finance • Explore strategies that accept higher transaction costs or above-market financing conditions (e.g. through smaller deal size in the project finance space).
	Listed / Private Equity	• Apply negative screening and / or best-in-class approaches, ideally using both carbon as well as green / brown metrics exposure metrics • Explore climate-related indices that use both carbon and green / brown metrics • Explore managing both sector and energy technology diversification
ENGAGEMENT	**Listed / Private Equity**	• Engage on reducing high-carbon capital expenditure and increasing climate friendly investment, including investment related to energy efficiency. • Engage on corporate GHG emissions targets and strategies, including on disclosure and transparency

2.2 CORPORATE BONDS

Overview. As outlined above, this report will only focus on corporate bonds. While sovereign bonds make up over 50% of the outstanding bond market, there is, to date, no meaningful way to assess climate friendliness and impact for that asset class. Government-related bonds issued by public companies, such as public utilities, are easier to assess and may be integrated into a corporate bonds assessment. They have also increasingly contributed to the growing green bond market. Created to fund projects that have positive environmental and / or climate benefits, green bonds generate proceeds earmarked for green projects, but backed by the issuer's entire balance sheet.

Strategy options. Investors have the following three strategy options for corporate bonds:

- Set negative industry / sectors screens for corporate bonds from the energy sector and high-carbon utilities or cap exposure below their share in global bond markets;
- Set absolute or relative targets in portfolios for green corporate bonds and asset-backed securities;
- Implement preferential financing conditions for green bonds.

Impact. Impact is only clear for the third strategy. Given the overall liquidity of the corporate bonds market, the first two strategies are only likely to contribute positively to financing the transition to a low-carbon economy if investors reach a critical mass. The exception to this may be green asset-backed securities as this market is basically non-existent and therefore very illiquid.

Challenges / barriers. There are a number of challenges here that don't exist for project finance. Barriers include:

- **Deal flow**: The share of 'green' in the global bond universe is peripheral, although growing rapidly. Corporate green bonds are still a tiny percentage of bond markets. The asset-backed security market is dominated by the real estate sector and there are currently almost no bonds backed with 'green' assets. This makes it difficult to set meaningful 'green' targets with current metrics. Over two-thirds of the existing climate-themed bonds universe in 2014 was associated with the transport sector (Fig. 2.3).

- **Diversification constraints**: High-carbon sectors are only marginally represented in the global bond market (Fig. 2.2). They are however significantly represented as a share of corporate bond markets. Given diversification constraints, investors may first choose to set screens for less prominent sectors (e.g. coal) or cap high-carbon sectors' exposure below current market diversification

- **Data constraints**: The non-financial data for bond markets is less comprehensive than for equity markets. This makes granular strategies beyond sector / industry screening difficult to implement. While some data from listed equities can be transposed to corporate bonds, this only covers a limited part of the investable universe.

- **Transaction costs**: Estimates suggest climate friendly corporate bonds are generally smaller in size than market average (cf. p. 30) , which may slightly increase transaction costs.

FIG. 2.2: EST. BOND UNIVERSE BY KEY SECTORS / TYPES (SOURCE: AUTHORS, BASED ON BARCLAYS GLOBAL BOND AGGREGATE AND CBI 2014)

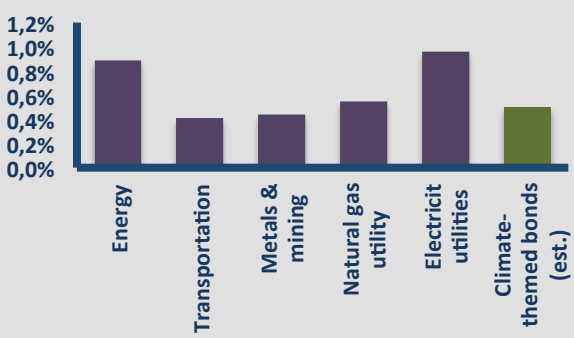
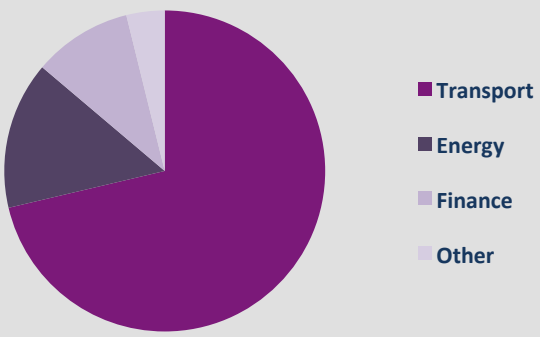


FIG. 2.3: BREAKDOWN OF CLIMATE-THEMED BOND UNIVERSE (SOURCE: CLIMATE BONDS INITIATIVE 2014)



2.3 REAL ESTATE

Overview. Real estate funds make up the largest share of most institutional investor alternative portfolios (Fig. 2.4). Buildings, through their direct and indirect GHG emissions, contributed over 18% to global GHG emissions in 2010 (Fig. 2.5). This makes them the second largest contributor to GHG emissions behind industry and ahead of the transport sector. Buildings may also lead to additional GHG emissions based on their location and the use of transport of the building users.

Although Institutional investors are exposed to the real estate sector in all asset classes, whether through real estate companies in the equity and corporate bond space, or mortgage-backed securities, the discussion here will focus on real estate as an asset class. To manage climate friendliness for this asset class, a key factor is energy use and efficiency. Over two-thirds of projected possible end-use energy savings in buildings relates to heating, cooling, and lighting, where efficiency gains can be significant (Retroficiency 2013).

Strategy. Investors can influence energy efficiency in their real estate funds through investing in funds that only include properties that have achieved a certain certification or implementing retrofits in the existing real estate portfolios. There is currently no metric to measure the alignment of energy efficiency measures with 2° C climate goals. The implication is that retrofits may lock-in emissions reduction that are not ambitious enough. As long as this metrics shortcoming exists, retrofits are best implemented using existing national or regional certification guidelines on energy efficiency.

Impact. The decision to finance retrofitting of an existing real estate portfolio creates impact directly, given the direct control of the investor over the investment decision in the real economy. The impact of a decision in turn to build real estate portfolios using a specific screen depends on the extent to which this decision impacts real estate developers.

Challenges. A number of building certification systems integrate energy efficiency criteria. These are usually country specific. In the United States for example, the prominent certification system is LEED, with certification levels ranging from “certified” to “platinum”. While there are a number of shortcomings to these certification systems, notably to the extent that they don’t necessarily focus exclusively on climate criteria, climate indicators can be isolated within certification standards (cf. box on GRESB). The Climate Bonds Initiative “Green Buildings” standard is currently under verification.

FIG 2.4 : BREAKDOWN OF ALTERNATIVE PORTFOLIOS BY INVESTOR (SOURCE: TOWERS & WATSON 2014)

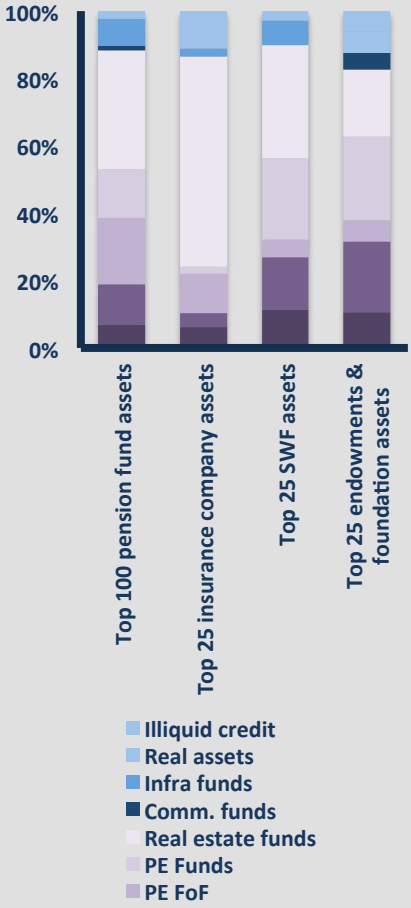
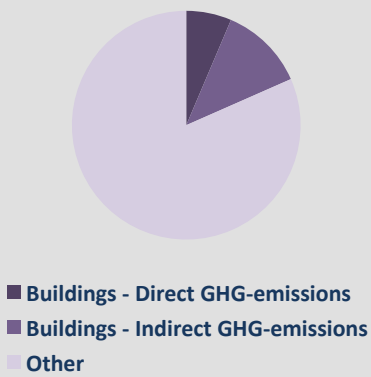


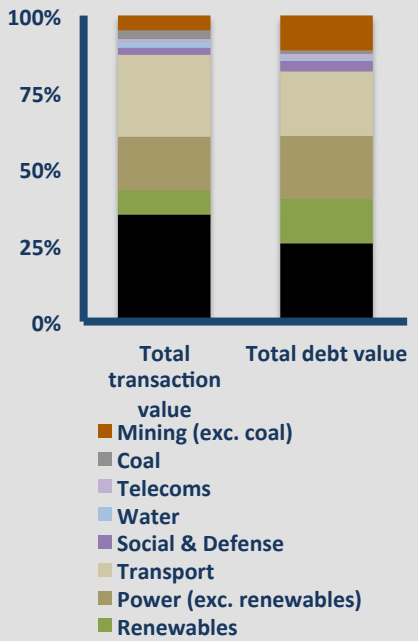
FIG 2.5: SHARE OF BUILDINGS IN DIRECT AND INDIRECT GHG EMISSIONS 2010 (SOURCE: IPCC 2014)



GRESB INTERNATIONAL CERTIFICATION

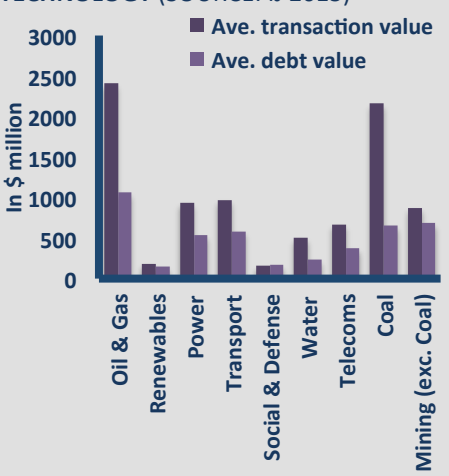
GRESB is assessesthe sustainability performance of real estate portfolios. The dynamic benchmark is used by institutional investors to engage with their investments with the aim to improve the sustainability performance of their investment portfolio, and the global property sector at large.

FIG 2.6: PROJECT FINANCE BY SECTOR & TECHNOLOGY (SOURCE: IJ 2015)*



* Excludes Corporate finance and public sector finance, acquisitions, securitization, and privatization. Database of 2,069 transactions.

FIG. 2.7: AVERAGE PROJECT FINANCE PROJECT VALUE 2014 BY SECTOR AND TECHNOLOGY (SOURCE: IJ 2015)



TRUCOST ASSESSMENT OF INFRASTRUCTURE FUND

Trucost conducted an assessment of the infrastructure fund of a large French institutional investor. The analysis was a bottom-up, life-cycle GHG emissions analysis of assets in the fund. A key emphasis of the work was a comparative analysis of a range of different investments beyond the clear green/brown taxonomy identified above. This type of analysis allows for assessing the climate-friendliness in particular for the transport sector.

2.4 PROJECT FINANCE

Overview. While project finance generally is only a small part of an institutional investors portfolio, it plays a significant role for climate friendly investments. Power (including renewables), oil & gas, and transport made up over 80% of global project finance in in the past four years (Fig. 2.6). According to BNEF, roughly 67% of renewable energy finance in 2014 was asset finance (internal & external).

Strategy options. Institutional investors implementing a climate strategy for project finance have three options:

- Set negative energy technology screens for high-carbon energy (e.g. oil, gas, coal) and transport (e.g. airport infrastructure). These screen can also be designed using carbon intensity metrics;

- Set targets for green shares in the fund. The metrics behind these targets can be based on a taxonomy of assets, such as the Climate Bonds Standards. Target can also be defined with regard to decarbonization focused on GHG emissions (cf. box on side);

- Implement preferential financing conditions for climate friendly project finance or focus on project finance in under-serviced markets (e.g. developing and emerging economies).

Impact. The impact of the first two strategies depends on the liquidity of the market. It is unclear to what extent an individual investor's decision to stop high-carbon project finance would change financing conditions for these types of projects. For oil & gas, given the overall volume of financing, this seems unlikely. For mining and green project finance, it appears that an individual investor can have an impact. For mining a broader trend seems underway involving higher financing costs, to which these activities may contribute (Fig. 2.7). The impact for the third activity is given even under the assumption of a do-it-yourself positioning.

Challenges. Transaction costs are likely to be higher for renewables gives that the average debt value of renewables is lower than for all other technologies (Fig. 3.9). On the other hand, the supply of renewables project finance (the "deal flow") is relatively large and thus this appears less of a challenge. In addition, the average basis points for renewables have dropped significantly while that for mining has increased, making renewables project finance largely in line with other sectors (cf. p. 30). Finally, project finance funds are usually not managed with a view towards managing 'optimal diversification'. Investment constraints of this nature thus are unlikely to apply, contrary to strategies for equities for example.

2.5 PRIVATE EQUITY

Overview. Investors currently only have a very small share of their portfolio invested in alternatives. Within alternatives in turn, private equity funds also only make up a small share (p. 23, Fig. 2.4). Private equity in turn is a very broad category and can include venture capital, small and medium-sized companies, and large non-listed companies.

The issue of private equity's climate friendliness is gaining increasing attention. Swedish pension fund AP6 for example conducted the first carbon footprinting of its private equity fund in 2015 (cf. box). In France, the Banque Public d'Investissement (Public Investment Bank), created in 2012 and a prominent player in the private equity space, has a mandate to finance the "ecological transition" (Art. 5).

Strategy. Private equity can be seen both from a portfolio construction view and engagement view. There are two strategies for influencing capital for private equity:

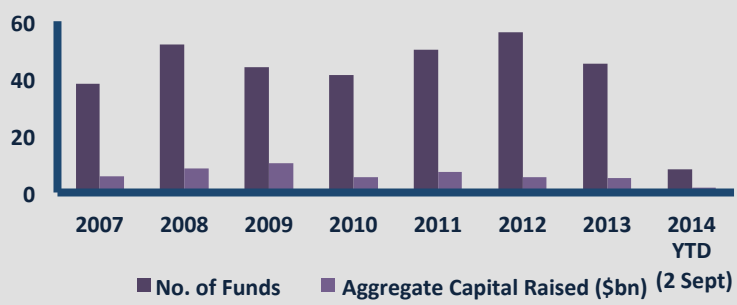
- Investors can contribute to **decarbonizing** the operations of their companies through targeted programs (cf. box on KKR Green Portfolio Program). This can then be part of a broader portfolio decarbonization strategy.

- Investors can invest in green private equity funds (Fig. 2.8). These funds may be climate specific or more generally sustainability themed (cf. box on WHEB Private Equity Fund). Private equity funds can help these companies grow market share.

Impact. Given that investors influence capital directly, both strategies involve impact. In the first case, investor action directly leads to improved climate friendliness of their investees. In the second case, investors are supporting green corporate growth.

Challenge. Given that investors are owners in the private equity space, the issue of critical mass is less material than for listed equity, where investors have to create coalitions. Some barriers may remain however with regard to data.

FIG 2.8: ANNUAL PRIVATE EQUITY CLEANTECH FUNDRAISING BY NUMBER OF FUNDS 2007-2014 YTD (02/09/2014)



AP6 PRIVATE EQUITY CARBON FOOTPRINTING

South Pole Group was commissioned to screen part of the Swedish pension fund AP6's private equity portfolio, and the results have been included in the pension fund's recently published annual report for 2015. The screening covered 80% of the total value of AP6's portfolio. The screening was conducted on the basis of the reported GHG emissions data of the companies in the portfolio. For non-reporting companies, South Pole Group approximated the GHG emissions of the remaining company using an 800 sub-sector specific evaluation model, applied to a proprietary green gas adjusted sector classification system.

KKR GREEN PORTFOLIO PROGRAM

KKR has established a Green Portfolio Program that involves set of analytic tools to help each company management team assess and track improvements across several key environmental performance areas, such as greenhouse gas emissions, water, waste, priority chemicals, and forest resources. The process is tailored to companies' existing environmental or sustainability programs. To date, KKR has launched the Green Portfolio Program at 25 of their portfolio companies and claims a total of 2.3 million metric tons of GHG emissions avoided (2008-2013). In early 2013, KKR published the GPP Handbook. The handbook highlights operational best practices and includes customizable action plan templates.

WHEB PRIVATE EQUITY FUND

WHEB manages a private equity fund that focuses on companies serving energy and resource efficiency markets. The private equity fund, although not solely focused on climate issues, places a strong emphasis on companies providing climate solutions. The specialized fund currently consists of nine companies in clean industrial processes, energy generation, energy efficiency, waste & recycling, and advanced materials.

