



2° SCENARIO ANALYSIS

InvestorName

2Dii PACTA MODEL

Important Information & Legal Disclaimer: MODEL OUTPUT REPORTS

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The 2Dii PACTA Model generates a limited 'point in time' estimate of the relative alignment of the Revealed Plans of Securities in the Scope versus the economic trends embodied in the 2C Scenario(s), as identified by external data and scenario providers.

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Scope Securities: The PACTA Model is limited in its scope and application. It does not consider all securities across all sectors, nor all securities within those sectors. The PACTA Model applies only to the Scope Securities set out in the Methodology Statement, as updated from time to time.

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EXECUTIVE SUMMARY

This report provides a 2°C scenario analysis of the investment portfolio.

It responds to the recommendations of the G20 Financial Stability Board Task Force on Climate-related Financial Disclosures (TCFD). Over 1,000 financial institutions have been assessed using the model applied in this report, as part of direct partnerships with over 200 institutional investors, and collaborations with a number of financial supervisors.

The outputs provided in this report – based on the scope summarized in the table on the right – provide an analysis of the portfolio relative to an economic transition consistent with limiting global warming to 2°C above pre-industrial levels, as well as a comparison to peers. The analysis provides answers to three questions:

1. What is the current exposure in the portfolio to economic activities affected by the transition to a low-carbon economy? (Section 2)
2. Does the portfolio increase or decrease its alignment with a 2°C transition over the next 5 years? (Section 3)
3. What is the expected future exposure to high- and low-carbon economic activities? (Section 4)

The analysis covers two asset classes: listed equity and corporate bonds, including the largest government and municipal power producers (subsequently labeled as ‘fixed income’)

The figure below shows the share of the total fixed income and equity investments included in the analysis. Analysis Coverage% of investments are included in the analysis (“the

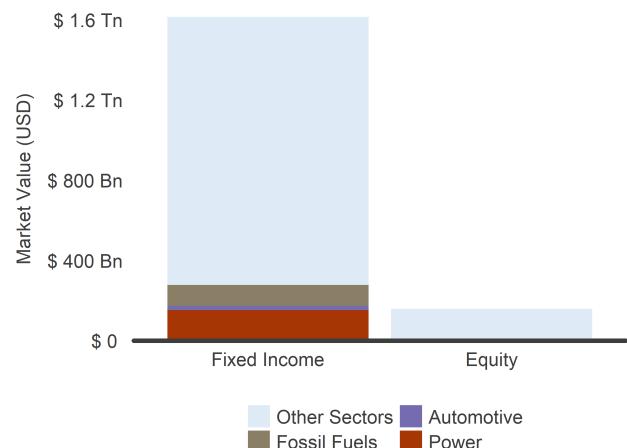
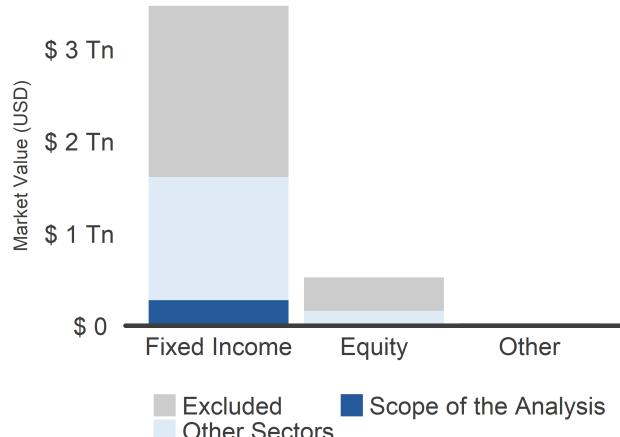
throughout this report).

Scope of Analysis	
Investor Name	InvestorName
Portfolio Name	PortfolioName
Size of portfolio	SizeofPortfolio
Scenario	IEA 2° Scenario
Geography - Financial Assets	Global
Geography - Economic Assets	Global
Asset Class	AssetClass
Peers	PeerGroup
Portfolio Timestamp	12.31.2017
Date of Analysis	TodaysDate

The graph on the bottom left shows the share of the total fixed income and equity investments included in the analysis, referred to as “the portfolio” (light blue plus dark blue sections). Within this portfolio, the 2°C scenario analysis focuses on the fossil fuel, power, and automotive sectors (dark blue), which account for roughly 90% of energy-related CO₂-emissions in a typical portfolio. The chart on the bottom right shows the share of companies active in each of these sectors in the analyzed portfolio.

portfolio”).

The figure below shows the share of the fossil fuels, power, and automotive sectors in the portfolio.



EXECUTIVE SUMMARY

4

The figure below shows the estimated percent of the portfolio currently exposed to activities across the fossil fuel, power, and automotive sectors.

The results show the share of the portfolio potentially exposed to transition risks in the fossil fuel, power, and automotive sectors. The results are calculated by first calculating the exposure of the portfolio to companies active in each of these sectors, and then calculating the specific technology exposure on the basis of the breakdown of those companies' asset base.

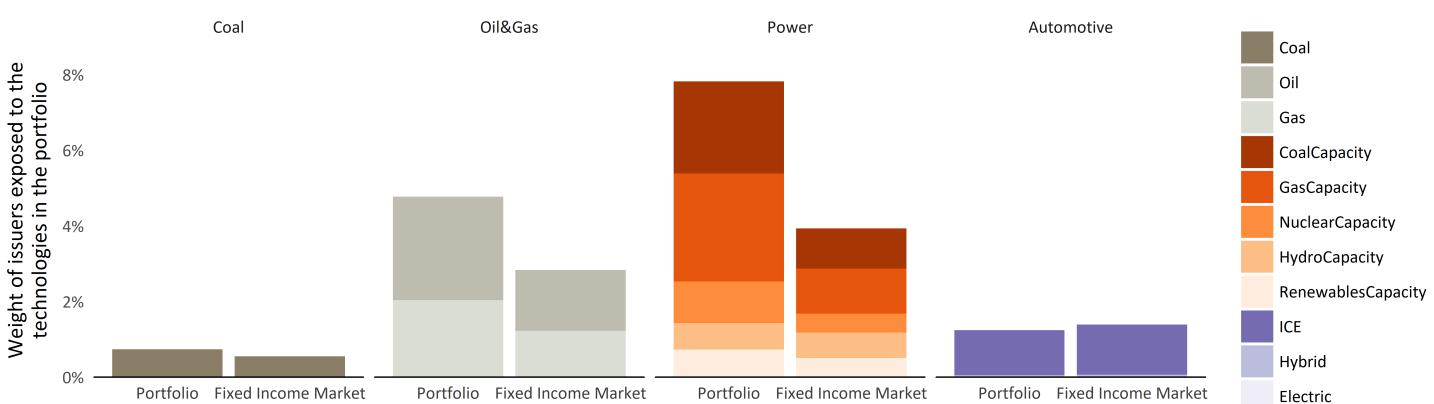
The percentages are compared to the market portfolio. The market portfolio results are calculated based on the exposure of the global universe of assets in both the listed equity and fixed income markets to the fossil fuel, power, and au-

tomotive sectors.

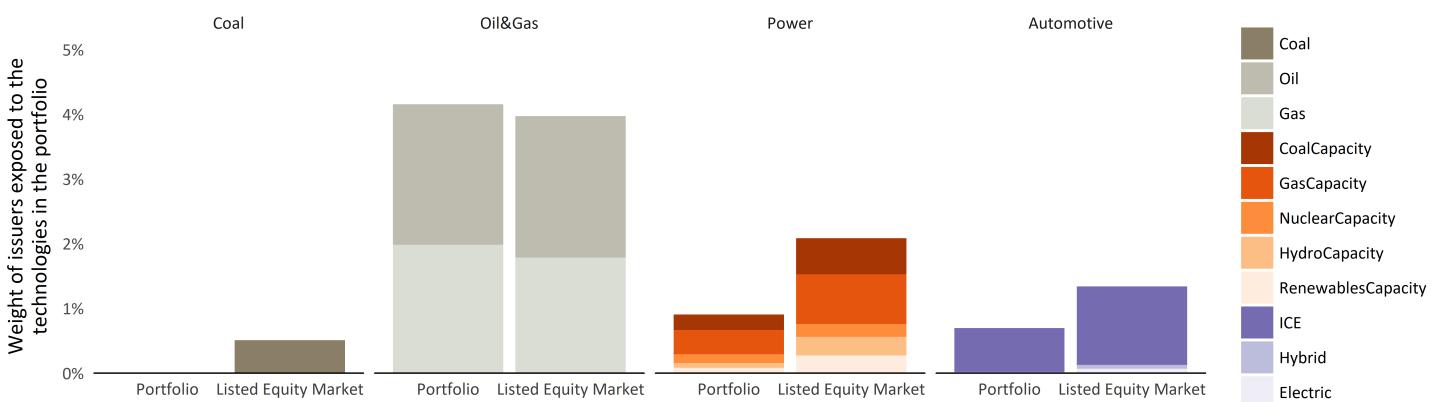
A value higher than the market portfolio suggests the portfolio is currently more exposed to transition risk than the market, on average. A value lower than the market portfolio suggests the portfolio is less exposed, all other things being equal. As will be outlined in the following sections, the extent to which these risks will materialize is likely to be at least in part a function of the evolution of the companies' activities over time.

Note: In the graphs below, coal is shown separately to highlight those results. In the graphs below and throughout this report, "ICE" refers to Internal Combustion Engine (petrol and diesel) vehicles.

Current exposure of the fixed income portfolio to high-carbon and low-carbon activities, as a % of the portfolio, compared to the fixed income market



Current exposure of the equity portfolio to high-carbon and low-carbon activities, as a % of the portfolio, compared to the equity market





SECTION 1: INTRODUCTION

REPORT CONTENTS

6

This report provides a 2°C scenario analysis, following the recommendations of the G20's Financial Stability Board Task Force on Climate-related Financial Disclosures (TCFD). Specifically, it seeks to inform the reader about four issues.

1. What is the current exposure of the portfolio to economic activities affected by the transition to a low-carbon economy? (Section 2)

The first part of the report summarizes the exposures of the portfolio (in terms of % of the portfolio) to business activities potentially affected by the transition to a low-carbon economy and by extension to transition risk. Specifically, it will quantify the percent of the portfolio exposed to low-carbon and high-carbon activities across the fossil fuel, power, and automotive sectors. The results will be presented relative to the market portfolio. For fossil fuels, the analysis will also show this portfolio's exposure relative to the distribution of fossil fuel exposures of all insurance companies included in this analysis.

2. Does the portfolio increase or decrease its alignment with a 2°C transition over the next 5 years? (Section 3)

The second part of the report will quantify the extent to which the portfolio is building or reducing risk in terms of being aligned / misaligned with the 2°C scenario pathway over the next 5 years. The analysis will focus on technologies in the fossil fuel sector (oil production, gas production), electric power sector (coal

power, gas power, nuclear power, renewables power), and automotive sector (internal combustion engine vehicles and electric vehicles). The analysis will compare the currently planned production or investment trend in the portfolio with the production or investment trend that would be required under the 2°C scenario.

3. What is the expected future exposure to high- and low-carbon economic activities based on the current revealed production and investment plans of the companies in the portfolio? (Section 4)

Section 4 of this report will quantify the expected evolution of the portfolio's exposure to high-carbon and low-carbon activities in 5 years (2023) based on the current revealed production and investment plans of companies in portfolio with business activities in the fossil fuel, power, and automotive sectors. The section will show the portfolio's expected future technology mix in each sector compared to the expected future technology mix of both the aggregated investment portfolio of all insurance companies included in this analysis and the 2° market benchmark.

4. What is driving the results? (Section 5)

Section 5 will provide background on the securities and companies driving the results presented in the previous sections, including additional analysis on individual companies' profiles.

You will also be able to find further background information on the scenarios and modelling at the end of the report (Section 6).

Section 1: Introduction

Section 2: The current exposure

Section 3: Trajectory of the portfolio relative to a 2°C scenario

Section 4: The expected future exposure in 2023

Section 5: Company exposure

Section 6: Background to the model

Background. In June 2017, the G20 Financial Stability Board Task Force on Climate-related Financial Disclosures (TCFD) recommended that financial institutions perform scenario analysis on their portfolios to assess financial risks related to climate change. The TCFD grouped climate-related risks into two categories: physical and transition risks. Transition risks are risks generated by the policy, technology, market, and regulatory changes likely to accompany the transition to a low carbon economy.

Goal. The goal of the scenario analysis was to assess insurers' exposure to transition risk, individually and as a whole, based on their estimated current and future exposure to high-carbon and low-carbon activities. This report provides the results of the analysis for a single portfolio.

Approach. The key elements of the analysis are:

- *Current and planned production and investment trends.* Current and planned production (for the fossil fuel and automotive sector) and current installed capacity as well as new capacity additions (for the power sector) for the next 5 years were sourced from commercial business intelligence databases. These data providers collect forward-looking production and capacity data at the physical asset level, including barrels of oil by field, cars by model and factory, and new capacity by power plant. 2Dii maps this data to their immediate owners and parent company to generate a company's aggregate 'current production profile' for each technology. These production plans are linked to the financial securities (equity and fixed income) issued by the company. The asset-level data used for this analysis was retrieved from data providers during the first half of 2017. See the 'Important Considerations and Limitations' section at the end of the report for notes on interpreting power sector capacity data.
- *Allocating the production of physical assets to financial assets.* Based on the share of total equity or debt held

in a portfolio, the model allocates a portion of each corporate issuer's current production plans for each technology to the portfolio. Aggregated over all companies to the portfolio level, this is the portfolio's 'current production profile' for a technology. This also defines the insurer's current 'exposure' to each technology.

- *From macro-level scenarios to micro-level targets.* To calculate production levels consistent with a climate scenario such as the IEA 2°C scenario, the model uses a 'fair share' principle that applies the changes specified by the scenario for a given technology and region equally across all owners of physical assets in that technology's sector in the given region. This creates a set of alternative, forward-looking production and capacity profiles consistent with the scenario for each company and technology. These alternative profiles are then aggregated to the portfolio level to create the portfolio's 'target production profile' under the scenario. This profile is used to determine the insurer's 'target exposure' to a technology under the scenario. The 'target exposure' does not assume any change in the composition of the portfolio: it models the changes in production and investment plans that are required across the different companies held in the portfolio in order to match the technology deployment described in the scenario. This report uses the scenarios of the International Energy Agency, specifically the 450S and the 2D scenario.

Results of the scenario analysis. The portfolio's 'target profile' under the scenario can be compared to the portfolio's currently revealed production and investment plans for each technology to derive the exposure to transition risk as well as the extent to which the portfolio is projected to increase or decrease alignment with the 2°C scenario over the next 5 years. It is this analysis that forms the basis of the subsequent sections, with Section 6 providing further detail on the methodology.

TRANSITION RISK FOR INVESTORS

What are transition risks? Transition risks can be broadly defined as economic and financial risks associated with the transition to a low-carbon economy. The international community has defined a mandate to limit the man-made contribution to global warming to well below 2°C above pre-industrial levels. According to best available science, achieving this objective requires decarbonizing the economy in the course of this century. This decarbonization is set to have significant implications for high-carbon sectors, most prominent among which are the fossil fuel, power, and transport sectors, contributing the majority of global anthropogenic GHG emissions.

