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REPORT

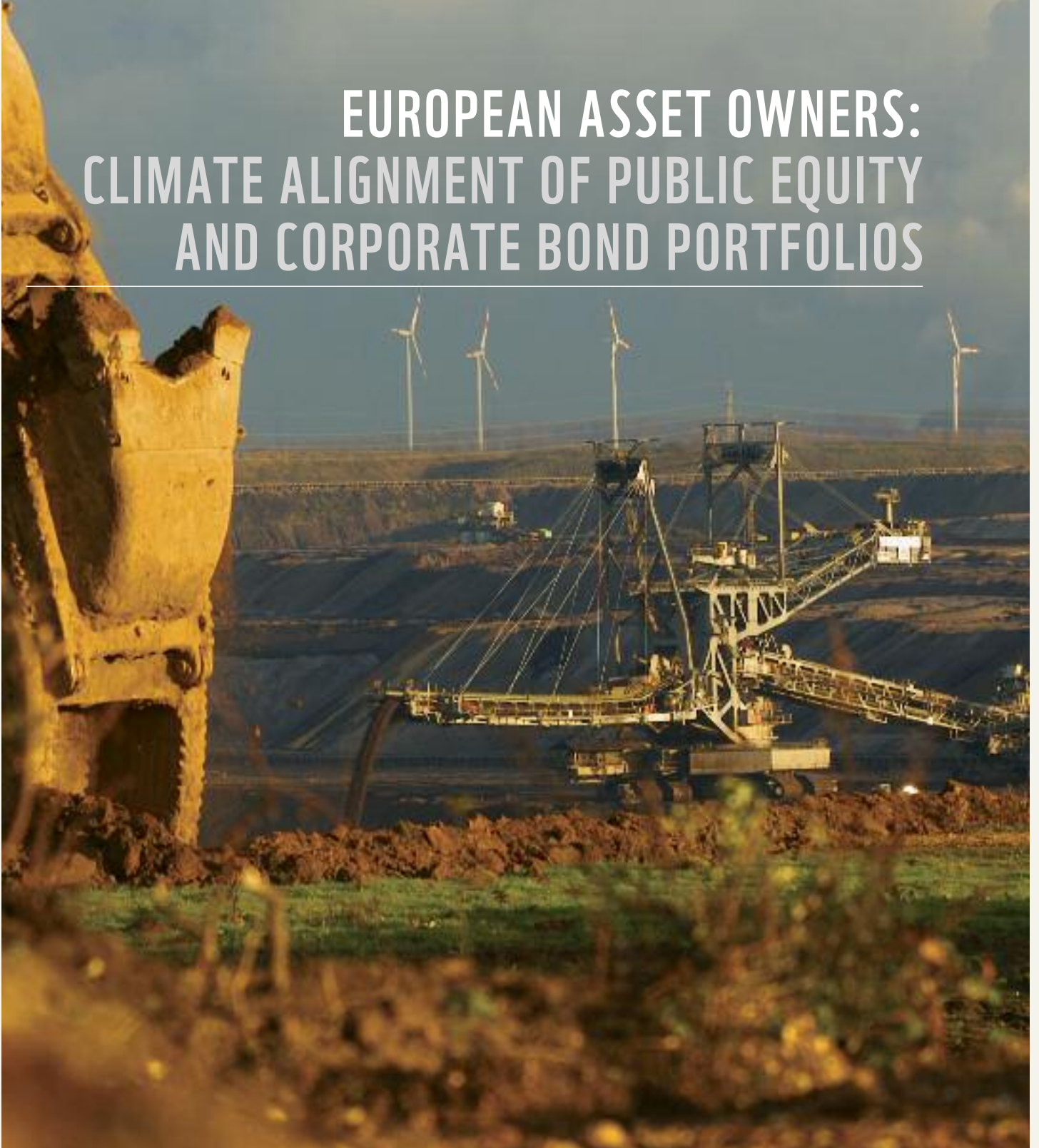
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2°C

EUROPEAN ASSET OWNERS: CLIMATE ALIGNMENT OF PUBLIC EQUITY AND CORPORATE BOND PORTFOLIOS



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2° Investing Initiative performed the climate alignment assessment presented in this report, based on holdings data provided by asset owners following engagement by WWF. It applied the Paris Agreement Climate Transition Assessment tool. The information and analysis is not intended as financial advice. The information and opinions constitute a judgment at the date indicated and are subject to change without notice. No representation or warranty, express or implied, is made by 2°ii as to their accuracy, completeness or correctness. 2°ii does not warrant that the information is up to date, nor does it take liability for errors in third-party sourced data.

