



PRI CLIMATE CHANGE STRATEGY PROJECT

DISCUSSION PAPER:
REDUCING EMISSIONS ACROSS
THE PORTFOLIO

THE SIX PRINCIPLES

- 1** We will incorporate ESG issues into investment analysis and decision-making processes.
- 2** We will be active owners and incorporate ESG issues into our ownership policies and practices.
- 3** We will seek appropriate disclosure on ESG issues by the entities in which we invest.
- 4** We will promote acceptance and implementation of the Principles within the investment industry.
- 5** We will work together to enhance our effectiveness in implementing the Principles.
- 6** We will each report on our activities and progress towards implementing the Principles.



The PRI launched The PRI Climate Change Strategy Project in response to asset owner interest in understanding whether and how to set a portfolio-wide emissions reduction goal. A growing number of asset owners want to know how their assets are exposed to climate change related risks, and the role that they can play in an orderly transition to a lower carbon economy.

The project is kindly funded by AP7, Batirente, Catholic Super, Local Government Super and University of California.

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EXECUTIVE SUMMARY

This discussion paper is Phase 1 of the project. It lays out:

A STRONG CASE FOR ASSET OWNER ACTION ON CLIMATE CHANGE

Drivers for action range from protecting financial value and managing risk to social values. There is growing consensus that considering environmental, social and governance (ESG) topics, including climate change, is supportive of fiduciary duty.

Asset owners with diversified, long-term portfolios will be exposed to costs associated with climate change risks. With governments and companies increasingly taking action, asset owners have a positive and unique role to play in tackling climate change.

THE KEY FACTORS TO CONSIDER WHEN SETTING AN EMISSIONS REDUCTION GOAL

Response to climate change must be tailored to an asset owner's investment approach and asset class mix. This could involve: measuring a portfolio carbon footprint; engaging with policy makers and companies on transitioning to a low-carbon economy; and accelerating newer forms of investment.

For some asset owners, divestment will be part of a risk management strategy or a way to align investment beliefs and values, while many organisations are finding that alternatives to divestment, such as engagement and reinvestment into low-carbon initiatives are effective.

HOW MEASURING A CARBON FOOTPRINT CAN ASSIST IN REDUCING EMISSIONS

Measuring a portfolio's carbon footprint can help asset owners build an understanding of the emissions of companies owned in the portfolio. It is also a useful tool for engaging with portfolio managers and companies, and can help set priorities for addressing emissions.

Asset owners including Local Government Super, the Environment Agency Pension Fund, AP7 and PFZW, already measure portfolio carbon footprints to highlight focus areas for reducing emissions.

NEXT STEPS

The PRI encourages asset owners to:

- **Understand their carbon risk exposure** by measuring their portfolio's carbon footprint, analysing it and reviewing it with portfolio managers.
- **Mitigate their carbon risk exposure** by setting a goal to reduce emissions, as appropriate for their individual organisations. This may include considering joining the Portfolio Decarbonization Coalition.

PROJECT BACKGROUND:

The PRI Asset Owner Climate Change Strategy Project supports PRI's broader climate change work including the Montreal Carbon Pledge and an investor engagement on corporate political lobbying. The project also aims to support parallel work by [The Portfolio Decarbonization Coalition](#), UNEP FI, Caring for Climate and The Global Investor Coalition on Climate Change.

Cary Krosinsky authored this paper. The PRI's project lead and contributor is Sagarika Chatterjee, Associate Director, PRI. Special thanks go to Danyelle Guyatt and Helene Winch, who provided substantial input.

Phase 2

Phase 2 of this project will provide a pilot framework for reducing emissions, and case studies of investor action, by COP21 in December.

For more information, email sagarika.chatterjee@unpri.org

ACTIONS FOR ADDRESSING EMISSIONS REDUCTION – SUMMARY TABLE

The following actions are underway by investors and will be explored further in the next stage of this project, the pilot framework.

Action	Example Activities	Pros	Cons
MEASURE	<ul style="list-style-type: none"> Ask portfolio managers to measure portfolio carbon footprint to understand carbon in the portfolio vs benchmark. 	<ul style="list-style-type: none"> Quantitative tool for insight into carbon in equities and fixed income portfolios. Assists in dialogue on climate change with portfolio managers and stakeholders. 	<ul style="list-style-type: none"> Requires resourcing to review and act on carbon footprint findings with portfolio managers. Data limitations need to be understood during review.
INCORPORATE WITHIN INVESTMENT PROCESS	<ul style="list-style-type: none"> Portfolio managers' investment analysis and decisions include climate change scenarios, risks and opportunities. Review asset class and portfolio sensitivity to climate change. 	<ul style="list-style-type: none"> Enhanced investment decisions, incorporating climate change 	<ul style="list-style-type: none"> Carbon risks and emissions remain in the portfolio if adequate action is not taken to minimise risk exposure and address emissions.
ENGAGE	<ul style="list-style-type: none"> Engage with companies on emissions reduction. May involve excluding companies where engagement is unsuccessful. Engage with public policy makers, for example on carbon pricing. 	<ul style="list-style-type: none"> Exercises active ownership. Supports an orderly transition to a low carbon economy that minimizes potential investment opportunity loss. Supports the policy framework needed for a low carbon economy. 	<ul style="list-style-type: none"> Positive outcomes depend on company responsiveness and high quality engagement. Engagement success requires sustained hard work by investors. Senior-level internal support and resourcing needed for public policy engagement.
LOW CARBON INVESTMENTS	<ul style="list-style-type: none"> Increase low carbon and clean energy investments within strategic asset allocation targets. 	<ul style="list-style-type: none"> Supports the transition to a low carbon economy. Opportunities in property, infrastructure, equities, fixed income and private equity. 	<ul style="list-style-type: none"> Total assets under management in low carbon may remain small within existing asset allocation requirements. Technology and policy risk must be mitigated in investment decisions.

INTRODUCTION: THE CASE FOR ASSET OWNER ACTION ON CLIMATE CHANGE

With scientific concerns about the effects of carbon emissions settled, asset owners are increasingly interested in understanding their carbon exposure and learning what role they can play to achieve a safe environment for future generations.

Globally, pressure is mounting.

The IPCC's 5th Synthesis report¹ from November 2014 cited 1000 Gt of remaining carbon budget before we reach likely tipping points. The IEA's incoming Executive Director Dr. Fatih Birol most recently spoke to this global carbon budget expiring in 2040². The Carbon Tracker Initiative's carbon budget analysis finds similar³ and PwC recently estimated that we have approximately 20 years left of annual carbon emissions at present rates before this budget is completely spent. It will be harder to stay within the global carbon budget the longer we do not take action. (See Appendix A for more on climate science).

Leading economists have proposed a ten-point global action plan for a low-carbon economy⁴. Senior religious figures, such as Pope Francis, are now asking followers to take up this cause. Such calls are expected to accelerate in future.

For carbon reductions to occur at the level required, corporate strategy, public policy, and investment strategy need to work in concert, each informing the other's needs.

Companies such as BP and Unilever are speaking publicly about a need for action on climate change and a growing number are calling for stronger carbon pricing, including most recently six major European energy companies⁵. Over 90 companies have committed to one or more business leadership initiatives on climate change ahead of COP21 and an increasing number of companies including Unilever, Nestle, AXA Group, Allianz and Honda⁶, have committed to adopting a GHG emissions reduction target.

Policy is needed to support investor strategy, for example by levelling the playing field on energy through subsidies as per the IEA's 4 steps to keep us within 2 degrees⁷. Policy is also needed to help support corporate strategy,

such as long-term fixed incentives to inspire renewable energy investment. Companies have been frustrated where incentives such as feed-in tariffs are established and then removed too soon.

Governments are working towards COP21 in Paris in December through bilateral agreements, high-level discussions and other lead-up gatherings. The Climate Change Convention - effectively a planetary risk management treaty - aims to manage climate change within acceptable limits. Parties to the Convention agreed in Cancun in 2010 to 2°C as the upper limit of acceptable warming. Governments will make a significant contribution by calling for a minimum 60% reduction in global emissions by 2050 from 2010 levels (consistent with the IPCC range of a 40%-70% reduction).

However, even if governments fail to reach an agreement at COP21 in Paris in December, the potential impacts of climate change on the economy and the global carbon budget mean that asset owners will still need to consider their carbon risk exposure and the full range of possible actions to reduce emissions. Their portfolios are inevitably exposed in some way to costs from climate change.

Large, institutional owners typically have diversified and long-term portfolios broadly representative of the overall capital markets. They can play a positive role in influencing companies and policy makers to minimise their exposure to these costs⁸.

Asset owners are already taking concrete actions. Examples include the Aiming for A Coalition shareholder resolutions on climate change⁹ as well as the growth in green bonds¹⁰, whereby proceeds are earmarked for projects with environmental and/or climate benefits. A new investor platform, investorsonclimatechange.org indicates a range of possible actions in measurement, engagement and reallocation to low carbon investments.

Whilst climate change poses risk to the environment, opportunities for investment in new energy sources and new technologies also exist for investors.

1 <http://www.ipcc.ch/report/ar5/syr/>

2 <http://www.iea.org/newsroomandevents/pressreleases/2014/november/signs-of-stress-must-not-be-ignored-iea-warns-in-its-new-world-energy-outlook.html>

3 <http://carbontracker.org/wp-content/uploads/2014/08/Carbon-budget-checklist-FINAL-1.pdf>

4 [Newclimateeconomyreport](http://newclimateeconomyreport.org)

5 <http://newsroom.unfccc.int/unfccc-newsroom/major-oil-companies-letter-to-un/>

6 <https://www.cdp.net>

7 <http://www.iea.org/publications/freepublications/publication/weo-special-report-2013-es---redrawing-the-energy-climate-map.html>

8 <http://onlinelibrary.wiley.com/doi/10.1111/j.1467-8683.2007.00577.x/abstract>

9 <http://investorsonclimatechange.org/portfolio/collaborative-engagement/>

10 <http://www.climatebonds.net/2015/01/final-2014-green-bond-total-366bn-%E2%80%93-that%E2%80%99s-more-x3-last-year%E2%80%99s-total-biggest-year-ever-green>

FIDUCIARY DUTY

Fiduciary duty has long been a fluid concept, and there is little reason to expect the interpretations and definitions of prudence and loyalty to not continue to evolve. The UK Law Commission has been looking at the relationship between ESG and fiduciary duty¹¹, and other jurisdictions are paying close heed to such developments in fiduciary duty laws and interpretations.

Asset owners such as CalPERS have developed investment beliefs that include recognition that fiduciary duty is multi-generational¹². The University of California has undertaken similar work¹³ and other asset owners including The Pensions Trust and the BT Pension Scheme have established belief sets or equivalent investment policies. Increasing across the globe there is an understanding that part of an investors fiduciary duty is to manage risks, that include long term risk such as environmental, social and governance risks.

A group of over 50 companies and investors, including Unilever, Lenovo, CalSTRs and Aviva Investors, are supporting The Climate Disclosure Standards Board (CDSB)'s statement on fiduciary duty and climate change¹⁴.

There may be a time where trustees and others in charge of pools of investable assets will need to be seen as positively addressing climate change or risk being found in breach of their own fiduciary duty. Sarah Barker, of Australian law firm Minton Ellison, identifies three trends; a proactive stance on governance on climate change is consistent with financial wealth interests; boards must actively engage with the issue of climate change impacts on their operations, risk and strategy; and a passive approach to climate change governance may be inadequate to satisfy directors' duties of due care and diligence¹⁵.

The PRI is examining how considering ESG risks is consistent with fiduciary duty through its project *Complying with your Fiduciary Duty: a Global Roadmap for ESG Integration*¹⁶, which will be published September 2015.

