



Heading North

Assessing the Alignment of the Norwegian Financial Sector
with the Paris Agreement

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About the 2° Investing Initiative (2DII):

The 2° Investing Initiative (2DII) is an independent, non-profit think tank working to align financial markets and regulations with the Paris Agreement goals. Globally focused with offices in Paris, New York, Berlin, London, and Brussels, 2DII coordinates some of the world's largest research projects on sustainable finance. Its team of finance, climate, and risk experts develop research, tools, and policy insights to help financial institutions and regulators hasten and adapt to the energy transition. In order to ensure its independence and the intellectual integrity of its work, 2DII has a multi-stakeholder governance and funding structure, with representatives from a diverse array of financial institutions, governments, and NGOs.

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Summary for policy-makers

Key messages

- This report assesses the climate compatibility of the Norwegian financial market using the open-source alignment approach Paris Agreement Capital Transition Assessment (PACTA), which assesses both current exposures as well as the 5-year forward-looking alignment performance of investee companies.
- The study covers portfolios from **41 Norwegian financial institutions with a total amount estimated of NOK 1.880,6 bn (USD 220,5 bn)**, covering 70%-90% of the total assets under management by asset managers, insurance companies, and pension funds.
- **The findings show that Norwegian financial institutions are less exposed to climate-relevant sectors¹** than financial institutions in countries like Switzerland, Liechtenstein, and Austria – where PACTA coordinated projects also took place. Note however that lower exposure also means less capital available to high-carbon sectors which need significant investments to decarbonize. In fact, most of the portfolios analyzed have large exposures to technology firms, financial services, and consumer goods – which have limited direct contributions to a transitioning economy.
- **The institutions have a higher share of their investments (exposure) in the power sector allocated to low-carbon technologies (hydropower and other renewables)** when compared to the global market and other countries like Switzerland, Liechtenstein, and Austria. The exposure to oil and gas extraction is lower than the countries mentioned and the exposure to coal mining is very small, also compared to other countries where PACTA assessment took place and the global market.
- **Even though a higher share of investments in the power sector are allocated in green technologies and a lower share of total investments are allocated to fossil fuels, the investments itself are not fully aligned with 2°C temperature goal when considering the 5-year forward looking trajectory of the underlying investee companies.** Invested coal companies, even if they represent a very low share of the total investments of Norwegian financial institutions, are fully misaligned with all climate mitigation scenarios, with production of coal exceeding what is allowed under these scenarios. The build out of renewable and hydropower capacity by investee companies are also not sufficient to meet the IEA's Sustainable Development Scenario in all financial sectors.
- **When contrasting production plans of invested companies by the financial sector in Norway with the 1.5°C scenarios designed by the Joint Research Centre (JRC), we find mixed results.** However, we highlight that even though Norwegian financial institution equity portfolios are set to meet the Sustainable Development Scenario in renewable investments, higher efforts need to be done to achieve the 1.5°C climate target.
- **While Norwegian financial institutions are not fully aligned with the Paris Agreement goals, many are heading in the right direction.** In general, compared to other countries where this study was also conducted, Norwegian financial institutions are slightly better positioned in green technologies in terms of exposure and alignment. Nonetheless, the pace is not fast enough to reach a sustainable future: great attention should be given to oil extraction, coal extraction, and internal combustion engine vehicles production that Norwegian portfolios are currently financing.

¹ oil and gas production, coal mining, power generation, automotive manufacturing, aviation, and industry (steel and cement)

The following tables provide an overview of the alignment results for different sectors and technologies across the peer groups in 2026. Please notice that ‘alignment results and ‘exposure’ to climate-relevant sectors are different concepts. The tables below reflect the alignment of the 2026 production plans from invested companies by the participant financial institutions according to different climate scenarios. For more information, please refer to the methodology explanation in Annex I.

Fossil Fuel Extraction (World Energy Outlook 2019)						
	Listed Equities			Corporate Bonds		
	Oil	Gas	Coal	Oil	Gas	Coal
Pension Funds	1.65 – 2.7°C	< 1.65°C	1.65 – 2.7°C	> 3.2°C	< 1.65°C	> 3.2°C
Insurers	1.65 – 2.7°C	< 1.65°C	> 3.2°C	1.65 – 2.7°C	< 1.65°C	> 3.2°C
Asset Managers	1.65 – 2.7°C	< 1.65°C	> 3.2°C	1.65 – 2.7°C	< 1.65°C	> 3.2°C

Power generation (World Energy Outlook 2019)						
	Listed Equities			Corporate Bonds		
	Coal	Hydro	Renewables	Coal	Hydro	Renewables
Pension Funds	1.65 – 2.7°C	> 3.2°C	< 1.65°C	> 3.2°C	1.65 – 2.7°C	> 3.2°C
Insurers	2.7°C – 3.2°C	> 3.2°C	1.65 – 2.7°C	> 3.2°C	1.65 – 2.7°C	2.7°C – 3.2°C
Asset Managers	2.7°C – 3.2°C	> 3.2°C	< 1.65°C	2.7°C – 3.2°C	1.65 – 2.7°C	> 3.2°C

Automotive (Energy Transition Pathway 2017)				
	Listed Equities		Corporate Bonds	
	ICE Vehicles	Electric	ICE Vehicles	Electric
Pension Funds	> 2.7°C	1.75°C - 2°C	> 2.7°C	1.75°C - 2°C
Insurers	> 2.7°C	1.75°C - 2°C	> 2.7°C	<1.75°C
Asset Managers	> 2.7°C	1.75°C - 2°C	> 2.7°C	<1.75°C

Table 1: Overview of the climate alignment of different sectors and technologies

Background

The first national climate compatibility test examines the extent to which Norway's investment portfolios are compatible with a decarbonization pathway that limits the global temperature increase to below 2°C. It also explores the compatibility of the portfolios to a pathway limiting the global temperature of 1,5°C. The analysis is conducted using the Paris Agreement Capital Transition Assessment (PACTA) method, a free and open-source software and methodology developed by the 2° Investing Initiative (2DII). PACTA examines the exposure and alignment of investments in equity and corporate bonds in seven climate-relevant sectors. This quantitative analysis of the submitted portfolios is complemented by a qualitative survey.

This report presents an aggregated and anonymous analysis of the portfolios submitted by participating institutions. In addition to this report, each institution has received a bespoke report containing their individual results, as well as access to the Climate Action Guide, a new module designed to guide financial institutions in the process of planning climate strategies and investigating climate-impact.

By joining the PACTA Coordinated Projects (PACTA COP), Norway joins Switzerland, Liechtenstein, Austria, and Luxembourg in a joint effort to run climate scenario analysis on financial systems on a country level. Financial supervisor and other hosting institutions are also applying PACTA on a systemic level in the Netherlands, Sweden, the US, France, Peru, Colombia, and Brazil. The goal of this program is to measure the alignment of the entire financial sector as well as the individual participating institutions. The outcome can be used by governments, supervisors, and participating FIs to inform their climate finance strategies.

Methodology and coverage

The study examines both the current exposure as well as forward-looking alignment of the portfolios in particularly climate-relevant sectors. In addition, existing climate strategies of Norwegian financial institutions are evaluated.

The analysis provides answers to the following three questions:

1. What is the current exposure of the Norwegian financial sector to particularly climate-relevant sectors and technologies?
2. What is the forward-looking alignment of the Norwegian financial sector towards different climate scenario targets according to the International Energy Agency in climate-relevant sectors and asset classes? The analysis also explores the alignment towards 1.5 °C designed by the Joint Research Centre.
3. What climate strategies and measures are financial institutions currently implementing and how do these relate to the results of the quantitative analysis?

A detailed description of the data used and methodology can be found in Annex I of this report.

The PACTA method is based on forward-looking production and capacity data of the world's industrial plants in the following climate-relevant sectors: oil and gas production, coal mining, power generation, automotive manufacturing, aviation, and industry (steel and cement).

The PACTA model covers equity and corporate bonds. The evaluation was carried out by 2DII and forms the core of the analysis.

41 Norwegian financial institutions participated in the evaluation of equity and corporate bond portfolios with a total amount estimated of NOK 1.880,6 bn (USD 220,5 bn). A direct comparison of the figures reported by financial institutions and the official assets under management in the country can be challenging as PACTA relies on self-reported portfolio data and has no means to verify in which categories the assets fall into. Nonetheless, when comparing the figures received in the PACTA project with the official reports from the Norwegian financial supervisor, it is possible to say that the study covers 91% of total assets under management by asset managers, 77% of pension funds and 92% of assets under management of non-life insurance.

Climate compatibility of listed equities and corporate bonds

Fossil Fuels: oil and gas extraction and coal mining

Between 4-6% of the listed equity and 1-3% corporate bonds portfolios of Norwegian financial institutions are invested in the direct extraction of oil and gas as well as coal mining. The exposure to oil, gas and coal extraction for Norwegian corporate bond portfolio is lower than the global bond market². However, the exposure of all types of financial institutions in listed equities investments are larger than the exposure of the global equity market. It is interesting to notice that financial institutions in Norway have very little exposure to coal mining when compared to other countries which also ran PACTA in a systemic level and when compared to the global market.

² Universe of all corporate bonds in a given sector that could be mapped to asset-based company data obtained from Asset Resolution and is used as a proxy for the global production of goods in the given climate-relevant sectors

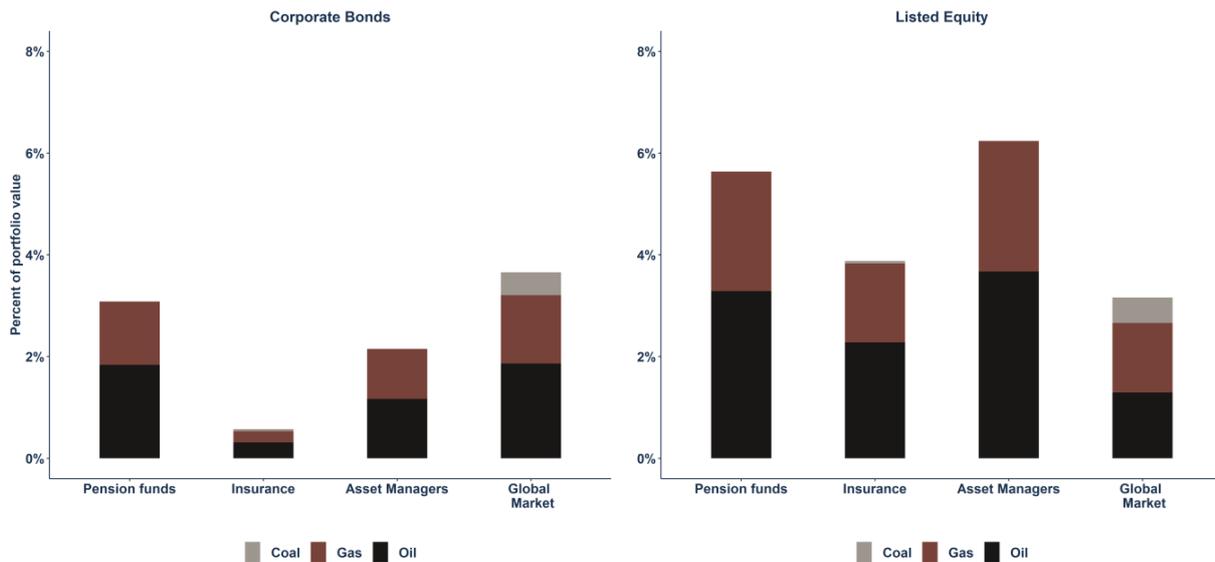


Figure 1: Share of aggregate sector portfolio values invested in companies active in oil and gas production or coal mining

Both coal mining and oil extraction will have to be reduced in the next five years, according to the IEA’s Paris-aligned ‘Sustainable Development Scenario’ (temperature rise of < 1.65 °C with 50% of probability), exposing this sector to transition risks in the near-term future. In oil extraction, production plans of companies financed by Norwegian financial institutions mostly follow a New Policies Scenario, which has an 50% probability of reaching temperature rises of about 1.65°C-2.7°C (indicating a misalignment with the Paris Agreement). In coal mining, institutions are set to meet a temperature rise of > 3.2°C (Current Policies Scenarios). The charts below reflect the total production of oil extraction attributed to different peer groups portfolios (lines in different patterns) contrasted with the different scenario production pathways prescribed by IEA. Therefore, the curves respond to changes in production plans of invested companies by Norwegian in the next 5 years. For more information on how to read the chart please check the box The PACTA Methodology in a glance.

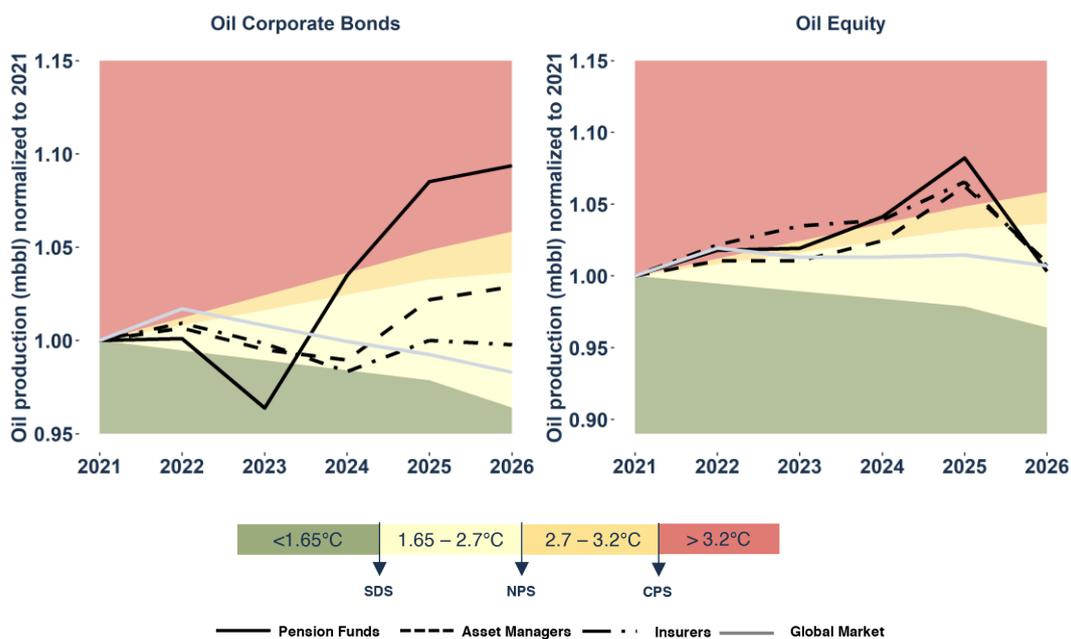


Figure 2: Alignment of oil production plans according to global decarbonization scenarios

Most decarbonization scenarios (including those used in this study such as IEA’s and JRC’s scenarios) still allow generous leeway for natural gas in the next five years as a so-called bridge technology. Nonetheless, investee companies in the gas extraction sector by Norwegian financial institutions are set to considerably decline the production of the technology, meeting the Paris Agreement temperature goal in the next 5 years. The production of invested companies is projected to be well below the global market (except for listed equities portfolios of insurance companies) and set to achieve the Sustainable Development Scenario with a reasonable margin. To see more on the forward-looking alignment in different technologies please check the section on Exposure and Alignment Results (page 17 of this report).

Power Generation

About 3-5% of the portfolios are currently invested in power generation. Asset managers have particularly large exposures to this sector. Across all financial institutions, investments in low-carbon technologies (hydropower and other renewables) currently account for more than half of the total investments in power generation through corporate bonds. This result is better than the global market and better than participant institutions in Switzerland, Austria, and Liechtenstein, where this exercise was also applied.

In terms of the equity portfolios, the exposure of Norwegian participating institutions to the power sector is higher than global market. That difference is driven by the higher exposures to renewables technologies. Nevertheless, the exposures to oil, gas and coal power capacity still account for more than 50% of the total investments in the power sector.

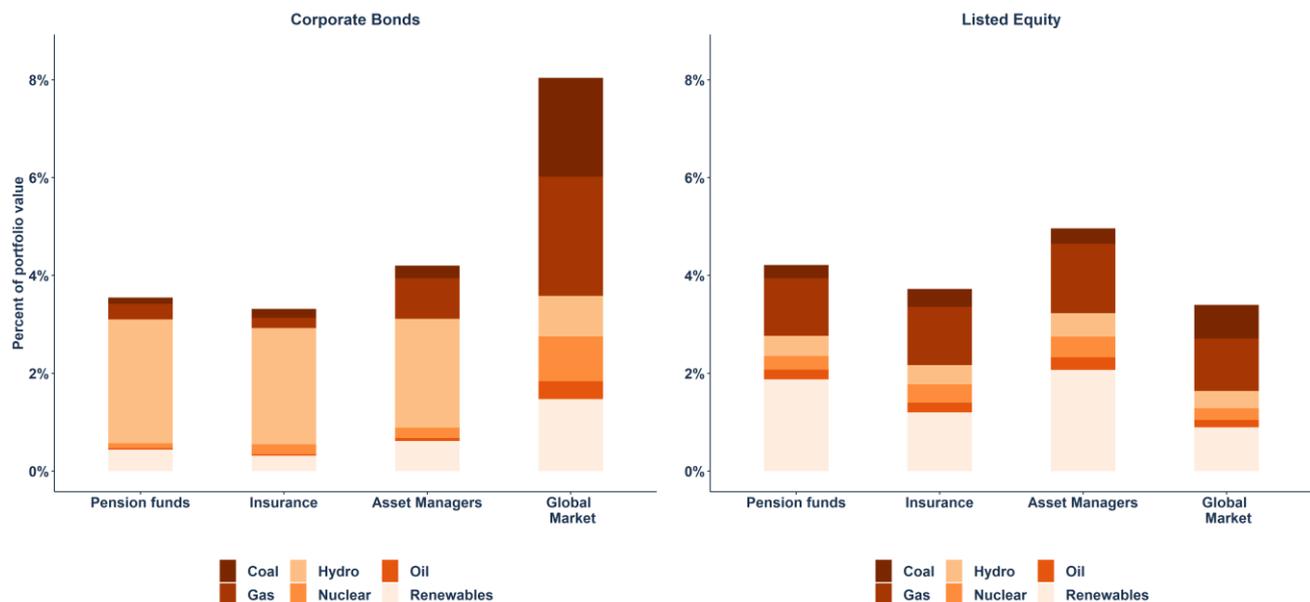


Figure 3: Share of aggregate sector portfolio values invested in companies active in the power sector

Norway’s economy is less CO₂ intensive than the OECD average and the country has a substantial renewable energy supply.³ However, there is still work to be done by participant financial institutions to finance more Paris-aligned build-out capacity of renewables and decline coal power capacity. Regarding coal power capacity, corporate bonds portfolios are set to meet the Sustainable Development Scenario in the short run, however, the production is set to grow again by 2026 for all peer groups analyzed, resulting in the misalignment of the portfolios in this asset type. Listed equities portfolios are also misalignment for the next 5

³ OECD Norway Economic Snapshot 2019: https://www.oecd.org/economy/surveys/Norway-2019-OECD-Economic%20Survey_Overview.pdf

years. For renewables, only listed equities portfolios of pension funds and asset managers are aligned in the coming 5 years with the Sustainable Development Scenario.

All financial sectors in Norway show a better exposure and forward-looking performance in terms of renewable power than its peers in countries like Switzerland, Austria, and Liechtenstein. However, when compared to the global market, invested companies underperform in corporate bonds portfolios and only marginally outperform the alignment of listed equities portfolios. When it comes to coal power generation, the financial institutions are better positioned than the global market in both asset types.

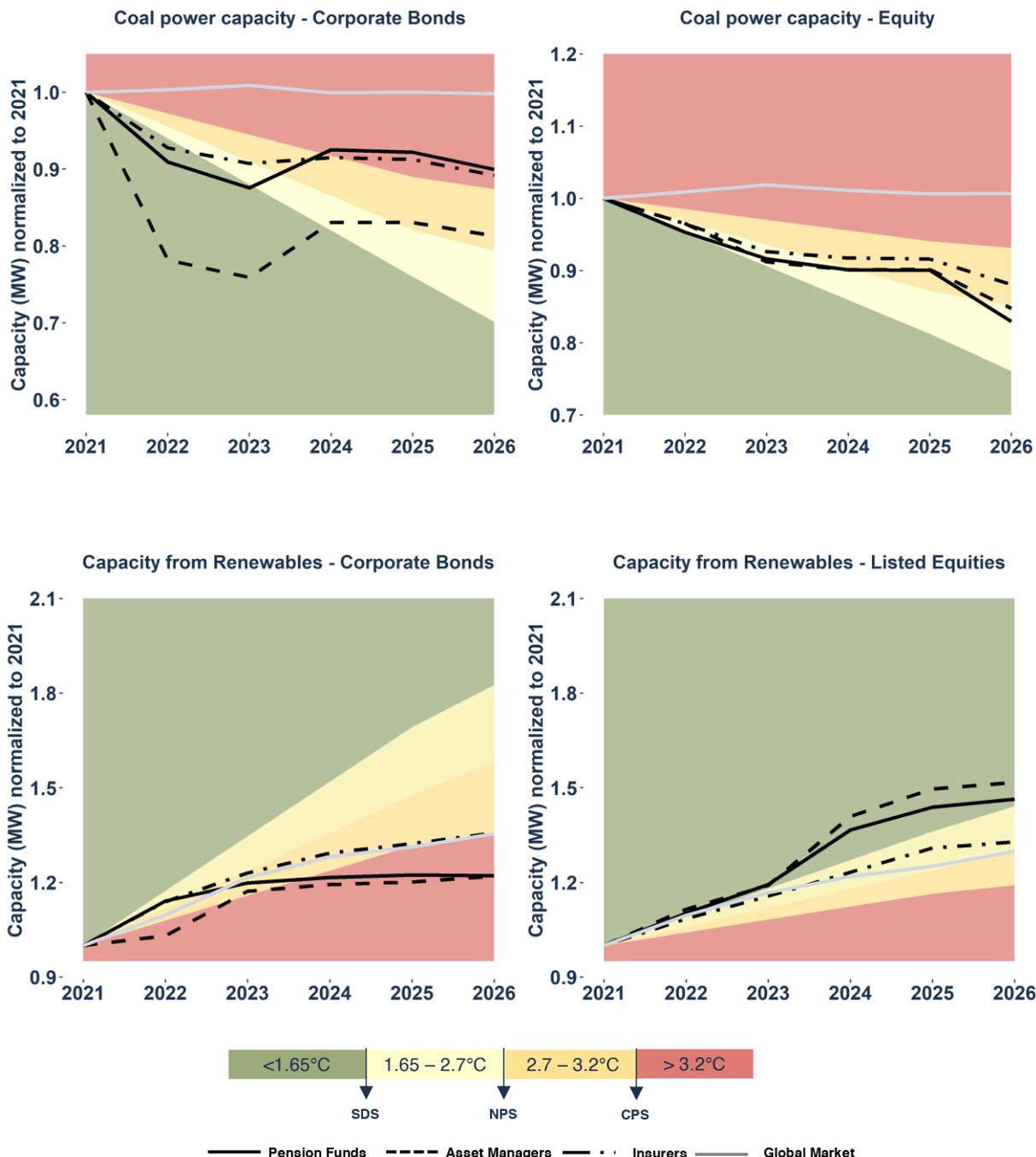


Figure 4: Alignment of coal, and renewables power capacity plans according to global decarbonization scenarios

Transportation: passenger cars, light and heavy-duty vehicles, aviation

Norway has a strong experience with electric cars incentives, which includes exemptions from value-added tax and vehicle registration tax, along with cheaper access to toll roads and parking. However, these policies don't seem to have fully reached the financial sector, which still invests largely in internal engine combustion vehicles production. Around 1% of the corporate bonds and 1-3% of the listed equities portfolios are invested in the production of passenger cars and light-duty vehicles (LDV). On average, around 70% of auto sector exposure is to vehicles with fossil-fuel combustion engines. Financial institutions in Norway holds less exposure to internal combustion engines (ICE) than Switzerland, Austria, and Liechtenstein (where the share invested in carbon intensive vehicles is 90%), but Norway's share is not better than the global market. Therefore, despite Norway's stellar performance in terms of electric car ownership (the country has the highest number of electric vehicles per-capita in the world), its financial markets have not yet followed suit. The share of investments in fossil-fuel combustion engines compared to electric alternatives is shown in the following graph.

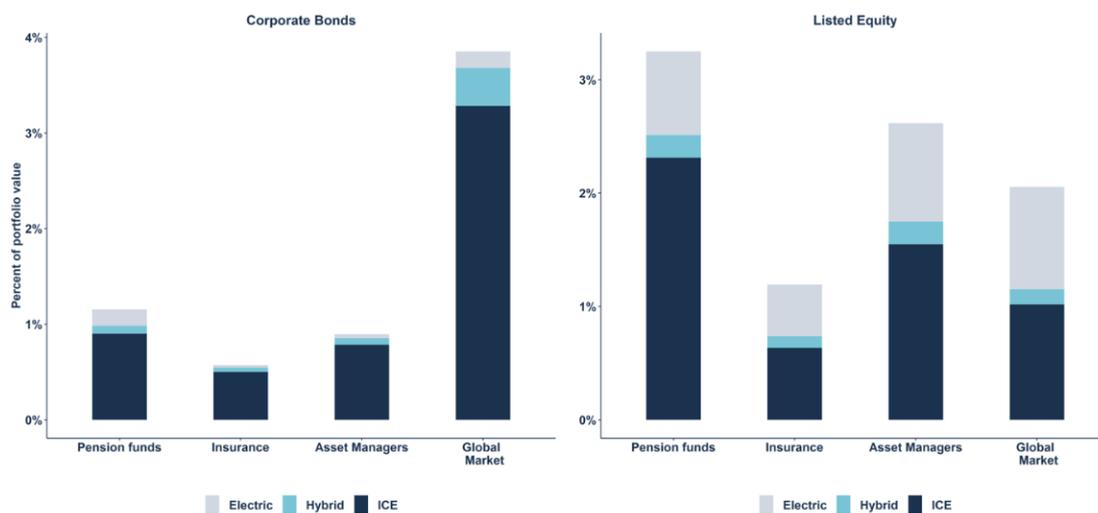


Figure 5: Share of aggregate sector portfolio values invested in companies active in the light-duty vehicles

The Energy Transition Pathway 2017 scenario requires a reduction of the total ICE vehicle stock, as well as a doubling of electric vehicle stock by 2026. Norwegian financial institutions have higher exposure to producers of electric cars in the light-duty segment when compared to other countries, but the invested companies' production plans do not meet the Beyond 2°C Scenario (temperature rise of < 1.75 °C with 50% of probability) in listed equities and are below the global market expected production for such technology – however, production is aligned with the sustainable development scenario. In corporate bonds the production is aligned with a Beyond 2°C Scenario but well below the project production for the global market.

The production of invested companies by Norwegian financial institutions producing internal combustion engines is misaligned and worse than what the global market is expected to produce in the next five years.

