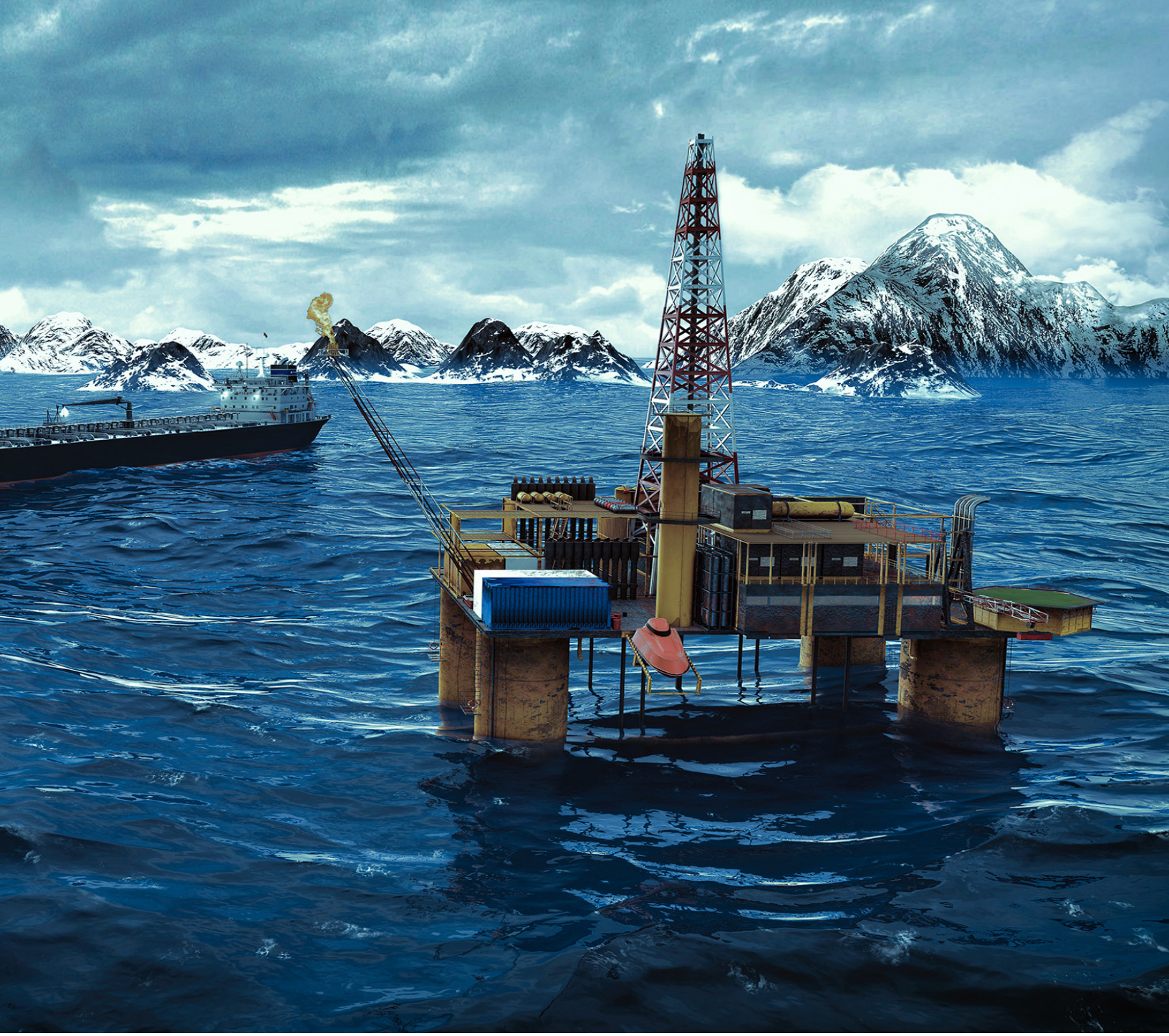

CARBON ASSET RISK: FROM RHETORIC TO ACTION

Ceres

2° Investing Initiative

Energy Transition Advisors
ETA

Carbon Tracker Initiative

This paper, first presented at the 1st Global Stranded Assets Conference, hosted by the Smith School in Oxford September 2015, looks at developments over the past two years around the concepts of carbon asset risk, stranded assets and wasted capital in relation to the fossil fuel industry. We draw on NGO and market research, and corporate and investor activity. The focus is on establishing a framework for analysis and assessing how investors and corporations are responding in terms of risk management, disclosure, corporate capital expenditures and the implications for investors in terms of portfolio management, engagement and divestment. This is done in the context of share and commodity markets. We show that carbon asset risk (CAR) is in the process of moving from discussion and acknowledgement to action and impact.

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EXECUTIVE SUMMARY

The Energy Transition is underway - more haste is needed!

In the past few years, carbon asset risk (CAR) has gone from a fringe topic discussed primarily by NGOs to a serious consideration of some of the largest companies in the world. Recent market action, investor pledges, new models and results, and significant shareholder resolutions are all contributing to pushing CAR into the public attention.[1] This report discusses some of the most important recent developments and provides the first attempt at quantifying the uptake of CAR assessment and management.

The report follows the basic structure of the recently released UNEP FI/WRI CAR Framework, a multi-stakeholder and multiyear process to develop a common terminology and language surrounding CAR assessment and management. It first summarizes the framework, which identifies carbon risk factors and explains how companies and financial institutions can assess their exposure, evaluate financial impacts, and manage risk. Importantly, the framework separates the risk that carbon-intensive companies are exposed to ("**operator carbon risk**") from the risk that is passed on to lenders and investors with a stake in these companies ("**carbon asset risk**"). Exposure and risk evaluation have to be done at the asset level by companies (operators of those assets) and at the portfolio level by owners of or financial intermediaries to those operators. Risk is then managed using several options: disclosure, diversification, divestment (avoidance), and engagement. UNEP FI/WRI had over 200 participants in the webinar launch of its Framework.

This report now looks at the evidence for action by operators (disclosure) and investors (divestment and engagement) in particular (there is limited evidence of action by financial intermediaries at this stage) in relation to these issues in the fossil fuels and utility sectors. It also analyzes how recent market volatility, a primary risk factor in the CAR framework, may be contributing to such action. It focuses on evidence of action in four spheres: market action, corporate disclosure and engagement, and direct investor action (divestment and portfolio exposure and stress testing). **We conclude that these developments are beginning to show progress in terms of action in an energy transition that now seems well underway. There is still a long way to go.**

- **Market Action**: the past year has essentially applied a "stress test" through energy commodity prices of a magnitude no one could have foreseen a year ago – spot oil prices around $40bbl and seaborne coal prices of $50t. While these are only spot and not the expectations for the next 20 years they show the dynamics at work in CAR evaluation. The key issue is what drove these price declines. Short-term cyclical forces and geopolitics are two obvious drivers. However, we also point to the following key themes that are part of the long-term CAR thesis in terms of:
    - **Regulatory and technology forces in coal markets**: a number of increasing regulatory and policy trends in the US and China in particular have affected coal demand.[2] Combined with technology changes in gas and renewable energy markets, these trends have led to a fall in US coal demand (impacting share markets) and signs of a peaking in Chinese coal demand.[3]

1 Indeed, one recent survey quoted the corporate secretary of an energy company as opining that the engagement process "had 'transformed the corporate secretary's role,' and had also 'transformed the boardroom.'" Marc Goldstein, "Defining Engagement: An Update on the Evolving Relationship Between Shareholders, Directors and Executives," ISS, 46 (April 10, 2014).

2 Moody's, Declining Chinese coal demand exacerbates pressure on Australian miners, (Aug. 10, 2015) available at https://www.moodys.com/research/Moodys-Declining-Chinese-coal-demand-exacerbates-pressure-on-Australian-miners--PR_331902; U.S. Energy Information Administration, "Coal use in China is slowing," (Sept. 17, 2015) available at http://www.eia.gov/todayinenergy/detail.cfm?id=22972.

3 Tom Randall, "Solar and wind just passed another big turning point," BloombergBusiness (Oct. 6, 2015) available at http://www.bloomberg.com/news/

- **Acknowledgement of carbon constraints and a rush of cheap supply in oil markets**: the Saudi Oil Minister has acknowledged that by 2050 the need for fossil fuels will be greatly reduced and this has coincided with a significant push of new supply from low cost producers to markets, crashing the oil price.[4]

- **In Europe and the U.S. utilities have been highly disrupted**. Analysts have been concerned with the "utility death spiral" for companies in both regulated and restructured markets because the companies generally have not anticipated or adapted their business models to several factors: a combination of policies that support distributed generation, renewables and increased energy efficiency mandates; changing market dynamics due to low natural gas prices; and newly designed capacity and energy markets. Investors should be concerned that companies failed to predict or mitigate the effects of these factors to avoid loss of value.

- **At least $200bn in capital expenditures, primarily oil & gas projects, has been deferred or cancelled over the past year.** Most recently, Shell announced that its $7-9 billion in capital expenditures chasing Arctic oil was unsuccessful, highlighting the danger of wasted capital for projects with high break-evens and long time frames for development.[5]

- **Major Oil companies including BP, Shell, BG, Eni, Statoil, and Total have called for a global carbon price**.

- **Market Analysts Views Are Evolving: The number of comments and papers focusing on CAR related issues has rapidly increased in the last year. We catalogue these papers by sell side, buy side, and ratings agencies**.

- **Engaging with Operator/Corporate Risk Management**: much of the focus by investors and NGOs has been on how the operators of carbon assets are managing risk. Engagement can take the form of requests for disclosure both in regulatory terms and in less formal ways such as surveys and discussion papers. The responses to these requests form the basis for any evaluation. It is not simply a question of measuring the company's carbon footprint – which is generally obvious in the fossil fuel and utilities sector – but a deeper consideration of how the operator stress tests the various possibilities in an Energy transition (e.g. a 2°C policy outcome).

    - **Proxy voting has been a key area for investors to press for more information from operators**.[6] Our data shows that a majority of investors supported proxy access resolutions at 23 out of 33 fossil fuel companies despite company opposition.[7] **There is ample evidence to support that under investor pressure, operators are addressing CAR in formal disclosure and informal evaluations, but not in sufficient detail. Our data show that companies have begun to consider the potential of a 2D scenario internally but that**

articles/2015-10-06/solar-wind-reach-a-big-renewables-turning-point-bnef; Mario Parker, "Half of World's Coal Output is Unprofitable, Moody's Says," BloombergBusiness (Oct. 1, 2015) available at http://www.bloomberg.com/news/articles/2015-10-01/half-of-the-world-s-coal-output-is-uneconomical-moody-s-says.

4 Pilita Clark, "Kingdom built on oil foresees fossil fuel phase-out this century," Financial Times (May 21, 2015) available at http://www.ft.com/intl/cms/s/0/89260b8a-ffd4-11e4-bc30-00144feabdc0.html#axzz3o5B6An3D.

5 Wall Street Journal, Shell to Cease Oil Exploration in Alaskan Arctic After Disappointing Drilling Season, available at http://www.wsj.com/articles/shell-to-cease-oil-exploration-offshore-alaska-1443419673.

6 Joe Carroll, "Oil's Green Investors Win Trojan Horse Victories in Board Access," BloombergBusiness (May 27, 2015) available at http://www.bloomberg.com/news/articles/2015-05-27/oil-s-green-investors-win-trojan-horse-victories-in-board-access.

7 Ceres, Shareholder Resolutions available at http://www.ceres.org/investor-network/resolutions#!/subject=&year=&company=&filer=&sector=&status=&memo=&all=proxy.

only a handful such as Conoco, Statoil, and BHP Billiton have publicly supported the use of a 2D analysis which again would benefit from more details, especially on capital expenditures.[8] There is a general tendency to dismiss strong policy action and expect an extended energy transition beyond a 2D climate pathway.

- **It is notable that the Governor of the Bank Of England has also pointed to climate and carbon risks and the need for disclosure to assess the potential for systemic financial risks**.[9]
- Further, it is difficult to determine the exact business assumptions around demand profiles and to some extent expected supply costs that make or break returns. This still lacks completeness in a risk management framework.
- **Engagement can also take the form of direct dialogue with operators and business planning and models. This is frequently private in nature.**
- **One regulatory initiative of particular note is article 173 of the French Energy Transition law, which requires both companies and investors to disclose on CAR issues.**

- **Direct Investor Portfolio action**: investors can also manage CAR directly at their own portfolio level, integrating some of the results of engagement. Most actions are mandate-dependent. That is, asset owners and asset managers have to follow the set out mandates ranging from ethical to passive to active.
  - **Divestment is the most extreme form of portfolio action and can have different thresholds of action triggers**. The divestment by the Norwegian sovereign wealth fund of coal companies deriving above 30% of revenue potentially leaves 122 companies to be sold. There are nearly 400 investing institutions claiming some degree of disinvestment, led by foundations and NGOs, faith-based investors, pension funds and governmental organizations, and colleges/universities.
  - **This has produced vocal responses from the fossil fuel industry**. While there is an economic case that disinvestment does not ultimately starve companies of capital, Peabody has pointed to the possibility of adverse business impacts in its disclosures. The industry has certainly focused on the potential for "stigmatization."
  - **Investors can use quantitative methods for testing exposure (carbon footprinting and stress testing portfolios for substantial carbon constraints) and evidence suggests this currently rare practice is growing**. A small percentage of the large asset owner industry currently do this—around 60 institutional investors have pledged to footprint their portfolio through PRI's Montreal Pledge, for instance—and there is substantial disagreement on whether current market offerings are adequate.

8 ConocoPhillips has endorsed the use of multiple 2 degree scenarios to inform its capital planning decisions. See ConocoPhillips' website, Carbon Asset Risk, available at http://www.conocophillips.com/sustainable-development/environment/climate-change/managing-risks-and-opportunities/Pages/carbon-asset-risk.aspx; BHP Billiton has also just released an analysis of the impact of multiple 2 degree scenarios on its assets. See BHPBilliton, "Climate Change: Portfolio Analysis" at http://www.bhpbilliton.com/~/media/5874999cef0a41a59403d13e3f8de4ee.ashx; Statoil, Energy Perspectives 2015 available at http://www.statoil.com/en/NewsAndMedia/News/2015/Pages/04Jun_Energy_perspectives.aspx.

9 Mark Carney, "Breaking the tragedy of the horizon – climate change and financia stability," (Sept. 29, 2015) available at http://www.bankofengland.co.uk/publications/Pages/speeches/2015/844.aspx.

- **Regardless, a significant number of providers have emerged to offer services in this area, mostly with respect to screening using carbon footprinting approaches**. A growing number of tools are going beyond cross-sectional analysis to include explicit scenario-based stress testing. However, currently "bottom-up" security-level tools are likely too complex for most investors to use directly, and "top-down" portfolio tools lack the security-level detail needed for stock-picking.
- **At an integrated Portfolio level Mercer have launched a top down model looking at climate risks including the effects of physical impacts**. Mercer has seen more than 3000 downloads of their document setting out the high level results which show diverse sector results, somewhat less so at the asset level and little effect at the overall portfolio level when the trends are addressed proactively.

By the Numbers 2014-15

Proxy Access

- Shareholder Control: Proxy access in U.S. for right to nominate directors focused on climate. 23 of 33 resolutions at fossil fuel companies and utilities gain majority vote.

Proxies Votes US

- 31 CAR Resolutions filed since 2013. All opposed by companies;
- 5 withdrawn in exchange for commitments; 3 received 25%+.

Proxies Votes Europe

- 3 "Aiming for A" filed. All supported by companies. 3 received 98%+.

Divestment

- 397 Institutions divested in some form

Financial research

- At least 40 research papers published by mainstream financial analysts (buy side, sell side, and ratings agencies).

Company Action

- 3 fossil fuel majors support 2D scenario analysis (ConocoPhillips, Statoil, and BHP Billiton).
- 6 oil majors call for global carbon pricing (Eni, Statoil, Shell, BP, Total, BG Group).
- 2 oil majors leave ALEC (BP, Shell)
- 4 oil majors defer Arctic drilling (Chevron, BP, Statoil, Shell)
- 2 oil majors **invest in renewable energy** (Total and Statoil)
- 8 oil majors announce plan to engage in climate policy.

Future Key Action metrics – much more is needed

Engagement

- Changing capital planning processes by successfully persuading companies to conduct transparent review of reserves and resources portfolio under 2C scenarios.
- Aligning executive compensation with creating value over volume at any cost by de-linking reserve replacement metrics and executive incentives.
- Highlighting public policy stances and actions of companies as compared to their statements about support for climate change action.
- Investor engagement with policymakers and regulators including continued public calls for strong climate action such as 357 investor signatories to UN calling for price on carbon, 62 investor signatories to SEC calling for implementation of climate disclosure, and investor calls for strong greenhouse gas emissions standards for power plants and methane regulations.

1. CARBON ASSET RISK: DISCUSSION FRAMEWORK: WRI AND UNEP-FI PORTFOLIO CARBON INITIATIVE[10]

1.1 INTRODUCTION

Climate change presents enormous economic, social, and financial implications for economies around the world. In response, many governments have enacted, or are considering enacting, policies to reduce greenhouse gas (GHG) emissions and increase deployment of low-carbon technologies.[11] Such policy actions are in turn occurring in the context of changing regional and global energy markets, as evidenced by recent volatility in global energy commodity prices. This has led a number of investors and other stakeholders to question whether loans or investments in carbon-intensive physical assets or companies could be at risk due to policy and market dynamics, separate from the physical risks that climate change presents (for example, severe storms, floods, etc.)[12].

This discussion on "**carbon risk**"[13] has been influenced by research undertaken by the International Energy Agency (IEA), Oxford University, and the Carbon Tracker Initiative, among others, which suggests that, absent carbon capture and sequestration or other technological solutions to manage GHG emissions, a significant quantity of the world's fossil fuel resources, especially coal, will need to remain in the ground (that is, unexploited) under climate mitigation scenarios. To take the clearest example, if a large quantity of fossil fuel resources cannot be extracted and produced (whether because of policy, market or other carbon-related constraints), companies whose business is principally focused on such activities could be negatively impacted, both operationally and financially. This in turn could represent financial risk to investors and lenders who hold a financial stake in such companies, sometimes referred to as "**carbon asset risk**."

This report will summarize recent activities in the CAR space and importantly quantitative data on uptake across three relevant stakeholder groups: markets, companies, and investors. The recently

10 Portions of this section were previously published in Carbon Asset Risk: Discussion Framework, WRI/UNEPFI (2015) available at http://www.wri.org/sites/default/files/carbon-asset-risk-discussion-framework-ghgp_0.pdf.

11 At the time of publication of this report, 119 "intended nationally determined contributions" (INDC) had been submitted to the UNFCC covering almost 86% of global emissions. See Climate Action Tracker available at http://climateactiontracker.org/indcs.html.

12 UNEP FI/WRI (2015) and 2dII/CDC Climate/UNEQ Inquiry (2015) provide good overviews of recent work.

13 All references to "carbon" in this document refer to all greenhouse gas emissions rather than just carbon dioxide.

released UNEP FI and WRI Carbon Asset Risk framework, which represents the work of dozens of stakeholders over several years to lay out the roles of different parties in assessing and managing CAR, serves as the basis for this report. The first section will briefly summarize the framework and connect it to the remaining sections. Following this, sections discussing market, corporate, and investor roles will be presented followed finally by a summary of the current state and future developments.

1.2 SUMMARY OF WRI/UNEP FI FRAMEWORK

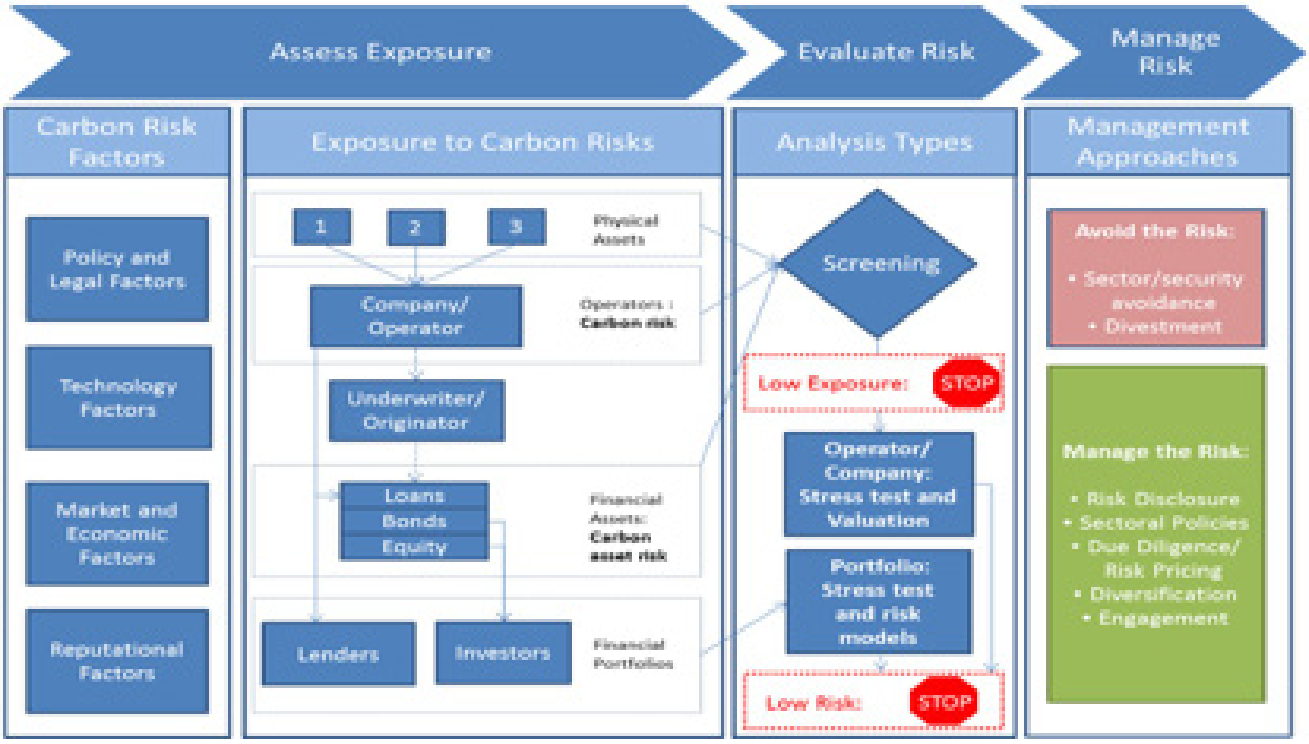
1.2.1 Purpose of the Framework

The dialogue around carbon asset risk has grown over time, but it has occurred in the absence of a comprehensive, generally accepted framework to guide institutions and other stakeholders in their efforts to think consistently and systematically about the issue. To meet this important need, the World Resources Institute (WRI) and UNEP Finance Initiative (UNEP-FI) launched a process in early 2014 to develop a framework to help financial intermediaries and investors, as well as stakeholders with an interest in this topic, more systematically to identify, assess, and manage carbon asset risk. It represents an open, multi-stakeholder framework for discussing current events in the CAR space.

1.2.2 Summary of the framework

The framework covers the key elements of addressing carbon asset risk during the process of making new financing or investment decisions and when managing existing investment portfolios. As shown in Figure 1 below (top arrows), the framework can be organized around three central actions investors and intermediaries can take in assessing CAR: assessing exposure, evaluating the impacts of this exposure (i.e. financial risk), and managing material risks.