“As a passive investor and universal owner we have a unique perspective in that we invest in a small share of the whole global economy, rather than specific companies or industries. As we are not an active investor, we do not distinguish between companies or industries being winners or losers in terms of climate risks. Our perspective is that the whole economy needs to lower its climate risks, because our interests and challenges are essentially the same as society's as a whole”

Charlotta Dawidowski Sydstrand, Sustainability Strategist, AP7

“Catholic Super believes it is essential to reduce global carbon emissions in order to reduce the effect CO2 may have on our climate and to improve the quality of life. This is one of the core reasons why Catholic Super supports the PRI's climate change project and is active in collaborative investor groups, and also why we engage with companies and strive for integration of risks of this kind into investment processes of our underlying fund managers.”

Garrie Lette, CIO, Catholic Super

¹¹ http://lawcommission.justice.gov.uk/publications/fiduciary_duties.htm

¹² <https://www.calpers.ca.gov/index.jsp?bc=/investments/policies/invo-policy-statement/home.xml>

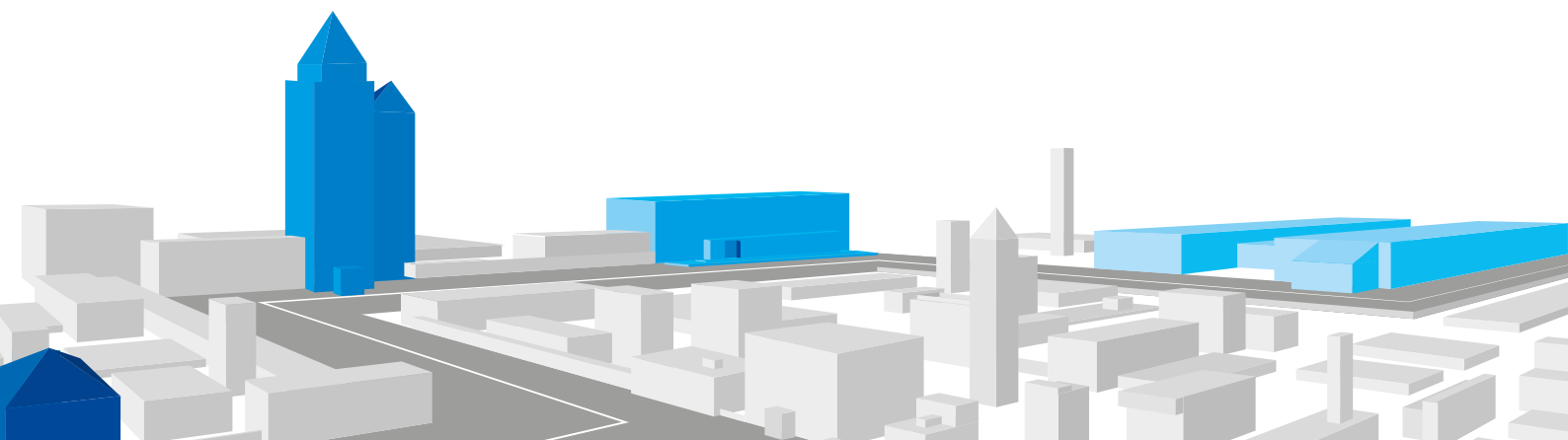
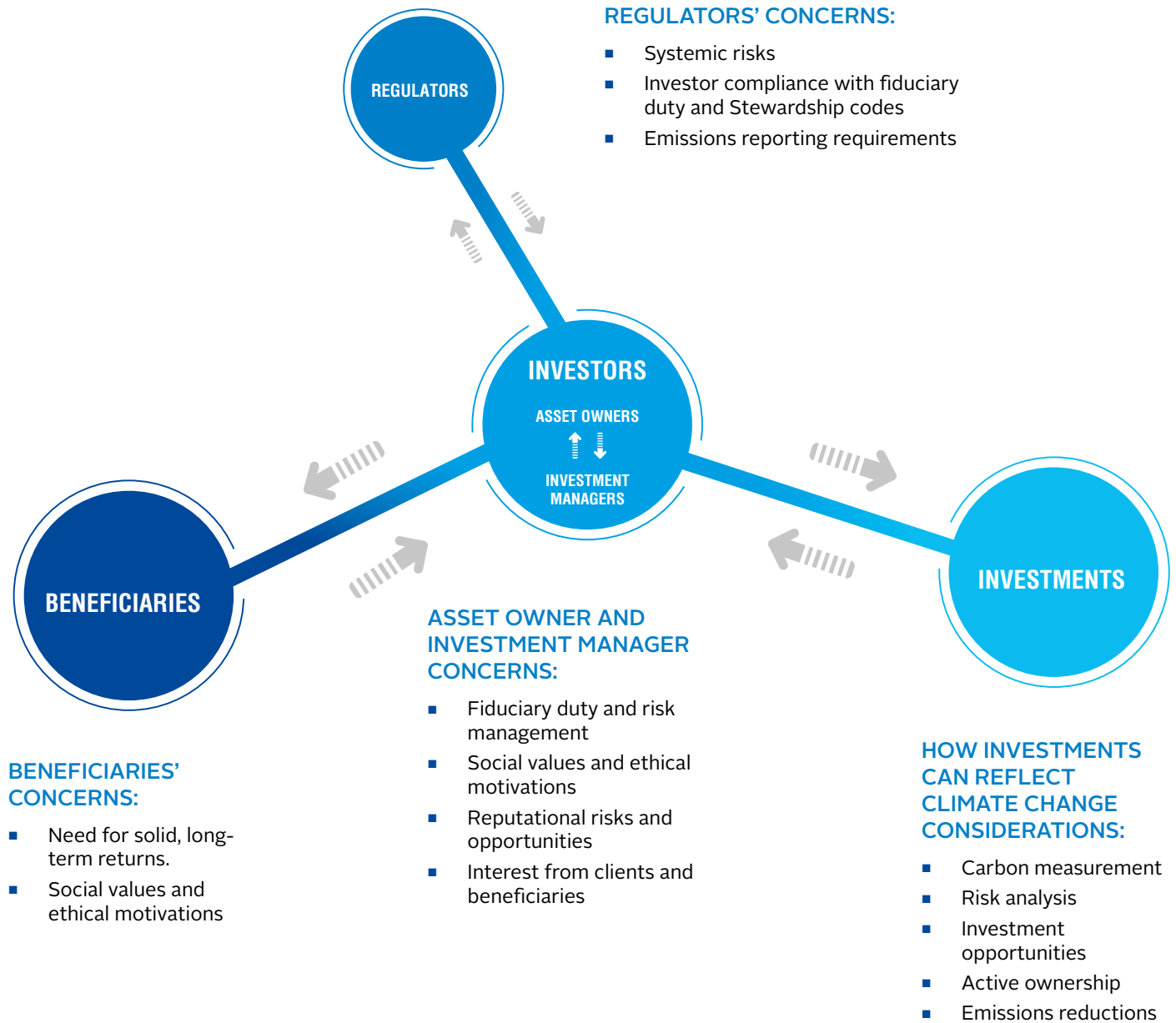
¹³ <http://ucnet.universityofcalifornia.edu/news/2015/02/cio-10-beliefs.html>

¹⁴ <http://www2.cdsb.net/fiduciarystatement/statement>

¹⁵ Governance Directions, Barker, February 2015

¹⁶ Also called [Freshfields – 10 Years On](#)

CLIMATE CHANGE AND THE INVESTMENT CHAIN



KEY FACTORS FOR ESTABLISHING AN EMISSIONS REDUCTION GOAL

Asset owners are diverse and drivers for action will vary, ranging from financial value to social values, with actions and outcomes flowing from these. Each asset owner will need to develop a goal appropriate to their particular organisation, starting by considering:

ORGANISATION PROFILE:

- Headquarters and operational countries, portfolio size, breakdown of AUM by asset class and market, investment strategy and relevant regulation
- Responsible investment beliefs, policy, goals and objectives

EXPOSURE TO:

- Carbon on a per member basis, as indicated by quantitative measurement (i.e. a portfolio carbon footprint) and qualitative review by portfolio managers
- Direction of public policy on climate change that may impact on the portfolio (either globally, domestically or in particular key markets)
- Technological and physical impact of climate change on the portfolio

OPPORTUNITIES TO REDUCE EMISSIONS AND CARBON INTENSITY:

- Investor engagement, public policy engagement, investment strategy
- Discussion with portfolio managers and investment consultants

Companies are developing emissions reduction techniques and in time these may hold learnings for investors, as well as prove important to include in investor engagement with companies. These techniques include: Science-based targets; The Three Percent Solution (WWF, McKinsey and CDP); We Mean Business; and the EC on Energy Efficiency Finance Opportunities. See Appendix D resources for details.

“As investment fiduciaries it is our responsibility to meet our stakeholder’s long-term financial objectives and understand a broad range of risks that affect the long-term returns of the investment portfolio. Climate change is both a risk and an opportunity that cannot be ignored, and understanding the impact to our portfolios, the companies we invest in, and the economy as a whole is our responsibility as investors”

Jagdeep Bachher, Chief Investment Officer,
University of California

“Most trustees are tasked with balancing risk and return across generations in an impartial manner that reflects evolving standards of care. Those who proactively integrate consideration of the material, long-term effects of environmental, social and governance factors into their investment and risk management process will be in the best position to demonstrate future compliance with fiduciary obligations”

Keith Johnson, The Cambridge Handbook of Institutional Investment and Fiduciary Duty¹⁷

¹⁷ <http://www.ceres.org/resources/reports/21st-century-engagement-investor-strategies-for-incorporating-esg-considerations-into-corporate-interactions/view>

PRIORITY AREAS FOR EMISSIONS REDUCTION

We run out of a carbon budget around **2040** (or sooner) if no substantial changes are implemented versus current levels of ongoing emissions. However, switching to a lower carbon economy could result in lower average carbon emissions over periods of time allowing for a gradual transition to occur successfully, keeping us within this budget by 2050:

Figure 6 – Decadal Carbon Emissions Reduction Scenario (Source: IPCC)

Years	Gt/Yr
2011-2015	185 Gt
2016-2020	150 Gt(30/yr as opposed to what is now 30 Gt/yr)
2021-2030	250 Gt (25/yr)
2031-2040	200 Gt (20/yr)
2041-2050	100 Gt (10/yr)
Total	885 Gt

Goals in line with the average decadal global emissions reduction percentages required would be one path forward for investors. Production and use will both need to be addressed for annual emissions reduction to be achieved. Action by category of emissions might include:

- Electricity generation – changing the energy mix
- Energy use in the ongoing functioning and maintenance of buildings – maximizing energy efficiency

- Modes of transportation – building infrastructure for electric vehicles along with efficiency policies such as miles per gallon
- Industrial processes – industrial symbiosis, sharing economy, closed loop/circular economies
- Agriculture and land use – better deforestation standards and growing practices including methane capture.

In *4 Steps to keep us within 2 Degrees*, the IEA suggested:

- Transitioning away from coal use
- Removing energy subsidies
- Maximising energy efficiency
- Capturing methane in natural gas extraction (and perhaps other processes)

Embedded in here are new policies that would be required and which investors need to be advocating for as well as financial opportunities in energy efficiency and methane capture. Examples can be seen in the Value Driver Model work on the UN Global Compact website¹⁸ and in related PRI publications¹⁹.

TIMEFRAMES AND REPORTING

Thought needs to be given to an appropriate timeframe for setting goals, taking into account the IPCC/IEA/Carbon Tracker Initiative consensus on a global carbon budget of about 900-1100 Gt expiring around 2040. Asset owners will need to agree targets and timeframes with portfolio managers.

Corporate examples could be useful guides. The Unilever Sustainable Living Plan, for example, was launched in 2010 and set out a “blueprint for sustainable growth” by 2020 focusing on three main goals (health and well-being, reducing environmental impact and enhanced livelihoods) underpinned by nine commitments. Unilever reports on its website whether the target is achieved, on-plan, off-plan and the percentage of the target achieved, providing strong transparency to customers.