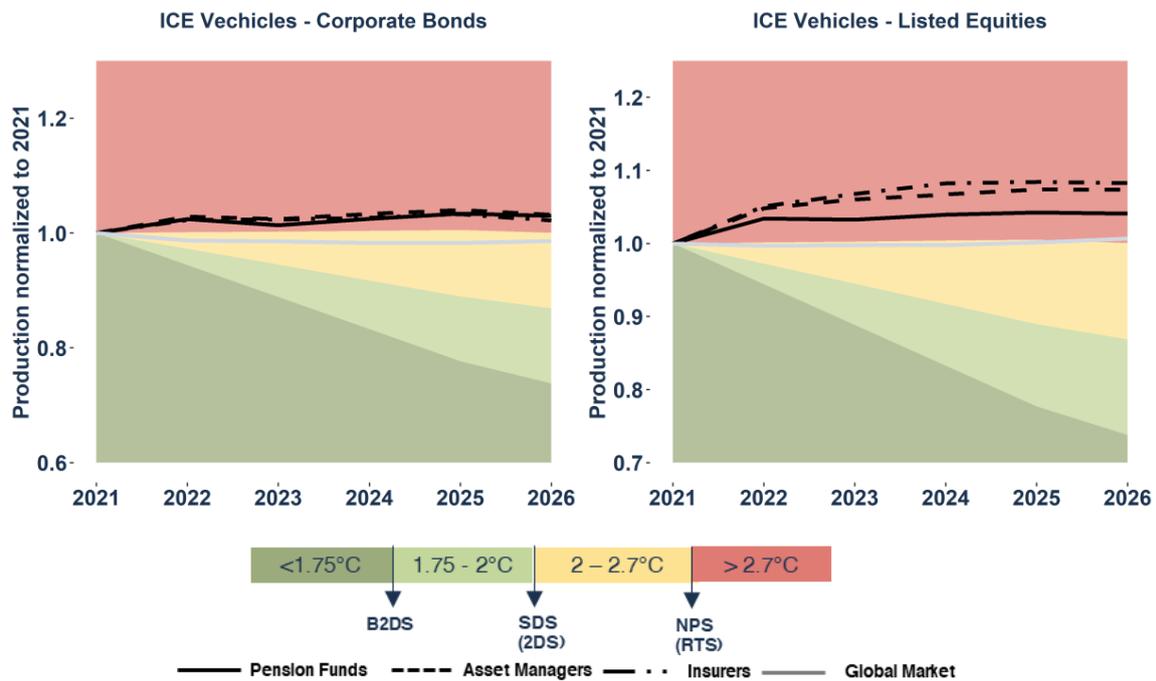


Figure 6: Alignment of vehicles production plans according to global decarbonization scenarios

Regarding the aviation sector, less than 0.5% of total portfolios are exposed to the aviation sector in both asset types analyzed. Nonetheless, airlines will have to significantly reduce the emission intensity of their flights in the next few years, which is not yet sufficiently planned for by the invested companies by Norwegian financial institutions.

Industry: steel and cement production

Less than 1% of aggregate equity and corporate bonds portfolios are invested in the steel sector. For the listed equity portfolios, a large part of these investments finance steel production using the Linz-Donawitz process, which is particularly harmful for the climate compared to other manufacturing processes. For corporate bonds only, less than 0,1% of the aggregated sector portfolios in corporate bonds are invested in the steel sector. Investee companies operating in the cement sector are not set to meet the Beyond 2°C Scenario pathway in neither of the technologies.

Cement is the second-largest industrial CO₂ emitter and while Switzerland, Liechtenstein and Austria financial institutions are, on average, 1-2% exposed to the sector, in Norway less than 0.5% of total value of portfolios are allocated to the sector, on average. Investments in Norway are mainly concentrated in the integrated facility technology and neither equity nor corporate bond portfolios are aligned with a Beyond 2°C Scenario in this technology.

It is important to note, however, that industrial production, such as steel and cement, has no obvious green-technology substitutes and the sector counts with limited availability of prospective emissions. For these reasons, conclusions about alignment of the sector should be taken with caution.

Results from qualitative survey on climate strategies

Measuring portfolio alignment analysis is simply a comment on the production and investment plans of portfolio companies and their consistency with climate goals, and it assumes a static balance sheet. Therefore, the quantitative analysis is not enough by itself to make conclusions on climate strategies considered by financial institutions. This is why this project also ran a qualitative survey to map actions and climate strategies that PACTA cannot capture. The results are based on the responses of 20 participants that filled out the qualitative questionnaire. It is important to notice that not all institutions replied to all questions, the completion rate of the questionnaire by financial institutions was 67%. The questionnaire covered three major themes and areas of potential engagement that are not covered by the quantitative analysis of the portfolio: climate action and strategies in different asset classes, political engagement, and consultation of clients on climate and sustainability preferences.

The climate strategies most frequently employed by participants include engagement as well as coal exclusion policies and exercising voting rights. Listed equities, corporate bonds and real estate are the asset classes that were mentioned the most as target climate related strategies. The following chart shows the frequency of climate-relevant strategies used by participants in Norway in different asset classes.



Figure 7: Climate Strategies in different asset classes: frequency of application by respondents (darker colours means more institutions reporting strategies in the given asset class)

Out of the 20 participants who replied to the survey, 16 could be linked to PACTA results in their equities portfolios. From these 16 respondents, 7 institutions that said they have coal exclusion policy in listed equities, of which 3 are still invested in coal mining and 4 are not. The ratio is the same when it comes to coal power capacity. The average production of coal mining is 4x higher for financial institutions that have a coal exclusion policy in place. 98.8% of the value invested in coal is invested directly by financial institutions, not through funds.

Introduction

Climate change is intensifying, according to the latest research of the IPCC. Their scientists find that climate change is already affecting every region on Earth and in multiple ways⁴. What's more, the latest UNFCCC report finds that emissions are expected to rise 16% by 2030 compared to 2010, while a decrease of 45% is needed to remain on a 1.5C pathway. In short, achieving the goals of the Paris Agreement remains a significant challenge.

Reaching the goals of the Paris Agreement will only be possible if investment and financing flows are aligned with the rapid transition needed. It is no surprise that the Paris Agreement itself recognizes this fact in Article 2.1.(c), which requires making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development. Assessing progress on Articles 2.1(c) requires methodologies and approaches for measuring alignment. After all, it's difficult to manage or change what you cannot measure. Therefore, the Norwegian government in 2019 signed up to an initiative to measure the alignment of financial flows across domestic financial institutions with climate goals. Under this initiative, initially instigated by the Swiss and Dutch governments, participating governments commit to help their financial sector measure their alignment with climate goals.

As part of this initiative, the Norwegian Ministry of Finance and Norwegian Ministry of Climate and Environment invited its financial institutions to voluntarily test the PACTA-tool to assess the climate compatibility of their portfolios, through the [PACTA Coordinated Projects](#) program. PACTA Coordinated Projects is a dedicated program in which 2DII collaborates with governments and supervisors, on an individual or collective basis, to help them apply PACTA to the portfolios of their regulated entities. The goal of this program is to measure the alignment of the entire financial sector as well as the individual participating institutions. The outcome can be used by governments, supervisors, and participating FIs to inform their climate finance strategies. Already, 2DII has helped to run the assessments in Switzerland, Liechtenstein, and Austria. Additional governments and supervisors, including the Netherlands, Luxembourg, Peru and Colombia are set to do the same over the course of 2021/2022.

This work forms the prelude to further European and international dialogue on the climate-friendly alignment of financial flows and climate transparency in the financial market. The financial sector had a central position in the last Conference of the Parties (COP 26) with world's big banks, its major investors, insurers, and its financial regulators having for the first time signed up to a coordinated pledge⁵ that will incorporate carbon emissions into their investment decisions. This action is a step forward in the much needed cooperation between the financial sector and governments on an international level in order to achieve the Paris Agreement goals. This report aims to contribute to such dialogue among the sectors not only by providing insights on the state of climate finance in Norway, but also by providing international comparison of these results in other countries where the study was also performed.

41 Norwegian financial institutions participated in the evaluation of equity and corporate bond portfolios with a total amount estimated of NOK 1.880,6 bn (USD 220,5 bn). The test covered 24 pension funds participating with a total amount of NOK 325.5 bn (USD 38.2 bn), 8 insurers covering NOK 201.0 bn (USD 23.7 bn), 7 asset managers covering NOK 1,347.4 bn (USD 157.9 bn), 1 bank covering NOK 5.7 bn (USD 0.7 bn) and 1 financial institution classified as other participating with NOK 0.1 bn (USD 6 million). In order to ensure the anonymity of the results of individual financial institutions, the results are aggregated at the level of the

⁴ Climate change widespread, rapid, and intensifying – IPCC: <https://www.ipcc.ch/2021/08/09/ar6-wg1-20210809-pr/#:~:text=%E2%80%99Climate%20change%20is%20already%20affecting,I%20Co%2DChair%20Panmao%20Zhai.&text=For%201.5%C2%B0C%20of,seasons%20and%20shorter%20cold%20seasons>

⁵ The United Nations' Glasgow Financial Alliance for Net Zero

different peer groups of financial institutions (insurance companies, pension funds, and asset managers). This shows differences between the aggregated investments in different industries.

The analysis presented here examines to what extent the investments held by Norwegian financial institutions are compatible with decarbonization scenarios that aim to limit the global temperature increase to below 2°C. This climate compatibility test is carried out as part of the international PACTA COP initiative. This report summarizes the findings from all individual portfolios in order to assess results on a financial system level. Besides the report, the participating financial institutions also received individual interactive reports with the PACTA results for each portfolio reported. 2DII also provided workshops and support to financial institutions to incentivize action upon their results.

To complement the quantitative analysis, this report also includes the assessment of a qualitative survey that aims to map other climate actions that financial institutions are taking that are not captured by PACTA. The PACTA model analyzes only a limited number of sectors and, therefore, a more comprehensive analysis needs to be carried out to have a better understanding of climate orientation inside the Norwegian financial system. Moreover, if the alignment of a financial portfolio regarding decarbonization improves, this does not mean that the financial institution in question has contributed to the decarbonization of the economy. For example, if that financial institution stops investing in a coal-fired power plant, it doesn't necessarily mean that coal-fired power plant has ceased operations - the emissions may just have been transferred to other financial portfolios or even asset classes.

The report is structured as follows: after this introduction, the PACTA methodology is presented on a glance to give context to the reader on how the methodology is translated to metrics here presented. More details on the methodology can be found in Annex I. Section 2 brings the full analysis of corporate bonds and listed equities. The section is organized by sector and contains charts on the exposure of the portfolio to the given sector, technology mix allocation of the portfolio, regional exposure of physical assets, and the forward-looking alignment results. Section 2 also contains the comparison ESG-portfolios performance to non-ESG portfolios and the assessment of the qualitative survey comparing it, where possible with the quantitative analysis. Section 3 presents the conclusions of this study.

Box: The PACTA Methodology in a glance

The Paris Agreement Capital Transition Assessment (PACTA) is a free and open-source methodology and software tool developed by the 2° Investing Initiative (2DII) to assess the alignment of investor and bank portfolios with climate goals. PACTA enables financial institutions to measure the alignment of their portfolios with climate scenarios across a set of climate critical sectors and technologies.

At its core, PACTA compares what needs to happen in sectoral decarbonization pathways with financial actors’ exposures to companies in those sectors. PACTA provides a five-year forward-looking, bottom-up analysis. The analysis looks at the investment and production plans of companies, which is based on physical asset-based company data, and consolidates that information to identify the energy transition profile of the companies and their related financial instruments. This information is aggregated at the portfolio level and compared to the production plans projected in different climate scenarios.

The PACTA methodology covers seven of the most carbon-intensive sectors in the economy (i.e., the sectors most exposed to transition risks) – oil and gas, coal, power, automotive, cement, aviation, and steel (the "PACTA sectors"). Together, they are responsible for ~75% of all CO₂ emissions. In each sector, PACTA focuses on the part of their value chain with the highest contribution in terms of CO₂ emissions. For example, in the oil and gas sector, the focus is on upstream activities related to production, while in the power sector the focus is on power generation.

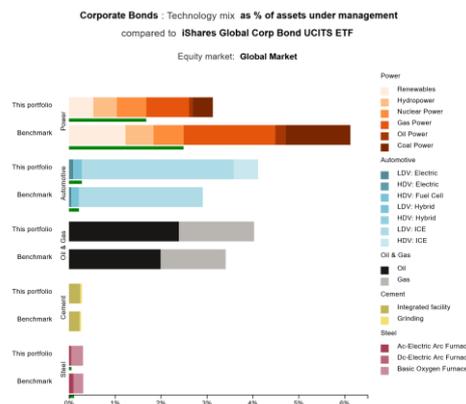
In practice, PACTA measures alignment in three concrete steps:

1. Connecting the forward-looking productions plans of companies to decarbonization pathways.
2. Calculating the alignment results on the company level.
3. Allocating company-level alignment results to the portfolio.

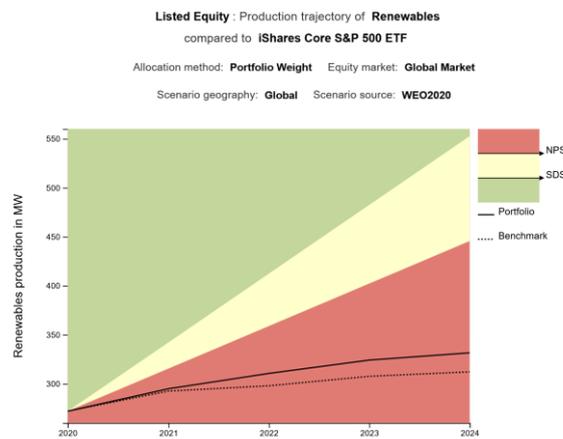
Metrics

The standard PACTA approach has three main metrics: Technology Mix, Production Volume Trajectory and Emission Intensities. Under the standard approach, the technology mix and the production volume trajectory are used for Fossil Fuels, Power, and Automotive - where technology roadmaps are known - while emission intensities are used for Steel, Cement and Aviation - where technology roadmaps are less well defined. Each metric provides different pieces of the alignment puzzle, together they provide a more holistic view of the alignment of portfolio exposures in these sectors. Below is an explanation of each metric.

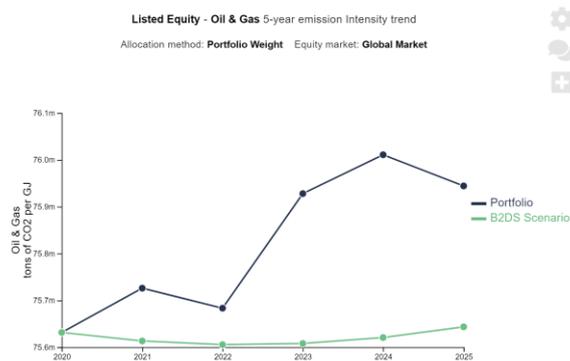
- **Technology Share Mix.** The technology share represents the weight of each technology in the sector as a percentage of investment therein. The portfolio's technology mix is compared to the scenario and a market benchmark. The technology mix metric focuses on technology shifts within the power, fossil fuels and automotive sectors. See below an example of the visualization.



- **Production Volume Trajectory.** The production volume trajectory metric aims to measure the alignment of a portfolio's projected production volumes, based on the five-year capital plans of companies, to those given in climate scenarios. It is used for the fossil fuels, power, and automotive sectors. The technology mix metric and the production volume trajectory metric both provide an indication of how aligned the companies that are part of the loan book are with the Paris Agreement goals. However, they differ in that the technology mix metric is a measure of the relative amounts invested in different climate relevant technologies within a loan book's portfolio, while the production volume trajectory measures whether the rate of change in the production amount is sufficient to meet the benchmark scenario that is in line with Paris Agreement goals.



- **Emission Intensity.** The emission intensity metric measures the average CO₂ intensity of the portfolio in all sectors but is used mainly for the steel and cement sector. This emission intensity is given as CO₂/economic unit of output (for example, CO₂/per ton of steel produced). This is then compared to an emission intensity reference point set by a climate scenario. While this is not the main metric of choice for the largest sectors tackled in this methodology, the emission-intensity of the activities financed by the portfolio is nonetheless the first metric in sectors for which no clear technology pathways have been set out (namely, steel and cement).



Exposure and Alignment results

The PACTA method is based on forward-looking production and capacity data of the world's industrial plants in the following climate-relevant sectors (hereafter, called PACTA sectors): oil and gas production, coal mining, power generation, automotive manufacturing, aviation, and industry (steel and cement). The model covers listed equity and corporate bonds. In this section, we discuss the results obtained from portfolio data reported by Norwegian financial institutions. Besides the exposure of portfolios to different climate-relevant sectors, the section also presents the forward-looking production trajectory compared to the roadmap designed by the International Energy Agency⁶ and the Joint Research Centre⁷ with different temperature goals.

It is important to highlight that listed equities and corporate bonds are analyzed using different allocation methods and therefore a direct comparison between the results of the portfolios in the two asset classes should be carried out carefully. The main feature of PACTA is its ability to attribute macro goals (Paris Agreement goals) to micro agents (firms). The attribution of production linked to listed equities is made using the ownership approach, which attributes the production results based on the shares owned by investors in the companies. The attribution of production linked to corporate bonds is made using the portfolio weight approach, which attributes the company's production to the portfolio based on the size of the investment into the companies relative to the investments into other companies in the same sector. Readers are invited to check the Annex I where a detailed explanation of both approaches is exposed.

The results presented in this section are compared to the “Global Market”. The global market consists of a global universe of financial assets that could be linked to the asset-based company data using the different attribution approaches for the different asset types. It is a snapshot of the current production plans that could be mapped worldwide using the data provided by Asset Resolution.

The first part of this section describes the coverage of this study regarding the total assets analyzed and their respective allocation to the PACTA relevant sectors. The second part present the PACTA results by sector. The third part analyze the exposure of portfolios classified as ESG into the PACTA relevant sectors. The last part presents the results from the qualitative survey.

Coverage of this study

41 Norwegian financial institutions participated in the evaluation of equity and corporate bond portfolios with a total amount estimated of NOK 1,880.6 bn (USD 220.5 bn). The test covered 24 pension funds participating with a total amount of NOK 325.5 bn (USD 38.2 bn), 8 insurers covering NOK 201.0 bn (USD 23.7 bn), 7 asset managers covering NOK 1,347.4 bn (USD 157.9 bn), 1 bank covering NOK 5.7 bn (USD 0.7 bn) and 1 financial institution classified as other participating with NOK 0.1 bn (USD 6 million).⁸

Making a direct comparison between the assets reported in the portfolios and the total assets under management in the country can be challenging, as PACTA relies on self-reported data and the

⁶ World Energy Outlook 2019

⁷ Global Energy and Climate Outlook 2019

⁸ As only one bank participated in the exercise, the results of the bank have not been incorporated in this report to ensure anonymity of the bank. The “other” financial institution is also not included in this analysis due to data comparability issues.

institutions remain anonymous to the local authorities. However, based on the table below it is possible to conclude that this study covers a significant share of the total assets under management in Norway in the respective sectors. The numbers for total assets under management were obtained from the Norwegian Financial Supervision Authority. The insurance sector in Norway is classified between life-insurance and non-life insurance. The total assets under management comparison for this peer group was made with the non-life insurance figures. However, note that it is possible that the portfolios reported also contain assets from life-insurance.

Peer group	Total Assets Under Management in Norway (Bn NOK)	Submitted Portfolio Value (Bn NOK)	Coverage
Asset Managers	1,475 ⁹	1,347.4	91,3%
Pension Funds	420 ¹⁰	325.5	77,5%
Insurers	217 ^{6,11}	201.0	92,6%

Table 2: Coverage of the study compared to the Total Assets Under Management in Norway

The sectors covered by PACTA make up about 9% of all financial institutions’ assets in equities and corporate bonds. All peer groups showed exposure between 6%-8% for investment in listed equities and 7%-11% for investments in corporate bonds. The numbers are slightly lower than those found in Switzerland (8%-12% of exposure for both asset types), Liechtenstein (10%-30% of exposure for both asset types) and Austria (8%-17% of exposure for both asset types). Figure 8 shows the share of the total investments allocated to PACTA sectors.

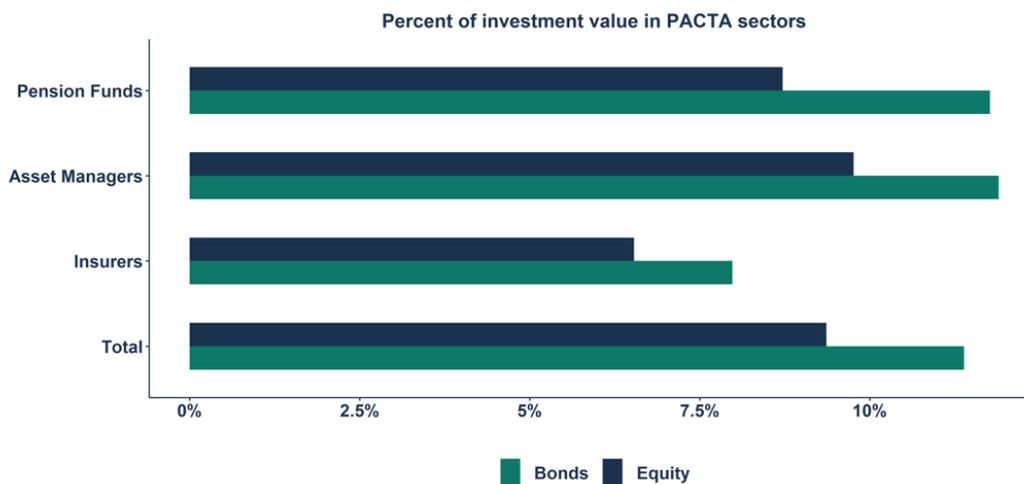


Figure 8: Percentage of Investments in the PACTA Sectors for Corporate Bonds and Listed Equities Holdings

While the lower exposure of Norwegian financial institutions to climate relevant sectors may appear positive, many sectors actually need significant investments to become zero-carbon. For almost all sectors (except for oil, gas and coal extraction, which simply needs to cease production and emissions altogether over time) investments in low carbon technologies are needed to achieve a temperature goal of below 2°C. The power, auto, steel, cement and aviation sectors will need to switch from high-carbon technologies to low/zero-carbon technologies, and this requires investments in these sectors. There is also a risk that - perhaps in order to easily comply with climate risks mitigation requirements - capital might be simply exiting a climate relevant

⁹ Based on the reporting of AuM from mutual funds under licence from Finanstilsynet – mostly UCITS funds. Please check <https://www.finanstilsynet.no/rapportering/fellesrapporteringer/kvartalsopp-gave-for-verdipapirfond/?parent=1974> and <https://www.finanstilsynet.no/contentassets/04c4e1af840e443eb406c2e7209102d4/resultatrapport-vp-foretak-og-fondsforvaltere-2020.pdf>

¹⁰ <https://www.finanstilsynet.no/contentassets/ff29bb10fb4d4fcd85fd3c61117a63/resultatrapport-for-finansforetak-2021q2.pdf>

¹¹ Total assets under management for non-life insurance

sector to other sectors such as IT and pharmaceuticals, rather than flowing to low-carbon assets¹², where it could finance the transition to a low-carbon economy. In fact, by analyzing allocation outside the PACTA sectors, Norwegian financial institutions are heavily exposed to technology firms, financial services, and consumer goods.

It is worth to note that the energy sector included in this graph below include only those companies outside of the PACTA scope (i.e., transformation, transmission, and distribution).

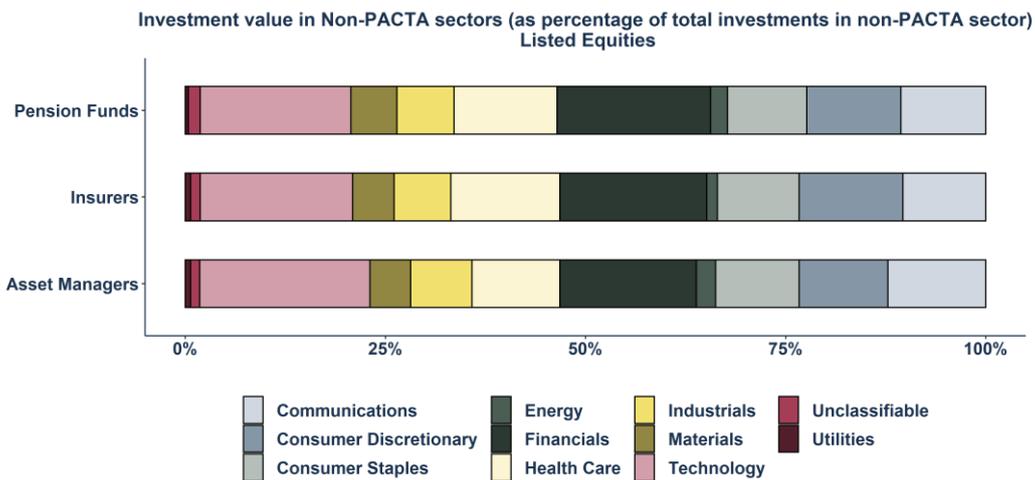


Figure 9: Percent distribution of investment value of listed equities portfolios in the non-PACTA sectors

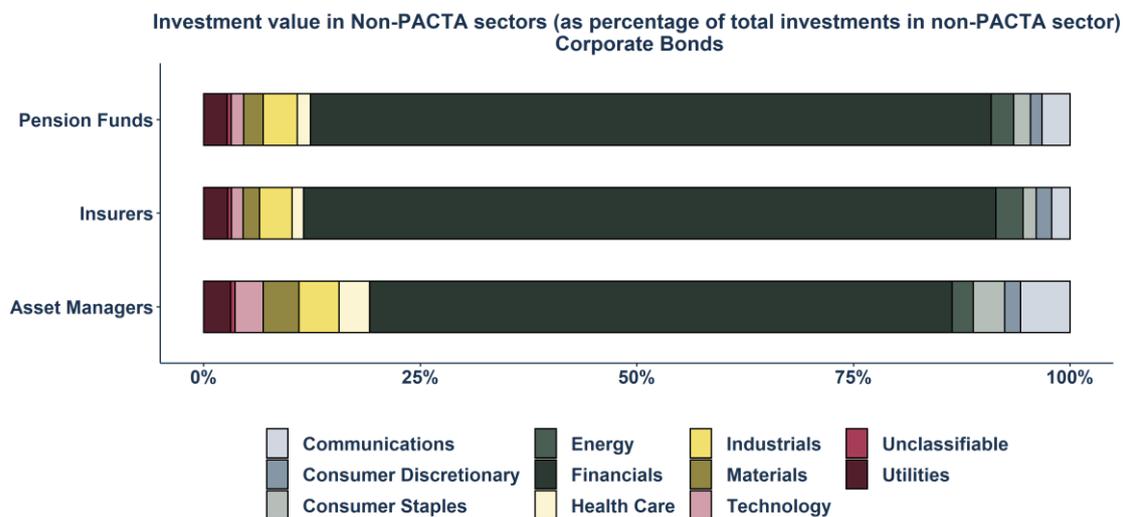


Figure 10: Percent distribution of investment value of corporate bonds portfolios in the non-PACTA sectors:

Within the total investment in PACTA sectors, oil & gas extraction and power generation dominate the overall picture, representing more than 50% of the total exposure to PACTA sectors in equity portfolios and 75% of the total exposure to PACTA sectors in corporate bonds portfolios. In both asset types, oil &

¹² Ameli, N., Kothari, S. & Grubb, M. Misplaced expectations from climate disclosure initiatives. Nat. Clim. Chang. (2021). <https://doi.org/10.1038/s41558-021-01174-8>

gas and power are the sectors which Norwegian financial institutions are most exposed to. It is important to highlight that the even though the oil-dependency in the Norwegian economy has come down significantly in recent years, the sector still account for 15% of the total economic activity and around 50% of total exports.¹³ Hydropower, fishery, forestry, and minerals are other important sectors for the Norwegian economy.

The composition of portfolio allocation in PACTA sectors changes drastically between the listed equities and corporate bonds: investments in corporate bonds are more exposed to the power sector than investments in listed equities, for example. Figures 11 and 12 below show the size of the sector exposure as a share of total exposure to the PACTA sectors.