Figure 1: Summary of Framework Structure



The framework first explores types of risk factors related to carbon risk. The framework discusses four core carbon risk factors that exist today—policy and legal, technology, market and economic, and reputational factors—that are closely intertwined and not always easy to isolate (picked up in Section 2: Markets).

The framework then draws an important distinction between how exposure to carbon risks materializes and to which parties. In particular, risk factors other than reputational[14] primarily affect carbon-intensive companies/operators ("**operator carbon risk**.") Depending upon the nature and severity of risk as well as the operator's risk management, this risk could then affect financial intermediaries and investors that have a financial relationship with these operators ("**carbon asset risk**").

Of course, certain industry sectors and types of companies are more or less exposed to carbon risk. To date, public dialogue has focused principally on physical assets and operations heavily reliant on fossil fuels, such as upstream fossil fuel exploration and production and fossil-fuel-fired power generation. This is a logical focus, given that these activities contribute the largest share of GHG emissions to the global economy and are most likely to be impacted directly by carbon (and other air-pollution-control) policy regimes, such as cap-and-trade programs or carbon taxes. Nevertheless, other sectors, such as fossil-fuel-dependent infrastructure and fossil-fuel-intensive industries that face competition from low-carbon competitors, may also be exposed to operator carbon risk depending on the profile of the underlying physical assets (type, fuel mix, location, operational lifetime, GHG emissions, etc.), the operator's earnings margin, and the way in which it manages the risk (termed "**operator carbon strategy**"). Such strategies can include factors such as future development/capital expenditure (capex) plans, asset diversification, and operational risk management efforts (for example, methane mitigation).

Even for investments in sectors or companies that face high levels of **operator carbon risk**, though, **carbon asset risk** to investors or lenders is largely a function of the type of financial relationship with the operator (for example, corporate loan, project finance, equity or bond) and the likely duration or "tenor" of the relationship ("financial assets" in the figure above). Specific aspects of financing, including the type of capital provided, the tenor, the seniority of capital, and whether it is secured by collateral, all affect the risk and return profiles of a financial investment and are important considerations in determining whether operator carbon risk may translate to carbon asset risk for an intermediary or investor.

Collectively, the characteristics of investee companies (and their underlying physical assets) in a financial portfolio determine the potential *exposure* to CAR. Such characteristics can thus be used to screen portfolios—the first step in evaluating financial impact—but alone cannot determine the financial impact of the risk. Two main analytical approaches can inform this assessment: 1) a "bottom-up" operator-level approach starting from physical assets and rolling up to a portfolio, and, 2) a "top-down" portfolio approach that evaluates the impacts of risk factors on an entire portfolio of investments.

Given the complexity associated with operator-level stress testing (collecting plausible scenario data, such as that explored in the International Energy Agency's World Energy Outlook as well as company-level risk factor data to plus into the scenario), this type of analysis is most likely to be done by carbon-intensive companies themselves.

The top-down portfolio approach instead evaluates the influence of risk factors at the portfolio level,

14 Reputational risks associated with carbon-intensive assets can affect both the carbon-intensive operators themselves as well as investors and lenders to these operators, as evidenced by "name and shame" campaigns against banks lending to coal companies and the divestment movement amongst institutional investors.

taking into account both high- and low-carbon investments and the expected risk correlation between them given an assumed scenario. While such an analysis is highly technical, tools to perform such evaluation are emerging, though only through commercial providers. Thus, it is feasible for large investors to perform such modeling and some are beginning to do so (discussed in Section 4).

Finally, where a significant risk exists, the framework suggests strategies that financial intermediaries and investors can pursue to manage carbon asset risk. The options for managing carbon asset risk will vary depending on the role of the intermediary or investor (for example, underwriter, bondholder, lender or shareholder) and whether financing or investment is under consideration or has already been made. In general, though shown in Figure 2, intermediaries and investors have two main options—avoiding risk altogether or managing it. The options—which are of course institution—and mandate-specific, can be summarized as "Disclosure, Diversification, Engagement, and Divestment."

Figure 2: Risk Management Options by Investment Stage for Different Financial Sector Actors

		Financial Intermediaries (Underwriters)	Financial Intermediaries (Lenders)	Bond Buyers	Shareholders
New Investments	Avoid the risk	• Sector/security avoidance	• Sector/security avoidance	• Sector/ security avoidance	• Sector/ security avoidance
	Manage the risk	• Promote Risk Disclosure • Proper Risk Pricing • Thorough due diligence	• Proper Risk Pricing • Sectoral policies • Thorough due diligence (potentially include covenants) • Engage in key areas	• Promote Risk Disclosure • Due diligence as possible in disclosure	• Invest with ESG screens • Diversification
Current Holdings	Avoid the risk	N/A	• Divestment at sector or loan level	• Divestment at sector or security level	• Divestment at sector or security level
	Manage the risk	N/A	• Diversification (sector and subsector) • Engagement to understand risk management	• Diversification	• Diversification • Engagement to understand risk management • Engagement to align risk and return perspectives

While not discussed in detail in this report, the framework also notes that some amount of CAR is a byproduct of the current uncertainty about future global and regional climate policy regimes. The financial sector can play a role in working to reduce this uncertainty through engagement in public policy arenas, asking for stable and predictable medium-term policy frameworks to deliver long-term emissions reductions goals.[15] Having greater clarity on issues such as the potential nature and timing of GHG regulation and reporting and disclosure requirements would greatly enhance the ability to assess and manage carbon asset risk.

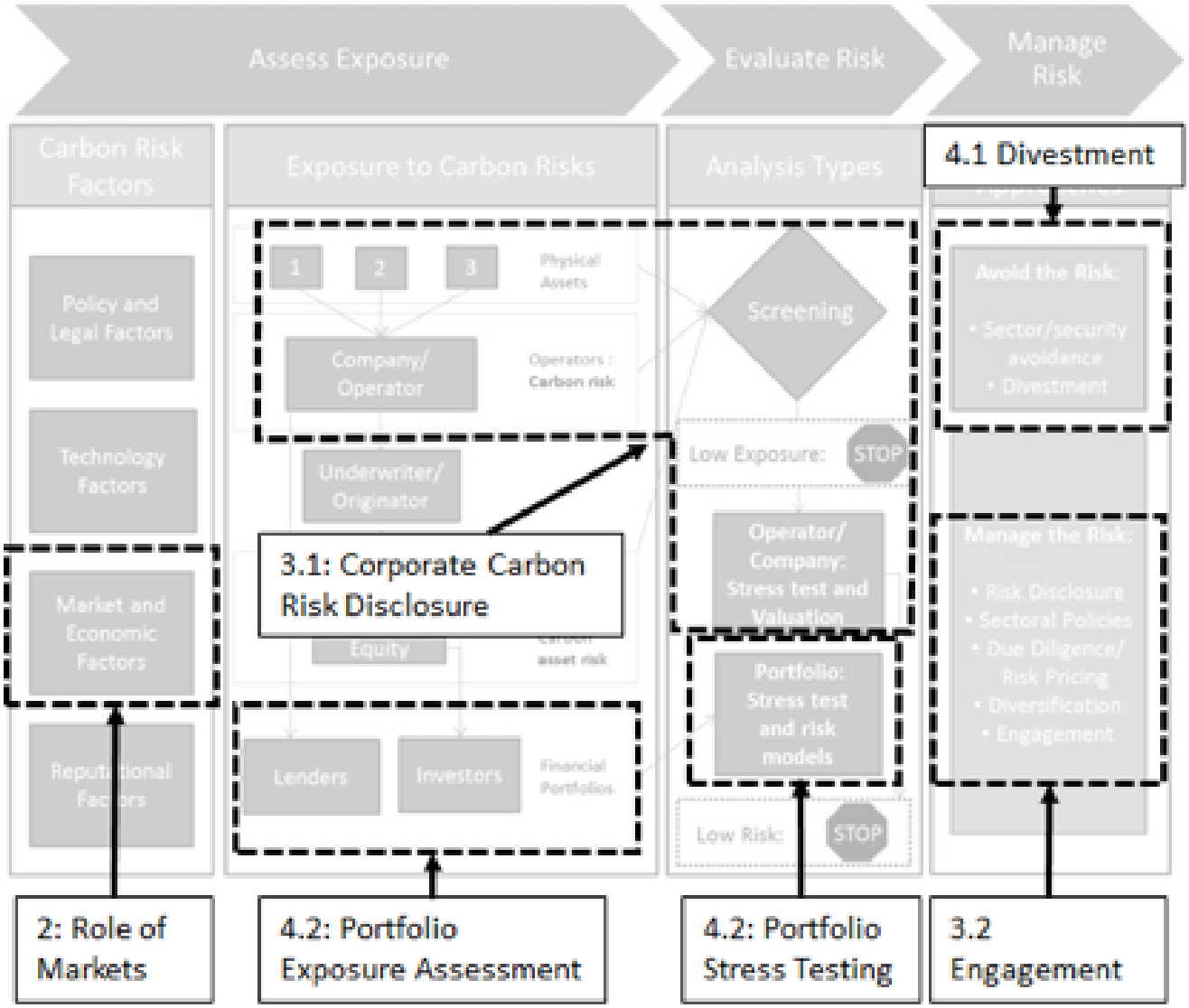
15 Letter from 100 investor CEO's to G7 Finance Ministers available at http://www.iigcc.org/files/publication-files/InvestorCEO_letter.pdf.

1.3 ORGANIZATION OF THIS REPORT

This report digs deeper into several of the areas of the CAR ecosystem as laid out in the UNEP FI/WRI framework to discuss recent events and attempt to quantify the actual uptake of CAR assessment and management (Figure below). We first discuss the role of markets in the context of recent commodity market volatility, one of the framework's risk factors (Section 2). While policy and technology risk factors often receive the most attention in CAR debates, the role of markets has proven paramount recently.

Section 3 of the report then discusses the state of corporate carbon risk disclosure and investor engagement. Corporate disclosures often serve as both important CAR exposure screening information for investors as well as the raw data driving operator level stress tests (which, in many cases, are precisely the data requested by investors). Investor engagement, one of the primary risk management techniques, is an important driver of such information and is discussed in the same section. Section 4 then analyses investor actions other than engagement, notably the divestment movement (Section 4.1) and quantitative techniques that are being applied to assess exposure or stress test CAR impacts (4.2).

Figure 3: Layout of this report in UNEP FI/WRI framework



2. COMMODITY MARKETS – EVIDENCE OF THE ENERGY TRANSITION OR CYCLICAL? COAL LEADS THE WAY.

In many ways in the last year markets themselves have seen the biggest action for much of the CAR thesis – battles in supply energy markets, falling energy commodity prices, turmoil in energy related stock prices. The question is does this at all relate to fundamental shifts due to an energy transition/climate constraint or is it all just cyclical. We believe that there is a fundamental peaking in coal demand and market dynamics, which is a function of regulation, natural gas and renewable energy. The Energy Transition is under full swing in this sector. Oil is more complex and there are undoubtedly cyclical forces at play. However even the Saudi Oil Minister can see long term carbon constraints and the move to dominate supply by OPEC is exactly what a climate constraint would be expected to produce.[16]

2.1 THE US COAL CRASH

We first look at the coal industry in the US.[17] Between 2011 and 2014 the Dow Jones index of coal stocks declined 76% compared to the overall market rising by 68%. Evidence of structural change based on regulation and new technology in the shape of fracked gas and renewables is strong.[18]

The EPA was active in relation both to clean air and climate pollution particularly advancing rules around Mercury but also directly in relation to GHGs. The new standards of performance for greenhouse gas emissions for new, modified and reconstructed stationary sources essentially established natural gas as the benchmark for emissions.[19] The proposed Clean Power Plan is set to expand on that by setting greenhouse gas limits for existing facilities.[20] Investors and businesses have played a key role in shoring up political support for these regulations.[21]

Underpinning this all has been the fracked or tight gas developments resulting from decades of research and development. The drilling technology breakthroughs in the mid-2000s produced high volumes of cheap natural gas that began to change electric power market dynamics as early as 2009 and resulted in shifting load from existing coal plants and replacing plans for new coal builds.[22]

Renewable energy sources have meanwhile been getting cheaper and more readily available. As a result the switch out of coal has been met from a combination of gas, renewables, and efficiency.

These forces represent clear examples of an energy transition from a longer-term perspective that has been driven primarily by market forces.

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16 Peter Waldman, "Saudi Arabia's Plan to Extend the Age of Oil, BloombergMarkets (April 12, 2015) available at http://www.bloomberg.com/news/articles/2015-04-12/saudi-arabia-s-plan-to-extend-the-age-of-oil.

17 Luke Sussams and Andrew Grant (Carbon Tracker), "The US Coal Crash, Evidence for Structural Change," (2015) available at http://www.carbontracker.org/report/the-us-coal-crash/.

18 Randall, supra note 3.

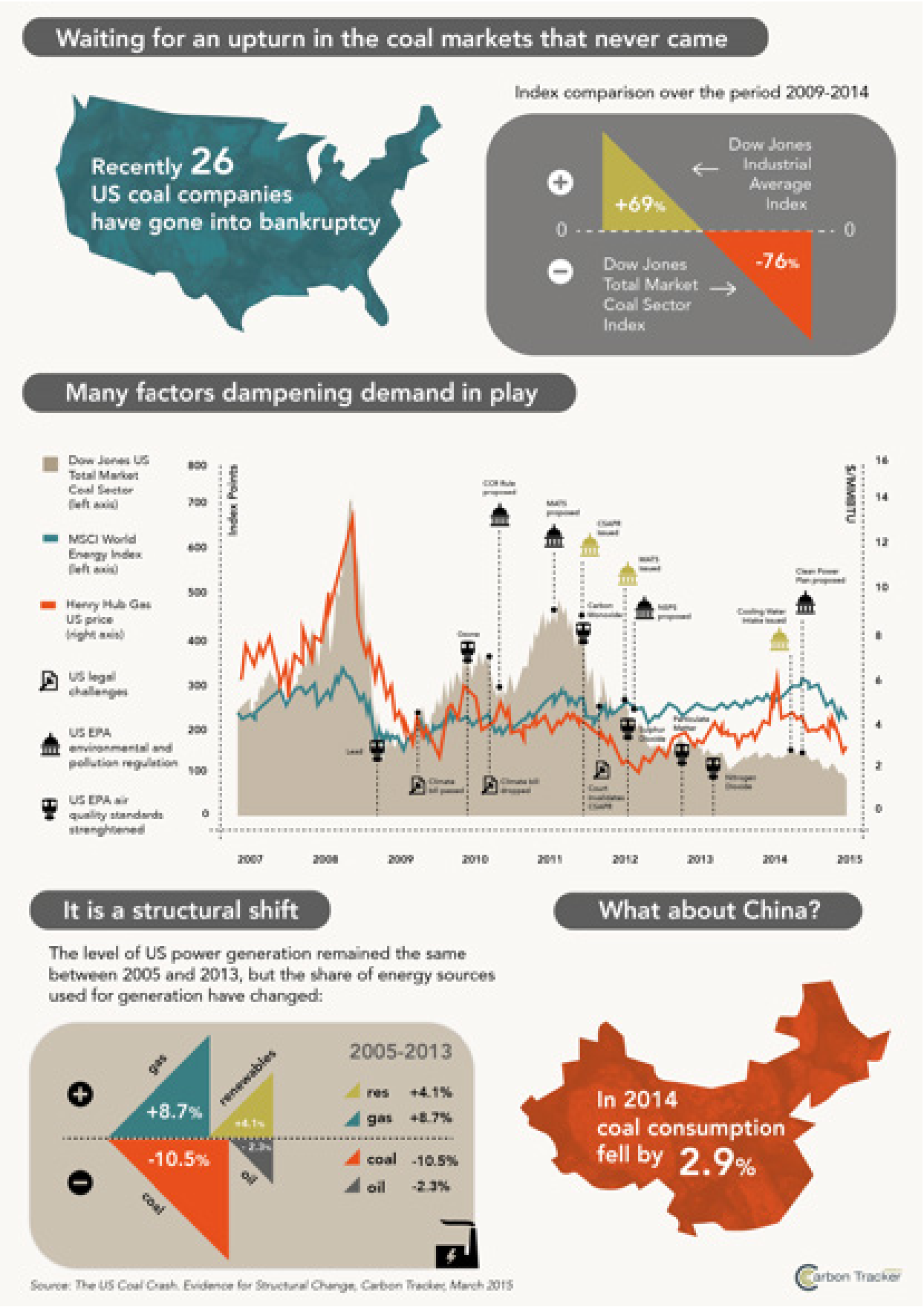
19 40 C.F.R. Pt. 60 Subparts Da and KKKK.

20 79 Fed. Reg. 67406 (August 2015).

21 Mindy Lubber, "Why Corporate America is Supporting EPA's Clean Power Plan," Forbes (August 3, 2015) available at http://www.forbes.com/sites/mindylubber/2015/08/03/why-corporate-america-is-supporting-epas-clean-power-plan/.

22 Mark Fulton, "Natural Gas and Renewables: The Coal to Gas and Renewables Switch is On!" Deutsche Bank Climate Change Advisors (Oct. 2011) available at https://www.db.com/cr/en/docs/NaturalGasAndRenewables-Oct_2011_Update.pdf; Gordon Pickering, "The phenomenon of Coal-to-Gas Switching," Navigant (Fall 2012) available at http://www.navigant.com/~/media/WWW/Site/Insights/Energy/The%20Phenomenon%20of%20CoaltoGas%20Switching%20by%20GPickeringWEI%20articlepdf.ashx; D.C. Denison, "Somerset power plant put up for sale," Boston Globe (September 07, 2012) available at https://www.bostonglobe.com/business/2012/09/06/dominion-resources-selling-its-brayton-point-power-station-somerset/q49szS9Osjb7XAaOXnYOxL/story.html.

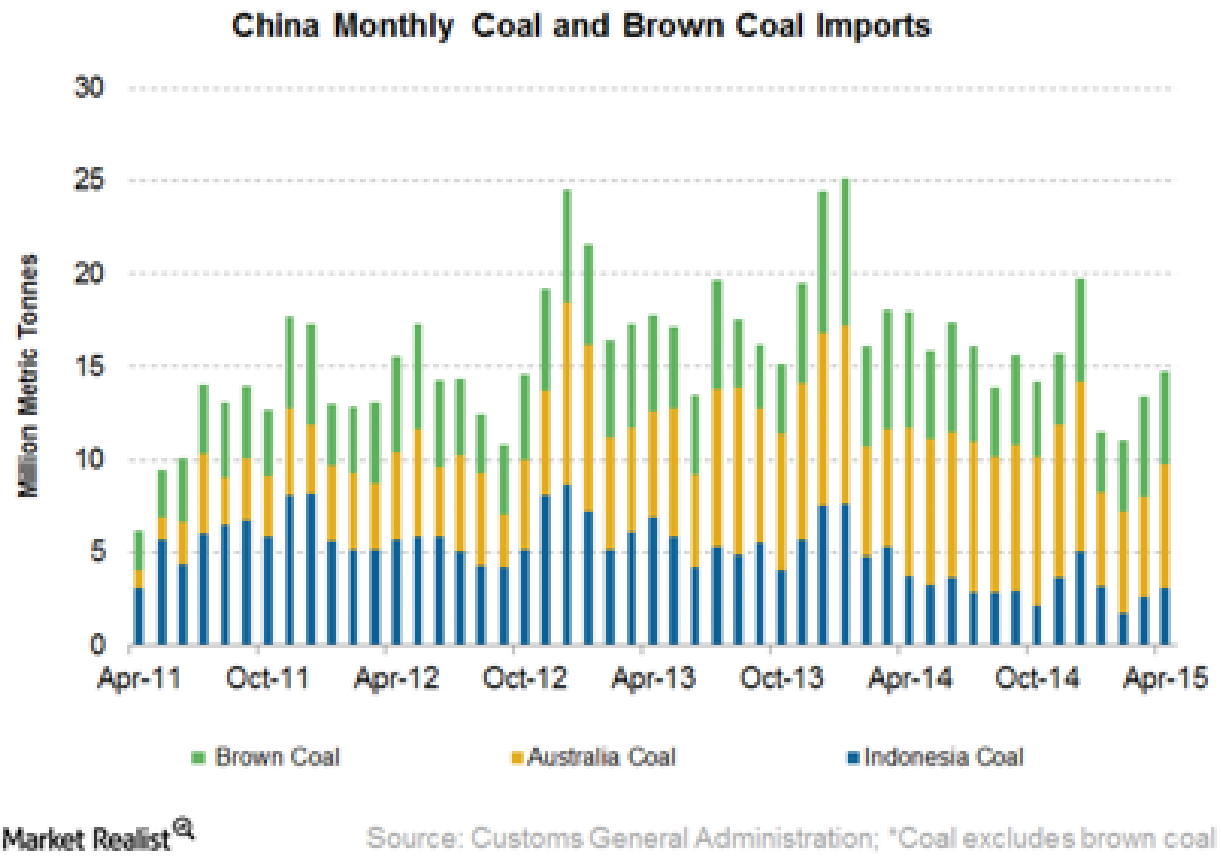
Figure 4: The US Coal Crash



2.2 CHINESE DEMAND

Meanwhile at the fundamental demand level for coal, Chinese demand seems to be peaking due to environmental and health constraints as well as a slow down in growth – a key element we expected in terms of the market overestimating continued demand growth. Recent data shows total imports for the first eight months of 2015 were 3.29 million tonnes, down 16.3 percent from the same period last year:

Figure 5: Chinese Coal Imports



2.3 EUROPEAN UTILITY DEATH SPIRAL

In European terms, the coal story has played out more in relation to utilities.[23] Many have performed poorly again from the fundamental energy transition standpoint of renewable energy being the dispatch of choice. The failure of utilities to adapt to this transition has led to the "Utility Death Spiral" syndrome.

23 See, e.g., Matthew Gray "Coal: Caught in the EU Utility Death Spiral," http://www.carbontracker.org/report/eu_utilities/.