¹⁸ https://www.unglobalcompact.org/Issues/financial_markets/value_driver_model.html

¹⁹ <http://www.unpri.org/publications/>

ASSET CLASSES

LISTED EQUITY

Responsible investment practices including active ownership and ESG incorporation are typically most advanced in listed equity. For actively managed mandates, investment analysis may help identify opportunities in companies well-positioned for climate change and those offering low-carbon or adaptation solutions. For actively managed and passive mandates, active ownership on climate change is likely to be an important approach, including voting on climate change-related shareholder resolutions and dialogue with companies and public policy makers on climate change. As highlighted below, portfolio carbon footprint measurement is most advanced in equities.

FIXED INCOME

Integrating climate change into issuer analysis is possible and underway to some degree in government issuers, emerging market debt investors, corporate (non-financial) issuers and in covered bonds. Some large fixed income owners find they have increasing influence to engage directly with the issuing company to address future potential credit risk. Climate bonds are designed to lower the footprint of sectors such as energy generation and transportation. More climate bonds being developed and issued could increase appetite for the asset class. Measuring the carbon footprint of new issues is an important short-term focus. For examples of climate change integration, engagement and green bonds, see PRI's Fixed Income Investor Guide²⁰.

PRIVATE EQUITY

Little-to-no useful data is available on either privately-owned or state-owned companies, although work is underway by at least one provider and asset owner to measure the carbon footprint of a private equity portfolio. CalPERS has called for equity to be considered as a single asset class, regardless of whether privately or publicly held, which would boost investors' ability to ask for data so that assessments can be made.

INFRASTRUCTURE

Bespoke analysis on infrastructure is essential. It is an important area of future focus, with calls for replacing trillions of dollars of energy and transportation infrastructure in the years to come including grid, storage, airports/aviation and much more that will have a direct bearing on the carbon footprint of global society. Solutions must also be found to properly fund energy innovation.

PROPERTY

Standards such as LEED and BREEAM are somewhat useful, as is the move to benchmark buildings in cities. In general, cities are expected to lead on reducing their carbon emissions with many planning to both mitigate and adapt through direct investment, including forms of energy efficiency financing that can create jobs. There is a clear opportunity for carbon reporting of portfolios to be performed over time, with targets that can be measured and reported.

COMMODITIES

There is no method to measure a carbon footprint for the vast majority of commodities, whether ecosystem-related or resource-related. A spectrum of Sustainability Standards are being developed at the sourcing level, varying in strength and credibility. Palm Oil standards (e.g. RSPO) are a work in progress to mitigate deforestation. Work has been done on sustainable fisheries and sustainable gold, amongst other resources, but these are typically traded by certificate without the ability to discern which are actually sustainable and not. Conservation of critical areas remains an important concern, including wetlands, forests, oceans, fisheries and, from a carbon reduction perspective, preserving, enhancing and restoring carbon sinks. Conservation finance does not provide enough cases to make techniques financially viable for investors at sufficient scale to address the underlying issues.

²⁰ www.unpri.org/wp-content/uploads/PRI-fixed-income-investor-guide-2014.pdf

INVESTMENT APPROACHES

ACTIVE OWNERSHIP

Investor engagement with companies on climate change has been underway for some time. As one recent example, Norges Bank Investment Management has published Climate Change Strategy Expectations to Companies²¹ which aims to serve as a basis for constructive dialogue between investors and companies. Positive developments for company-investor dialogue include The Aiming for A Coalition's shareholder resolution, Strategic Resilience for 2035 and Beyond, which received support from company management and over 98% of shareholders at the 2015 Annual General Meetings of BP, Royal Dutch Shell and Statoil.

The Carbon Asset Risk Initiative involves engagement with fossil fuel companies to use shareholder capital prudently. Meanwhile, a recent shareholder resolution filed by As You Sow and Arjuna Capital's called on Chevron to return dividends in light of spending on high-cost, high-carbon projects; the resolution received support from 4% of shareholders. There are also calls for forceful Stewardship, whereby investors would press companies to present 2 degree compliant business plans and vote for resolutions to change business models.

INVESTOR COLLABORATION

Institutional investment makes up over 65% of equity ownership in publicly-traded companies – up from 35% over the past few generations. If institutional investment – whether invested actively or passively, directly or through outsourced relationships – were to act collectively and collaboratively on carbon emissions, this may present the largest available opportunity to address the climate challenge at hand. Through Carbon Action, investors have engaged collectively with companies on disclosing an emissions reduction target and the PRI has launched a collaborative engagement programme on corporate climate lobbying. This engagement is aimed at encourage responsible company practices on climate change-related policy activity, focusing on Australia, Canada, Europe and the USA.

PASSIVE INVESTING

There is a move in the market towards lower fee investing, especially passively managed public equity. Passive investment does not mean passive ownership. As large investors with substantial voting rights, passive investors are well-placed to influence companies. As they invest across the whole market, passive investors have an interest in raising standards beyond the individual company level and through engagement with regulators. Passive investment can be done through separate accounts and other low-cost index strategies to ensure that asset owners are able to tilt their portfolios towards lower carbon assets when clients request this within the mandate. Further work is needed with some asset managers on how to provide this basic service within pooled, passive mandates.

PORTFOLIO MANAGERS AND EXTERNAL MANAGERS

Dialogue and engagement with portfolio managers is essential. This may include asking for portfolio carbon footprints as well as integrated analysis and active ownership on climate change. Portfolio managers must demonstrate the necessary knowledge of and capacity to address climate change factors in order to meet goals for portfolio measurement, asset allocation and engagement strategy.

Many asset owners work with third-party providers such as external fund managers, hedge funds and consultants. The Global Investor Coalition on Climate Change's recent Climate Change Investment Solutions guide includes guidance on how asset owners can engage with fund managers, including on:

- Measuring emissions and carbon intensity
- Integrating within investment decision-making
- Voting and engagement
- Setting targets to reduce portfolio carbon intensity and exposure to fossil fuel reserves
- Including climate change in mandate design

²¹ <http://www.nbim.no/globalassets/documents/climate-change-strategy-document.pdf?id=5931>

²² <http://www.ceres.org/files/investor-files/car-factsheet>

²³ <http://www.asyousow.org/companies/chevron/>

²⁴ <https://preventablesurprises.com/programmes/climate-change/>

²⁵ <https://www.cdp.net/CDPResults/Carbon-action-report-2014.pdf>

²⁶ http://www.iigcc.org/files/publication-files/Climate-Change-Investment-Solutions-Guide_IIGCC_2015.pdf

FOSSIL FUELS AND DIVESTMENT

For some asset owners divestment is a way to align investment beliefs with invested dollar. A classic example would be the outright sale of a sector, such as selling of tobacco companies due to health concerns and liability considerations. Another practice would be selling a targeted company after years of engagement failing to achieve a result.

Norges Bank Investment Management has a specific process for, and history of, selling companies they have failed to make engagement progress on.

For other asset owners, divestment will conflict with investment beliefs linked to active ownership and ESG integration. Furthermore, the global use of fossil fuels may be seen as being so embedded in commerce, household consumption and society that it would be unclear where to stop divesting to remove fossil fuel from one's portfolio.

Asset owners considering their approach towards fossil fuels are encouraged to consider carbon mitigation measures recommended by the IPCC and in The Low Carbon Investment Registry²⁷. The range of approaches for reducing or removing exposure to fossil fuel reserves include: placing a percentage cap on exposure to fossil fuel extraction, or excluding fossil fuel industry groups; using a low carbon indices to measure and manage portfolios against a benchmark that integrates climate change into its weighting methodology; and for passively managed funds applying a tilt away from higher carbon assets to lower carbon ones.

Investor approaches include:

- In Fossil-fuel investments in the Norwegian Government Pension Fund Global: addressing climate issues through exclusion and active ownership, the expert group of authors recommended active ownership and integration into investment analysis, which led to the fund divesting from 40 coal companies.
- Investors with guidelines on coal include KLP, KPA, Storebrand, Nordea Investment Management, Wespath, Local Government Super and HESTA.
- The Church of England has committed to divesting from thermal coal and oil sands, while the Church of Sweden has divested from all fossil fuels. Several universities have committed to divestment, with Stanford University divesting from coal.

- AXA has committed to divesting internally managed assets from companies most exposed to coal-related activities to de-risk investment portfolios and align with AXA's corporate responsibility strategy, while tripling green investments to €3 billion by 2020.

HOW MEASURING A PORTFOLIO CARBON FOOTPRINT CAN ASSIST IN CLIMATE RISK MITIGATION AND REDUCING EMISSIONS

WHAT IS A PORTFOLIO CARBON FOOTPRINT

A portfolio's carbon footprint is the sum of a proportional amount of each portfolio company's emissions (proportional to the amount of stock held in the portfolio). A carbon footprint is a useful quantitative tool that can inform the creation and implementation of a broader climate change strategy.

WHY UNDERTAKE A PORTFOLIO CARBON FOOTPRINT

Measuring the carbon footprint of a portfolio means you can compare it to global benchmarks, identify priority areas and actions for reducing emissions and track progress in making those reductions. There are caveats that carbon footprinting is not yet available for unlisted assets, does not include scope 3 emissions and different estimation methodologies exist. Nevertheless, investors who have already measured the carbon footprint of portfolios say that doing so can improve their own understanding of the portfolio risks and opportunities that climate change presents, gives them answers to stakeholder questions on climate change and allows them to demonstrate publicly their commitment to tackling climate change.

WHERE EMISSIONS COME FROM - THE SYSTEM OF GLOBAL COMMERCE

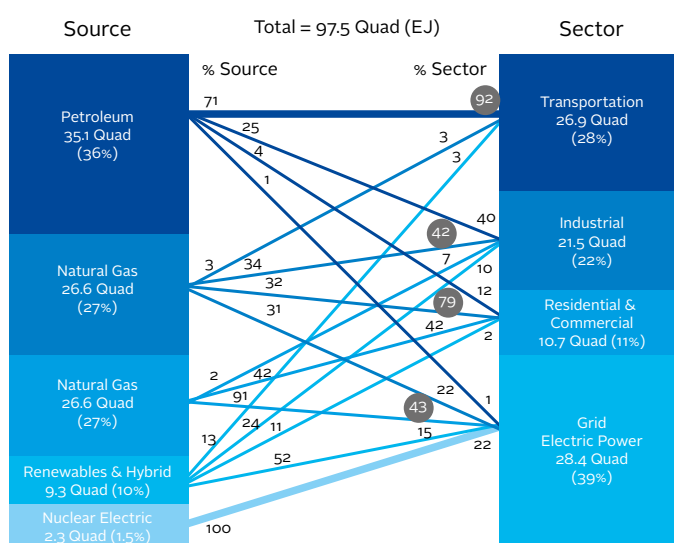
Essentially important to understand for any investor considering portfolio carbon footprinting is where emissions specifically come from. Carbon dioxide is an ongoing outcome from a variety of primarily human activities, but especially from:

- Electricity generation
- Energy use in the ongoing functioning and maintenance of buildings
- Modes of transportation
- Industrial processes, as well as,
- Agricultural process/land use/deforestation.

²⁷ <http://globalinvestorcoalition.org/low-carbon-investment-registry/>

As a result of ongoing use patterns, greenhouse gas emissions are embedded throughout the functioning of the entire system of global business and society. Ongoing use of energy patterns can be mapped exactly to ongoing production globally and by region. An example of this systemic perspective can be seen in the US as per its energy consumption:

(Figure 3 – The US System of Energy Production and Use
- Source: US EIA)



Globally, percentages of energy use and production vary by region, with coal use being the largest proportion in the Asia/Pacific region, while oil and gas are the largest by percentage everywhere else. “Leapfrogging” the developing world on renewable energy then becomes a critical factor for achieving a successful global low carbon transition. Energy use is the majority source of global carbon emissions with agriculture and land use the next most significant cause²⁸. Understanding the presently locked in patterns of global production and use are an essential step towards seeing how carbon footprinting can inform investment strategy, as both production and use of energy are arguably of equal relevance to this.