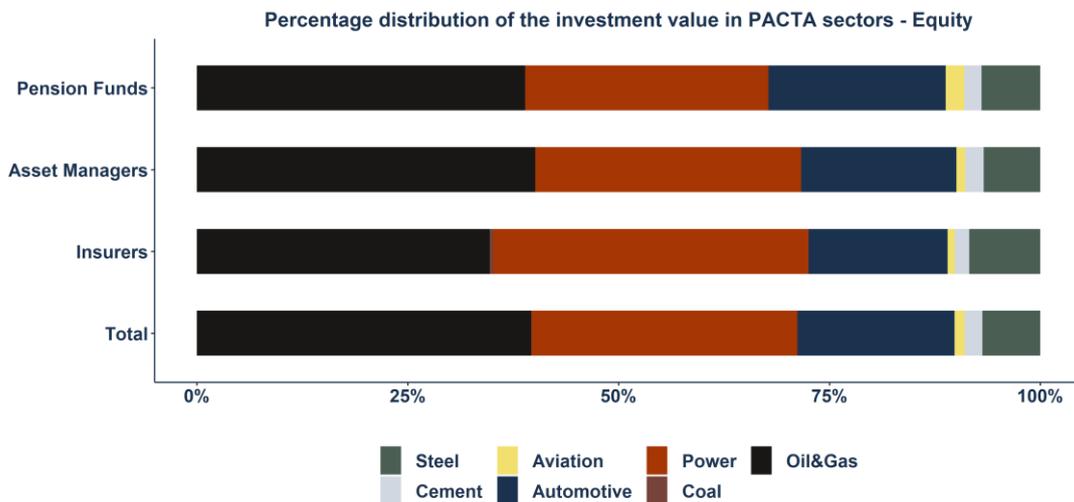


Figure 11: Percent distribution of investment value of listed equities portfolios in the PACTA sectors

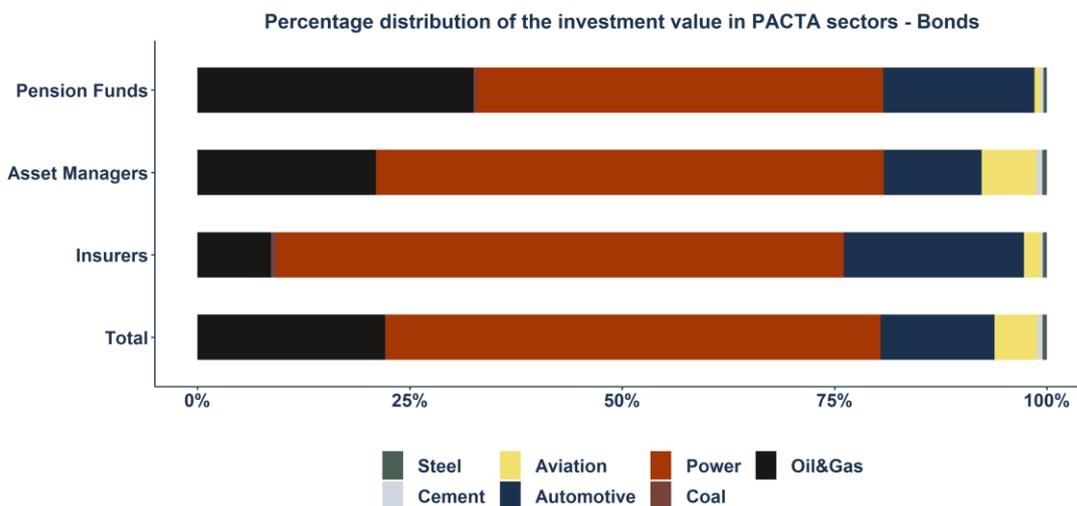


Figure 12: Percent distribution of investment value of corporate bonds portfolios in the PACTA sectors

Climate alignment of listed equities and corporate bonds portfolios

Fossil fuels: oil and gas extraction and coal mining

¹³ OECD Norway Economic Snapshot 2019: https://www.oecd.org/economy/surveys/Norway-2019-OECD-Economic%20Survey_Overview.pdf

Between 4-6% of the listed equity and 1-3% corporate bonds portfolios of Norwegian financial institutions are invested in the direct extraction of fossil fuels technologies. The exposure to oil, gas and coal extraction for Norwegian corporate bond portfolio is lower than the global bond market. However, the exposure of all types of financial institutions in listed equities investments are larger than the exposure of the global equity market. It is interesting to notice that financial institutions in Norway have almost no exposure in coal mining – except for a small exposure in corporate bonds investments for insurers.

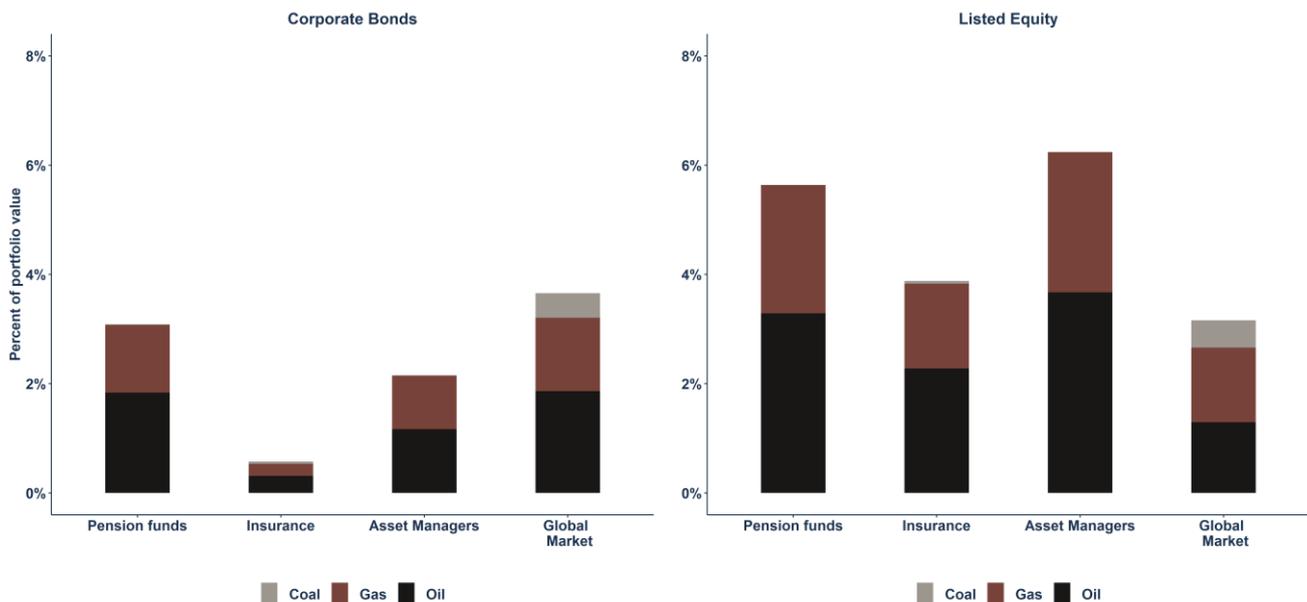


Figure 13: Share of aggregate sector portfolio values invested in companies active in oil and gas production or coal mining.

Looking at the individual financial institutions level, no organization has exposure to fossil fuels higher than 5% of their total portfolios in both asset types analyzed. In fact, only one financial institution (identified as a pension fund) has a total exposure of 5% of their total portfolio in the fossil fuel sector, all the other institutions fall under this threshold. Out of the 41 financial institutions, 33 have exposure to fossil fuels in corporate bonds portfolios and 35 have exposure in listed equities portfolios. The distribution chart below shows the exposure to the sector by participants and their organization type (each bar represents one institution). When comparing Norway’s distribution against Switzerland, Austria and Liechtenstein, it is interesting to note that in Norway there are no outliers with exceptionally high exposures in fossil fuel – while in the case of Switzerland some outlier institution’s exposures could reach 20-60% in. However, in countries like Switzerland and Liechtenstein the exposure of most participating institutions falls on under 1%, while for Norway 91% of participating financial institutions with exposure to fossil in their listed equities portfolios have at least 1% or more of the portfolio exposed. This share drops in corporate bonds portfolios 39% of financial institutions with exposure to fossil fuel higher than 1% of the total portfolio.

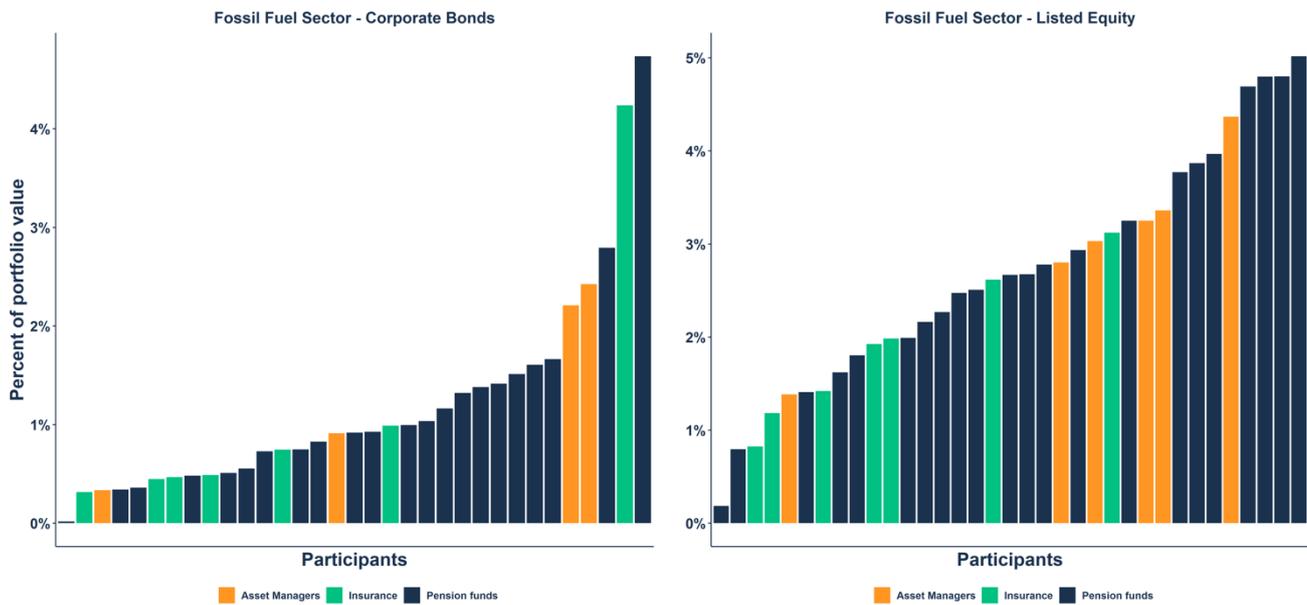


Figure 14: Peer comparison of financial institutions in fossil fuel production as a percentage of the corporate bond and equity portfolios

One of the aims of PACTA is to link physical assets in the real world to financial securities and attribute the weighted production to investment portfolios. By investigating the location of the assets linked to fossil fuel extraction financed by Norwegian financial institutions, we see that a large share of listed equity related assets in oil and gas extraction are in Norway, United States, Russia and Brazil, while for corporate bonds assets are mostly located in United States, Egypt, Iraq and Angola. Norwegian companies are barely exposed to coal mining, but it is interesting to notice that the exposure to assets in such technology is located mostly in countries like Australia, Indonesia, Colombia, and South Africa. Countries where assets are located are also the biggest producers of fossil fuel extraction, therefore it is not of surprise that financial flows are allocated in these locations. However, identifying the location of assets linked to financial instruments is relevant to connect such assets to raise awareness to potential carbon leakage issues. For instance, countries like the United States, Australia, Russia, and Brazil have no carbon taxation mechanisms at the moment¹⁴.

For more insights regarding the regional exposure to physical assets and the respective production attributed to Norwegian participant financial institutions, please refer to Annex III.

¹⁴ According to the World Bank Carbon Pricing Dashboard: https://carbonpricingdashboard.worldbank.org/map_data

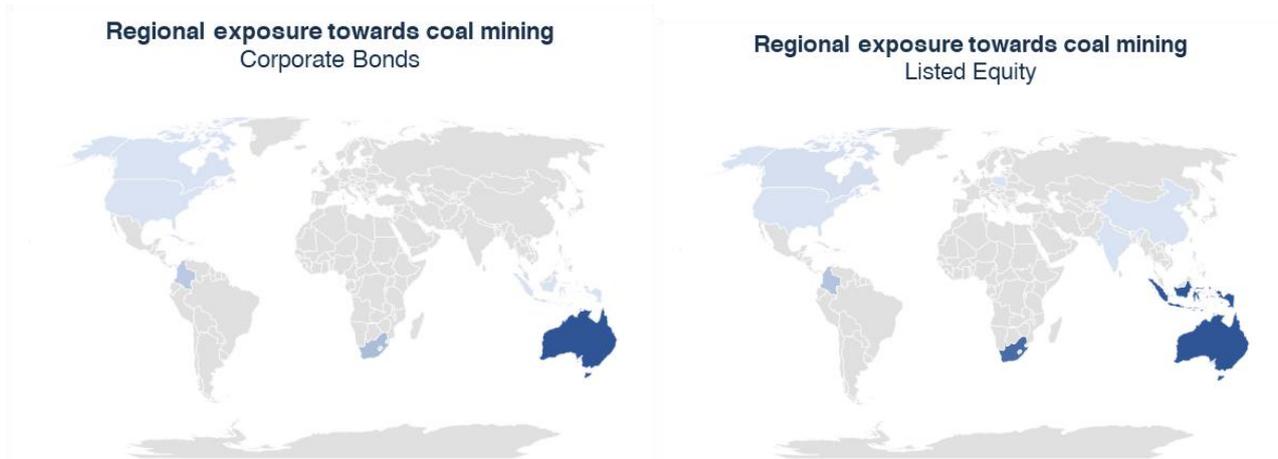


Figure 15: Production and location of physical assets in the coal mining sector measured in tons of coal (darker shades of blue indicate higher production volume in the highlighted country)

Technology	Listed Equity	Corporate Bonds
Oil	Norway (40%), United States (17%), Brazil (7%)	United States (25%), Iraq (17%), Angola (6%)
Gas	Norway (41%), United States (25%), Russia (6%)	United States (26%), Egypt (12%), Australia (9%)
Coal	Australia (32%), Indonesia (32%), South Africa (27%)	Australia (69%), South Africa (19%), Colombia (13%)

Table 3: Location of assets in the fossil fuels sector, by asset class and percent of allocated production located in a certain country

Both coal mining and oil extraction will have to be reduced in the next five years, according to the Paris-aligned ‘Sustainable Development Scenario’ (Implied Temperature Rise or ITR of less than 1.65°C) of the IEA, exposing this sector to transition risks in the near-term future. As shown by the set of graphs in figure 16, for both asset types, investee companies in the oil sector by Norwegian financial institutions are not aligned with the Sustainable Development Scenario. The production plans of invested companies are rather aligned for bonds with the New Policies Scenarios (ITR of 2.7°C) and for equities with the Current Policy Scenarios (ITR of >3.2°C), which is better than results presented by other countries, but still far from complying with the Paris Agreement.

Investee companies in the gas extraction sector by Norwegian financial institutions are set to considerably decline the production of the technology. The production of invested companies is projected to be well below the global market (except for listed equities portfolios from insurance companies) and set to achieve the Sustainable Development Scenario with a reasonable margin. It is important to highlight that for gas, most decarbonization scenarios still allow generous leeway in the next five years as a so-called bridge technology. However, even considering a more permissive pathway, the results achieved by participant financial institutions are still very good when we consider the importance of the gas extraction to Norway’s economy.

The charts below are derived from production volume trajectory metric. In order to generate the curves for the different peer groups, individual portfolios submitted are evaluated as part of a peer group. Production of invested companies are attributed to the portfolios using different weighting approaches according to the asset class. Attributed production on the financial asset level is then rolled up to the technology level and normalized to 2021 levels. The final production results are finally compared to the temperature pathways prescribed by IEA along the years for that technology (background colors). Therefore, the increase/decrease movements of the lines in the chart corresponds to aggregated production plans from invested companies in the given technology.

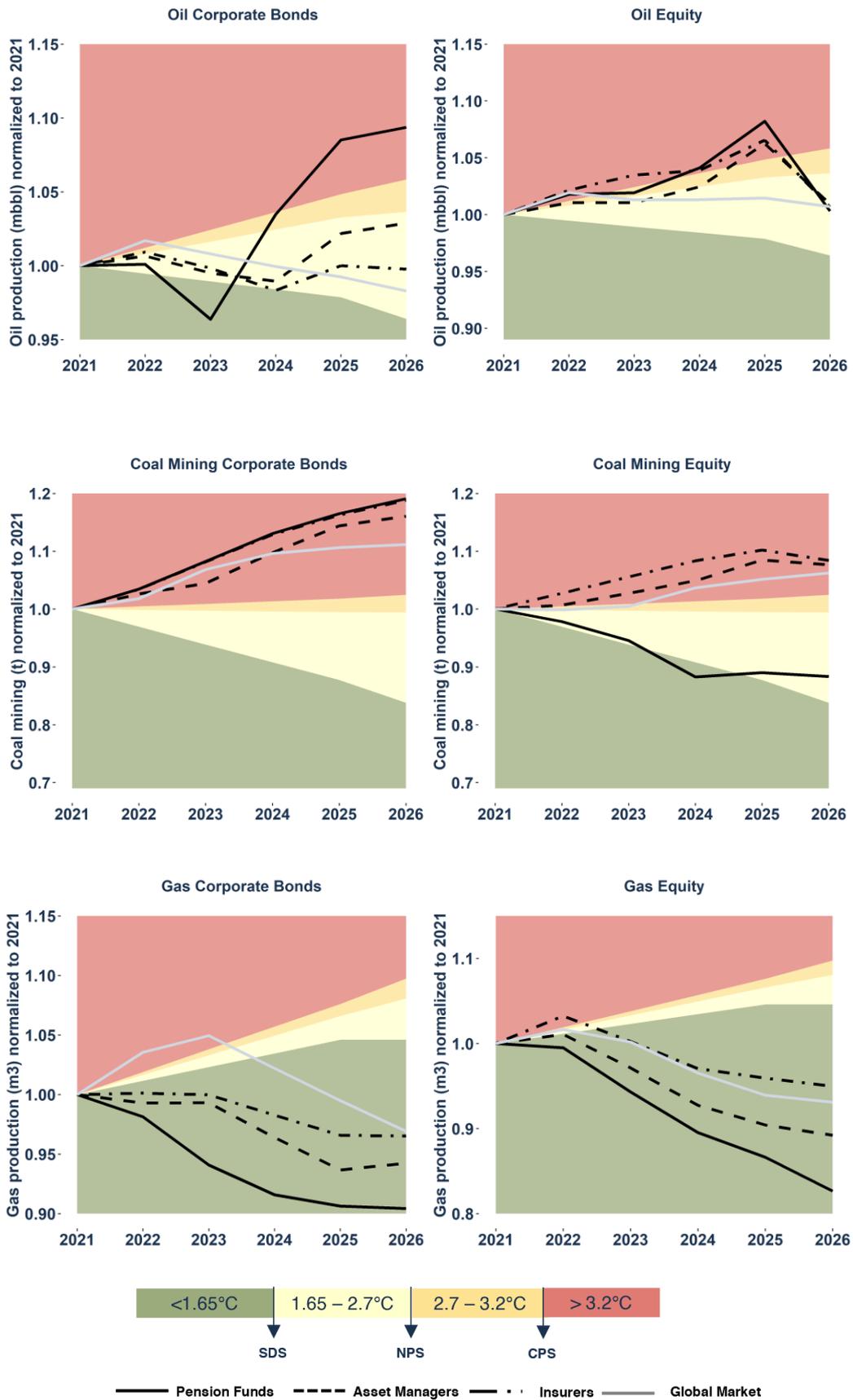


Figure 16: Alignment of oil, gas, and coal mining production plans according to global decarbonization scenarios

A key question regarding climate strategies of financial institutions in the fossil fuel sector relates to the role today’s oil and gas companies will take in a low-carbon energy transition. No oil and gas company will be unaffected by the energy transition and there will be different strategies companies can take to respond to this. On the qualitative survey that ran together with this exercise, 55% (11 out of 20) of the respondents reported to have coal exclusion policy in their investments strategies, while 25% (5 out of 20 respondents) reported to have general fossil fuels exclusion policies.

Power generation

About 3-5% of the aggregated sector portfolios are currently invested in power generation. Asset managers have particularly large exposures. Across all financial institutions, investments in low-carbon technologies (renewables and hydropower) currently account for more than half of the total investments in power generation through corporate bonds. This result is better than the global market and better than participant institutions in Switzerland, Austria, and Liechtenstein, where this exercise was also applied.

In terms of the equity portfolios, the exposure of Norwegian participating institutions to the power sector is higher than global market, however, that difference is driven by the higher exposures to renewables technologies. Nevertheless, the exposures to oil, gas and coal power capacity still accounts for more than 50% of the total investments in the power sector.

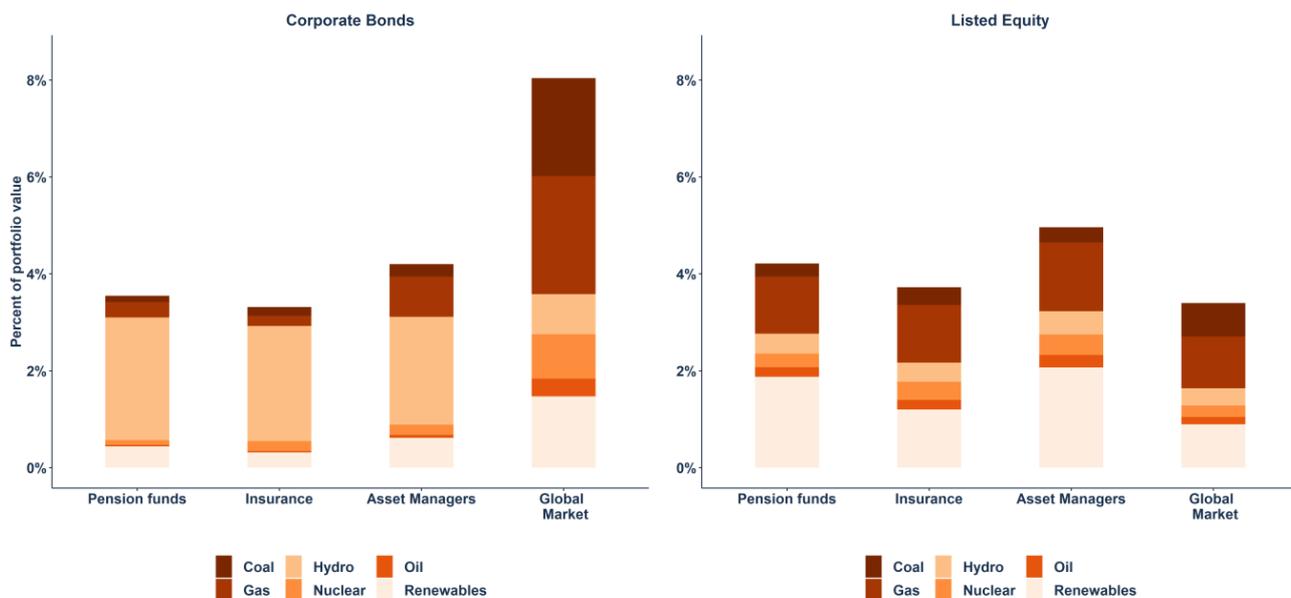


Figure 17: Share of aggregate sector portfolio values invested in companies active in the power sector

On an individual financial institution level, the exposure of organizations in high carbon power technologies are concentrated in the range of around 40%-50% of total investments in power sector for listed equities (18 out of 33 institutions with exposure in the sector falls in this range), and 20%-40% for corporate bonds (20 out of 30 institutions with exposure falls in this range). It is also interesting to note that the distribution is less spread in listed equity portfolios than corporate bonds portfolios – meaning that in a scenario of transition to a low-carbon economy more portfolios are highly exposed to climate-related risks in the former asset type portfolios.

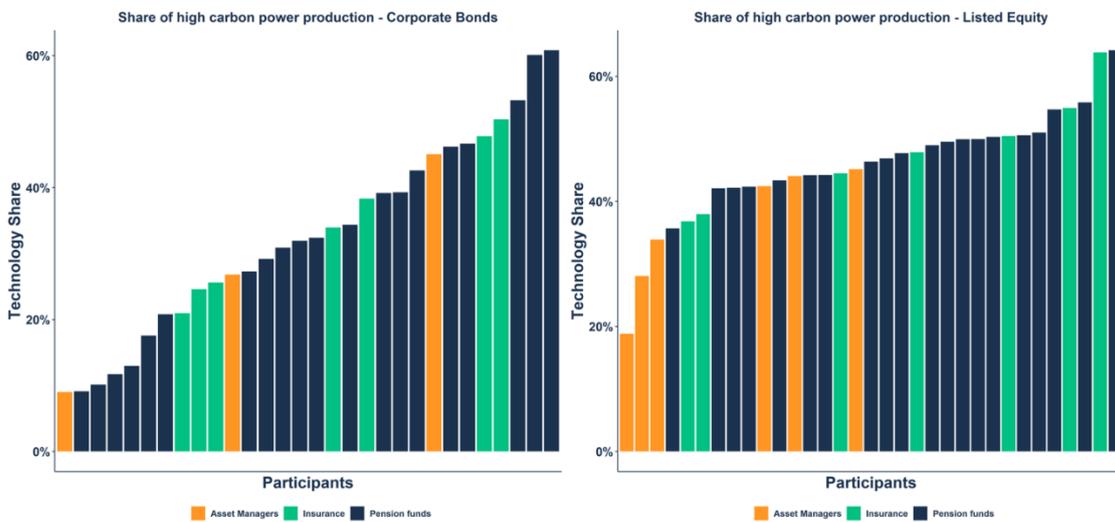


Figure 18: Peer comparison of financial institutions in high-carbon power production as a percentage of the corporate bond and equity portfolios

A large number of participants with power exposures are leading the way with respect to their current exposure to low-carbon power capacity: particularly across the listed equity portfolios submitted, 32 financial institutions submitted aggregate corporate bonds portfolios with a greater than 25% exposure to low-carbon power capacity. In listed equities, also 32 financial institutions reported portfolios with exposure greater than 25% in low-carbon power capacity. In corporate bonds portfolios 6 institutions have 100% of their exposure to the sector is allocated in low-carbon technologies, while only 1 institution has the same exposure in listed equities portfolios.

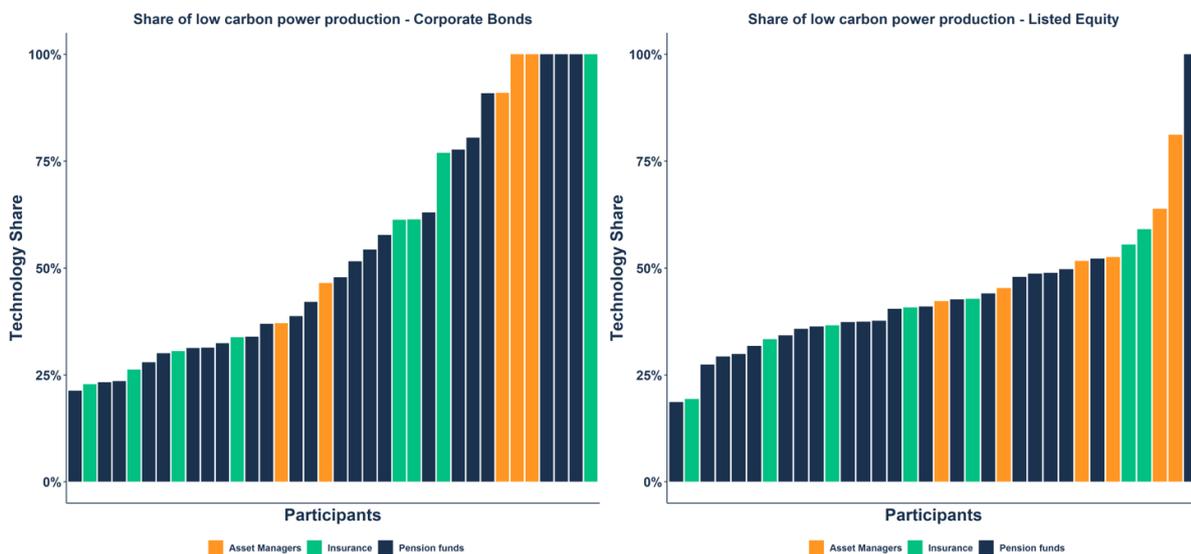
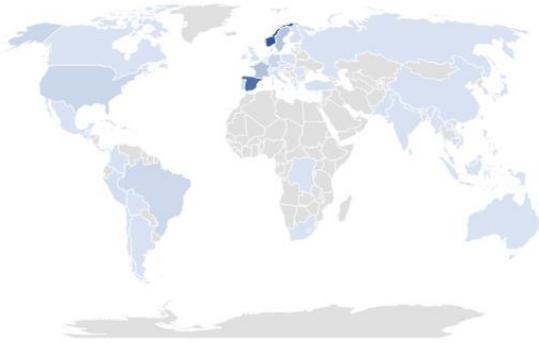


Figure 19: Peer comparison of financial institutions in low-carbon power production as a percentage of the corporate bond and equity portfolio

While most of the power capacity from high-carbon sources comes from physical assets outside Europe, the capacity from low-carbon physical assets are mostly located in Europe. All peer groups have most of their exposure in corporate bonds allocated to hydropower, and the power capacity of this technology comes mostly from Norway. In listed equities investments, the exposure is concentrated between renewables and gas, and the power capacity coming from these sources are mainly located in the United States, Mexico, and Spain.