As the economy decarbonizes, companies that fail to properly anticipate this transition are set to be exposed to economic risks. Companies well-prepared for this transition in turn are set to capitalize from this economic opportunity. Similarly, economic risks may translate into financial risks in financial markets if these risks are not properly anticipated by financial market actors.

Crucially, the transition to a low-carbon economy is set to already have dramatic impacts in the short- and medium-term. By 2040, in only 22 years, global coal production is set to decline by 46%, with a more accelerated decline expected in developed markets. Global coal power capacity in turn is similarly set to decline by 41%. The production of gasoline and diesel vehicles (internal combustion engine or ICE vehicles) is set to decline by 21%. This decline in high-carbon activity in turn will be accompanied by the commensurate deployment and growth of new technologies. Renewable power capacity and electric vehicle production in turn is set to nearly quadruple in volume by 2040.

Scenario analysis can help financial institutions assess and ultimately manage the risks and opportunities associated with the transition. In recognition of these risks, scenario analysis has been applied to date by hundreds of financial institutions as well as financial supervisors. It forms the basis of the recommendations of the FSB TCFD. The TCFD notes

that “forward-looking assessments of climate-related issues is important for investors and other stakeholders in understanding how vulnerable individual organizations are to transition and physical risks and how such vulnerabilities are or would be addressed. As a result, the Task Force believes that organizations should use scenario analysis to assess potential business, strategic, and financial implications of climate-related risks and opportunities and disclose those, as appropriate, in their annual financial filings” (TCFD Final Report, p. 33).

To clarify its scenario analysis recommendation, the Task Force explains, “A key type of transition risk scenario is a so-called 2°C scenario, which lays out a pathway and an emissions trajectory consistent with holding the increase in the global average temperature to 2°C above pre-industrial levels” (TCFD Final Report, p. 35).

It is this premise that forms the basis of this report, highlighting for the portfolio the current exposure to transition risks in the fossil fuel, power, and automotive sectors, the trends in the portfolio over time in these sectors relative to the 2°C scenario, and the expected future exposure on the basis of these trends. While these sectors do not represent all high-carbon activities and sectors, they account for both the largest share in a typical portfolio and the most significant contribution to climate change currently, as well as benefiting from well-developed scenario pathways.

The report does not provide specific estimates as to the potential loss in value that may be realised in the portfolio should these risks materialize, which is obviously associated with significant uncertainty and myriad modelling assumptions. For any individual security, the potential loss may range from 0 to 100% and may even be associated with positive returns, depending on the adaptive capacity of the company, the anticipation of the trend by financial markets, and the nature of a potential repricing. It is the proper anticipation of these risks that minimizes the loss that this report seeks to contribute to.

Technology	Total Volume Change by 2023	Total Volume Change by 2040
Renewable Power	69%	354%
Hydro Power	13%	59%
Nuclear Power	17%	89%
Gas Power	8%	31%
Coal Power	-3%	-41%
Oil Production	-2%	-23%
Gas Production	5%	8%
Coal Production	-11%	-46%
ICE Production	-9%	-21%
Hybrid Production	97%	440%
Electric Production	105%	352%



SECTION 2: THE CURRENT EXPOSURE

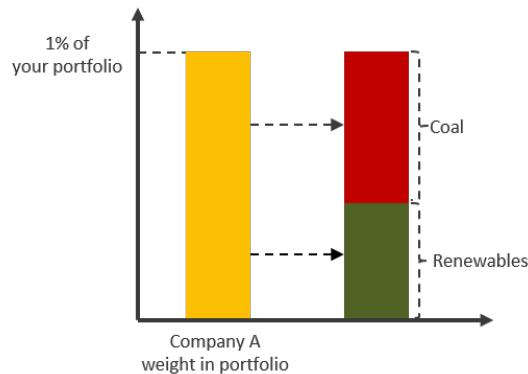
CURRENT EXPOSURE COMPARISON TO MARKET

This page provides information on the estimated percent of the portfolio currently exposed to activities across the fossil fuel, power, and automotive sectors.

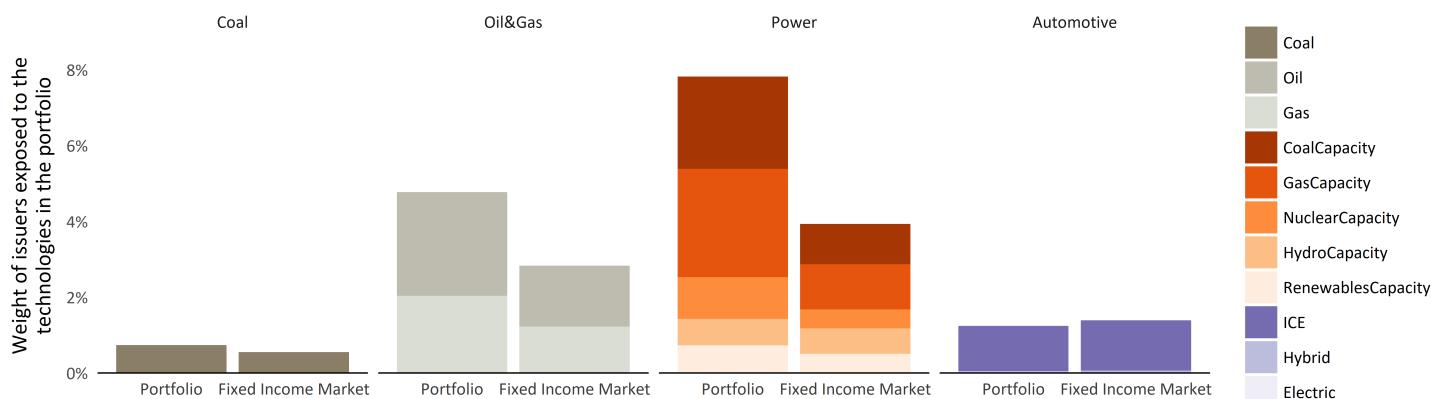
These business activities account for roughly 70-90% of energy-related CO₂-emissions in the typical investor portfolio. The graphs below show the weight of each technology/fuel in the portfolio by asset class and sector, and by extension the share of each portfolio potentially exposed to transition risks in the fossil fuel, power, and automotive sectors. For context, the results for the relevant fixed income and listed equity market are also included.

A value higher than the market portfolio suggests the portfolio is currently more exposed to transition risk than the market, on average. A value lower than the market portfolio suggests the portfolio is less exposed, all other things being equal.

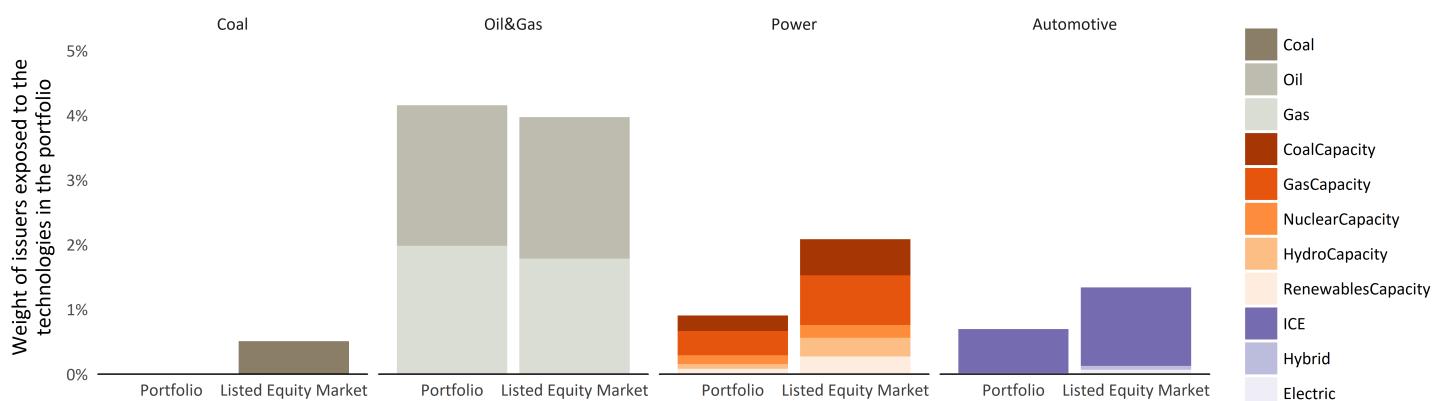
The results are calculated by first calculating the exposure of the portfolio to companies active in the fossil fuel, automotive, and power sectors, and then calculating the specific technology exposure on the basis of the breakdown of these companies' asset base (see Fig. below).



Current exposure of the fixed income portfolio to high-carbon and low-carbon activities, as a % of the portfolio, compared to the fixed income market



Current exposure of the equity portfolio to high-carbon and low-carbon activities, as a % of the portfolio, compared to the equity market





SECTION 3: TRAJECTORY OF THE PORTFOLIO RELATIVE TO A 2°C SCENARIO

5 YEAR TREND - POWER SECTOR

The analysis for the portfolio builds on the forward-looking projections of capacity additions by fuel over the next 5 years, as sourced from business intelligence data provider GlobalData. The five year time horizon is a function of the typical investment planning horizon of power capacity additions, recognizing that planning horizons for specific investments may be both longer and shorter. More long-term analysis would thus fail to identify significant further additions currently in the planning pipeline of companies. Excluded from the analysis presented here are planned power capacity additions by companies outside of the power sector (e.g. IT companies building wind parks to power their data centers). The evolution of the portfolio is based on the planned capacity additions by the companies behind the securities in the portfolio, weighted by their relative weight in the portfolio.

It is important to note that data on announced or otherwise officially planned retirements of power assets is not considered in the analysis presented here. This is intentional, given both a dearth of related data, as well as the desire to show the required retirements. For technologies projected to decline under the 2° scenario, the gap between current capacity projections and capacity consistent with the 2° scenario should be seen as an estimate of the capacity that would need to be retired to be in alignment with the 2° scenario.

As outlined above, the scenarios are based on the global trends, scaled to the portfolio based on the ‘fair share’ approach, where the trend in the macro scenario is translated into a micro target based on the market share of the portfolio. For the power sector, this approach may of course fail to capture changes in market share across asset classes and actors, notably with the rise of household renewable power

capacity (e.g. rooftop solar), set to change the power market. While this trend implies that in practice companies are likely to lose market share, this trend is intentionally not internalized in the analysis, in order to document the potential loss of market share under a 2°C scenario – and by extension the potential accumulating transition risk.

Further information on the data and the scenarios is provided in Section 6.

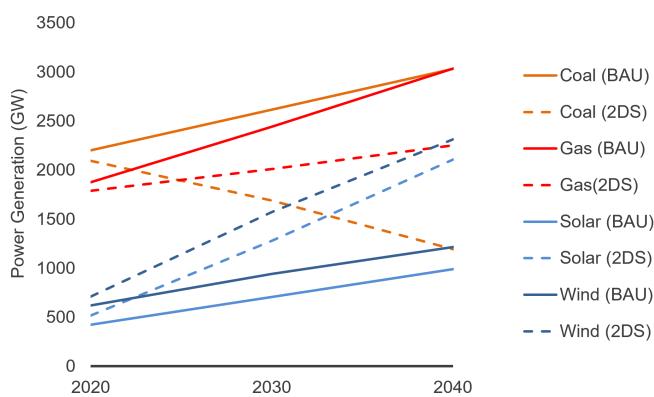
In a 2°C scenario, the power sector will decarbonize over the long-term in a shift from fossil fuel-based to renewable energy production. The International Energy Agency (IEA) says that in a 2°C scenario:

“Electricity supply worldwide is set to diversify and decarbonise, with low-carbon generation overtaking coal before 2020. Coal-fired power’s share of generation is projected to fall from above 40% now to 28% in 2040. By then, wind, solar and bioenergy-based renewables combined increase their market share from 6% to 20%” (IEA World Energy Outlook 2016, p. 241).

The mix of technologies will vary greatly based on the scenario. Coal-based power generation will increase under current trends but decreases in a 2°C scenario. Wind and solar would grow more rapidly in a 2°C Scenario.

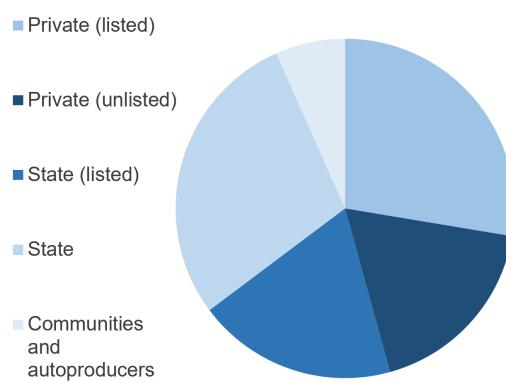
Equity and fixed income investors are exposed to these trends through the financial instruments issued by power companies. An estimated 28% of power generation assets are owned by publicly traded companies and 19% of assets are owned by listed state entities, for example municipal bond issuers (see figure below).

Power generation mix under IEA business as usual and 2DS scenarios for selected technologies



Source: IEA World Energy Outlook 2016

Ownership of global power generation assets



Source: IEA analysis and 2Dii, based on Platts, Bloomberg Professional service, Bloomberg New Energy Finance and national sources

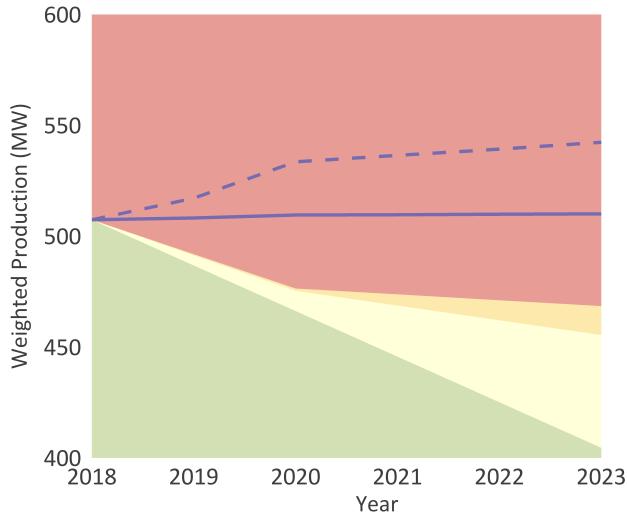
5 YEAR TREND - FIXED INCOME POWER

13

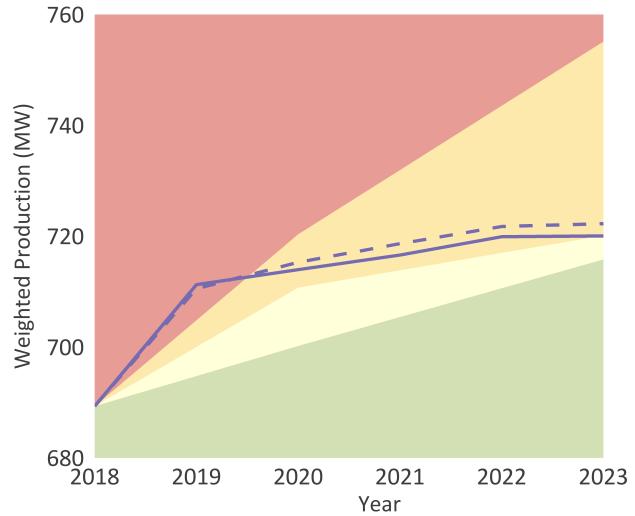
The alignment graphs below show the alignment of selected power technologies in the fixed income portfolio relative to the IEA scenarios for 2°C, 4°C and 6°C temperature change and the global fixed income market. For each technology, the value plotted for the portfolio (solid line) is the planned evolution or ‘trajectory’ of installed capacity allocated to the fixed income portfolio over the next 5 years. The

lines separating the color-coded background areas plot the portfolio’s ‘target production’ for each technology under the 2°, 4°, and 6° scenarios. The dotted line shows the planned trajectory of installed capacity in the specific technology for the fixed income market, scaled to the same starting point as the portfolio.