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FOREWORD

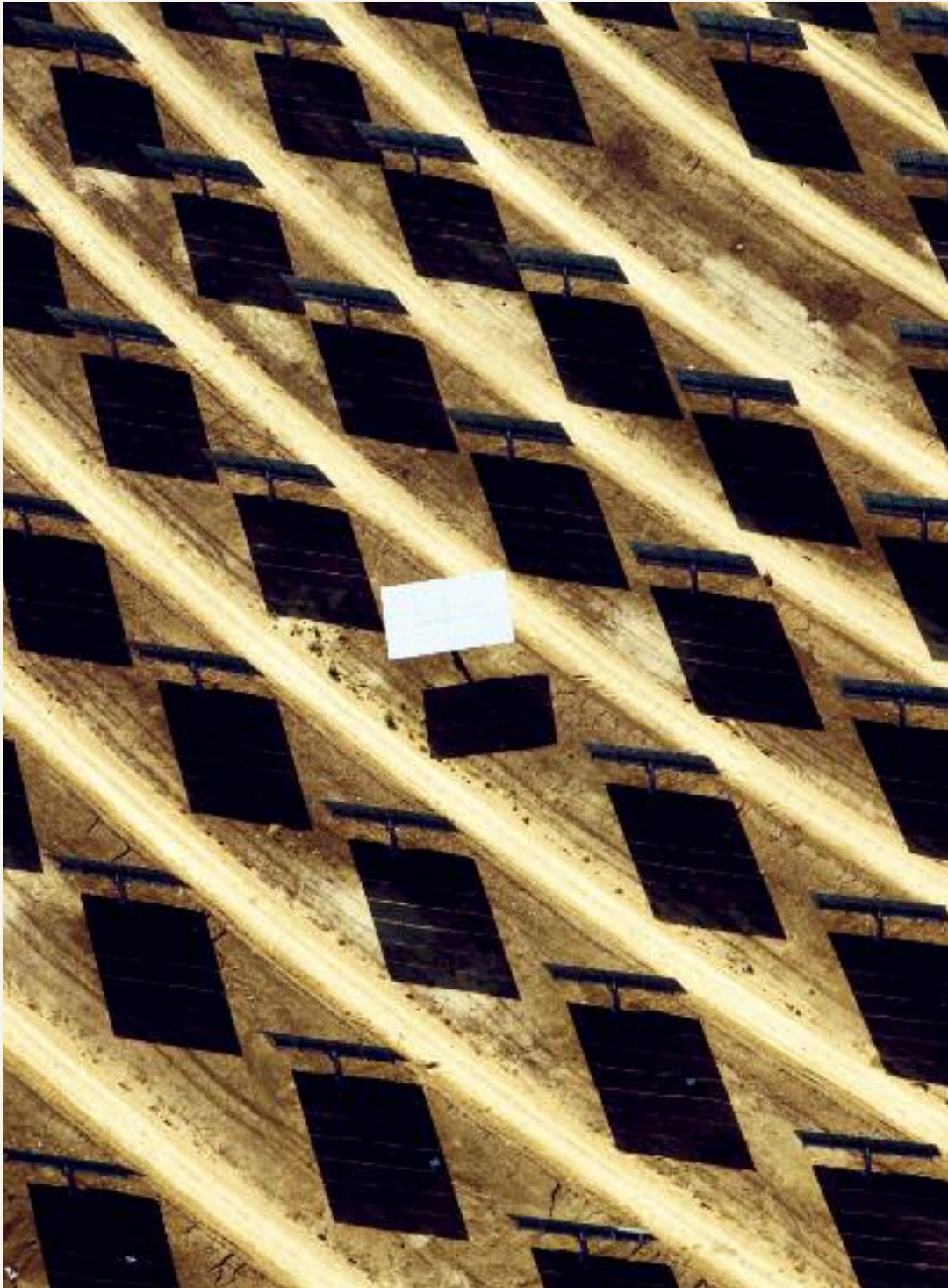
The Intergovernmental Panel on Climate Change's *Special Report on 1.5°C* made clear that the global community needs to move much faster if we are to limit warming and the related impacts on the world in which we live. The analysis and resulting message from the scientific body underlined the critical need for deep, transformational change in every sector. Climate scientists delved into the wide-ranging impacts a warming climate will have, including extreme heat waves, severe droughts, coral bleaching and more—impacts we are already experiencing at our current 1°C warming, following one of the hottest years on record.