MEASURING A PORTFOLIO CARBON FOOTPRINT

The most thorough example of measuring the carbon footprint of a portfolio would be measuring the greenhouse gas emissions onsite at particular facilities, getting them verified by reliable external parties and then rolling them up into a single corporate number of absolute production emissions. This could extend across all operations, and to a company’s suppliers and further down the supply chain, all the way to the raw materials procured for use in production processes. Such ongoing production and process emissions can be monitored by software, allowing for a dynamic picture of carbon emissions to be developed

Equity: Off-the-shelf and customised services exist for measuring an equity portfolio’s carbon footprint. It may consider not only carbon but also natural capital, fossil fuel reserves and exposure to stranded assets. A carbon footprint is typically constructed by the following steps:

- Obtain carbon emissions data on companies or projects owned in a portfolio, either from verified disclosure or from estimated/interpreted sources
- Choose an appropriate benchmark
- Calculate the total emissions of the owned percentages of each company and add them together resulting in a total owned carbon emissions figure per portfolio
- Normalize the results, typically using factors such as annual revenue or market capitalization
- Perform the same calculation on the chosen benchmark, assuming the same dollar amounts are owned of that alternative set of companies. The percentage difference can be expressed as a result.
- Further refinements and analysis can be considered within and across sectors and regions.

Fixed income: Providers exist for measuring carbon footprints of fixed income portfolios, though how best to do this is still under development and discussion. The aim is to allocate greenhouse gas emissions according to accounting rules, following the GHG Protocol, and including an ownership principle. If an investor holds both the stock and a bond of a company, emissions can be split to avoid double-counting. For government bonds, it is possible to compare climate-protecting policies and how they are enforced.

²⁸ BP Statistical Review

²⁹ TEEB for Business Top 100 Externalities of Business 2013

Other asset classes: Measurement techniques are under development in private equity. They are not available easily for unlisted assets, but can be conducted on a best-efforts basis.

DATA CHALLENGES

Carbon footprint measurements can be cradle-to-gate or cradle-to-cradle:

- **Cradle-to-gate** means understanding a company's footprint up to the point it sells a product to a consumer, after which any related emissions become part of their footprint. For example, if Toyota sells a car, the footprint for using the car becomes the purchaser, not the company's.
- **Cradle-to-cradle** would consider the whole lifecycle of a product, from sourcing of raw materials, through the use phase, and the eventual disposal.

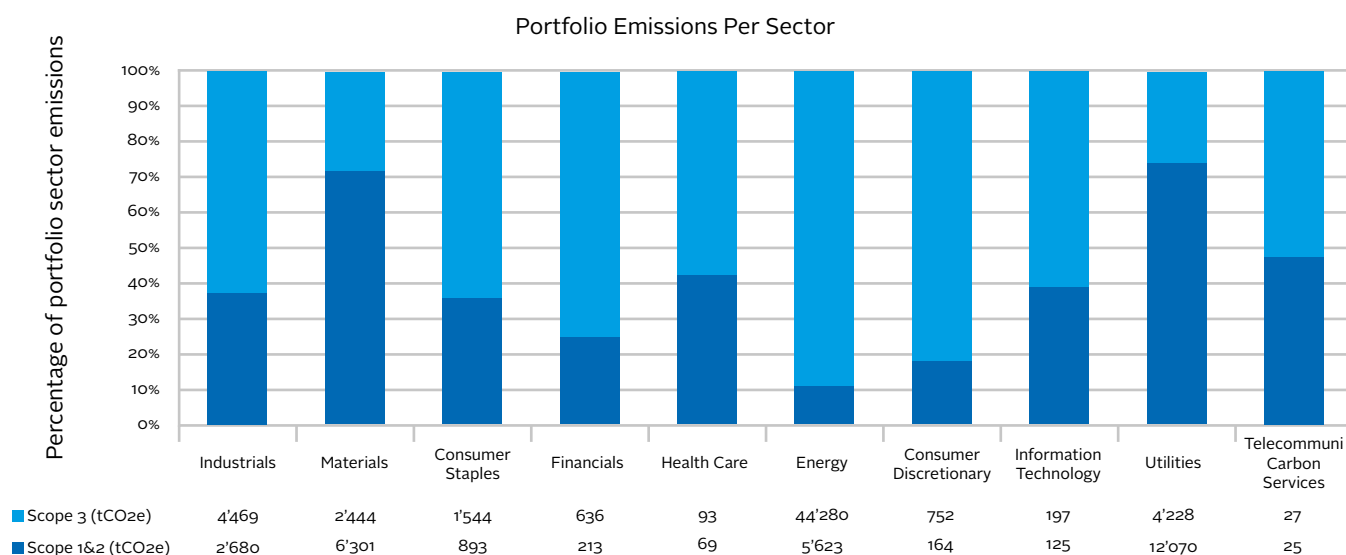
Much of the emissions impact of a product is therefore not captured by cradle-to-gate analysis of the company that produces them. ACCA reported in 2011 that ignoring a company's indirect emissions, those that fall under Scope 3 of the GHG Protocol (see appendix), can result in 75% of the carbon emissions being missed by analysis³⁰.

For example, Ford has completely analysed its business and found that 90% of its footprint comes from the use of its cars and trucks. Therefore the design of its future products, along with the development of new technologies and infrastructure for electric cars and trucks using lower carbon energy, would be a clear relative priority over making improvements to Scope 1 and 2 emissions.

Companies continue to report their greenhouse gas emissions to varying degrees of quality and detail, with some reports being verified by external parties and others not. Companies often do not understand the full nature of their supply chain relationships, even if they did want to report on their Scope 3 emissions (for example, first tier suppliers are understood, but raw material providers may not be, nor all sources of transportation within multiple levels of a supply chain).

South Pole Carbon calculates the emissions by sector (see Figure 4) to be vastly different if considering Scope 3 and not:

(Figure 4: Source: South Pole Carbon)



³⁰ http://www.accaglobal.com/content/dam/acca/global/PDF-technical/climate-change/not_counting.pdf

OVERCOMING DATA CHALLENGES

Scope 3 analysis tends to be from estimates such as industry averages, in the absence of measured and verified data. For a comprehensive account of the emissions of any company, it is necessary to combine voluntarily-reported, partially-verified data with estimations across some or all of Scopes 1, 2 and 3, using a variety of modelling techniques. Such approaches include Economic Input-Output Life Cycle Assessment (EIO-LCA) models³¹. Many data providers already integrate some scope 3 using reported data or estimates. The Greenhouse Gas Protocol will produce accounting and disclosure guidance for asset owners by December 2016. (See Appendix A for more on Greenhouse Gas Emissions, calculations, potential complexities and scope 3. For a list of providers see <http://montrealpledge.org/resources/>)

WHO IS ALREADY MEASURING THEIR PORTFOLIO CARBON FOOTPRINT?

Measuring portfolio carbon footprints is now roughly ten years old, dating back to Henderson's June 2005 How Green is my Portfolio? and The Carbon 100 report³². In the case of this first Henderson footprint, the Henderson Global Care Income Portfolio was found to be 32% lower carbon than its chosen FTSE All-Share benchmark at the time. Investors measuring their carbon footprint today include Green Century, Calvert, Pax World and signatories to the Montreal Carbon Pledge. In May 2015, the French government voted to amend article 48 of The Energy Transition Law and to require institutional investors (insurance companies, public institutions and public pension funds) to report on risks arising from climate change and GHG emissions associated with assets owned³³.

PRI Montréal PLEDGE

Launched at the annual PRI in Person conference in 2014, the Montréal Carbon Pledge commits signatories to measuring and disclosing a portfolio carbon footprint.

Over 50 investors have endorsed the pledge from Africa, Australia, Canada, Europe and Japan.

These include Etablissement du Régime Additionnel de la Fonction Publique (ERAFP), PGM Investments, CalPERS, Batirente, The Joseph Rowntree Charitable Foundation and The Environment Agency Pension Fund.

For guidance on how to get started on carbon footprinting visit

<http://montrealpledge.org/how-to/>

³¹ <http://www.eiolca.net/>

³² Performed with Trucost, see Appendix for detail

³³ <http://www.assemblee-nationale.fr/14/ta-pdf/2736-p.pdf>

USING A PORTFOLIO CARBON FOOTPRINT

A portfolio carbon footprint improves understanding of emissions in the portfolio for equities and fixed income, and can be used as a tool for engaging with fund managers and companies on climate change risks, opportunities and reporting. It can also be used as a tool to inform further action, including emissions reduction. However, it needs to be complemented by discussion with portfolio managers and companies, particularly where data is less reliable.

Asset owners using portfolio carbon footprinting to inform actions include:

- Dutch healthcare pension fund PFZW, has committed to increasing sustainable investments four-fold, to at least €16 billion, while reducing the carbon footprint of its entire portfolio by 50% by 2020. Sustainable investments will include direct investments in green energy, clean technology, sustainable climate-related solutions, food security and against water scarcity. The footprint will be halved by comparing companies in each sector and picking the best performers, using data from four service providers.
- ASN Bank has worked with Ecofys to develop a Carbon P&L methodology. This Carbon P&L concept attempts to proportion out lower carbon investments (the P of their P&L) versus traditional emissions intensive investments (the L side of the ledger) with a goal of balancing this ledger by 2030. ASN are also driving a coalition to make similar commitments.
- The Environment Agency Pension Fund and Local Government Super use carbon footprints to inform priority engagement with companies, including on emissions disclosure and performance.
- The Environment Agency Pension Fund works with its corporate bond managers and Trucost to monitor the total environmental footprint of its corporate bond fund. Analysis identifies bonds linked to high-impact activities, and, where practical, these are replaced in the portfolio where another bond can meet the same portfolio needs but with less impact.³⁴
- See the Appendix for case studies.

“While this data is not sufficient to fully understand the carbon risks in our portfolio, we find having some quantitative data valuable, rather than relying entirely on qualitative assessments”

Bill Hartnett, Head of Sustainability, Local Government Super

“As we ask more from the companies we invest in, we must hold ourselves accountable for measuring and managing the carbon risk in our portfolio”

Jagdeep Bachher, Chief Investment Officer, University of California

³⁴ <http://www.unpri.org/viewer/?file=wp-content/uploads/PRI-fixed-income-investor-guide-2014.pdf>

CONCLUSION AND NEXT STEPS

This paper finds that there is a strong case for asset owners to play an effective role in reducing emissions, alongside government and business, consistent with fiduciary duty. Asset owners are encouraged to:

- Take steps to understand their carbon risk exposure by measuring their portfolio carbon footprint, and analysing and reviewing it with portfolio managers
- Take action to mitigate this by setting a goal to reduce emissions, appropriate for their individual organisations.

The next stage of this project will assist asset owners in setting a goal that is challenging and attainable. This will be through a pilot framework, developed by the project participants, taking into account the key factors for establishing a goal outlined in this paper and the experience of asset owners participating in this project.

The PRI encourages input from all asset owners, particularly on the following questions:

- What would be a meaningful goal on emissions reduction?
- What hurdles would you need to overcome to implement such a goal?
- What experience and case studies do you have that could assist the PRI?