Figure 6: European utility share price performance versus DAX from 2008 to 2013 (2008 = 100)

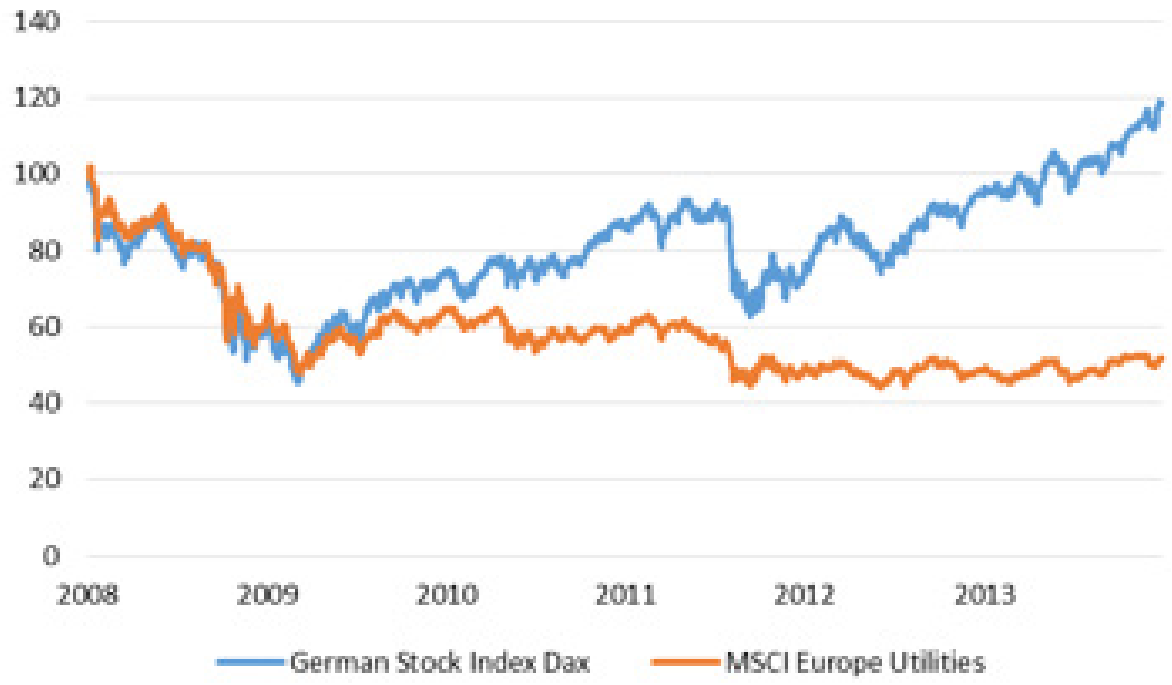
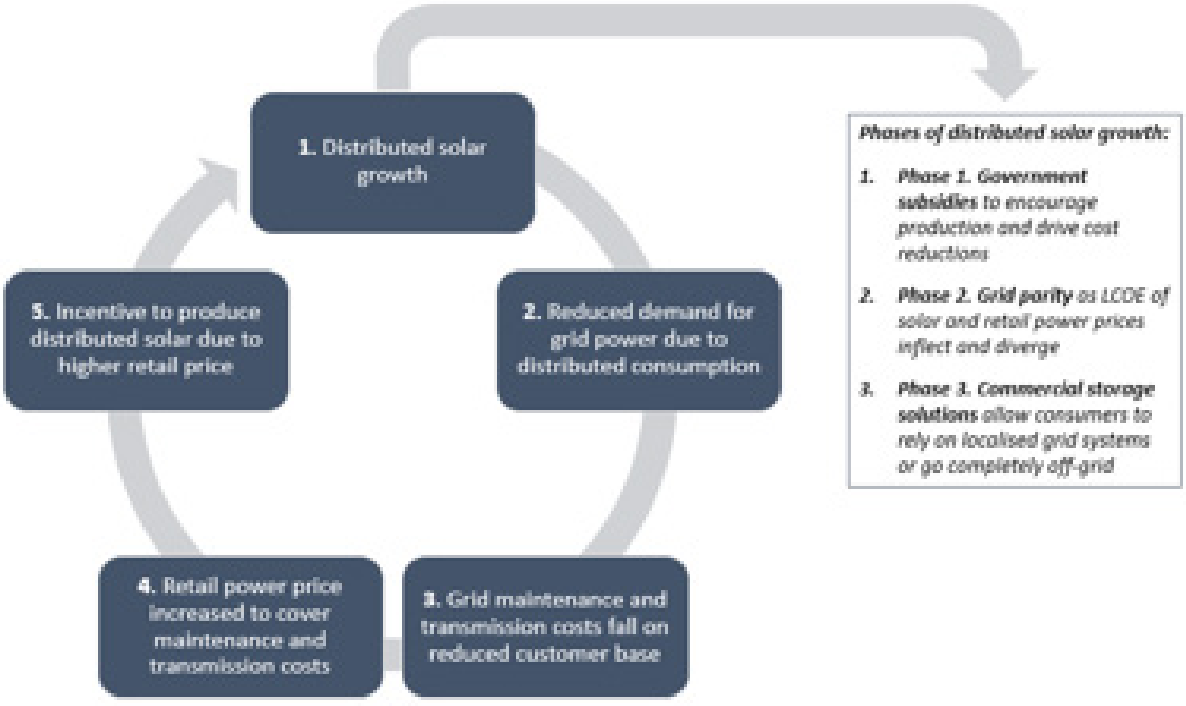


Figure 7: The utility 'death spiral' explained



2.4 OIL MARKETS

The oil markets have experienced a recent return to volatility that few expected.[24] Notably, one of the premises of the carbon asset risk initiative was that the rapid rise in capital costs as compared to a low rate of production growth had put the industry in a fragile position where any faltering in oil demand and/or price would produce significant wasted capital.[25] The commentary of Sheikh Naimi, the Saudi Oil Minister, has emphasized the elements of cheap supply, high cost projects under pressure and recognition of long term carbon constraints at play.

In May 2015 Sheikh Naimi against the background of increased supply into weakening prices stated: "In Saudi Arabia, we recognise that eventually, one of these days, we are not going to need fossil fuels. I don't know when, in 2040, 2050 or thereafter.' Saudi Arabia planned to become a 'global power in solar and wind energy.'"[26]

Relating this to Carbon Tracker's Carbon Supply Curves-Oil Capital Expenditures[27] yields the following observations:

- OPEC and Saudi Arabia were identified as having the lowest cost supply and so the most "climate secure" oil if demand falls more than expected due to climate and other economic factors. Put another way, any battle for market share would see Saudi Arabia in particular as a winner in the long term.
- The question is, does this very long run carbon constraint play a role in their desire to supply low cost oil, even now? Perhaps at the margin that is true.

Regardless, the return to volatility, and in particular, the return to $40-50/barrel has presented, to some degree, the type of stress-testing that the Carbon Asset Risk Initiative called for from the beginning. As a result, some of the highest cost projects have begun to fall by the wayside as companies scramble to identify which projects could be put on hold, whether costs could be renegotiated with vendors, and how much of their planned capital expenditures would need to be slashed in order to preserve their balance sheets and reassure analysts and investors.[28] The Carbon Asset Risk Initiative posited that unconventional reserves, specifically oil sand, deepwater, ultradeepwater, and Arctic drilling would be particularly vulnerable to stranding.[29] Of course Shell's recent announcement that it is suspending its Arctic drilling plans after investing $7-9 billion in exploration costs is the most notable example of the risk of wasted capital.[30] Shell knew as early as February 2014 that its efforts would not be profitable unless the formation it was exploring turned out to be completely full of oil, but it took the gamble and invested an additional $4-5 billion that will never show a return.[31] The initial analysis by Wood Mackenzie below seems to confirm that deepwater/ultradeepwater (which includes some Arctic projects) and oil sands have borne the brunt of the cancellations.

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24 Zain Shauk, "Chevron CEO says $100 a barrel is the new $20," FuelFix (March 4, 2014) available at http://fuelfix.com/blog/2014/03/04/chevron-ceo-says-100-a-barrel-is-the-new-20/.

25 See 2015 Chevron Carbon Asset Risk Resolution available at http://www.ceres.org/investor-network/resolutions/chevron-carbon-asset-risk-2015.

26 Maher Chmaytelli, "Saudi Arabia Minister Sees Day When Nation Exports Gigawatts," Bloomberg (May 21, 2015) available at http://www.bloomberg.com/news/articles/2015-05-21/saudi-arabia-oil-minister-sees-day-when-nation-exports-gigawatts.

27 Carbon Tracker Initiative, Carbon Supply Curves: Evaluating Financial Risk to Oil Capital Expenditures (May 2014) available at http://www.carbontracker.org/wp-content/uploads/2014/09/CTI-Oil-Report-Oil-May-2014-13-05.pdf.

28 Liam Denning, "Big Oil's Disruptive Climate Change," Wall Street Journal (May 6, 2015) available at http://www.wsj.com/articles/big-oils-disruptive-climate-change-1430934533.

29 Carbon Tracker Initiative, Carbon Supply Curves, supra note 27; Carbon Asset Risk, http://www.ceres.org/issues/carbon-asset-risk.

30 Jennifer Dlouhy, "Shell Abandons Arctic Oil Quest after $7 billion bid yields 'disappointing' results," Fuel Fix, (Sept. 28, 2015) available at http://fuelfix.com/blog/2015/09/28/shells-arctic-oil-well-comes-up-dry/#34370101=0. http://fuelfix.com/blog/2015/09/28/shells-arctic-oil-well-comes-up-dry/#34370101=0.

31 Ed Crooks, "Shell's Arctic Extraction to take more than a decade," Financial Times (May 27, 2015) available at http://www.ft.com/intl/cms/s/0/849bffac-0295-11e5-92ce-00144feabdc0.html#axzz3ntKKCPaghttp://www.ft.com/intl/cms/s/0/849bffac-0295-11e5-92ce-00144feabdc0.html#axzz3ntKKCPag; Oceana, Frozen Future: Shell's ongoing gamble in the US Arctic available at http://oceana.org/sites/default/files/reports/Shells_Frozen_Future_2_25_14.pdf.

2.4.1 Wood Mackenzie: Pre-FID project deferrals: 200 billion boe and counting[32]

Finally we can show the impact of all this on expected capital expenditures – a $200bn pull back in the short term at least. Below we extract directly from their recent report.

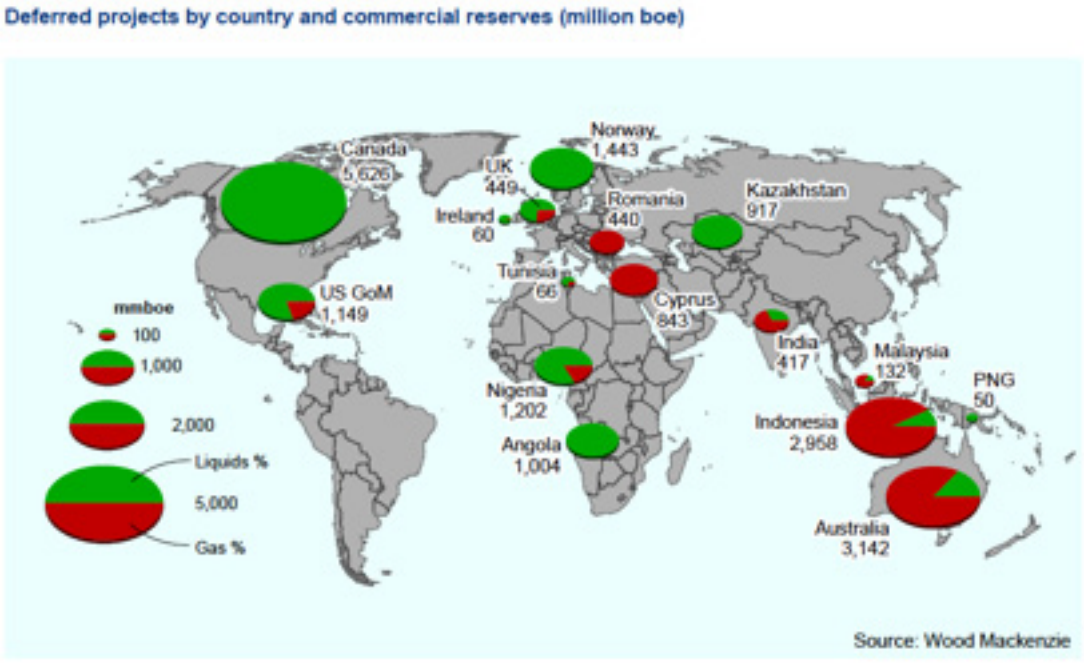
Executive summary[33]

By year-end we may be able to count the number of major upstream projects that made FID during 2015 on one hand. The dramatic fall in oil prices in 2014 and subsequent deconstruction of 2015 company capital budgets has by mid-year already resulted in over 45 major project FID deferrals. Together, these create a substantial hole in the industry's investment pipeline.

We estimate 20 billion boe of reserves has been pushed back from a diverse range of onshore, shallow-water and deepwater developments. Combined, they represent over US$200 billion in potential capital spend. Projects that are technically challenging, have significant upfront costs, and/or low returns have proved vulnerable – over 50% of the 20 billion boe is located in deepwater fields, and nearly 30% in the Canadian oil sands….

The upstream industry is winding back its investment in big pre-FID developments as fast as it can. This is partly because it is one of the quickest ways to free up capital in response to low oil prices, although this process was already underway in the shift to value versus volume. Cost inflationary pressures have pushed many projects into economically marginal territory and operators are now reworking costs and development solutions to achieve their hurdle rates.

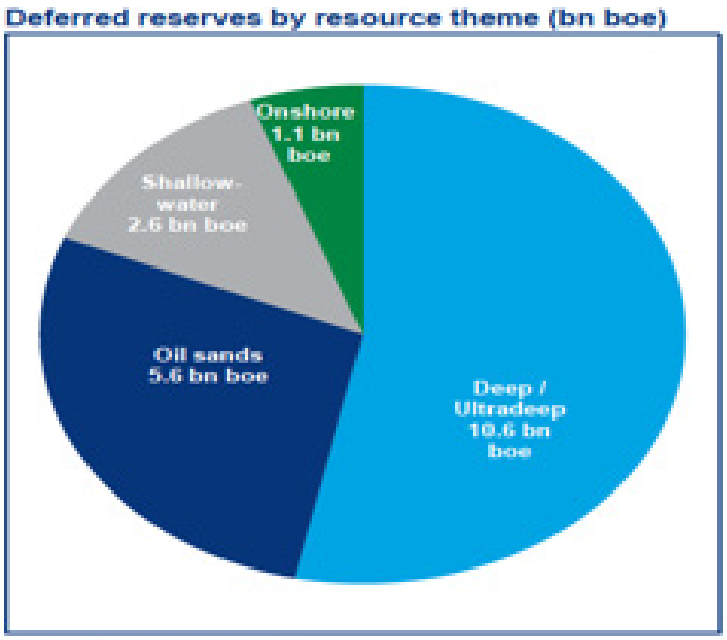
Figure 8: Wood Mackenzie Deferred Oil Projects



32 June 2015.

33 Italicized text and figures are used with permission from Wood Mackenzie.

Figure 9: Deferred Resources



Source: Wood Mackenzie

2.4.2 Oil and Gas companies support Carbon price.

As market forces have created significant financial headwinds for fossil fuel companies and momentum towards the Global Conference of Parties in Paris has grown, six major European integrated oil and gas companies have joined together to issue a call for carbon pricing.[34] The following letter was sent by the CEOs of six major European oil companies to the United Nations indicating their support for a global price on carbon. Many commentators believe this move should be seen in a market context where gas in particular is fighting for market share in power markets in relation to coal. Aside from embracing a policy that will be especially detrimental to coal, the letter also seems to indicate a continuing divide among European and North American integrated majors as to what role they should play in global climate discussions. Chevron and Exxon were approached by investors about joining the letter and each company publicly refused.[35]

34 Reuters, "Oil majors' climate call exposes U.S.-Europe rift on carbon pricing," (June 3, 2015) available at http://www.reuters.com/article/2015/06/03/us-climate-change-oil-majors-idUSKBN0OJ19E20150603; ThinkProgress, "Why you should be skeptical of big oil companies asking for a price on carbon," (June 3, 2015) available at http://thinkprogress.org/climate/2015/06/03/3665618/oil-companies-want-carbon-price/.

35 Joe Carroll and Bradley Olson, "Exxon, Chevron Say No Thanks to European Peers on Climate," Bloomberg (May 27, 2015) available at http://www.bloomberg.com/news/articles/2015-05-27/exxon-ceo-says-it-won-t-give-lip-service-on-climate.

Her Excellency
Ms. Christiana Figueres
Executive Secretary of the UNFCCC
UNFCCC secretariat - UN Campus
Platz der Vereinten Nationen1
53113 Bonn
Germany

His Excellency
Mr. Laurent Fabius
President of COP21
Ministry of Foreign Affairs
37, Quai d'Orsay
75007 Paris
France

Friday, May 29th 2015

Dear Excellencies,

Climate change is a critical challenge for our world. As major companies from the oil & gas sector, we recognize both the importance of the climate challenge and the importance of energy to human life and well-being. We acknowledge that the current trend of greenhouse gas emissions is in excess of what the Intergovernmental Panel on Climate Change (IPCC) says is needed to limit the temperature rise to no more than 2 degrees above pre-industrial levels. The challenge is how to meet greater energy demand with less CO2. We stand ready to play our part.

Our companies are already taking a number of actions to help limit emissions, such as growing the share of gas in our production, making energy efficiency improvements in our operations and products, providing renewable energy, investing in carbon capture and storage, and exploring new low-carbon technologies and business models. These actions are a key part of our mission to provide the greatest number of people with access to sustainable and secure energy.

For us to do more, we need governments across the world to provide us with clear, stable, long-term, ambitious policy frameworks. This would reduce uncertainty and help stimulate investments in the right low carbon technologies and the right resources at the right pace.

We believe that a price on carbon should be a key element of these frameworks. If governments act to price carbon, this discourages high carbon options and encourages the most efficient ways of reducing emissions widely, including reduced demand for the most carbon intensive fossil fuels, greater energy efficiency, the use of natural gas in place of coal, increased investment in carbon capture and storage, renewable energy, smart buildings and grids, off-grid access to energy, cleaner cars and new mobility business models and behaviors.

Our companies are already exposed to a price on carbon emissions by participating in existing carbon markets and applying 'shadow' carbon prices in our own businesses to test whether investments will be viable in a world where carbon has a higher price.

Yet, whatever we do to implement carbon pricing ourselves will not be sufficient or commercially sustainable unless national governments introduce carbon pricing even-handedly and eventually enable global linkage between national systems. Some economies have not yet taken this step, and this could create uncertainty about investment and disparities in the impact of policy on businesses.

Christiana Figueres, the Executive Secretary of the UN Framework Convention on Climate Change responded by asking the companies to (1) participate in detailed, open carbon pricing dialogues; (2) commit to consistent government engagement focused on supporting a long term policy framework; and (3) plan for long term scenarios consistent with an orderly transition to low carbon forms of energy.[36] It remains to be seen whether the companies will follow through on all aspects. Investors have also been active in calling on companies to engage positively in climate dialogues.[37]

2.5 SELECTION OF MARKET ANALYST RESEARCH PAPERS.

CAR and Climate Change: Sell-Buy side analysts, Rating agencies, Consulting Actuaries and Investors 2013- to date.

Figure 10: Analyst Reports

ANALYSTS
Actuarial Profession - Resource constraints: sharing a finite world, 17 January 2013
The Actuary, The Environment: The carbon bubble, September 2013
Allianz Global Investors - ESG matters, Issue 6, October 2013
Aperio Group – Do the Investment Math: Building a Carbon-Free Portfolio, 2013
Bank of America IIGCC Seminar - Unburnable carbon? Nov 2011
Bernstein – Asia Strategy: Shouldn't we all be dead by now? May 2015
Bloomberg, Carbon Risk Valuation Tool. November 2013
Bloomberg NEF White Paper - Fossil fuel divestment: a $5 trillion challenge, 25 August 2014
Cazenove - Responding to Climate Change Risk in Portfolio Management, February 2015
CDSB - Climate resilient stock markets, December 2014
Citi - BHP Billiton & Climate Change, Oct 2013
Citi – Global Oil Demand Growth – The End is Nigh, 2013
Citi - Energy Darwinism II report, August 2015
Deutsche Bank - Peak carbon before peak oil, in Deutsche Bank, Konzept, Issue No. 2 (January 20, 2015)
The Economist's Intelligence Unit- The cost of inaction: Recognising the value at risk from climate change, 2015
HSBC – Oil & Carbon Revisited: Value at risk from 'unburnable' reserves, January 2013.
HSBC – Keeping it cool: Oil, CO2 and the carbon budget, March 2015
HSBC - Stranded assets: what next? April 2015
HSBC - Green Bonds. More to come, May 2015
HSBC – Decoupling CO2, energy & GDP, June 2015
HSBC – G7 climate change declarations, June 2015
IHS Herold - Deflating the "Carbon Bubble," Sept. 2014
ITS Global - Fossil Fuels- A Sound Investment in a Growing World, 20 June 2013

36 UNFCC, Christiana Figueres Urges Higher Amibtion from Oil Industry, available at http://newsroom.unfccc.int/unfccc-newsroom/christiana-figueres-urges-higher-ambition-from-oil-industry/.

37 In September 2015, IIGCC coordinated a letter to 75 European companies to invite a dialogue on European climate and energy policy and how this relates to their business strategy. The letter was supported by 50 investors from 8 countries representing over € 4.4 trillion in assets under management. The engagement aims to encourage companies to support climate policy measures that investors have agreed are cost-effective and protective of long-term investment value.

ITS Global - SUSTAINABLE RESOURCE INVESTMENT Briefing, Feb 2014
Kepler Cheuvreux - Toil for oil spells danger for majors, Sept. 2014
Kepler Cheuvreux - Stranded assets, fossilised revenues, April 2014
KLP - Carbon Report: Investments in Fossil Fuel, Nov 2014
Mercer – Investing in a Time of Climate Change, 2015
MSCI ESG Research Issue Brief - FAQ: Responding to the Call for Fossil-fuel Free Portfolios, June 2013
MSCI ESG Issue Brief Options for Reducing Fossil Fuel Exposure, Updated January 2014
Platts, Grounded in Reality: The problem of Stranded Assets, December 2014
PwC – The road ahead: Gaining momentum from energy transformation, 2015
Rystad Energy - Petroleum Production under the two degree scenario (2DS), July 2013
Sustainable Insight Capital Management- The Risks and Returns of Fossil Fuel Free Investing, 2014
Towers Watson - Exploring the stranded assets debate, Jan 2015
Trucost - Stranded Assets: Fossil Fuels, 2014
UBS Investment Research - Sustainable Innovation: “Integration”, May 2013
UBS, Global Utilities: Does the future of solar belong with Utilities, June 2015
World Coal Association - Policy Challenges Ahead of the Global Coal Industry, April 2013
World Energy Council - World Energy Trilemma, 2013
RATINGS AGENCIES
Moody’s, Global Mining Industry/Water Scarcity to Raise Capex and Operating Costs, Heighten Operating Risks, February 2013
Moody’s, US Nuclear and Coal-Fired Power Plant Retirements to Jolt Some Local Governments, June 2014
Moody’s, Summary of Moody’s Views on Key Corporate Governance Issues, November 2014
Moody’s, Impact of Carbon Reduction Policies is Rising Globally, March 2015
Moody’s, Coal-Fired Power Plants Won’t Soon Be Replaced by Alterative Sources, July 2015
INVESTORS
Boston Common Asset Management – Boston Common’s Approach to the Energy Sector: A Practical Challenge, January 2013
Environment Agency Pension Fund - Strategy to reduce climate risk, 2014
First Capital - Responsible Investment and Stewardship Annual Report 2013
Expert Group Appointed By The Norwegian Ministry Of Finance - FOSSIL-FUEL
Investments in the Norwegian Government Pension Fund Global, Dec 2014
GMO Quarterly Letter, Jeremy Grantham, Nov 2012
Green Century& Trillium – Extracting Fossil Fuels from your Portfolio, 2013
CDSB - Climate resilient stock markets, December 2014
Impax Investment - Beyond Fossil Fuels: The Investment Case for Fossil Fuel Divestment, 2013

3. ENGAGEMENT, DISCLOSURE AND SHAREHOLDER PROPOSALS

Engagement with asset operators/companies can take many forms but the most important in relation to Carbon Asset Risk (CAR) are simply:

- Asking a company to disclose more information – this could be in regulatory form but frequently in more informal informational discussion pieces; and
- Asking a company to change its practices.

The key initiators of engagement have been:

- Investors themselves, and
- NGOs either on their own behalf or on behalf of investors as members.

These actions can proceed through two primary channels:

- Engaging directly with the company, via mechanisms such as the shareholder proposal process; and
- Engaging directly with policymakers and regulators to, for example, seek improved disclosure or establish and implement relevant policy changes.