Investment decisions need to be guided by the risk considerations of a rapidly changing natural world. The Governor of the Bank of England, Mark Carney, rightfully emphasized the increasing imperative to financial stability for asset owners to disclose climate vulnerabilities, and the concomitant need to invest in low-carbon opportunities. Many asset owners have taken this advice to heart, and have started to reflect on these risks and opportunities and take action to make their portfolios more climate resilient.

Beyond the physical risks and opportunities from a warming world, forward-looking investment decisions should consider the development of policy frameworks aimed at mitigating climate change and implementing the 2015 Paris Agreement. As this report is being finalized, for example, European-wide regulation to strengthen the market for sustainable finance is advancing apace.

This report comes at a time when many individual investors, policy makers, financial regulators and central banks are moving to minimize and adapt to the impacts of a warming world. I urge asset owners to take into account the findings and recommendations of this report and align their portfolio with the Paris Agreement—for the benefit of the climate and their clients.

Margaret Kuhlou,
Practice Leader, Finance,
WWF International



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EXECUTIVE SUMMARY

The Paris Agreement on climate change has built a strong consensus on the need to “keep global average temperature to well below 2°C above pre-industrial levels, and pursue efforts to limit temperature increase to 1.5°C”. It also states that financial flows must be “made consistent with a pathway towards low greenhouse gas emissions and climate-resilient development”.¹

A recent report by the Intergovernmental Panel on Climate Change (IPCC) has laid out the challenge of achieving the 1.5°C target along with its potential impacts. This window is closing rapidly; the world could already reach 1.5°C of global warming in as few as 12 years.²

The financial community has now begun to respond to the Paris climate goals. The context is rapidly changing. The Financial Stability Board’s Task Force on Climate-related Financial Disclosures (TCFD) has elevated the need for financial institutions to assess and disclose their climate-related risks and opportunities based on forward-looking climate scenario analysis: it has already gained support from 287 financial institutions, responsible for assets of nearly US\$100 trillion.³ The European Commission has launched a ten-point action plan along with subsequent legislative package that—when implemented—should strengthen the market for sustainable finance and related disclosure.⁴ Financial institutions are uniting to disclose climate-related risks⁵ and engage with targeted high-carbon companies.⁶

THIS REPORT AIMS TO INFORM AND SHAPE ONGOING CONVERSATIONS ON HOW INVESTOR STRATEGIES AND FINANCIAL POLICIES CAN CONTRIBUTE TO DELIVERING A WELL BELOW 2°C TRANSITION.

This report aims to inform and shape the ongoing conversations between asset owners, asset managers, data providers, financial regulators and policy makers on how investor strategies and financial policies can contribute to delivering a well-below 2°C transition. It offers a forward-looking climate scenario analysis on how Europe’s largest asset owners can align their public equity and corporate bond portfolios with the Paris climate goal of keeping global warming well below 2°C for a set of key technologies: coal power, renewable power, coal mining⁷, oil production and gas production.^{8,9} The reason WWF is focusing on these technologies is that burning coal, oil and gas accounts for 65 percent of global greenhouse gas emissions.¹⁰ The decarbonisation of the power sector is a critical and impactful solution where asset owners can already contribute, given that mature and competitive renewable power technologies, suitable for investment, are already available on a large scale.

¹ UNFCCC (2015), Paris Agreement. The articles referred to are 2.1(a) and 2.1(c).

² IPCC (2018) Global warming of 1.5°C. This report states with high confidence that ‘global warming is likely to reach 1.5°C between 2030 and 2052 if it continues to increase at the current rate’.

³ FSB TCFD (2018), 2018 Status Report.

⁴ European Commission (2018), European Commission’s Action Plan: Financing sustainable growth, COM(2018) 97 final.