To share your input please email
sagarika.chatterjee@unpri.org

APPENDIX A: CLIMATE SCIENCE

The IPCC, representing a consensus of global climate science, in its 5th synthesis report released in November 2014 said: “If left unchecked, climate change will increase the likelihood of severe, pervasive and irreversible impacts for people and ecosystems. However, options are available to adapt to climate change and implementing stringent mitigations activities can ensure that the impacts of climate change remain within a manageable range, creating a brighter and more sustainable future. We have the means to limit climate change.” In the UNFCCC’s recent document entitled “The Science³⁵” the global effects anticipated by scientists from unchecked climate change include, on a worldwide level:

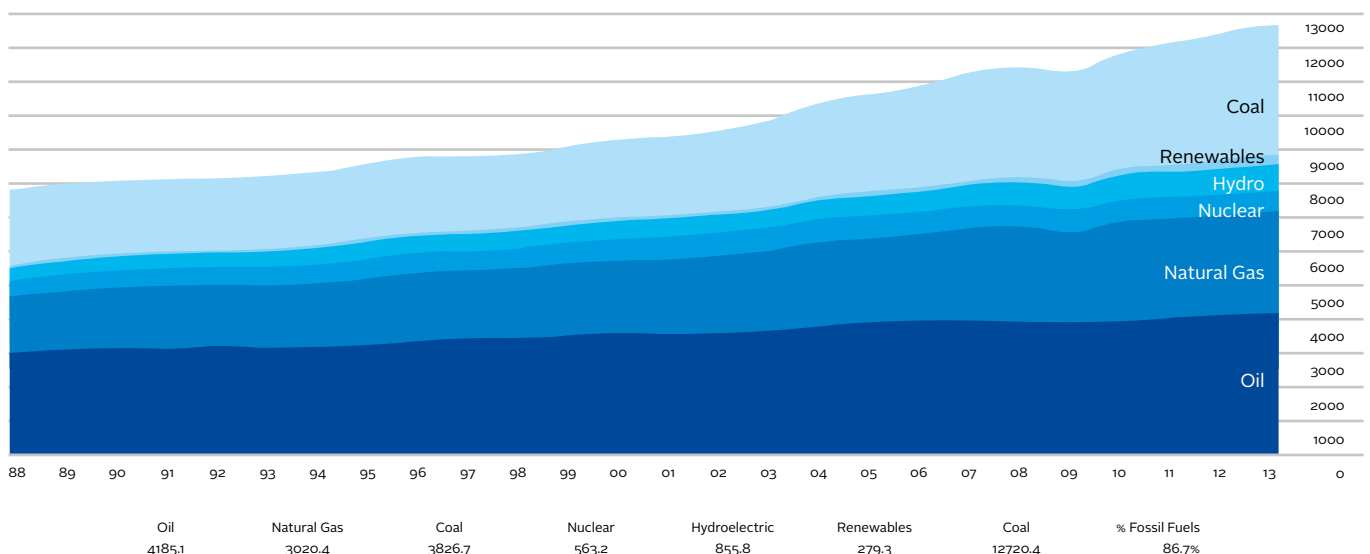
- **Agricultural yields which are expected to drop in most tropical and sub-tropical regions** (and in temperate regions, too) if the temperature increase is more than a few degrees. They will be affected, for example, by changing river flows (from ice pack behavior) and rainfall patterns, to the changing behavior of pests, of friendly species required for pollination and pest-control, of the effectiveness of herbicides.
- **Diseases, especially those carried by vectors like mosquitoes, which could spread to new areas in the world.** Imagine what happens when a disease is introduced to a population with no previous contact and therefore little to no immunity to it. Many mosquito species, such as those which carry malaria and dengue, survive and breed more efficiently in hotter temperatures. Then there is increased risk of heatstroke and food-related illnesses.

- **Millions of people whom are expected to be exposed to increasing water stress** as ice packs that feed melt-water into rivers that keep millions of people alive, shrink progressively over the decades; or pump extra water into the rivers in the summer, causing damaging, unprecedented flooding.
- **More intense weather-related disasters** combined with rising sea levels and other climate-related stresses to make the lives of those living on coastlines, particularly the world’s poor. Computer models predicting more “extreme weather events” have in the last decade proven to be on target.
- **Extinctions** are also expected from the current warming trends. Large numbers of plant and animal species, already weakened by pollution and loss of habitat, probably will not survive the next 100 years.

Yet global carbon emissions, caused mainly by global energy consumption, embedded throughout commerce, remain on the rise (per Figure 1 below). Unchecked, these trends will continue to increase, as is estimated to occur both in the developed and developing world.

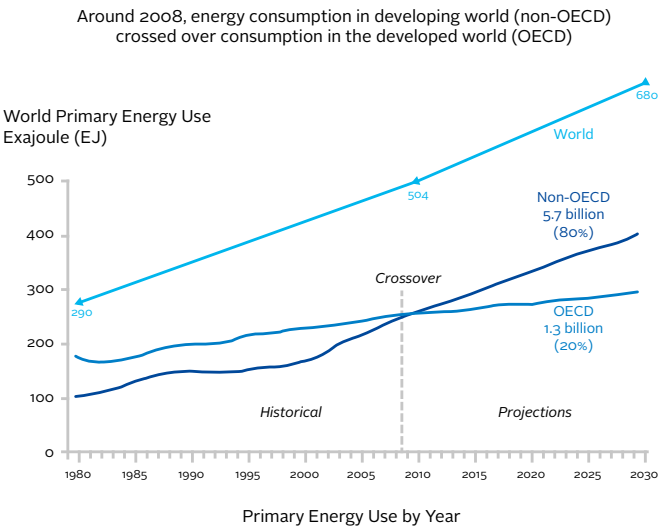
(Figure 1: Primary energy world consumption 2013. Source - BP Energy Outlook 2014)

Million tonnes oil equivalent



35 https://unfccc.int/essential_background/the_science/items/6064txt.php

(Figure 2: Source - Energy for all: financing access for the poor by International Energy Agency)



Slowing or reversing these trends in the developing world represents a particularly important challenge as countries such as India understandably seek to solve for energy poverty, mainly through increased use of coal which also exacerbates air pollution with related damaging health effects on the ground. With the developing world having crossed over in 2008 to become a larger consumer of primary energy use (per Figure 2 above) than the OECD, and this trend not expected to reverse any time soon, the opportunity to leapfrog developing countries on energy technology is of great importance (and perhaps therefore financially as well) to consider.

The IEA WEO 2014 scenarios: These include the IEA's baseline scenario, the New Policies Scenario, and the 450 Scenario, which considers an energy pathway consistent with a 2° C goal and limiting concentration of greenhouse gases in the atmosphere to around 450 parts per million of CO2:

(Source: IEA WEO 2014 scenarios³⁶)

Years	New Policies Scenario	450 Scenario
Outcome	3.6° outcome and inadequate policy response	2° C outcome and strong policy response
Investment Implications	Likely to require adaptation investment	Requires mitigation investment and adaptation investment
Energy mix by 2040	World primary energy demand will change modestly with oil 26%, coal 24%, gas 24%, nuclear 7% and renewables 19%.	Global energy mix will change significantly, with oil 21%, coal 17%, gas 22%, nuclear 11% and renewable 30%. Includes controversial assumption of large-scale CCS technology on coal and gas-fired power stations.

“Climate change may exacerbate water scarcity and lead to sharp increases in food costs. The pressures caused by climate change will influence resource competition while placing additional burdens on economies, societies, and governance institutions around the world.”

The US Military's Quadrennial Defense Review in 2014³⁷

³⁶ http://www.worldenergyoutlook.org/media/weowebsite/2014/141112_WEO_FactSheets.pdf
³⁷ http://www.defense.gov/pubs/2014_Quadrennial_Defense_Review.pdf

APPENDIX B – CARBON FOOTPRINTING METHODOLOGY

Explanation of Greenhouse gas emissions: While there are numerous greenhouse gases to potentially consider, Carbon Dioxide (CO₂), Methane and Nitrous Oxide (NO₂) represent 97% of greenhouse gas impacts in the US³⁸ emitted annually. The Kyoto Protocol³⁹ focuses on six gases and some look at other gases, but most focus remains on CO₂ and Methane. Methane is known to be a more intensive greenhouse gas than CO₂, and so greenhouse gas emissions are typically calculated in “CO₂ equivalent” terms (CO₂e) across all greenhouse gases.

CO₂ itself in the atmosphere is now measured at roughly 400 parts per million and these as well as the other GHG emissions in the atmosphere are annually increasing. Through a phenomenon known as “radiative forcing,” heat is increasingly trapped in the atmosphere by these accumulating gases. Much of the additionally generated heat to date has been absorbed by the oceans which are also increasingly acidifying from absorbing these perpetually emitted carbon emissions, acting as form of a ‘carbon sink’⁴⁰. The US EPA explains⁴¹ this dynamic as follows: “Greenhouse gases act like a blanket around Earth, trapping energy in the atmosphere and causing it to warm. This phenomenon is called the greenhouse effect and is natural and necessary to support life on Earth. However, the buildup of greenhouse gases can change Earth’s climate and result in dangerous effects to human health and welfare and to ecosystems.”

MIT explains “The concept of radiative forcing is fairly straightforward. Energy is constantly flowing into the atmosphere in the form of sunlight that always shines on half of the Earth’s surface. Some of this sunlight (about 30 percent) is reflected back to space and the rest is absorbed by the planet.⁴²” If greenhouse gas emissions accumulate to a degree which causes average global temperatures to increase through this forcing by more than two degrees Celsius per year, dangerous outcomes are expected, and so finding a way of reducing carbon emissions from being trapped in the atmosphere is an increasingly important imperative to achieve.

Carbon emissions metrics and calculations: Metrics to measure carbon footprints of portfolios vary, from absolute quantity of emissions in carbon dioxide equivalent across each of Scope 1, 2 and 3 (by each Category) or by specific GHG. A frequently used metric would be Carbon Intensity, typically calculated in this sort of fashion:

Annual Total GHG Emissions * Social Cost of Carbon

Normalizing Factor (often annual revenue)

Normalization is useful when comparing companies within a sector to get a sense of “carbon efficiency,” although there are problems with normalization as well. Annual, ongoing absolute emissions are the main issue, of course. However, companies need to be compared and not punished for being larger, or rewarded for being smaller. Therefore, carbon intensity can give a sense for how efficient a company is surrounding their emissions relative to their size. Many companies place great emphasis on energy efficiency, resulting at times in billions of dollars of savings as well as lowered GHG emissions⁴³. The aggregate emissions of all sectors are represented by both large and small companies, and so it is potentially useful to see both the absolute and relative efficiency perspectives. Some asset owners engage with companies on their efficiency measures⁴⁴ and so would need to understand where such companies are and what they can specifically do to improve.

Normalizing factors can vary – for example, within the auto manufacturing sector, per automobile produced would be a reasonable factor to consider, but that doesn’t help create a cross sector perspective of carbon efficiency. EBITDA or other measures of profitability are interesting to consider to see for example what ongoing levels of profit come from what sometimes are referred to as “externalities” but that is a hypothetical exercise, and not all companies make a profit. Number of employees working at a company is an interesting measure for some sectors but not others such as REITs which have relatively few employees versus their size. Annual revenue is a typical default choice, allowing for some sense of relative scale. Enterprise value or market capitalization is another possible option, but revenue is most frequently seen.