Because information obtained in direct one on one engagement with corporations may not be in the public domain, we focus on the more public aspects of engagement surrounding CAR, especially through NGOs. A critical focus of shareholder engagement has been to have companies disclose carbon asset risks associated with a 2 degree scenario. In response to those efforts, ConocoPhillips and Statoil have endorsed the use of 2 degree scenario analysis, but have not released the methodology or modeling assumptions behind those assessments. BHP Billiton became the first major fossil fuel company to disclose some of the details behind its analysis of multiple 2 degree scenarios on September 29, 2015.[38] While BHP Billiton's analysis represents real forward progress, it would benefit from additional detail regarding how the company will incorporate the analysis into its capital planning processes and which types of resources and projects are most vulnerable to these low demand scenarios. None of the other oil, gas, coal, or utility majors has disclosed the results of such an analysis on the viability of their reserve and resource portfolios, though some have begun to consider it internally. This is a tremendous departure from earlier responses to the CAR Initiative that simply dismissed the feasibility of achieving the 2 degree goal. Now, Statoil has not only stated that "the 2 degree target is possible," but it has laid out a potential pathway to achieving it.[39]

3.1 BACKGROUND

Engagement on CAR stands on the shoulders of both formal and informal disclosure efforts. CDP has developed the largest collection globally of self reported climate change disclosures and has recently expanded its climate survey to include supplementary questions related to carbon asset risk and more specifically, the risks to the oil and gas sector.[40] For embedded emissions reporting,

38 BHP Billiton press release available at http://www.bhpbilliton.com/investors/news/diversification-and-competitiveness-provide-resilience-to-climate-risk.

39 Statoil, Energy Perspectives 2015, available at http://www.statoil.com/en/NewsAndMedia/News/2015/Pages/04Jun_Energy_perspectives.aspx.

40 For more information about CDP's collection visit https://www.cdp.net/en-US/Pages/About-Us.aspx.

the World Resources Institute and World Business Council on Sustainable Development created the Greenhouse Gas Protocol (GHG Protocol) that has set the standard globally for measuring, managing and reporting greenhouse gas emissions.[41]

Past regulatory developments have also fed the CAR initiative. In the United States, Ceres has worked with its Investor Network on Climate Risk to persuade the Securities and Exchange Commission (SEC) to improve disclosure of climate change risks in companies' annual mandatory financial filings. A petition filed with the SEC in 2007 by investors representing $1.2 trillion in assets resulted in the SEC's 2010 guidance that said that climate change and related regulations lead to risks and opportunities for companies in a variety of sectors, and those issues, when material, must be disclosed in SEC filings.[42]

Building upon these steps, member-based NGOs have sought additional detail from the fossil fuel sector. For example, in December 2014, the Global Investor Coalition on Climate Change, led by IIGCC and Ceres, developed a document outlining the key disclosures sought during company engagements, known as "Investor Expectations: Oil and Gas Company Strategy." CDP has since mapped the Investor Expectations to its 2015 climate change questionnaire.[43]

NGOs and investors have also examined the discrepancies between a company's disclosures to CDP, the SEC, and other reporting organizations, providing a much clearer picture of how companies have downplayed or given short shrift to such risks in government-mandated reporting while elaborating on them in voluntary reporting forms in order to increase their score or ranking.[44] These discrepancies were highlighted in recent correspondence to the SEC by Ceres and CTI as an indication that fossil fuel companies are not meeting the current reporting requirements.[45] Although more work is needed, it appears that regulators are at least listening to the concerns.

Here, we focus on several critical NGO and investor-led engagements, starting with CAR letters sent to 45 oil, gas, coal and utility companies in 2013 followed by shareholder proposals filed in subsequent years. We then discuss Carbon Tracker's in-depth engagement with responses from Shell and ExxonMobil that the INCR/IIGCC/CAR process generated. Finally, we take a step back from the detail and summarize the breadth of fossil fuel company responses to CDP's questionnaire. CTI analyzed those responses in an October 2014 report entitled "Recognizing Risk, Perpetuating Uncertainty."[46]

41 For more information about the GHG Protocol visit http://www.ghgprotocol.org/.

42 Ceres, Cool Response: The SEC & Corporate Climate Change Reporting, available at https://www.ceres.org/resources/reports/cool-response-the-sec-corporate-climate-change-reporting/view.

43 CDP, Linking CDP and GIC's Investor Expectations: Oil and Gas Company Strategy, available at https://www.cdp.net/Documents/technical/2015/Linking-CDP-Investor-Expectations-Oil-Gas-Company-Strategy.pdf.

44 See, e.g., Ceres, "Sustainable Extraction? An Analysis of SEC Disclosure by Major Oil & Gas Companies on Climate Risk and Deepwater Drilling Risk" available at http://www.ceres.org/resources/reports/sustainable-extraction-an-analysis-of-sec-disclosure-by-major-oil-gas-companies-on-climate-risk-and-deepwater-drilling-risk/view.

45 Ceres letter available at http://www.ceres.org/files/confidential/investor-sec-letter-inadequate-carbon-asset-risk-disclosure-by-oil-and-gas-companies/at_download/file; CTI letter available at http://www.carbontracker.org/report/letter-to-the-u-s-securities-and-exchange-commission/.

46 Carbon Tracker Initiative, "A baseline survey of climate disclosures by fossil fuel companies, Recognising Risk, Perpetuating Uncertainty available at http://www.carbontracker.org/report/climateriskdisclosures/.

3.2 INVESTOR ENGAGEMENT: CERES AND IIGCC REVIEW OF INVESTOR ENGAGEMENT[47]

While investors have for years been engaging with companies on the risks from climate change, 2013 was a watershed year when over 75 investors representing more than $3.5 trillion in assets issued letters to 45 of the world's largest oil, gas, coal and electric utility companies[48] calling on them to assess and disclose the potential exposure they faced to carbon asset risk.[49] This investor letter was the first step of the Carbon Asset Risk Initiative and has led to a sustained engagement campaign organized by Ceres and IIGCC and supported through collaboration with Carbon Tracker.

The goals of the CAR Initiative were ambitious but straightforward:

1. To prevent shareholder capital from being wasted on developing high-carbon and high-cost fossil fuel reserves that are "unburnable" if the world is to avoid catastrophic climate change or may prove uneconomic if prices decline; and
2. To drive fossil fuel companies to acknowledge and plan for the escalating physical impacts of climate change such as higher temperatures, rising seas and stronger storms.

The range and quality of responses varied greatly, some companies were spurred to take positive actions and stake out meaningful positions in response to the initial letters:

Figure 11: CAR Initiative Responses

BG Group	• Explained that it has a 'group-wide GHG target which applies to our equity-share emissions from all assets in our portfolio which we set to align with recommendations from IPCC and IEA 450 ppm scenarios.[50] • Recognized that for natural gas to contribute meaningfully to climate goals, methane has to be controlled. BG Group explicitly pointed to the recommendation of IGCC, INCR, and IIGCC as its rationale for joining the UN's CCAC initiative to reduce methane emissions.[51] • Pointed to its decision not to pursue Arctic, oil sands, heavy oil, or coal as a signal of its climate commitment.
PetroChina	• Indicated support for a global climate agreement. • Recognized that China has embraced a target of limiting warming to 2C and 450 ppm, and pointed to a binding emissions reduction target of 40-45%.[52]
Statoil	• Voiced support for a 2C goal even though it ultimately concluded it is "not a realistic outcome."[53]
Total	• Voiced support for "international and progressive agreements on climate."[54]
Eni	• Supported a post-2020 climate agreement and discussed a strategy to reduce "carbon intensity" that has been in place since 2000.[55]
Suncor	• Recognized the "importance" of working to keep CO2 below 450ppm, and committed to establishing GHG reduction targets for 2015 (yet to be set).[56]

47 This section focuses primarily on resolutions that require reporting; however, it is important to note that investors have filed resolutions calling for actions ranging from establishing science-based greenhouse gas targets to methane reductions to explicitly reducing capital expenditures. For more information on those resolutions, see "Carbon Asset Risk: A Review of Progress and Opportunities" (June 2015) available at http://www.ceres.org/resources/reports/carbon-asset-risk-a-review-of-progress-and-opportunities/view.

48 See Appendix 1 for a list of the companies that received letters.

49 Copies of individual initial letters to oil, gas, coal, and electric utilities available at www.ceres.org/carbonassetrisk.

50 Letter from Andrew Gould, Chairman to Ryan Salmon at 1 (Aug. 28, 2014).

51 Id. at 2, 8.

52 Letter from Mao Zefeng, Joint Company Secretary to Narina Mnatsakanian (Apr. 4, 2014).

53 Letter from Hilde Merete Nafstad, Senior Vice President to Ryan Salmon at 5 (Oct. 4, 2013).

54 Letter from Martin Deffontaines, Vice President to Ryan Salmon at 3 (Apr. 9, 2014).

55 Letter from Francesco Gattei, Senior Vice President to Ryan Salmon at 2 (Jun. 9, 2014).

BHP Billiton	• Recognized that the world must pursue:[57] - Limiting climate change to the lower end of the IPCC emission scenarios in line with current international agreements; - Providing access to the affordable energy required to continue economic growth; - Implementing a price on carbon in a way that addresses competitiveness concerns and achieves lowest cost emissions reductions.
Exxaro	• Accepted the IPCC assessment of climate change and asserted its goal of becoming carbon through a range of initiatives including:[58] - Carbon Capture and Storage (CCS) for coal plants - Energy efficiency throughout its operations - Co-generation power plants - Wind energy projects - Management of climate impacts through increased resilience

Stepping back from the details of each company's recognition of carbon asset risks, the letters evinced an emerging trend in fossil fuel companies from different sectors developing distinct positions on addressing climate change, which suggests the potential for the political process to become more effective. The first signs of this split began to emerge as cheap natural gas started to dislodge coal's grip on power generation in the U.S.; the first responses to the Carbon Asset Risk Initiative letter confirmed that change, as one after another oil and gas company pointed to coal as the overwhelming source of carbon dioxide emissions and the most likely fossil fuel to be stranded. At the same time, these companies pointed to their ability to shift towards natural gas to reduce their "carbon intensity" and take up coal's market share in the power generation sector as the primary reason that they would not see major stranding.[59]

Shareholders followed up on the more than 20 responses investors received to their carbon asset risk letters with formal shareholder proposals to the companies, to be voted upon at their annual general meetings. In the U.S., shareholders conducted a three-pronged approach.

First, they added the "Carbon Asset Risk" resolution to the several climate change-related resolutions already being offered at fossil fuel companies.[60] While there is some variation amongst these resolutions, they typically focus on the financial risks faced by the company in any scenario in which the internationally recognized goal of limiting warming to 2C is approximated. The vast majority of these resolutions have been allowed by the SEC, suggesting that resolutions pertaining to risks flowing from the important policy target of limiting warming to no more than 2C are perfectly acceptable. The carbon asset risk resolution has now been placed on the proxy ballot at over 20 companies, in many cases receiving more than 25% shareholder approval—a very significant number for shareholder approvals that have been unanimously opposed by the company's board.

The most notable response to these resolutions came from ExxonMobil. At the end of 2013, Arjuna Capital, As You Sow, The Christopher Reynolds Foundation and the Tri-State Coalition began a series of engagements regarding carbon asset risk with ExxonMobil. In response to resolutions filed by

56 Letter from Arlene Strom, Vice President to Ryan Salmon at 1-2 (Nov. 15, 2013).

57 See Peabody Energy Corporate Responsibility Report available at http://www.peabodyenergy.com/content/200/publications/csr-reports.

58 Letter from SA Nikosi, CEO to Ryan Salmon (Jan. 28, 2015).

59 The potential pitfalls of relying too heavily on natural gas as a hedging strategy are detailed in Carbon Tracker Initiative's recent report, Carbon Supply Cost Curves: Evaluating the Risk to Natural Gas (2015) available at http://www.carbontracker.org/report/gascostcurve/.

60 Valerie Volcovici, "Investor group demands fossil fuel companies disclose carbon asset risk," Reuters (February 12, 2014) available at http://www.reuters.com/article/2014/02/12/usa-climate-disclosure-idUSL2N0LH0PB20140212.

these groups, ExxonMobil agreed to conduct and issue a report assessing its vulnerability to carbon asset risk. Exxon released the report on March 31, 2014.[61] Though the conclusions Exxon reached were at odds with the premises of the CAR Initiative, largely due to its refusal to consider a 2C scenario as a possibility, this represented a significant departure for Exxon from its usual strategy of setting its own terms for the debate.[62] For the first time, a major—in many people's mind, the major—integrated oil and gas company was entering into the conversation on investors' terms and providing new insight into the assumptions that drive its business decisions.

Second, investors have begun to highlight the need to change the executive compensation structures at fossil fuel companies focusing on compensation schemes which reward reserve replacements of even the highest cost capital projects. In response to investor efforts by IIGCC member, Matthew Crossman of Rathbone Greenbank, Shell made some adjustment to its executive compensation structure. In its 2014 executive remuneration report, Shell announced that the long-term incentive program performance measures would be altered and that "[f]or awards from 2014 onwards, the relative hydrocarbon production growth performance measure has been replaced by relative return on average capital employed (ROACE) growth, giving greater focus on capital efficiency."[63]

In 2015, the Unitarian Universalist Association and the Presbyterian Church (USA) filed a resolution at ConocoPhillips pursuing this angle. The resolution sought to 'de-link' executive compensation from reserves replacement by requesting that ConocoPhillips

> *'adopt a policy that it will not use 'reserve additions,' 'reserve replacement ratio' ('RRR') or any other metric based on reserves to determine the amount of any senior executive's incentive compensation without adjusting reserves to exclude barrels of oil equivalent that are not economically producible under a Demand Reduction Scenario in which the price of a barrel of Brent crude oil decreases to $65….'*

Proxy advisory firm ISS recommended against the resolution because it viewed the $65/bbl figure to be too prescriptive; however, with oil now having stayed in the $40-50/bbl range for months, shareholders and proxy advisory firms may view such resolutions differently. Therefore, while the resolution received only 5.8% of shareholder votes in 2015, it remains to be seen whether, in light of the persistent low oil price environment, investors are not more concerned about the practice of rewarding executives for replacing reserves with barrels of oil that are more costly than prevailing market prices.

Third, in an effort led by the New York City Comptroller's Office and coordinated with Ceres INCR, shareholders in U.S. companies have sought the ability to nominate their own candidates for the board and have those candidates added to the company's proxy for voting purposes. This "proxy access" campaign was targeted at companies that were deficient in one or more of three areas—one of those areas was climate change and therefore swept in many fossil fuel companies.[64]

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61 Exxon Mobil, Energy and Carbon: Managing the Risks (March 2014) available at http://cdn.exxonmobil.com/~/media/global/files/other/2014/cover-letter-to-arjuna-capital.pdf.

62 Andrew Logan, Investors question forecasts from ExxonMobil and other oil companies, The Guardian (Dec. 12, 2014) available at http://www.theguardian.com/sustainable-business/2014/dec/12/investors-exxonmobil-big-oil-forecasts-climate-change-environment.

63 Royal Dutch Shell, SEC Form 20-F, p. 76 available at http://www.sec.gov/Archives/edgar/data/1306965/000119312514096790/d605787d20f.htm.

64 For more detailed information on the New York City Comptroller's Board Accountability Project visit: http://comptroller.nyc.gov/boardroom-accountability/.

The campaign was immensely successful this past year. 23 of 33 resolutions that went to a vote at fossil fuel companies received more than 50% support—an unprecedented level of support considering that in virtually all of those instances, the companies' boards recommended against the resolutions.[65] Notably, Apache Energy Corporation, one of the energy companies that has been most engaged with investors over a sustained period of time, supported the proxy access resolution demonstrating just how important long-term engagement can be in moving companies.[66]

A list of the carbon asset risk, proxy access and carbon asset-risk related resolutions filed the past two years (see Appendix 2) suggests both increasing concern from investors as to the financial implications of climate change and a willingness to call for fundamental changes to company strategy for thriving in a carbon-constrained world.

Engagement of investors with fossil fuel companies on climate and carbon asset risk in the U.S. has increased over the past two years as shown by the following table, which includes the total number resolutions filed:[67]

Figure 12: Proxy Resolutions

Resolutions	2013	2014	2015
Climate resolutions	110	150	167
GHG Targets	4	20	28
Proxy Access/ Governance	0	3	41
CAR resolutions	5	13	15

Increased entrenchment from some of the North American fossil fuel companies this past proxy season show a need for even more coordinated action during the 2016 proxy season.

Similar resolutions have met with even greater success in Europe. European investors, supported by IIGCC, have been actively engaged with European oil and gas companies and in January 2015 ushered in the first examples of fossil fuel companies endorsing climate resolutions as Shell, BP, and Statoil announced support for carbon asset risk resolutions developed and filed by the "Aiming for A Coalition."[68] These resolutions titled "Strategic Resilience for 2035 and beyond," were filed at Shell, BP, and Statoil and received more than 98% approval from shareholders.[69] Although the "Aiming for A" resolutions were endorsed by company management, this endorsement may be suggestive of the growing recognition within some corners of the fossil fuel sector that a broad range of shareholders are genuinely concerned about carbon asset risks. The "Aiming for A" resolutions asked the companies to report, on an ongoing and annual basis, on the following issues:

65 Corinne Ramey, "Comptroller Scott Stringer is Lauded for Work on Shareholders," Wall Street Journal (September 29, 2015) available at http://www.wsj.com/articles/comptroller-scott-stringer-is-lauded-for-work-on-shareholders-1443492738.

66 Terry Wade, "Apache shareholders approve proxy access proposal," Reuters (May 14, 2015) available at http://www.reuters.com/article/2015/05/14/us-apache-agm-idUSKBN0NZ2EZ20150514.

67 Note, some resolutions may not have gone to vote due to agreements for withdrawals. For more detail on the results of the 2013 and 2014 proxy seasons see 110 shareholder resolutions related to climate change and fossil fuel use yield strong results during 2013 proxy season available at http://www.ceres.org/press/press-releases/110-shareholder-resolutions-related-to-climate-change-and-fossil-fuel-use-yield-strong-results-during-2013-proxy-season?searchterm=proxy+2013; Investors secure groundbreaking corporate commitments to protect forests, reduce carbon emissions available at http://www.ceres.org/press/press-releases/investors-secure-groundbreaking-corporate-commitments-to-protect-forests-reduce-carbon-emissions?searchterm=2014+proxy.

68 Helen Wildsmith of CCLA led the engagement with BP and Matt Crossman led the engagement with Shell while AP2 and AP4 engaged with Statoil. See http://www.lapfforum.org/LNews/FullListings-Institutional-Supporters-Resolution25-BPAGM-As-at-14thApril2015.pdf; http://www.ap2.se/en/Financial-information/Press-releases/2015/ap2-submits-shareholder-proposals-for-increasing-climate-reporting-of-statoil/.

69 More details on the votes can be found at https://www.churchofengland.org/media-centre/news/2015/04/98-vote-for-climate-change-resolution-at-bp-agm.aspx and at http://www.lapfforum.org/news/files/MediaReleaseAimingforAInvestorCoalitionWelcomesDecisiveShellAGMClimateVote19thMay2015.pdf.

- Testing asset portfolio resilience to the IEA scenarios, including the 2C scenario;
- Key performance indicators and executive incentives;
- Low Carbon R&D strategies;
- Public Policy engagements on climate issues.

It is no coincidence that these three companies were also among the six European majors who joined together to send a letter to the UN voicing their support for global carbon pricing mechanisms and among the eight oil companies who will be meeting in Paris this month to discuss their plans to engage on climate. Many have criticized engagement strategies for focusing on disclosures; however, it is clear that engagement has resulted in real, substantive actions on the ground including cancellation of risky, costly projects. Three prime examples of actions that go beyond disclosure are included below:

Statoil provided one of the most detailed responses to the initial CAR letter and has a history of engaging with shareholders on sustainability issues at the highest levels of the company. In September 2014 after extensive engagement with Mercy Investment Services and Boston Common Asset Management, Statoil deferred the Corner oil sands project in Alberta for at least three years and announced that it would be reviewing all of its projects and prioritizing only the most competitive.[70] In 2015, Statoil chose a new CEO, Eldar Saetre, who previously served as the head of the company's renewable energy group.[71] Statoil also announced that it would defer plans for Arctic drilling.[72] In addition, as described above, Statoil is one of the only oil majors to conduct an analysis of the impacts of a 2 degree scenario on its assets. Statoil's analysis concluded that the 2 degree target could be achieved, contrary to the claims of some of its competitors, and Statoil also recognized that a failure to meet the 2 degree target would result in serious economic consequences that could have negative consequences on demand.[73]

Newfield Exploration changed its SEC disclosures in direct response to shareholder engagement. Newfield is now one of the only oil and gas companies to use the "Reserve Sensitivity Table" in their 10-K reports.[74] This tool was developed by the SEC in 2009 as part of its efforts to amend its reserve reporting rules. The sensitivity table provides investors with important data on the risk to reserve value for a broader range of oil prices.

Of the North American majors, only ConocoPhillips has publicly endorsed the use of scenario planning that includes an analysis of three scenarios that would result in a 50% chance of limiting global average temperature rise to 2C. According to ConocoPhillips: "We have integrated carbon-restricted scenarios into the strategic portfolio planning process to test our portfolio, and have developed annual GHG price forecasts for companywide use in long-range planning and project evaluation."[75] However, ConocoPhillips has not disclosed how it uses these scenarios to inform capital planning decisions and has not publicly disclosed information about the methodologies and assumptions used to develop the scenarios or the range of impacts that each scenario would have on its portfolio of assets.

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70 See Statoil announcement available at http://www.statoil.com/en/NewsAndMedia/News/2014/Pages/25Sept_CornerPostponement.aspx; Mercy Investment announcement available at http://www.mercyinvestmentservices.org/community-investing-news/925.

71 Mikael Holter, "Statoil Picks Acting CEO as Permanent Boss after Lund," Bloomberg Business (Feb. 4, 2015) available at http://www.bloomberg.com/news/articles/2015-02-04/statoil-appoints-eldar-saetre-as-new-ceo-to-succeed-helge-lund.

72 Mikael Holter, "Statoil Puts Arctic Exploration on Hold after Oil Price Plunge," Bloomberg Business (Jan. 29, 2015) available at http://www.bloomberg.com/news/articles/2015-01-29/statoil-puts-arctic-exploration-on-hold-after-oil-price-plunge.