⁵ For example, the UN Environment has set up a pilot project with 20 leading investors on implementing TCFD recommendations. This group will focus on developing the analytical tools and indicators needed to assess and disclose exposures to the risks and opportunities presented by climate change, and make their findings public. It includes the following asset owners/asset owners’ internal investment managers that are also part of the WWF project: Aviva, Caisse des Dépôts, NBIM (investment manager of GPF), Nordea Investment Management and Storebrand Asset Management. UN Environment (2018), Pilot project on implementing the TCFD recommendations for investors.

⁶ For example, the largest ever investor initiative Climate Action 100+ is systematically asking the 160 most carbon-intensive companies globally to reduce their emissions consistent with the Paris Agreement. It has gathered 310 investors managing US\$ 32 trillion in assets. AIGCC, Ceres, IGCC, IIGCC and UNPRI (2017), Climate Action 100+.

⁷ Coal mining covers both thermal coal and metallurgical coal.

⁸ In this study, asset owners are defined as insurance companies, pension funds and sovereign wealth funds.

⁹ WWF believes that temperature increase should be limited to 1.5°C, but currently no assessment models exist to allow comparisons of investment portfolios with this target. WWF used the Beyond 2 Degrees Scenario (B2DS) of the International Energy Agency, which offers a 50 percent chance of limiting global warming to 1.75°C.

¹⁰ IPCC (2014), AR5 Working Group 3. Summary for policy makers.

Asset owners should be willing to integrate a forward-looking approach into their investment decisions to respect their fiduciary duty¹¹ and safeguard the pensions and assets of current and future generations. WWF identified the largest asset owners in 11 European countries and approached 88 of them, offering to assess their public equity and corporate bond portfolios.^{12,13} We can draw two conclusions from this exercise:

MUCH GREATER EFFORTS ARE NEEDED TO ENSURE THAT PUBLIC EQUITY AND CORPORATE BOND INVESTMENTS ALIGN WITH THE WELL-BELOW 2°C TRANSITION.

1. The climate alignment findings show that much greater efforts are needed to ensure that public equity and corporate bond investments align with the well-below 2°C transition. There are encouraging indications that asset owners' investments are partly aligned with that goal for some of the technologies included in this research. However, none of the asset owners is aligned for all technologies. These results are unsurprising, as diversified and universal asset owners' public equity and corporate bond portfolios typically aim to reflect the global economy,¹⁴ which itself is currently on a path to an estimated 3.4°C warming.¹⁵ Research by Mirova shows that most mainstream equity and bond indices (e.g. S&P 500, MSCI World) are actually on a 5°C warming path.¹⁶
2. The coverage of the findings in this report are limited by the current transparency and disclosure practices of asset owners. 42 out of 88 asset owners agreed to assess their public equity and corporate bond holdings in the context of this project, of which climate alignment findings for 33 are included in this report. The degree of transparency varies from country to country. In Nordic countries (Denmark, Finland, Norway, Sweden) there is extensive disclosure of climate alignment results and several investors are actively engaged in international initiatives. In the Netherlands and France - which has pioneered an innovative comply-or-explain approach to climate-related disclosures under article 173(vi) of its energy transition law,¹⁷ there is some degree of disclosure. In other countries (Belgium, Germany, Italy, Spain, United Kingdom) there is zero disclosure.

WWF will continue its dialogue with asset owners and other market participants to seek greater disclosure of forward-looking climate scenario analyses and underlying holdings data throughout the financial sector. We also advocate for establishing harmonised frameworks for forward-looking climate scenario assessments via industry practices and standards, supervisory oversight and regulation. These actions and policies must ultimately lead to the alignment of financial flows and economic activities with the Paris climate goals.

¹¹ UK Parliament (November 2018), Committee secures pensions reform – but Government rejects mandatory climate risk reporting.

¹² Annex 1 provides a full list of the asset owners contacted in Belgium, Denmark, Finland, France, Germany, Italy, Netherlands, Norway, Spain, Sweden and the UK. Swiss asset owners were not included in order to avoid duplication of work of the Swiss Federal Office for the Environment (FOEN) and the State Secretariat for International Financial Matters (SIF), more details of which are also included in Annex 1.

¹³ The Paris Agreement Climate Transition Assessment (PACTA) model was used for this exercise. PACTA's main characteristics are described in the section on research results and in Annex 2.

¹⁴ More precisely, those listed companies and companies that have issued corporate bonds.

¹⁵ Climate Action Tracker (November 2017), The CAT thermometer.