³⁸ <http://www.epa.gov/climatechange/ghgemissions/gases.html>

³⁹ http://unfccc.int/kyoto_protocol/items/3145.php

⁴⁰ <http://science.time.com/2013/08/26/ocean-acidification-will-make-climate-change-worse/>

⁴¹ <http://www.epa.gov/climatechange/basics/>

⁴² <http://newsoffice.mit.edu/2010/explained-radforce-0309>

⁴³ https://www.unglobalcompact.org/Issues/financial_markets/value_driver_model.html

⁴⁴ http://www.calstrs.com/sites/main/files/file-attachments/calpers-calstrs_climate_change_fact_sheet.pdf

GHG emissions and scopes: The GHG Protocol has been accepted as a global standard and divides emissions into:

- Scope 1 (the operations portion of a company's products and services)
- Scope 2 (purchased electricity)
- Scope 3 (indirect emissions of a company, across 15 categories, including aspects from raw materials procured to external investments made by a company to the use and disposal of a company's products)
 1. Purchased Goods and Services
 2. Capital Goods
 3. Fuel and Energy Related Activities
 4. Upstream Transportation and Distribution
 5. Waste Generated in Operations
 6. Business Travel
 7. Employee Commuting
 8. Upstream Leased Assets
 9. Downstream Transportation and Distribution
 10. Processing of Sold Products
 11. Use of Sold Products
 12. End of Life Treatment of Sold Products
 13. Downstream Leased Assets
 14. Franchises
 15. Investments

Limits to carbon footprinting techniques: Modelling techniques can make an attempt to fill gaps using sectoral considerations across all 15 Categories of Scope 3. South Pole Carbon provides a degree of this perspective, but again what is included and not can skew results. For example, including investments or not in the footprint of a Financial Services company can make such organizations seem lighter on carbon or among the most carbon intensive. Some techniques only look at Scope 1 & 2 (MSCI's launched Low Carbon Index Series in 2014, for example), and some functions only look at reported data (Bloomberg – expansion plans underway). Levels of reporting also vary by region with little data available from companies headquartered in countries such as China, India, Russia and elsewhere in the developing world (where energy use is now larger than the developed world as in the figure above). How companies report greenhouse gas emissions also varies, with some companies reporting only carbon dioxide, some will report specific greenhouse gases including methane and the other Kyoto Protocol gases⁴⁵ either specific to each gas and others in carbon dioxide equivalents without such specifics.

Carbon dioxide equivalency has also been something of a moving target. For example, the Environmental Defense Fund estimates that methane is over 84 times more potent as a greenhouse gas than carbon dioxide in the short term⁴⁶. The EPA suggests methane is 21 times more potent over a 100 year period⁴⁷. The IPCC adjusted up its methane equivalency calculation in its AR5 reporting up by 40% from previous reports⁴⁸. (As a side note: Asset Owners interested in reporting on the positive environmental impacts of their investments should note that Methane mitigation as an industry has the potential to create jobs which can be tracked and reported.⁴⁹)

The complexity and variability in company greenhouse gas reporting requires data gathering and quality control efforts which are costly, time consuming and which need to be performed with expertise to successfully cover the publicly traded companies which do report. Data on privately held companies, small to medium sized enterprises and state owned enterprises tends not to be available, with State Owned Enterprises being a very large missing piece of the global picture. Regardless, static carbon footprinting of portfolios is possible, and across asset classes, where robust data is available.

Given the level of estimation necessary (for the foreseeable future) in compiling data on public and privately held companies across Scopes 1, 2 & 3, turning carbon footprinting techniques into dynamic reports remains a challenge for investors. For example, if an investor wishes to reduce its carbon emissions over time, through measuring and reporting their success, they need to be conscious of:

- The level of scopes (1, 2 and/or 3) being used in the target and measurement of your portfolio's carbon footprint
- If only Scopes 1 & 2 are used in calculations, is the majority of the portfolio's footprint being considered and what implications result from this
- Given a lack of reported Scope 3 data, if Scope 3 is included and thereby a majority of the carbon emissions data used in portfolio calculations are estimated, how can a reduction target be reported with confidence

⁴⁵ http://unfccc.int/kyoto_protocol/items/3145.php

⁴⁶ <http://www.edf.org/climate/methane>

⁴⁷ <http://epa.gov/climatechange/ghgemissions/gases/ch4.html>

⁴⁸ <http://carbontracker.org/wp-content/uploads/2014/08/Carbon-budget-checklist-FINAL-1.pdf>

⁴⁹ <http://www.edf.org/energy/us-methane-mitigation-industry>

Puma example: At the time, the most robust Scope 1, 2 & 3 analysis was arguably performed for Puma by PwC and Trucost, with results illustrated here:

(Figure 5: Puma's "Environmental P&L" Source: Puma)

	Water Use €million	GHGs €million	Land Use €million	Other Air Pollution €million	Waste €million	Total €million	% of Total
	33%	32%	26%	7%	2%	100%	
PUMA Operations	47	47	37	11	3	145	100%
Tier 1	•	●	•	•	•	8	6%
Tier 2	•	●	•	•	•	13	9%
Tier 3	•	●	•	•	•	14	10%
Tier 4	●	•	•	•	•	27	19%
Tier 5	●	●	●	•	•	83	57%

The Puma analysis is a useful sample illustration, showing how the largest environmental impacts (not just carbon emissions) can reside deep within a company's supply chain⁵⁰, in this case as regards the raw materials being procured to manufacture the company's products such as leather and cotton. However, data at this level of specificity is rare with very few companies having reported on this basis. Investors must press for significantly improved disclosure around scope 1, 2 and 3 emissions.

⁵⁰ http://www.unep.org/resourceefficiency/Portals/24147/scp/business/dialogue/2012/pdf/Case_Studies/Puma.pdf

APPENDIX C – CARBON FOOTPRINTING CASE STUDIES

The UK Environment Agency Pension Fund case study:

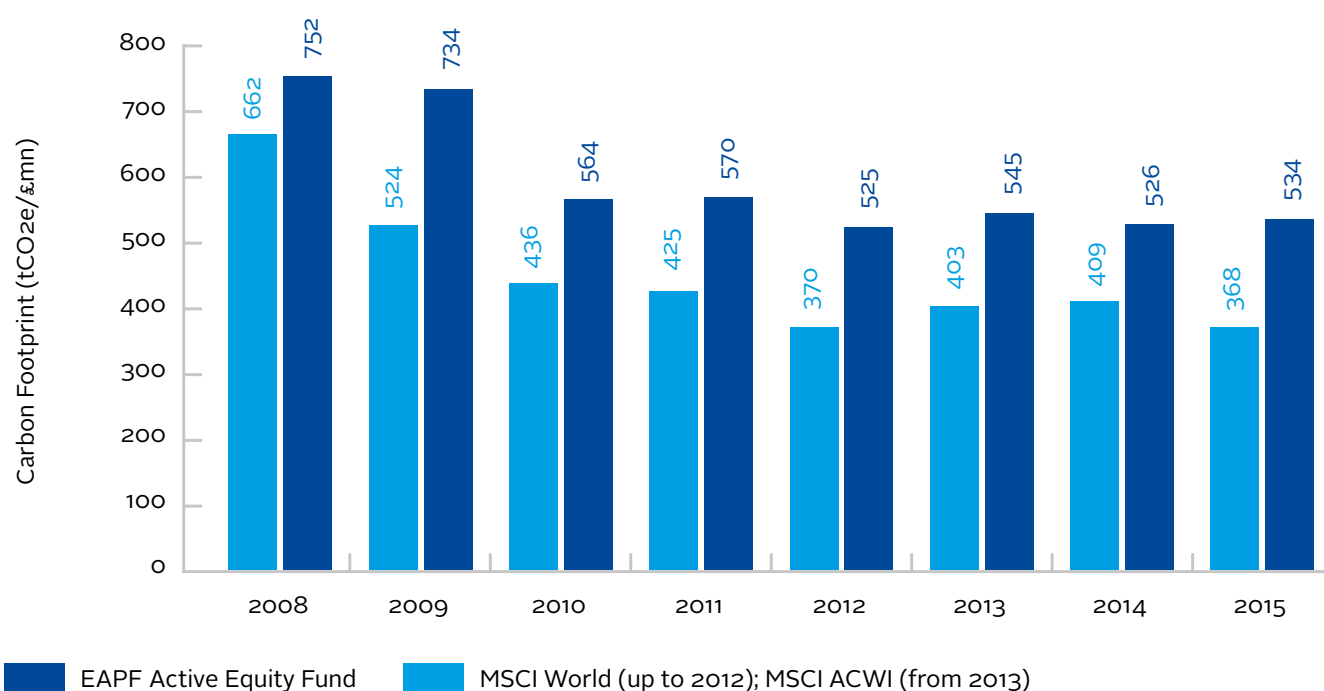
The Environment Agency Pension Fund (EAPF) is a defined benefit Local Government Pension Scheme with over 40,000 members and assets of £2.9 billion. It provides for the future pensions of its members working for Environment Agency, Natural Resources Wales and Shared Services Connected Limited.

We have reduced our carbon footprint by 44% on the combined active equities since we began carbon footprinting in 2008 (31% less than the benchmark for 2015). We have also reduced our active corporate bond carbon footprinting by 42%⁵¹ since starting to measure it in 2011 (48% than its index for 2015). Each of our active managers⁵² analyses the carbon footprint of their portfolio each year. This is used as part of our discussions with

managers, alongside all the other metrics, to assess the risks and opportunities in their portfolios and informs the engagement plans for the year. One manager was able to demonstrate 50% reduction in the reported carbon emissions from one of its most carbon intense holdings through engaging with the company to improve the reporting. Other managers have used the carbon footprints to inform the investment case for certain holdings.

We strongly encourage other institutional investors to use carbon footprinting to assist in identifying ways to reduce carbon risk for institutional investors. We publish more detail on our approach to managing climate risk on [our website](http://www.eapf.org.uk) which includes our strategy and work on stranded carbon assets at www.eapf.org.uk.

(Source: The Environment Agency Pension Fund)



⁵¹ £263m Corporate Bond Portfolio run by Royal London Asset management

⁵² Listed equities and corporate bonds

Local Government Super Australia case study:

We receive six-monthly ESG and Carbon Risk Audits from MSCI ESG Research on our Australian and international equity portfolios, individually and in aggregate. The carbon footprint measurements they provide are portfolio carbon emissions, scope 1 and 2 (million tCO₂e) and portfolio carbon intensity (tCO₂e by revenue). While this data is not sufficient to fully understand the carbon risks in our portfolio, we find having some quantitative data valuable, rather than relying entirely on qualitative assessments.

The audits and the carbon footprint measurement provide answers to some key questions:

- How are our portfolios' carbon footprints positioned relative to their benchmark? Could this be a reason for relative out/under performance?
- Are there any sectors that have particularly large carbon footprints? If so: What are the potential responses?
- Do any of our external managers have particularly high or low carbon footprints? If so: What are the reasons? Is this an opportunity to engage? Are the managers well-informed on carbon risks?
- Are our low carbon themed allocations actually low carbon?

The quantitative data also allows for some basic scenario analysis. We can start considering the impact a global carbon price will have on our portfolio, and from there develop future carbon cost-curve scenarios to model for increasing carbon legislation. The quantitative analysis that can be done will improve as carbon disclosure from companies increases, methodology for measuring carbon footprints becomes more settled (particularly around scope 3 boundaries and definition) and the regulatory response to carbon emissions becomes clearer. We use the carbon footprint measurements and audits as a means to communicate our efforts to address carbon and ESG risks. They are published on our website (see "Local Government Super Carbon and ESG Risk Portfolio Audits"). At 31 December 2014, our ASX and international portfolios had, relative to their benchmarks, 14%/30% lower carbon emissions respectively and 16%/18% lower carbon intensity. Source: www.lgsuper.com.au

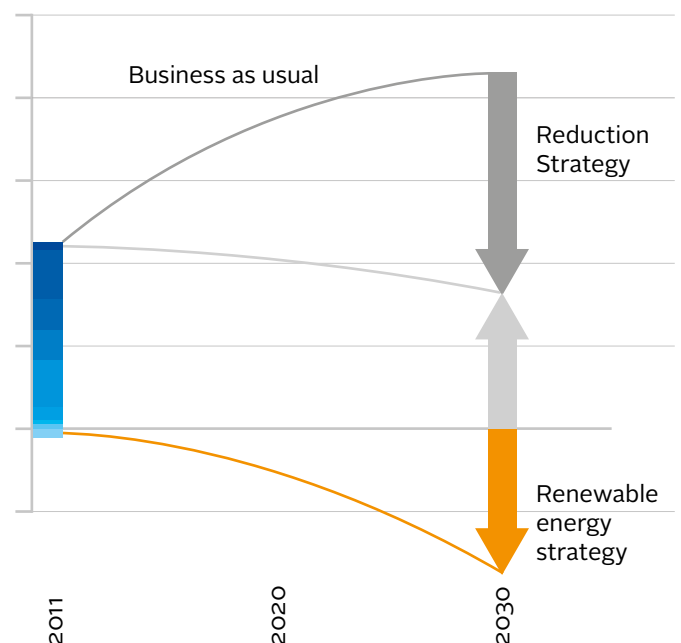
Ecofys and the ASN Bank Carbon Profit and Loss

Methodology case study: Regarding climate change ASN Bank wished to contribute to both mitigation and adaptation through its investments. ASN Bank's goal is to be net climate neutral in 2030, meaning that the cumulative positive and negative GHG impacts of all (financial) activities of the bank are zero.