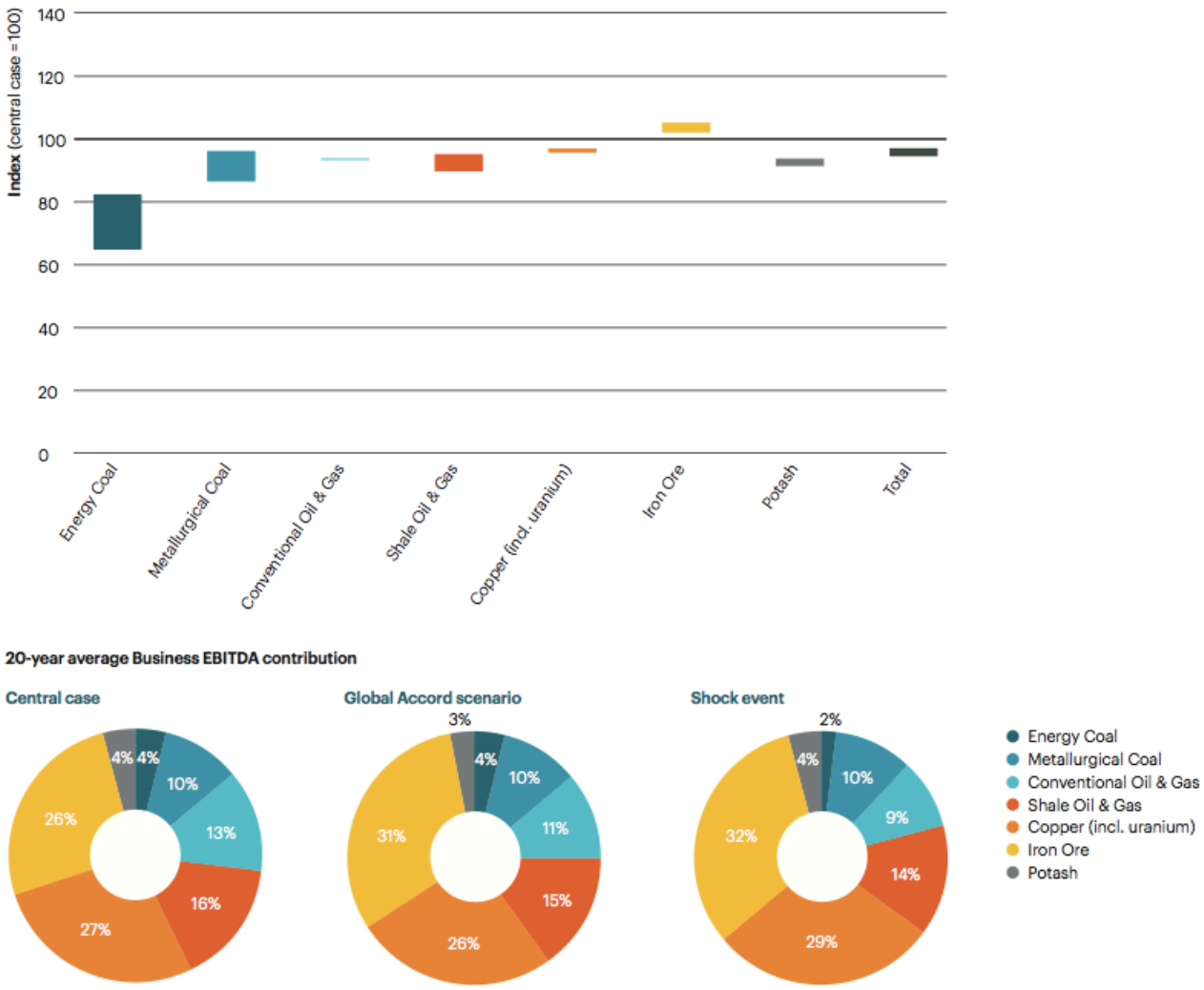
73 Statoil, Energy Perspectives 2015, 3 (June 2015) available at http://www.statoil.com/en/NewsAndMedia/News/2015/Downloads/Energy%20Perspectives%202015.pdf.

74 Newfield Exploration 2014 10-K.

75 See ConocoPhillips website available at http://www.conocophillips.com/sustainable-development/environment/climate-change/managing-risks-and-opportunities/Pages/carbon-asset-risk.aspx.

BHP Billiton has issued one of the most detailed analyses to date on the potential impacts that multiple 2 degree scenarios could have on its portfolio. BHP Billiton's report represents a significant step forward. Although BHP Billiton concludes that it will not see significant asset stranding, the reasoning behind that conclusion represents a sea change from the premise relied upon by Exxon and Shell in earlier responses. Instead of dismissing any possibility of achieving the globally agreed upon 2 degree target, BHP Billiton recognizes that wasted capital is a threat, and essentially commits to adjust its allocation of capital expenditures to address the kinds of triggers and events that create carbon asset risk to mitigate any damage to its portfolio of reserves and resources.[76]

Figure 13: 20-year Average Business EBITDA Contribution



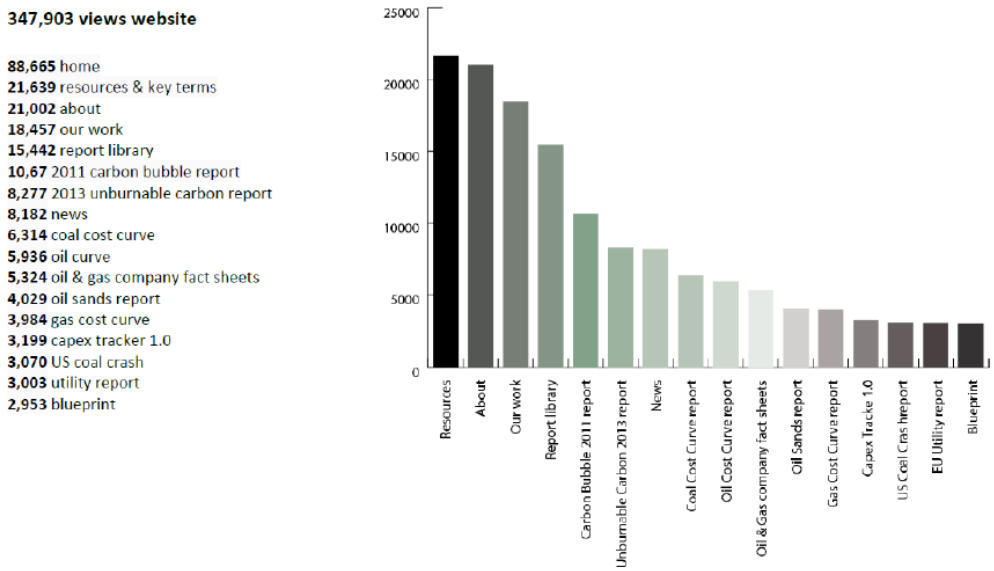
76 BHP Billiton, "Climate Change: Portfolio Analysis," 14 ("Depending on the speed of transition and the energy choices made during the transition, we expect there will be opportunities to mitigate the impact on portfolio value through selectively investing in those commodities that are preferred or advantaged due to policy or technological breakthroughs that eventuate or due to their lower emissions intensity.").

Efforts like those put forward by ConocoPhillips, Statoil, and BHP Billiton provide valuable information, but they would be strengthened by providing more insight into the methodologies used to develop the 2 degree scenarios. Revealing the details behind the development of these scenarios would advance understanding of additional pathways for reaching the 2 degree target as well as provide an opportunity to check the inputs against current trends and forecasts. Without information about key assumptions such as: (1) the primary drivers of change (e.g. technological, regulatory, or market based); (2) forecast changes in the proportion of demand being met by particular energy resources including efficiency, energy storage, and renewable energy; (3) the level of adoption of various types of low carbon technologies or carbon mitigation technologies; and (4) the forecasts for prices, costs, and capacity it is difficult to assess the level of confidence that can be attributed to the analysis. This additional level of detail would provide investors with greater confidence about a company's competitive positioning among its peers while also contributing positively to the conversation about pathways to achieving the 2 degree target.

3.3 CARBON TRACKER'S ENGAGEMENT WITH OIL AND GAS COMPANY ASSESSMENT OF CLIMATE RISK

The increase in engagement by investors has also led to additional analysis from informational intermediaries like Carbon Tracker. As one of the leading public voices in the debate, it is interesting to consider the growth and overall readership in Carbon Tracker's work. The figure below shows the breakdown of nearly 350,000 website views over a 15 month period of May 2014-August 2015.

Figure 14`: Carbon Tracker Website Access Data



In addition to public education, Carbon Tracker has been heavily involved in engaging fossil fuel companies on disclosures as well. As noted above, in March 2014, ExxonMobil published two documents responding to shareholder requests from Arjuna Capital, As You Sow and the Christopher Reynolds Foundation for how it was addressing CAR. On May 16th, 2014 Royal Dutch Shell issued a public letter 'in response to enquiries from shareholders regarding the 'carbon bubble' or 'stranded assets' issue.'

The engagement itself was a positive development, though Carbon Tracker identified several shortcomings in the analysis that limited the usefulness of the disclosures for investors and published responses. The issues discussed below highlight the points that cause analysts to raise a risk premium flag over the fundamental positions the company is taking. These deficiencies weigh in favor of further disclosures to clarify the company's views.

Below, are some of the key issues Carbon Tracker focused on in responding to Royal Dutch Shell and ExxonMobil.[77] Carbon Tracker's analysis of these disclosures clearly demonstrates the importance of having a dialogue in which assumptions and methodologies can be examined and corrected or supplemented.

A. Shell and Exxon address the risk of asset stranding, but dismiss it by largely focusing on the proven reserve base.

> *Shell does not believe that any of its proven reserves will become 'stranded' as a result of current or reasonably foreseeable future legislation concerning carbon.*
>
> *—Royal Dutch Shell*

> *... [W]e are confident that none of our hydrocarbon reserves are now or will become "stranded".*
>
> *—ExxonMobil*

It is promising that both Shell and Exxon focused on the risk of stranded assets, but they focused largely on proven reserves, depriving the market of an analysis of how a low-demand scenario would impact their resource base.

In their 2014 responses, both Shell and Exxon define carbon asset risk as if it referred to proven reserves only. This approach looks at a static snapshot of a given company which disguises the risk, since an ongoing "business as usual" re-investment program merely transfers value from "low carbon risk" proven reserves to future resources. Value will only be preserved – and stranded assets avoided – if the cash flow from today's proven reserves is not redeployed to new resources. But that is not the way that oil companies are run. They are dynamic entities that continuously reinvest a material proportion of cash flow back into the ground.

B. Shell and Exxon suggest that even low-carbon scenarios require future investments, but provide little analysis of the delta between their planning scenarios and low-carbon scenarios.

> *The world will continue to need oil and gas for many decades to come, supporting both demand, and oil & gas prices. As such, we do not believe that any of our proven reserves will become "stranded".*[78]
>
> *—Royal Dutch Shell*

77 Carbon Tracker issued open responses to the Shell and Exxon publications and these comments are adapted from those responses.

78 Letter from Royal Dutch Shell to Investors, 1 (May 16, 2014) 8 available at http://s02.static-shell.com/content/dam/shell-new/local/corporate/corporate/downloads/pdf/investor/presentations/2014/sri-web-response-climate-change-may14.pdf.

The IEA in its World Energy Outlook 2013 examined production of liquids from currently-producing fields, in the absence of additional investment, versus liquids demand, for both their lead "New Policies Scenario" and for a "450 Scenario." As shown in the chart above, in both scenarios, there remains significant liquids demand through 2035, and there is a need for ongoing development and investment. Without ongoing investment, liquids demand will not be met, leaving the world short of oil.

—ExxonMobil

Carbon Tracker agrees with much of this analysis as most energy demand forecasts show that some level of fossil fuel production will be required in the future even in a low-carbon scenario, given natural decline rates. However, the level of investment will clearly be lower in (say) a 450 scenario when compared to Exxon's "business-as-usual" scenario. Capital expenditure requirements will be similarly lower. Companies that continue to invest at the levels needed for "business-as-usual" run the risk of seeing their returns fall as prices react to weaker demand. Here, the risk that companies need to consider is what happens to pricing in a market that turns to secular decline as characterized by a low-carbon scenario.

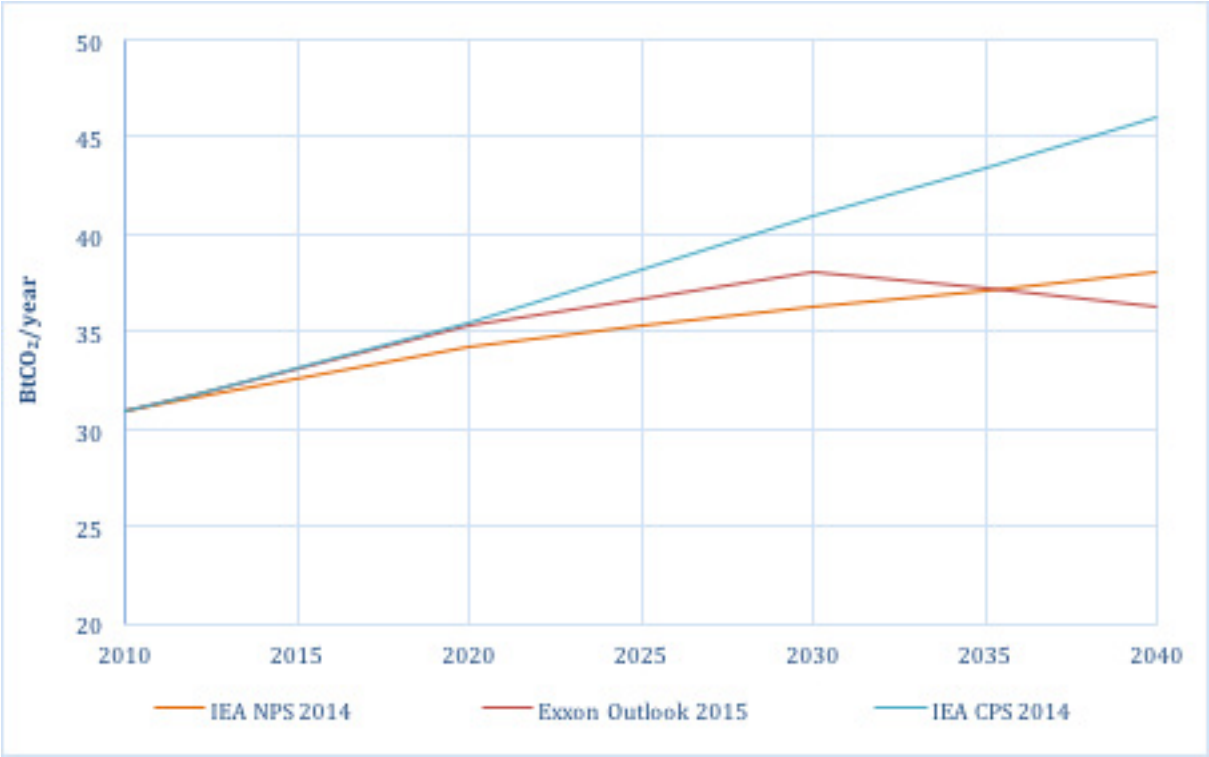
The box below looks at an analysis carried out by Carbon Tracker in Blueprint: Managing corporate risk from an energy transition: an oil and gas focus 2015.[79]

Here, we analyze ExxonMobil's forecasts against the latest New Policies Scenario (NPS) from the IEA (their central scenario) as an example of the numerous disparities, which, while not being immediately obvious, are deeply meaningful in understanding the risk-perceptions adopted by the company. Exxon presents all elements of a comparison and so the underlying assumptions are readily accessible. We find:

- Exxon has an emissions pathway that is above IEA NPS until 2035 cumulatively by 18.8BtCO_2, equivalent to 49% of annual energy-related emissions in 2040.
- Exxon assumes a shift away from coal significantly larger than IEA NPS and indeed Carbon Tracker's recent work. We see risk to this assumption.
- Exxon's demand forecast for oil is cumulatively 56 million b/d (mb/d) above IEA NPS by 2040 (or 2mb/d on average). By 2040, Exxon's demand forecast for oil is 6.8% above NPS, a significant difference for planning purposes.
- Exxon's commentary implies a very low probability to anything below IEA NPS, i.e., 450PPM or 2° C.
- We note that the actual price assumptions that emerge from these scenarios can be very different depending on supply assumptions and how key players in the markets – OPEC, Saudi Arabia – approach them. We have not attempted here to address that.

79 Carbon Tracker Initiative, "The Fossil Fuel Transition Blueprint," April 2015 available at http://www.carbontracker.org/report/companyblueprint/.

Figure 15: ExxonMobil's scenario exceeds the NPS CO2 emissions trajectory



Source: IEA World Energy Outlook 2014; ExxonMobil, 2015, Outlook for Energy; Shell, 2013, New Lens Scenarios[80]

C. Shell and Exxon contend that their risk assessment programs consider the relevant issues, but their disclosures raise additional questions.

Each of the foregoing arguments from Shell and Exxon suggested potential gaps in their approach to carbon risk. However, both Shell and Exxon do disclose some steps they have taken, including establishing price bands for project screening and associating a carbon cost with the production of their products. While these disclosures provide some value to investors they also raise questions about the basics of how these risk assessment tools are actually employed. Additionally, the screens offered suggest that the companies may not be stretching to test their assets against the risk of a low-carbon energy transition.

Here, the disclosures by Shell and Exxon differ slightly so we discuss them separately.

> *The energy industry has for decades been exposed to the sorts of fundamental business risks outlined in your letter. These range from, but are not limited to, regulatory risks, price risks to project performance and competitiveness. Shell has a framework in place when making new investment decisions that is designed to evaluate the extent to which all of our projects are exposed to these various risks.... For price risks we use a project screening value of $70 to $110 USD for our base Brent benchmark.*[81]
>
> *—Royal Dutch Shell*

80 Royal Dutch Shell, Scenarios available at http://s01.static-shell.com/content/dam/shell-new/local/corporate/Scenarios/Downloads/Scenarios_newdoc.pdf.

81 Shell, supra note 78 at 8

Shell's disclosure of its screening range was helpful to investors by providing the range of potential prices considered. But it also revealed that, despite Shell's decades of experience with commodity market risks, it was not using prices below $70 to screen projects. That the oil price fell below the screening range within twelve months is worrying. It may be that Shell did look at a $45-60 scenario as well but without knowing the probability that Shell assigned to this range, it is not of much help to investors. As Carbon Tracker noted in the Blueprint, the range of variables needs to be realistic. Shell's 2014 $70-$110 range has already proven insufficient to cover current prices that have fluctuated, in our view, based upon the same types of risks that Shell has considered over time. This should be of concern to investors since it is not on account of the new demand risks posed by technologies such as electric vehicle penetration, or the synergies between EVs and solar/battery storage have not yet captured significant market share.[82]

Moreover, the screening price reveals little information about the projected and actual costs of Shell's development projects. Without such information, investors are hard-pressed to gauge risks to the profitability of Shell's future production.

> *We also set a project screening value for CO2 to evaluate the potential economic impact of stricter CO2 related regulatory changes. This screening value is currently $40 /tonne of CO2 emitted. This is applied as the economic base case across all of our projects. For short life assets or assets without significant CO2 emissions, the extent of the analysis is limited to the screening value. For longer life assets, or those with higher carbon risk profiles, known as "carbon critical projects,", more extensive work is done.*[83]
>
> *—Royal Dutch Shell*

We interpret[84] Shell's CO2 price as applying to upstream emissions associated with extraction while ignoring the potential downward pressure on prices that would likely be associated with carbon pricing for end-users. This understates the potential threat to returns from Shell's (and other majors') projects from action on carbon.

Shell's use of a CO2 price seems to reflect a consensus of the strong likelihood of increasing measures to reduce carbon pollution, suggesting the "direction of travel" for future climate policy – that emissions regulation will increasingly squeeze the margins of fossil fuel projects. However at $40/tonne CO2, the economic impact on "upstream" activities amounts to only $1-2/bbl for most conventional oil projects—a level dwarfed by recent market fluctuations.[85] This suggests that, despite perceiving that climate change is a significant problem and that action may be taken, Shell believes that action will have no meaningful impact on their business, and suggests that the carbon price employed does not serve as an adequate test of the business decisions.

To assess the full 'potential economic impact of stricter CO2 related regulatory changes,' Shell needs to consider how such changes might affect future demand for and price of their products. More rigorous analysis of project risks would thoroughly evaluate direct impacts on project costs and indirect impacts on project revenues (i.e. due to lower oil prices). Shell hints at performing this kind

82 Michael W. Parker (Bernstein), et al. "Asia Strategy: Shouldn't We All Be Dead By Now?" (May 2015).

83 Shell, supra note 78.

84 Carbon Tracker welcomed further clarification from Shell on how it uses CO2 prices in project evaluation; to our knowledge, no such clarification was forthcoming.

85 In our Carbon Supply Cost Curves report we calculated average lifecycle CO2 emissions of 0.47tCO2/bbl – versus the EPA's estimate of combustion-only CO2 emissions from oil of 0.43tCO2/bbl. Using non-combustion emissions of 0.04tCO2/bbl and multiplying by $40/tonneCO2 results in a charge of $1.6/bbl.

of analysis,[86] but greater disclosure around how such analyses are performed would inform investors as to how rigorously Shell is integrating climate policy risk into its project analyses.

As noted in section 3.2.1, Shell supported a shareholder resolution filed by the Aiming for A coalition that passed overwhelmingly at the 2015 Annual General Meeting that requires it to improve its reporting. Following through on that resolution presents an opportunity for Shell to address many of these issues.

> *We also address the potential for future climate-related controls, including the potential for restriction on emissions, through the use of a proxy cost of carbon…. Our proxy cost, which in some areas may approach $80/ton over the Outlook period, is not a suggestion that governments should apply specific taxes.*
>
> *—ExxonMobil*

ExxonMobil's "proxy cost of carbon" 'seeks to reflect all types of actions and policies that governments may take over the Outlook period relating to the exploration, development, production, transportation or use of carbon-based fuels.'[87] This proxy carbon cost is "embedded" in Exxon's Outlook for Energy, which is Exxon's single-scenario demand analysis. Through 2040, the projected carbon cost varies from less than $20/tCO2 in some regions (e.g. Africa and the Middle East) to as high as $80/tCO2 in other regions. This level of regional detail helps investors to understand how companies are integrating climate risk into their capital investment decisions. However, like Shell, it is not transparent how Exxon's CO2 price is applied.[88] For example, it is not clear whether the price is applied along the value chain of oil production, (including the largest portion of emissions which come from consumption of the products).

3.4 SUMMARIZING: QUANTIFYING THE DISCLOSURE RESULTS AS AT JUNE 2014:

The CTI paper: "Recognizing Risk, Perpetuating Uncertainty"[89] is in effect a summary of much of the above using CDPs questionnaire. Below is an extract from that paper:

Methodology

The report analyses disclosures from those listed fossil fuel companies by synthesizing:

i) CTI's list of the top 200 coal, oil and gas companies by reserves as of the 2013 "Wasted Capital and Stranded Assets" report;

ii) those fossil fuel companies that responded to CDP's 2014 climate change questionnaire and oil and gas module by 24th July 2014; and

iii) the 20 responses to the Carbon Asset Risk (CAR) letters.

This resulted in 81 companies being included in the synthesis analysis as a sample representative of the fossil fuel industry; 49 oil and gas companies and 32 coal companies. Under this approach, six respondents to the CAR letters were not included in the analysis.

86 "Current and future CO2 regulation policies of the markets into which the asset's products will be sold are evaluated including, for example, the possible impact of low carbon fuel standards." Shell, supra note 78.

87 ExxonMobil, Energy and Carbon-Managing the Risks, supra note 61.

88 CDP, "Use of internal carbon price by companies as an incentive and strategic planning tool: a Review of Findings from CDP 2013 disclosure," December 2013, https://www.cdp.net/CDPResults/companies-carbon-pricing-2013.pdf..

89 Available at http://www.carbontracker.org/report/climateriskdisclosures/.

Conclusions:

Insufficient climate-related risk reporting

The International Organisation of Securities Commissions (IOSCO) outlines that the role of capital markets regulators is to 'protect investors, maintain fair, efficient and transparent markets and seek to address systemic risk' on those exchanges companies use to raise funds. It is intended that corporate reporting achieve this aim. While some steps have been taken to address increasingly pressing climate-related risks, including the SEC guidance, the UK mandatory greenhouse gas reporting for listed companies (which the UK is now considering repealing) and European Union accounting, transparency and prospectus directives, reporting requirements on the whole remain woefully insufficient. Global regulators are not utilising the potential of capital markets reporting to build 'climate literate' capital markets.