¹⁶ Mirova (January 2018), Estimating Portfolio Coherence with Climate Scenarios.

¹⁷ UN PRI (2016), French Energy Transition Law: Global investor briefing on Article 173.

THE VALUE OF FORWARD-LOOKING CLIMATE SCENARIO ASSESSMENTS

Asset owners seeking to safeguard the pensions and assets of current and future generations increasingly understand that climate change poses significant risks to their investments. They also recognise that timely action can enable them to take advantage of the opportunities offered by the low-carbon transition. WWF has mapped existing knowledge on climate-related financial risks and opportunities in a [Climate Guide to Asset Owners](#). It found that:

ALIGNING WITH A BELOW 2°C PATH PROVIDES BOTH THE LOWEST RISK AND THE HIGHEST POTENTIAL FOR MAXIMISING RETURNS.

- Global climate-related Value at Risk (VaR) runs into trillions of dollars**, an amount that increases significantly as climate change worsens.¹⁸ The Economist Intelligence Unit estimates that equity assets losses by 2100 could amount to US\$7.2 trillion in a 5°C warming scenario. Keeping global warming under 2°C will still entail losses, but only half of those of a 5°C scenario.¹⁹ However, these VaR estimates fail to take into account the risk of societal instability: the World Bank finds that “there is no certainty that adaptation to a 4°C world is possible”, while AXA concludes that a 4°C world is not insurable.²⁰
- At a portfolio level, Mercer finds that aligning with a below 2°C path provides both the lowest risk and the highest potential for maximising returns.**²¹ According to MSCI, a provider of global indexes and market analysis tools, for a typical diversified portfolio “all of the asset classes today are more exposed to negative growth impacts from a business-as-usual high warming trajectory than a low warming trajectory with higher transition risks in the near term”.²² The London School of Economics states that limiting warming to no more than 2°C makes financial sense to risk-neutral investors; even more so to risk-averse investors.²³
- The impacts of climate change are unevenly spread across asset classes and industry sectors.** Coal, oil and electric utilities have the highest negative sensitivity, while renewables have the highest positive sensitivity. Mercer estimates that, over a ten-year period, the average annual returns for renewable energy could increase modestly or nearly double, depending on the climate scenario.²⁴
- Climate-related financial risks can already manifest themselves in the short-term.** The University of Cambridge Institute for Sustainable Leadership finds that “short-term shifts in market sentiment, induced by awareness of future climate risks, could lead to economic shocks and losses of up to 45 percent in an equity investment portfolio value, and 23 percent in a fixed income portfolio”.²⁵

¹⁸ Climate-related value at risk can be defined as the size of losses incurred due to climate change within a given time horizon at a particular probability.

¹⁹ Economist Intelligence Unit (2015), The cost of inaction.

²⁰ World Bank (2012), Turn Down the Heat. Bloomberg (25 January 2018), Climate change could make your basement uninsurable in the next decade. Forbes (26 May 2015), AXA: A 2°C World Might Be Insurable, A 4°C World Certainly Would Not Be.

²¹ Mercer (2015), Investing in a time of climate change.

²² MSCI (2018), ESG trends to watch.

²³ London School of Economics (2016), Climate value at risk of global financial assets.

²⁴ Mercer (2015), Investing in a time of climate change.

²⁵ University of Cambridge (2015), Unhedgeable risk.

**ASSET OWNERS THAT
CHOOSE TO UNDERTAKE
FORWARD-LOOKING
CLIMATE ASSESSMENTS
WILL PUT THEMSELVES
AHEAD OF THE CURVE IN
UNDERSTANDING THE
CLIMATE-RELATED RISKS
AND OPPORTUNITIES
WITHIN THEIR
PORTFOLIOS.**

The increasing understanding of climate-related financial risks and opportunities has led to the development of tools for forward-looking climate scenario analysis. These either assess investment portfolios' climate alignment (consistency with the Paris climate goals) or their climate risk exposure (climate-related VaR).²⁶

Those asset owners that choose to undertake forward-looking climate assessments will put themselves ahead of the curve in understanding the climate-related risks and opportunities within their portfolios. The results can both inform climate strategy development and highlight the need for actions on several levels. For example, this could mean adjusting the investment policy, formulating sector policies, changing strategic asset allocation, engaging with investment managers on portfolio construction and security selection, engaging with, or divesting from, portfolio companies, etc.