2.6 LISTED EQUITIES – PORTFOLIO CONSTRUCTION

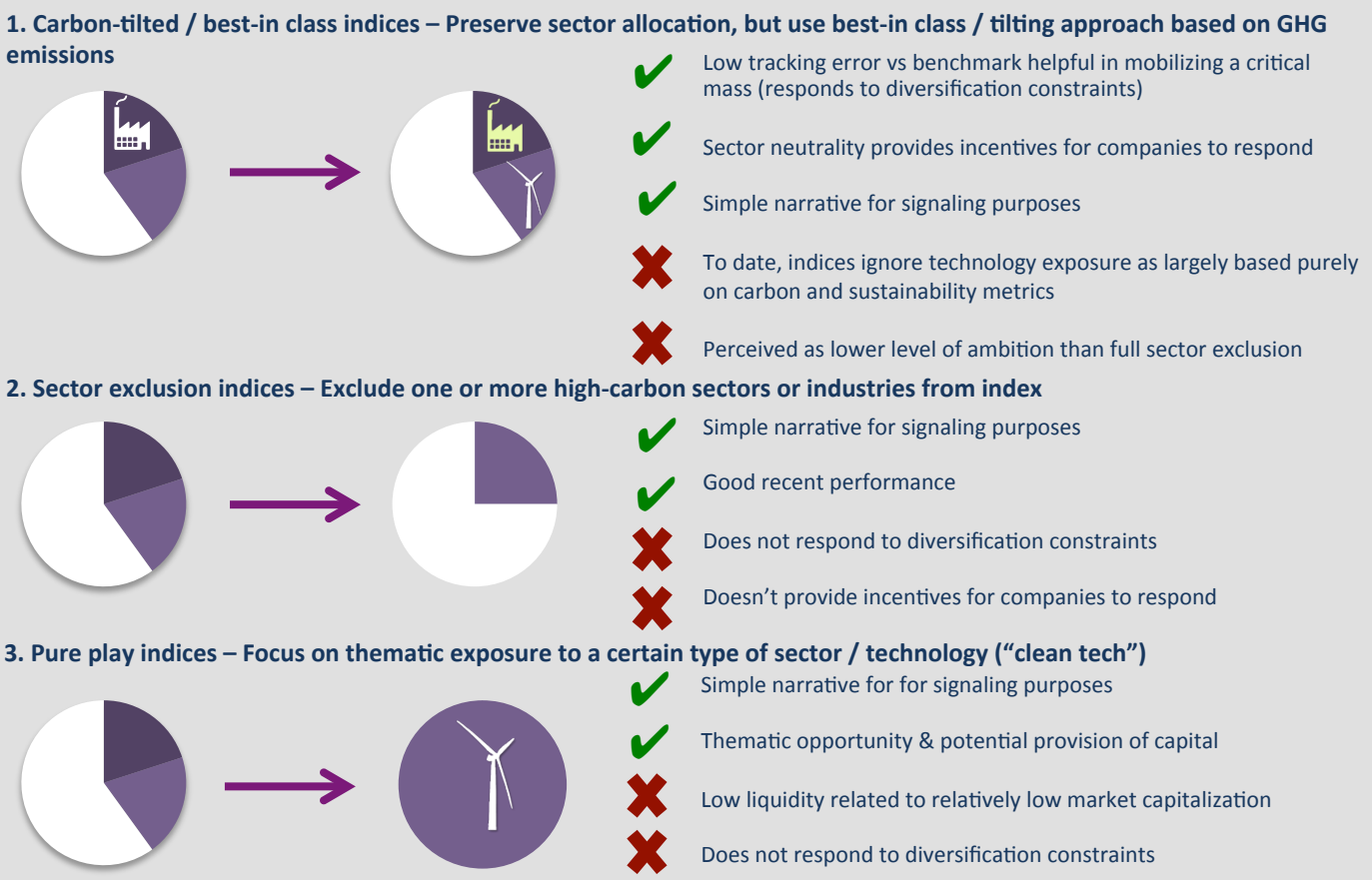
Overview. A significant share of most institutional investors' portfolios is invested in equities. Recent attention to climate friendly investment activities such as portfolio construction and engagement (discussed in the next section) has arguably been the most pronounced in the equity space. Together with project finance, listed equities are arguably the asset class with the most comprehensive data, given corporate reporting requirements for listed companies. Climate friendly approaches for listed equities can focus on portfolio construction and engagement. It should be noted that both approaches can be pursued in parallel, with initiatives facilitating a combination of index investing and engagement under way in Sweden and France. In terms of portfolio construction, the potential impact can relate either to the impact on share price and market capitalization directly, knock-on effects for companies based on stigmatization as part of a signaling process (cf. p. 31 & 32) and through equity issuance.

Strategies. Portfolio construction strategies can be pursued with an active or passive mandate:

- **Active mandate:** Active mandate strategies can be designed in a myriad number of ways, either using a similar approach as for index design or a targeted more sophisticated approach involving a range of indicators. One key and still unanswered question for active mandates is how they can be developed to mobilize a critical mass.

- **Passive mandate:** The current landscape of passive investing strategies allows for three approaches (Fig. 2.9). Each approach is predicated on a specific index product. First, a range of indices are designed using a best-in class or tilting approach, where climate-related metrics are used to reweight companies (tilting) and / or exclude worst performers (best-in class). These types of indices are offered by all major index providers. Alternatively, a number of indices have been designed using a sector or industry exclusion approach. Notable examples for this approach include indices excluding fossil fuels or coal. Finally, indices may be 'pure play' with inclusion limited to e.g. solely 'clean tech' companies or companies with 'climate-related' revenues.

FIG 2.9: CLIMATE-RELATED ALTERNATIVES TO MAINSTREAM INDICES (SOURCE: AUTHORS, BASED ON 2° INVESTING INITIATIVE 2014)



Carbon-tilted / best-in-class indices use a best-in-class/ tilting approach to compare companies to their peers, while largely preserving sector exposure (Fig. 2.11). This provides an incentive for companies to respond by improving on the indicators. A low tracking error makes these approaches more attractive for mainstream investors, which may facilitate mobilizing a critical mass. However, sector neutrality also means that these indices are often seen as less ambitious than more pronounced approaches such as full sector exclusion. Another challenge is the shortcomings of the underlying data used, in particular carbon metrics for comparing companies (p. 37 and following). Carbon-tilted indices do not, for instance, address exposure to green technologies. Thus, the MSCI ACWI Low Carbon Target Index underweights green technologies (Fig. 2.10).

Sector/industry exclusion indices exclude sectors / industry from a benchmark index. Corporate responses can relate to seeking a sector or industry re-classification. These indices are likely to violate diversification constraints of many investors, making it difficult to mobilize a critical mass. Equally, none of the ex fossil fuel indices reviewed exclude the energy sector entirely (Fig. 2.12).

Pure play indices define an investment universe and then apply a positive screen to only include climate friendly companies. Examples include clean tech indices. Instead of looking to influence companies, these strategies are designed more from the perspective of helping the growth of the green economy. These indices can be used for a small share of the equity portfolio as part of a broader diversified equity portfolio.

Impact. Portfolio construction can have an impact on equity issuance, which is a source of capital for some companies. Despite equity issuance having been identified by the IEA as a marginal source of financing in most climate-related sectors, portfolio construction may still have an impact for 'green' companies. Portfolio construction approaches can impact corporate market capitalization and share prices, which are frequently linked to corporate management incentives. Demonstrating a clear preference for 'climate performers' puts pressure on companies to improve relative to peers. Companies may change their strategy to 'woo' investors back into purchasing the stock. Given the liquidity of equities, this strategy likely requires a very large number of investors to achieve impact. One exception may be clean tech indices, where investors create impact accepting lower liquidity.

Challenges. Critical mass is only likely be achieved using indices that mainstream investors are willing to buy. There is likely a trade-off between the ambition of the index in terms of indicators and the ability to achieve a critical mass. The strategy also relies on the landscape of index products, which currently faces a number of shortcomings.

FIG 2.10: SHARE OF GREEN IN MSCI ACWI AND MSCI ACWI LOW-CARBON TARGETS INDEX (SOURCE: MSCI)

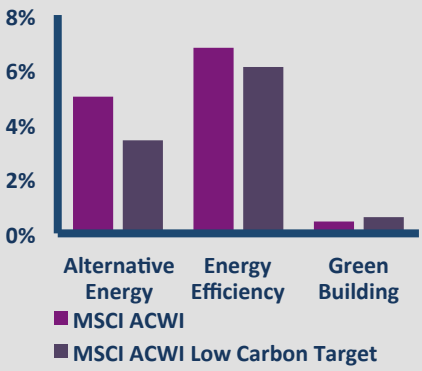


FIG 2.11: AVERAGE SECTOR EXPOSURE OF MSCI LOW CARBON INDICES RELATIVE TO BENCHMARK (SOURCE: MSCI 2015)

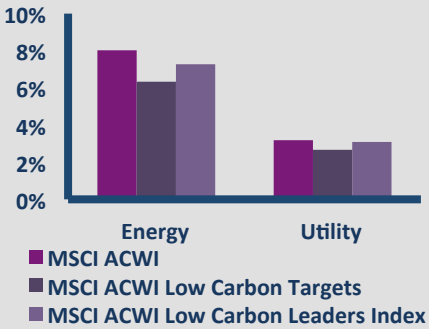
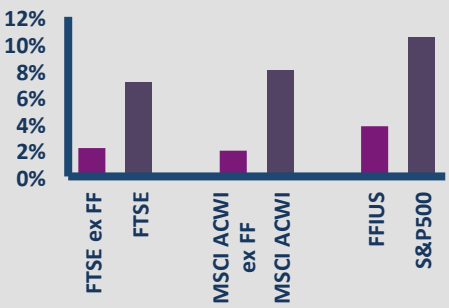


FIG 2.12: AVERAGE ENERGY SECTOR EXPOSURE OF FOSSIL FUEL EXCLUSION INDICES RELATIVE TO BENCHMARK (SOURCE: FTSE, MSCI, FFIUS)



AP4 / FRR / AMUNDI INDEX

AP4, FRR, and Amundi have earmarked $2 billion for investment in the MSCI Low Carbon indices. The indices uses carbon metrics and fossil fuel reserves and aim to reduce the GHG emissions by 50%.

FIG. 2.13: SHARE OF INSTITUTIONAL INVESTORS' HOLDINGS IN US STOCK MARKETS (SOURCE: BLUME 2012)

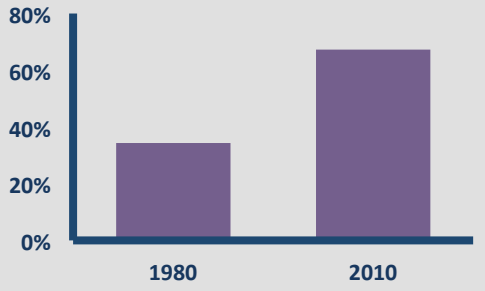
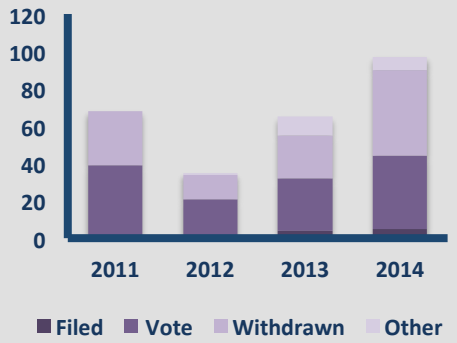


FIG. 2.14: GROWTH IN US SHAREHOLDER RESOLUTIONS (SOURCE: CERES 2015)



CALPERS ENGAGEMENT POLICY

CalPERS engages directly with corporations through its Focus List Program. CalPERS identifies companies in its portfolio that are underperforming with regards to both stock returns and risk management of environmental issues. Engagement occurs for up to three years, which includes the submission of shareholder proposals where necessary. This has been correlated with a positive impact on financial performance, known as the "CalPERS Effect". CalPERS is also a part of the CERES-led Carbon Asset Risk Initiative that draws together 70 global investors with more than $3 trillion AUM. The initiative asks 45 large oil and gas, coal, and electric power companies to assess the financial risks that climate change poses to business plans.

NORGES CLIMATE STRATEGY

Norges Bank, manager of Norway's pension fund, has announced updated expectations for companies. Moving forward, Norges will ask the companies it invests in to consider the impact of the "successful implementation to limit the likelihood of temperature rising above 2°C."

2.7 LISTED EQUITIES – ENGAGEMENT

Overview. Institutional investors can contribute to climate goals indirectly in their role as shareholders of corporate equities. In the United States, institutional investors' share in stock markets has grown from 34% in 1980 to 67% in 2010 (Fig. 2.13). Engagement may be complementary to influencing management by rewarding and punishing companies through portfolio construction.

Large institutional investors, including California pension funds CalPERS (cf. box), CalSTRS, and French pension fund ERAFP have active shareholder engagement records on the issue of climate change. AODP / ACCR have coordinate activities in Australia. In the United States, the movement has been led by private advocacy groups that build shareholder coalitions on social, governance, and environmental issues. The initiatives have led to an increase in the number of shareholder resolutions in the United States (Fig. 2.14). Mutual fund support for these shareholder resolutions has jumped from 16% to 33% in the past decade (Ceres 2015).

Strategies. The Council for Institutional Investors, a non-profit association of pension funds and leading voice for effective shareholder engagement, describes the range of strategies as a "continuum of engagement" that ranges from relationship building and proxy voting to advocacy coalitions and shareholder resolutions, and, ultimately, reallocation of funds or divestment. From a climate perspective, shareholder engagement can focus on the following issues:

- Reducing investment in brown, in particular with regard to capital expenditure, and increase investment in green technologies, both for capital expenditure and R&D;
- Development of corporate level climate targets (e.g. GHG emissions reduction, increase in green sales, etc.) and strategies;
- Disclosure of climate-related metrics and data.

Green/brown exposure metrics are likely to be most relevant for engagement as investments relate directly to decision-making in favor or against specific technologies. Technically, it is also possible to engage on investments using carbon metrics, for example through setting carbon intensity screens in corporate investment decisions. This type of engagement can focus for example on the GHG-intensity of oil plays or coal power plants, using recently developed criteria by the Carnegie Institute and the work of the Oxford Stranded Assets Research Program (cf. p. 54).

Investors can engage on corporate targets and strategies using all types of metrics. Corporate targets can be articulated using quantitative or qualitative indicators. Corporations can, for example, set GHG emissions reduction targets relative to the sectoral decarbonization Approach, developed by CDP, WWF, and Ecofys (cf. p. 54).

In the United States, 22 resolutions in 2015 ask companies to set GHG emissions reduction targets, 16 of which are still pending (Proxy Preview 2015). The proposals either focus on quantitative goals to reduce total GHG emissions. Nine of the 22 resolutions focus on company operations and 12 focus on company operations and products. Some resolutions have been challenged in front of the US Securities and Exchange Commission (SEC), but no proposal has been rejected by the SEC so far for 2015.

Investors can also engage on corporate incentives related to climate change. One example is the shareholder resolution filed with ConocoPhilips targeting the management incentives around fossil fuel replacement (cf. box on left). Alternatively, investors can influence corporates to set targets on climate score indicators. One example for this is the "Aiming for A" resolution calling on BP and Shell to achieve an "A" rating on the CDP Climate Performance Leadership Index (cf. p. 44).

Impact. All of the activities described above, assuming success, involve some form of impact. This applies in particular to influencing capital expenditure decisions which alters investment in the real economy. The development of corporate targets and strategies achieves the same effect indirectly. One key challenge here is the intrinsic credibility of corporate climate targets given the lack of a legal obligation to deliver. Disclosure of climate-related metrics and data creates transparency enabling investors to implement investing activities.

Challenges. Generally, engagement on climate-related issues is compatible with the broader investment constraints and fiduciary duty of investors. As the "CalPERS effect" suggest, engagement can help financial performance, especially with a view towards managing exposure to carbon risk and streamlining production processes. Nevertheless, the key challenge to this strategy also relates to critical mass. For engagement, the critical mass is needed to ensure a corporate response to engagement activities. The value of this critical mass is dependent both on the regulatory framework and the type of shareholder resolution. In principle, the critical mass relates to the necessary votes to pass a resolution. At the same time, 'non-confrontational' resolutions like "Aiming for A" have received corporate endorsement and thus are likely to be successful as a result. This can be facilitated through board engagement policies (cf. box on side).

CONOCOPHILIPS RESOLUTION ON EXECUTIVE PAY

The Unitarian Universalist Association of Congregations filed a shareholder resolution in 2015 with ConocoPhillips seeking to delink executive compensation from indicators related to fossil fuel reserves, in particular reserve additions and reserve replacement ratios. The resolution focuses on a traditional issue of shareholder resolutions – executive compensation – and links it to the climate performance and carbon risk related issue of fossil fuel reserves. The current status of the motion is "filed".