Climate-related risks threaten investors

An energy transition is underway as stakeholders increasingly recognise the potential severity of future climate-related constraints. Coal prices are at a perilous low as demand for heavy polluting coal-fired power falters and oil and gas capital expenditures are spiralling to even maintain the status quo of production levels. All the while, the supply cost of renewable energy technologies continues to fall. If the resulting potential downside risks to future fossil fuel demand are not disclosed in company disclosures and regulatory filings, current and prospective investments run the risk of destroying shareholder value or depressing group returns – what Carbon Tracker terms "wasting capital in stranded assets."

99% of sampled fossil fuel companies recognise it is a risky business…

The sample of 81 coal, oil and gas companies analysed in this report unequivocally display an awareness of climate change as an issue and a belief that it could poses a risk to their business. 86% of companies consider climate change to pose physical risks, while 99% of the sample deem climate-related regulation to be a risk.

…But perpetuate uncertainty with a lack of implementation

In spite of this high level of awareness of climate-related risk, companies are failing to connect the dots when it comes to applying this knowledge through risk management measures. 80% of oil and gas companies did not display evidence of running climate scenario analyses of different temperature increases due to climate change, with only 10% of companies going on to stress-test projects against conditions similar to a 2°C future. Approximately the same proportion of coal companies conduct climate scenario analyses, with only one, however, disclosing evidence of stress-testing against a 2°C outcome.

Such low levels of examination of low demand and price scenarios within a sample that should be considered as 'best in class' given they responded to CDP's climate change questionnaire and Ceres and Carbon Tracker's investor letters, should make investors question whether initial risk disclosures by fossil fuel companies are merely boilerplate rhetoric without much influence, and should serve as a call to financial regulators for greater scrutiny on climate-related risk integration.

The occurrence of reporting inconsistencies remains a concern

Of particular importance to regulators is their role in ensuring regulatory filings submitted by companies are consistent with those made in other voluntary reporting mechanisms - in essence to ensure what a company says to investors reflects what is being implemented. Our analysis of US listed fossil fuel companies shows that while there appears to be a consensus that climate-related

regulatory risks are the most significant, there is discrepancy in the perception of physical risks in particular between company annual reports and voluntary disclosures. Corporate reports must provide investors with the most accurate information possible.

Investors need to call for more

Through initiatives such as the UN PRI, CDP, SASB, IIRC and Ceres and CTI's Carbon Asset Risk Initiative investors have displayed demand for more meaningful climate-related information flows. This research seeks investors to call for a greater focus from fossil fuel companies on their relative risk and resilience to a carbon-constrained scenario.

Regulating capital market to manage climate-related risks

We recommend:

- Companies to disclose, either voluntarily or due to regulatory amendments, in their regulatory filings, preferably under a separate heading:
- A descriptions of their assessment of climate-related risks, including aggregate demand and price impacts;
- The carbon embedded in their coal, oil and gas reserves and resources;
- Details related to resilience in a low price/demand scenario, such as the parameters set out in stress-tests in different price/demand scenarios;
- Relationship of data to corporate capital expenditure strategies and risks to the business model.
- In the absence of the regulatory requirements above, companies must continue and improve disclosures of risk through CDP's climate change questionnaire such that investors remain informed and pressure for mandatory changes grows.

Securities regulators and financial report standard setting bodies

- Increase scrutiny of existing regulations and guidance of coal, oil and gas disclosures based on existing authority;
- Scrutiny should include ensuring that fossil fuel companies provide clear descriptions of their assessment of climate-related risks, including aggregate demand and price impacts associated with a low-carbon scenario, and that those assessments are consistent with other company statements on climate risk;
- Issue guidance to interpret existing standards related to carbon asset stranding so that preparers of reports fully consider the viability of coal, oil and gas stocks.
- Require information in annual reports and listing prospectuses on the emissions potential of reserves, and the emissions trajectory assumptions of corporate strategy;
- Require stress-testing of how reduced demand and price could affect the fossil fuel reserves and resources of a company.

Voluntary reporting guideline setters

Develop technical guidance on reporting the carbon dioxide emissions potential of reserves to provide a forward-looking indicator, ensuring compatibility with financial reporting standard.

Figure 16: Carbon Tracker Analysis of corporate responses - regulatory risk

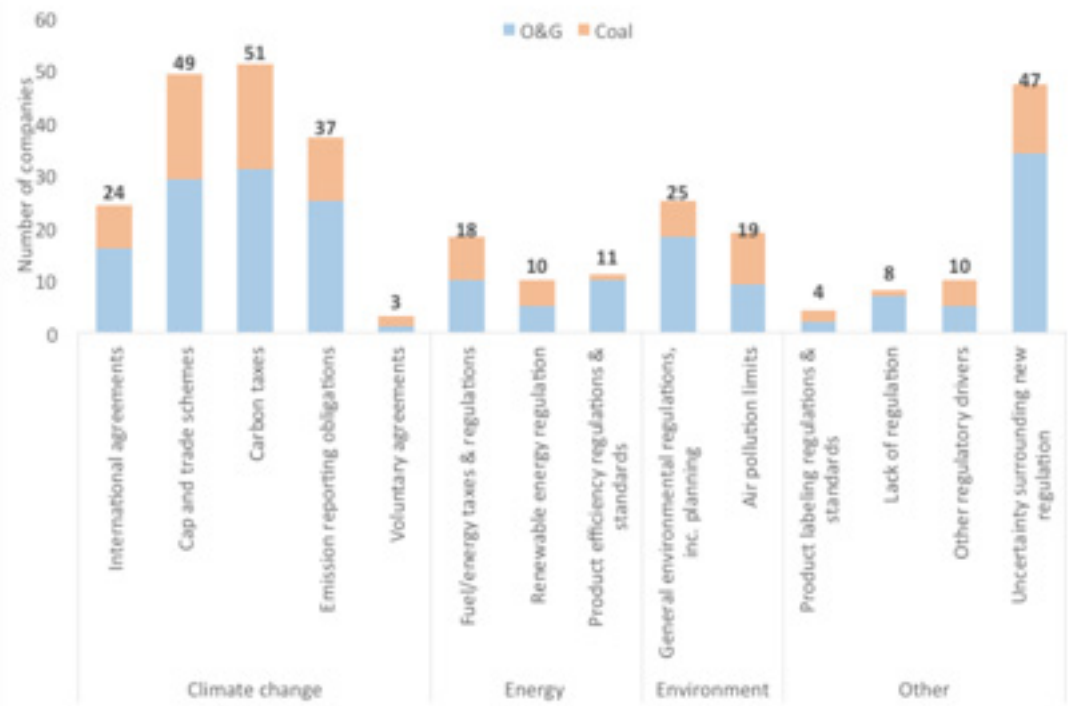


Figure 17: Carbon Tracker analysis of corporate responses - substitution risk

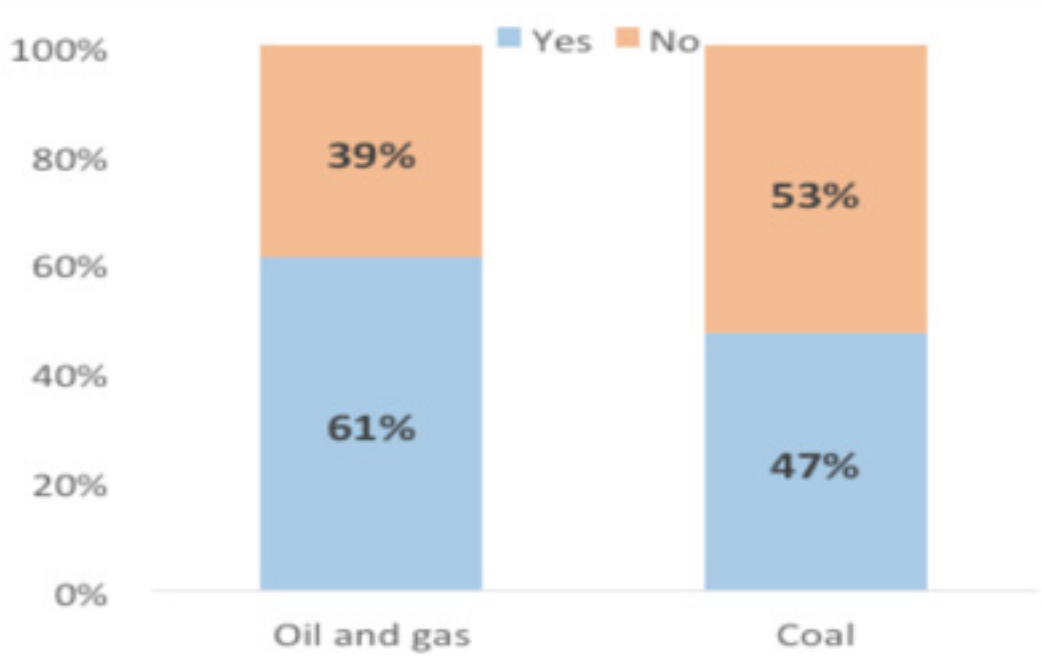


Figure 18: Carbon Tracker analysis of corporate responses – assessing climate risks

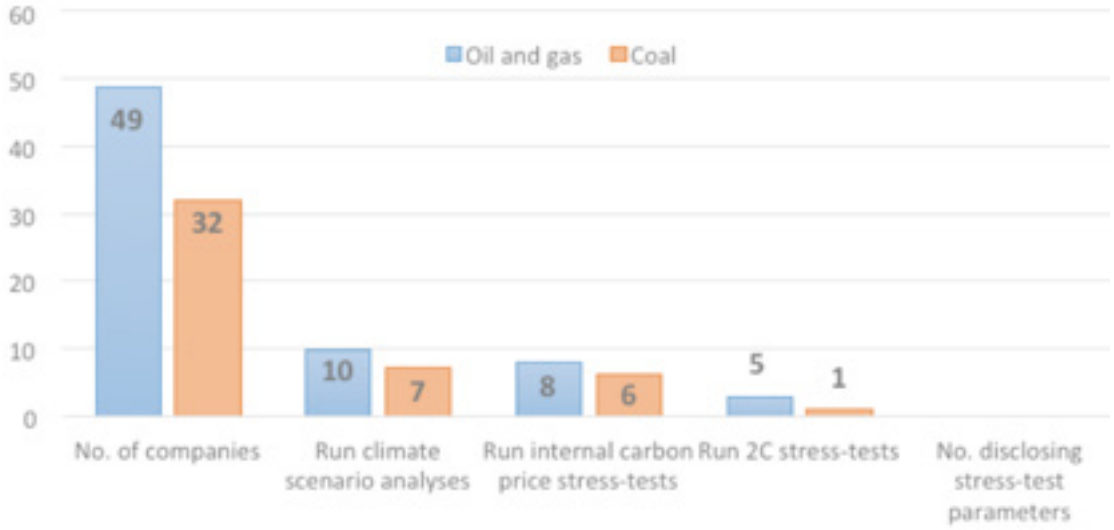


Figure 19: Carbon Tracker analysis of companies – risk significance

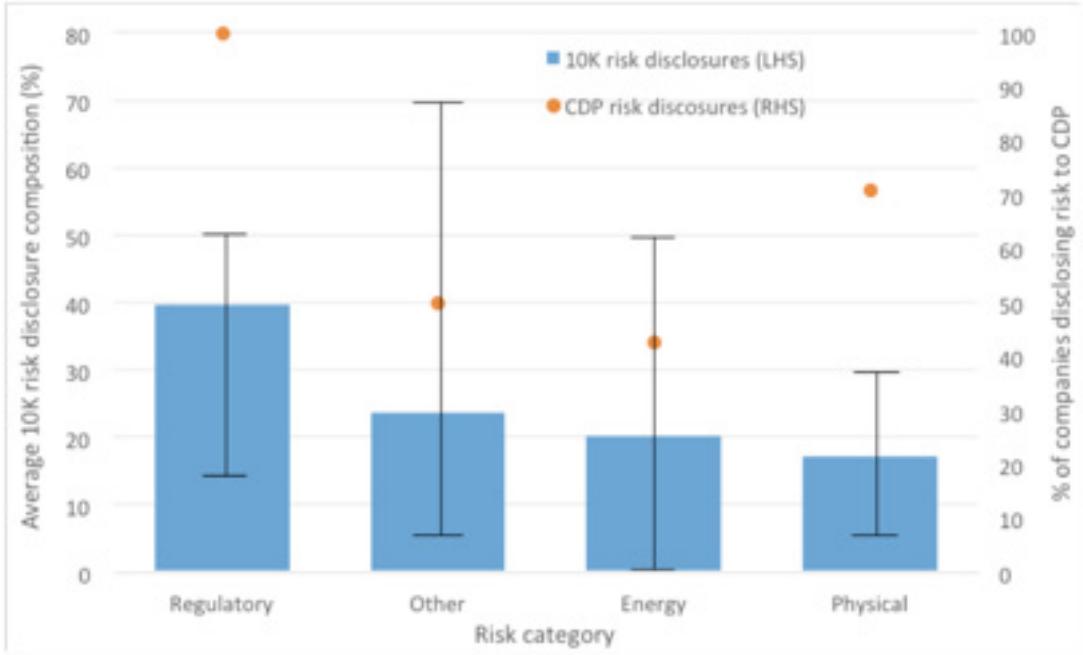


Figure 20: CDP Climate Change Questionnaire

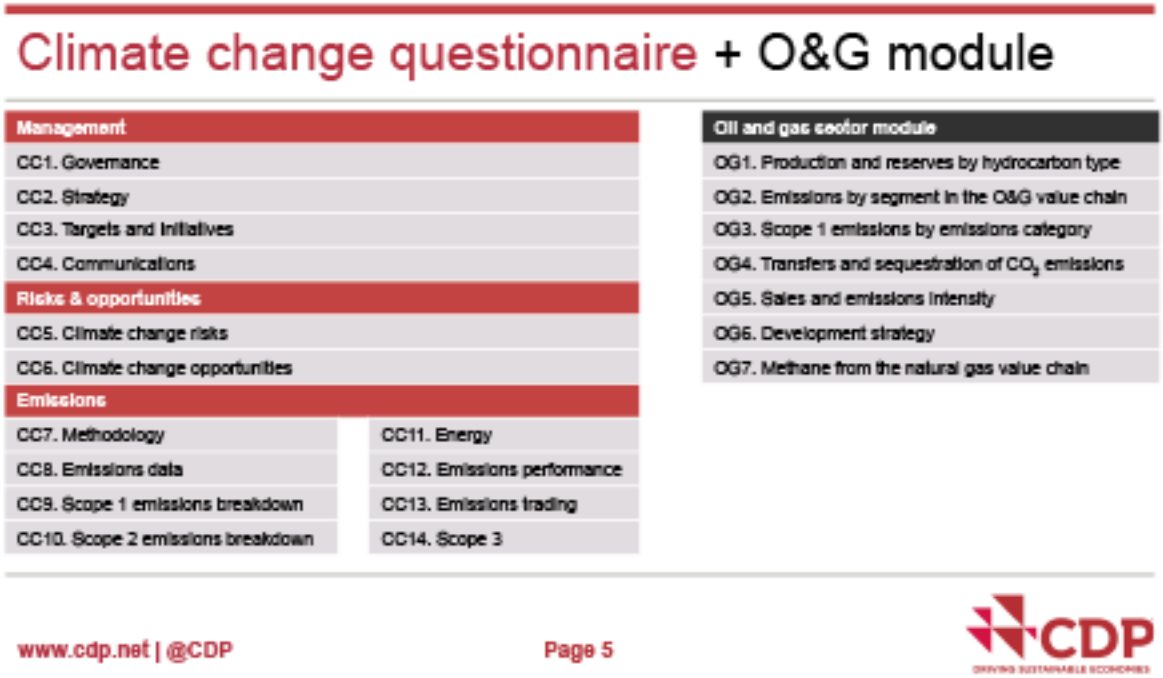


Figure 21: CDP Investor Expectations Governance

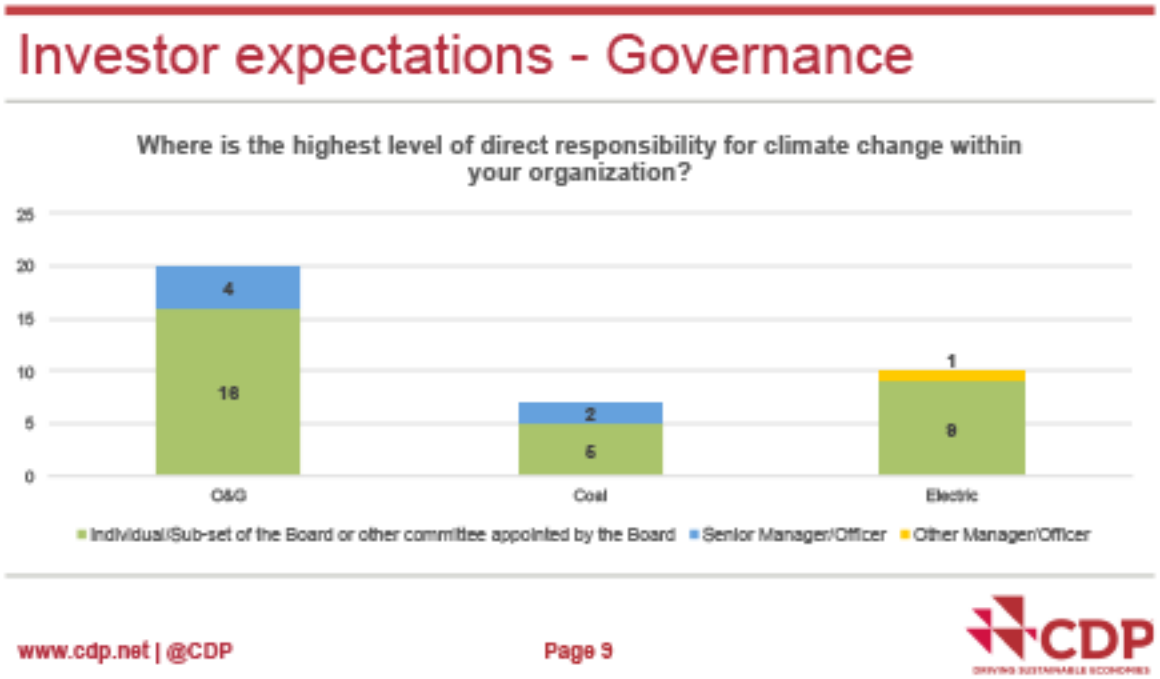
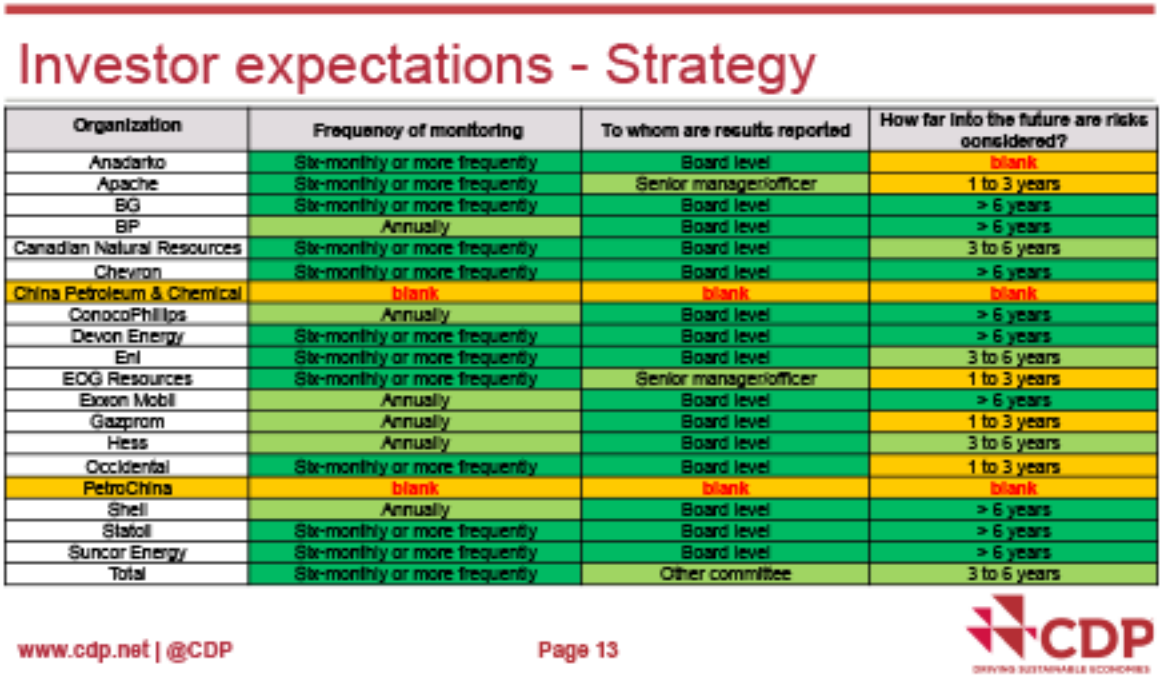


Figure 22: CDP Strategy Considerations



Investor expectations - Strategy

Organization	Frequency of monitoring	To whom are results reported	How far into the future are risks considered?
Anadarko	Six-monthly or more frequently	Board level	blank
Apache	Six-monthly or more frequently	Senior manager/officer	1 to 3 years
BG	Six-monthly or more frequently	Board level	> 6 years
BP	Annually	Board level	> 6 years
Canadian Natural Resources	Six-monthly or more frequently	Board level	3 to 6 years
Chevron	Six-monthly or more frequently	Board level	> 6 years
China Petroleum & Chemical	blank	blank	blank
ConocoPhillips	Annually	Board level	> 6 years
Devon Energy	Six-monthly or more frequently	Board level	> 6 years
Eni	Six-monthly or more frequently	Board level	3 to 6 years
EOG Resources	Six-monthly or more frequently	Senior manager/officer	1 to 3 years
Exxon Mobil	Annually	Board level	> 6 years
Gazprom	Annually	Board level	1 to 3 years
Hess	Annually	Board level	3 to 6 years
Occidental	Six-monthly or more frequently	Board level	1 to 3 years
PetroChina	blank	blank	blank
Shell	Annually	Board level	> 6 years
Statoil	Six-monthly or more frequently	Board level	> 6 years
Suncor Energy	Six-monthly or more frequently	Board level	> 6 years
Total	Six-monthly or more frequently	Other committee	3 to 6 years

4. DIVESTMENT

Divestment is particularly dependent on the mandate of the asset owner or fund as discussed in the framework. Simply put, many are prohibited from divesting without seeking a mandate change.[90]

Divestment has attracted a good deal of publicity and focus following Bill McKibben and 350.org's efforts to promote it as a way of forcing change on fossil fuel companies. As the report by the Smith School Stranded Assets program sets out clearly, the pure economic arguments for divestment are not always clear in terms of corporate impact, but the impact through "stigmatization" can be substantial. That said, companies such as Peabody are pointing to the movement in its risk disclosures as a factor that may "adversely" impact the company and its share price, and the Australian mining industry has gone so far as to suggest that companies think about diversification into renewables and low carbon technologies. Looking at the number of institutions and the prestige of those who have divested, this is clearly an area that can claim action. In addition, indexes and funds offering reduced exposure to fossil fuels have performed well in recent years and point to the economics of some types of divestment from an investor perspective. Here are the primary sources on the issue of divestment.