Forward-looking climate scenario analysis has already gained major recognition and support, and there are several tools already available in the market (see Box 4). Given the very dynamic context, most notably the action of financial regulators and central banks, WWF believes that assessing climate-related risks and opportunities will become common practice amongst financial institutions within three to five years, and that it will become mandatory over time. WWF therefore believes that it is very relevant for asset owners to immediately start becoming familiar with, and producing forward-looking climate scenario analysis, while in parallel continuously improving the methodological frameworks and underlying data.

²⁶ Examples of climate alignment tools are the Paris Agreement Climate Transition Assessment (developed by the Sustainable Energy Investment Metrics – SEIM - consortium) and Exane (developed by BNP Paribas). The most notable examples of climate risk exposure tools are TRIP (developed by Mercer), ClimINVEST (developed by Cicero), the Carbon Delta assessment framework, and the Energy Transition Risk Consortium (led by 2° Investing Initiative). UNEP FI has also set up an initiative with leading investors to further explore the use of tools and metrics to assess climate risk. More details of these tools are provided in chapter 1.5 of the WWF full climate guide to asset owners.

METHODOLOGY: PARIS AGREEMENT CLIMATE TRANSITION ASSESSMENT

WWF encourages asset owners to test various and complementary climate assessment tools. This report aims to demonstrate the concrete value of forward-looking climate scenario analyses by applying one methodology—the Paris Agreement Climate Transition Assessment (PACTA)²⁷—to the portfolios of Europe’s largest asset owners. PACTA builds on a methodology developed by the Sustainable Energy Investment Metrics (SEIM) consortium.²⁸

PACTA is a forward-looking climate scenario analysis tool for equity and corporate bond portfolios. It measures the climate alignment of investment portfolios by comparing them with different climate scenarios. WWF currently uses the Beyond 2°C Scenario (B2DS) of the International Energy Agency (IEA), which gives a 50 percent chance of limiting global warming to 1.75°C.

PACTA has a global scope and provides results for climate-relevant technologies in the following eight sectors: power (renewables²⁹, hydro³⁰, coal, gas, nuclear)³¹, upstream oil and gas, coal mining, automotive (electric, hybrid, fossil fuel light duty vehicles), steel, cement, shipping and aviation.

The methodology has four steps:

- **Build production databases that link assets to financial instruments.** Asset-level data are harvested from databases (e.g. Globaldata for the power sector), providing production capacity at asset level (e.g. megawatt for power plants) and ownership information. In a first step, production capacity is allocated to each owner depending on the ownership share in the asset. In a second step, the production is rolled up to its ultimate owner along company ownership trees and connected to financial instruments.³²
- **Translation of decarbonisation roadmaps.** The IEA models the evolution in production levels (e.g. coal power capacity or number of electric vehicles produced) for the climate-relevant technologies covered by PACTA. The rate of change in production levels is applied to public equity and corporate bond markets in order to reflect the role of companies in deploying these technologies as well as energy production in different geographies. This provides a climate benchmark that represents a market aligned with the chosen IEA scenario; in the case of this study, the IEA 1.75°C scenario (B2DS: see Box 1).
- **Technology exposure.** The current and future exposure of the listed equity or corporate bond portfolio to the climate-relevant technologies is assessed. First, the portfolio is connected to the production database via the financial identifiers. Second, its exposure is calculated based on ownership in/financing of the companies.

²⁷ WWF recognises that there is a broad range of methodologies available on the market for asset owners to conduct forward-looking assessment. WWF seeks to contribute to the development of these methodologies through a broad range of projects and does not favour one methodology over another. For this project, WWF has selected the methodology developed by the SEIM consortium (of which WWF is a member). WWF welcomes discussions on other methodologies and their respective merits. WWF is committed to supporting the development of climate-aligned methodologies.

²⁸ The SEIM consortium was led by 2° Investing Initiative with the Frankfurt School of Finance and Management, the University of Zurich, CDP, Kepler-Cheuvreux, Climate Bonds Initiative,

SMASH, WWF European Policy Office and WWF Germany. SEIM was funded by the European Commission through the research program Horizon 2020.

²⁹ Includes solar (Photovoltaic and concentrated solar power), wind, geothermal, biomass and tidal.

³⁰ Includes large and small hydro.

³¹ The analysis for the power sector focuses on production of electricity, and does not include heating from combined heat and power plants.