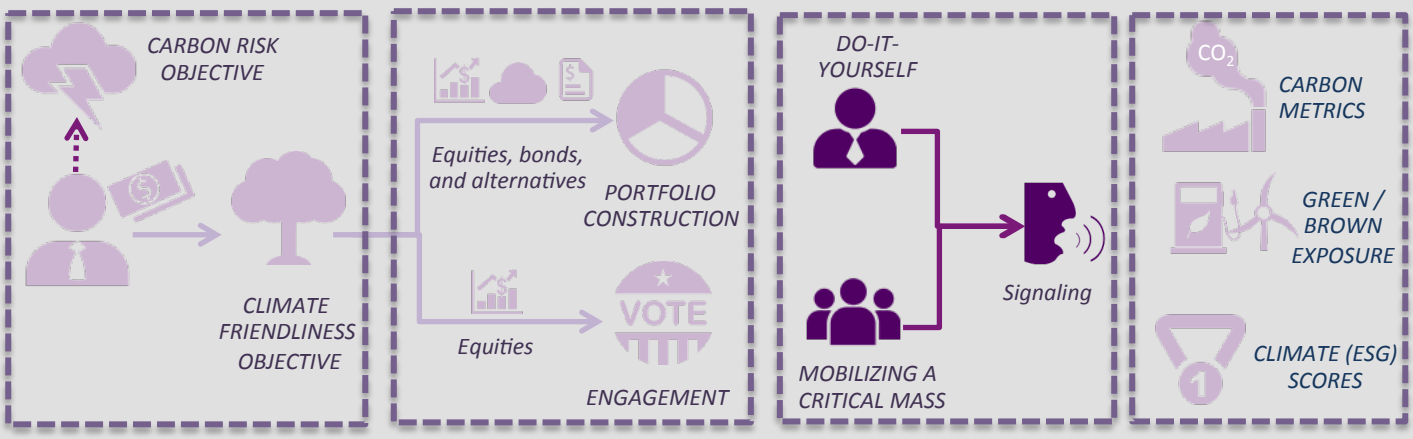
SHAREHOLDER RESOLUTION "AIMING FOR A"

Shareholder groups ClientEarth, Share Action and Aiming for A have proposed a resolution to BP and Shell called "Aiming for A." The resolution was originally launched by a group of investors, including CCLA, the Local Authority Pension Fund Forum (LAPFF) and the Church Investors Group (CIG), representing more than $300 billion in assets. The resolution now has support from CalPERS, AXA Investment managers, and UK railways pension manager Railpen. Both BP and Shell have agreed to support the resolution. The proposal asks for more information on operational emissions management, asset portfolio resilience to International Energy Agency's (IEA) scenarios, low-carbon energy R&D and investment strategies, and public policy positions relating to climate change in annual reports. A key aspect of the resolutions are the aim to be included in the CDP "A" performance band of its Climate Performance Leadership Index. The coalition is currently UK-focused, but is planning to file similar resolutions with other companies in the future.

PGGM / RPMI MODEL BOARD ENGAGEMENT POLICY

British investor RPMI and Dutch investor PGGM have published a 'model engagement' policy for US boards based on their European experience. The document explores how boards should engage with shareholders, what expectations they should have of their shareholders, and appropriate topics for engagement.

CHAPTER 3:
CLIMATE FRIENDLY POSITIONING & SIGNALING



KEY MESSAGES:

DON'T EQUATE EXPOSURE & IMPACT • Modifying a portfolio's exposure to different sectors, companies, technologies, or themes does not directly have the same effect in the real economy. The extent to which a climate friendly objective translates into impact depends on the investor's positioning and signaling.

DON'T SEEK A "FREE LUNCH" • Achieving real climate impact without a critical mass will likely require offering capital with better-than-market terms: higher risk, lower return, higher transaction costs, etc. However, accepting these terms in the short term can mobilize other investors and create benefits over the long-term.

DO FOCUS ON MOBILIZING A CRITICAL MASS • When individual action is insufficient to achieve impact, investors should focus on mobilizing a critical mass as part of investor approaches and / or to coordinate a policy signal. Platforms like the Portfolio Decarbonization Coalition (PDC) and Montreal Pledge help achieve this.

3. INVESTOR POSITIONING & SIGNALING

3.1 OVERVIEW

From climate friendly investor activities to climate impact. As outlined above, climate friendly investor activities by themselves do not necessarily produce a climate impact, in the form of GHG emissions reductions in the real economy. Achieving this impact then will depend both on the investor positioning associated with the strategy and the way the investor communicates on the strategy and the positioning. This chapter discusses the implications for investors both in terms of positioning and signaling. There are two options in terms of positioning:

- **Do-it-yourself** positioning may have a climate impact in illiquid markets, when willing to incur transaction costs or below market returns (cf. p. 30), or as part of the signaling (cf. p. 32-33).

- **Mobilizing a critical mass** applies for portfolio construction in liquid markets and engagement strategies for listed equities. It involves seeking a group of like-minded investors to employ a coordinated strategy (cf. p. 31).

The next step after choosing an investor positioning then relates to **signaling** on the strategy and associated investor positioning (cf. p. 32-33). Signaling can relate to communicating strategies or a more generic attempt to influence policy makers and other key stakeholders through e.g. signing public investor statements on climate change. Signaling can involve communicating on current measurement of climate friendliness, climate friendly strategies, targets associated with these strategies, or broader non-strategy specific signaling to policy makers and other key stakeholders.

INVESTOR POSITIONING

DO IT YOURSELF

Investors have an impact at individual level in certain cases. For instance, investors can influence the cost and availability of capital by providing financing at below-market conditions for green activities. However, outside of very large investors, influencing companies' investment decisions as individual investors likely only works in the private equity space. A do-it-yourself strategy can be seen as the first step to mobilizing a critical mass or be combined with signaling to increase impact.

MOBILIZING A CRITICAL MASS

Common action by investors is key to achieving impact for engagement and for portfolio construction in liquid markets. Investors can contribute to achieving a critical mass through a number of different avenues including investor platforms, shareholder advocacy coalitions, and / or demonstration effects related to specific investment strategies. In the short-term, success relies on 'crowding-in' investors through approaches that are compatible with existing investor constraints.

SIGNALING

Achieving global climate goals will depend on strong and reliable climate policies. Investment in the real economy will depend on households, corporates, and governments responding to these policies. While investors' role is limited in this respect, they can influence the broader policy and market environment by sending a political signal. Investors can also see the activities around measuring and managing climate-friendliness as contributing to the broader societal and political actions on climate change. Investor statements, pledges, and actions, such as portfolio decarbonization and divestment, can contribute to putting pressure on international climate and domestic policymakers.

FIG. 3.1: AVERAGE MARKET CAPITALIZATION OF MSCI INDICES (SOURCE: 2° INVESTING INITIATIVE 2014)

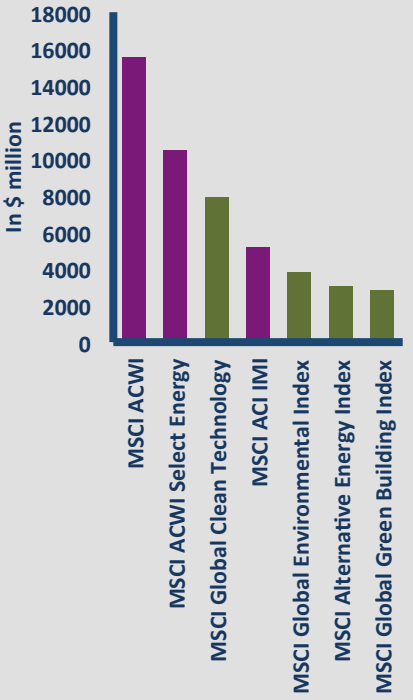


FIG. 3.2: SHARE IN TOP 40% AND BOTTOM 60% OF BARCLAYS GLOBAL BOND AGGREGATE (SOURCE: 2° ii 2014)

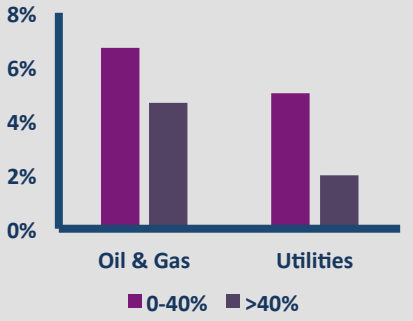
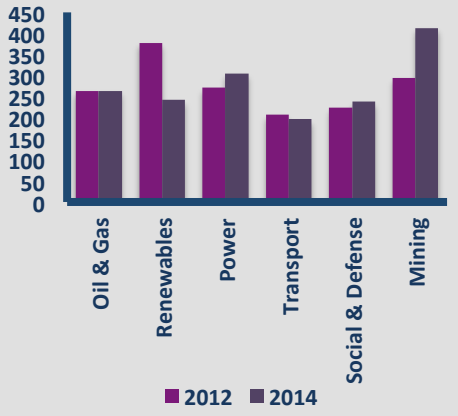


FIG. 3.3: AVERAGE PROJECT FINANCE RETURNS (BASIS POINTS) BY SECTOR AND TECHNOLOGY (SOURCE: IJ 2015)



3.2 INVESTOR POSITIONING – DO-IT-YOURSELF

Overview. The first approach investors can choose in terms of positioning vis-à-vis their activities can be labeled do-it-yourself. This implies that an investor seeks to have an impact without trying to mobilize other investors in parallel. The climate impact associated with this positioning depends on the specific strategy pursued. Specifically, a do-it-yourself approach may have a climate impact if pursued in illiquid markets, associated with a willingness to accept higher transaction costs or lower returns, or realized as part of a signaling strategy.

Illiquid markets. Generally, individual investor activity is unlikely to impact the overall cost and availability of capital for investees, given the size of most markets. The exception may be in illiquid markets, where an individual investor may have an impact. This may apply for example in project finance, which is much smaller relative to bond and equity markets. The exact impact for this market is under-explored and depends also on the scope of the market. Thus, an investor choosing to invest in infrastructure in emerging or developing economies is likely to have a bigger impact than an investment decision in relatively more mature infrastructure finance markets in Europe and the United States.

Transaction costs. The decision to increase the share of 'green' in financial portfolios as part of a do-it-yourself strategy is likely to have an impact only when associated with a willingness to incur higher transaction costs. The assumption is that if this strategy involved a 'free lunch', it would already be pursued by mainstream investors. An example for transaction costs relates to size. 'Green' companies in equity markets generally have a significantly lower average market capitalization than non green companies, even when compared to the MSCI ACWI Investable Universe (Fig. 3.1). Similarly, high-carbon companies in both the equity and bond space are generally larger (Fig. 3.2). Investors willing to accept lower market capitalization or deal size, and thus perhaps higher transaction costs and lower liquidity, may in this context then have an impact. In terms of returns, investors who are willing to accept lower returns are more likely to have an impact as part of a do-it-yourself strategy. At the same time, green technologies do not necessarily have lower returns, as seen in the case for project finance (Fig. 3.3). The extent to which this is both a realistic and feasible strategy, given broader investor constraints, is unclear.

Signaling. If neither of the above two conditions are met, a do-it-yourself approach may still have an impact if implemented as part of a signaling strategy that seeks to influence the broader ecosystem, notably policy makers (cf. p. 33).

3.3 INVESTOR POSITIONING: MOBILIZING A CRITICAL MASS

Strategies. While the threshold for achieving a critical mass is unclear (cf. focus on side), the strategies to mobilize investors are more straightforward. In particular, the following actions are worth highlighting:

- **Investor pledges/coalitions:** Investors can be mobilized with investor pledges that enable them to act in concert and make it easier to justify action. Platforms like the PDC and the Montreal Carbon Pledge might provide the vehicles required for reaching a critical mass.

- **Transparency and knowledge sharing:** Transparency around investor actions can help demonstrate options and their implications, in terms of climate friendliness, impacts, and financial performance. In this context, investors may be mobilized on climate friendliness through a risk narrative. Another area where knowledge-sharing can be impactful relates to platforms identifying investment opportunities, in particular for project finance. Knowledge-sharing can also operate around climate-related metrics. As part of the G7 2015, the German presidency launched an initiative to define 2° investing criteria for financial institutions and explore a technical secretariat

- **Barriers to entry:** Uncertainty around climate friendly strategies and metrics, and their associated efficacy, leaves many investors unsure about taking action. One way to respond to this is to make 'successful' strategies easily replicable, for example through joint development of standardized technical annexes for request for proposals for asset management. Another way to lower barriers of entry may be by 'starting' with a do-it-yourself strategy that demonstrates to other investors their options and helps build the market for specific products, tools, and metrics. For this strategy, investors can decide to pursue a do-it-yourself strategy that may not have an impact in the short-term, with a long-term view towards mobilizing a critical mass.

Challenges. The trade-off for mobilizing a critical mass may be between ambition and the ability to mobilize mainstream investors. If all investors decided to invest in indices employing negative screens by technology and weighting in favor of climate friendly companies, this would likely have a powerful impact on corporates. Such a strategy is unlikely to mobilize a significant number of investors outside of the SRI investing space. Thus, while some carbon-tilted indices may involve lower ambition in terms of climate friendliness, their ability to minimize the tracking error to the mainstream benchmark may convince a larger number of investors to invest.

CRITICAL MASS

In illiquid markets, where the number of alternate investors may be limited or non-existent, an individual investor may be sufficient to have an impact through a DIY approach. However, individual investor strategies in liquid markets run the risk of being offset by other investors. In such cases, limited research exists on estimates of the critical mass needed to achieve the desired impacts directly.

The Stranded Assets Programme finds that the direct impacts of fossil fuel divestment on equity or debt of the companies are likely to be limited. University endowments and public pension funds globally have total assets under management of about $12 trillion. University endowments in the US have 2-3% of their assets committed to investable fossil fuel public equities, while the proportion in the UK averages about 5%. Experience from earlier divestment campaigns suggests that only a small proportion of the total divestible funds are actually withdrawn. For example, despite a three-decade evolution only about 80 organisations and funds (8% of a universe of over 1000) have ever substantially divested from tobacco.

Thus in theory, at a 3% current commitment to fossil fuel equities and an 8% withdrawal rate, the equity divestment movement at its peak would see institutional investors remove about $29 billion from oil & gas companies. This is a marginal 0.6% of the $5,000 billion market capitalisation of listed oil, gas, and coal companies.

As a result, even divestment and other portfolio construction approaches in liquid markets are more likely to have indirect signaling impacts on the valuations of fossil fuel companies, by changing the probabilities of future outcomes through stigmatisation.

FIG. 3.4: DIVESTMENT PLEDGES AS SHARE OF FOSSIL FUEL MARKET CAPITALIZATION (SOURCE: PACIFIC CLIMATE SOLUTIONS 2015)

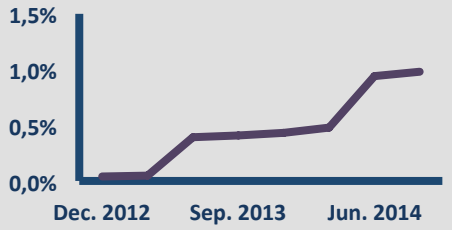
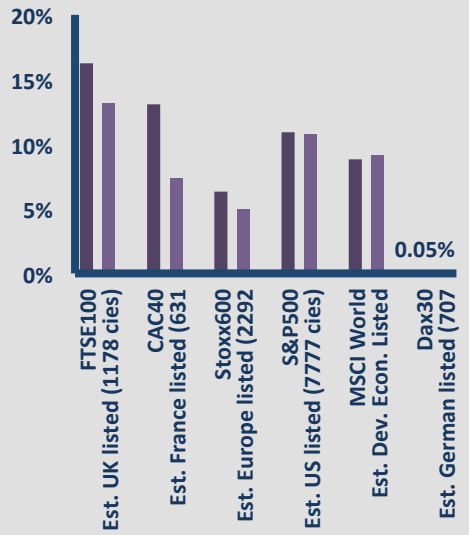


FIG. 3.5: SHARE OF OIL & GAS IN STOCK MARKETS (SOURCE: 2° INVESTING INITIATIVE 2014)



KLP STATEMENT ON DIVESTMENT

"KLP wishes to assist in the transition to a low carbon society. (…) KLP's board of directors voted on 4 November 2014 to use the exclusion of coal companies to contribute to the realization of the two-degree target. The exclusion of coal companies will have little or no effect on the world's carbon emissions in the short term. That investors like KLP choose to exclude coal companies sends, however, an important signal about their future financing potential, and constitutes an incentive for companies to increase their revenues from sources other than coal."

INVESTOR ORGANISATIONS

Investors networks (e.g. Institutional Investor Group on Climate Change (IIGCC), ASrIA) lobby on stronger climate regulation. One set of policies that may be more relevant to target are finance sector policies, such as those currently being explored by the UNEP Inquiry on Designing Sustainable Financial Markets.