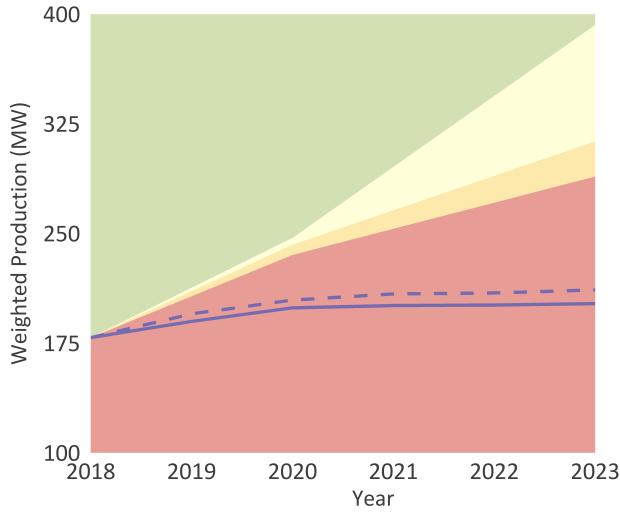
Trajectory of Coal Power Capacity



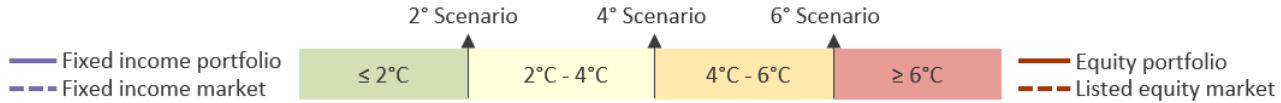
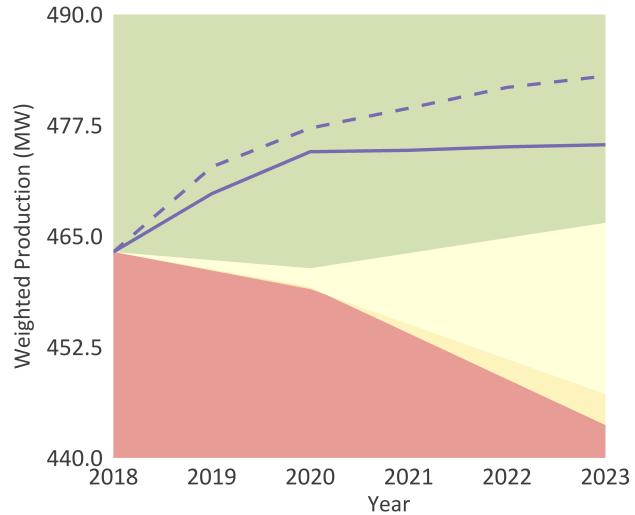
Trajectory of Gas Power Capacity



Trajectory of Renewable Power Capacity



Trajectory of Nuclear Power Capacity



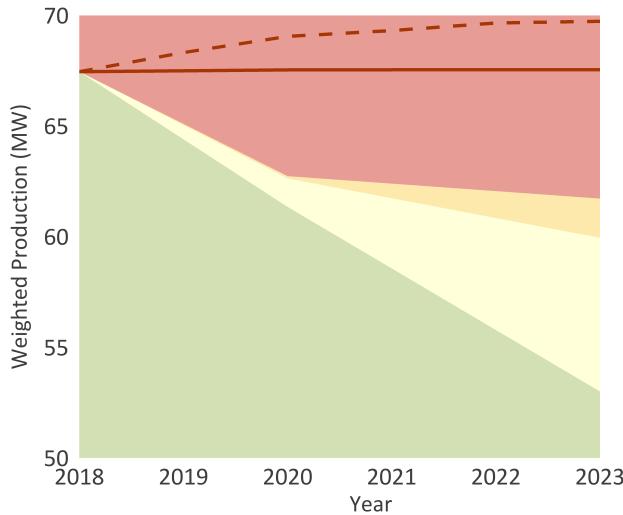
5 YEAR TREND - EQUITY POWER

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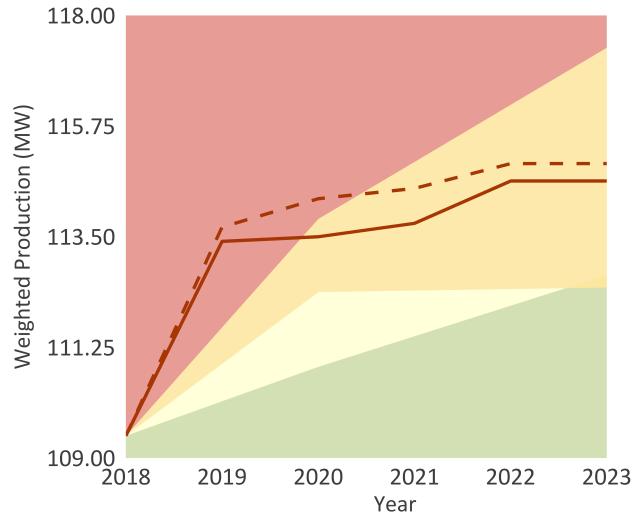
The alignment graphs below show the alignment of selected power technologies in the equity portfolio relative to the IEA scenarios for 2°C, 4°C and 6°C temperature change and the global listed equity market. For each technology, the value plotted for the portfolio (solid line) is the planned evolution or 'trajectory' of installed capacity allocated to the equity portfolio over the next 5 years. The lines separating

the color-coded background areas plot the portfolio's 'target production' for each technology under the 2°, 4°, and 6° scenarios. The dotted line shows the planned trajectory of installed capacity in the specific technology for the listed equity market, scaled to the same starting point as the portfolio.

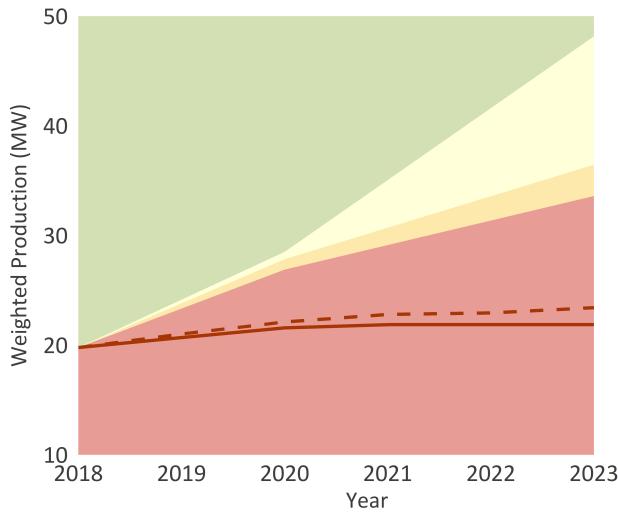
Trajectory of Coal Power Capacity



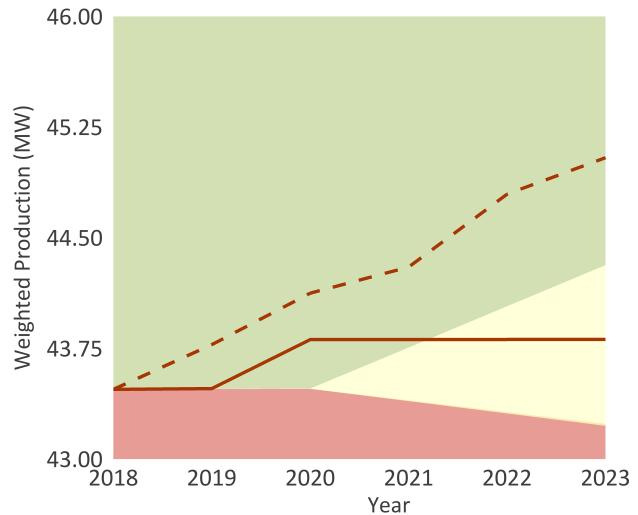
Trajectory of Gas Power Capacity



Trajectory of Renewable Power Capacity



Trajectory of Nuclear Power Capacity



— Fixed income portfolio - - - Fixed income market	2° Scenario $\leq 2^{\circ}\text{C}$	4° Scenario $2^{\circ}\text{C} - 4^{\circ}\text{C}$	6° Scenario $4^{\circ}\text{C} - 6^{\circ}\text{C}$	— Equity portfolio - - - Listed equity market
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5 YEAR TREND - FIXED INCOME FOSSIL FUELS AND AUTOMOTIVE

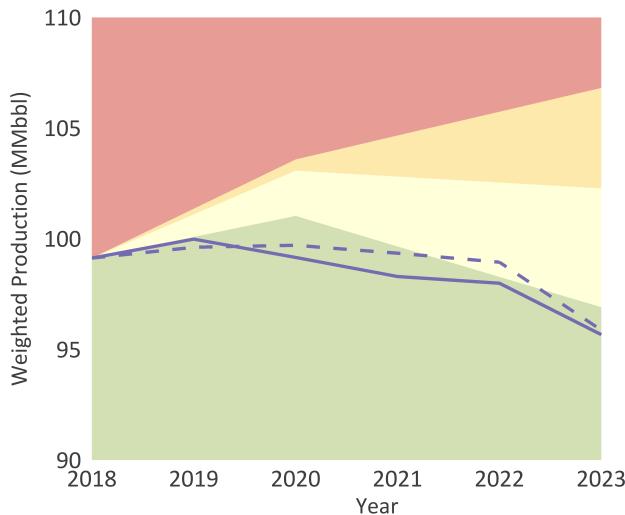
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The alignment graphs below show the alignment of selected fossil fuels and automobile technologies in the fixed income portfolio relative to the IEA scenarios for 2°C, 4°C and 6°C temperature change. For each technology, the value plotted for the portfolio (solid line) is the planned evolution or ‘trajectory’ of fossil fuel production (top graphs) or automobile production (bottom graphs) allocated to the

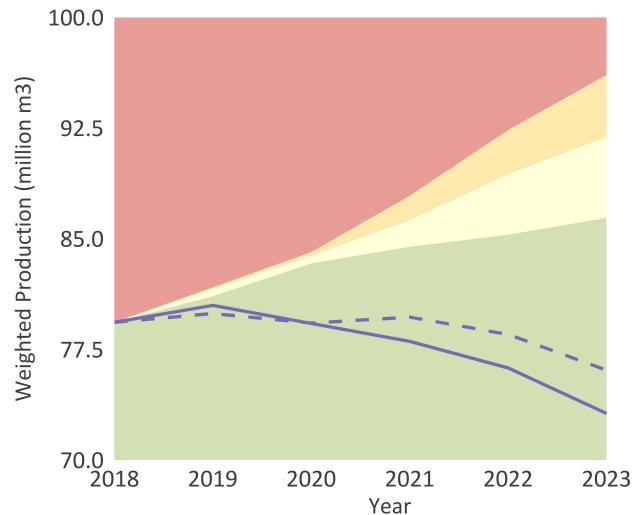
fixed income portfolio over the next 5 years. The lines separating the color-coded background areas plot the portfolio’s ‘target production’ for each technology under the 2°, 4°, and 6° scenarios. The dotted line shows planned production in the specific technology for the fixed income market, scaled to the same starting point as the portfolio.

Fossil Fuel Sector

Trajectory of Oil Production

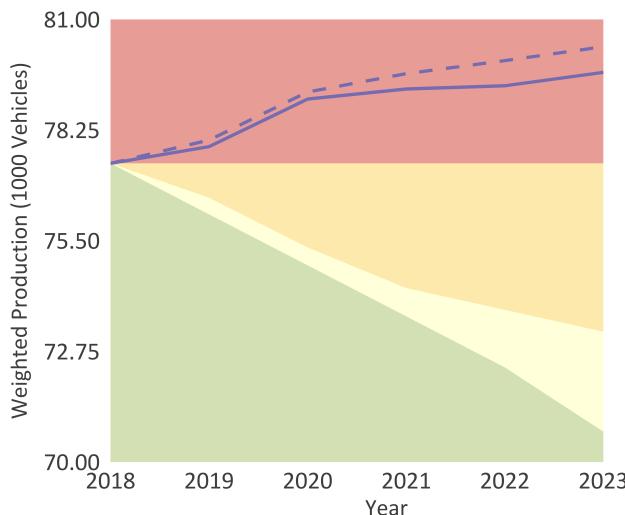


Trajectory of Gas Production

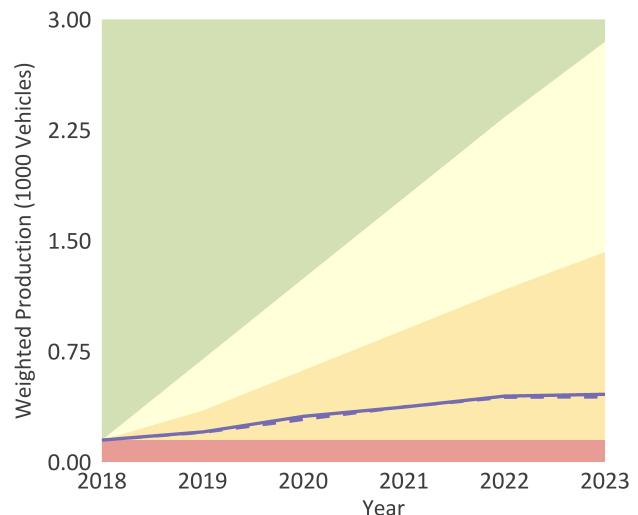


Automotive Sector

Trajectory of ICE Vehicle Production



Trajectory of Electric Vehicle Production



— Fixed income portfolio
--- Fixed income market

— 2° Scenario
— 4° Scenario
— 6° Scenario

— Equity portfolio
--- Listed equity market

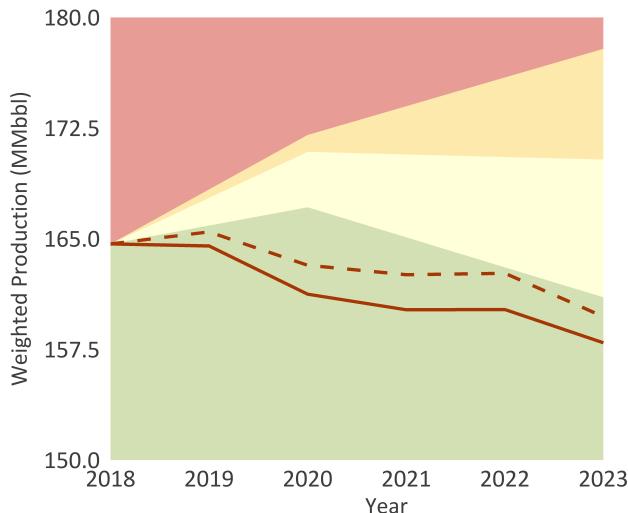
5 YEAR TREND - EQUITY FOSSIL FUELS AND AUTOMOTIVE