Regional exposure towards hydropower capacity
Corporate Bonds



Regional exposure towards hydropower capacity
Listed Equity

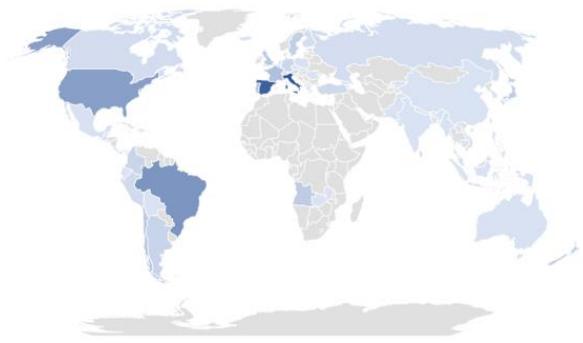
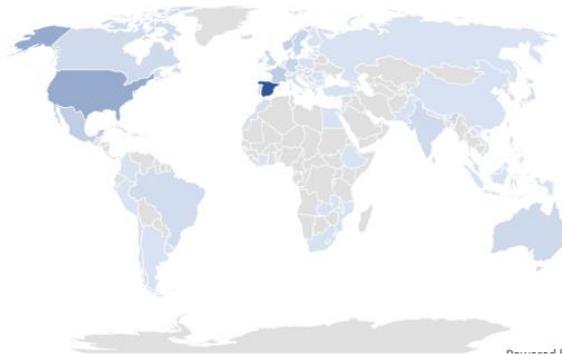


Figure 20: Production and location of physical assets in the hydropower technology measured in MW (darker shades of blue indicate higher production volume in the highlighted country)

Regional exposure towards renewables power capacity
Corporate Bonds



Regional exposure towards renewables power capacity
Listed Equity

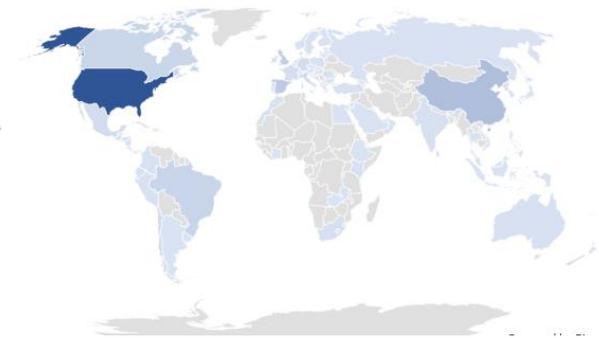
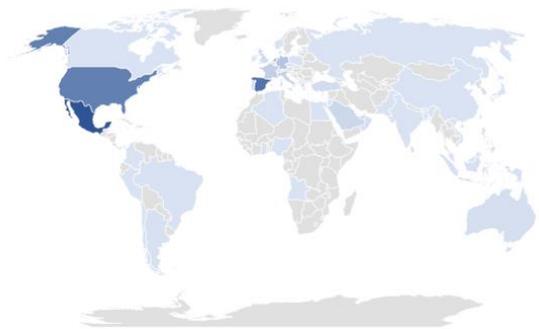


Figure 21: Production and location of physical assets in the *renewable's* technology measured in MW (darker shades of blue indicate higher production volume in the highlighted country)

Regional exposure towards gas power capacity
Corporate Bonds



Regional exposure towards gas power capacity
Listed Equity

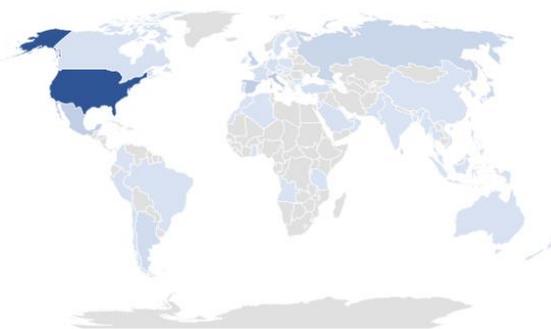
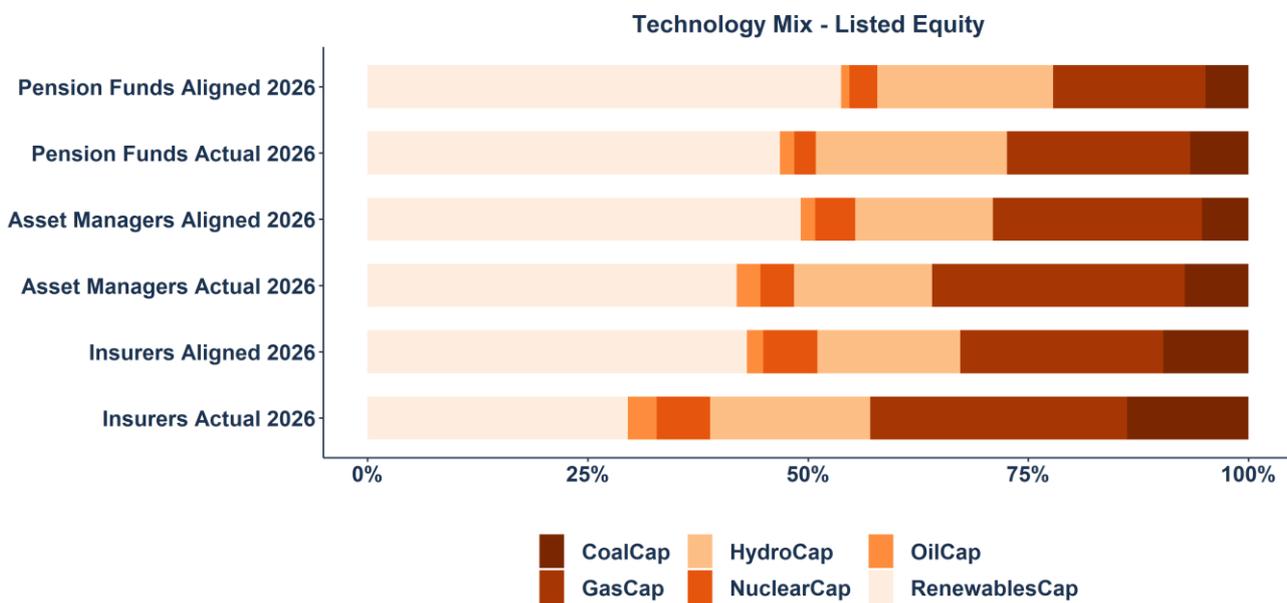


Figure 22: Production and location of physical assets in the gas technology measured in MW (darker shades of blue indicate higher production volume in the highlighted country)

Technology	Listed Equity	Corporate Bonds
Coal	United States (30%), Italy (18%), Hong Kong (10%)	United States (50%), Germany (13%), South Africa (9%)
Oil	United States (50%), Spain (14%), Japan (8%)	United States (36%), Germany (10%), South Africa (9%)
Gas	United States (47%), Italy (9%), Spain (7%)	Mexico (27%), Spain (21%), United States (19%)
Nuclear	United States (62%), Germany (11%), France (10%)	France (41%), United States (28%), Sweden (10%)
Hydro	Italy (20%), Spain (18%), Brazil (11%)	Norway (37%), Spain (30%), France (8%)
Renewables	United States (45%), China (11%), Spain (7%)	Spain (38%), United States (15%), France (6%)

Table 4: Location of assets in the power sector, by asset class and percent of allocated production located in a certain country

Considering static portfolio allocation until 2026, investee companies by Norwegian financial institutions are not set to promote the technology change in the power sector needed in order to be aligned with a Sustainable Development Scenario. The PACTA methodology is adjusted to allocate macro climate targets to micro-economic agents considering the temperature goal scenarios. Therefore, each invested company in the power sector is attributed a given power capacity target in order to achieve a climate temperature goal. The technology mix chart below shows peer groups’ technology mix for the power sector as of 2026 based on the investee companies’ capital plans, as well as the target technology mix needed to be Paris-aligned in 2026. For both corporate bonds and equities, financial institutions’ investments in renewables were insufficient to be Paris-aligned by 2026 – mainly in their corporate bonds investments in the sector.



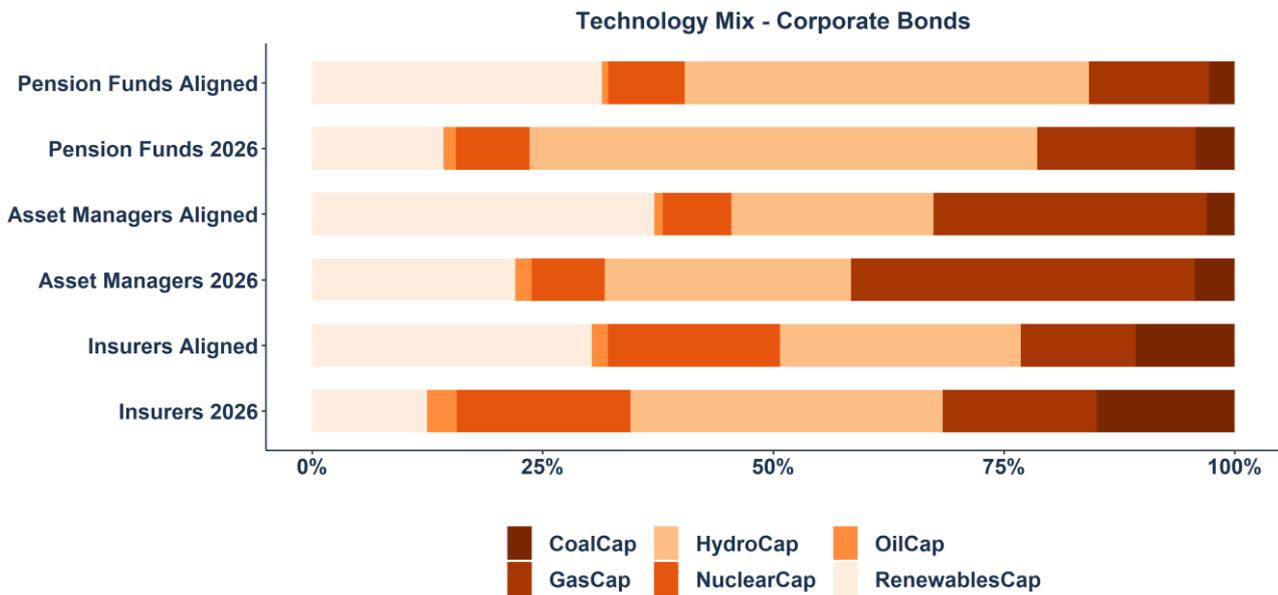


Figure 23: Future technology mix as % of sector based on the WEO2019 scenario

It is important to notice that this chart does not include assumptions around changes in portfolio composition, but rather how company changes of its production impact the overall portfolio composition.

Norway’s economy is less CO₂ intensive than the OECD average and the country has a substantial renewable energy supply.¹⁵ However, there is still work to be done by participant financial institutions to finance more Paris aligned build-out capacity of renewables and divest from coal power capacity. Regarding coal power capacity, corporate bonds portfolios are set to meet the Sustainable Development Scenario in the short run, however, the production is set to grow again by 2026 for all peer groups analyzed, resulting in the misalignment of the portfolios in this asset type. Listed equities portfolios are also misalignment for the next 5 years. For renewables, only listed equities portfolios of pension funds and asset managers are aligned in 2026 with the Sustainable Development Scenario.

In hydropower, technology which corporate bonds portfolios of financial institutions are heavily exposed, the production is set to remain almost stable for the next five years while the total production of the global market is set to increase largely. For invested companies in corporate bonds portfolio the production is aligned between new policies scenarios and current policies scenario. For listed equities the production in hydropower is misaligned for the entire period studied as production plans of invested companies do not foresee big increases for the next 5 years and the IEA scenario foresee the need of rise in production in order to achieve a sustainable development scenario.

All financial sectors in Norway show a better exposure and forward-looking performance in terms of renewable power than its peers in countries like Switzerland, Austria, and Liechtenstein. However, when compared to the global market, investee companies underperform in corporate bonds portfolios and only marginally outperform the alignment of listed equities portfolios. When it comes to coal power generation, the financial institutions are better positioned than the global market in both asset types.

¹⁵ OECD Norway Economic Snapshot 2019: https://www.oecd.org/economy/surveys/Norway-2019-OECD-Economic%20Survey_Overview.pdf

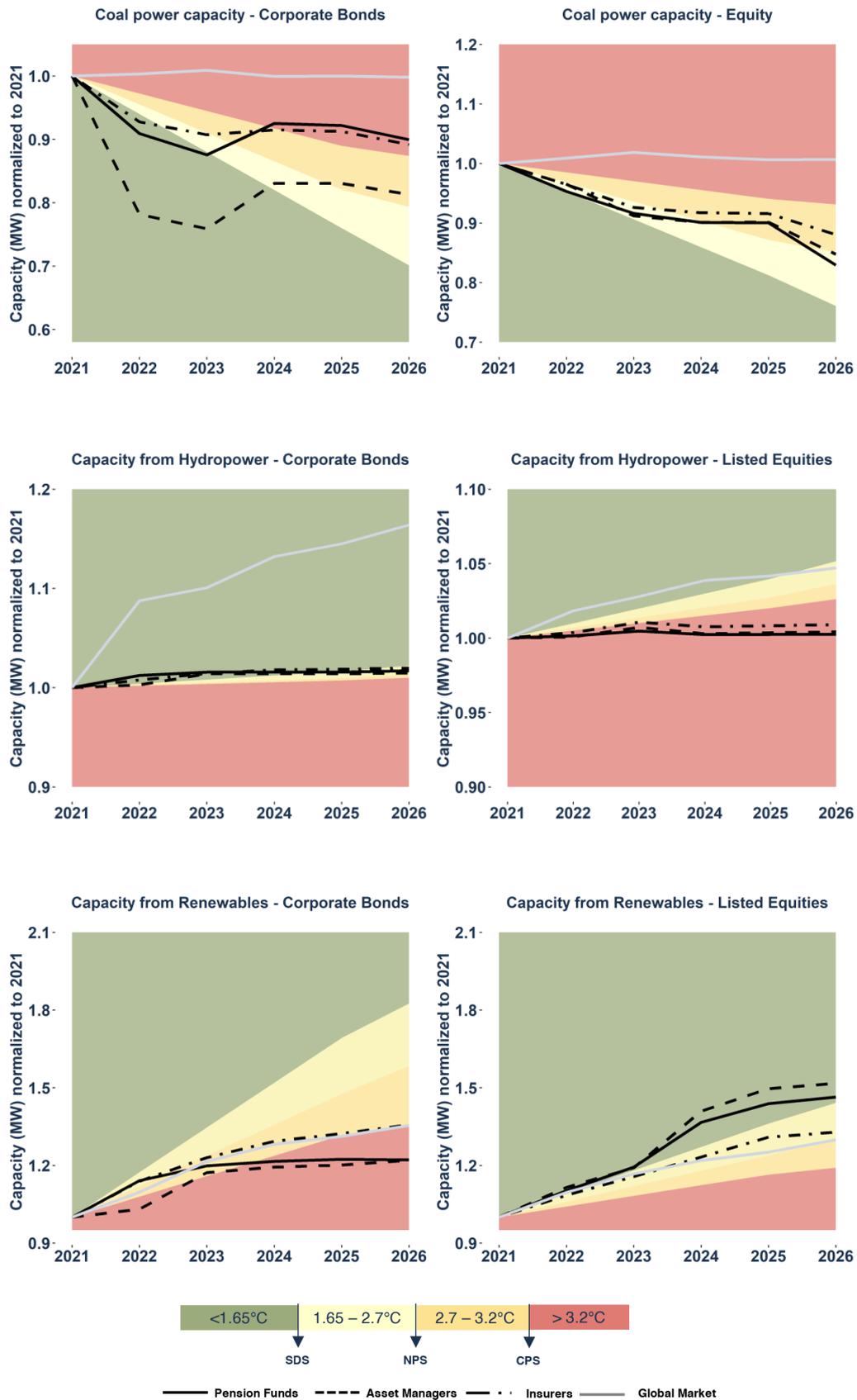


Figure 24: Alignment of coal, hydro and renewables power capacity plans according to global decarbonization scenarios.

Transportation: passenger cars, light and heavy-duty vehicles, aviation

Norway has a strong experience with electric cars incentives, which includes exemptions from value-added tax and vehicle registration tax, along with cheaper access to toll roads and parking. However, the policies still didn't reach the financial sector, which still concentrated largely in internal engine combustion vehicles production. Around 1% of the corporate bonds and 1-3% of the listed equities portfolios are invested in the production of passenger cars and light-duty vehicles (LDV). On average, around 70% of auto sector exposure is to vehicles with fossil-fuel combustion engines. Financial institutions in Norway hold less exposure in internal combustion engines (ICE) than Switzerland, Austria, and Liechtenstein (share invested in carbon intensive vehicles is 90%), but this share is not better than the global market. Therefore, despite Norway's stellar performance in terms of electric car ownership (the country has the highest number of electric vehicles per-capita in the world), its financial markets have not yet followed suit. The share of investments in fossil-fuel combustion engines compared to electric alternatives is shown in the following graph.

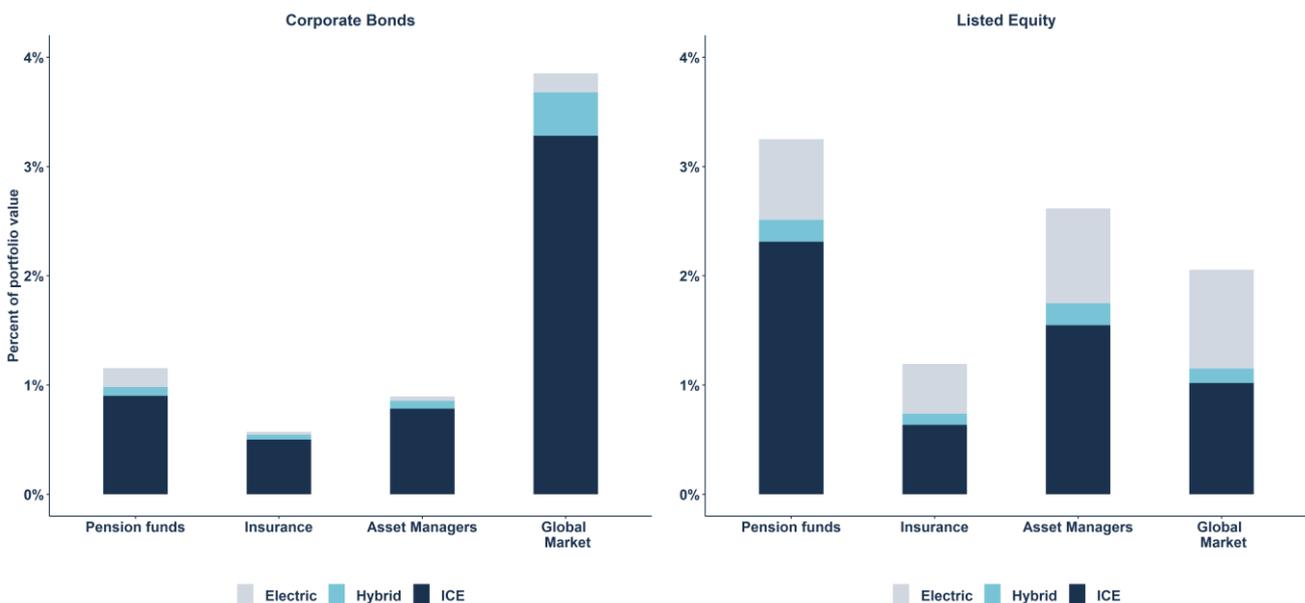


Figure 25: Share of aggregate sector portfolio values invested in companies active in the light-duty vehicles

When it comes to heavy-duty vehicles, the exposure is less than 1% of portfolios in any of the asset classes studied. Almost all of this exposure is to internal combustion engines. However, it is important to highlight that the production of electric and hybrid heavy-duty vehicles are still under development and there are very few companies in the market that produce low-carbon alternatives.

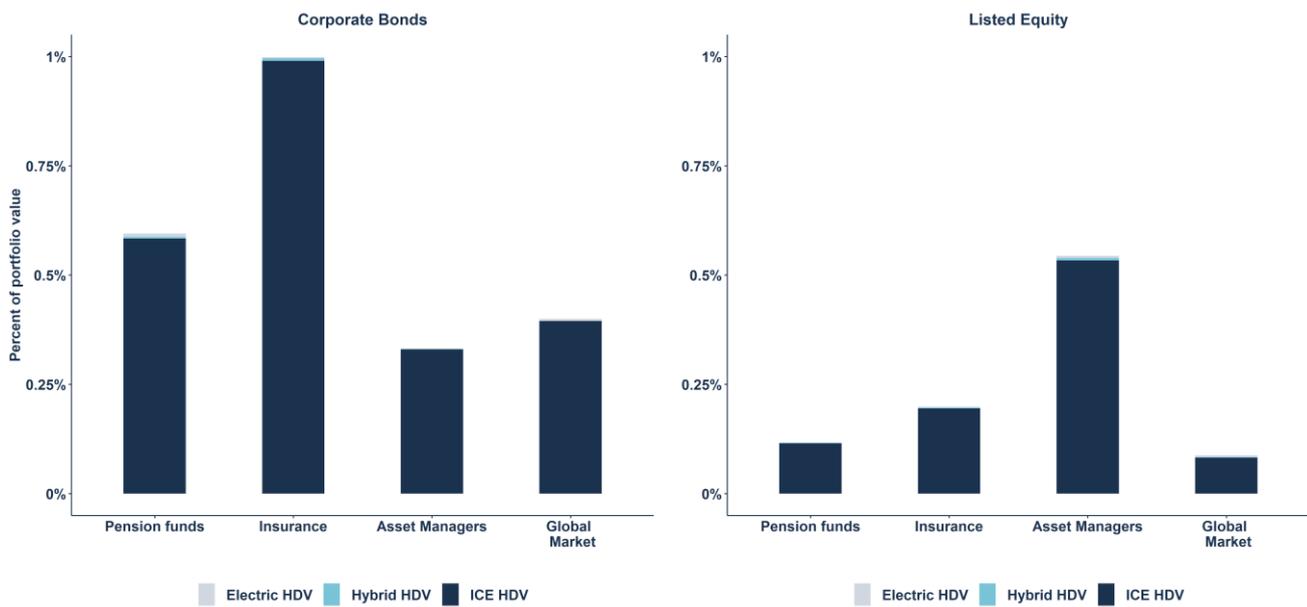


Figure 26: Share of aggregate sector portfolio values invested in companies active in the heavy-duty vehicles. (Source: authors)

Most of the physical assets related to the production of electric vehicles are located in Brazil for both listed equities and corporates bonds. China, Germany, and the United States – as the biggest vehicles producers in the world – are the countries where most of the production financed by Norwegian financial institutions across all technologies is based. The charts below show the location of assets related to the production of low-duty vehicles with internal combustion engine – the technology which financial institutions have more exposure to.

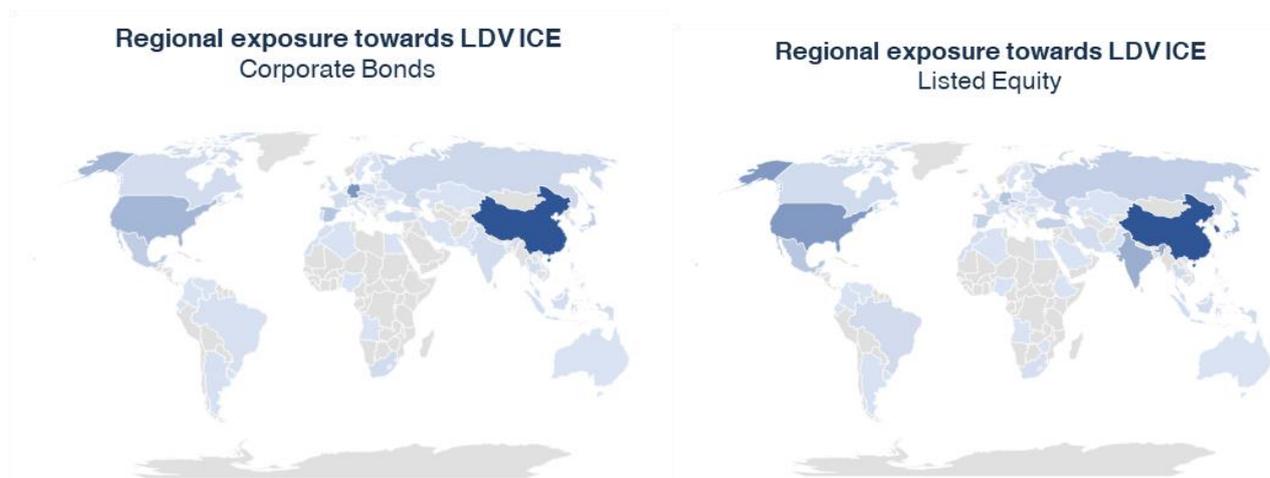


Figure 27: Production and location of physical assets in the light-duty vehicles moved by internal combustion engine measured in units of car produced (darker shades of blue indicate higher production volume in the highlighted country)

Technology	Listed Equity	Corporate Bonds
LDV – Electric	Brazil (38%), China (17%), South Korea (11%)	Brazil (45%), Germany (20%), China (8%)
LDV – Hybrid	Japan (23%), South Korea (16%), China (14%)	Japan (24%), Germany (22%), China (17%)
LDV – ICE	China (21%), South Korea (24%), United States (19%)	China (30%), Germany (16%), United States (9%)

HDV - ICE	United States (22%), Brazil (9%), France (8%)	United States (28%), Germany (14%), France (10%)
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Table 5: Location of assets in the automotive sector, by asset class and percent of allocated production located in a certain country

In terms of future technology mix, Norwegian financial portfolio allocation along the different technologies is not set to meet the target of a Sustainable development scenario by 2026. For both asset types, the invested companies would need to increase the share of electric and hybrid vehicles considerably, while reducing internal combustion engines technology.