3.4 SENDING A POLICY SIGNAL

Overview. Realizing climate objectives will not depend solely on decisions made in financial markets. If a sufficiently strong policy signal does not materialize, it will likely be impossible for investors to align their portfolios to achieve climate impacts.

Strategy. Investor rhetoric *and* action can play a prominent role in driving the debate on this issue outside of financial markets, in particular for policy makers. Divestment for example sends a strong message, although commitments have been limited (Fig. 3.4). Political signals can also involve a re-weighting of sectors without full divestment. This also relates to the portfolio construction issues for listed equities (cf. p. 24-25).

To date, frameworks to set science-based targets related to broader decarbonization roadmaps are still under development (cf. p. 54). Moreover, current exposure of investors may actually over-weight high-carbon sectors (cf. Fig. 3.5). Decarbonization targets relative to current benchmarks may thus still be higher than decarbonization roadmaps. This provides caveats to investor options to set targets. Currently, targets can be set as follows:

- Targets related to green exposure based on market analysis by asset class. These targets can seek to over-weight green relative to current market shares in the asset class by a specific percentage;

- As an economy decarbonizes, portfolios will similarly have a lower GHG emissions footprint. Investors can anticipate this reduction , addressing potentially also risk considerations, by setting decarbonization targets. These targets should be linked to a current set of carbon metrics by a specific provider and associated with transparency around data constraints;

To influence policy makers, investors can also set conditional targets related to more ambitious climate commitments. Target setting will also be related to reporting, either through pledges platforms or reporting organizations like the Asset Owner Disclosure Project (AODP). Some investors like KLP are already explicitly highlighting the signaling aspects in communicating on their strategy (cf. box on side).

Challenges. While investor pledges and statements have received significant media attention, their actual impact is hard to measure. Generally, these initiatives are likely to have more impact domestically, as the political economy of international climate negotiations, involving high-polluters from emerging and developed economies, may create a barrier to impact. One way to increase impact may be through coordination (cf. box on side).

3.5 SENDING A SIGNAL – SETTING CLIMATE TARGETS

Setting climate targets. Setting targets can be part of a signaling strategy in order to strengthen the message associated with a climate friendly strategy and objective. The Portfolio Decarbonization Coalition (PDC) for example requires concrete decarbonization targets as part of the investor commitment. This can involve either targets around lowering the carbon footprint or capital reallocation targets from high-carbon to climate friendly technologies. The scope is not limited to specific asset classes. The PDC does not prescribe a specific method with regard to decarbonizing.

Targets by asset class. The ability of investors to set decarbonization targets, assuming such an objective is defined, is a function of both the asset class and the landscape of metrics. Thus, setting targets for increasing the share of climate solutions, where this can be directly measured (cf. box on side), is easier than for equity portfolios, where data may be incomplete across sectors. For equities, targets may make more sense at a sector by sector level. At the same time, this type of sophisticated target setting, while perhaps meaningful to inform climate friendly strategies, may have a weaker signaling effect than a uniform *one number* target that can be easily picked up and understood by an external audience. Divestment targets from a whole sector or industry are easier to communicate, as seen by the powerful messaging of the divestment community (cf. box on side). This could also involve more subtle targets such as the decision by KLP to reduce exposure to coal companies (cf. p. 32).

Some investors are looking into setting decarbonization targets associated with the carbon footprint of the portfolio. Using this metric as the basis for setting targets suffers from the shortcomings already highlighted in this report related to carbon metrics (cf. p. 37).

For investors that do seek to set a target, this leaves the following options:

- Set targets by asset class, focusing on indicators that can be measured and verified (e.g. green / brown exposure and carbon metrics for project finance, green / brown metrics for equity and bond portfolios).

- When setting targets for an equity portfolio or a cross-asset portfolio using GHG emissions, communicate on the extent to which this target operates as an ambition rather than a quantitative benchmark or performance indicator against which your fund can be measured at all times. While this may be a sensible approach, it may create a risk of a backlash if the target is not achieved.

PFZW CLIMATE OBJECTIVES

Following the signing by its asset manager of the Montreal Carbon Pledge, the €152bn Dutch healthcare pension fund PFZW aims to increase its sustainable investments fourfold by 2020 and simultaneously reduce the carbon footprint of its entire portfolio by 50% by comparing companies in each sector and picking the best performers.

AP4 / FRR DECARBONIZATION

MSCI launched the Global Low Carbon Leaders Indices, which were developed jointly with AP4, FRR, and Amundi; they address two dimensions of carbon exposure – carbon emissions and fossil fuel reserves. The indices aim to reduce their carbon footprints by at least 50%.

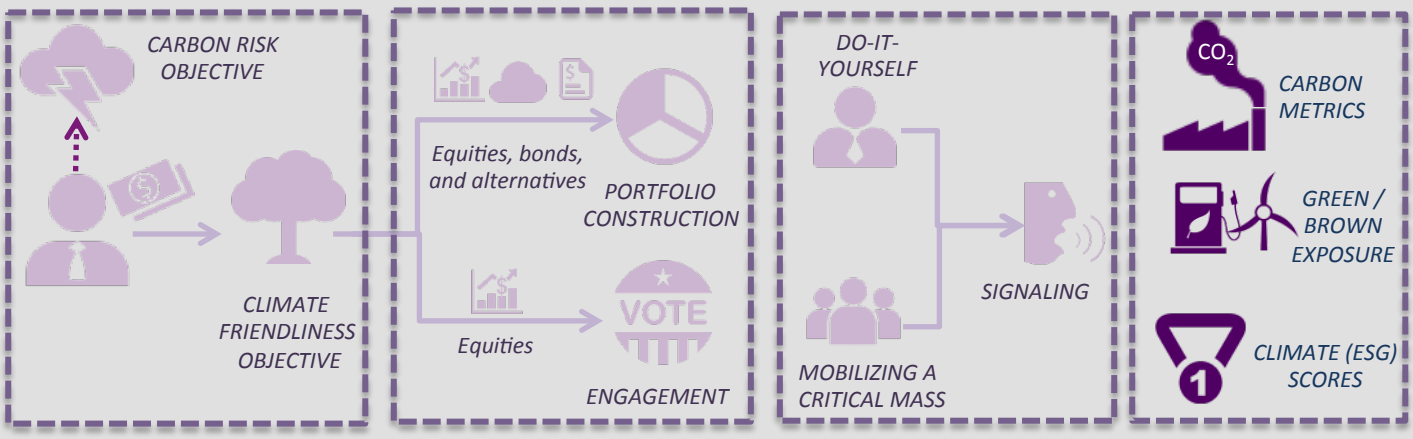
UNIVERSITY OF SYDNEY

The University of Sydney has set a target to cut its fossil fuel investments by reducing the carbon footprint of its AUD$413m listed share portfolio by 20% over three years. The University has distanced itself from straight divestment, saying that the policy does not account for the carbon footprint of non-fossil fuel companies and risks cutting out fossil fuel companies which are also working on renewable energy. This decision makes the University the first in Australia to commit to phasing out emissions from all the companies in its portfolio rather than exclusively targeting those in fossil fuels.

CHURCH OF ENGLAND

The Church of England has divested £12m (of a £9bn investment fund) out of two of the most polluting fossil fuels, tar sands oil and thermal coal. It has also ruled out future investments in any company that makes more than 10% of its revenues from thermal coal and oil from the tar sands. It does not yet intend to divest from all fossil fuels because engagement with some oil and gas companies produced results. The fund stated that it would divest if engagement did not work.

CHAPTER 4:
CLIMATE FRIENDLY METRICS



KEY MESSAGES:

DON'T RELY EXCLUSIVELY ON CARBON METRICS • Carbon metrics have certain advantages: companies are generally familiar and have experience with the concepts, vocabulary, and methodology. They enable a general comparison across sectors. They also have shortcomings: emissions profiles are based on historical data, which may disregard investments in emissions reductions, they do not always capture cradle-to-grave emissions, and they do not directly capture exposure to green technologies. For non-equity asset classes, green / brown exposure metrics likely capture a more complete picture of climate. For listed equity, reporting should involve a mix of carbon metrics, green / brown exposure metrics, and climate (ESG) scores.

DO CONSIDER THE EXPOSURE TO GREEN TECHNOLOGIES • One shortcoming of carbon metrics is their inability to measure the exposure to green technologies. The shift to a low carbon economy is largely a shift toward green technologies, and a climate friendly strategy should therefore utilize metrics that can measure this shift.

DO DISTINGUISH METRICS BY SECTOR AND APPROACH • Certain climate metrics are more appropriate for some sectors than others; the same goes for investment approaches and objectives. Similarly, some metrics can make more or less sense in different situations, such as an investor's sustainability report or an investment approach.

4. CLIMATE FRIENDLY METRICS

4.1 OVERVIEW

Fig. 4.1. provides an overview of the climate friendliness metrics reviewed in this section. The report presents three categories of climate metrics: carbon metrics, green/brown exposure metrics, and climate scores. The categories help organize the plethora of metrics currently available on the market:

- **Carbon metrics** are indicators based on greenhouse gas emissions (i.e. carbon footprint of financial institutions' financial services) and energy efficiency-related GHG emissions reductions indicators.
- **Green / brown exposure metrics** are indicators distinguishing between climate solutions and climate problems at technology, industry, or sector level.
- **Climate (ESG) scores** are qualitative indicators provided by specialized ESG analysts based on quantitative and qualitative climate indicators, including. carbon and green / brown exposure metrics.

For each metric category, this chapter provides an overview of available data, the typical application by asset class and strategy, and pros and cons. The discussion will also briefly reference the use of financial data (cf. p. 49).

FIG 4.1: CLIMATE FRIENDLINESS METRICS FOR INVESTORS (SOURCE: AUTHORS)

	DESCRIPTION & EXAMPLES	APPLICATION	PROS	CONS
CARBON METRICS	Indicators related to GHG emissions including carbon foot-printing, financed emissions methodologies (i.e. carbon footprint of financial institutions' financial services), and energy efficiency-related GHG emissions reductions indicators.	• Connecting the dots between portfolios and climate change • Project finance screens • Real estate energy efficiency measures • Engagement on short-term corporate emissions reduction • Portfolio construction for listed equities ideally together with green / brown exposure metrics • Public communication & reporting	• Broad information on climate intensity of sectors • Prominence among corporates and experience • Standardization of corporate reporting across sectors enables portfolio reporting	• High uncertainty associated with data at financial asset level • Incomplete coverage • Lack of accounting standard • Data volatility associated with external factors when normalizing
GREEN / BROWN EXPOSURE	Segmentation indicators distinguishing between climate solutions and climate problems at technology, industry, or sector level.	• Negative / positive screening for project finance • Negative screening and 'green' targets for corporate bonds (ex. Green bonds) • Portfolio construction for listed equities together with carbon metrics • Engagement on investment in different technologies	• Quantitative indicator with high data transparency • Relevant indicator for corporate management	• Only applicable for a number of key sectors • Challenge of distinguishing relative climate friendliness within categories (e.g. gas vs. coal) • Currently no format to aggregate data across sectors
CLIMATE (ESG) SCORES	Climate-related indicators / scores are qualitative indicators based on quantitative and qualitative climate indicators, including carbon and green / brown exposure metrics.	• Engagement with companies on corporate strategies • Engagement on climate issues together with non-climate issues	• Summary indicators capturing a range of different factors • Established frameworks	• Black box • Risk of greenwashing • Not directly linked to a specific strategy

TYPES OF DATA AND THEIR SOURCES

Types of data. This section focuses on the relevant data needed to implement the strategies outlined in the previous chapter. The word "data' will be used to describe three sets of information: primary data, secondary data, and performance data (Fig. 4.2 and text in box). The first source of data is physical economic activity and associated physical assets. This data is collected by companies as the owners of the assets, by public sector agencies directly at the physical asset level (e.g. government controls of mining sites), and by data providers.

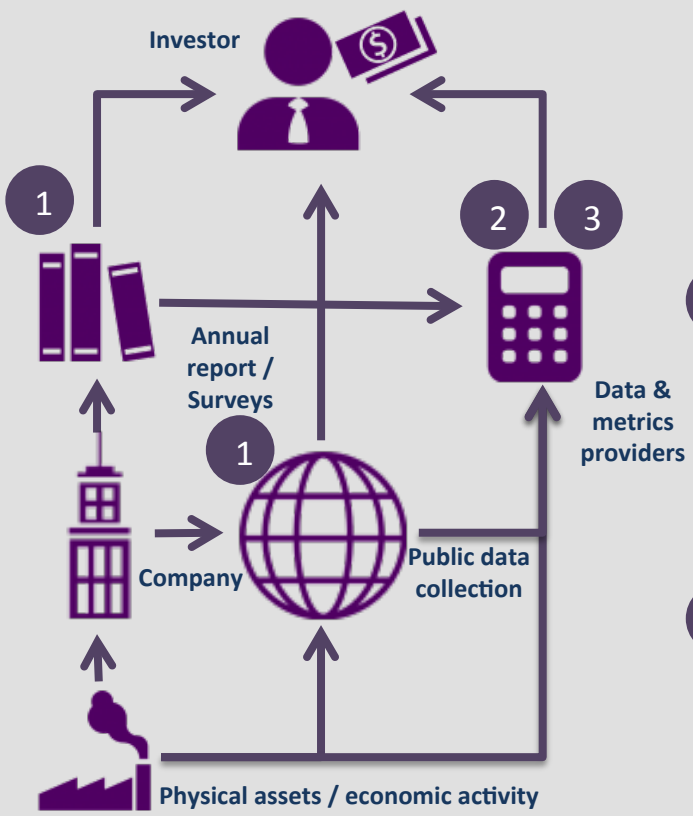
Accessing data from companies. In the case of companies, investors access company data primarily through annual reports, either directly or through data providers that aggregate annual report information. The scope of this disclosure is usually regulated. In Europe for example, reporting on non-financial data is regulated by a European Directive on non-financial and diversity information, although the climate-related disclosure requirements in this Directive are relatively under-developed and not standardized. With regards to climate issues, a number of key indicators are usually not reported by companies, notably the breakdown of capital expenditure by energy technology and the nature of R&D investment. Companies justify this disclosure gap by arguing that it involves propriety information that could affect competitiveness.

Accessing public data. Investors can access public data either directly or through data providers that aggregate this data. This data may be relevant both for assessing specific companies (e.g. fuel efficiency of cars by manufacturer) or benchmarking companies relative to national indicators (e.g. annual electricity generation).

Data from data providers. Data providers aggregate data from physical assets, companies, reporting mechanisms, and public agencies. Beyond that, data providers also provide tertiary performance data, such as qualitative scores, or ESG scores, that are developed using a specific set of data and application of weights.

Financial vs. activity data. Both financial and activity data can be relevant for climate-related investment activities (cf. p. 49). Regulatory and market standards usually result in financial data that is reported in a standardized fashion (e.g. EBIT, etc.). Activity data, on the other hand, is largely non-standardized and thus needs to be harmonized or 'treated', although there are exceptions (e.g. proved oil & gas reserves).

FIG 4.2: TRACING THE PATH OF DATA FOR INVESTORS
(SOURCE: AUTHORS)



1 **Primary data** relates to data directly provided by companies through surveys or their annual reports. Primary data may also be collected by public agencies or data providers directly at physical asset or corporate level.

Sales, EBITDA, net profits, debt levels.

Proved reserves, CO2 emissions (incomplete), reporting on climate change strategy / risk

2 **Secondary data** includes data and metrics collected, aggregated, harmonized, and estimated by data and metrics providers using annual reports, public data sources, and analysis of physical assets.

Geography of sales, tax, cost of capital, harmonization of business segmentation

Installed capacity, breakdown of capital expenditure, estimates of CO2 emissions

3 **Performance data** (subjective or objective) developed by data and metrics providers, including scoring, benchmarking, and 'ratios'

P/E ratio, EV/EBITDA,

ESG scores, risk metrics related to climate change

4.2 GUIDE TO 'CARBON METRICS'

Overview. GHG emissions data is most frequently applied to strategies for listed equities. Companies use the GHG-Protocol standard as a guide to greenhouse gas accounting (cf. box on left). Over 5,000 companies in 2014 reported this data to CDP. In addition, there are a number of organizations working on estimating the carbon footprint for companies, value chains, and portfolios. While improving rapidly, carbon footprinting still only captures a static point in time, missing implications of present investments for future emissions improvements, and is largely limited to Scope 1 and 2. Scope 3 emissions are key, but this data is still imprecise at company level (cf. p. 39).