The alignment graphs below show the alignment of selected fossil fuels and automobile technologies in the equity portfolio relative to the IEA scenarios for 2°C, 4°C and 6°C temperature change. For each technology, the value plotted for the portfolio (solid line) is the planned evolution or 'trajectory' of fossil fuel production (top graphs) or automobile production (bottom graphs) allocated to the eq-

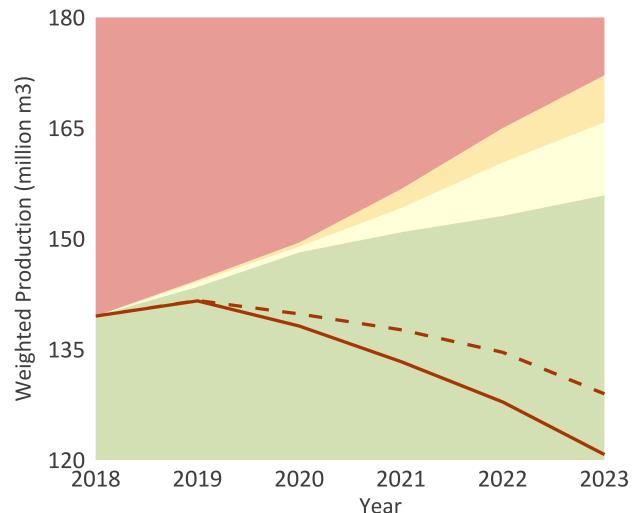
uity portfolio over the next 5 years. The lines separating the color-coded background areas plot the portfolio's target production for each technology under the 2°, 4°, and 6° scenarios. The dotted line shows planned production in the specific technology for the listed equity market, scaled to the same starting point as the portfolio.

Fossil Fuel Sector

Trajectory of Oil Production

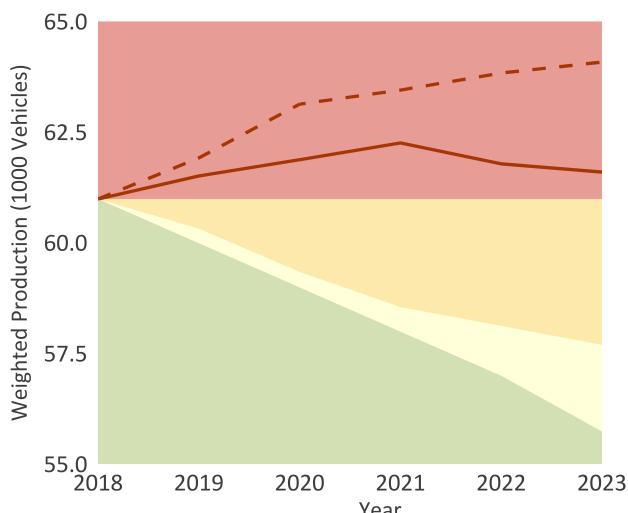


Trajectory of Gas Production

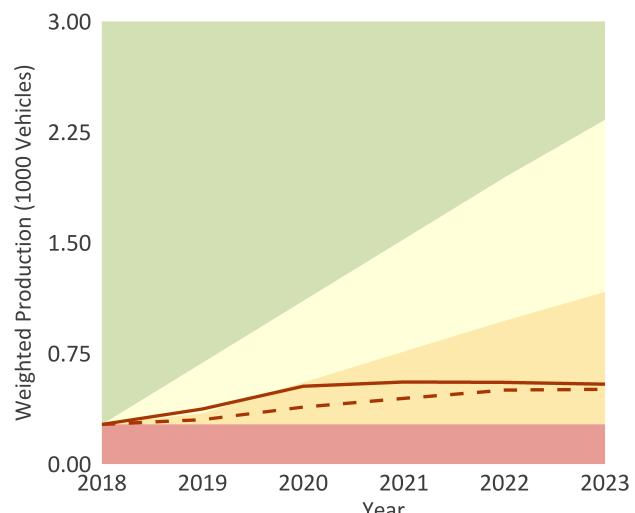


Automotive Sector

Trajectory of ICE Vehicle Production



Trajectory of Electric Vehicle Production



— Fixed income portfolio
--- Fixed income market
— Equity portfolio
--- Listed equity market

2° Scenario 4° Scenario 6° Scenario

≤ 2°C 2°C - 4°C

4°C - 6°C

≥ 6°C

EMISSION INTENSITY - CEMENT AND STEEL

17

As mentioned in the introduction to this report, there are a number of sectors for which no zero carbon technology exists or has yet been modeled by IEA 2°C scenarios (not considering partial substitutes, such as wood for cement). This applies in particular to the steel, cement, ship and air transport sectors. These sectors are therefore analyzed here.

For these sectors, decarbonisation efforts will be confined to increasing efficiency in production and use, as well as investment in research and development in the next 5-10 years, in order to bring CO₂-neutral alternatives to market maturity in the medium term. As a result, both the scenarios and the data are relatively imprecise.

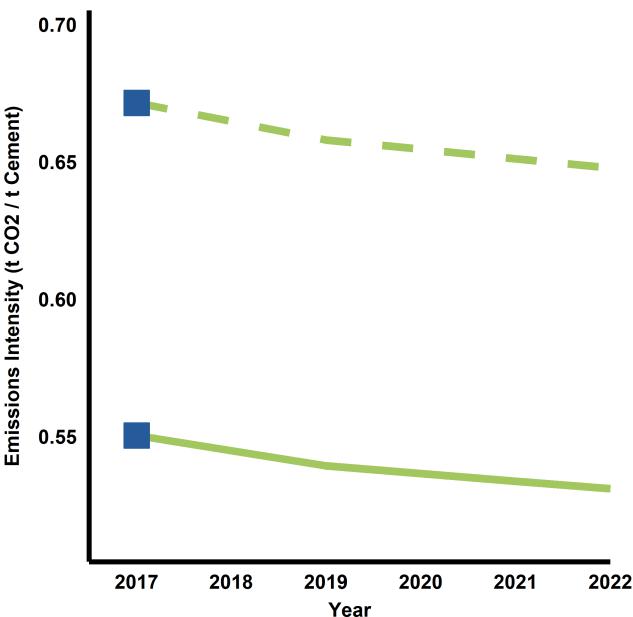
The figures presented here are based on external CO₂ intensity estimates, themselves based on a publicly available emission estimation model developed by 2Dii together with the consulting company EY. For shipping, an external CO₂ rating model developed by Rightship and the Carbon War Room has been used. Since this model is estimated externally and top-down, it is associated with some uncertainties. The results should therefore be considered as estimates, in contrast to previous analyses in the energy, electricity and

automotive sectors. In the following paragraphs, the sectors are considered individually.

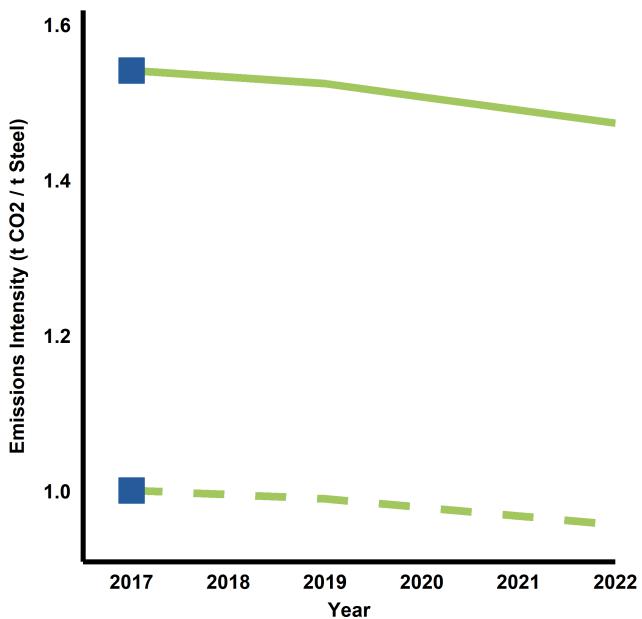
After chemicals, steel production is the second largest energy consumer among industrial sectors and the most carbon-intensive sector. The deployment of electric arc furnaces is key to reducing emissions (even if this technology remains carbon-emitting). The rate of deployment of this more efficient process is therefore presented in combination with the intensity of CO₂. If your portfolio is invested in these sectors, the results illustrate the estimated carbon intensity per tonne of steel and cement produced for the equity/bond portfolio as well as the benchmark 2°C. The results are based on the sectoral decarbonization pathways defined by the Science-based Targets Initiative, developed by WWF, WRI and CDP.

These results can serve as a starting point for discussions with steel producers on carbon intensity and strategies consistent with a 2°C climate objective. The data presented here are unfortunately too imprecise for the implementation of portfolio allocation strategies.

Cement



Steel



— Target emissions intensity for your Corporate Bond Portfolio — Target emissions intensity for your Equity Portfolio ■ Current Portfolio Emission Intensity

Source : 2ii based on 2ii/EY 2016, PlantFacts, IEA 2017 and SDA 2015

EMISSION INTENSITY - AVIATION AND SHIPPING

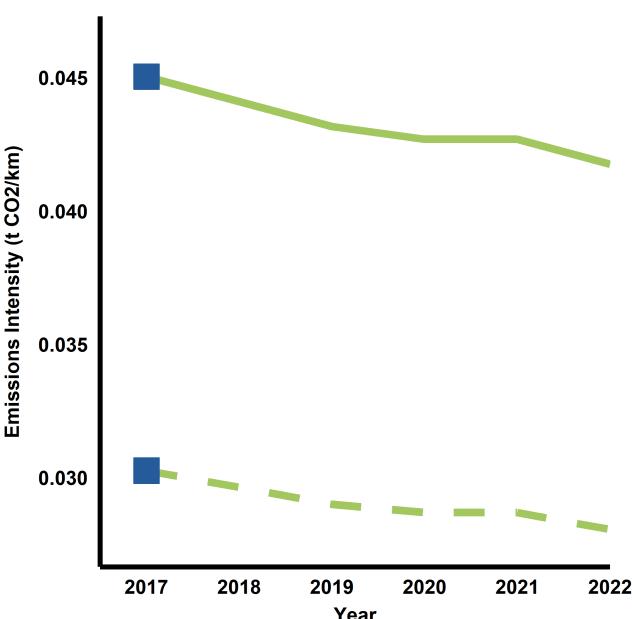
18

For the shipping and aviation industries, the analysis is focused on the CO₂ intensity.

For the aviation sector, we used the Sectoral Decarbonization Approach (SDA) of the Science-Based Target (SBT) project: the curve of the 2°C trajectory takes as a starting point the current portfolio situation, the sector average. To convert aircraft fleets into CO₂ emissions, we had to define assumptions on aircraft utilization rates. This introduces a level of uncertainty that does not allow a comparison between airlines. Furthermore, it is important to note that we have only carried out the analysis for the passenger transport shipping; cargo activity is outside the scope.

For the maritime sector, we have not developed a 2°C target. The IEA scenario provides only an indication for the emission trajectory of the sector as a whole. However, given the differences between uses (oil tanker, cargo, etc.), it did not make much sense to compare the companies to a global target.

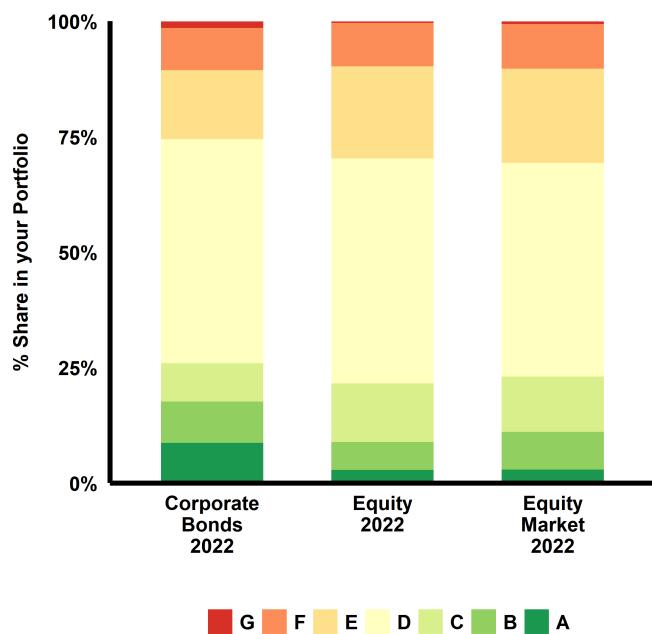
Aviation



So we preferred to apply another method, well established in the market, that only compares companies and portfolios among themselves. This is categorization by Carbon Efficiency Level, developed by Carbon War Room and Rightship. Each vessel is rated from A to G, where A is the best rating. The ranking is dynamically calculated to account for annual improvements in efficiency and variations in the mean, so that "A" ships always represent the top 10% (measured in terms of CO₂ intensity).

If your portfolio is invested in passenger air transportation, the following charts show the carbon intensity, standardized per kilometer for your stocks and bonds. For passenger air transport, the following charts show the carbon intensity, standardized per kilometre for your share portfolio and bonds. If your portfolio is invested in shipping, the charts show the exposure by Carbon Efficiency Rating (A-G) for portfolios and comparison to the average.