³² The production is “connected” to a financial ID: Bloomberg ID for equity and corporate ticker for corporate bonds.

- **Gap analysis.** The technology exposure of the assessed portfolio can be compared to that of the global public equity/corporate bond market³³ or to a climate benchmark. WWF deems a portfolio aligned when it is on the same or a better path than the climate benchmark. This suggests over-exposure to low-carbon technology and under-exposure to high-carbon technology.³⁴

Further details on the technology exposure and gap analysis metrics are provided in the research chapter below; a detailed description of the PACTA methodology can be found in Annex 2.

BOX 1. MOVING TO A SCIENCE-BASED CLIMATE BENCHMARK

Traditionally, a benchmark is a broad market index for measuring the performance of a portfolio. This report uses a different type of benchmark, based on absolute and physical metrics contained in climate roadmaps. This “climate benchmark” allows the alignment of an investment portfolio to be measured against climate goals for a range of climate-relevant technologies.

The degree of rigour of the climate benchmark is defined by the underlying climate roadmap. PACTA is scenario-neutral, but currently only the IEA scenarios model the required evolution of production levels with sufficient granularity for all the covered climate-relevant sectors and technologies.

The IEA scenario used by WWF for this research (Beyond 2°C Scenario, B2DS) offers a 50 percent chance of keeping global warming below 1.75°C. This IEA 1.75°C scenario can be considered a “well below” 2°C scenario aligned with the upper range of the Paris Agreement’s goals. WWF believes that temperature increase should be limited to 1.5°C—the lower range of the Paris Agreement’s goals—and encourages research institutions to develop scenarios that are sufficiently granular to provide a high likelihood (i.e. at least 66%) of respecting this threshold.³⁵

³³ From the global production databases, solely the production connected to a financial instrument within the respective asset class (equity or bonds) is aggregated: i.e. for the equity market all production owned by listed companies and for bonds all production owned by companies that issue bonds.

³⁴ An alternative interpretation of alignment is that it only occurs when a portfolio is exactly on the same path as the benchmark. In that case, outperforming the benchmark is considered as ‘over-alignment’. However, this interpretation does not take into account that currently no 1.5°C benchmarks exist. Such benchmarks would require a faster reduction in production levels for high-carbon technologies (e.g. coal power) and a faster

increase in production levels for low-carbon technologies (e.g. renewable power). Hence, WWF believes that over-alignment to the current benchmark is required to align with a 1.5°C transition.

³⁵ The International Institute for Applied Systems Analysis (IIASA) whose quantitative, model-based climate change mitigation paths underpin the IPCC Special Report on Global Warming of 1.5°C, has made its data available through an online scenario explorer. Whether these data can be used as an input to the PACTA model is currently being explored by 2° Investing Initiative.

BOX 2. INFRASTRUCTURE AND OTHER ASSET CLASSES

Climate-related financial risks and opportunities affect portfolios as a whole but with different impacts on different asset classes. Analysis by Mercer, for example, shows that unlisted companies are set to gain market share in the global power market under a 2°C transition, while listed equities will lose.³⁶

Several asset owners have already adapted their strategic asset allocation to capture the trends above, notably by increasing their exposure to unlisted renewable energy infrastructure. In some cases, these investments will constitute a sizeable part of an asset owner's total assets under management. WWF fully supports and encourages such adjustments; the direct contribution of renewable energy infrastructure investments to the energy transition is significantly higher than similar investments in more liquid asset classes, such as public equity and/or corporate bonds.

However, increasing investments in alternative asset classes do not automatically reduce misalignment with Paris climate goals or climate-related risk within public equity or corporate bond portfolios. In fact, alternative assets (such as unlisted energy infrastructure) may themselves contribute both positively and negatively to climate stabilisation.

Hence asset owners should strive to align their investments with the Paris climate goals both across their portfolio and within each asset class. Research has shown that this minimises climate-related risks on a portfolio level.³⁷

PACTA cannot yet capture investors' exposure to unlisted renewable energy infrastructure, nor does it measure climate alignment for the portfolio as a whole.

³⁶ Mercer (2015), Investing in a time of climate change.

³⁷ See section/chapter above (the value of forward-looking climate assessments) for more information.