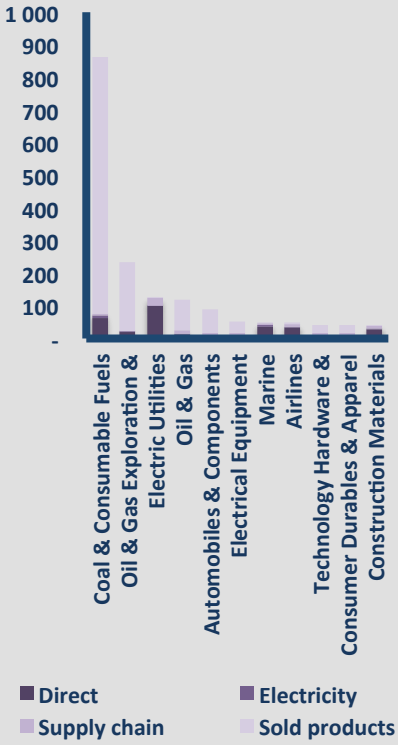
Carbon footprinting for financial portfolios. The key question for financial institutions is the carbon footprint of the portfolio, or the financed emissions. While standard GHG accounting methodologies are relatively good at capturing the sum of the carbon footprints of the investees, they are not technically the GHG emissions *financed* by the portfolio (cf. next page).

Carbon footprinting data is an absolute value that needs to be normalized in order to be comparable across companies, sectors, or portfolios. Data can be normalized in terms of revenue, market capitalization, products, or employees. Normalizing by market capitalization allows for a comparison across sectors, but may create biases if market capitalization changes. Normalizing by sales in is a challenge given differences in currencies and prices (ex. two cars sold can have very different prices). Both allow however for a comparison of GHG emissions across sectors, an advantage in terms of reporting a 'portfolio indicator'.

Equally, for some sectors GHG emissions can be normalized by product (cf. p. 39, Fig. 4.6), which arguably provides the best comparability between companies within a sector. This approach is limited to a few types of products however and is difficult to apply to a diversified company like Siemens. While no normalizing approach is perfect, normalizing by market capitalization or sales does allow some degree of comparability that in turn allows for portfolio reporting. At the same time, where possible, normalizing by product may be an option.

Pros. Carbon footprinting data is arguably the only type of data that enables a relevant comparison of the climate intensity across sectors. Moreover, although there is a significant margin of error for data at an individual security level, this error is relatively low at portfolio level (cf. p. 39). Moreover, the relative costs of implementing carbon footprinting is relatively low for institutional investors (2° Investing Initiative 2013).

FIG 4.3: GHG EMISSIONS BY SCOPE FOR A SAMPLE OF SECTORS (SOURCE: ADEME 2012)



* Data is based on revenues and normalized (100 = intensity for electric utilities direct emissions). The category 'electricity' includes emissions of the supply chain. Industry-groups are based on GICS taxonomy, with different levels of aggregation applied.

CLASSIFICATION STANDARD FOR GHG EMISSIONS OF COMPANIES

GHG-Protocol has developed a standard to measure the GHG emissions of companies using three 'scopes'. Scope 1 are the direct emissions of a company, notably from company vehicles and facilities. Scope 2 emissions are indirect upstream emissions that come from the purchase of electricity, heating & cooling for the own use of the company. Scope 3 emissions are also indirect and refer to both upstream supply-chain emissions such as business travel, leased assets, and purchased goods and services, as well as downstream activities, notably emissions from processing and use of sold products, as well as emissions from franchises. The GHG emissions from investments ('financed emissions') also fall in this category

Key accounting issues. The following provides an overview of the key accounting issues (Fig. 4.4):

- **Scopes of reporting:** Financed emissions methodologies differ on the scopes of reporting they integrate in the assessment. Many providers now integrate some Scope 3, using either estimates or reported data. The incomplete reporting landscape is an issue because it leaves much of this data too uncertain to be meaningful (cf. p. 39). In addition, there is no more sophisticated way to weight different GHG emissions beyond simple addition to date. Some service providers address this issue by factoring in double-counting (e.g. not counting the GHG emissions of a utility company and electricity consumer twice).

- **Annual or lifetime emissions**: There are two coexisting standards for carbon accounting: corporate and product. Corporate carbon profiles are typically counted on an annual basis and draw from historical emissions data. Carbon profiles for products generally use full life-cycle analyses, albeit only for the products sold that year and not the lifetime of sales related to a production site for example. Both standards are incomplete in that they fail to capture potential emissions / emissions reductions or locked-in emissions. Potential emissions or emissions reductions refer to emissions stored in fossil fuel reserves that will be burned in the future or investments in green technology that would reduce future emissions. Locked-in emissions refer to emissions that will be emitted over the lifetime of existing oil and gas-based infrastructure, such as a coal plant or wellhead. These two emissions areas are not reported in a standardized way and present missed opportunities for impact for investors.

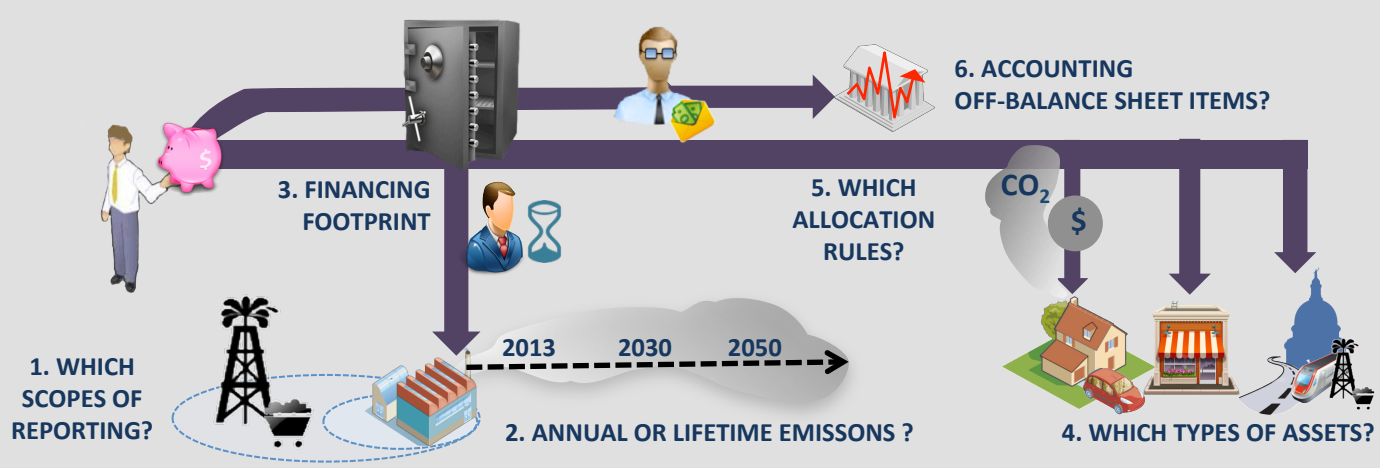
- **Financing footprint:** The emissions contribution of an investor from long-term investments in the real economy depends on a number of factors including the asset class, the time horizon, the ratio of external financing, etc. To date, GHG accounting methodologies do not value these factors and allocate emissions equally across all types of investors irrespective of these key differentiators.

- **Types of assets:** Most financed emissions methodologies prioritize assessing equities and project finance, with less comprehensive guidance for bonds and other alternatives. This is partly a function of data availability as data is less available for bonds and alternatives. By extension, these methodologies only cover a limited part of the total portfolio of an investor.

- **Allocation rules:** Most practitioners follow the GHG-Protocol corporate standard's financial control approach and allocate 100% of GHG emissions to the shareholder. Cross-asset methodologies looking at different asset classes in turn apply a more complex logic of allocating emissions based on the relative weight of shareholders equity and debt in the liabilities. Differences in allocation methodologies can prevent comparability of data.

- **Off-balance sheets:** The accounting for banks is the most complex, given the myriad ways in which banks in particular influence capital allocation. To date, financed emissions methodologies don't take off-balance sheet activities such as underwriting into account.

FIG 4.4: OVERVIEW OF KEY DIFFERENCES IN ACCOUNTING PRINCIPLES (SOURCE: 2° INVESTING INTIIATIVE 2013)



UNCERTAINTY AROUND GHG EMISSIONS

Problems with reporting. The first challenge presented by the accuracy of carbon footprinting and associated financed emissions methodologies has to do with reporting issues. While reporting to the CDP has increased significantly in recent years, reporting is still relatively limited to listed companies. There are major concerns about the quality of reporting, particularly the accuracy and completeness of the data provided by corporations. A study by Anderson from 2014 finds that the Scope 3 emissions reported by companies are likely to constitute less than 30% of actual Scope 3 emissions (Fig. 4.5). Given the significant share of Scope 3 emissions in many high-carbon sectors, this can be a concern (cf. p. 37, Fig. 4.3)

Another challenge with carbon reporting data is that investors can use three different consolidation approaches in order to calculate their scope 1, 2 and 3 emissions (equity share; financial control; operational control). Choosing a different consolidation approach can result in different results, as GHG emissions will be allocated to different investors.

Uncertainty around Scope 1 and 2 emissions. In most cases, carbon data provided by reporting companies for scope 1 and 2 are secondary (estimated) data based on the application of emission factors to primary energy, raw material consumption, and electricity purchases. The uncertainty of the related emission factors ranges from 5% (oil, gas and coal) to 10-15% (electricity).

Generally, it is assumed that the quality of Scope 1 and Scope 2 emissions data is sufficient to be able to distinguish between different companies. Research by Liesen et al. from 2011 however suggests that this may not be the case. In a review of a sample of 222 GHG emissions reporting companies, only 23% received the highest disclosure completeness score in 2009. The score looked at the scopes of GHG emissions reported, the type of economic activities covered and the extent to which GHG emissions were reported for the whole company.

Uncertainty around physical data. When practitioners apply process-based emission factors to outputs reported in physical units (oil barrels, tons of cement, etc.) by the companies, the level of uncertainty varies greatly between different types of products and industries (Fig. 4.6). In many cases, the precision of activity data reported necessitates the use of industry averages rather than process-specific factors, which in turn leads to additional uncertainties (in some industries differences between old / innovative processes can be as high as 100% compared to the benchmark).

Implications for use. While there is significant uncertainty around GHG emissions data, a key question is how this uncertainty impacts investors ability to use this data effectively in combination with financial data. Estimates suggest that uncertainty of the data drops significantly at a portfolio level (Fig. 4.7). However, this does not necessarily mean it becomes a relevant indicator at portfolio level (cf. p. 43). By the same token, uncertainty is lower at project finance level given that GHG emissions are tracked for a physical asset. Where uncertainty becomes more problematic is at the level of stock picking, especially if data excludes Scope 3 GHG emissions. The question here is whether alternative metrics are better suited or may be complementary.

FIG 4.5: UNIT OF EMISSIONS OF A COMPANY BY ACADEMIC ESTIMATES VERSUS REPORTING BY COMPANIES 2013 (SOURCE: ANDERSON 2014)

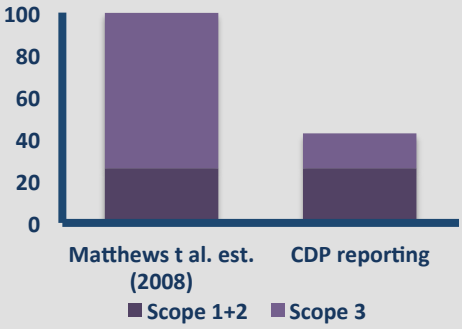


FIG 4.6: AVERAGE UNCERTAINTY FOR SCOPE 3 EMISSIONS (SOURCE: ADEME 2011)

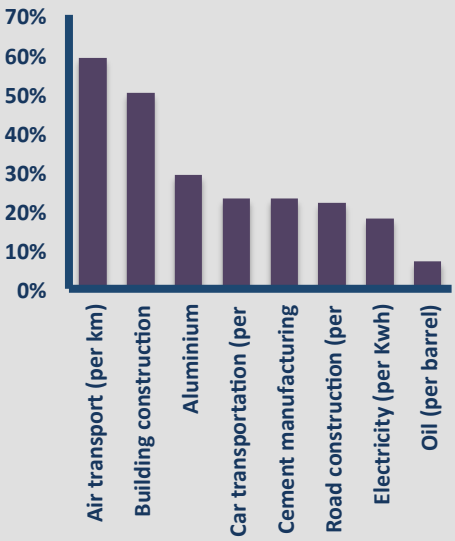
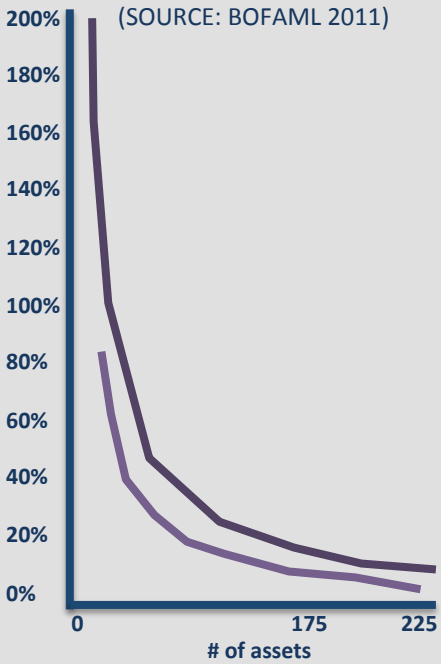


FIG 4.7: UNCERTAINTY OF PORTFOLIO CARBON FOOTPRINT BY SIZE AND SECTOR CLASSIFICATION (SOURCE: BOFAML 2011)



Quantitative GHG Emissions Data

	KEY FEATURES	ASN Bank / Ecofys "Carbon Profit & Loss Methodology"	MSCI ESG Research	South Pole Group
ACCOUNTING RULES	Scopes accounted for investees	1 and 2 (+ scope 3 in specific cases, e.g. social housing associations)	1 and 2 (+ scope 3 when reported)	Scope 1,2 and 3, including supply chain and product usage
	Management of multiple counting	Identification and avoiding	Not managed	Identification and discounting
	Time boundaries (investees)	Annual	Annual	Annual plus lifetime for sold products + forward looking, adjusted to client need
	Time boundaries (investors)	Assets outstanding	Assets Outstanding	Assets Outstanding
	Rule of allocation to investors	Share of equity+debt	Share of equity	Share of equity + debt (Enterprise value)
COVERAGE	Listed equities	4,500 (reported + modeled)/ Trucost Data	◆ 9,000 (reported + modeled data)	◆ 50,000 (reported + modeled data)
	Corp. bonds & loans	◆	◆	❖◆ Bonds of listed companies, unlisted on request, loans
	Private equity / SME loans	n.a.	◆	❖◆ Sector modelling based on carbon-profile based sector classification
	Sovereign bonds	Calculated specifically for each country (9), municipality and water board		Climate policy assessments
	Fin. institutions	◆ Calculated specifically for some partner institutions		·Industry averages, balance sheet
	Other asset types covered	Renewable energy and energy efficiency project finance, green bonds, mortgages, loans to social housing associations		❖ Real Estate, private equity, impact investment, project finance, infrastructure
SOURCES OF CARBON & ACTIVITY DATA	GHG data used to calculate investees' footprint	Reporting and specific emissions based on national inventories	Company data reported by company (via CDP) or by government agencies	Validated data from all available sources (CDP, CSR reports, other sources, plus models and LCA databases)
	GHG data used to calculate the carbon intensity of non-reporting investees	National GHG inventory and accounts	Derived from reported data by 156 GICS sub-industries; separate models for high-emitting industries	Regression models, peer information, input/ output, LCA databases
	# of categories in the underlying model	40	156	800
	Method used to adapt the model to global or/and local contexts	n.a.	No	Proprietary classification system, national inventories, national grid factors
	Sources of activity data and methods used for matching with emission factors of the model	Specific data based on reporting. Equities specific data provided by Trucost	One company per GICS sub-industry, except for high-emitting industries	Proprietary classification system in combination with 800 subsector specific models
	Method used when detailed segmentation is not performed	Industry-average or reported data extrapolated	Average intensity for each of 156 industries	Industry specific approximation formulae based on a combination of activity data (sales, staff, assets, COGS etc.)
DATA PROCESSING	Bulk data processing		Listed equities and bonds (290,000 securities)	For equities, corporate bonds and private equity, via online screeners on Bloomberg, YourSRI.com and ESG Analytics
	Measurement and reduction of uncertainties	Data quality monitoring for sectors / asset classes over time; external verification	Confidence levels for 156 industries based on their coefficient of variance (standard deviation/industry average intensity)	Validation of reported data, uncertainty analysis per industry, subsector-specific model quality assessment

◆ Methodology applicable ❖ Footprinting tool for investees provided (based on activity/liability data of the user)
◆ Financed GHG data (per $ of asset held) provided to users Items in grey relate to developments underway