To measure this, ASN Bank began in 2007 to create a GHG inventory methodology of its equity funds and afterwards of its renewable energy investments. In 2012, ASN Bank reported the footprint of its equity funds publicly. In 2013, ASN Bank commissioned Ecofys to develop a methodology and tool to footprint ASN Bank's total financial portfolio, to track ASN Bank's progress towards climate neutrality and to have a mechanism to collect and improve the data quality and to influence and reduce the impact.

The methodology has been finalised and the total financial portfolio (i.e. sovereign bonds, corporate and public loans, mortgages, projects (energy efficiency and renewable energy), funds (equity and projects)) has been included in ASN Bank's Annual Reports. ASN Bank has assessed their carbon footprint for the years 2011 - 2014 and is active in integrating the footprint methodology in their operational controlling system. Finally, ASN Bank is actively sharing its methodology with other financial institutions and asking them for feedback and collaboration to improve the methodology over time.

(Source: ASN Bank)



More carbon footprinting case studies:

- Henderson Global Investors “How Green is my Portfolio” (2005 - note: this report is believed to be first public facing example of a performed carbon footprint of a managed portfolio) <http://www.trucost.com/published-research/29/how-green-is-my-portfolio-a-carbon-audit-of-the-henderson-global-care-income-fund>
- Green Century Balanced Fund “A Green(er) Portfolio” (2013 – an update to the 2009 public facing carbon footprint of this mutual fund, believed to be the first such performed publicly in the US) <http://greencentury.com/wp-content/uploads/2013/04/carbon-footprint-2013.pdf>
- AP6 (analysed 80% of their holdings on carbon emissions and discussed related investment strategies in 2014, found holdings to be approximately 1/3 lower than benchmark): http://www.apfond6.se/Global/Engelsk%20Webbsida/Annual%20reports/AP6_AR_2014_ENG.pdf
- Portfolio 21 Environmental Impact Report <http://portfolio21.com/fund/impact/environmental-impact-report/>

APPENDIX D: CORPORATE EMISSIONS REDUCTION TARGET TECHNIQUES

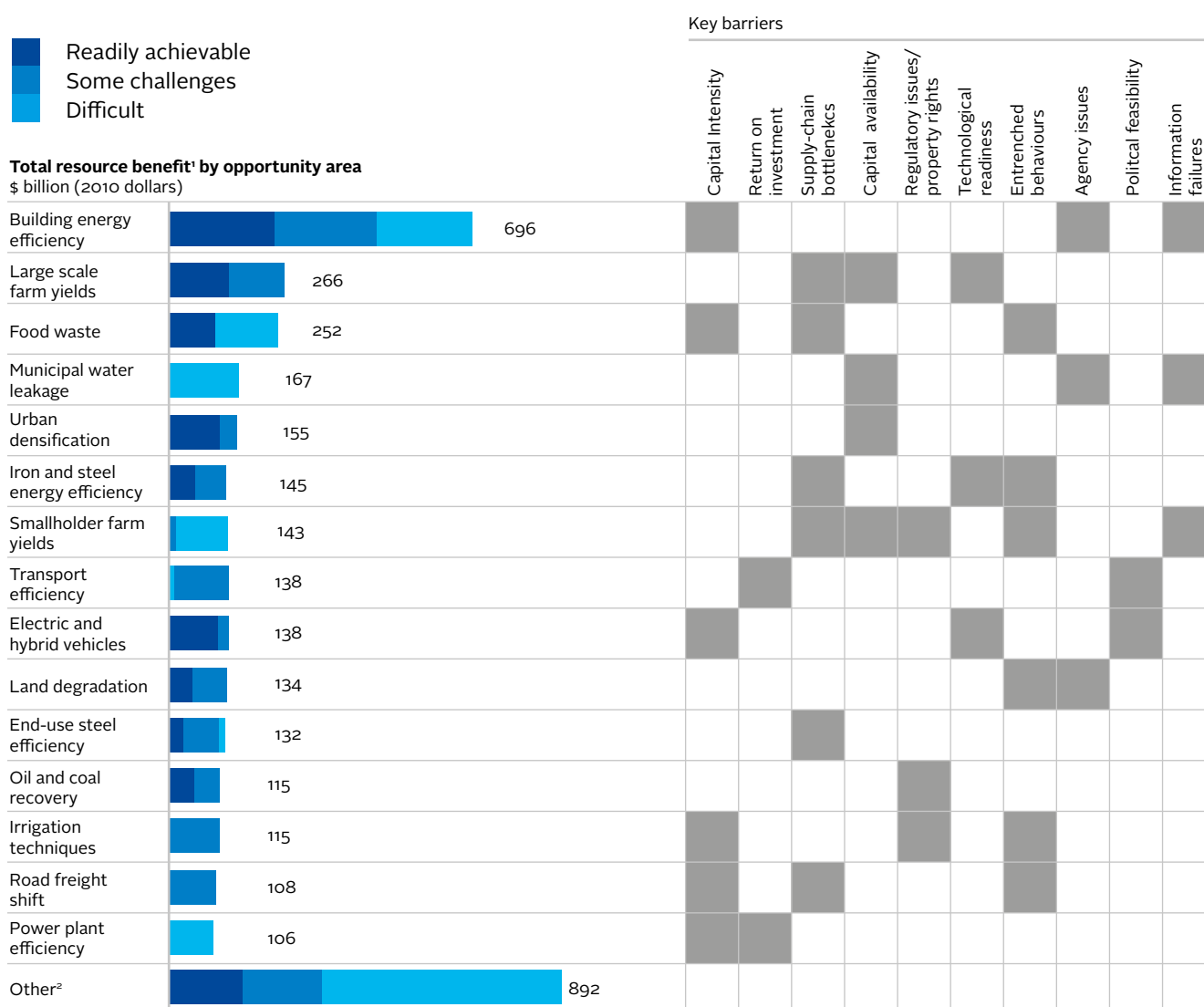
Science-Based Targets: As per the Caring for Climate Initiative⁵³, the concept here is that corporate target setting can be a useful method for businesses to demonstrate their progress against specific goals that align with the likely outcomes being otherwise predicted by the latest climate science. Methodologies⁵⁴ for such Science-Based Targets remain a work in progress, especially as they may not cover

every sector, or include Scope 3, which can represent a significant proportion of a company's emissions footprint. As Science-Based Targets evolve into consideration of specific strategies being executed successfully by companies within relevant sector, there will be a natural alignment with the findings of this paper.

(Figure 13 – Resource Productivity vs Barriers. Source: McKinsey)

ACHIEVING THE MAIN PRODUCTIVITY OPPORTUNITIES WOULD REQUIRE OVERCOMING A MULTITUDE OF BARRIERS

2030 potential savings by feasibility



¹ Based on current prices for energy, steel and food plus subsidized water prices and a shadow cost for carbon

² Includes feed efficiency, industrial water, air transport, municipal water, steel recycling, wastewater reuse, and other industrial energy efficiency

⁵³ <http://caringforclimate.org/workstreams/long-term-target-setting/>

⁵⁴ <http://sciencebasedtargets.org/methodologies/>

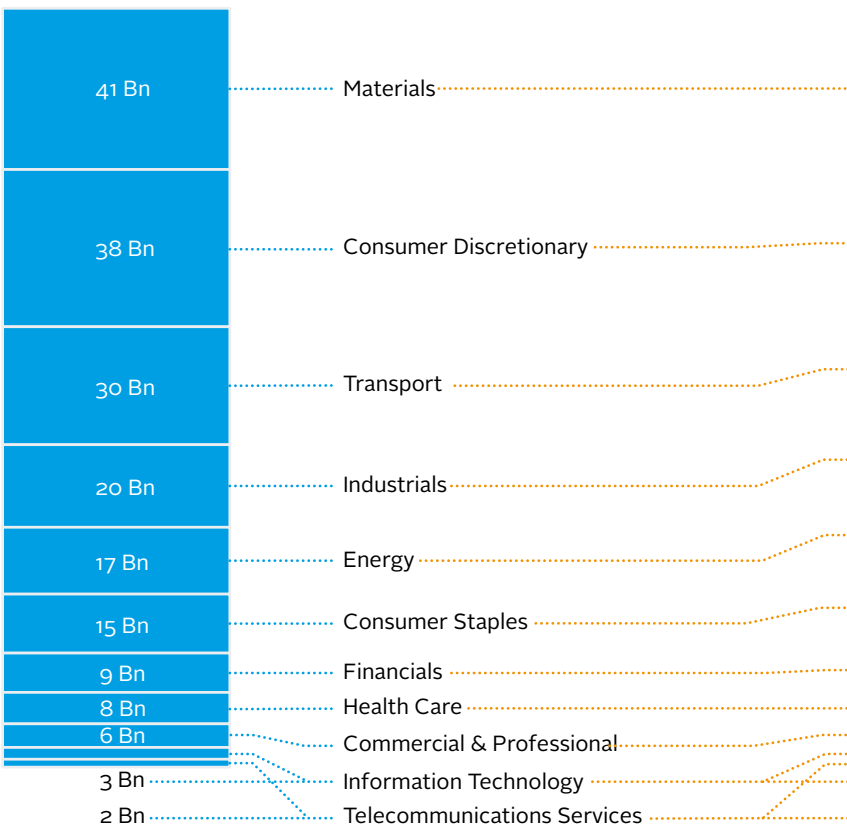
The 3% Solution: This identifies how US-based companies can set GHG reduction targets that boost energy efficiency and transition to low-carbon energy sources, while leading to collective cost savings while aligning with 2°C. Using this approach, the US corporate sector as a whole would reduce emissions by 3% annually on average. As per Figure 9, 1.2 Gt of reductions have been found which would result in US\$190B of savings. Investors could, for example, consider engaging with companies in equities and/or fixed income portfolios to achieve these specific reductions, which would then be beneficial for the company in question's bottom

lines, thereby feeding into improved levels of profitability, which asset owners would enjoy. CalSTRS is an example of an investor engaging on this basis with corporations. The Value Driver Model work is a set of case studies of companies who have successfully executed on such strategies. Such companies outperformed during the course of their own transitions.