Shipping



— Target emissions intensity for your Corporate Bond Portfolio

— Target emissions intensity for your Equity Portfolio

■ Current Portfolio Emission Intensity

■ G ■ F ■ E ■ D ■ C ■ B ■ A GHG-Score

Source: 2ii based on EY 2016, FlightAscend, and Rightship, Carbon War Room



SECTION 4: THE EXPOSURE OF THE PORTFOLIO TO 2°C SCENARIOS IN 2023

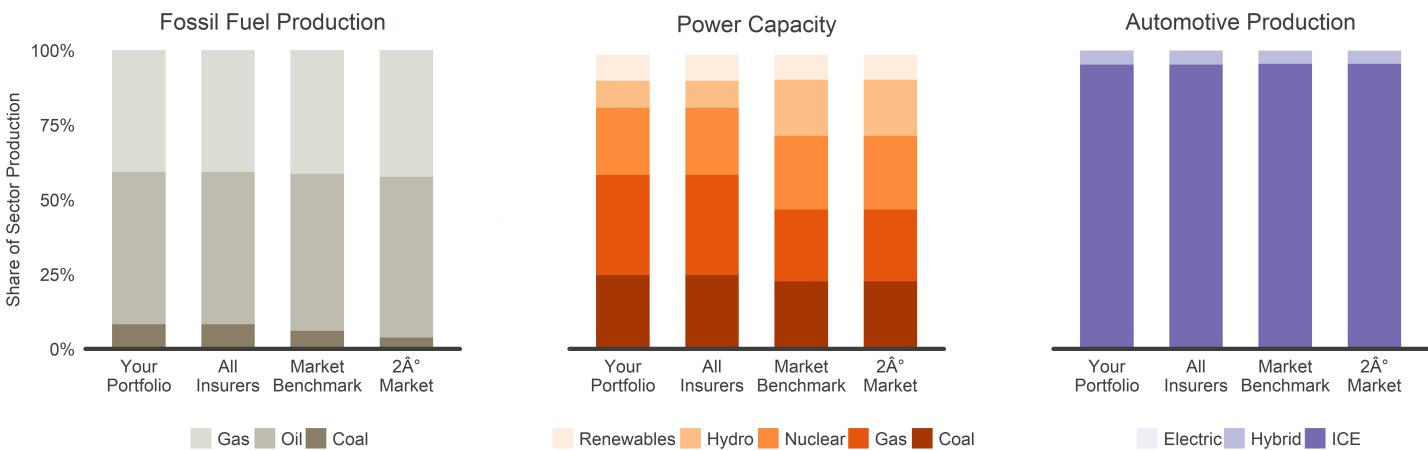
FUTURE TECHNOLOGY SHARE

The figure below shows the estimated exposure in 2023 to high-carbon and low-carbon technologies for the fossil fuels, power, and automotive sector, in both your fixed income and equity portfolios.

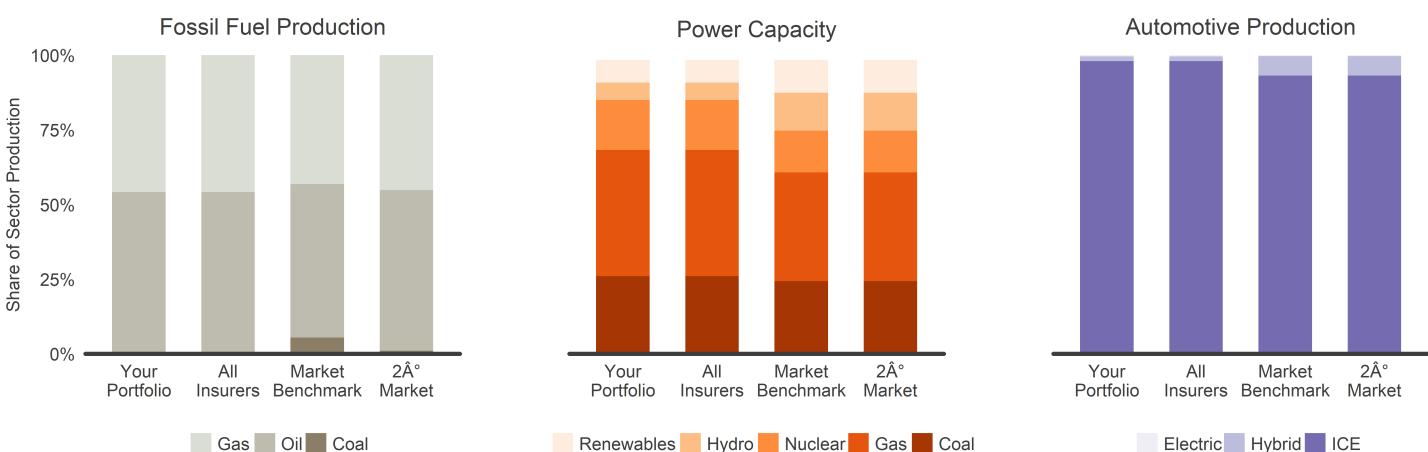
The results are a function both of the starting point of the exposure (Section 2) and the evolution of the exposure over time (Section 3) based on current revealed investment and production plans for all technologies. The results show the relative exposure of your portfolios across asset classes and technologies / fuels. The results are compared to the expected market fuel mix under a 2°C transition in 2023.

As highlighted previously, the analysis does not include assumptions around changes in portfolio composition. Rather, it is limited to how the portfolio's exposure to high-carbon and low-carbon technologies is set to change over time as a function of changes in company exposures, independent of portfolio composition changes. The results help contextualize the share of the sectoral exposure in 2023 exposed to transition risks in terms of the share of activities that can be classified as either high-carbon or low-carbon. Given the marginal nature of renewable activities across oil and gas companies, this share has not been considered in the analysis, although it may over time represent a growing share.

Fixed Income



Equity

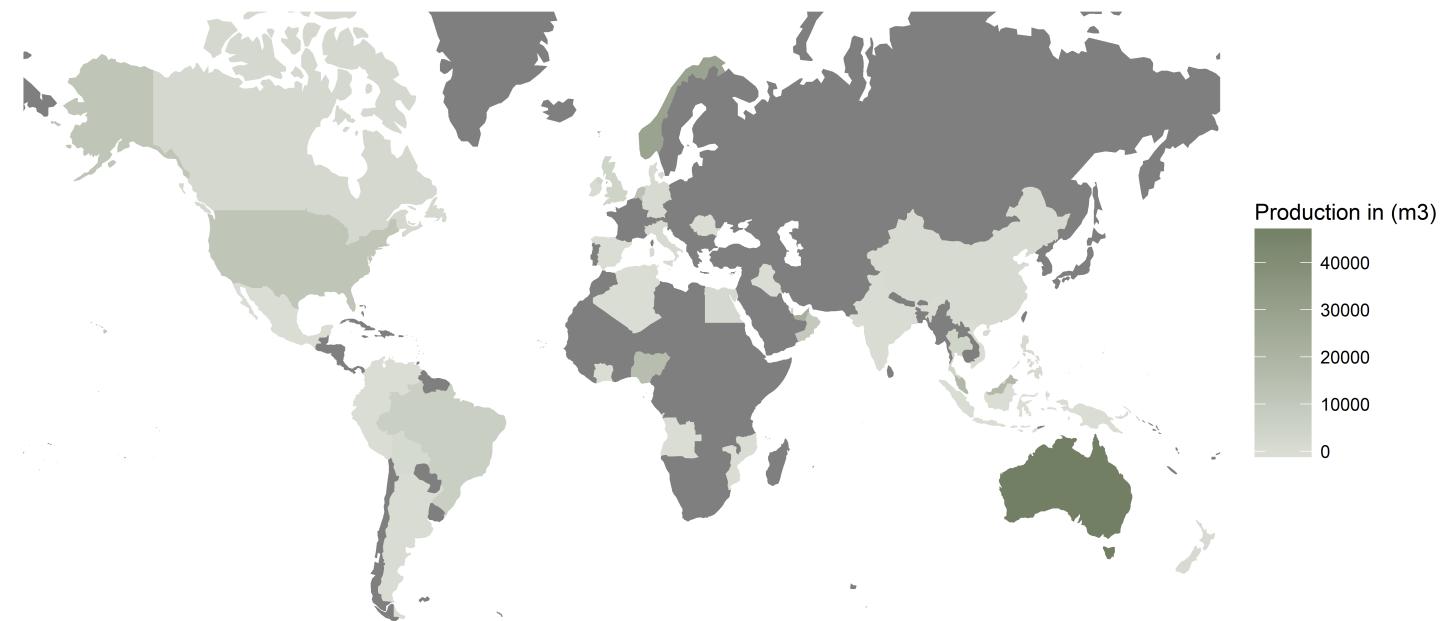


REGIONAL EXPOSURE COAL MINING

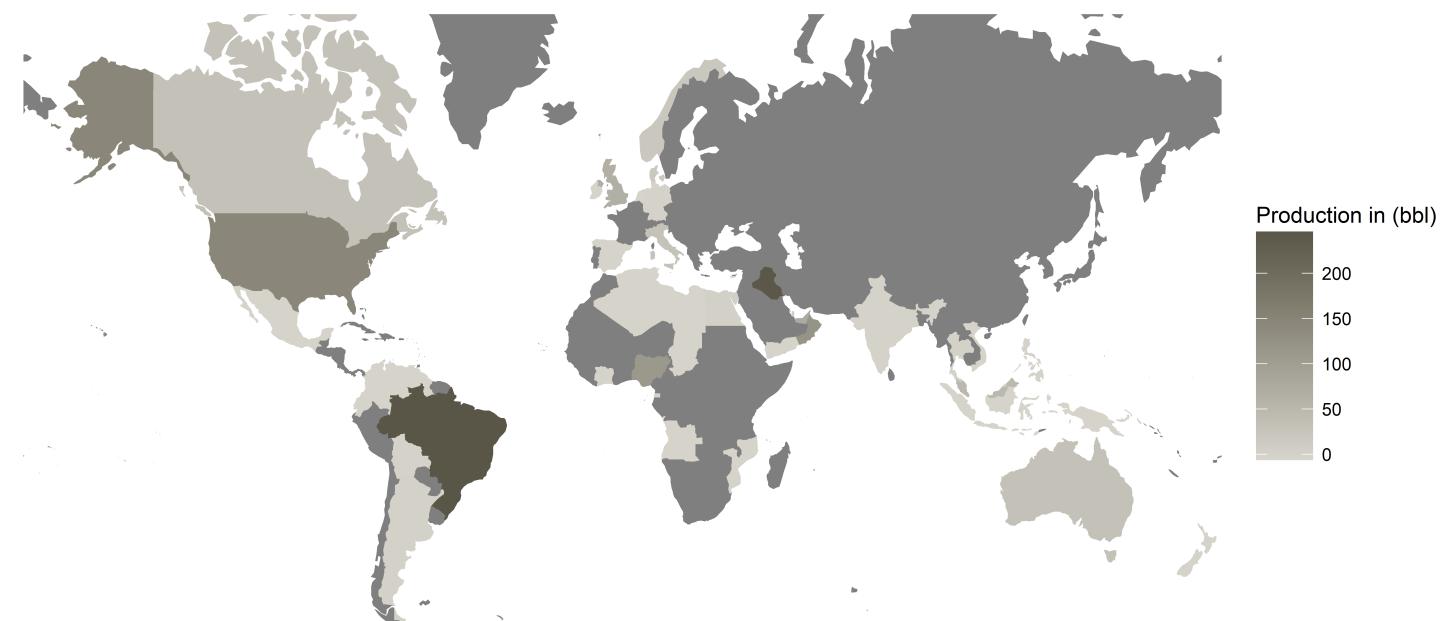
21

The following charts show the regional exposure of your fixed income and equity portfolios to coal mining in 5 years. These charts show the aggregated coal mining capacity allocated to your portfolio.

Fixed income portfolio regional coal exposure



Equity portfolio regional coal exposure





SECTION 5: COMPANY EXPOSURE

CONTRIBUTIONS OF SECURITIES TO THE RESULTS

23

The objective of this section is to provide insight into the specific companies driving the results presented in the previous sections.

The following pages will show results for individual companies in the fossil fuel, power, and automotive sector. The analytics provided show just one piece of information related to potential scenario analysis of companies and their contribution to a portfolio's performance. A range of additional indicators could be considered that go beyond the scope of this particular report. As a result, the indicators presented here should not be understood as providing investment recommendations, but rather as a summary of the exposures of the companies that are driving the results of the portfolio scenario analysis. Section 6 provides further detail on the data sources informing this section.

As part of a partnership with a range of technical experts, 2dii is currently developing a company scenario analysis report mirroring the portfolio reports presented here, designed to be made freely available and provide a more comprehensive and holistic picture of a company's positioning relative to a decarbonization scenario. This infrastructure can be used to inform future scenario analysis and actions and will be launched in the second half of 2018. The analytics in this report thus only show a snapshot of the type of data that can be explored.

The following will briefly summarize the type of data that will be shown for each sector.

Oil and gas. For oil and gas production, three types of indicators will be shown. The first indicator is the total planned change in production of oil and gas companies over the next 5 years, based on their currently revealed production plans from the asset-level databases. The graphs on the next page show the largest companies by amount of oil or gas production allocated to the fixed income and equity portfolios in 2018; these companies have the most influence on the portfolio's alignment results for the fossil fuels sector. For each asset class and technology, the results are shown relative to the portfolio's targeted total change in production during the 5 year period under the 2° scenario (green bar). It should be noted that the figures provided are based on cur-

rent estimated production and evolution of the existing asset base. Mergers, acquisitions, and increases in capital expenditure relative to baselines may of course lead to changes in these trends over time.

The second indicator builds on analysis conducted by the Carbon Tracker Initiative in partnership with the UN Principles for Responsible Investment (UNPRI). This indicator takes a more long-term view and analyses the alignment of companies with a 2°C carbon budget from the perspective of the cost structure of their oil and gas assets. This indicator differs from the first in terms of the time horizon and the underlying allocation rules that allocate macro scenarios to microeconomic actors. More information on the methodology and the approach can be found at <http://www.2degreesseparation.com/>. This indicator can only be used to analyze the listed equity portfolio, as data is unavailable for fixed income securities.

Finally, the third indicator shows the breakdown of oil assets of individual companies by type of oil (e.g., conventional, tar sands, etc.). Wood Mackenzie (2018) proposes that while shifting away from high-carbon fuels towards low carbon is necessary as an overall trend, within the oil and gas industry, shifting away from particular extraction methods is a transitional alternative. This report does not comment on the emissions by extraction type, however data is available on this. Investors need to look beyond resource themes and review the variations in upstream emissions intensity to see how companies can reduce their carbon footprints. Even assets of the same theme can have significantly different emissions intensity based upon maturity, location and other unique factors.

Coal mining.