	Inrate (EnvIMPACT®)	Trucost	Profundo	Oekom
	1, 2 and 3 (full supply chain & sold products)	1 and 2 + 3 upstream supply chain	1 + sold products	Scope 1 to 3 (individual requirements for every company, depending on sector-specific requirements)
	Identification & discounting		Not managed	n.a.
	Annual + lifetime for sold products	Annual (standard) + in-use and lifecycle for specific sectors	Forward looking	Annual
	Assets outstanding	Assets outstanding	Assets outstanding + cash flows	n.a.
	Share of equity	Share of ownership (equity, firm value) or Investment	Share of equity+ debt	n.a.
	◆ 2,700 (modeled data)	◆ 5,200 (with potential to model 1,000s)	◆ 190 (coal power, coal mining, oil palm)	◆ 3,000+ : Coverage of listed issuers
	◆	❖ Listed Issuing companies (standard), others on demand	◆	Coverage of about 90% of worldwide corporate bond benchmark.
	◆	◆ Proprietary EEIO model or LCA based analysis (on demand)	◆ 90 (coal, power, oil palm)	
		❖ Methodology is set up with data for all countries (on demand)		56 states (OECD, EU BRICs and important emerging markets) and the EU
		◆❖ (on demand- detailed loan data or estimated from reporting [using factors from proprietary EEIO and regional data])	◆ 50 (balance sheet + AM + underwriting)	Part of the 3000+ issuers
		Real Estate, Infrastructure, Project Finance		Major non-listed issuers (>200, i.e. development banks, mortgage banks, public sector banks and state-owned companies).
		Reported + CDP (verified data only) + modelled	Life Cycle data	Company data, provided through annual reporting, CDP, or directly by the company. Data is used for calculation of intensities and trends.
	US EEIO model enhanced with life cycle data and expert review	Proprietary EEIO model enhanced with global bottom up production and intensity data		
	340	531	n.a.	n.a.
	CO2 intensity of electricity adjusted to regional	Scope 2 and other emissions factors adjusted to global/regional Detailed regionalization of model production and factors (on demand)	n.a.	n.a.
	CO2 intensity of electricity adjusted to regional (combination of sales of purchased electricity with regional emission factors)	Segmentation for 5,200 companies (revenues, plus production & energy consumption for specific sectors)	In house analysis + transactions covered in financial databases	n.a
	Detailed revenue segmentation of companies (sales and physical units)	Emissions factors for primary sector or Industry-average	n.a.	n.a
	Listed equities	Listed equities and listed corporate bond issuers		n.a
	Model calibrated with LCA data for some industries	Model calibrated with reported data; Model used to compare accuracy of disclosed data; Every company undergoes an engagement process		n.a

Quantitative GHG Emissions Data

KEY FEATURES		Carbone 4	Grizzly RI	Eiris	Cross Asset FootPrint[c]
ACCOUNTING RULES	Scopes accounted for investees	*Scope 1+2+3 (full supply chain & sold products)*	1 + 2	1 and 2 (+ 3 supply chain)	1, 2 and 3 (full supply chain & sold products)
	Management of multiple counting	*Consolidation rules to limit multiple counting at portfolio level*	No double counting		Identification & discounting
	Time boundaries (investees)	*Annual + lifetime for sold products*	Annual	Annual	Annual + lifetime for sold products
	Time boundaries (investors)	*Assets outstanding*	Assets outstanding	n.a.	Assets outstanding
	Rule of allocation to investors	*Share of equity + debt*	Share of equity	n.a.	Share of equity or equity + debt
COVERAGE	Listed equities	◆	◆ 8,000	3330	◆ Same as Inrate + industry average data for all listed cies
	Corp. bonds & loans	◆	◆	35	❖◆ Industry average
	Private equity / SME loans		◆	n.a.	❖◆ Industry average
	Sovereign bonds		n.a.	91	❖◆ 20 countries
	Fin. institutions				❖◆ Industry average (balance sheet)
	Other asset types covered				❖ Real estate, mortgages, cons.loans, climate projects
SOURCES OF CARBON & ACTIVITY DATA	GHG data used to calculate investees' footprint	CDP + reporting + modeled data based on activity input	Thomson Reuters	Company sustainability reports, CDP data, data reported to government agencies)	Inrate model enhanced + additional LCA + model per $ of asset held for banks + reporting
	GHG data used to calculate the carbon intensity of non-reporting investees	Modeled data based on activity input	GHG emissions intensity factors based on reported data		
	# of categories in the underlying model	Focus on 7 key sectors, with ad hoc methodology for each sector (energy, building, forest, agriculture, heavy industry, transport, suppliers of efficient solutions)	983 (SIC level4)	n.a.	340
	Method used to adapt the model to global or/ and local contexts	Global analysis by default, refined analysis by company can take into account local context	Geo-based energy mix factors	n.a.	Same as Inrate + 131 countries specifics
	Sources of activity data and methods used for matching with emission factors of the model	n.a.	Thomson Reuters (Asset4 for carbon data and Worldscope segmentation by SIC Group (sales))	n.a.	Inrate data + segmentation for governments (budget) & listed banks (assets)
	Method used when detailed segmentation is not performed	For non-key sectors, scope 1 (+2 optional)	Activity and geo-based benchmark	n.a.	Average intensity per industry group (cies) & sector/country
DATA PROCESSING	Bulk data processing	n.a.	Listed equities	n.a.	Listed equities
	Measurement and reduction of uncertainties	n.a.	Analysis of Variance (ANOVA) Real-Data vs. Benchmark	Regular approval of all records and bi-annual data integrity checks	Model calibrated with LCA data + reported data for some companies

Application of carbon metrics. Given data gaps for bond markets and the limited exposure to alternatives, the main use of carbon metrics to date has been for equities. The investor carbon pledges both focus on this asset class in particular. Their application is discussed below

Application for understanding climate friendliness. GHG emissions accounting standards ensure that carbon metrics are comparable across all sectors in an equity portfolio. By extension, carbon footprinting allows an investor to get a comprehensive overview how each sector contributes to GHG emissions. Carbon footprints are a useful tool for understanding the extent to which the footprint of a portfolio is a function of sector exposure, or the exposure to companies within sectors. For this exercise, issues of uncertainty for company level data or differences in methodologies are less relevant, and as a result will largely match across methodology providers, when controlling for external factors (e.g. currency of portfolio, time of reporting, scopes included, etc.) (IIGCC 2015). The objective is at this stage just to understand in general terms the link between climate and financial portfolios.

Application to improving climate friendliness. As a second step, investors can use carbon footprinting to begin to address climate friendliness. These metrics can be used for portfolio construction and shareholder engagement:

- **Portfolio construction – Listed equities:** Carbon metrics are primarily used to select best performers within an industry group. A certain number of conditions should be met for this approach to make sense. First, given both the materiality of scope 3 GHG emissions and the relative reporting gap, investors should make sure they are not comparing GHG profiles that include scope 3 emissions with profiles that do not. Second, the use of physical metrics (e.g. tons of cement) as denominators helps investors avoid price level biases or exposure to the turnover of non-core activities (e.g. roofing solutions for cement manufacturers). Given that the question is performance within sectors, the associated sacrifice in comparability as a result of using physical units as denominators is less material. Third, given that carbon metrics currently do not account for the development of green technologies, they can be complemented with green / brown exposure metrics in some sectors (e.g. utilities, transport). Where possible, these types of metrics should focus on 'forward-looking' indicators such as capital expenditure. Considering these constraints, the use of currently available carbon metrics to inform best-in-class selection is currently limited to a few industries, such as power production, airline industry and cement.

  An alternative to 'picking' best-in class is using carbon intensity metrics as part of a portfolio optimization process, called tilting. A key constraint to tilting, beyond the challenges described above, is the issue of addressing 'green' exposure. For example, carbon intensive utilities may also have a high exposure to renewables. Similarly, tilting across sectors may lead portfolios to replace brown with climate-neutral investments (e.g. pharmaceutical). It may make sense to limit tilting approaches to key sectors.

- **Engagement – Listed equities.** Corporate climate targets are generally related to GHG emissions. Using carbon metrics to inform shareholder engagement has effectively brought low hanging fruit like operational energy efficiency measures to the top of corporate agendas. However, most companies with long-term physical assets face significant inertia when it comes to re-weighting investments from brown to green. Thus, negotiating on short-term reduction targets, while potentially effective, will be limited to addressing day-to-day operations. Equally, addressing the main problem for high-carbon sectors, the physical assets, requires negotiating on long-term targets with no guarantee and limited ability to follow-up. Engaging on green / brown exposure (or physical assets GHG-intensity) metrics may be more appropriate in this regard.

- **Investor positioning**. Despite its shortcomings for portfolio management, carbon footprinting is definitely the most powerful indicator from a communications perspective. It has been used to compare investment products and funds (cf. p. 15), to report on carbon footprinting by financial institutions (e.g. EAPF in the UK) and, more recently, to set targets. For communication purposes, issues at a financial asset level (e.g. uncertainty, comparability within sectors) appear less material. Nevertheless, using carbon footprinting to communicate should be applied with three key caveats in mind. First, to provide a complete climate friendliness picture, the reporting should be complemented by green / brown exposure metrics. Second, investors should be aware that changes in portfolio construction by themselves doesn't necessarily translate one-to-one into changes in investment (cf. p. 14-15). Third, the benchmark used to set targets may itself be more carbon intensive than the current economy: the S&P500 for example has a 10% exposure to oil & gas relative to a 3% share of oil & gas in the US economy (cf. p. 30). Setting reduction targets relative to high-carbon benchmarks may thus still leave portfolios carbon-intensive.

SCREENING COMPANIES WITH >50% COAL REVENUES

In November 2014, KLP's Board of Directors voted to exclude companies that derive more than 50% of their revenues from coal from their investment portfolio. This strategy concretely excludes 27 companies. KLP explicitly highlights the extent to which they see this strategy as a signal (cf. p. 32). It can also be a relevant way to provide and influence capital.

KLP is using data from Trucost to identify companies that derive 50% or more of their revenues from coal-based operations, defined as mining, coal-based power generation and the manufacture of coal products. The data is based on the annual reports of companies.

In addition, KLP is also commissioning South Pole Group to provide a further analysis on these companies. This strategy demonstrates an interesting combination of green/brown exposure metrics from Trucost and carbon footprinting metrics from South Pole Group.

CERTIFICATION SYSTEM FOR GREEN BOND FUNDS

The Climate Bonds Initiative (CBI) is creating industry taxonomies to define assets that are aligned with 2°C climate goals. Taxonomies have been developed for the wind and solar sector and are currently being developed for Bus Rapid Transit, Water, Agriculture & Forestry, and Green Buildings. Standards are developed with industry experts and financial market stakeholders. Although they are focused on defining assets' eligibility for bonds, the taxonomy can also be applied to project finance.

The taxonomy is currently being applied by investors and issuers to certify the climate friendliness of bonds that are then labeled 'green' bonds. This applies in particular to green bond indices, issued by Solactive, MSCI, Bank of America Merrill Lynch, and others, as well as green bond funds, such as the one set up by Zurich Re. At this stage, only one green bond is certified on the basis of the Climate Bonds Initiative standard and the taxonomy is still under construction.

4.3 GUIDE TO GREEN & BROWN EXPOSURE METRICS

Overview. Green / brown exposure metrics are segmentation indicators distinguishing between climate solutions and climate problems at technology, industry, or sector level.

Metrics providers. Investors can access green / brown exposure metrics through ESG data providers. Metrics can also be accessed through bespoke databases. Wood Mackenzie (recently acquired by Verisk Analytics) provides data on the oil, gas, and coal sector, ThomsonReuters and Infrastructure Journal on project finance, and GlobalData for the power sector. There are a range of other databases. In addition, some data is publicly available; for example, the US Energy Information Administration makes its data available for free. Green / brown exposure metrics can be used as follows:

- **Portfolio construction – project finance.** Projects can be distinguished as green / brown through taxonomies. Investors can use these metrics to set minimum green targets or screen brown projects.

- **Portfolio construction – bonds.** Data on green / brown exposure is limited in the bond space. Financial data on business segmentation can be used however (cf. p. 49). In addition, there is a growing universe of labeled green bonds (cf. side bar and p. 20).

- **Portfolio construction – listed equities.** Investors can construct indices that use green / brown exposure metrics in addition to carbon metrics for key high-carbon sectors (cf. next page). Beyond technology-specific metrics used for tilting, indices can be constructed on the basis of labeling companies green or brown based on shares of revenues derived from a certain technology. Thus, MSCI has a green share metric for a limited universe of companies and a similar metric is being developed by FTSE. South Pole Group and Trucost have developed a metric to distinguish companies that have more than 50% of their revenues from coal (cf. box on side).

- **Engagement– private equity & listed equity.** Investors can engage with companies on corporate capital allocation decisions, specifically on capital expenditure, using the same taxonomy applied to project finance. These taxonomies can be complemented using financial (cf. p. 49).

- **Investor positioning.** Investors can partially aggregate green/brown exposure metrics for public reporting. A comprehensive indicator for a portfolio is currently being developed (cf. SEI metrics project p. 54-55).

Metrics by sector. Green / brown exposure metrics can encompass a range of indicators within different sectors, not all of which are currently available to investors (Fig. 4.12):

- **Oil & gas & coal sector:** Data on oil & gas reserves and oil & gas capital expenditure (Fig. 4.10) is available, if expensive. Some companies also report on the renewable energy activities. Data for oil & gas reserves is integrated in the MSCI Low Carbon Leaders Index.

- **Power sector:** Data on the energy-technology breakdown of power generation and the expected remaining lifetime of high-carbon assets is key. Data on the fuel mix of the power is available in annual reports and from ESG data providers. Data on capital expenditure is more difficult to access because few companies report (cf. p. 39), but can be found post facto by tracking the change in the fuel mix and through bespoke databases.

- **Car manufacturing:** Metrics include the share of sustainable propulsion technologies in car sales (Fig. 4.9). Relevant data includes the average fuel economy of vehicles and may be available through ESG data providers or bespoke databases. Metrics such as R&D in sustainable propulsion technologies are still poorly reported.

- **Industry.** Metrics for high-carbon manufacturing are still in their infancy and relate to zero-carbon manufacturing and R&D. This data is not consistently reported.

Key challenges are access to data and the extent to which green / brown categories distinguish between climate impact within categories (e.g. between gas and coal). Metrics are limited to specific sectors and thus not available for all sectors, nor can they be easily aggregated or compared.

FIG 4.9: SUSTAINABLE PROPULSION TECHNOLOGIES IN US CAR SALES (SOURCE: 2° ii 2014)

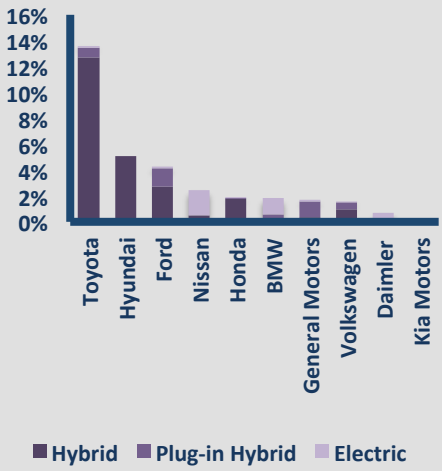


FIG 4.10: SHARE OF HIGH-COST CAPITAL EXPENDITURE (SOURCE: CARBON TRACKER INITIATIVE 2014)

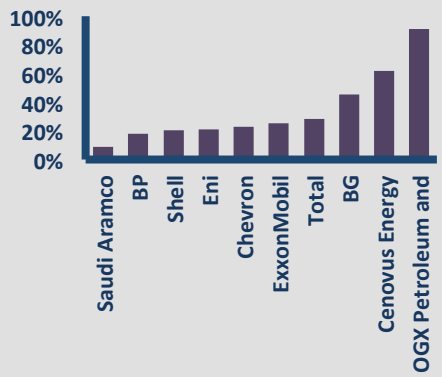


FIG 4.12: EXAMPLES OF GREEN / BROWN EXPOSURE METRICS BY SECTOR (SOURCE: AUTHORS)

	Brown	Green
Oil & Gas & Coal	• Share of high-cost capital expenditure	• Share of carbon capture and storage • Share of renewables in R&D and capital expenditure
Power	• Share of high-carbon electricity generation • Est. remaining lifetime of power plants	• Share of renewables in elec. generation, installed capacity, and capital expenditure
Transport	• Average miles per gallon (MPG) of car fleet	• Share of sustainable propulsion technologies in sales
Manufacturing		• Share of zero-carbon manufacturing • Relative investment levels in green manufacturing R&D or deployment
Cross-sector	• Share of oil & gas in sales / revenue • Share of coal in revenues	• Share of 'green' (e.g. low-carbon economy) in sales / revenue