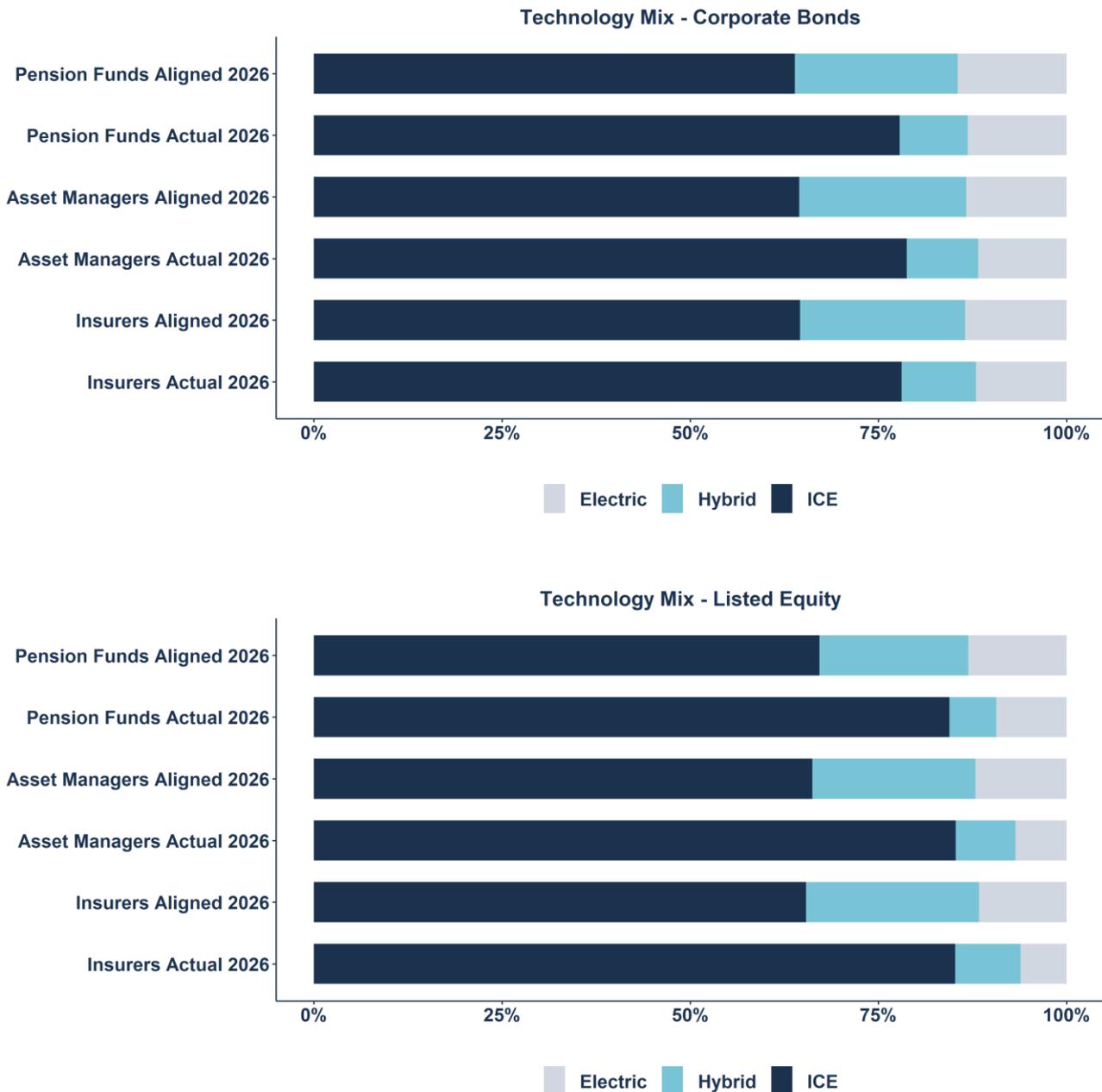


Figure 28: Future technology mix as % of automotive sector based on the WEO2019 scenario

The Energy Transition Pathway 2017 scenario requires a reduction of the total ICE vehicle stock, as well as a doubling of electric vehicle stock by 2026. Norwegian financial institutions have higher exposure to producers of electric cars in the light-duty segment when compared to other countries, but the invested companies' production doesn't meet the Beyond 2°C Scenario (B2DS) in listed equities and are below the global market expected production for such technology – however, production is aligned with the sustainable development scenario. In corporate bonds the production is aligned with a Beyond 2°C Scenario but well below the project production for the global market. The production of invested companies by Norwegian financial institutions producing internal combustion engines is misaligned and worse than what the global market is expected to produce in the next five years.

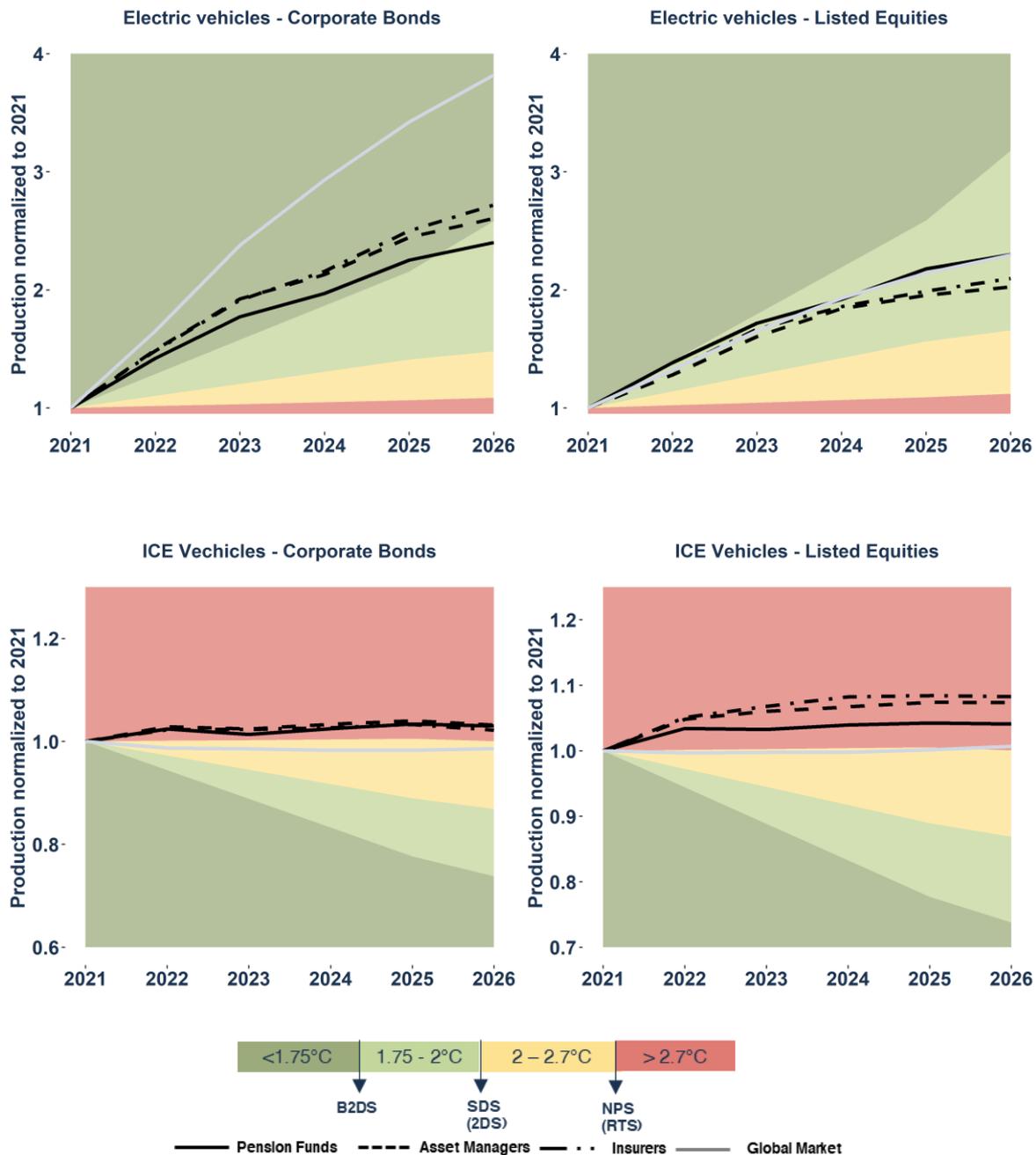


Figure 29: Alignment of vehicles production plans according to global decarbonization scenarios

Regarding the aviation sector, less than 0,5% of total portfolios are exposed to the aviation sector in both asset types analyzed. Nonetheless, airlines will have to significantly reduce the emission intensity of their flights in the next few years, which is not yet sufficiently planned by the invested companies by Norwegian financial institutions. Therefore, the analyzed equity and corporate bond portfolios are not aligned in this sector. Note that the scenario emission requirement for both asset managers and pension funds are the same, and the lines therefore overlap with each other (brown line equals orange line).



Figure 30: Current fleet intensity vs reduction required under Beyond 2°C Scenario for the aviation sector. (Source: authors)

Industry: steel and cement emission intensity

Less than 1% of aggregate equity and corporate bonds portfolios are invested in the steel sector. For the listed equity portfolios, a large part of these investments finance steel production using the Linz-Donawitz process, which is particularly harmful for the climate compared to other manufacturing processes. For corporate bonds only, less than 0,1% of the aggregated sector portfolios in corporate bonds are invested in the steel sector. This number is considerably lower than the aggregated equity portfolios. Lower-carbon manufacturing processes in electric arc furnaces also account for a larger share in corporate bond portfolios – except for insurance companies.

Electric arc furnaces (EAFs) and Basic oxygen furnace (BOF) are key to decarbonize the steel sector as it is considerably less energy-intensive than primary production from iron ore. Invested companies acting in the sector financed by Norwegian financial institutions are not set to meet the **Beyond 2°C Scenario**¹⁶ pathway in neither of the technologies. Nonetheless, there is limited prospective emissions data available yet for steel sector (as well as cement). Changes in prospective emission intensities of companies are mostly due to changes in asset ownership. As such, the insights that can be obtained from these graphs below are mostly in relation to how far ahead (or behind) the companies in the Norwegian portfolios are relative to the scenario at the present moment.

¹⁶ Energy Technology Perspectives 2017

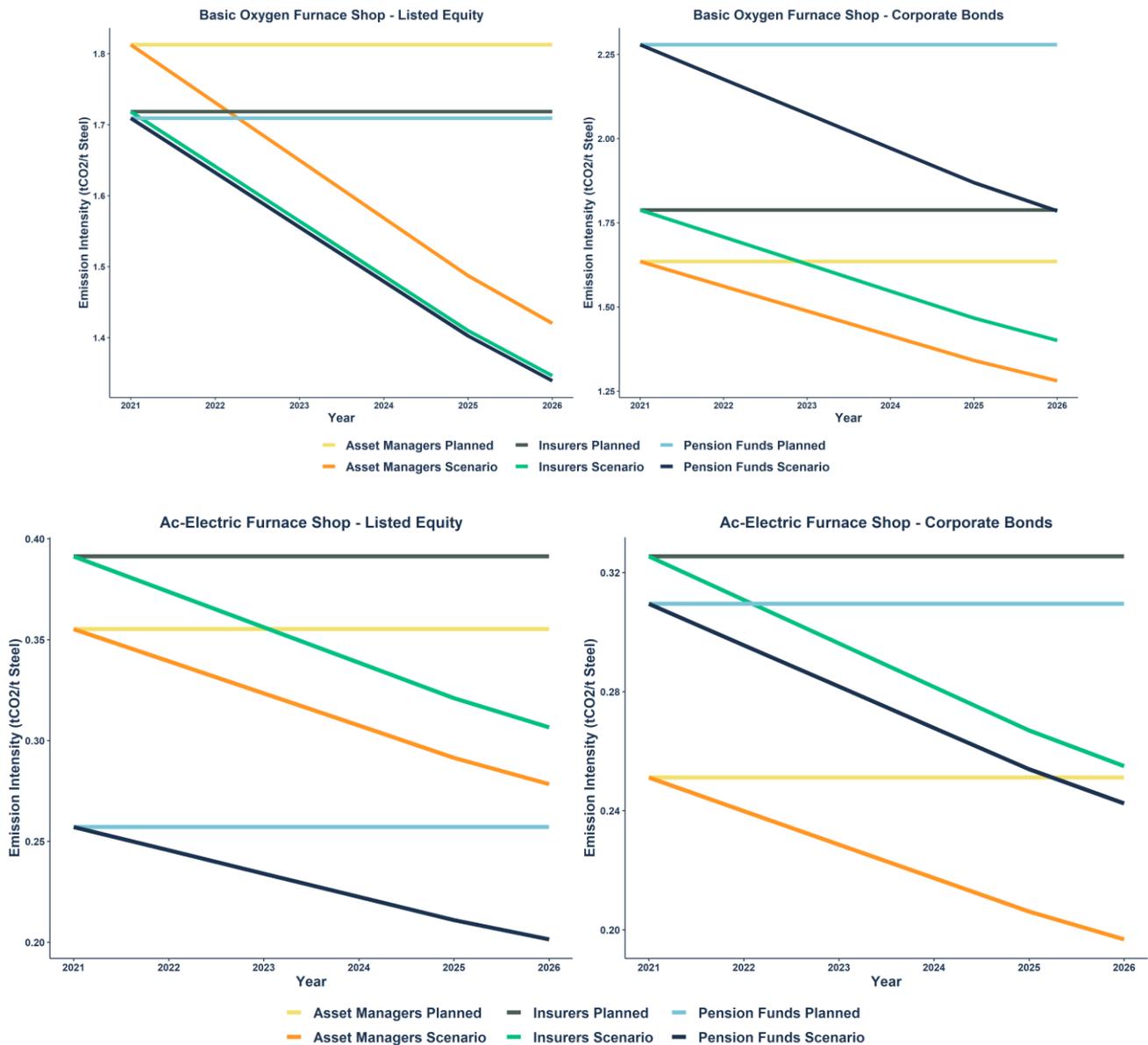


Figure 31: Current emission intensity vs reduction required under Beyond 2°C Scenario for the steel sector. (Source: authors)

Cement is the second-largest industrial CO₂ emitter and while Switzerland, Liechtenstein and Austria financial institutions are, on average, 1-2% exposed to the sector, in Norway less than 0,5% of total value of portfolios are allocated to the sector, on average. Investments in Norway are mainly concentrated in the integrated facility technology and neither equity nor corporate bond portfolios are aligned with a Beyond 2°C Scenario in this technology.

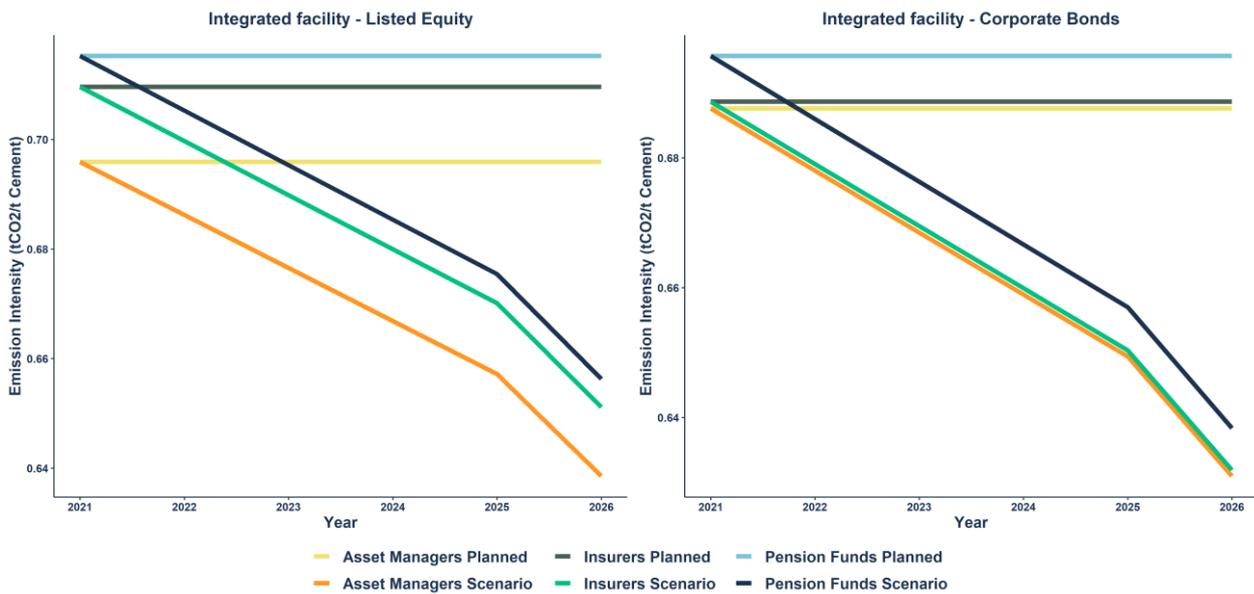


Figure 32: Current emission intensity vs reduction required under Beyond 2°C Scenario for the cement integrated facility technology. (Source: authors)

Scaling ambition to meet a 1.5°C temperature target

In order to investigate the ambition required to reach a 1.5°C temperature target, this section shows the scenarios published in the **Global Energy and Climate Outlook 2019** using the **Prospective Outlook on Long-term Energy Systems (POLES)** model. POLES is an energy system model that is structurally similar to the energy models used by the IEA but is published by the European Commission Joint Research Centre. This section, however, is not a direct comparison between the models, as models by different agencies have different assumptions, but rather an illustration of the different pathways possible to meet the 1.5°C temperature goal.

The graphs below compare the production plans that would have to be financed by participants under different climate scenarios, as well as their actual production plans.

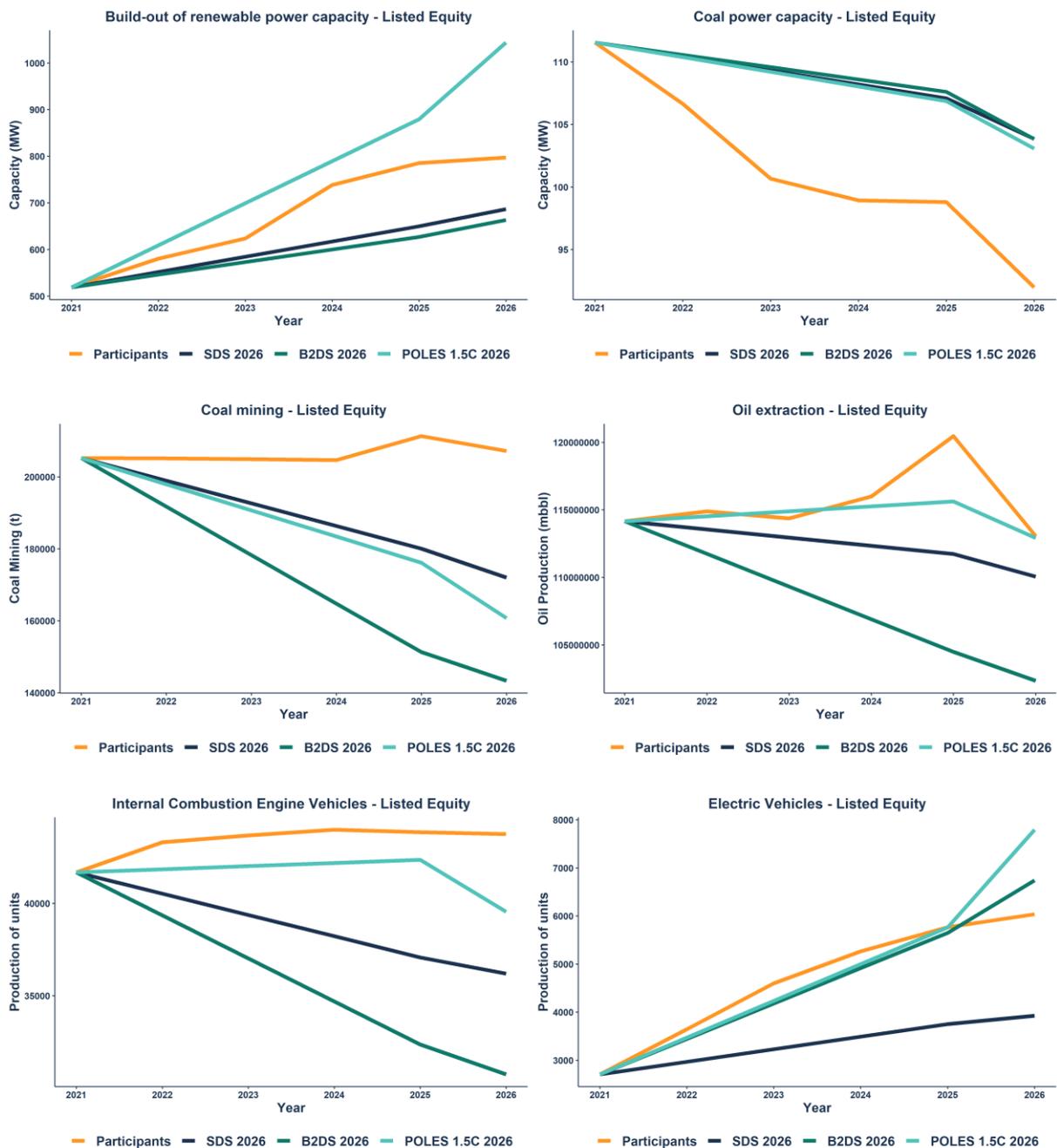


Figure 33: Build-out required in different technologies under different climate scenarios, compared to aggregate Norwegian build-out. (Source: authors)

The POLES 1.5°C scenario requires significantly steeper expansion of renewable energy capacity than the Sustainable Development Scenario or the Beyond 2°C scenario (B2DS). Even though Norwegian financial institution equity portfolios are set to meet the Sustainable Development Scenario, higher efforts need to be done to achieve the POLES 1.5°C. The build-out of electric vehicles required under the POLES 1.5°C scenario is also steeper than the build-out under the two IEA scenarios. This ambition is also not met by the portfolios analyzed. On the other hand, the POLES 1.5°C scenario gives more leeway to high-carbon technologies such as internal combustion engines, coal power capacity and oil production. In the case of coal mining, the portfolios analyzed are still far from meeting the ambition required under any scenario. In the case of coal power capacity on the other hand, portfolios analyzed align with the assumptions of the POLES 1.5°C.

Climate compatibility of ESG portfolios

Introduction

In the financial industry, “ESG” stands for “Environmental, Social, Governance” and relates to three sustainability categories by which financial institutions can evaluate invested companies. Environmental and climate performance are summarized under “Environmental”, while “Social” can refer, for example, to human rights, working conditions and animal welfare. “Governance” evaluates, among other things, the management structure and remuneration in a company. These criteria are included in investment decisions by financial institutions for various reasons, but mainly to be able to better estimate the return and risk associated with an investment. Since there is no standardized "ESG approach", financial institutions can focus on one or the other category and weight the underlying evaluation criteria at their discretion.

This chapter compares the climate compatibility of portfolios marked as ESG with conventional portfolios. When uploading the portfolios, financial institutions could indicate whether the uploaded portfolio was an ESG portfolio according to their own definitions. This made it possible to classify the results and to evaluate the ESG portfolios separately. The majority of the uploaded asset value was marked as non-ESG. Depending on the industry 25-50% of the submitted asset value was marked as ESG, depending on the peer group and asset type.

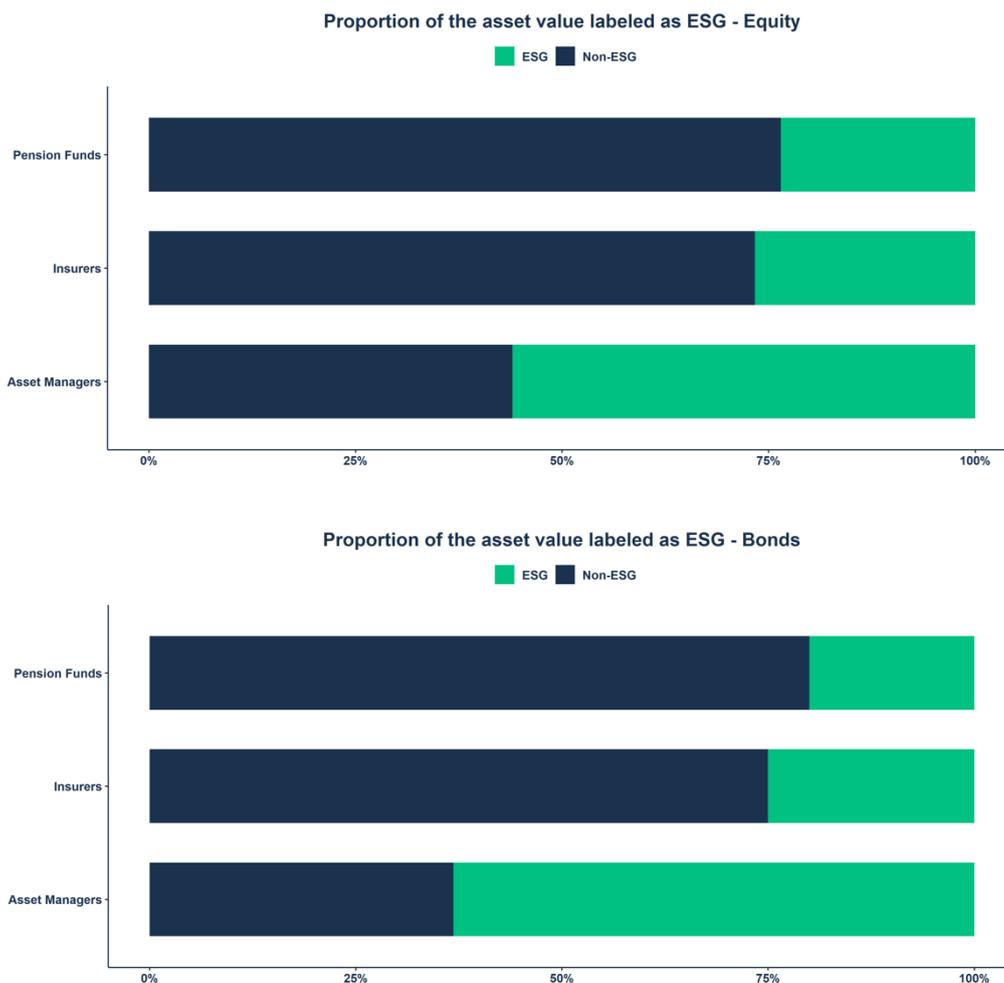


Figure 34: Proportion of portfolios classified as ESG and non-ESG across peer groups

When interpreting the results, it should be noted that the portfolios labeled as ESG / non-ESG are statements made by the participants themselves. Overall, portfolios marked as ESG perform better than conventional portfolios in terms of climate compatibility. However, this does not apply to all ESG portfolios, as the following analysis shows.

Current exposure in climate-relevant sectors

In the submitted ESG equities and bonds portfolios, on average, a lower proportion of the portfolio value is invested in the seven climate-relevant sectors analyzed. As highlighted in the first part of this report, having a lower proportion of value invested in climate-relevant sector is not necessarily positive from a climate perspective as the transition to a low carbon economy requires high volumes of investments to decarbonize high-carbon sectors. However, ESG strategies incorporate more aspects than only environmental ones where Norwegian financial institutions might be invested in, and which PACTA is not able to capture nor evaluate.

The charts below summarize the statistics around the exposure of portfolios classified as ESG and non-ESG. The main part of the chart (the “box”) shows where the middle portion of the data is: the interquartile range. At the ends of the box, is located the first quartile (the 25% mark) and the third quartile (the 75% mark). The far bottom of the chart (at the end of the left “whisker”) is the minimum (the smallest number in the set) and the far top is the maximum (the largest number in the set). The median is represented by a vertical bar in the center of the box. The dots are outliers.

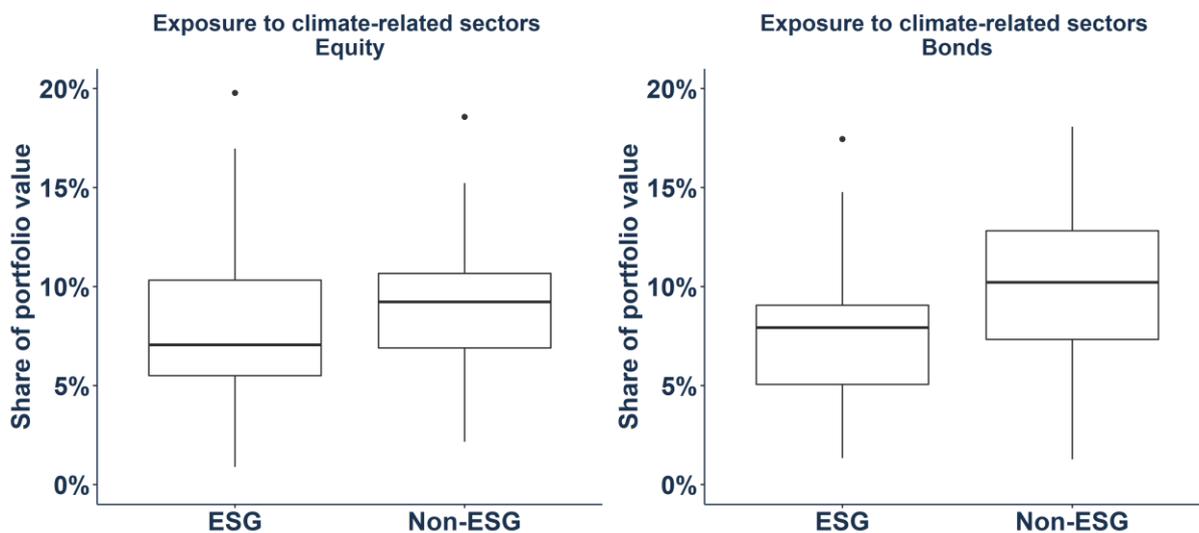


Figure 35: Performance of ESG vs non-ESG labelled portfolios across exposure to climate-relevant sectors

ESG portfolios perform better on average in all examined metrics: notably, in listed equities portfolios they have lower exposure to fossil energy generation and the share of financed electricity capacity from renewable energies is higher. The results difference is however less notable in corporate bonds fossil fuel exposure and electricity capacity from coal power source. The following graphics show the results of various PACTA metrics. The distribution of this metric among all submitted ESG portfolios is compared with the distribution among all conventional portfolios.