90 The divestment movement has recognized this to some extent by advancing legislation that would change the mandates of asset owners or funds. For example, California's Assembly recently passed a bill that would require California's pension funds to divest from companies generating more than 50% of their revenue from coal by 2017 if certain conditions are met. See Reuters, "Coal divestment bill passes California state legislature," (September 2, 2015) at http://www.reuters.com/article/2015/09/02/us-california-divestiture-coal-idUSKCN0R226A20150902.

4.1. BACKGROUND

As the report by the Smith School Stranded Assets program[91] sets out clearly:

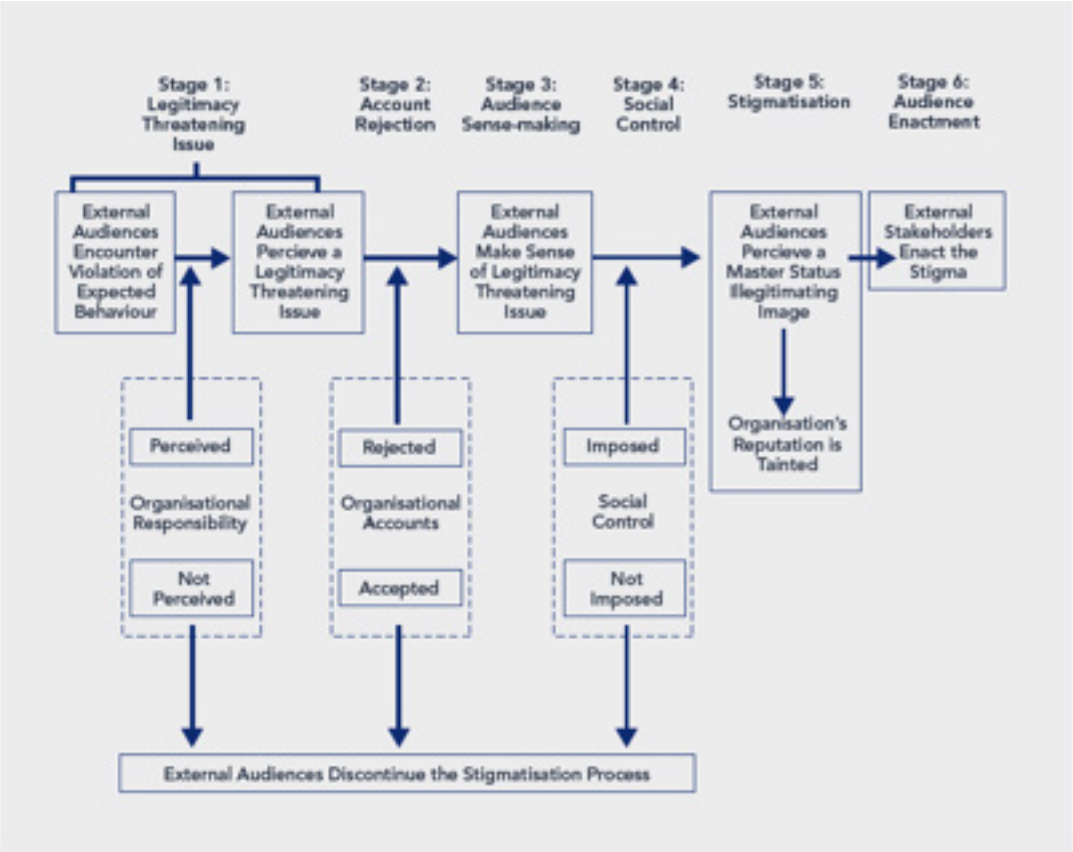
> *...direct impacts on equity or debt are likely to be limited. The maximum possible capital that might be divested from the fossil fuel companies represents a relatively small pool of funds. In contrast, the market capitalisation of fossil fuel companies, particularly integrated oil and gas players, is several times higher. Even if the maximum possible capital was divested from fossil fuel companies, their shares prices are unlikely to suffer precipitous declines over any length of time. Financial markets are volatile. Daily swings as high as ±5% are not uncommon even for large stocks such as ExxonMobil. Sizeable withdrawals are likely to escape the attention of fossil fuel management since oil and gas stocks are some of the world's most liquid public equities... We acknowledge that direct effects on coal valuations are likely to be more substantial. Coal companies represent a small fraction of market capitalisation of fossil fuel companies and coal stocks are also less liquid. Divestment announcements are thus more likely to impact coal stock prices since alternative investors cannot be as easily found as in the oil and gas sector.*

However they find it is in relation to "stigmatisation" that Divestment can have its largest impact:

> *Divestment campaigns will probably be at their most effective in triggering a process of stigmatisation of fossil fuel companies. We find that even if the direct impacts of divestment outflows are limited in the short term, the campaigns will cause neutral equity and/or debt investors to lower their expectations of fossil fuel companies' net cash flows in the long term. The process by which uncertainty surrounding the future of fossil fuel industry will increase is through stigmatisation. In particular, the fossil fuel divestment campaign will increase legislative uncertainty and potentially also lead to multiples' compression causing more permanent damage to the companies' enterprise values. Finally, we find that stigmatisation, while likely to cost fossil fuel companies billions, is unlikely to threaten their survival. Coal companies will probably be the hardest hit segment of the market.*

91 Atif Ansar, et al., "Stranded assets and the fossil fuel divestment campaign: what does divestment mean for the valuation of fossil fuel assets," (October 2013) available at http://www.smithschool.ox.ac.uk/research-programmes/stranded-assets/SAP-divestment-report-final.pdf.

Figure 23: Smith School analysis of divestment stigmatization



4.2 SIZING THE MOVEMENT

The size of the Divestment movement is tracked by a number of organizations. However, the proper metric—number of institutions divesting, AuM divested, etc. along with what screen is used—remains unclear and tracking is far from complete. A major issue remains exactly how each asset owner defines "divestment" – total exclusion of fossil fuels (including comingled funds), coal only, top 200 companies, and the threshold used for defining a diversified company as a "fossil fuel company" (30% of revenues, 50% of revenues, etc.). These definitional problems mean that as of yet there are no weighted average impacts available, but simple counts are available from several sources.

4.2.1 The Go Fossil Free Movement[92]

Go Fossil Free tracks divestment commitments and currently shows 397 institutions that have pledged to divest at some level.[93] The plot below shows the types of institutions that are divesting, dominated by foundations, faith-based groups, public funds and other governmental organizations, and universities/schools. According to a report released in September 2015, the total amount of investment funds now managed by portfolio managers who have pledged to divest has reached $2.6 trillion; however, the report does not explain the actual amount of funds that have been directly divested, what percentage of these assets are currently invested in fossil fuels, or what types of screens are being applied to these funds.

92 Reports regarding divestment are available from Fossil Free Invest at http://gofossilfree.org/commitments/.

93 As of September 2, 2015.

Figure 24: Divestment by Type of Institution

4.2.2 The Norwegian Example

The Norwegian sovereign wealth fund's divestment from 122 companies with greater than 30% of revenues from coal has been one of the biggest divestment announcements to date. The following briefing was researched and written by Urgewald and co-published with Greenpeace Norway and the Future in Our Hands.[94] It also shows that divestment from coal is a key starting focus for many asset owners.

Visitors opening the English language webpage of the Norwegian Parliament (Storting) are greeted by a stark image and a strong message these days. A photo of a colossal lump of coal and the following announcement: 'The Storting has made the unanimous decision to pull the Government Pension Fund Global (GPFG) out of coal.'

The gist of our assessment is that the amount of coal holdings to be excluded by the new criteria is much higher than the Finance Ministry's estimate. The annex of this briefing contains a divestment list of 118 companies whose share of coal business is over 30% and 4 companies, whose coal expansion projects are so significant in relation to the company's size or power generation portfolio that they also warrant an exclusion. Companies were only put on the list, if there was sufficient documentation that they meet the divestment criteria.

And now, the big number: The GPFG's investments in these ***122 companies*** *total* ***NOK 67.2 billion or € 7.7 billion****. This is the biggest divestment action to date from the coal industry and sets a new standard for investors worldwide.*

4.2.3 Index Providers.

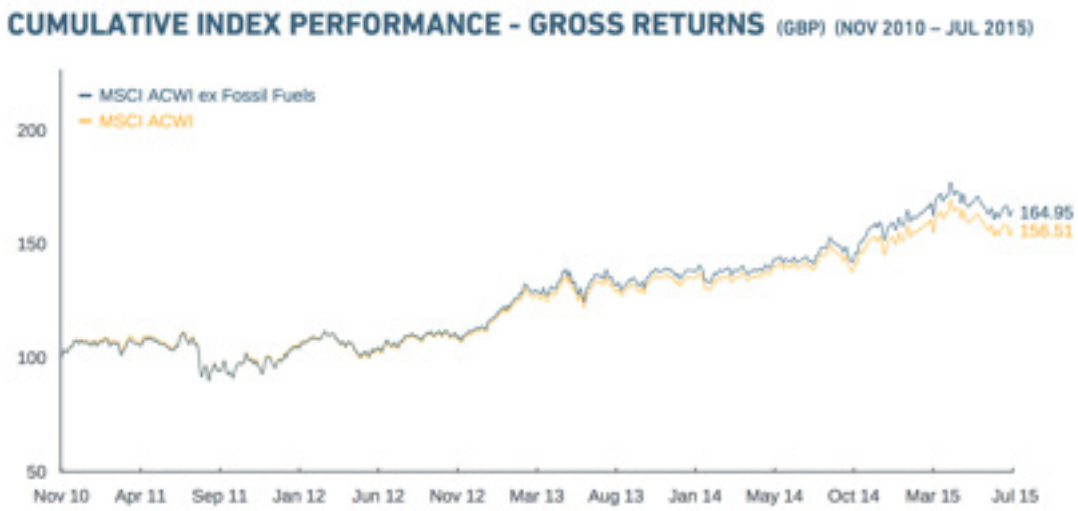
Divestment can also take place by adopting indexes that exclude fossil fuel companies in some way. Performance for such indexes has been positive in recent years, which makes an economic argument for fossil fuel divestment from an investor's perspective. Several asset managers have stepped up to offer products to achieve this result as well.

94 The italicized text excerpted from Urgewald, Greenpeace Norway, and Future is in Our Hands, "Norway Divests," (June 4, 2015) available at http://www.greenpeace.org/norway/Global/norway/Klima/dokumenter/2015/Divestment.briefing.pdf.

For example, in late 2014 MSCI launched their MSCI ACWI Ex Fossil Fuel index, based on the MSCI ACWI parent index and including large and mid-cap stocks across 23 Developed Markets (DM) and 23 Emerging Markets (EM) countries*. The index represents the performance of the broad market while excluding companies that own oil, gas and coal reserves. It is a benchmark for investors who aim to eliminate fossil fuel reserves exposure from their investments due to concerns about the contribution of these reserves to climate change.

The performance of such indexes compared to benchmark is an important question for investors considering divestment. Analysis to date shows that performance can match or exceed benchmark over 1-5 year timeframes. For instance, the figure below shows MSCI ACWI Ex Fossil Fuel vs. MSCI ACWI on a 5-year timeframe.

Figure 25: MSCI Fossil Fuel Free Index



Research by Sustainable Insight Capital Management has also examined the performance of three different fossil fuel free portfolios, all against the S&P 500 Index. SICM finds outperformance across 1, 3, and 5 year periods compared to S&P 500. They also highlight a number of important considerations the Asset Owner and Asset Manager should contemplate as they embark on the path of fossil fuel free investing.

They note the importance of definitions as highlighted above:

> *As with all investments, clear definitions are necessary. This is particularly true with fossil fuel free investments where a wide range of interpretations are possible, in turn, giving rise to a variety of possible investment approaches. Investors must choose whether to opt for the simplicity and clarity of a negative screen or choose the best-in-class approach, perhaps with a carbon tilt, or a highly discretional thematic investment process. Simply by imposing a negative screen, investors can end up omitting anywhere between 11% to close to 20% of the S&P 500 Index.*

4.2.4 Making an impact on corporations

As the Smith School paper cited above suggests, the main impact of divestment is likely to be through the stigmatization of fossil fuel companies. We provide two examples here. First, certainly Peabody Energy[95] in its risk disclosures seems to take the movement seriously, although this should be understood within a full legal framework. Further they cite the possibility that this could affect them in capital markets:

> *Concerns about the environmental impacts of coal combustion, including perceived impacts on global climate issues, are resulting in increased regulation of coal combustion in many jurisdictions, unfavorable lending policies by government-backed lending institutions and development banks toward the financing of new overseas coal-fueled power plants and divestment efforts affecting the investment community, which could significantly affect demand for our products or our securities.*

Extracts from the following article[96] in the context of the Australian Mining Industry are interesting for several reasons. It shows the coal industry is aware of the impact of "stigmatization". It shows an industry looking to counter that but it also shows an open discussion of alternatives to coal and the potential needs for diversification by companies. This demonstrates that divestment is also fostering the type of dialogue many investors are having through direct engagement:

> *It's become very clear that something has to be done. Anti-mining protesters have developed an unprecedented level of sophistication in their approach to environmental activism… Although the traditional methods with protesters chaining themselves to trees and machinery will always be in vogue - with badges of honour to be won and treasured in the memories of those who were there on the ground - we are now seeing new social waves of protest in the form of the fossil-fuel divestment movement … Mining is a long-term business, and if companies can open their scope to include new developments for future capitalisation, so much the better. By investing in alternative energy technologies that may fall under the purview of conventional businesses, technologies that might even be considered a threat from traditional points of view, then it is impossible to divest from that company without divesting from their operations relating to alternative energy … What is required is a holistic view of energy production, and a preparedness to bring those projects supported by the divestment movements into the fossil fuel miner's fold, with a view to enhancing those technologies for the benefit of the industry and their own business, rather than to scotch the whole thing to protect traditional concerns.*

95 https://mscusppegrs01.blob.core.windows.net/mmfiles/files/investors/2014%20peabody%20annual%20report.pdf (at pages 29-30).

96 Ben Hagemann, Australian Mining (July 29, 2015).

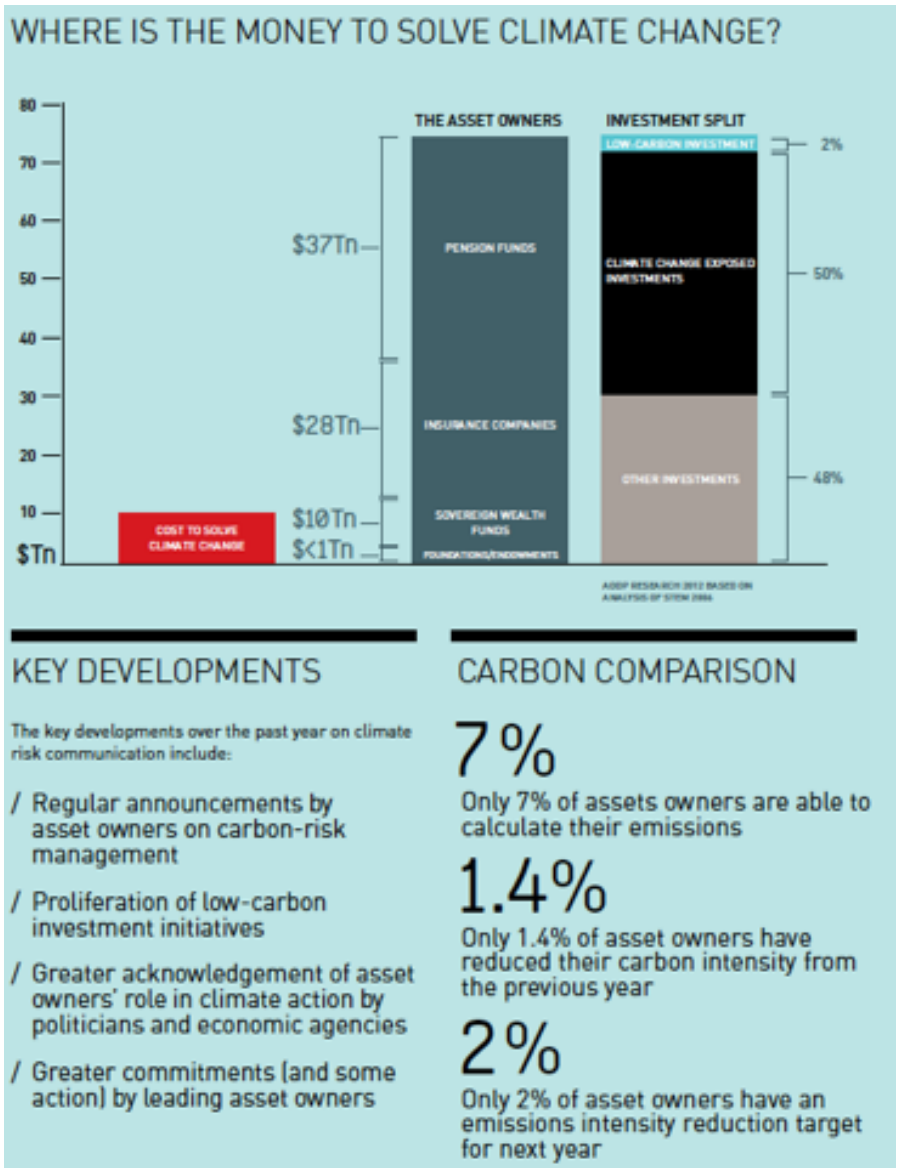
5. INVESTOR PORTFOLIOS AND SERVICE PROVIDERS

5.1 AODP OVERVIEW

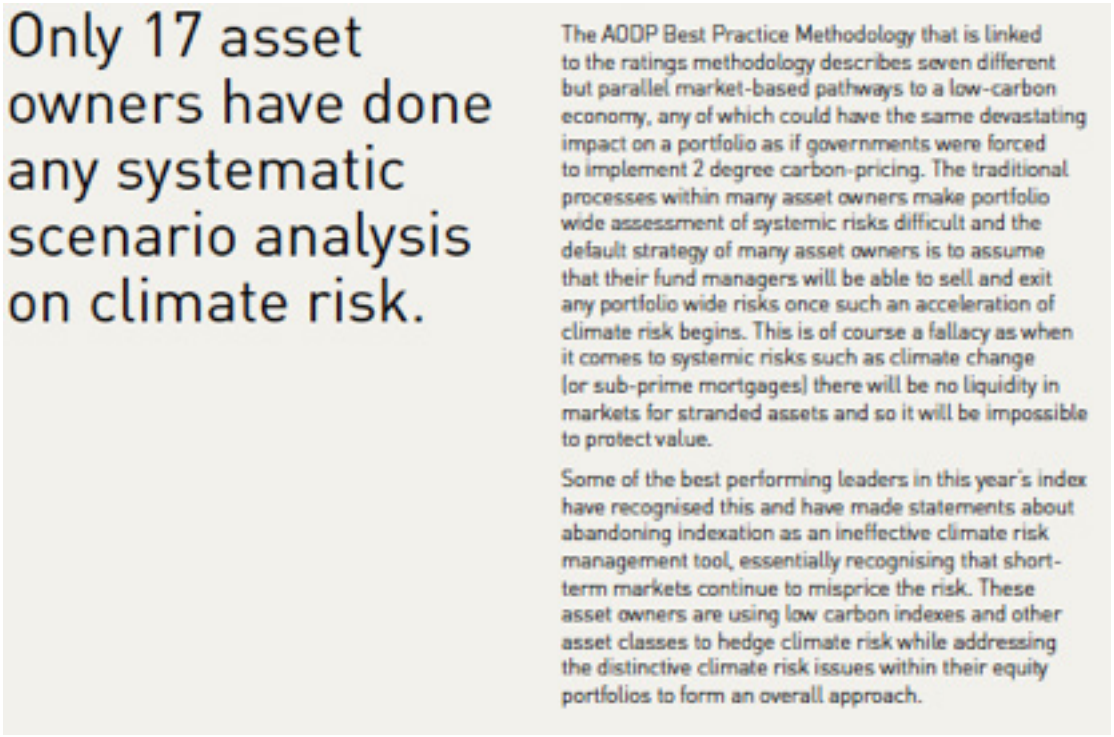
The role of investors, asset owners and asset managers--and potentially family offices—remains central to the evaluation and management of CAR. Managing risk has been evident in the Engagement, Disclosure and Divestment chapters. In addition to these primarily qualitative tools, we now turn more directly to quantitative methods investors can use in terms of carbon footprinting and stress-testing at the portfolio level.

Here the available information on CAR uptake is less encouraging, though recent evidence suggests practices are slowly spreading. The Asset Owners Disclosure Project (AODP) tracks investor disclosure in this area. While this is not an exhaustive survey of all investors and does not include Asset Managers, AODP's evidence Figure 25 shows that outside of a handful of leaders, there is a long way to go to see investors actually stress testing at the portfolio level on a widespread basis.

Figure 26: Asset Owners Disclosure Project – AODP Global Climate Index 2015[97]



97 Asset Owners Disclosure Project, "Global Climate Index 2015," 4 available at http://aodproject.net/images/docs/AODP-GLOBAL-CLIMATE-INDEX-2015-view.pdf.



Having said that, a number of tools are available and uptake is increasing for both risk and stakeholder pressure reasons.[98] Currently available tools have been recently reviewed by both the UNEP FI/WRI CAR process and the 2° Investing Initiative/CDC Climate/UNEP Inquiry.[99] As identified in both reviews, a crucial distinction is between asset- or operator/company-level "bottom-up" tools vs. portfolio-level "top-down" tools that take into account diversification and portfolio-level effects. A further distinction can be drawn between primarily cross-sectional tools primarily used for assessing exposure or screening and scenario-based tools designed to assess the impact of change in risk factors (technology, policy, market, etc.).

5.2 SERVICE PROVIDERS

Figure 27: Types of quantitative CAR models.
Source: Modified from UNEP FI/WR 2015 and 2dII/CDC Climat/UNEQ Inquiry 2015.

	CROSS-SECTIONAL	SCENARIO-BASED
Bottom-up (Asset/operator level)	Corporate carbon disclosure: CDP, Ceres, etc.	Asset impairment tests (CTI) Impact on revenues/margins (Kepler-Cheuvreux, Allianz) Impact on valuation/DCF models (HSBC, Bloomberg) Credit Ratings (S&P, Moody's)
Top-down (Portfolio level)	Portfolio footprinting: South Pole, Trucost, MSCI, others[100]	Portfolio Stress test (Mercer)

The table above shows the dominant families of CAR assessment models. This chapter will focus on portfolio level tools and models. As discussed in recent work, the key advantages of each quadrant

98 E.g. the PRI Montreal Pledge and UNEP FI/CDP Portfolio Decarbonization Coalition.

99 Financial Risk and the Transition to a Low Carbon Economy, 2° Investing Initiative, UNEP Inquiry, and CDC Climate Research (July 2015).

100 See WRI/UNEP FI/2dII Climate Strategies and Metrics: Options for Institutional Investors.

are clear. Cross-sectional analyses require less overall data and assumptions but are limited to the analysis of risk exposure as opposed to financial impact, whereas scenario-based models offer a greater level of rigor with concomitant effort and can estimate financial impact. Similarly, bottom-up company and asset-level models offer a greater level of technical rigor for each individual security but lack the ability to assess diversification and strategic asset allocation (the strength of portfolio stress test models like Mercer's).

This chapter will briefly introduce recent quantitative modeling at portfolio scale, including the current state of portfolio carbon footprinting (next section) and stress testing (final Section).