Technology Exposure Data

Provider	Sector	Universe covered	Exposure Data	Green/Brown Categories	Primary Sources	Comments
MSCI	All fossil fuel related companies	ACWI IMI (8 500 companies) + sovereign	Volume of proved and probable reserves	Coal, Oil, Gas (L&G), shale gas, oil sands	Annual report	Datapoints available to clients and used in Low Carbon indexes as well as in carbon portfolio analytics
	All	ACWI IMI (8 500 companies)	% of revenues from clean tech	- Alternative energy: Wind, solar, biogas, biomass, waste etc. - Energy Efficiency: Insulation, Battery, Smart Grids, Hybrid/Electric Vehicles, Industrial Automation etc. - Green Building: Green certified properties - Pollution prevention: Waste Treatment, Rainwater Harvesting, Environmental remediation etc. - Sustainable water: Water Infrastructure and distribution, desalinization, water recycling equipment and services etc.	Annual report + in house estimations	Used in Global Environment Index, in Carbon PA and in ESG analysis
	Utilities	ACWI IMI (8 500 companies)	Generation , installed capacity and planned additional capacity (within 5 years)	Gas, coal, nuclear, liquid, solar, wind, biomass, hydro, other	Annual report	Used in ESG Analysis
	Real Estate	ACWI and US IMI, Nordic IMI, UK IMI, Australia IMI, Canada IMI, South Africa IMI (5 500)	% of green certified building	Any certification	Annual report	Used in ESG Analysis
OEKOM	Construction Material	Construction Materials companies with cement/concrete production (ca. 32 out of 59 companies covered in the sector)	Greenhouse gas emission intensity	kg/t cement material, trend over the last three to five years	Corporate reporting + company dialogue	
	Chemicals	Chemicals companies (ca. 90 out of 112 companies covered in the sector)	Energy use by source	Percentage values for the following categories: - Renewable energy sources including small-scale hydropower - Large-scale hydropower - Natural gas - Waste incineration - Coal/oil - Lignite/peat - Nuclear Power - Other	Corporate reporting + company dialogue	Indicator available for further sectors, e.g. Aerospace & Defence, Construction Materials, Machinery, Paper & Forest Products, Real Estate
	Metals & Mining	Metals & Mining companies (105 out of 112 companies covered in the sector)	Carbon intensity of metals production processes	t/t of product or t/oz of product (for precious group metals / PGM); trend over the last three to five years	Corporate reporting + company dialogue + CDP	Data quality and availability varies
			Energy intensity of metals production processes	GJ/t or GJ/oz (for PGM); trend over the last three to five years		

**Note that not all indicators provided by rating agencies are disclosed in these tables. Exhaustive tables with all indicators available will be disclosed as an Annex to the final report*

Provider	Sector	Universe covered	Exposure Data	Green/Brown Categories	Primary Sources	Comments
OEKOM	Oil, Gas & Consumable Fuels	Oil & Gas companies with upstream activities (approx. 100 out of 156 companies covered in the sector)	Gas flaring intensity	Volume of natural gas flared; different units, e.g. kg/boe	Corporate reporting + company dialogue	Units differ according to data availability
		Oil & Gas companies with refining activities (approx. 20 companies out of 156 companies covered in the sector)	Energy intensity of refineries	Different units, e.g. GJ/boe		
	Paper & Forest Products	Mill operation companies (24 out of 25 covered in the sector)	Thermal efficiency of mills (%)	% values, trend over the last three to five years	Corporate reporting + company dialogue + CDP	Data availability varies
	Real Estate	All companies in the Real Estate sector (193)	Percentage of floor space covered by properties certified to a sustainable/ green building standard	% (Floor space certified per total floor space)	Corporate reporting + company dialogue	
	Utilities	Utilities companies with energy generation (129 out of 162 companies covered in the sector)	Energy generation by source	Percentage values for the following categories: Renewable energy sources including small-scale hydropower, Large-scale hydropower, Natural gas, Waste incineration, Coal / Oil, Lignite / peat, Nuclear Power, Other	Corporate reporting + company dialogue	Estimates based on capacity if no data on generation available
			Carbon intensity of energy generation	g/kWh trend over the last three to five years	Corporate reporting + company dialogue + CDP	
	Transportation Infrastructure	All companies in the Transportation Infrastructure sector (44)	Modal mix of transport modes served	% of transportation modes (aviation, road transport, ship transport, rail transport)	Corporate reporting + company dialogue	
	Transport & Logistics	Companies active in road transport (approx. 30 out of 79 companies covered in the sector)	Percentage of renewable/ alternative fuels	% of vehicles powered by renewable/ alternative fuels (e.g. hybrid, electric) in the fleet		
INRATE	Electric Utilities	63 utilities with physical values	Electricity produced	Coal, Oil, Gas, Nuclear, Hydro, Wind, Solar, other renewables	Corporate reporting	
	Automobiles	18	Fuel efficiency of the average fleet (CO2/ km)			
SOUTH POLE GROUP	Oil & gas companies with oil reserves	All listed companies with information available	Proven reserves		Company information + CDP	
	Electric Utilities	All with available production or output information	Electric power, production capacity, by different sources and over time	Solar, Wind, Coal-fired, Gas-fired, Liquid fuel-fired, Biomass, Geothermal	Global Data + Corporate reporting + Grid factors	Data quality and availability varies
FTSE LCE	All sectors	9 200 companies	Revenue by activity (120 000 activities in total)	Part / not part of FTSE Low Carbon Economy transition activities	Corporate reporting	Methodology not yet launched

Technology Exposure Data

Provider	Sector	Universe covered	Exposure Data	Green/Brown Categories	Primary Sources	Comments
CARBONE 4	Electric Utilities	On demand	Electric power, annual production , by primary fuel (MWh)	Solar, Wind, Coal-fired, Gas-fired, Liquid fuel-fired, Biomass, Nuclear, Hydro	Corporate reporting	
	Automobile Manufacturers		Average fuel consumption of cars sold during the year (l/100km)	Liters/100km		
	Industry : Providers of efficient solutions		Share of turnover due to efficient products	Providers of efficient solutions for: Industry, Transport, Building, IT, Networks		
	Forestry products (pulp & paper, wood products)		Annual consumption of wood, origin of wood and FSC certification	Deforestation risk depends on wood origin: Europe, US/Canada, Americas (ex US, Canada), Africa, Asia, Middle East, Oceania, Brazil, Indonesia, Australia, Malaysia		
BLOOMBERG	Utilities	All companies when reported	Electricity generation / Installed capacity	By type of technology	Corporate reporting	
	Fossil-fuel companies		Reserves, Reserve replacement ratio, E&P spending, Average reserve life, CAPEX	Breakdown by oil, gas and oil sands		
TRUCOST	All mining and extractive sectors	Any company in database of 5 200 with operating activities in these sectors	Production data by extraction type	Natural Gas, Oil, Metals, Coal, Minerals, Aggregates	Corporate reporting + CDP	Collected as standard (part of annual company review)
	Oil, gas and coal companies		•Proven & Probable reserves (P2) split by fuel type & technology •CAPEX on fossil fuels	Coal, Natural Gas, Shale Gas, Conventional Oil, Unconventional Oil	Corporate reporting	Collected as standard on a quarterly basis
	Electric Utilities		•Power generation split by fuel type •Capacity •CAPEX on fossil fuels	Natural Gas, Coal, Petroleum, Wind Hydroelectric power, Solar, Geothermal, Wave & Tidal, Biomass, Nuclear, Landfill, Other Electric	Corporate reporting + CDP	
	Automobile Manufacturing		Information on different technologies and fuel efficiencies	Operational emissions during manufacturing, Emissions per km (gCO_2/km), Lifetime emissions	Corporate reporting + CDP + DEFRA + ICCT	
	Real Estate Operating Companies	On demand	Total floor space (m2), Total building energy use, Total building GHGs Scopes 1 & 2	•Emissions per m2 of different types of real estate (subsector, geography & capacity) •Energy use (kWh) per m2	Corporate reporting + LCA + academic studies + national inventories	
	Investments (financing)		Carbon intensity, Natural Capital intensity, Net benefits, Carbon savings	•At asset, project or investment level •Green bonds verification & quantification	Corporate reporting + client data	
PROFUNDO	Utilities	40 utilities with more than 5 000 MW of coal capacity	Installed capacity/ generation	Wind, Solar, Coal etc.	Corporate reporting	
			Investments		Corporate reporting + estimates based on announced plants	

Industry and sector classification as green / brown data. Industry classification data, which is used as part of the traditional financial data framework, acts in a similar way to green / brown data, albeit at industry or sector level. In this capacity, it can complement green / brown data technology level or operate where more granular data is incomplete (e.g. for corporate bonds). Financial databases organize companies based on industry classification codes. Major types include the North American Industry Classification System (NAICS), the Standard Industry Classification (SIC), the Global Industry Classification Standard (GICS), the Industry Classification Benchmark (ICB), and the UN International Standard Industrial Classification of All Economic Activities (ISCI).

Traditional industry classification systems are usually built based on revenue, which doesn't account for a categorization of non-financial performance. Moreover, their level of granularity is usually relatively low when it comes to emerging sectors, in particular with regard to energy technologies. This is a barrier to using industry classification for climate friendliness assessment. Nevertheless, they are meaningful when looking at high-carbon sectors.

Alternatively, investors can switch from traditional to alternative systems. This switch can relate both to sector allocation guidelines and to a broader tracking of exposure to various sectors. One example is the SASB Industry Classification System (SICS), which categorizes industries based on resource intensity and sustainability innovation potential (see box on side). FTSE is currently developing a Low Carbon Economy Industry Classification System.

SASB SUSTAINABLE INDUSTRY CLASSIFICATION SYSTEM™

Health care: Biotechnology & Pharmaceuticals, Medical technology, health care providers

Financial: Banking and Investment Banking, Specialty Finance, Insurance

Technology & Communication: Technology, Semiconductors, Telecommunications, Internet & Media Services

Non-renewable resources: Oil & Gas, Coal, Metals & Mining, Construction Materials

Transportation: Automobiles, Air Transportation, Marine Transportation, Land Transportation

Services: Consumer Services, Hospitality & Recreation, Media

Resource Transformation: Chemicals, Industrials

Consumption; Food, Beverages, Tobacco, Retailers, Apparel & Textiles, Consumer Discretionary Products

Renewable resources & alternative energy: Alternative Energy, Forestry & Paper

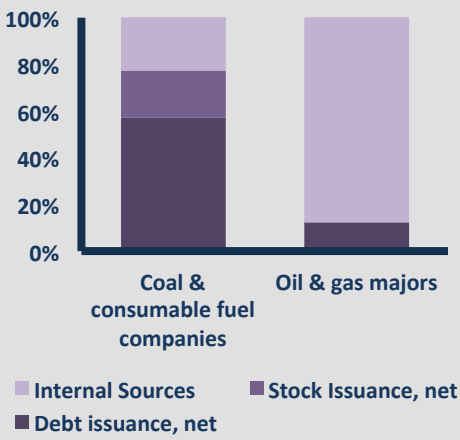
Infrastructure: Utilities, Waste Management, Infrastructure, Real Estate

FINANCIAL DATA

Financial data can help inform non-financial activity data. Investors can use financial data to track the capital expenditure intensity or share in indices, the value of fixed assets, or sector-specific data such as installed capacity. This does not necessarily inform on the extent to which this capital expenditure is climate friendly. It can be used as a proxy however for climate friendliness. This data, together with data like EBIT and rate of return, is also relevant from a risk perspective.

From an engagement perspective, it may also be interesting to look at climate and financial data in combination with the structure of financing (Fig. 4.15). This data can inform on the extent to which investors can influence internal sources of capital.

FIG 4.15: SOURCES OF FINANCING FOR COAL AND OIL & GAS COMPANIES 2002 – 2012 (SOURCE: 2° INVESTING INITIATIVE 2014)



EIRIS CLIMATE CHANGE TOOLKIT

EIRIS's Climate Change Toolkit includes a carbon profile, a carbon risk factor, and a carbon engager, which serve to highlight how companies are addressing climate change combined with their climate change impacts. The carbon profile seeks to calculate the climate impacts of companies and the carbon risk factor seeks to assess management responses to climate change.

CDP CLIMATE PERFORMANCE LEADERSHIP INDEX

CDP collects metrics focused on corporate disclosure related to climate change and climate change mitigation targets. CDP then creates a scoring scheme based on this data. It provides comparative information on a company's management of its carbon footprint, climate change strategy, and risk management processes. The results are published in the annual Climate Performance Leadership Index. CDP analysis is often further used by other agencies to assess companies' climate strategies.

SOUTH POLE GROUP FORWARD-LOOKING ASSESSMENT

South Pole's Climate Impact Assessment is a forward-looking toolkit conducted jointly with the CDP. It combines South Pole Group's carbon footprinting and financed emissions methodology with CDP's assessment of corporates climate mitigation strategies. The assessment provides concrete advice on engagement issues related to corporate targets and strategies, as well carbon metrics.

MSCI CLIMATE RATINGS

MSCI develops specific climate ratings for companies as part of their ESG research. The MSCI Global Climate Index is built on the basis of these ratings. Companies are rated based on three themes: renewable energy, clean technology & efficiency, and future fuels.

4.4 GUIDE TO CLIMATE (ESG) SCORES

Overview. This category of indicators consists of qualitative scores given to companies based on climate-related issues. These scores are usually embedded in broader ESG (environmental, social, governance) scores. For investors interested in climate issues, climate-related indicators used to feed the broader scoring can be isolated to find the climate-related qualitative score for a company.

Types of ESG / climate score providers. There are a range of agencies that attempt to systematically evaluate companies on a variety of ESG criteria. Agencies assign weighted scores to each company (and sector) on a range of criteria relevant to the company's ESG impacts, and translate these scores into ratings. These scores are based primarily on qualitative data and benchmarking against industry practices. The overall score / rating of a company can be used to assess the sustainability of a portfolio. Agencies typically rely on public data sources to obtain the information needed for their ratings, including the companies themselves, media, NGOs, and other stakeholders.

Given its intangible nature, a standardized definition of ESG has not been established to date. As a result, different entities have different interpretations of ESG. This is reflected in the range and type of indicators used by various ratings agencies in determining their metrics and ratings.

Climate ratings. Climate strategies are a subcomponent of the 'Environmental' set of ESG considerations. Ratings agencies can thus disentangle climate issues from a company's ESG ratings. Research has identified only a limited number of ESG providers that offer this service through a specific toolkit that focuses exclusively on climate issues (cf. box on side). All other ratings providers, even if they do not offer a specific toolkit, can offer bespoke analysis on climate change as part of their ESG services. Climate scores usually focus on scoring a company's public climate-related targets and strategies, together with their actual climate friendliness, assessed on the basis of carbon and / or green / brown exposure metrics.

While climate scores are usually limited to companies, the Asset Owner Disclosure Project (AODP) has started adopting this approach to score institutional investors. AODP publishes an annual ranking of institutional investors using a similar mix of of qualitative data, green / brown exposure metrics, and carbon footprinting data on financial portfolios.

Climate scores integrate both quantitative and qualitative indicators:

- **Empirical metrics:** Carbon footprint, GHG emissions reduction target (quantitative), electricity generation mix, carbon reserves, sales of 'climate-related' technologies.

- **Qualitative metrics:** GHG emissions reduction target (qualitative), climate mitigation strategy, disclosure practices related to climate impact, stakeholder responses.

Advantages of climate scores. Climate scoring is an effective summary indicator and is likely to offer a more comprehensive overview of the indicators it considers compared to isolated carbon or green / brown exposure metrics. By extension, a climate rating together with the underlying analysis can potentially provide a more comprehensive picture of the climate performance of a company compared to the other indicators discussed in this report. In addition, other climate-related indicators are poorly developed for certain sectors. For these sectors, a climate score may be the best option.

Limitations of climate scores. Climate-related scoring faces a number of limitations. First, climate-related scores are generally subsumed in a broader ESG score. As the analysis on the previous page suggests, specific climate-related scoring is still not offered as an investor tool by all ESG providers and the tools that do exist are not necessarily tailored to the strategies highlighted in the previous chapter.

Another limitation is that ESG scores usually adopt a best-in class logic within sectors. This allows high scores for oil & gas companies relative to their peers, even if their business model is fundamentally misaligned with climate goals. While climate scoring naturally can only be as good as its inputs, and thus suffers from the same shortcomings pertaining to carbon and green/brown exposure metrics, another question involves the subjectivity of the score, introduced by qualitative metrics and weighting. Subjectivity always introduces a risk for validity of the indicator, a concern that exists less for carbon and green / brown exposure metrics. In this way, climate scores represent a black box.

Potential application. In terms of the strategies outlined in the previous chapter, climate (ESG) scores by themselves only have limited applicability.

- **Portfolio construction – Bonds & alternatives.** Climate (ESG) scores are applied to corporations. Their relevance is thus limited to corporate bonds and listed equities. For corporate bonds in turn, ESG ratings may not be applied across all issuers, which implies a data constraint. For all other asset classes, green / brown exposure metrics or carbon metrics are more relevant. By extension, climate scores are only relevant for listed equities.