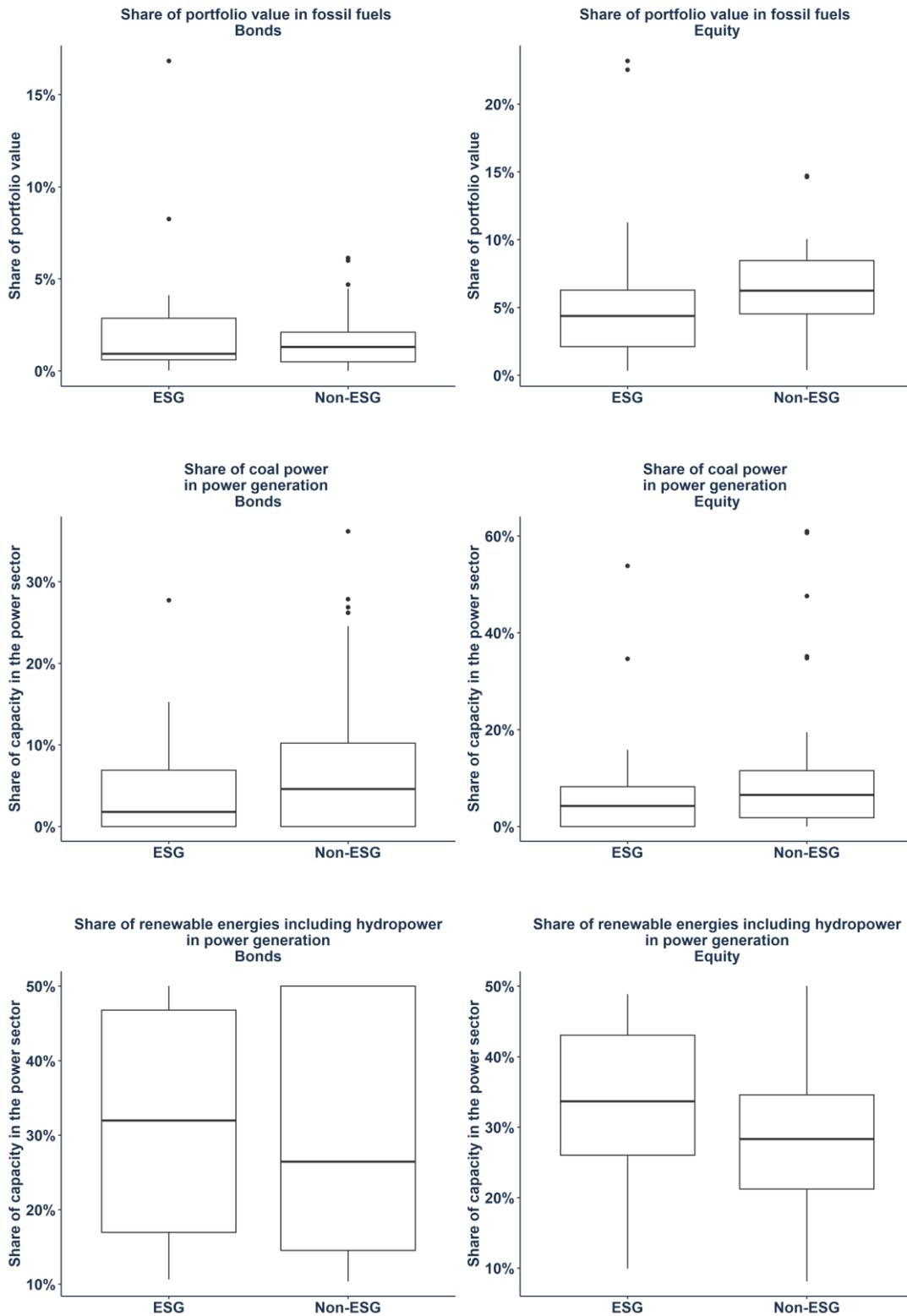


Figure 36: Performance of ESG vs non-ESG labelled portfolios across exposure in different sectors

Taking Action: Climate Strategies and Impact

This section seeks to understand the climate strategies and actions complementing the portfolio exposures and alignment results described in this report. Portfolio alignment analysis is simply a comment on the production and investment plans of portfolio companies and their consistency with climate goals. In aggregate, the analysis speaks to the broader trends in financial markets as it relates to the Paris Agreement. However, for an individual financial institution such analysis only shows one side of the equation. The other side is the extent to which climate issues are integrated into the actions and strategies that these institutions deploy. A financial institution may for example be exposed highly to fossil fuel sectors but use engagement tools to seek to influence these companies to decarbonize. Similarly, low exposures may be associated without any climate actions or “intent” to contribute to the Paris Agreement.

The results are based on the responses of 20 participants that filled out the qualitative questionnaire. It is important to notice that not all institutions replied to all questions, the completion rate of the questionnaire by financial institutions was 67%. The percentages presented in this section will always relate to the full number of participants that replied to the survey – not only those who replied to the specific question. The questionnaire covered three major themes and areas of potential engagement that are not covered by the quantitative analysis of the portfolio: climate action and strategies in different asset classes, political engagement, and consultation of clients on climate and sustainability preferences.

The results presented here can be subject to biases. The sample that replied to the survey is limited and it is conceivable that organizations who are more climate engaged are more likely to reply. Nevertheless, the value invested in portfolios associated with survey respondents cover approximately 92% of the total value of portfolios submitted. This is a substantial share of the Norwegian equity and bonds markets and allows somewhat generalisable results. Still it is important to keep in mind that the analysis made in this section are also not in-depth statistical assessments and should be treated as a sense of direction instead of a hard facts.

45% of the participants reported having a climate related strategy in the investments in at least one asset type. Listed equities and corporate bonds are the asset type that are mostly subject to climate goals strategy: 7 respondents reported having climate strategies in listed equities portfolios and 9 respondents reported having climate strategies in corporate bonds portfolios. Real estate and sovereign bonds are other popular assets subject to climate goals strategies. Some financial institutions also reported to have climate goals on their cash and derivatives positions. Although there is little clarity on what financial institutions classify as climate goals, the transition to a low carbon economy requires investments to be driven to assets that can make impact in the real economy, and in the context, due to their speculative nature, cash and derivative may not be the most efficient to tackle climate change issues.

We observe that more than half of the assets invested are in asset classes that are covered by the quantitative analysis (corporate bonds and listed equity). These asset classes are also those in which the highest percentage is indicated to be managed with a climate strategy across all participants. These results confirm that the quantitative analysis covers those asset classes driving the climate strategy of financial institutions. The graph below shows the percent of assets invested in different asset classes, averaged across all respondents. Coloured in grey are the percent of assets that were reported to be managed with a climate target or strategy, although the precise nature of the climate strategy was not specified.

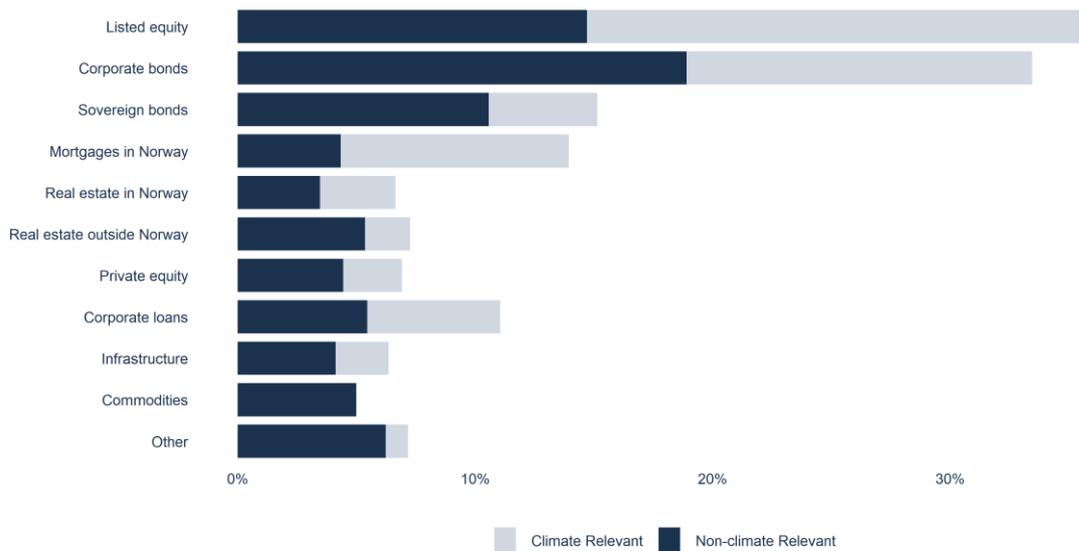


Figure 37: Average share of holdings invested in different asset classes. Grey: percent of holdings invested that has a climate strategy, based on self-declared information.

The climate strategies most frequently employed by participants include engagement as well as coal exclusion policies and exercising voting rights. As mentioned above, listed equities, corporate bonds and real estate are the assets that were mentioned the most as target climate related strategies. The following chart shows the frequency of climate-relevant strategies used by participants in Norway in different asset classes. Climate relevant strategies that investors could choose from include engagement, exercising shareholder voting rights, exclusion criteria for oil, gas or coal, best-in-class investing, sustainability criteria in loan contracts and impact investing. The strategies were “pre-defined” as options to select and thus may not fully capture all types of approaches deployed by participating financial institutions. Moreover, the distribution of strategies is of course at least in part driven by the actual exposure to that asset class, with a large share of participants for example not invested in commodities.

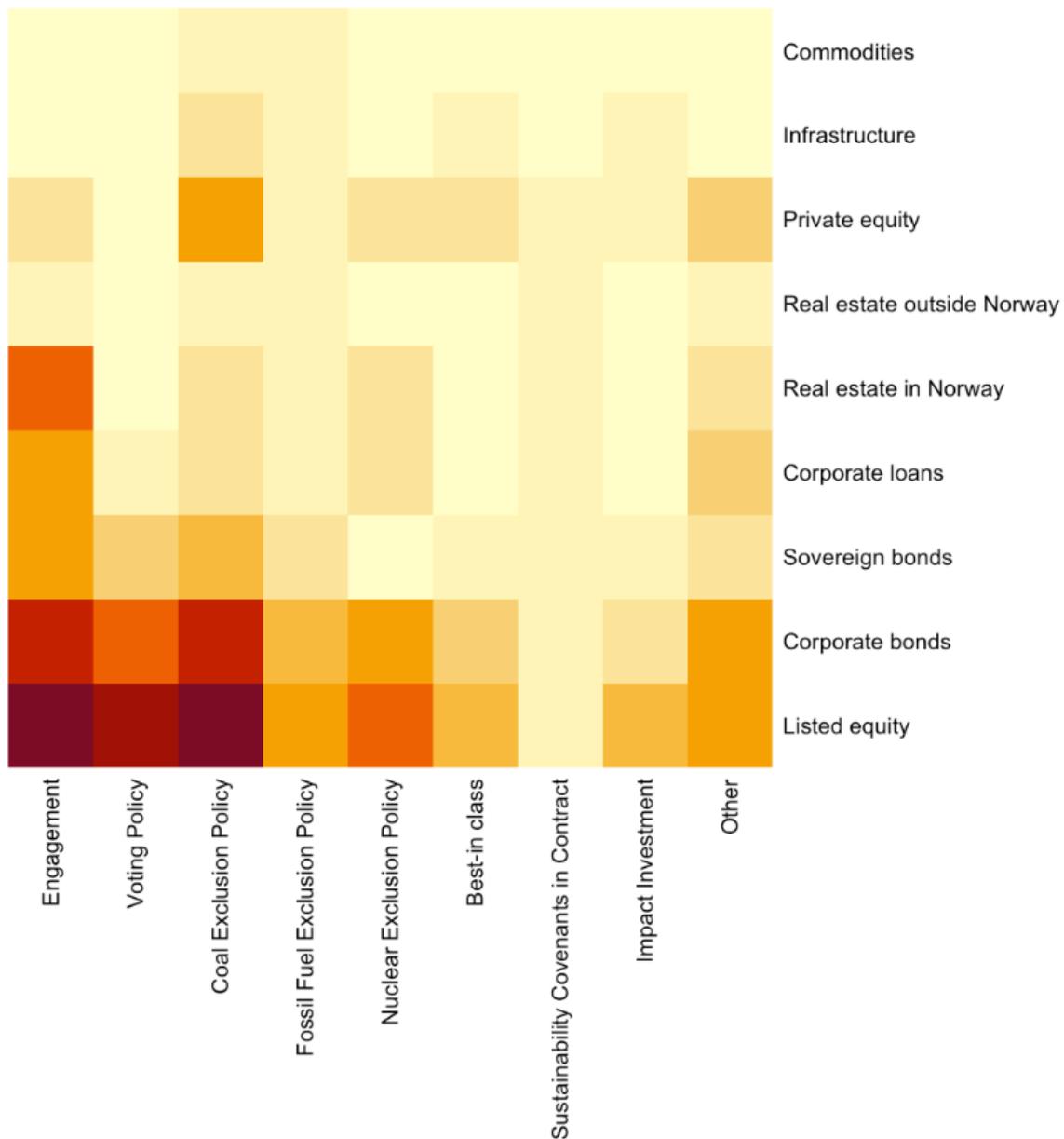


Figure 38: Climate Strategies in different asset classes: frequency of application by respondents

6 respondents in total, implement four or five climate relevant strategies and 5 respondents implement no strategies at all from those listed in the survey. In general, there is substantial overlap between the different strategies employed. The table below shows co-occurrence of different strategies among participants, that is the share of participants implementing one strategy (for example shareholder engagement) that are also implementing another (such as exercising voting rights). We find that respondents that have an exclusion policy in place usually also have voting rights or engagements policies in their investment strategies. However, the opposite is not true. Also, most respondents who have a general climate related target reported to have specific policies in place (i.e., exclusion or engagement), which is a useful check that broad organizational strategies are also often complemented by more concrete ones.

Percent of investors applying strategy listed in row	General climate related target or aspiration	Shareholder engagement	Exercising voting rights	Coal exclusion policy	Fossil fuels exclusion policy
General climate related target or aspiration (9)	100	89	78	56	33
Shareholder engagement (9)	89	100	89	67	44
Exercising voting rights (8)	88	100	100	63	37
Coal exclusion policy (7)	71	86	71	100	57
Fossil fuels exclusion policy (4)	75	100	75	100	100

Table 6: Overlapping strategies adopted by respondents

The next paragraphs will seek to compare qualitative survey answers with PACTA results from listed equities. Out of the 20 participants who replied to the survey, 16 could be linked to a listed equity portfolio with PACTA results. Those 16 are the focus of the analysis.

From the 7 institutions that said they have coal exclusion policy in listed equities, 3 are invested in coal mining and 4 are not. The ratio is the same when it comes to coal power capacity, as it can be seen in the charts below. The average production of coal mining is 4x higher for financial institutions that have a coal exclusion policy in comparison to those which have no exclusion policy in place. 98.8% of the value invested in coal is invested directly by financial institutions, not through funds¹⁷.

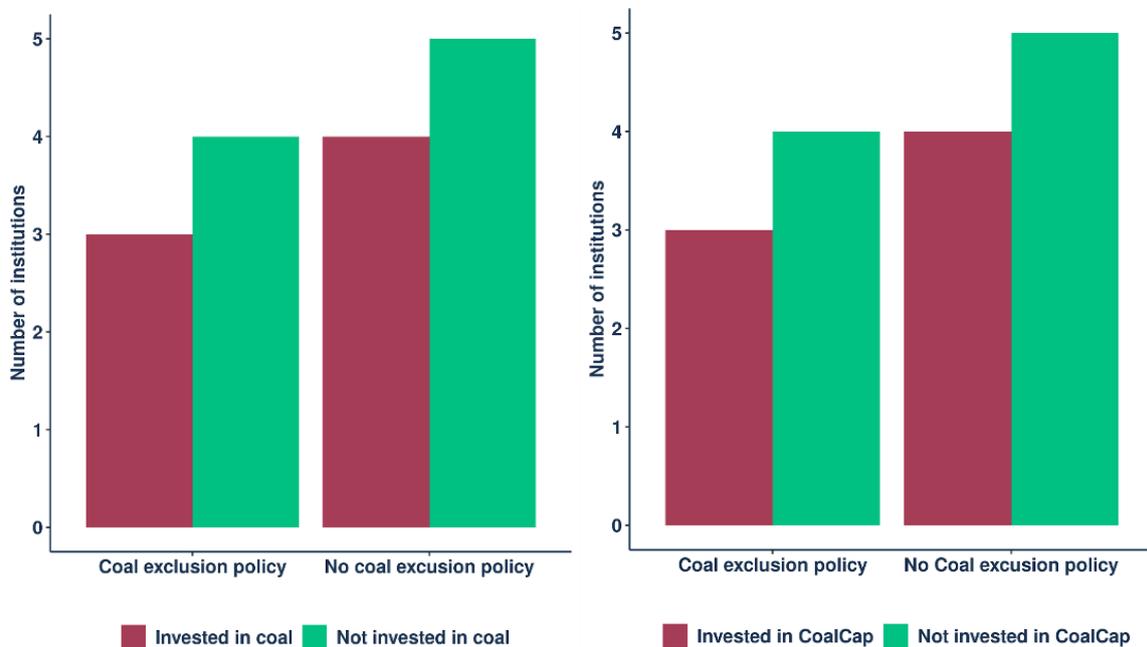


Figure 39: Number of financial institutions invested in coal mining and coal power according to the exclusion policy adopted

¹⁷ It is also possible that financial institutions reported funds allocation as direct investments, and in this case this analysis cannot classify what is invested directly or indirectly.

	Coal exclusion policy	No coal exclusion policy
Average production	4.212 tons (standard deviation: 5.981 tons)	1.023 tons (standard deviation: 1.922 tons)
Average number of companies invested, having coal mining assets	44.1 (standard deviation: 82.3)	18.9 (standard deviation: 24.5)

Table 7: General statistics of coal mining production associated with portfolios according to exclusion policy adopted

	Coal exclusion policy	No coal exclusion policy
Average production	2.61 MW (standard deviation: 4.13 MW)	0.239 MW (standard deviation: 0.466 MW)
Average number of companies invested, having coal power assets	404 (standard deviation: 747)	189 (standard deviation: 263)

Table 8: General statistics of coal power capacity production associated with portfolios according to exclusion policy adopted

Interestingly, respondents that reported having fossil fuel exclusion policy in place have higher associated production in oil & gas extraction and coal mining, as well as power capacity from oil, gas, and coal than other policies. In regard to the power sector, those financial institutions with fossil exclusion policy are also the ones with higher production associated in green technologies. The charts below show the weighted capacity production associated to subsets of the sample according to the climate strategy adopted.

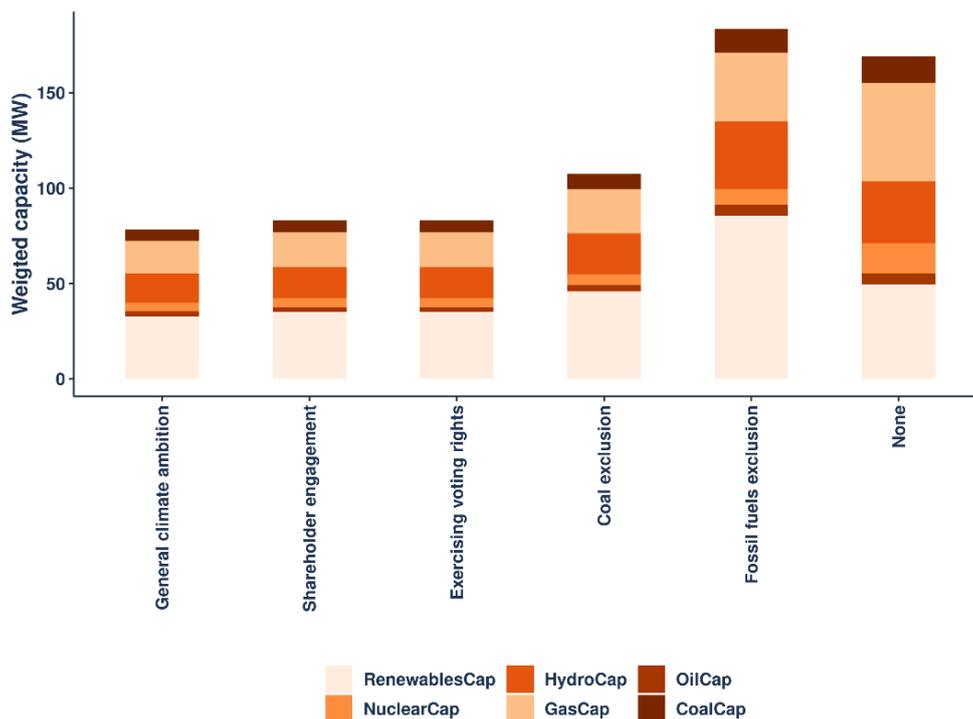


Figure 40: Weighted power capacity associated with portfolios according to the different climate strategies adopted

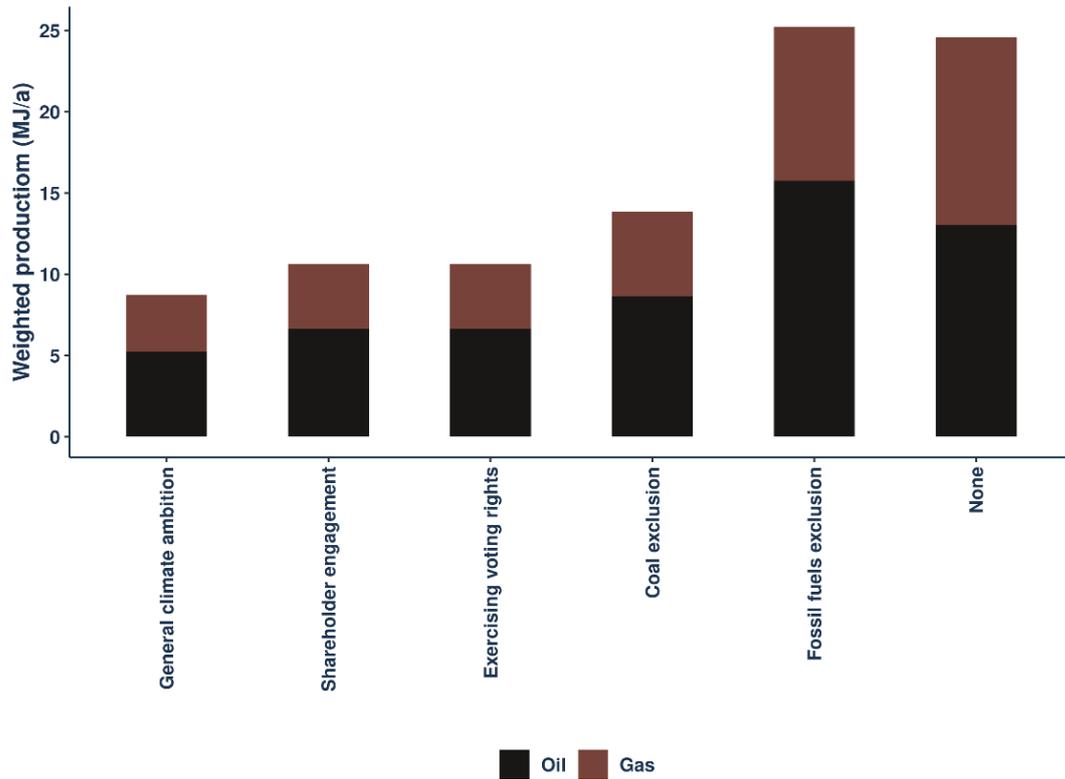


Figure 41: Weighted oil & gas production associated with portfolios according to the different climate strategies adopted

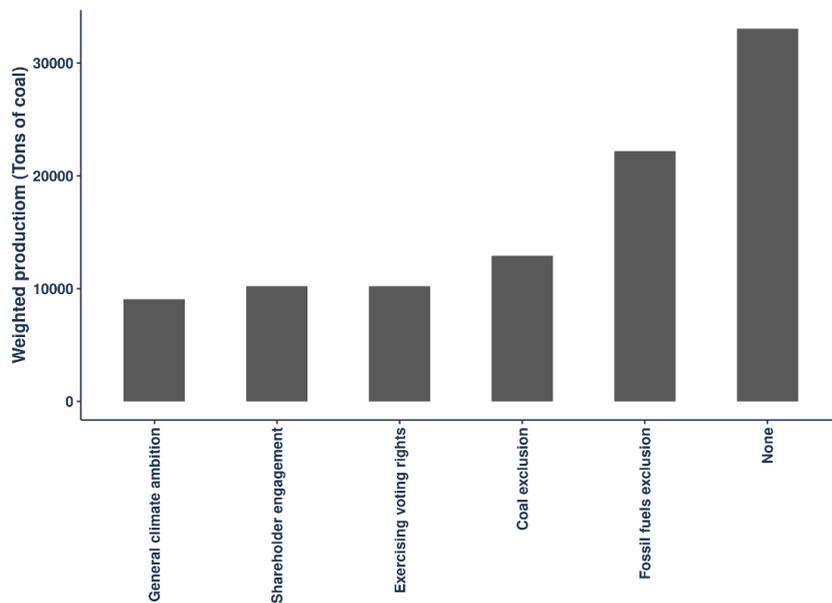


Figure 42: Weighted coal production associated with portfolios according to the different climate strategies adopted

Institutions with overlapping strategies are also the ones associated with higher production of oil & gas in their portfolios. The financial institutions applying four or five climate strategies in their portfolios have a higher exposure in the oil and gas technologies than the ones applying three or less strategies. The same results also apply to other sectors such as automotive, coal, and power – as it can be seen in the charts in Annex II. In

fact, in the power sector, institution applying one or two strategies have higher exposure to renewables and hydropower than those apply four or five strategies.

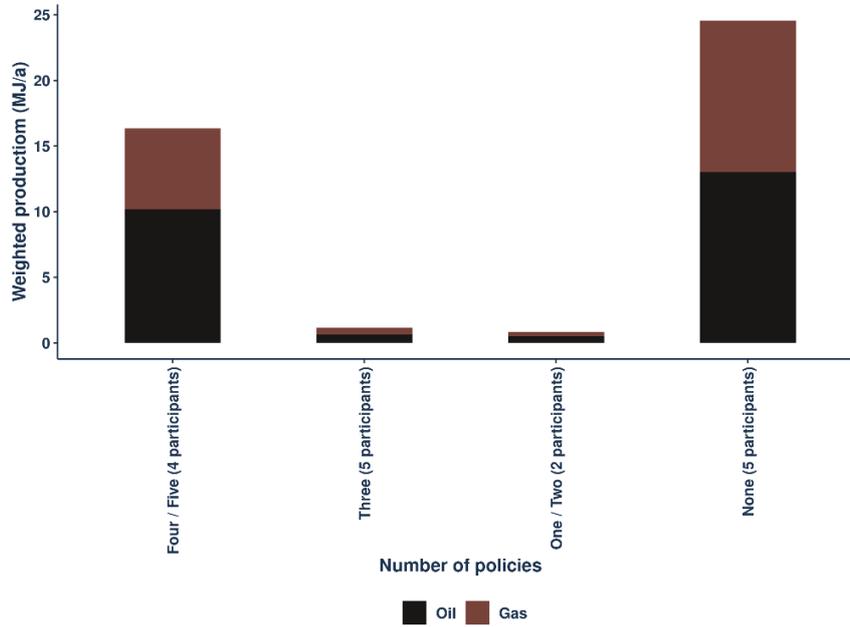


Figure 43: Weighted oil & gas production associated with portfolios according to cluster strategies adopted

Further analysis on the relationship between the qualitative survey and PACTA results can be found in Annex II.