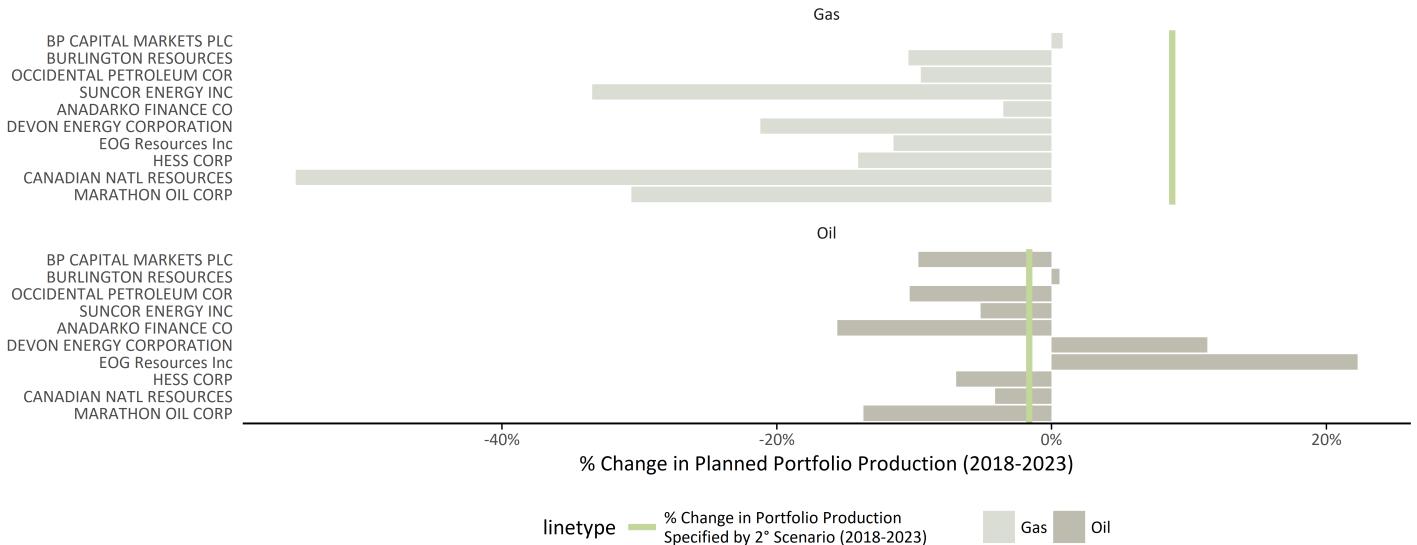
Power and automotive sectors. For the power and automotive sectors, the company level information focuses on the technology mix of the utilities and automotive manufacturers in the fixed income and equity portfolios, informing in particular the results for Section 4. Additional information on the build out plans of these companies and the changes over time can be provided upon request.

CONTRIBUTIONS OF SECURITIES TO THE RESULTS

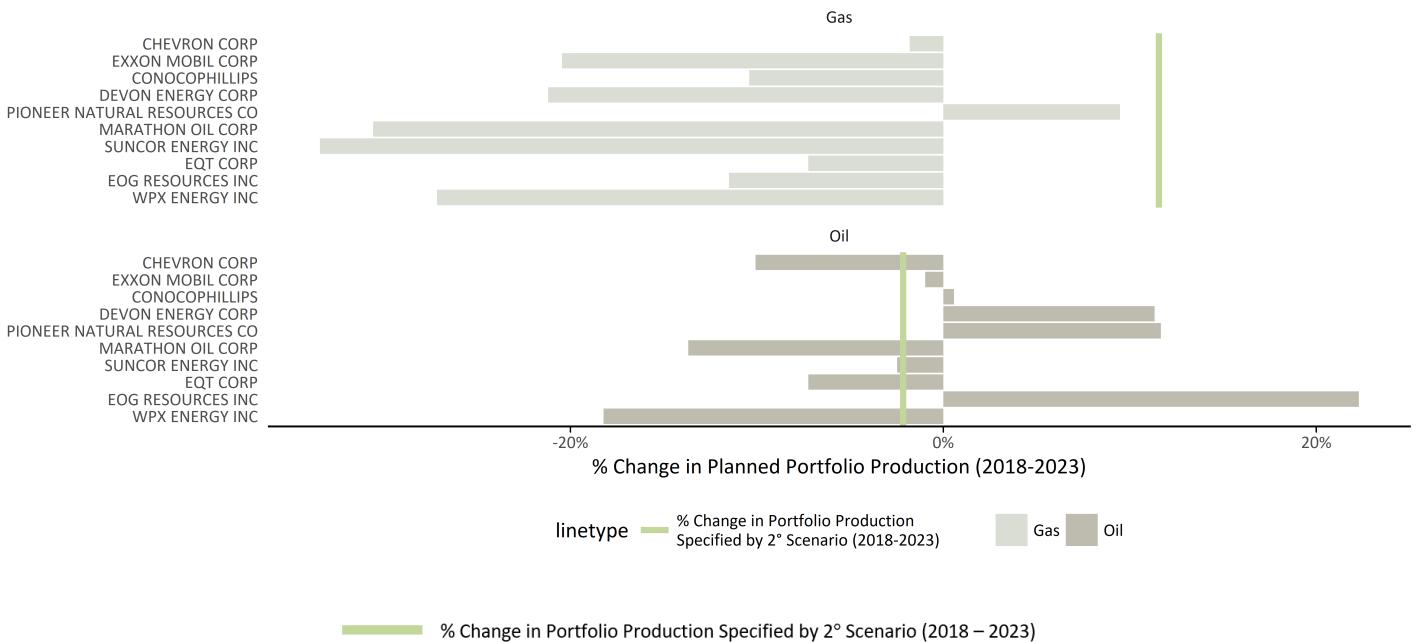
OIL AND GAS

24

Planned total percent change in fossil fuel production of companies with most production allocated to the fixed income portfolio



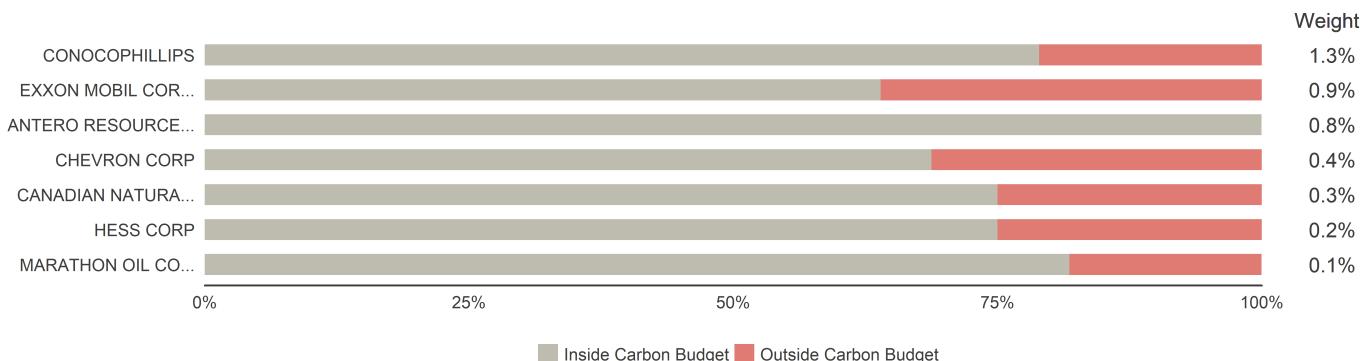
Planned percent change in fossil fuel production of companies with most production allocated to the equity portfolio



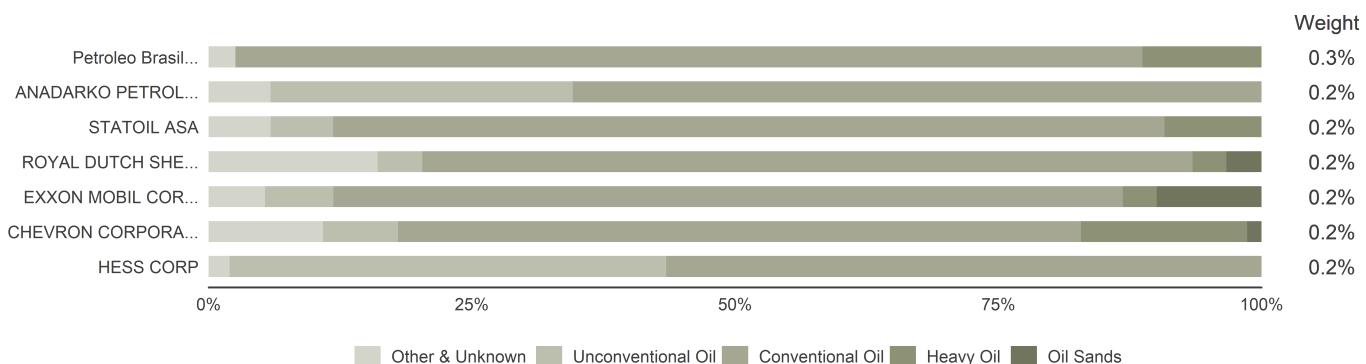
CONTRIBUTIONS OF SECURITIES TO THE RESULTS OIL

25

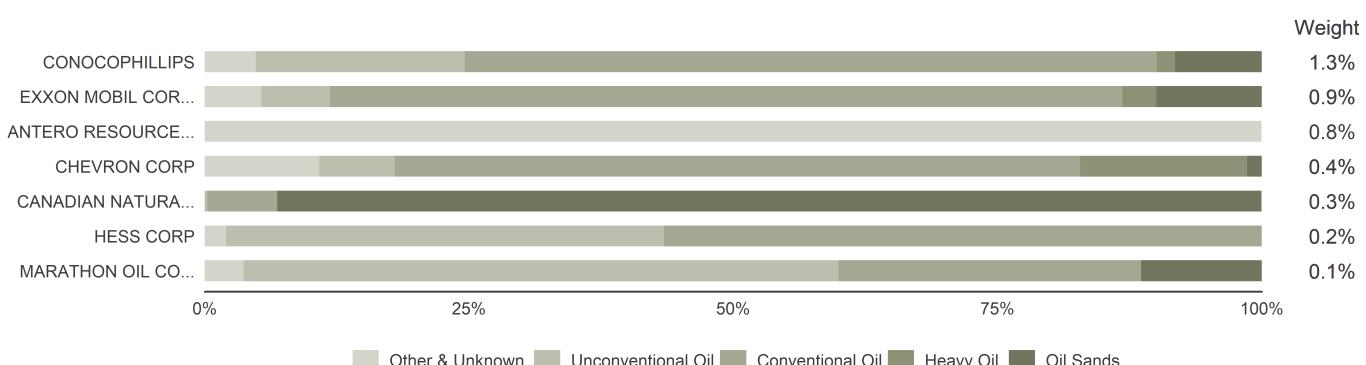
Carbon budget alignment of the largest oil and gas companies in the equity portfolio. This graph is based on the work of the Carbon Tracker Initiative and UNPRI and shows the carbon budget alignment, and by extension the level of potential exposure to unneeded capex, of the largest oil and gas producers (by market value).



Resource breakdown of oil production of the largest holdings in the fixed income portfolio. This graph shows oil production by type of oil for the largest holdings (by market value) of oil producers in the fixed income portfolio.



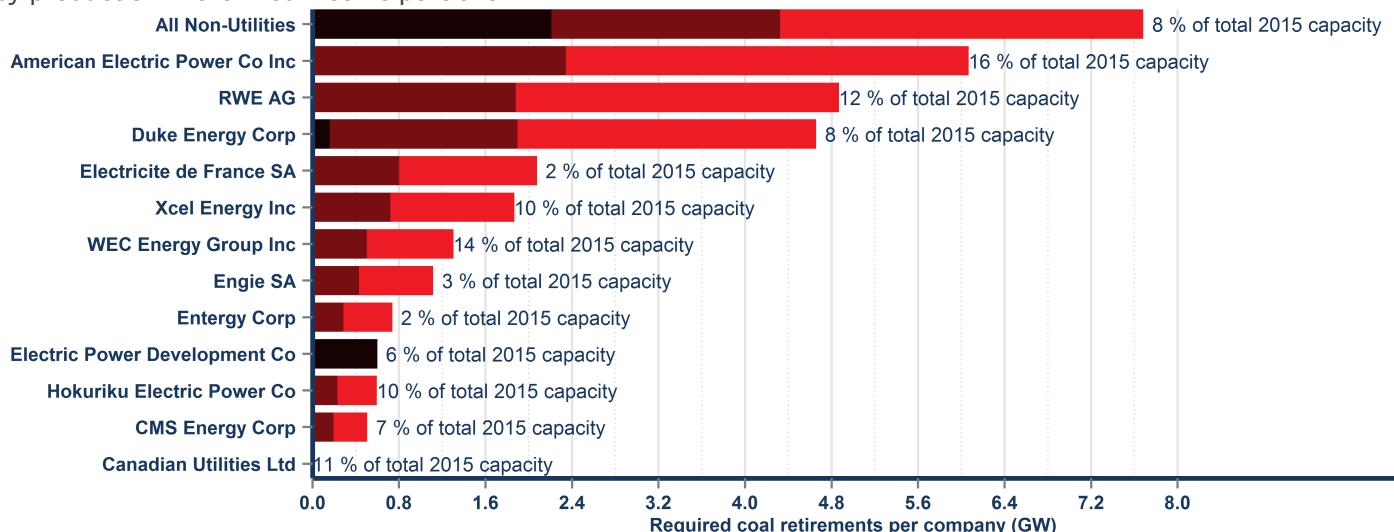
Resource breakdown of oil production of the largest holdings in the equity portfolio. This graph shows oil production by type of oil for the largest holdings (by market value) of oil producers in the equity portfolio.



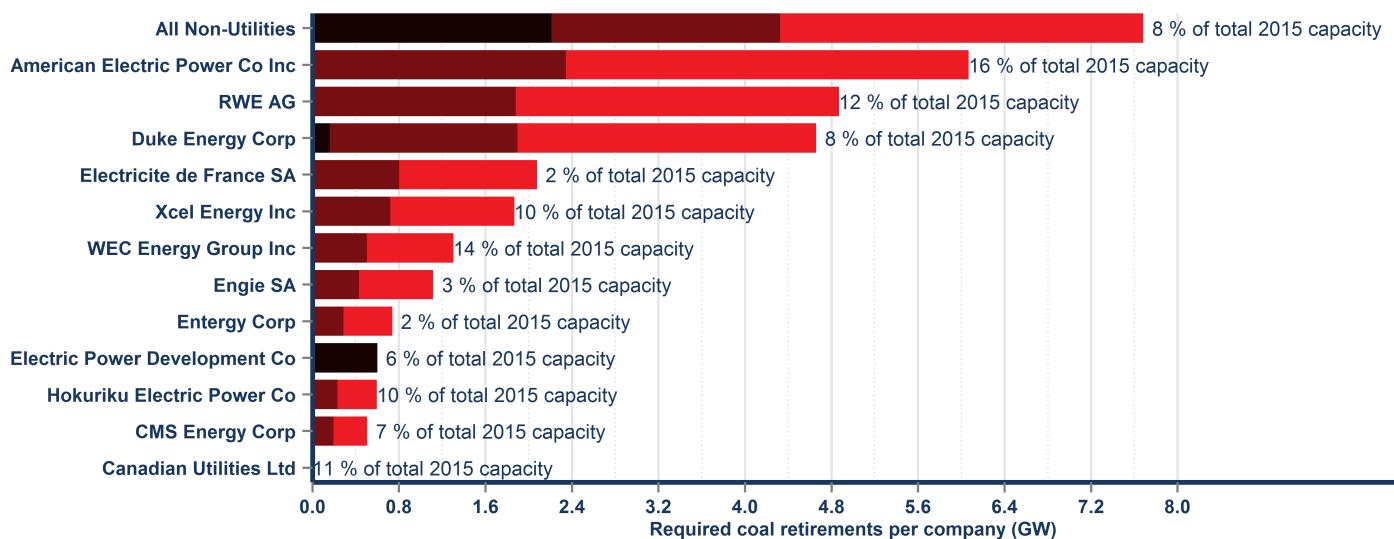
CONTRIBUTIONS OF SECURITIES TO THE RESULTS COAL MINING

26

Coal mining build out in the fixed income portfolio. This graph shows the coal mining build out for the largest coal miners by production in the fixed income portfolio.