(Figure 9: Three Percent Solution. Source: WWF, McKinsey, CDP)

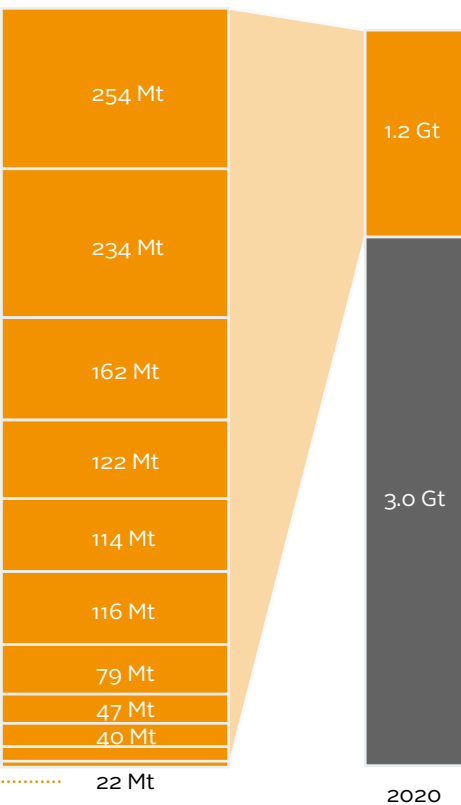
Net Savings Opportunities in 2020 (PV)

up to US\$190 Bn



GHG Reduction Opportunities

up to 1.2 Gt



We Mean Business: The findings of this initiative include advocating for the following public policies, all of which would seem necessary if critical for achieving any successful low carbon transition.

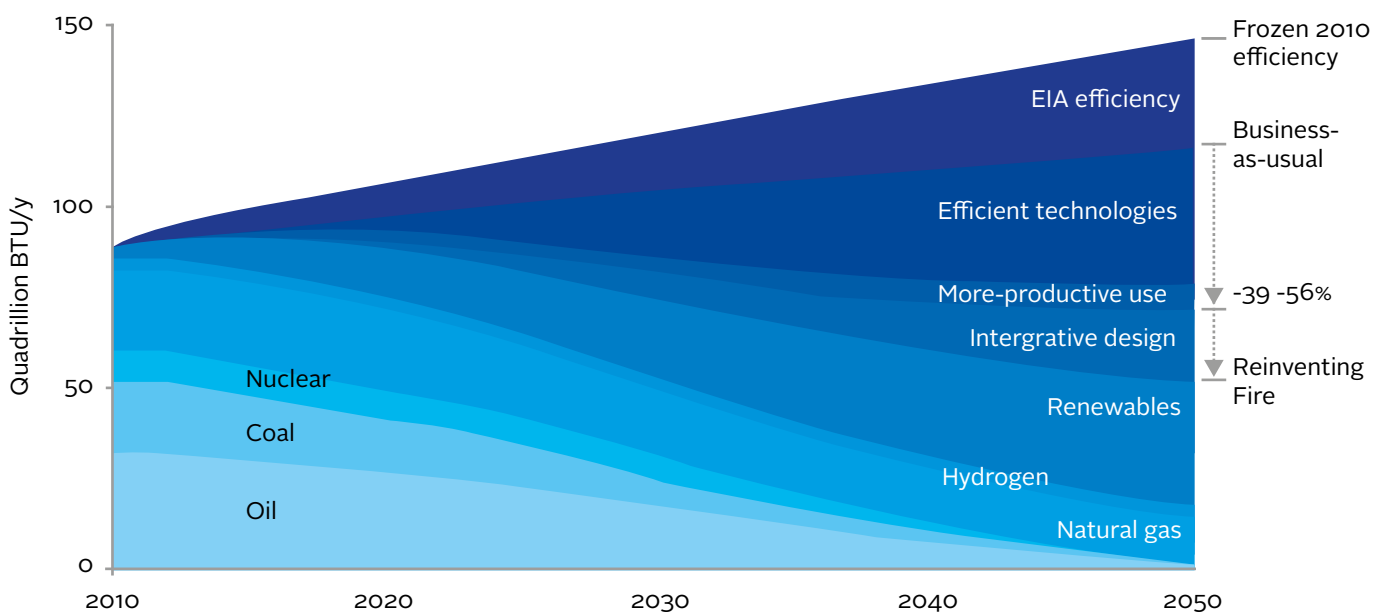
(Figure 10: We Mean Business Recommended Policies. Source: We Mean Business Report)

- Eliminating subsidies that incentivize high carbon energy
- Enacting meaningful pricing of carbon
- Ending deforestation
- Putting in place robust energy efficiency standards
- Supporting the scale-up of low carbon energy
- Ensuring that all policy regimes dealing with fiscal, energy, industry and trade-related issues provide actionable incentives for an early transition to a low carbon future

The EC and the Energy Efficiency Finance Group: There is important work being performed on energy efficiency and finance which can be considered, including that of ACEEE, the Rocky Mountain Institute, and perhaps especially the EC and the Energy Efficiency Finance Group (EEFIG) recently released reports. More investment strategies detail to follow in the next phase of this project.

Success then would reflect a transition being achieved which can be mapped across “wedges” such as Amory Lovins cited in his book *Reinventing Fire* and illustrated here above in this US 2010-2050 example in Figure 11. Much of this wedge involves efficiency, but also an energy mix transition as well. This sort of scenario analysis is critical to ensure we head down a path which avoids say one of Shell's New Lens Scenarios, performed in 2013, which foresaw over 40 Gt of carbon emissions in 2040⁵⁵.

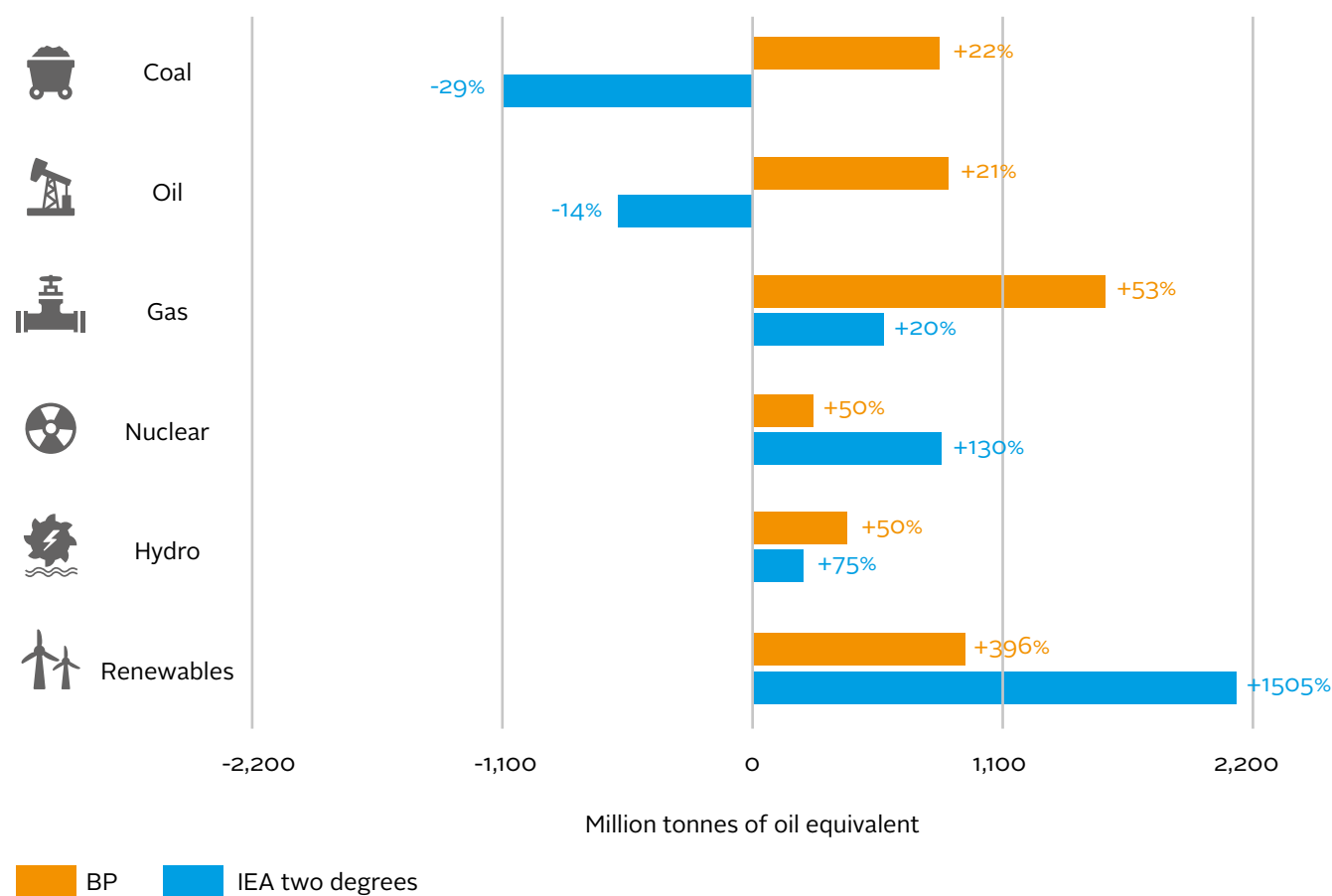
(Figure 11: US Energy consumption scenario 2010-2050, Source: Reinventing Fire, Amory Lovins)



55 http://so1.static-shell.com/content/dam/shell-new/local/corporate/Scenarios/Downloads/Scenarios_newdoc.pdf

An example of a potentially necessary energy mix transition for a 2 Degree Scenario can be seen in Figure 12 below.

(Figure 12: Source – Carbon Brief from BP Energy Outlook versus the IEA Two Degree scenario)
Projected Changes in Energ Mix.



APPENDIX E: GLOSSARIES AND FURTHER RESOURCES ON CLIMATE CHANGE

OECD Glossary of Statistical Terms

<https://stats.oecd.org/glossary/detail.asp?ID=6323>

UNEP Facts on Pollutants

<http://www.unep.org/tnt-unep/toolkit/pollutants/carbondioxide.html>

US EPA Glossary of Climate Change

<http://www.epa.gov/climatechange/glossary.html>

Mercers Investing in a Time of Climate Change – 2015 Study

<http://www.mercer.com/services/investments/investment-opportunities/responsible-investment/investing-in-a-time-of-climate-change-report-2015.html>

The Principles for Responsible Investment (PRI) Initiative

The PRI Initiative is a UN-supported international network of investors working together to put the six Principles for Responsible Investment into practice. Its goal is to understand the implications of sustainability for investors and support signatories to incorporate these issues into their investment decision making and ownership practices. In implementing the Principles, signatories contribute to the development of a more sustainable global financial system.

The Principles are voluntary and aspirational. They offer a menu of possible actions for incorporating ESG issues into investment practices across asset classes. Responsible investment is a process that must be tailored to fit each organisation's investment strategy, approach and resources. The Principles are designed to be compatible with the investment styles of large, diversified, institutional investors that operate within a traditional fiduciary framework.

The PRI Initiative has quickly become the leading global network for investors to publicly demonstrate their commitment to responsible investment, to collaborate and learn with their peers about the financial and investment implications of ESG issues, and to incorporate these factors into their investment decision making and ownership practices.

More information: www.unpri.org



The PRI is an investor initiative in partnership with UNEP Finance Initiative and the UN Global Compact.

United Nations Environment Programme Finance Initiative (UNEP FI)

UNEP FI is a unique partnership between the United Nations Environment Programme (UNEP) and the global financial sector. UNEP FI works closely with over 200 financial institutions that are signatories to the UNEP FI Statement on Sustainable Development, and a range of partner organisations, to develop and promote linkages between sustainability and financial performance. Through peer-to-peer networks, research and training, UNEP FI carries out its mission to identify, promote, and realise the adoption of best environmental and sustainability practice at all levels of financial institution operations.

More information: www.unepfi.org



UN Global Compact

Launched in 2000, the United Nations Global Compact is both a policy platform and practical framework for companies that are committed to sustainability and responsible business practices. As a multi-stakeholder leadership initiative, it seeks to align business operations and strategies with ten universally accepted principles in the areas of human rights, labour, environment and anti-corruption, and to catalyse actions in support of broader UN goals. With 7,000 corporate signatories in 135 countries, it is the world's largest voluntary corporate sustainability initiative.

More information: www.unglobalcompact.org