Conclusions

The PACTA COP Norway project offers an initial analysis of the climate compatibility of investments by Norwegian financial institutions in listed equities and corporate bonds. It thus represents an important reference in the further alignment of the financial sector to the climate goals of the Paris Agreement. This study counted with 41 Norwegian financial institutions and covers NOK 1.880,6 bn (USD 220,5 bn) in assets, which represents 70% to 90% of the assets under management of the peer groups analyzed. Due to the higher coverage of assets assessed in the pension funds and asset managers sectors, the results for these sectors can be interpreted as a meaningful assessment of the overall orientation. The coverage for the insurance sector is also high when considering only the non-life insurance total assets management, however, it is unclear if the submitted portfolios relate only to non-life insurance investments. Therefore, the results for this peer group should be considered more as an initial assessment. The qualitative survey was submitted by 20 participants and should also be considered as an initial overview of the existing climate strategies in the Norwegian financial sector.

Listed equities and corporate bonds portfolios of participants have 6%-11% of total assets exposed to the called PACTA sectors¹⁸, which is slightly lower than the numbers found in Switzerland, Liechtenstein, and Austria. However, lower exposure to climate relevant sectors is not necessarily good for the transition for a low-carbon intensive economy as new green technologies needs investments to scale-up. In fact, this report showed that participant financial institutions investments allocation outside the PACTA sectors, are heavily relying to technology firms, financial services, and consumer goods – which have limited direct contribution a transitioning economy.

The sectorial results found for the Norwegian financial institutions are mixed. For instance, while invested companies in the oil sector do not meet the sustainable development scenario, investments allocated in gas production are set to decrease considerably in the next 5-years, in line with the sustainable development scenario and better than global market projections. In the power sector, institutions have a higher share of their investments in the sector allocated to low-carbon technologies (hydropower and renewables) when compared with the global market and other countries like Switzerland, Liechtenstein, and Austria. Nonetheless, not all portfolios are aligned with Paris Agreement. In the vehicle production sector, where Norway has large incentive policies in place for electric car purchases, but policies didn't reach the financial sector allocation as the higher portion of financial institutions investments in the sector still go to internal combustion engine vehicles. Investments in the automotive sector are also not fully set to meet the Beyond 2° Scenario.

When scaling up the ambition, investments in coal power capacity are on a good pathway to reach the 1.5°C climate goal. However, production pathways for the 5 years in coal mining, renewables, electric vehicles and vehicles based on internal engine combustion are misaligned with the targets set on a technology level by the Joint Research Centre to achieve 1.5°C climate goal. In principle, PACTA methodology is scenario agnostic, meaning that the same analysis can be done with different scenarios providers since it attends the models needs. The main scenario used in this analysis were provided by the International Energy Agency (IEA), but some analyses were also provided with the 1.5°C POLES model, designed by the Joint Research Centre. In renewables technologies, for example, investments allocations by Norwegian financial institutions are set to meet a Sustainable Development Scenario and even a Beyond 2° Scenario (designed by IEA) when considering aggregated portfolios (without distinction of peer groups) – but more efforts still needed to reach the 1.5°C (designed by JRC). In all the other studied technologies, results are very similar between scenarios. As a note, the PACTA team is currently working on expanding the scenarios

¹⁸ Oil and gas production, coal mining, power generation, automotive manufacturing, aviation, and industry (steel and cement).

available for country assessments, like this one. Future country assessment will count with a deeper overview of alignment according to different scenario providers.

While it is true that Norwegian financial institutions still have not fully aligned their investments to Paris Agreement temperature goals, we can also see that many are heading north in the right direction. For instance, exposure to coal mining is almost zero, and compared to the global market, Norwegian financial institutions are better positioned in green technologies. Nonetheless, when it comes to climate change, the pace of change of investee companies is not fast enough to reach a sustainable future: great attention should be given to oil extraction and internal combustion engine vehicles production

Portfolios classified as ESG perform better on average in all examined metrics: notably, in listed equities portfolios they have lower exposure to fossil energy generation and the share of financed electricity capacity from renewable energies is higher. The results difference is however less notable in corporate bonds fossil fuel exposure and electricity capacity from coal power. A lower proportion of the portfolio value classified as ESG is invested in the seven climate-relevant sectors analyzed. However, as highlighted above having a lower proportion of value invested in climate-relevant sector is not necessarily positive from a climate perspective as the transition to a low carbon economy requires high volumes of investments to decarbonize high-carbon sectors.

The results from the qualitative survey shows that a little less than a half of the respondents have climate strategies in listed equities, corporate bonds and real estate portfolios. 45% of the participants reported to have a climate related strategy in the investments in at least one asset type. The climate strategies most frequently employed by participants include engagement as well as coal exclusion policies and exercising voting rights. However, some of the institutions that reported having a coal exclusion policy in place still hold investments in coal assets – which suggests that a deeper due-diligence analysis needs to be held in portfolio allocation in order to truly comply to the goals set.

While metrics to measure the climate alignment of financial institutions have now become more widespread, we are still at the beginning of understanding real world impact of the climate actions taken by financial institutions. Alignment as a concept is critical at system level and responds to the political objectives of the Paris Agreement. However, supporting private sector actions, target-setting, and effective implementation driving real world change, requires looking beyond alignment and moving towards measuring the impact of different strategies on real world emission reductions. Further work is needed in supporting the private sector in designing effective climate actions and setting impact-oriented targets. Research is also needed on bridging methodological gaps for certain sectors (e.g., agriculture) and for to be developed climate solutions (e.g., R&D), as well as making potential links to other sustainability issues. Nevertheless, hopefully the road taken here gets us a little closer to a north.

In this context, international harmonization and standardization also play a role. To date, PACTA has been used by over 1,700 organizations. PACTA can be used to set science-based climate goals and is currently used by several investors and banks under the Net Zero Asset Owner Alliance (AOA), the Principles for Responsible Banking Collective Commitment on Climate Action (CCLA), and the Net Zero Banking Alliance. PACTA also supports the Climate Action CA100+ initiative and is used by a number of governments and financial regulators around the world. The use of the PACTA tool also ensures compliance with certain recommendations of the Task Force on Climate-related Financial Disclosures (TCFD).

Together, an improvement in the existing metrics, a deeper understanding of the climate impact of investment decisions, regular participation in coordinated international initiatives and the implementation of policies to directed to the Norwegian financial sector can all contribute to closing the gap between the goals of the Paris Agreement and those of Norwegian portfolios managed by financial institutions.

The PACTA Methodology

Coverage

The analysis covers listed equity, corporate bonds, and includes climate-relevant sectors that are key to the transition to a low carbon economy. These include the power, automotive, oil and gas, coal mining, aviation, cement, and steel sectors, which together account for approximately 70-80% of the CO2 emissions associated with a typical portfolio as well as 15-25% of a typical portfolio in terms of asset value. The real estate, agriculture, and forestry sectors, despite being highly relevant in terms of climate, are not covered on a global level due to a lack of available data and may be covered by other tools. R&D investments are also not covered.

Data Inputs

Portfolio Data. To run the portfolio assessment, participants provide an input file containing security information for each of the portfolios to be analyzed. It includes the following information:

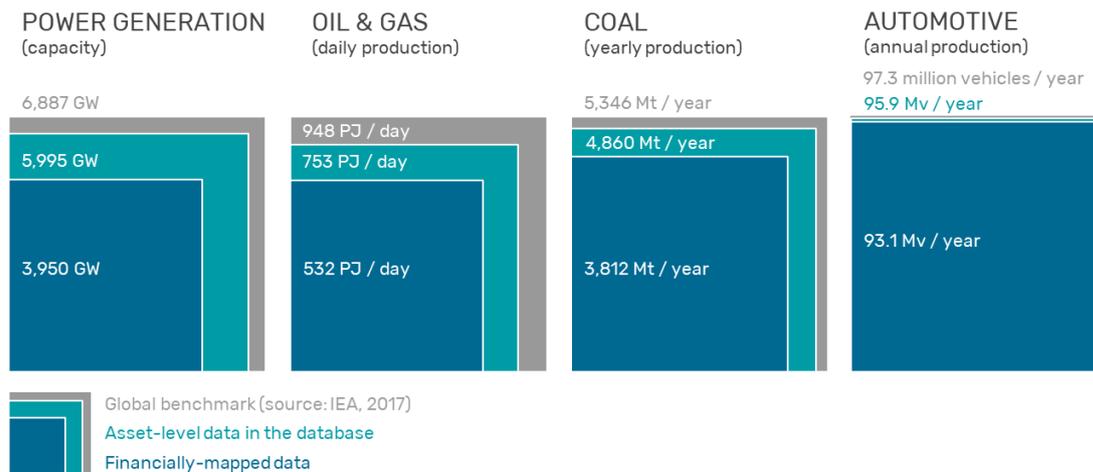
- i. One ISIN for every listed instrument (funds are identified by their ISIN. Securities in each fund are included in the analysis)
- ii. The market value of the financial assets held in the portfolio
- iii. The currency code corresponding to the market value
- iv. A time stamp of the portfolio

Financial Data. Financial data from Bloomberg is used to assign securities to sectors and to link them to parent and subsidiary companies, as well as for sector classification analysis. This data is supplied by 2° Investing Initiative.

Physical Asset-Based Company Data. The PACTA model is based on physical asset-based company data across key climate-relevant sectors. Any data source formatted as required by the PACTA code can be used. On Transition Monitor and as part of the PACTA tool, 2DII sources the data from Asset Resolution. Asset Resolution links financial portfolios with the real economy and provide 2DII with asset-based indicators linked to companies and securities.

Asset Resolution works with specialized sectoral data providers to source data on individual assets in climate-relevant industries. These specialized data providers use a variety of research capabilities, including web scraping, desk research, and direct engagement with industry to map physical assets. Forward-looking information is based on company investment and production plans that have been announced publicly.

These asset-based company datasets cover over than 280,000 individual assets (e.g. individual power plants, oil fields, etc.), accounting for around 70-80% of global carbon emissions. The following charts show the coverage of asset-level data relative to estimated global production figures—the global benchmark—for the power, oil & gas, coal, and automotive sectors. They also highlight the share of assets that have been mapped to financial data and are thus included in the analysis.



Only the assets that have been mapped to financial data are included in the analysis (the blue box in the charts above). This is because financial identifiers are required to link the asset-based company production data to the portfolios provided by the participants.

The gap between the asset-based company data coverage and the global production figures can be explained by non-corporate asset ownership, time lags in reporting, and errors in datasets. The discrepancy between the asset-based company data and the financially mapped production figures exists because not all companies listed in the asset-company data have been matched with financial instruments in the financial data. Asset Resolution is continuously working to expand its matching capabilities, including with a text-string matching software and manual matching.

Provided that assets have been matched with financial data, Asset Resolution allocates production to companies, and further to financial instruments, based on direct ownership of assets and based on majority ownership of subsidiary companies that own assets. The result is a forward-looking production profile for each financial instrument that serves as starting point and basis of comparison for climate scenario analysis.

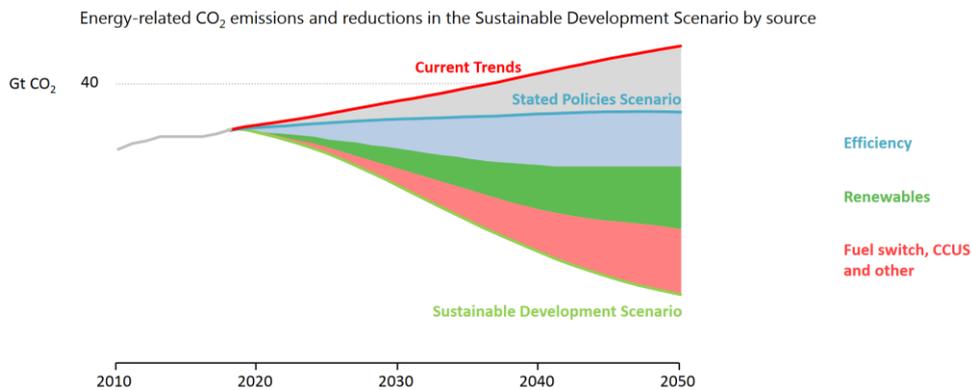
Scenario Data. This analysis is based on the five climate scenarios developed by the IEA and JRC shown in the table below.

Scenario	Abbreviation	Estimated temperature increase	Source	Sectors Covered
POLES 1.5°C scenario	POLES1.5	~ 1.5°C	JRC	Power, automotive, oil & gas and coal
POLES 2°C scenario	POLES2	~ 2°C	JRC	Power, automotive, oil & gas and coal
POLES Reference Scenario	POLESref	2.9 - 3.8°C	JRC	Power, automotive, oil & gas and coal
Beyond 2° Scenario	B2DS	< 1.75°C	ETP 2017	Power, automotive, oil & gas, coal, cement, steel, and aviation
Sustainable Development Scenario	SDS	< 1.65°C	WEO 2019	Power, automotive, oil & gas and coal
New Policies Scenario	NPS	1.65 - 2.7°C	WEO 2019	Power, automotive, oil & gas and coal
Current Policy Scenario	CPS	> 3.2°C	WEO 2019	Power, automotive, oil & gas and coal

These scenarios were selected for their high degree of granularity, extensive geographic and sectoral coverage, as well as for the compatibility of their indicators with the needs of 2DII's analysis. In particular, the model uses the following indicators as basis for comparison to the portfolio:

- a. Power capacity by technology in megawatt (MW).
- b. Oil production in barrels per year.
- c. Gas production in billions of cubic feet per year.
- d. Coal production in tons of coal equivalent per year.
- e. GHG emissions pathways in the aviation, shipping, cement, and steel sectors.

The figure below illustrates the distinction between IEA’s “Current Policies”, “New Policies Scenario” and the “Sustainable Development Scenario” in terms of CO2 emissions reduction until 2050.



Allocate economic assets to financial portfolios

Based on the share of total equity or debt held in a portfolio, a portion of each company's current production plans is allocated to the portfolio by sector and technology. The portfolio's current technology exposure (production profile) can then be identified by aggregating the allocated assets of all companies in the portfolio.

Listed Equities: Ownership Approach. For listed equities, production plans are allocated to the portfolio by using the ownership approach. This approach calculates the technology exposure based on the portfolios ownership in companies. The technology exposure is presented in absolute values (e.g. oil production in barrels of oils per day).

Subsidiary’s production figures are allocated to their parent companies using the “equity ownership approach”: if Group α is the parent of Company A, it gets attributed its production multiplied by the ratio of Group α's owned shares to Company A's total outstanding shares (or 1, if Company A has no shares). If Company A is a joint venture then this is done for each entity.

For the power sector, ownership of physical assets is attributed to a subsidiary based on their respective equity stake in each physical plant. This ownership is then aggregated to the parent of the subsidiary as identified by the data provider, depending on if the subsidiary is private or publicly listed. For private subsidiaries, 100% of assets ownership attributed to the subsidiary is roll up to the parent company. For publicly listed subsidiaries, the ownership of physical assets is allocated over both the floating and non-floating portion of the company’s total equity. The non-floating portion of the equity is attributed to the parent company, and the floating portion to the respective stock exchange.

For the Automotive sector, the production values are aggregated to brand of automotive producer, as well as up to the ultimate global brand owner. In the case of joint ventures, which are most prevalent in the Chinese market, the production from these manufactures is distributed to the joint venture’s owners by their respective equity share. This data for joint venture equity share is obtained through Bureau van Dijk’s database, Orbis.

Corporate Bonds: Portfolio Weight Approach. For corporate bonds, production plans are allocated to the portfolio by using the portfolio weight approach. This approach calculates the portfolios technology exposures based on the weighting of each position within the portfolio. The technology exposure is presented in weighted

technology share (i.e. percentage values). The weighting of the technology share is done by the weight of the company in the portfolio.

It is the approach chosen in the ESG ratings of both MSCI and Morningstar/Sustainalytics, as well as the climate ratings of ISS-Ethix / CDP. This approach is generally used to weight normalized or scored indicators rather than allocating absolute climate units, as it represents the relative weight of different scores or intensities in the portfolio.

The portfolio weight approach is more intuitive for credit portfolios, since it can be said to represent the capital allocation decision of the relationship manager behind the portfolio. In other words, the portfolio value of a credit instrument, as measured in book value, can be said to represent the capital allocation of the portfolio manager.

Metric types

Exposure Metrics. PACTA assesses the financial portfolio's exposure to high- and low-carbon technologies across climate-relevant sectors. This assessment can be used to approximate the portfolio's relative exposure to the economic activities that are impacted by the transition to a low-carbon economy.

To do so, PACTA gathers forward-looking, geography-specific asset-level business intelligence data from various sources and matches them with security / financial data. It bypasses wherever possible backward-looking, corporate reporting, although such reporting can be used for validating forward-looking parameters. These exposure metrics are therefore not only at the sector level but also show the results at technology granularity (ie coal or renewable power capacity).

Alignment Metrics. By comparing the investment plans of companies to the trajectories outlined in climate scenarios, measures of alignment with these scenarios can also be calculated.

Power, Fossil Fuels and Automotive: To assess the level of climate alignment, 5-year production trajectories of each sector are compared to the decarbonization pathways as defined in climate scenarios. This assessment is made for power, fossil fuels and automotive sectors, for which forward-looking technology road maps are available. Current production plans are compared to climate scenarios.

Aviation, Cement, Steel: No technology road maps exist for aviation, shipping, cement and steel sectors. For these sectors, an analysis of the required changes in emissions intensity is conducted using Sectoral Decarbonization Approach (SDA).

Further Qualitative Survey Analysis

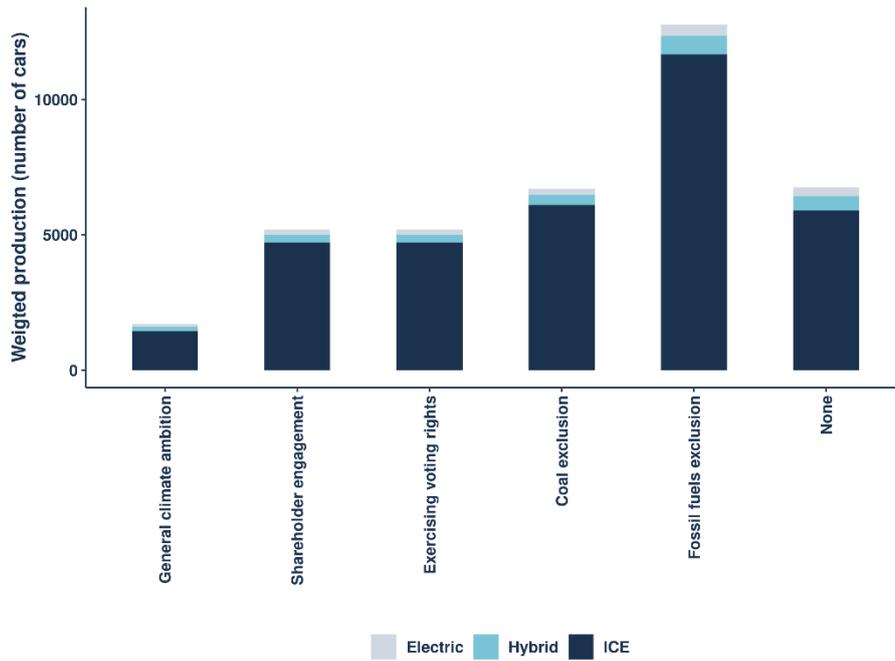


Figure 44: Weighted automotive production associated with portfolios according to the different climate strategies adopted

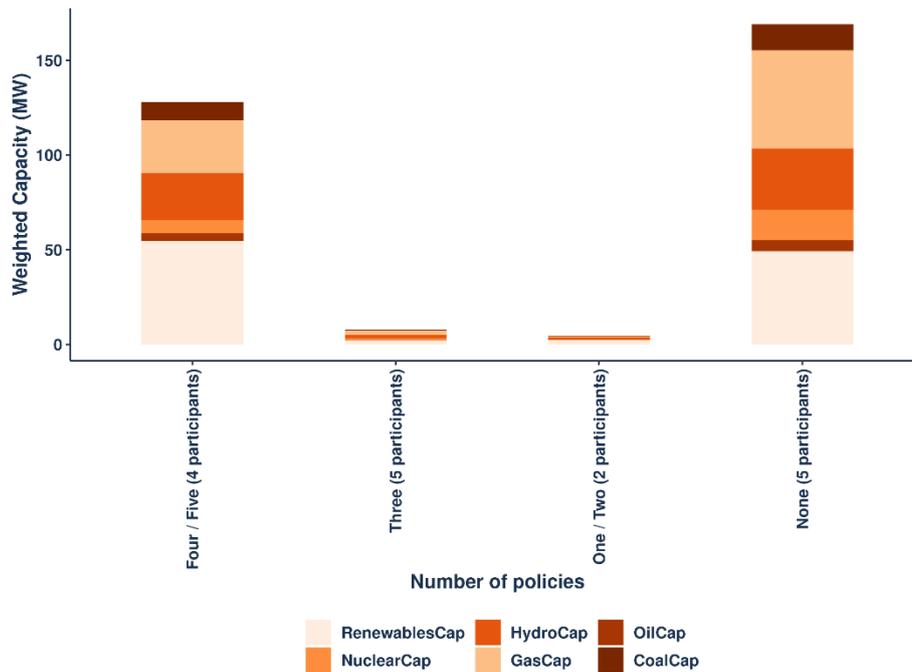


Figure 45: Weighted power capacity production associated with portfolios according to cluster strategies adopted

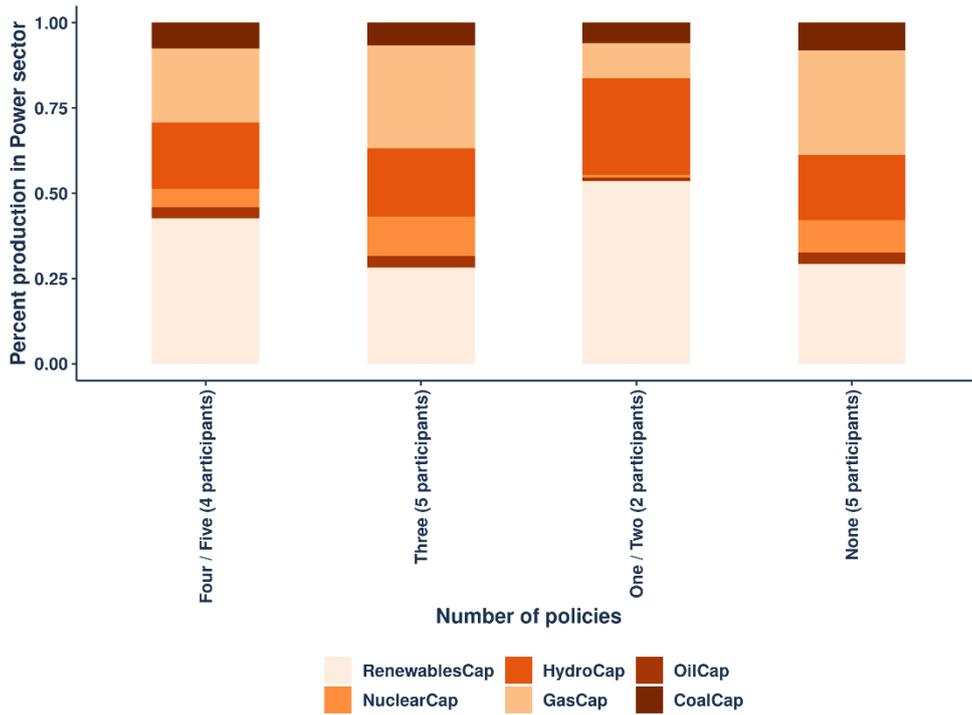


Figure 46: Weighted power capacity production associated with portfolios according to cluster strategies adopted in percent terms of total allocation in the sector

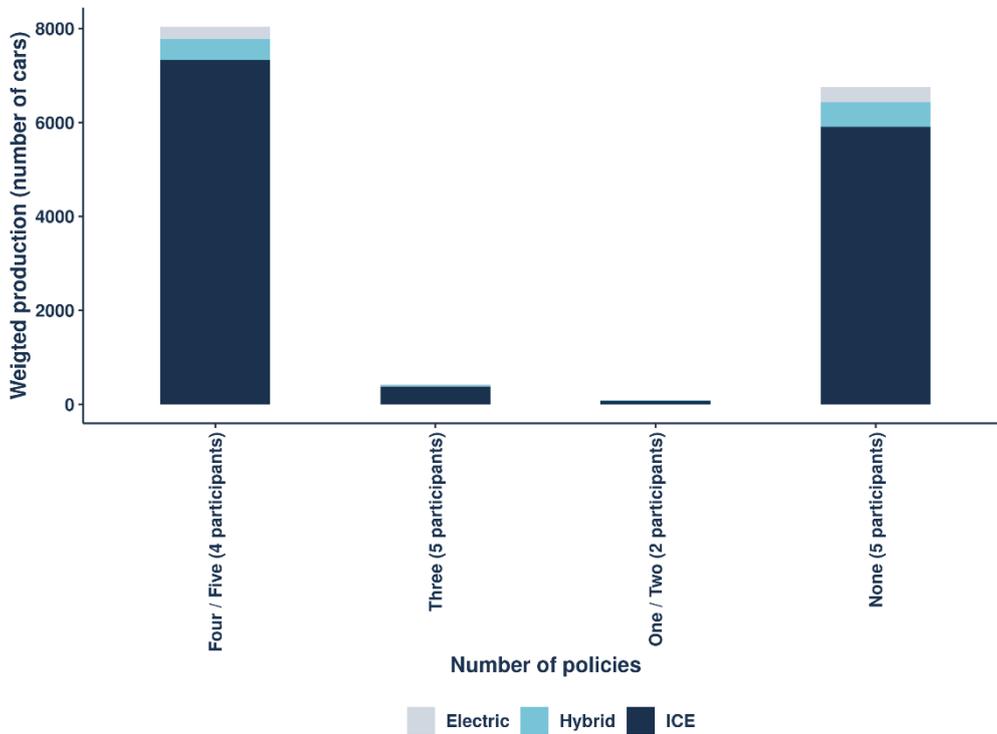


Figure 47: Weighted automotive production associated with portfolios according to cluster strategies adopted