Coal mining build out in the equity portfolio. This graph shows the coal mining build out for the largest coal miners by production in the equity portfolio.



CONTRIBUTIONS OF SECURITIES TO THE RESULTS

POWER

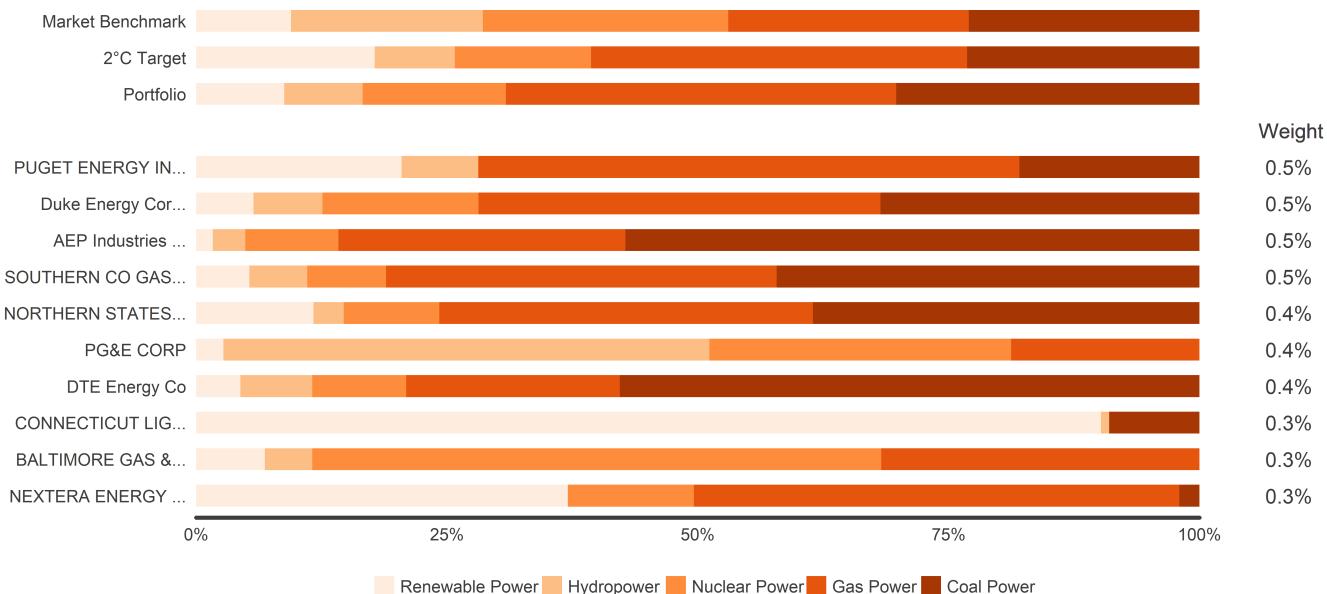
27

The figures below show the currently planned fuel mix in 2023 for the largest holdings (by market value) of utilities in the fixed income and equity portfolios.

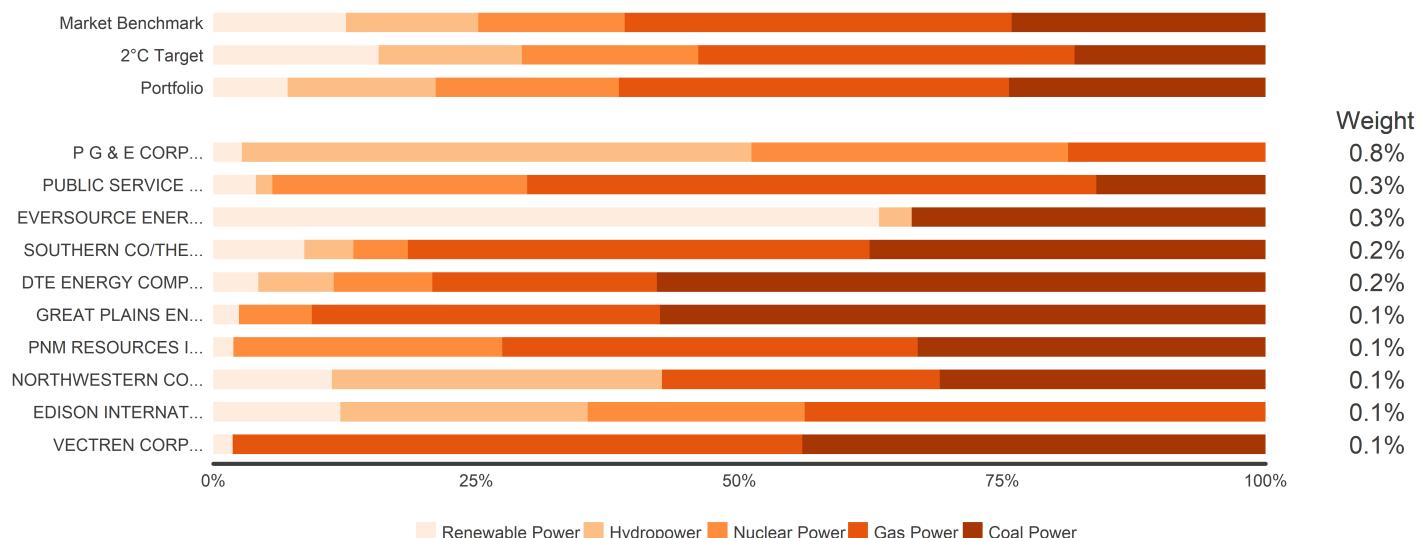
The results are shown compared to the portfolio's currently

planned fuel mix, the portfolio's target fuel mix under a 2° scenario, and the market's currently planned fuel mix (all as of 2023). The weight is the size of the total investment in each company as a percent of the total value of the fixed income portfolio.

Technology breakdown of power companies within the fixed income portfolio



Technology breakdown of power companies within the equity portfolio



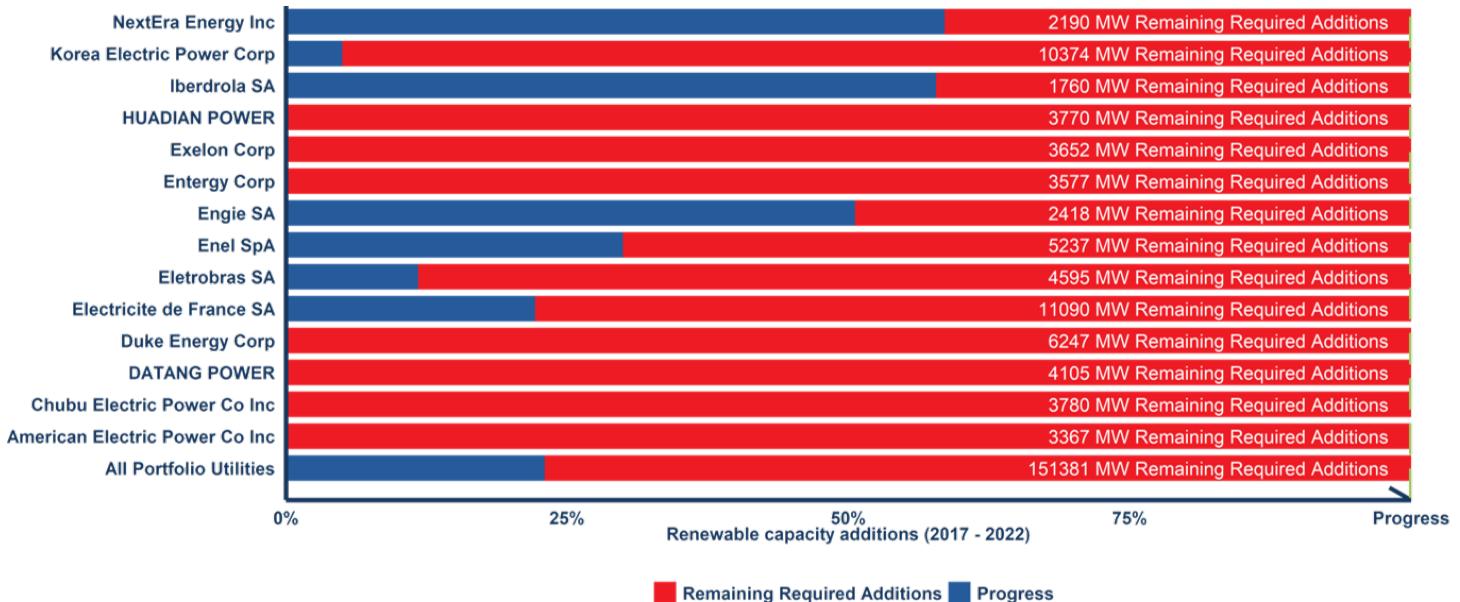
CONTRIBUTIONS OF SECURITIES TO THE RESULTS

RENEWABLE ENERGY

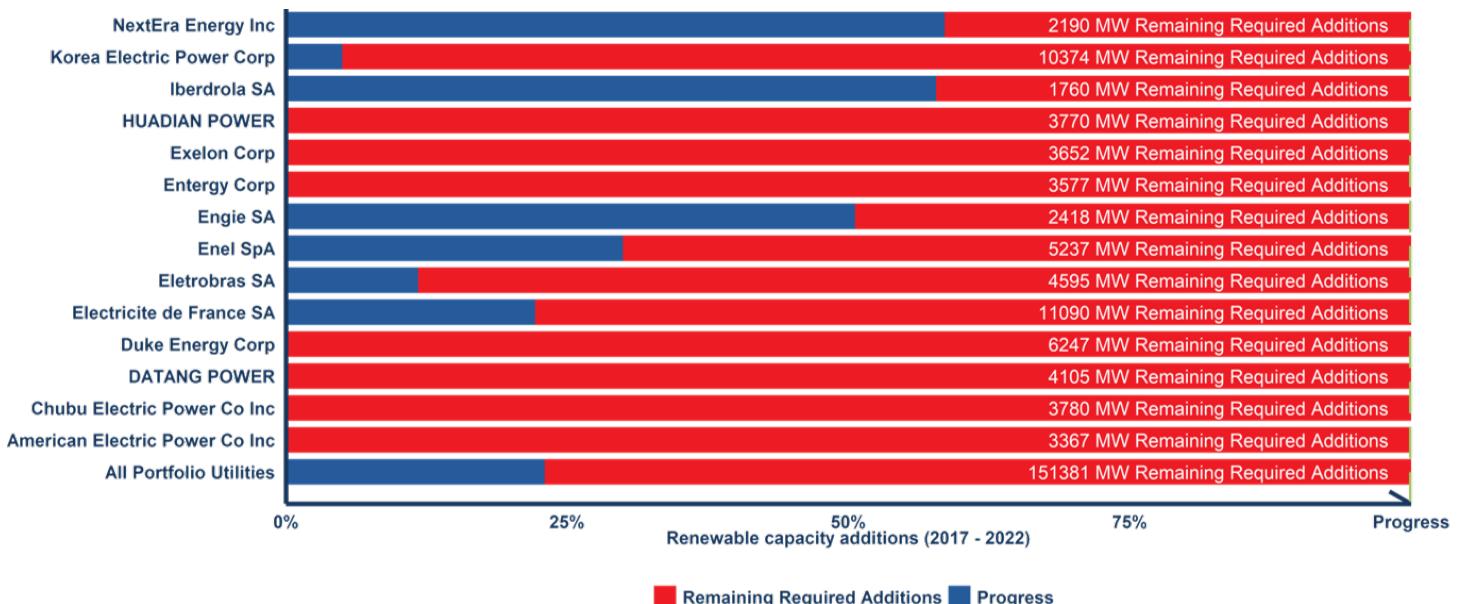
28

The figures below show the renewable energy build out required of utilities in the fixed income and equity portfolios.

Renewable energy build out required of power companies within the fixed income portfolio



Renewable energy build out required of power companies within the equity portfolio



CONTRIBUTIONS OF SECURITIES TO THE RESULTS

AUTOMOTIVE

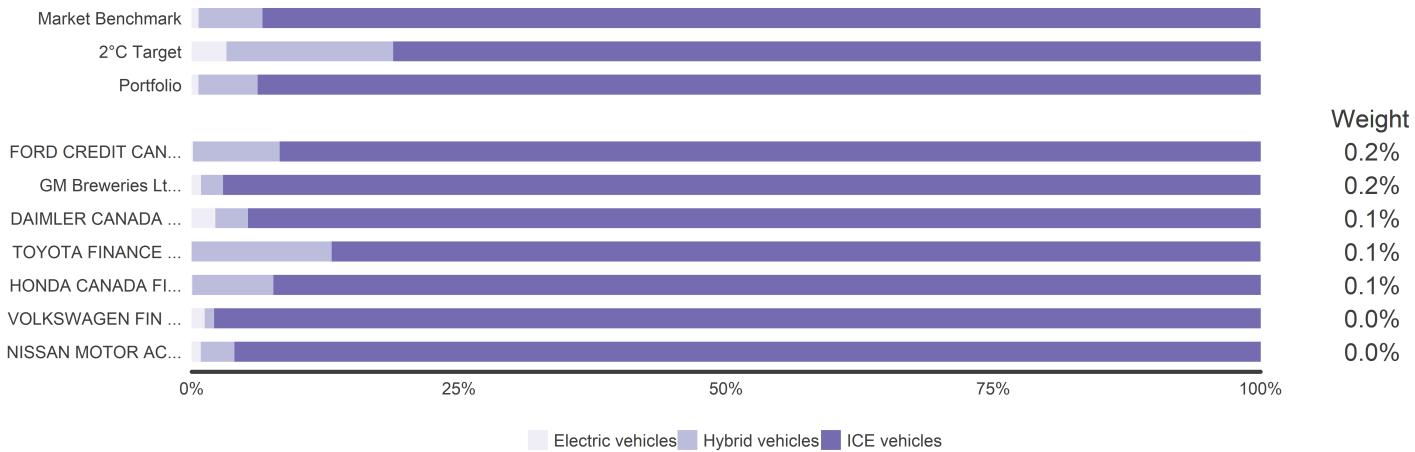
29

The figures below show the currently planned production mix of engine technologies in 2023 for the largest holdings (by market value) of automobile manufacturers in the fixed income and equity portfolios.