- **Portfolio construction – Listed Equities.** A number of index providers have developed sustainability indices involving ESG and climate scores. From a climate friendliness perspective, indices using a combination of carbon and green / brown exposure metrics are likely to be relevant in informing on the climate performance of companies. Given the limitations of climate (ESG) scores, these metrics are likely to remain more relevant in index construction.

- **Engagement – Listed equities.** Climate (ESG) scores focus in particular on the combination of carbon metrics, green / brown exposure metrics, and qualitative analyses of climate targets and strategies of corporates. They can thus be used as a dashboard for engagement in terms of understanding where the company is a 'leader' or a 'laggard.' Some climate (ESG) scores are designed in association with a specific 'engagement' list of investors (cf. previous page).

Climate (ESG) scores will be particularly relevant for investors that want to employ sustainability strategies that go above and beyond climate friendliness targets. In that regard, ESG metrics enable a comparison of a company across a range of indicators, including non-climate related environmental objectives. The focus of this report however is on climate friendliness metrics specifically. In this context, it is particular the components of the score that appear material in informing investor activities.

Climate scores

Provider	Sector	Universe covered	Components assessed	Scoring system	Primary Sources
MSCI	All sectors	ACWI and US IMI, Nordic IMI, UK IMI, Australia IMI, Canada IMI, South Africa IMI (5500)	Carbon Business Segment Risk Exposure analyzes a company's business in terms of revenues, assets, or operations (SIC codes level)	Score from 0 to 10 (10 being the highest level of risk / opportunity)	Comprehensive Environmental Data Archive (CEDA), US Department of Energy, etc.
			Carbon Geographic Segment Risk Exposure analyzes company's geographic segments in terms of revenues / assets, or operations		
			Assessment of company's ability to manage its risk exposure in three broad categories: Strategy & Governance, Initiatives, Performance	Score from 0 to 10 (10 being the highest level of performance)	Corporate reporting
OEKOM	All sectors	Over 3,500 companies covering developed and emerging markets as well as important non-listed bond issuers	Climate change management of the company, inc. position, GHG inventories, Emissions reduction targets and action plans, risks and mitigation strategy	Score from D- to A+ for all sub criteria. Overall score of climate change management based on 4 sub criteria. Weights of sub criteria differ according to risk exposure of the sector	Corporate reporting + CDP + Company dialogue
	Automobile	All companies in the Automobiles sector (39)	Alternative drives and fuels	Score from D- to A+ based on quantity and quality of alternative drive systems	Corporate reporting + company dialogue
	Construction	All companies in the Construction sector (79)	Energy efficiency and renewable energy in design, construction and operation of buildings and structures	Score from D- to A+ based on qualitative assessment; separate indicators for design, construction and operation.	
	Financials	Banks with corporate/ public sector lending activities (oekom banking universe; approx. 490 companies)	General environmental guidelines for corporate/public sector lending activities	Score from D- to A+ based on a qualitative assessment of 7 sub criteria (including five selected climate-related sub criteria) in combination with an assessment how binding guidelines are	
	Oil, Gas & Consumable Fuels	Companies with refining activities (20 companies by 2015; 50 by end 2016)	Alternative fuel activities	Score from D- to A+ based on qualitative assessment (e.g. of R&D activities)	
		All companies in the sector (156)	Renewable energy investments and assets	Score from D- to A+ based on qualitative assessment	
	Real Estate	All companies in the Real Estate sector (193)	Energy efficiency of buildings and use of renewable energy sources		
	Transport & Logistics, Transport & Logistics/ Rail	All companies in the sectors Transport an Logistics (79) and Transport & Logistics/Rail (28)	Use of renewable/alternative fuels	Score from D- to A+ based on qualitative assessment	
	Utilities	Utilities companies with energy generation based on fossil fuels (Approx. 110 out of 162 companies covered in the sector)	Thermal efficiency of fossil-fired power plants owned by the company	Score from D- to A+ based on a combined benchmark and trend evaluation	
		Utilities companies with energy generation (129 out of 162 companies covered in the sector)	Activities regarding renewable energies. Sub criteria: Strategy and investments to promote renewable energies, Share of renewable energies in electricity generation	Score from D- to A+, based on a qualitative assessment of the strategy, and a combined benchmark and trend evaluation of the percentage share	
SOLARON	Oil & Gas, Metals & Mining, Chemicals, Construction Materials	MSCI EM	Environmental policy, Strategies for managing impacts on biodiversity, Initiatives or programs implemented to mitigate spills and releases, Emissions reduction target	Based on scoring guidelines and disclosure of data, scores are assigned to each indicator on a scale with a minimum score of 1 to a maximum score of 10	Corporate reporting

Climate scores

Provider	Sector	Universe covered	Components assessed	Scoring system	Primary Sources
TRUCOST	All sectors	5,200 comp	Customized to client requirements (e.g. Rank in Sector, Revenues at risk, EBITDA at risk)	Customized to client requirements (e.g. Impact Ratio % (GHG damage costs in $m / $m revenues or EBITDA))	Corp. reporting + CDP + modeled data + proprietary valuations
SOUTH POLE GROUP	All sectors	All listed companies	Company specific risks and opportunities related to climate change legislation and effects	Scoring A-D + individual information reported back to investor on portfolio and company level and feeding into an "engagement list"	Offered together with CDP, based on proprietary CDP data
		All reporting companies	GHG data reporting quality: Trust-worthiness of self-reported GHG data	Scoring 1-100%	Proprietary methodology and analysis
		All listed companies	Peer ranking: Emission intensity by employees and revenue per subsector	Quartiles	
INRATE	All sectors	MSCI World MSCI EM SPI (Swiss Performance Index) 200 outside of MSCI	Model CO2-intensities as well as additional company-specific features (e.g. unconventional fossil fuel sources, efficiency level of machinery produced, sourcing quality of raw materials) Climate policy, management system transparency, reduction programs and quantitative targets	Scoring from 1 to 12 based on product portfolio and operational management features and controversies inc. macro perspective on sector level, on unconventional fossil sources, material sourcing, etc.	Company reporting, Model value emission factors and information from LCA
CARBONE 4	All sectors	Listed companies, on demand	GHG-emissions (cf. carbon metrics)	CIR : Carbon Impact Ratio	Corporate reporting
			Induced/avoided emissions per sector, Business strategy, R&D, investments	Climate impact score	
VIGEO	All sectors	3,125 companies	Environmental strategy, energy consumption, impacts from transport, development of green products, impact from the use of the product, integrity & transparency of lobbying practices, etc. Each weighted from 1 to 3 depending on the exposure of stakeholders to the topic as well as the density of risks the management of the topic represents for the company.	Score between 0 and 100 1. Policies (1/3 of score): Degree of formalization of commitments, policy content, presence and degree of ambition of quantified targets, presence of a dedicated structure 2. Implementation (1/3 of score): measures in place, coverage/perimeter of the measures 3. Result (1/3 of score): KPIs trends and benchmarks, presence of allegations assessed on severity, frequency and management of corrective measures	Corporate reporting + Press review + Stakeholder feedback + External sources (CDP, public databases, etc.)
	Electric utilities	156 utilities covered across Europe, North-America, Asia-Pacific and Emerging markets	Climate change related issues assessed for such companies: environmental strategy, development of renewable energy, efficiency of T&D activities, efficiency of fossil-fuel based power plants, energy demand-side management, integrity & transparency of lobbying practices	Carbon factor, thermal carbon factor, % of renewable energy in installed capacity, % of renewable energy in production, share of sites under ISO14001, % of CCGT and CHP in thermal capacity, trends in SF6 leaks in electric T&D, trends in CH4 leaks in gas T&D, trends in energy consumption of the gas network, trends in energy losses along the network, trends in energy saved by end-use customers, etc.	Corporate reporting + Press review + Stakeholder feedback + external sources (CDP, public databases, etc.) + contacts with companies
EIRIS	Climate change relevant sectors	1,035 comp.	Climate management of the company including policy, management & strategy, disclosure, & performance	Climate score is based on 22 sub indicators and results in 5 grades	Corporate reporting
FTSE	All sectors	FTSE All World, FTSE UK All Share, Russell 1000 + spec. markets	1.Strategy 2.Implementation 3.Performance & metrics	Score from 0 to 5 based on a transparent rules based methodology that combines assessment of strategy, implementation and sector relative performance.	Corporate reporting + CDP

FIG 4.16. CAPITAL EXPENDITURE OF UK UTILITY SSE
(SOURCE: SSE ANNUAL REPORT 2014)

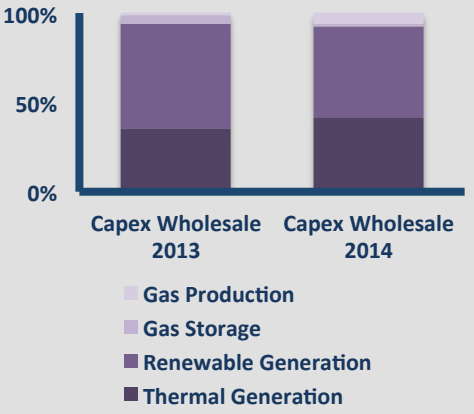


FIG 4.17: SDA STEEL PROFILE
(SOURCE: SDA 2015))

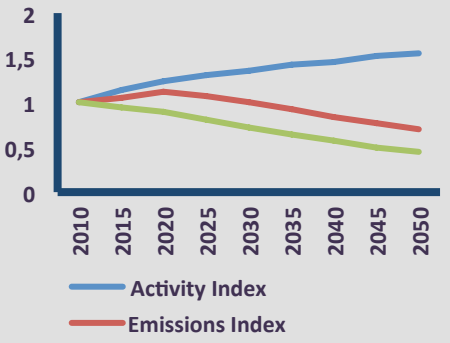
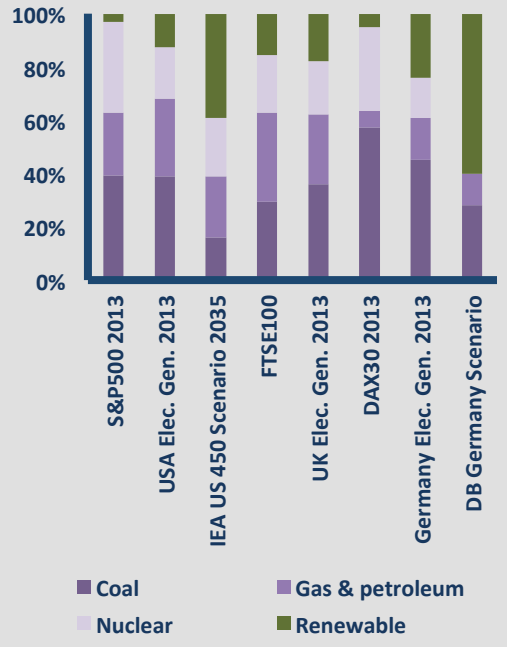


FIG 4.18. SEI METRICS' CONCEPT: COMPARING PORTFOLIOS EXPOSURE WITH 2°C ROADMAPS. EXAMPLE FOR ELECTRICITY GENERATION
(SOURCE: 2°ii 2015, forthcoming)



4.5 NEXT STEPS ON METRICS DEVELOPMENT

Overview. The report highlighted a number of areas where current data frameworks and / or metrics are lacking. The following provides an overview of some of the key areas where further development is taking place:

- **GHG emissions reporting.** More stringent accounting standards and improved overall accountability are likely to improve reporting. First evidence of this can be seen in the growing number of companies that received the highest score in the Liesen et al. (2011) study between 2005 and 2009.

- **Locked-in GHG emissions.** A key potential for metrics improvement is to capture the lock-in of physical assets (e.g. power plants, mining, etc.), and therefore companies owning these assets. While there are significant question marks around these types of metrics, simple proxies can already be applied today.

- **Avoided GHG emissions.** Carbon metrics act almost exclusively as a brown metric. Carbone4 together with French asset manager Mirova is currently developing a first indicator to estimate avoided GHG emissions at company level based on activity data publicly reported.

- **Defining green and brown.** Taxonomies around green and brown are still poorly developed. The Climate Bonds Initiative is currently developing taxonomies for a number of sectors which is likely to improve this situation over the coming years. A process has also been launched on this question as part of the German G7 presidency. In terms of brown metrics, work by the Carbon Tracker Initiative and others is helping to understand which types of high-carbon investments may still be aligned with 2° C roadmaps and which investments are misaligned.

- **Tracking capital expenditure.** A key shortcoming of current data frameworks is the extent to which capital expenditure data by energy technology is missing (Fig. 4.16). The biggest challenges relates partly to corporate reporting, but, at least in the major climate-related sectors (e.g. energy, power) also to a question of data aggregation by data providers.

- **Setting targets**. Climate scenarios do not enable setting GHG reduction or investment targets for each sector or company. Two international research efforts, both based on the IEA scenarios, the *Sectoral Decarbonization Approach* (Fig. 4.17) and the *Sustainable Energy Investment Metrics* are currently trying to address this issue (Fig. 4.18).

PROJECTS DEVELOPING NEW OR IMPROVED CLIMATE FRIENDLINESS METRICS
(SOURCE: AUTHORS)

Organization	Metrics	Timeline	Technologies / sectors	Short description
SEI Metrics Consortium (2° Investing Initiative, Climate Bonds Initiative, Kepler-Cheuvreux, Frankfurt School of Finance, WWF Germany, WWF Europe, University of Zurich, CDP, Cired)	Green / brown exposure metrics	March 2015 March 2017	Focus on sectors covered by the IEA scenarios (energy, power, road transportation, air transportation, real estate, cement, steel).	The project develops 2° investing criteria for low-carbon and high-carbon corporate assets (including in part a review of physical assets by the Climate Bonds Initiative). A particular focus of the project is on the alignment of financial assets, investment portfolios and loan books with 2° C climate goals.
CDP / WRI / WWF (in partnership with ECOFYS) Sectorial Decarbonization Approach (SDA)	Carbon metrics	May 2015	SDA focused on sectors covered by the IEA scenarios, but larger project covering all sectors.	The research partners are developing sectorial guidance for companies. The guidance informs companies on the GHG emissions trajectory they need to converge to in order to achieve 2° C climate goals. The guidance does not address questions around the climate friendliness of financial assets.
Climate Bonds Initiative	Green / brown exposure metrics	Ongoing	Water, Bus Rapid Transit, Wind, Solar, Water, Agriculture & Forestry, Green Buildings	The Climate Bonds Initiative creates public standards for industries to help inform on the climate friendliness of bonds. The standards are developed in partnership with industry experts. Standards can be applied to project finance, as they focus on assets. Guidance can be applied by public banks for low-carbon assets, but don't address high-carbon assets.
Carbon Tracker Initiative Carbon Cost Curves	Green / brown exposure metrics		Oil, gas, coal	CTI develops research that analyses the investment projects that would be stranded under various price scenarios. While currently focused on risk, it is being adapted to climate roadmaps. The results can provide a macro indicator for the alignment of high-carbon investments with climate roadmaps.
Hamburg U., Reading U., Sociovestix Labs, South Pole Group, CDP	Carbon metrics	-	-	A joint project seeking to improve the GHG emissions reporting from corporates. The research doesn't focus on metrics, but the quality of data underpinning the metrics.
EDF Investor Confidence Project	Carbon metrics	-	Energy efficiency	The project focuses on improving the data quality around energy efficiency savings.
Carnegie Oil Climate Index	Carbon metrics	2015	Oil	The Carnegie Institute is developing an indicator to measure the upstream and downstream GHG emissions of oil plays.
Asset Owner Disclosure Project	Scoring	Ongoing		The research provides qualitative guidance on managing climate friendliness from an institutional investor's perspective. The research doesn't provide guidance on metrics for investors or banks.

The 2° Investing Initiative [2°ii] is a multi-stakeholder think tank working to align the financial sector with 2°C climate goals. Our research work seeks to align investment processes of financial institutions with climate goals; develop the metrics and tools to measure the climate friendliness of financial institutions; and mobilize regulatory and policy incentives to shift capital to energy transition financing. The association was founded in 2012 in Paris and has offices in Paris, London, and New York City. Visit www.2degrees-investing.org

UNEP FI is a global partnership between UNEP and the financial sector. Over 200 institutions, including banks, insurers and fund managers, work with UNEP to understand the impacts of environmental and social considerations on financial performance. Through its Climate Change Advisory Group (CCAG), UNEP FI aims to understand the roles, potentials and needs of the finance sector in addressing climate change, and to advance the integration of climate change factors - both risks and opportunities – into financial decision-making.
Visit www.unepfi.org.

The Greenhouse Gas Protocol (GHG Protocol) is the most widely used international accounting tool for government and business leaders to understand, quantify, and manage greenhouse gas emissions. A decade-long partnership between the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD), the GHG Protocol is working with businesses, governments, and environmental groups around the world to build a new generation of credible and effective programs for tackling climate change.
Visit www.ghgprotocol.org

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