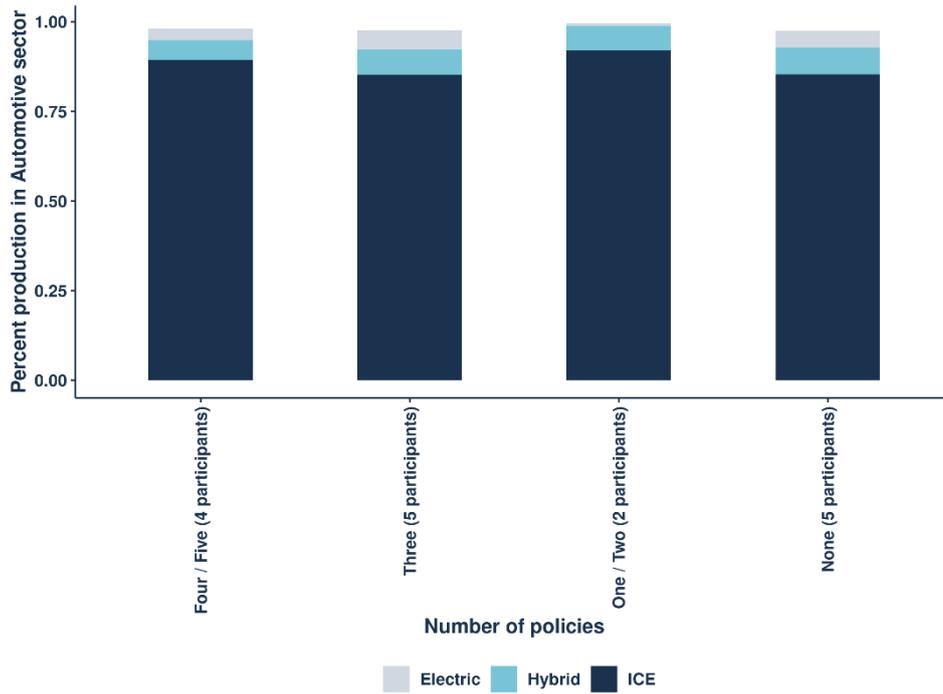


Figure 48: Weighted automotive production associated with portfolios according to cluster strategies adopted in percent terms of total allocation in the sector

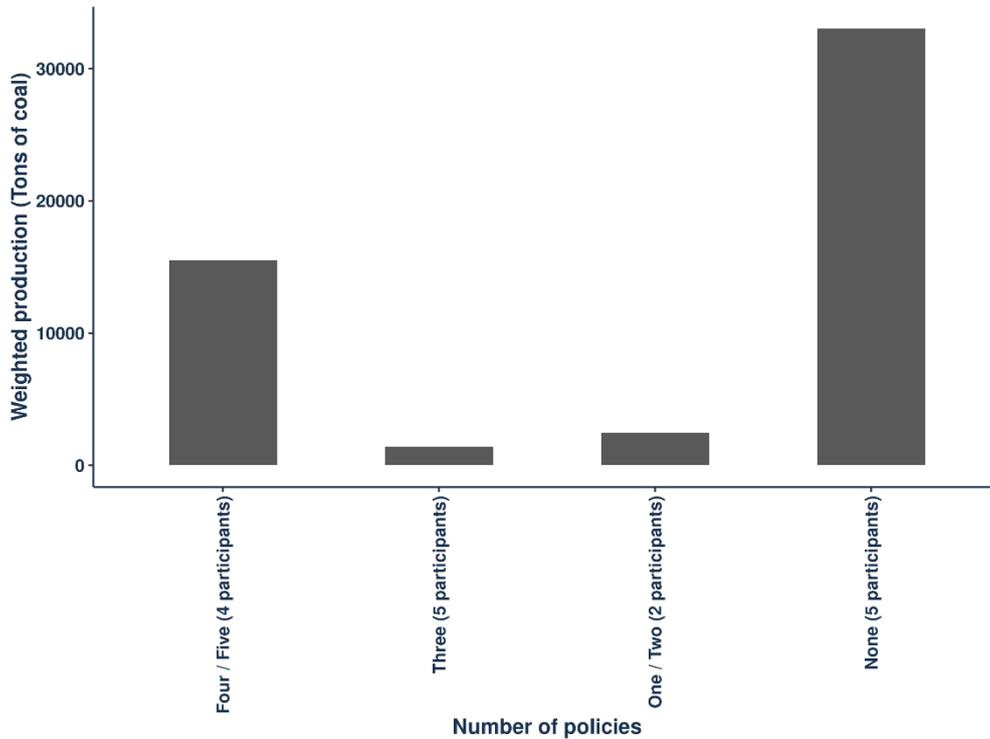


Figure 49: Weighted coal production associated with portfolios according to cluster strategies adopted

	Four - Five	Three	One - Two	None
Oil (WEO 2019)	2 – 2.7°C	2 – 2.7°C	2.7 – 3.2°C	2 – 2.7°C
Coal (WEO 2019)	> 3.2°C	> 3.2°C	2 – 2.7°C	2.7 – 3.2°C
Coal Power Capacity (WEO 2019)	<1.5 - 2°C	<1.5 - 2°C	<1.5 - 2°C	<1.5 - 2°C
Renewables Power Capacity (WEO 2019)	<1.5 - 2°C	2.7 – 3.2°C	2 – 2.7°C	2 – 2.7°C



Electric (ETP 2017)	1.75 - 2°C	1.75 - 2°C	2.7 – 3.2°C	1.75 - 2°C
ICE (ETP2017)	> 2.7°C	> 2.7°C	> 2.7°C	> 2.7°C



Table 9: Alignment of selected technologies in listed equities portfolios by cluster of strategies adopted (these results are a summary of the alignment of 16 participants who replied to the qualitative survey and could be linked to a given equity portfolio)

	General ambition	Engagement	Voting	None
Oil (WEO 2019)	2 – 2.7°C	2 – 2.7°C	2 – 2.7°C	2 – 2.7°C
Coal (WEO 2019)	> 2.7°C	> 2.7°C	> 2.7°C	2.7 – 3.2°C
Coal Power Capacity (WEO 2019)	<1.5 - 2°C	<1.5 - 2°C	<1.5 - 2°C	<1.5 - 2°C
Renewables Power Capacity (WEO 2019)	<1.5 - 2°C	<1.5 - 2°C	<1.5 - 2°C	2 – 2.7°C



Electric (ETP 2017)	1.75 - 2°C	1.75 - 2°C	1.75 - 2°C	1.75 - 2°C
ICE (ETP2017)	> 2.7°C	> 2.7°C	> 2.7°C	> 2.7°C



Table 10: Alignment of selected technologies in listed equities portfolios by climate strategies adopted (these results are a summary of the alignment of 16 participants who replied to the qualitative survey and could be linked to a given equity portfolio)

Regional exposure

The charts in this annex shows the production and location of physical assets allocated in different technologies identified in participant institutions' portfolios. Darker shades of blue indicate higher production volume in the highlighted country.

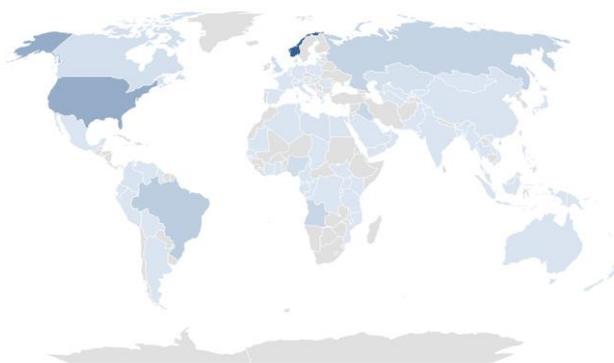
As explained in annex II, PACTA methodology allocates production from companies in the real economy to investment portfolios through different allocation methods. Therefore, through the methodology it is possible to assess where physical assets are located and how much production of these assets Norwegian portfolios are financing. This is an important analysis because financial institutions might as well not be aware of overseas production, they are financing (as it may come from indirect investments) and also brings carbon leakage issues to the attention of authorities.

The maps below are ordered by sector, technology, and asset class in climate relevant sectors. The source of all the charts is the authors of this report based on portfolio data reported by financial institutions.

Fossil Fuels

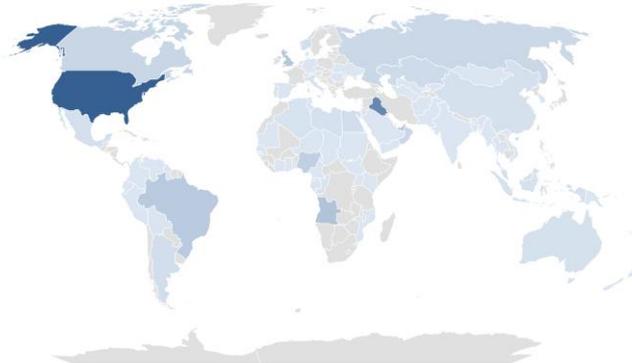
Regional exposure towards oil extraction
Listed Equities

Boe per day 0 7,803,145



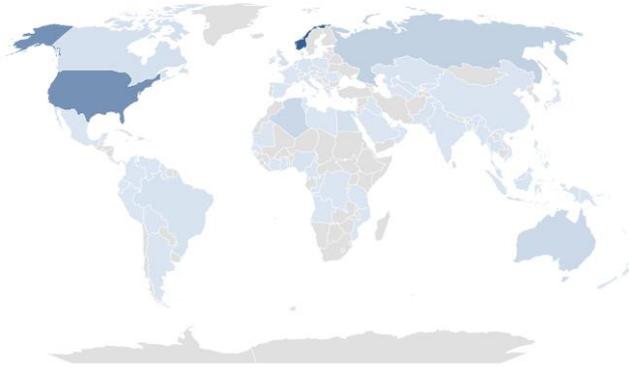
Regional exposure towards oil extraction
Corporate bonds

Boe per day 0 2,485,940



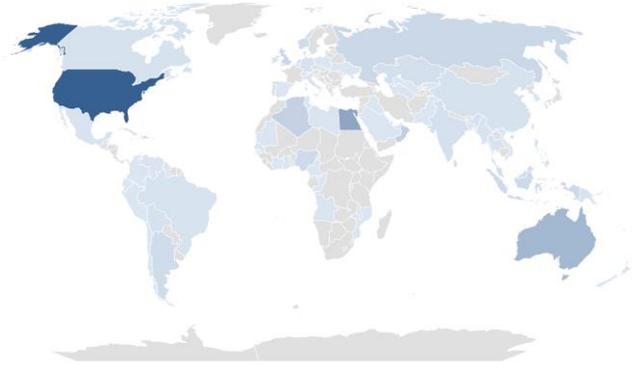
Regional exposure towards gas extraction Listed Equities

m3 per day
0 978,999,655



Regional exposure towards gas extraction Corporate bonds

m3 per day
0 368,094,012



Regional exposure towards coal extraction Listed Equities

tonnes of coal
0 2,128



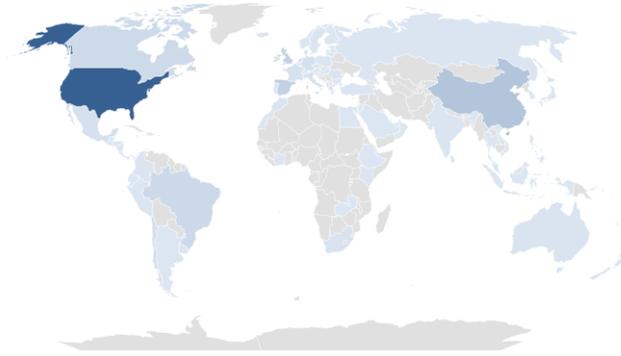
Regional exposure towards coal extraction Corporate bonds

tonnes of coal
0 7,363

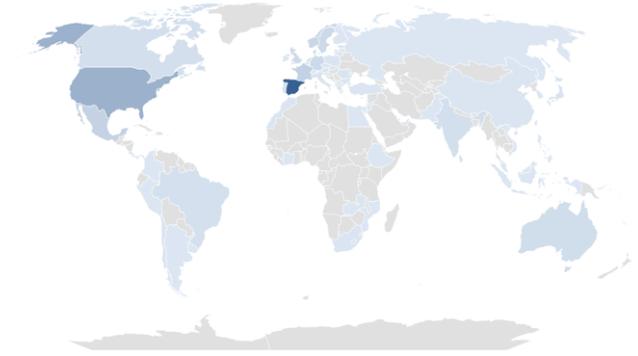


Power

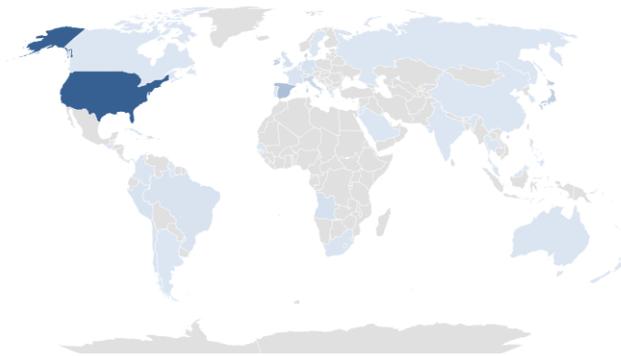
Regional exposure towards renewables power capacity
Listed equities



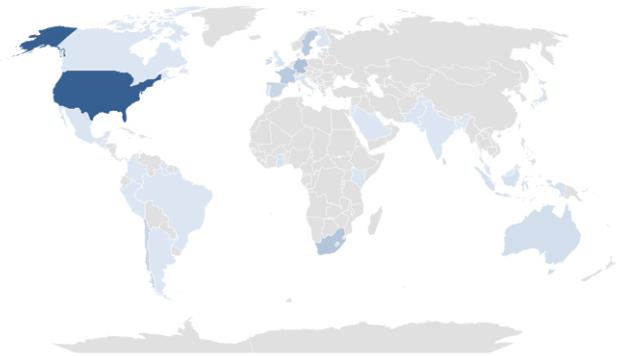
Regional exposure towards renewables power capacity
Corporate bonds



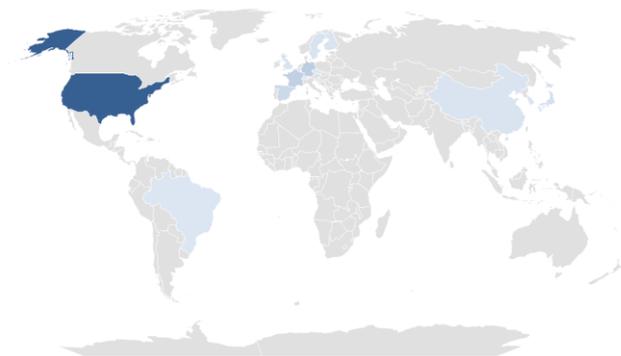
Regional exposure towards oil power capacity
Listed equities



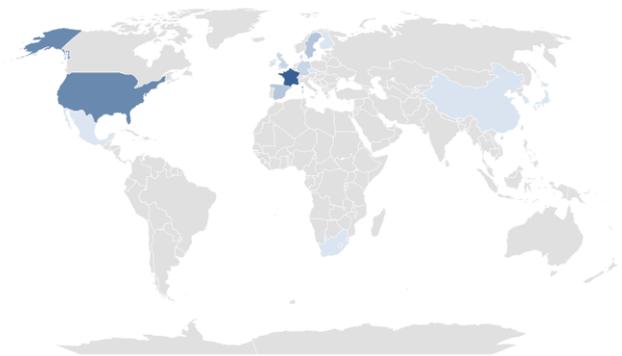
Regional exposure towards oil power capacity
Corporate bonds



Regional exposure towards nuclear power capacity
Listed equities

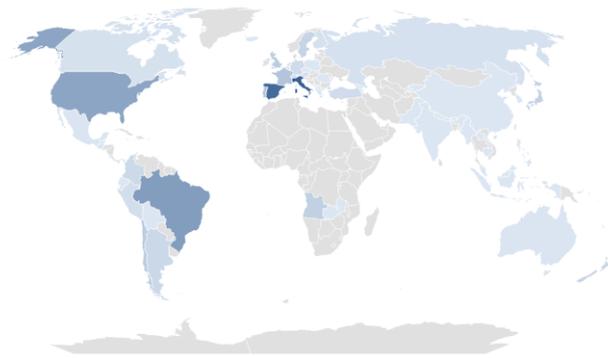


Regional exposure towards nuclear power capacity
Corporate bonds



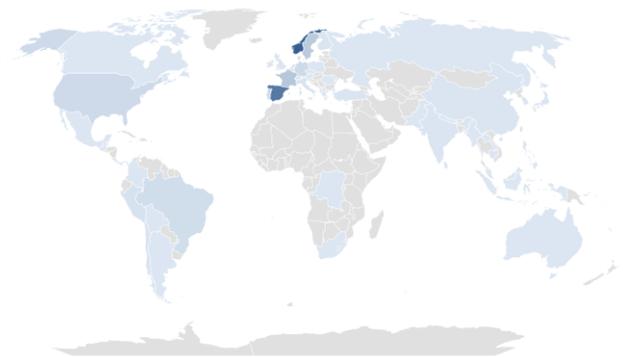
Regional exposure towards hydro power capacity
Listed equities

MW 0.0 25.5



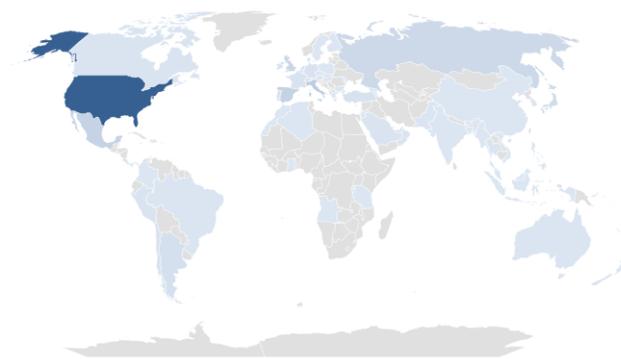
Regional exposure towards hydro power capacity
Corporate bonds

MW 0.0 56.8



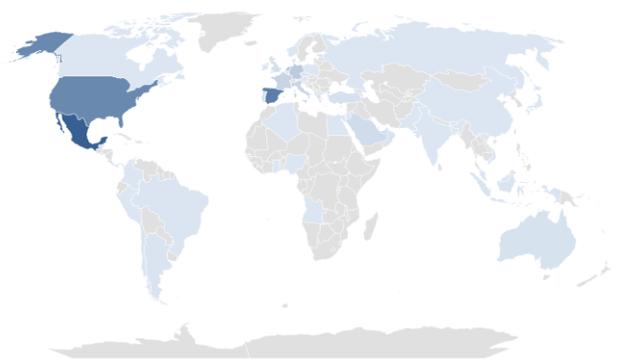
Regional exposure towards gas power capacity
Listed equities

MW 0.0 123.8



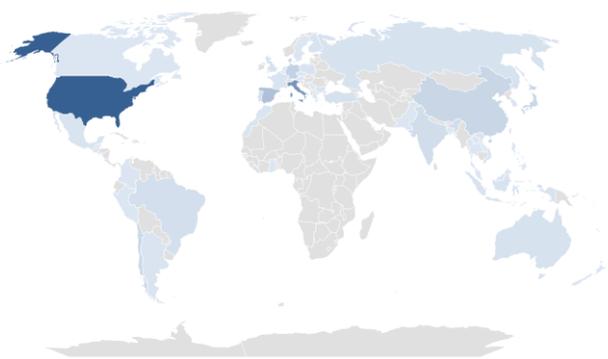
Regional exposure towards gas power capacity
Corporate bonds

MW 0.0 43.0



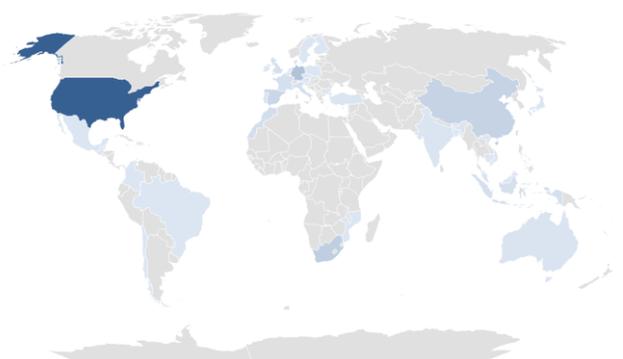
Regional exposure towards coal power capacity
Listed equities

MW 0.0 21.1



Regional exposure towards coal power capacity
Corporate bonds

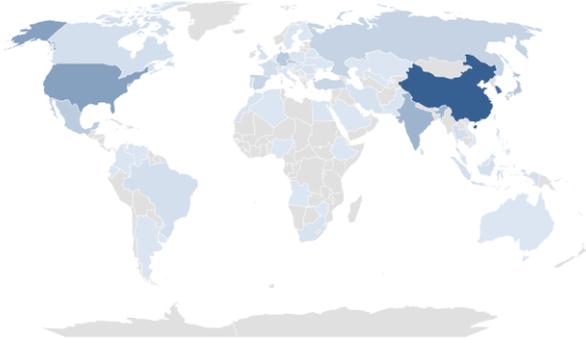
MW 0.0 15.4



Automotive

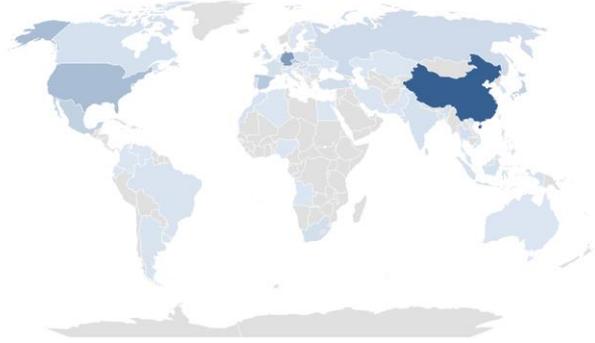
Regional exposure to internal combustion engine vehicles
Listed equities

vehicles units 0 15,960



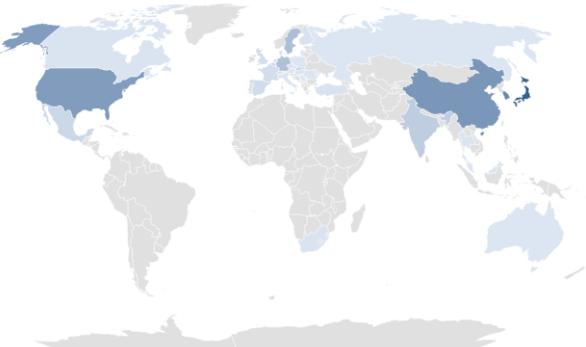
Regional exposure to internal combustion engine vehicles
Corporate bonds

vehicles units 0 12,993



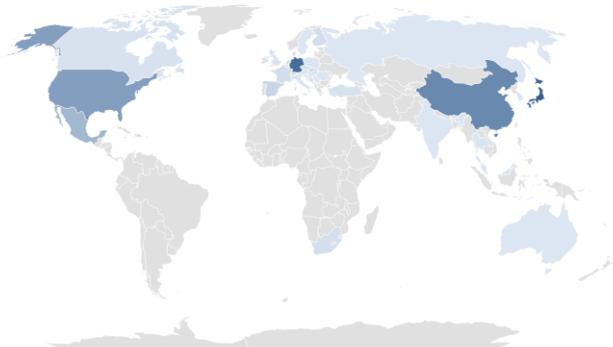
Regional exposure to hybrid vehicles
Listed equities

vehicles units 0 1,230



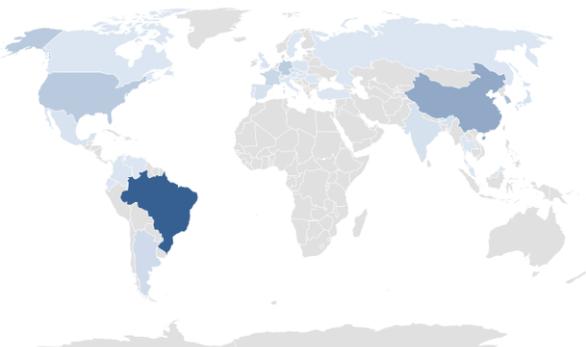
Regional exposure to hybrid vehicles
Corporate bonds

vehicles units 0 861



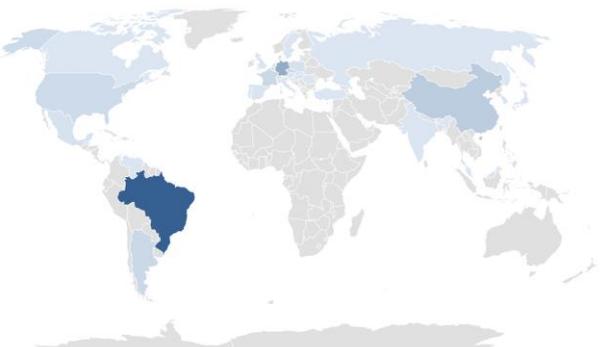
Regional exposure to electric vehicles
Listed equities

vehicles units 0 1,353



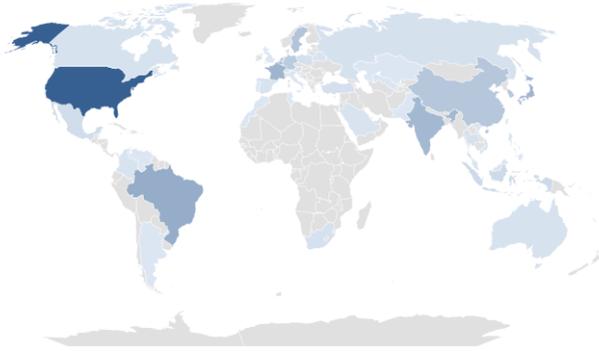
Regional exposure to electric vehicles
Corporate bonds

vehicles units 0 1,216



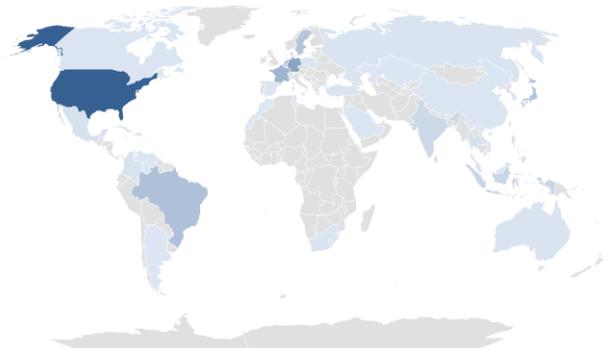
Regional exposure to HDV internal combustion engine
Listed equities

HDV units 0 377



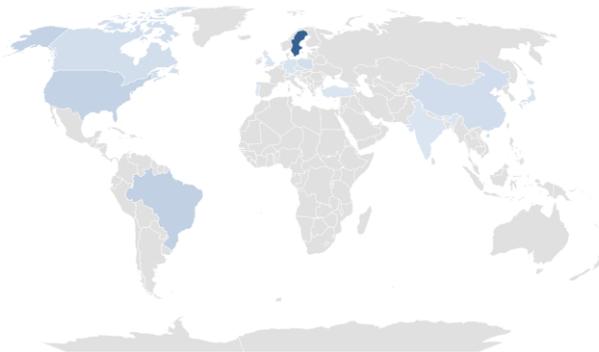
Regional exposure to HDV internal combustion engine
Corporate bonds

HDV units 0 216



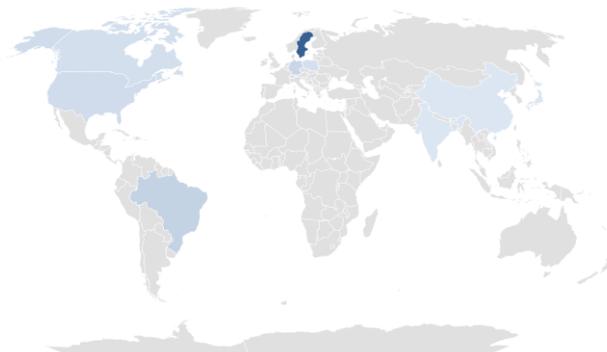
Regial exposure HDV hybrid
Listed equities

HDV units 0 6



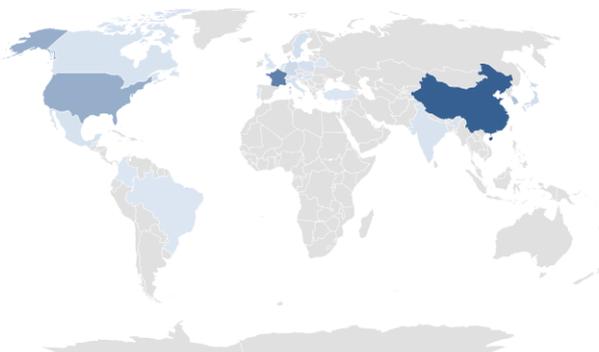
Regional exposure HDV hybrid
Corporate bonds

HDV units 0 2



Regional exposure to HDV electric
Listed equities

HDV units 0 5



Regional exposure to HDV electric
Corporate bonds

HDV Units 0 1