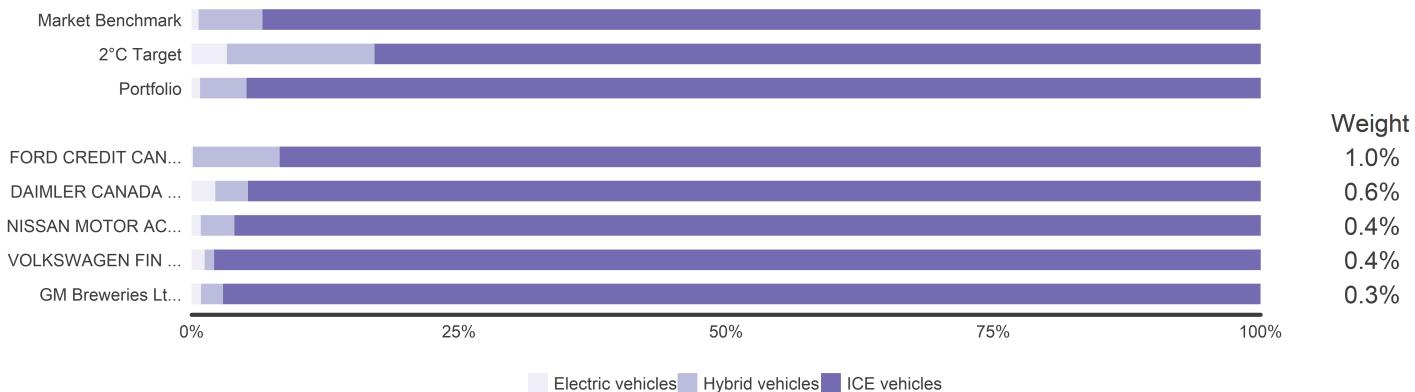
The results are shown compared to the portfolio's currently

planned production mix, the portfolio's target production mix under a 2° scenario, and the market's currently planned production mix. The weight is the size of the total investment in each company as a percent of the total value of the equity portfolio.

Technology breakdown of automotive companies within the fixed income portfolio



Technology breakdown of automotive companies within the equity portfolio





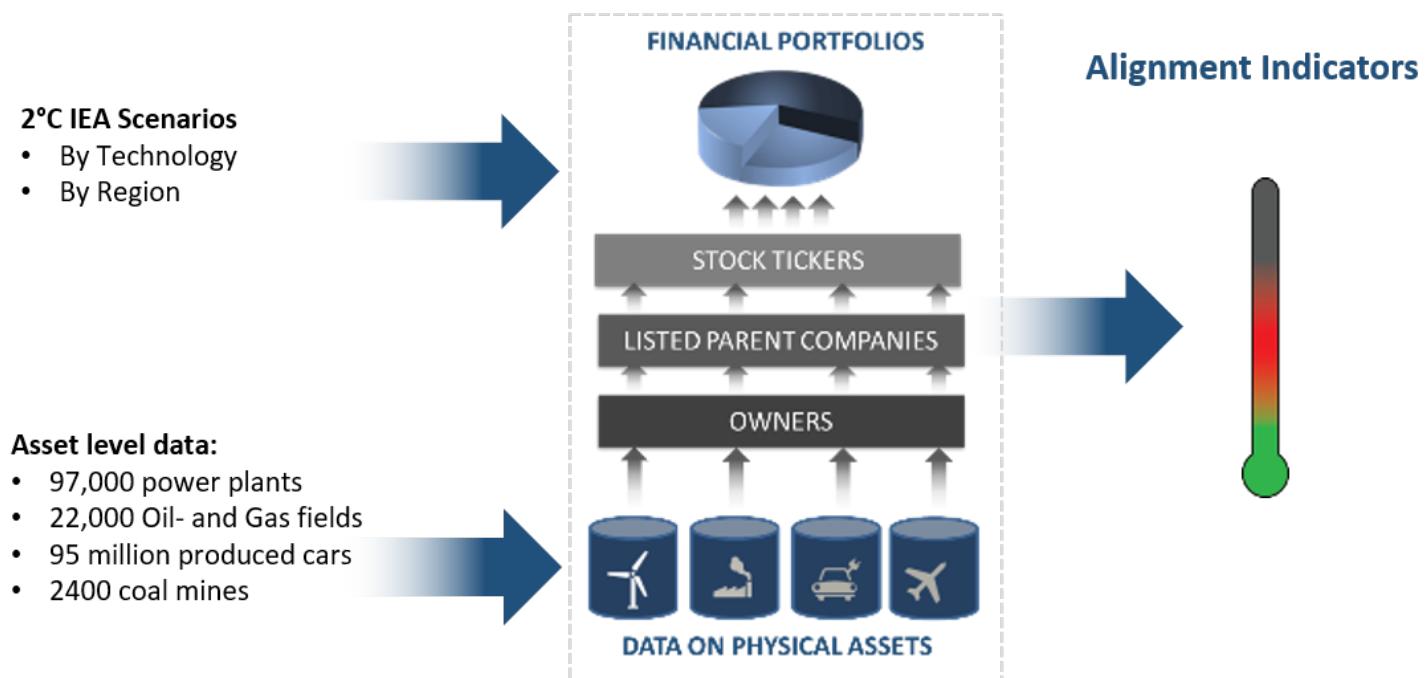
SECTION 6: BACKGROUND TO THE MODEL

BACKGROUND TO THE MODEL

31

The objective of the assessment framework applied in this scenario analysis is to measure the alignment of financial portfolios with 2°C decarbonisation pathways. The model consists of 3 key elements that are detailed in the following pages.

- Scenarios, notably 2°C scenarios, that form the basis of the analysis and define the benchmark against which portfolio trends are compared. While in theory a range of scenarios can be applied within the model, in the interest of simplification this analysis relies on the scenarios of the International Energy Agency. These provide targets for each technology at a regional level.
- Financial portfolios and associated financial data to al-
- low for the portfolio assessment. Within this report, the analysis is limited to fixed income and equity portfolios. Funds within the portfolios have been identified and the underlying financial data extracted from Morningstar and included as part of the portfolio.
- Physical / industry ‘asset level data’ (current and forward looking) is mapped to companies, parents, and securities. This allows the link between financial portfolios and industry and production data (oil and gas production, automotive production, power capacity) to be established. Consequently, this allows a comparison to the 2°C scenarios and a corresponding evaluation of the alignment of the portfolio.



Allocation Rules. Based on the financial data, the asset level data is allocated to the portfolio to quantify a representative value of what the portfolio physically owns. The assets are allocated to the portfolio based on the weight of the securities in the portfolio.

Benchmarking. Using the allocated production or capacity

of technologies within the portfolio in as a starting point, an allowance based on the regional scenarios is calculated. This is extrapolated over the next 5 years to create the trajectory and this is compared to the current and future ownership. The variation of the ownership from this benchmark is used as the alignment indicator in the preceding results.

BACKGROUND TO THE MODEL

Assessing Alignment with a 2°C Transition Pathway. This analysis assesses the level of alignment with a 2°C transition pathway, using two references:

- *The portfolio's 'own' 2°C target.* This is the portfolio's target production profile 'under the 2° scenario': the changes required in the production profile of the companies held in the portfolio, in order to meet the target, based on the above-described methodology. While the 2°C scenario is the focus of this analysis, the target profiles for a 4°C and a 6°C scenario are also calculated to provide further context. Since the securities held and their weight in the portfolio are identical for the portfolio and its alternative versions, comparing them shows how aligned or misaligned the current production profiles of companies held in the portfolio are with each scenario.
- *The 2°C benchmark.* This is the target production profile of a 'market benchmark' under the 2° scenario. The same principle as described above is applied to a 'benchmark portfolio': the listed equity market as a whole, or the corporate fixed income market as a whole. Since the securities and their weight in the market portfolio differ from those in the portfolio, this comparison highlights 'idiosyncratic' alignment or misalignment. In other words, it shows how the current composition of the portfolio affects the alignment with the different scenarios, when the first reference only stresses the changes requested from the companies.

The alignment or misalignment of a portfolio's production and exposure to each technology relative to a scenario is one way to better understand an insurer's exposure to energy transition risk. If policy, technology, market, or regulatory changes occur to bring the global real economy in line with the 2°C scenario, misalignment in a given technology would likely change the financial returns associated with those underlying physical assets. However, this analysis only assesses one dimension of energy transition risks: the assets at risk in the real economy. It does not take into account the financial resilience of the company to those changes and its capacity to adapt, which would require further financial analysis.

Scenarios. The IEA's 450 Scenario (450S) is the most well known climate scenario globally. It defines how climate-relevant technologies - essentially energy technologies - must be deployed by 2050 to reach a 50% probability of limiting warming to 2°C. In addition to the 450S, the IEA also defines the New Policies Scenario (NPS) and Current Policies Scenario (CPS): other technology roadmaps that correspond to a 50% probability of maximum 4°C and 6°C warming, respectively. The 450S (also referred as the '2° scenario'), NPS ('4° scenario'), and CPS ('6° scenario') all pro-

vide forward-looking projections with enough regional detail to perform scenario analysis for 11 technologies in 3 sectors. The analysis is based on the IEA scenarios for the California Department of Insurance and covers fossil fuel extraction (oil, gas, and coal mining); production of electricity (from coal, gas, petrol, hydro, nuclear, and renewables); and, the production of cars (internal combustion engines - petrol and diesel, hybrid, and electric).

The IEA historically has assumed significant amounts of nuclear power and carbon capture and storage in their scenarios. While the IEA has updated the names and models in 2017, given that this report uses 2016 portfolio data, 2016 scenarios were applied for this analysis. In addition, the international community has accelerated their global target from the 2°C goal to 'well below 2°C' with a target of 1.5°C. It is important to highlight that each investor can and may want to take an individual view on the likely decarbonization scenario that may or may not relate to the scenarios modelled by the International Energy Agency or others.

The model uses the following indicators from the International Energy Agency scenario against which the portfolio is compared:

- Electric capacity by fuel expressed in MW (e.g. renewables, coal, gas, oil, hydropower, nuclear);
- Oil production expressed in barrels of oil / year;
- Gas production expressed in m³ / year;
- Coal produced expressed in tonnes / year;
- GHG emissions pathways in a sample of additional sectors (e.g. aviation, shipping, cement, steel).

Asset Level Data. The Asset Level data is sourced from the following data providers:

- GlobalData (Power plant data, including plants classified as active, announced, financed, partially active, permitting, temporarily shutdown, under construction, under rehabilitation and modernization, and Oil and Gas production data and forecasts until 2018-2023, as well as coal mining data);
- WardsAuto (light passenger duty vehicles, including BAU production forecasts 2018-2023);
- Bloomberg (financial data);
- S&P Cross-Reference Services (database matching securities to parents);
- Morningstar (database on funds).

IMPORTANT CONSIDERATIONS AND LIMITATIONS WHEN INTERPRETING THESE RESULTS

33

- *Stringency of scenarios.* The use of a given scenario (2°C, 4°C, and 6°C) does not constitute an assumption that this scenario is more likely to prevail than others. Similarly, the choice of IEA scenarios should not be interpreted as an endorsement of the underlying assumptions by 2Dii or the California Department of Insurance. The IEA historically has assumed significant amounts of nuclear power and carbon capture and storage in their scenarios, an assumption that is debated within the energy-climate scientific community. In addition, the international community has accelerated their global target from the 2°C goal to well below 2°C and towards 1.5°C. It is important to highlight that each insurer can and may want to take an individual view on the likely decarbonization scenario that may or may not relate to the scenarios modelled by the International Energy Agency.
- *A snapshot rather than forecasts.* The forward-looking production data is based on current ‘revealed’ plans from companies, and is subject to change. The estimates should thus not be interpreted as forecasts, but rather as the current plans of companies as estimated from various sources of information by industry-specific business intelligence experts – who might not know everything about the CEO’s actual plans. Given the 5 year time horizon, it is likely that these plans will change in some way over time. Similarly, insurers are highly likely to alter the composition of their portfolio over time. Fixed income maturity is usually around 3–7 years. The average holding period of a stock by a fund manager is 20 months on average. However, this analysis seeks to be a point in time assessment of future exposures under current conditions.
- *Power sector projections.* This is a measure of ‘locked-in’ capacity, not a capacity forecast. Distinct from the production data for the fossil fuel and automotive sectors, capacity data for the power sector does not include information on planned retirements. It should therefore be interpreted as a measure of currently locked-in capacity and not as a forecast of future capacity. Retirements are not included for several reasons: First, the availability of planned retirement data is highly variable across jurisdictions and regions, to the extent that including no retirement information was deemed more representative of industry capacity than including partial data. Second, in contrast to the fossil fuel sector where oil wells, gas fields, and coal mines cease production when their resource runs out, it is possible for power plants to be announced as retired or even be retired and then resume production. Given the higher level of uncertainty around planned retirements, they are not included in the power sector projections used for this analysis, and capacity projections should thus be interpreted as the potential maximum ‘lock-in’ from current infrastructure. For technologies projected to decline under the 2° scenario, the gap between current capacity projections and capacity consistent with the 2° scenario should be seen as an estimate of the capacity that would need to be retired to be in alignment with the 2° scenario.
- *Changes in plans.* The forward-looking data is based on current ‘revealed’ plans from companies and is subject to change. The estimates should thus not be interpreted as final forecasts, but rather the current plans of companies if they don’t change. Another way to interpret the results is the call for action with regard to the required change to align with the 2°C economic trend. Given the 5 year time horizon, there is a high degree of certainty that plans will still change in some way over time. Similarly, the participating financial institutions can of course alter their portfolio exposures over time. The analysis however seeks to be a point in time assessment of future exposures under current conditions.
- *Ability to capture SRI strategies.* The model takes a diversified ‘market portfolio’ as a basis, focusing on key technologies reflected in the IEA roadmaps. By extension, thematic portfolios invested in breakthrough technologies and / or SRI portfolios with a range of environmental, social, and governmental considerations may not value these elements.

NOTES AND DISCLAIMER

34

The data and scenario sources for this analysis are shown below.

Published Research

The methodology behind this scenario analysis, the accounting rules applied, and further information to the scenarios and data can be found in the following published research papers.

Accounting Principles: <http://www.mdpi.com/2071-1050/10/2/328>

Scenario Work: <http://et-risk.eu/toolbox/scenarios/>

Asset Level Data Analysis: http://2degrees-investing.org/IMG/pdf/assetdata_v0.pdf

Sources for the data and scenario analysis

Automobile data are from July 2017 and is provided by Ward'sAuto / AutoForecastSolutions. Power data is from July 2017 and is provided by GlobalData. Oil, gas and coal production data is from July 2017 and is provided by GlobalData. When linking asset data with companies, the data is used by the data providers mentioned above and, where possible, enriched with company data from Bloomberg. All financial data, as well as identification numbers for linking company data with financial instruments, come from Bloomberg.

The decarbonization pathways for other sectors comes from the Science-Based Targets Initiative, which bases its methodology on the IEA scenarios. The scenarios for the energy and power sector come from the IEA's World Energy Outlook 2016. Because this report does not include scenario information for the automotive sector, the related data is taken from the sister report of the World Energy Outlook, the Energy Technology Perspective report. Benchmarks for the electricity sector are determined regionally and applied in relation to the regional exposure data and then aggregated, weighted according to the regional exposure of the portfolio. All other results are global.

Sources

IPCC (2018) <https://www.ipcc.ch/report/ar5/>

FSB (2018) <https://www.fsb-tcfd.org/publications/final-recommendations-report/>

Aviva / ECIU (2015) <https://www.aviva.com/media/thought-leadership/climate-change-value-risk-investment-and-avivas-strategicresponse/>

FSB (2018) <https://www.fsb-tcfd.org/publications/final-recommendations-report/>

WoodMacKenzie (2018) <https://www.woodmac.com/news/editorial/carbon-intensity-not-all-assets-are-created-equal/>

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