5.2.1 Portfolio Carbon Footprinting

As discussed above, the primary use of portfolio carbon footprinting is the cross-sectional assessment of where in the portfolio an investor could be exposed to GHG emissions. Importantly, the degree to which portfolio carbon footprint serves as a proxy or even a screening tool for CAR is a hotly debated point. It is not within the scope of this work to comment on this debate directly, but the reader is encouraged to consult the references to this article and form her own opinion.[101]

Compared to engagement and disclosure-related activities, portfolio carbon footprinting is a relatively new phenomenon, introduced in the mid-2000's. However, the application has picked up in particular since 2014, notably due to voluntary investor commitments, such as the UN PRI Montreal Pledge and UNEP FI/CDP Portfolio Decarbonization Coalition.[102]

- The Montreal Pledge, led by UNPRI, focuses on mobilizing investors to commit to measuring and disclosing the carbon footprint of their portfolios. Over 60 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.

Importantly, the recent investor pledges are couched in both risk and moral/ethical objectives. For instance, the Montreal Pledge notes:

> *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 … whereas the PDC allows its signatories to disclose either the portfolio exposure to GHG-related risks, and/or the portfolio alignment with the low-carbon economy.*

Another more recent development, the French Energy Transition Law, includes the first mandatory disclosure for investors' carbon footprints, again using language mixing risk and moral/ethical issues:

> *[T]he exposure to climate-related risks, including the GHG emissions associated with assets owned, the contribution to the international goal of limiting climate change and the contribution to the realization of the energy and ecological transition[103]…*

101 The reader is encouraged to consult 2dII (2014), UNEP FI/WRI/2dII (2015) , GICCC (2015)

102 More information here: UN PRI Montreal Pledge and UNEP FI/CDP Portfolio Decarbonization Coalition.

103 Translation from 2dII (2015).

Thus, in addition to the requirements for disclosing CAR and portfolio carbon footprint, investors are also required to report on their portfolio's contribution to the energy transition, a requirement that will likely require innovation on the part of investors and asset managers to meet.[104] The Law also includes provisions related to listed company disclosures, including requiring CAR-related disclosure: the financial risks related to the effects of climate change and the measures adopted by the company to reduce them, by implementing a low-carbon strategy in every component of its activities. An implementation decree is expected by the end of the year, and the stringency of the required disclosures will likely depend on interpretations in this decree.

Partly driven by these developments, notably the Montreal Pledge, the portfolio footprinting market has expanded considerably over the last year. Discussions with market leaders and surveys by Novethic[105] suggest around 60 large institutional investors in 2013 have grown to nearly 200 conducting this type of analysis, generally focused on equities portfolios. More interestingly, it seems that the market is beginning to move beyond 'the usual suspects', predominantly public pension funds and religious groups to include more mainstream funds and asset managers. Industry experts consulted for this study report that the motivation for footprinting portfolios remains a mixture of moral/SRI type motivations and risk, though more clients who may have a predominantly moral driver are beginning to ask about risk exposure.

Increasingly equity portfolio footprinting is also being conducted alongside other risk-relevant metrics being developed by data providers, including exposure to fossil fuel reserves, exposure to 'green' assets as a CAR hedge, and alternative carbon metrics across private equity, infrastructure, and real estate holdings. A brief summary of current market offerings can be found in UNEP FI/WRI (2015) and 2dII/UNEP FI/WRI (2015), but in general leading service providers are offering a similar combination of CAR-relevant services, including assessment of:

- **Risk exposure from current carbon intensity**
- **Risk exposure from potential future emissions (fossil fuel reserves)**
- **Exposure to Clean Technologies as a share of total**
- **Some level of scenario/regulatory analysis**
- **Scoring against benchmarks on GHG emissions governance and target implementation for individual companies and their position relative to peers.**

All providers also offer services to benchmark portfolios to commonly used investment indices such as the S&P 500, STOXX 600, etc. A growing trend in the field is the creation of low-carbon and fossil fuel exclusion indices used for alternative benchmarking, as discussed in the divestment section above.

5.2.2 Portfolio Stress Testing

The other predominant form of portfolio analysis, much rarer to date, is the portfolio-level stress test. As discussed above the dominant available model is Mercer's, which was designed using sector-level scenario assumptions to assess impacts on strategic asset allocation and sector-level diversification. Mercer's model has seen significant interest, with over 3000 unique downloads of their most recent report.

The Mercer SAA approach identifies four climate scenarios and four climate risk factors, and

104 2dII has provided an initial summary and analysis of the Law's provisions for investors, see here

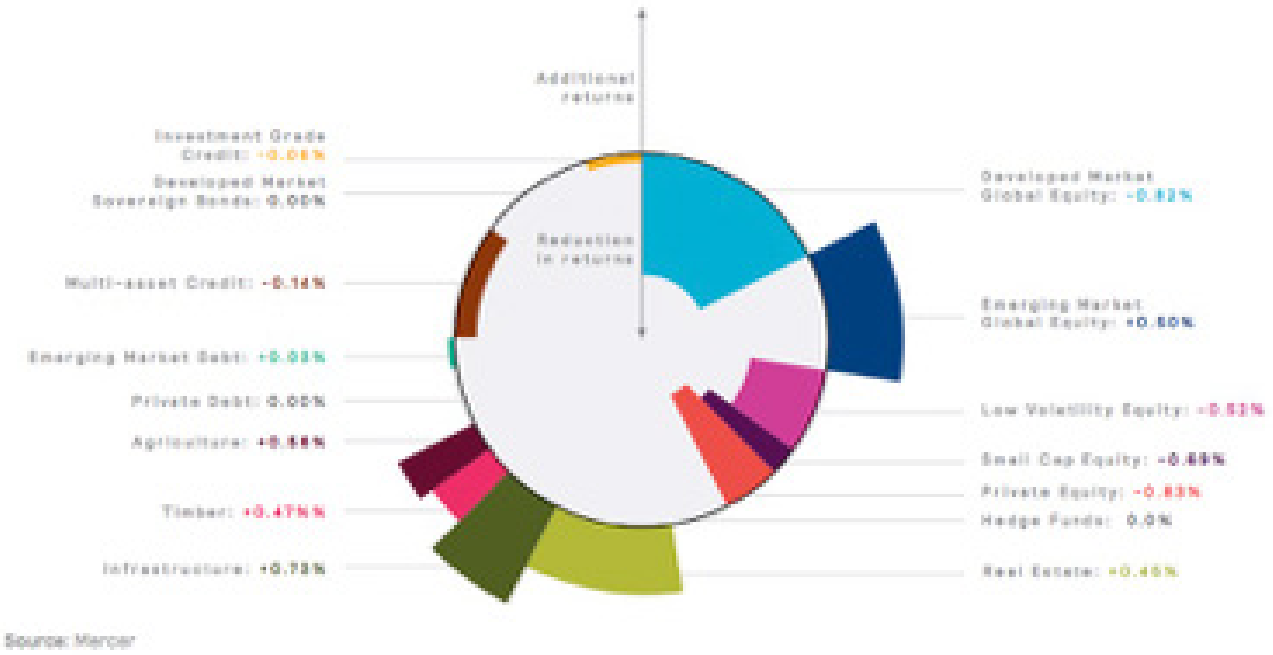
105 Data were gathered by leading footprint organizations MSCI, South Pole Carbon, and Trucost. Market experts suggested that these providers likely represent 60-90% of the overall market for bespoke footprint analyses. Novethic's survey panel found around 80 investors who had conducted a carbon footprint study in May 2015.

integrates these in the modeling process alongside more traditional market assumptions, scenarios, and risk factors. Importantly, the risk factors capture indicators for policy and technology, similar to other CAR assessments, but also with physical impacts driven by catastrophic incidents (for example, storm, wildfire, and flood) and long-term weather changes affecting key resources (for example, water).

The results provide investors with an insight to potential impacts on return distribution expectations for the SAA, enabling them to examine the implications of different climate scenarios in the context of their current asset allocation, and consider resulting actions and opportunities, such as:

- Developing a formal point of view on climate risk and associated implementation strategy
- Identifying risk, and risk management solutions, at the asset class and sector level (e.g. real asset physical risk exposure across the portfolio)
- Framing questions on sector level impacts which asset owners (and consultants) can use in their oversight of external managers, and managers can use in their oversight of companies
- Considering opportunities to access low carbon, high growth investments across asset classes
- Developing an appropriate stakeholder relations strategy

Figure 28: Impact of climate change scenario on the Median Annual Return Impact over 10 years. Source: Mercer, 2015



Source: Mercer

APPENDIX 1: COMPANIES THAT RECEIVED THE INVESTOR CARBON ASSET RISK LETTER

Coal

Alpha Natural Resources
Anglo American plc
Arch Coal
BHP Billiton
China Shenhua Energy Company Limited
CONSOL Energy
Exxaro
Glencore Xstrata
Mitsubishi Corporation
Peabody Energy
Rio Tinto
Severstal
Shanxi Coking Co., Ltd.
Vale

Utility

AES Corporation
American Electric Power
China Power International Development Limited
Duke Energy
FirstEnergy
NTPC
Southern Company

Oil & Gas

Anadarko Petroleum Corporation
Apache Corporation
BG Group
BP
Canadian Natural Resources
Chesapeake Energy
Chevron
CNOOC Limited
ConocoPhillips
Devon Energy Corporation
Eni S.p.A.
EOG Resources, Inc.
ExxonMobil
Gazprom
Hess Corporation
Lukoil
Occidental Petroleum
Oil and Natural Gas Corporation Ltd.
PetroChina
Royal Dutch Shell
Sinopec Corp.
Statoil
Suncor
Total

APPENDIX 2: SUMMARY OF CAR SHAREHOLDER PROPOSALS

OIL AND GAS

ANADARKO			
YEAR	**SUBJECT**	**SHAREHOLDER**	**OUTCOME**
2014	Carbon Asset Risk	As You Sow	30%
2015	Carbon Asset Risk	As You Sow	29.1%

BP			
YEAR	**SUBJECT**	**SHAREHOLDER**	**OUTCOME**
2015	Carbon Asset Risk	Aiming for A Coalition led by CCLA, LAPFF, co-filers include:	98.28%

CHESAPEAKE			
YEAR	**SUBJECT**	**SHAREHOLDER**	**OUTCOME**
2015	Carbon Asset Risk	Unitarian Universalist Association of Congregations	11.5%

CHEVRON			
YEAR	**SUBJECT**	**SHAREHOLDER**	**OUTCOME**
2013	Carbon Asset Risk	Christopher Reynolds Foundation	7.6%
2014	Carbon Asset Risk	As You Sow	Challenged-Omitted
2015	Return capital to investors rather than continue to invest in high risk projects	As You Sow	3.2%

CONOCOPHILLIPS			
YEAR	**SUBJECT**	**SHAREHOLDER**	**OUTCOME**
2015	Executive Compensation linked to ESG and Carbon Asset Risk	United Unitarian Universalist Association of Congregations	5.8%

DEVON ENERGY CORPORATION			
YEAR	**SUBJECT**	**SHAREHOLDER**	**OUTCOME**
2014	Carbon Asset Risk	New York State Comptroller	20.5%
2015	Carbon Asset Risk	New York State Common Retirement Fund	23.2%

ENERGEN CORPORATION			
YEAR	**SUBJECT**	**SHAREHOLDER**	**OUTCOME**
2015	Carbon Asset Risk	Connecticut Retirement Plans and Trust Funds	25.7%

EXXONMOBIL			
YEAR	**SUBJECT**	**SHAREHOLDER**	**OUTCOME**
2013	Climate Risk Report	Christopher Reynolds Foundation	Omitted
2014	Report on Assumptions for Carbon Asset Risk	Christopher Reynolds Foundation	Withdrawn; Company addressing through further engagement
2014	Carbon Asset Risk Report	Arjuna Capital	Withdrawn; Company addressed with Carbon Asset Risk Report
2015	Return capital to shareholders	Arjuna Capital	Omitted

HESS			
YEAR	**SUBJECT**	**SHAREHOLDER**	**OUTCOME**
2014	Carbon Asset Risk	Connecticut Office of the State Treasurer	8.4%
2015	Carbon Asset Risk	As You Sow, co-filer, Connecticut Office of the State Treasurer	23.36%

KINDER MORGAN INC.			
YEAR	**SUBJECT**	**SHAREHOLDER**	**OUTCOME**
2015	Carbon Asset Risk	First Affirmative Financial Network, LLC	22.3%
2014	Carbon Asset Risk	First Affirmative Financial Network, LLC	27%

MARATHON OIL			
YEAR	**SUBJECT**	**SHAREHOLDER**	**OUTCOME**
2015	Carbon Asset Risk	Unitarian Universalist Association of Congregations	36.3%

NEWFIELD EXPLORATION CO.			
YEAR	**SUBJECT**	**SHAREHOLDER**	**OUTCOME**
2015	Carbon Asset Risk	Unitarian Universalist Association of Congregations	Withdrawn; ongoing dialogue

NOBLE ENERGY			
YEAR	**SUBJECT**	**SHAREHOLDER**	**OUTCOME**
2015	Carbon Asset Risk	Presbyterian Church (USA)	20.3%

ROYAL DUTCH SHELL			
YEAR	**SUBJECT**	**SHAREHOLDER**	**OUTCOME**
2015	Carbon Asset Risk	Aiming for A Coalition, led by CCLA and LAPFF, co-filers include:	98.9%
STATOIL			
YEAR	**SUBJECT**	**SHAREHOLDER**	**OUTCOME**
2015	Carbon Asset Risk	Aiming for A Coalition	99.95%

COAL

ALPHA NATURAL RESOURCES			
YEAR	**SUBJECT**	**SHAREHOLDER**	**OUTCOME**
2013	Climate Risk Report	United Unitarian Universalist Association of Congregations	18%
2014	Carbon Asset Risk	United Unitarian Universalist Association of Congregations	23.3%

CONSOL ENERGY			
YEAR	**SUBJECT**	**SHAREHOLDER**	**OUTCOME**
2013	Carbon Asset Risk	As You Sow	19.7%
2014	Carbon Asset Risk	As You Sow	17.9%
2015	Carbon Asset Risk	As You Sow	11.2%

PEABODY ENERGY CORPORATION			
YEAR	**SUBJECT**	**SHAREHOLDER**	**OUTCOME**
2014	Carbon Asset Risk	Connecticut Office of the State Treasurer	Withdrawn

ELECTRIC

AES			
YEAR	**SUBJECT**	**SHAREHOLDER**	**OUTCOME**
2014	Sustainability Reporting	Laborers' International Union of North America	Withdrawn;

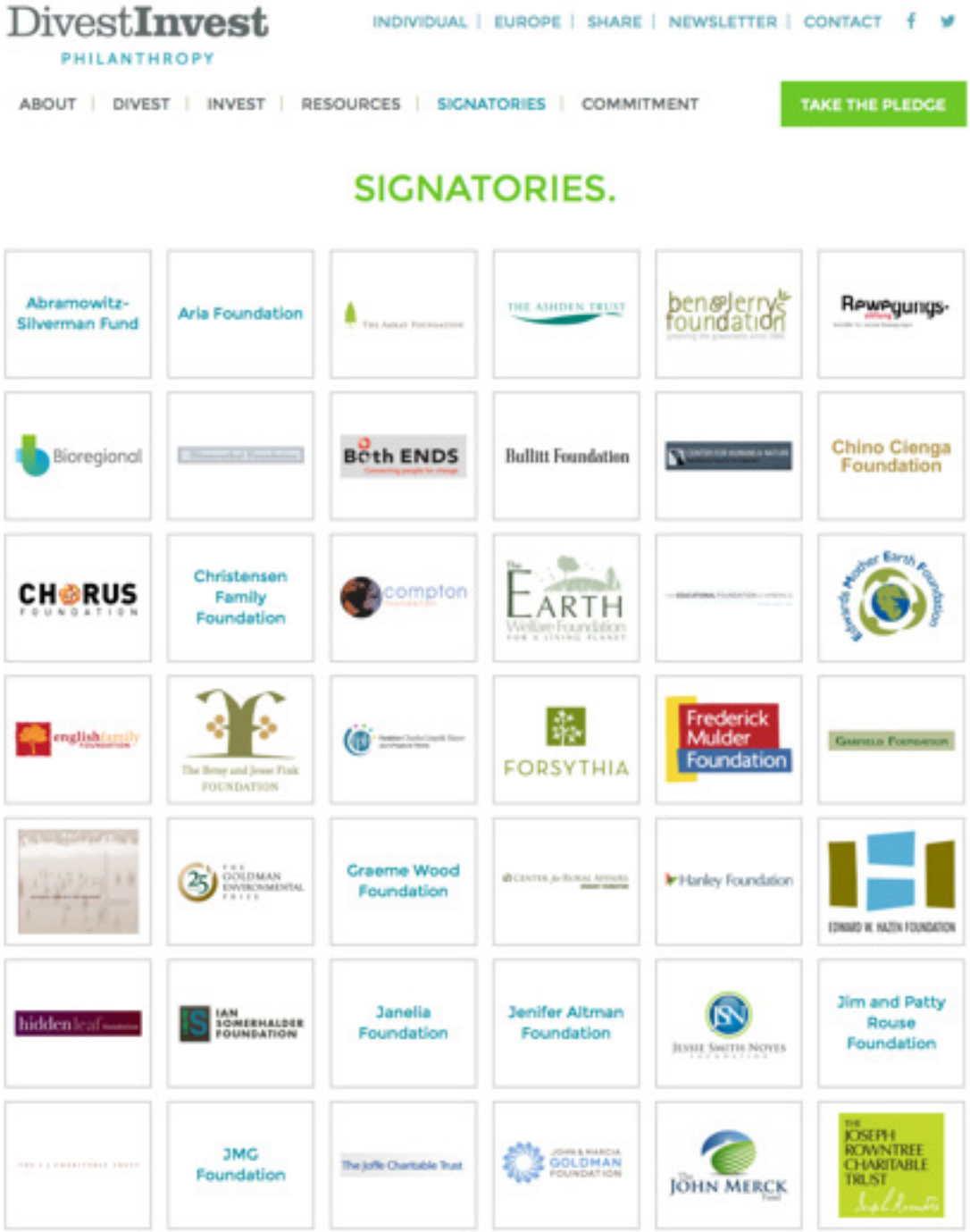
DTE ENERGY			
YEAR	**SUBJECT**	**SHAREHOLDER**	**OUTCOME**
2015	Changing Business Model	New York City Comptroller	27.5%

FIRST ENERGY			
YEAR	**SUBJECT**	**SHAREHOLDER**	**OUTCOME**
2014	Adopt policies to reduce emissions in line with U.S. goals and address Carbon Asset Risk	New York State Comptroller	Withdrawn

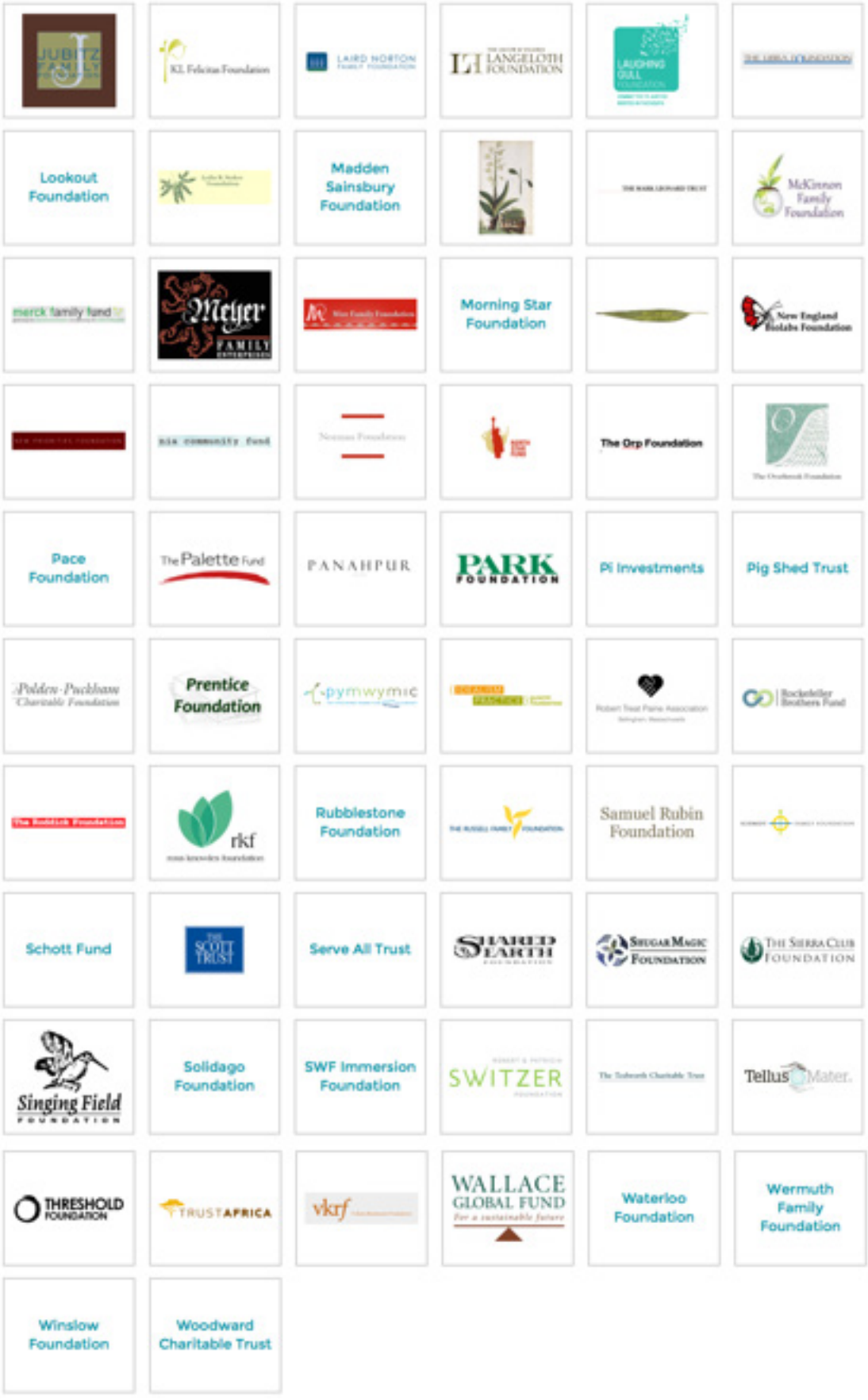
SOUTHERN COMPANY			
YEAR	**SUBJECT**	**SHAREHOLDER**	**OUTCOME**
2014	Adopt policies to reduce emissions in line with U.S. goals and address Carbon Asset Risk	As You Sow	Withdrawn

APPENDIX 3: INSTITUTIONS DIVESTING

In addition to divestment commitments, a key movement has been to promote the reinvestment of funds to climate solutions. Divest-invest is an NGO-led pledge In terms of the names of key institutions, Divest- Invest lists the following signatories, who have pledged not only divestment but also the reinvestment of 5% of their portfolio to climate solutions.[106] Note that the number of institutions—currently 104—is fully contained in the 397 commitments counted by Go Fossil Free.



106 http://divestinvest.org/philanthropy/signatories/.


Lookout Foundation
Madden Sainsbury Foundation
Morning Star Foundation
The Orp Foundation
Pace Foundation
PANAHPUR
PARK FOUNDATION
PI Investments
Pig Shed Trust
Prentice Foundation
rkf
Rubblestone Foundation
Samuel Rubin Foundation
Schott Fund
Serve All Trust
Singing Field
Solidago Foundation
SWF Immersion Foundation
SWITZER
WALLACE GLOBAL FUND
Waterloo Foundation
Wermuth Family Foundation
Winslow Foundation
Woodward Charitable Trust

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