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RESEARCH FINDINGS

Sector and technology coverage

As with the PACTA methodology, research findings are presented per climate-relevant technology. This report focuses on coal power, renewable power, coal mining³⁸, oil production and gas production, identified as most relevant for the following reasons:

- Coal, oil and gas burning accounts for 65 percent of global greenhouse gas emissions.³⁹ Respecting the Paris Climate goals will require a rapid reduction in, and ultimately a phase out of, all fossil fuels.
- The decarbonisation of the power sector is a critical and impactful solution that asset owners can already contribute to; mature and competitive renewable power technologies are available on a large scale. These can replace fossil fuels, most notably coal.

Most companies with activities in the climate-relevant technologies covered here are situated in the upstream oil and gas, coal mining and electrical utilities sectors.⁴⁰

Asset owner coverage

This report contains climate alignment findings for 33 (out of 88 contacted) asset owners.⁴¹ Figure 1 details the disclosure per asset class for each asset owner, while Figure 2 breaks down the total value of the assessed holdings between the type of asset owner (left) and the asset class (right).

All portfolios are assessed for the same point in time, i.e. the end of 2017. This allows for coherent comparison between asset owners.

³⁸ Coal mining covers both thermal and metallurgical coal.

³⁹ IPCC (2014), AR5 Working Group 3. Summary for policy makers.

⁴⁰ This corresponds to the following industries in the Global Industry Classification Standard (GICS): oil, gas and consumable fuels (201020), mining (151040) and electric utilities (551010). It is possible that companies outside these main industries are included in the analysis, however, most notably for the climate-relevant technologies in the power sector.

⁴¹ WWF considers asset owners that disclose climate alignment findings as best practice examples. Figure 19 provides an overview by country of how the 88 contacted asset owners responded to WWF's request to undertake a climate alignment assessment. Annex 1 provides the full list of contacted asset owners, including the names of asset owners that did not disclose climate alignment findings.

FIGURE 1. OVERVIEW OF ASSET OWNER CLIMATE ALIGNMENT DISCLOSURE IN THIS REPORT (WWF)⁴²

NAME	COUNTRY OF HEADQUARTERS (AT END OF 2017) ⁴³	DISCLOSURE OF CLIMATE ALIGNMENT FINDINGS	
		PUBLIC EQUITY	CORPORATE BONDS
ABP	Netherlands	Disclosed	Portfolio not provided for assessment
Alecta	Sweden	Disclosed	Disclosed
AMF Pension	Sweden	Disclosed	Disclosed
AP Fonden 1	Sweden	Disclosed	Disclosed
AP Fonden 2	Sweden	Disclosed	Disclosed
AP Fonden 3	Sweden	Disclosed	Disclosed
AP Fonden 4	Sweden	Disclosed	Disclosed
AP Fonden 7	Sweden	Disclosed	Has no corporate bond portfolio
ATP	Denmark	Disclosed	Portfolio not provided for assessment
CNP Assurances	France	Disclosed	Disclosed
Crédit Agricole Assurances	France	Disclosed	Disclosed
Danica Pension	Denmark	Disclosed	Disclosed
DNB Liv	Norway	Disclosed	Disclosed
Elo Mutual Pension Insurance	Finland	Disclosed	Disclosed
Folksam	Sweden	Disclosed	Has no corporate bond portfolio
Government Pension Fund Global	Norway	Disclosed	Disclosed
Government Pension Fund Norway	Norway	Disclosed	Disclosed
Ilmarinen	Finland	Disclosed	Disclosed
Industriens Pension	Denmark	Disclosed	Disclosed
Keva	Finland	Disclosed	Disclosed
KLP Liv	Norway	Disclosed	Disclosed
Nordea Life&Pension⁴⁴	Sweden	Disclosed	Disclosed
PenSam	Denmark	Disclosed	Disclosed
PensionDanmark	Denmark	Disclosed	Disclosed
PFA Pension	Denmark	Disclosed	Disclosed
PFZW	Netherlands	Disclosed	Disclosed
PKA	Denmark	Disclosed	Not disclosed
Rabobank Pensioenfonds	Netherlands	Disclosed	Disclosed
Sampension	Denmark	Disclosed	Disclosed
Skandia Liv	Sweden	Disclosed	Disclosed
State Pension	Finland	Disclosed	Disclosed
Storebrand Liv	Norway	Disclosed	Disclosed
Varma	Finland	Disclosed	Disclosed

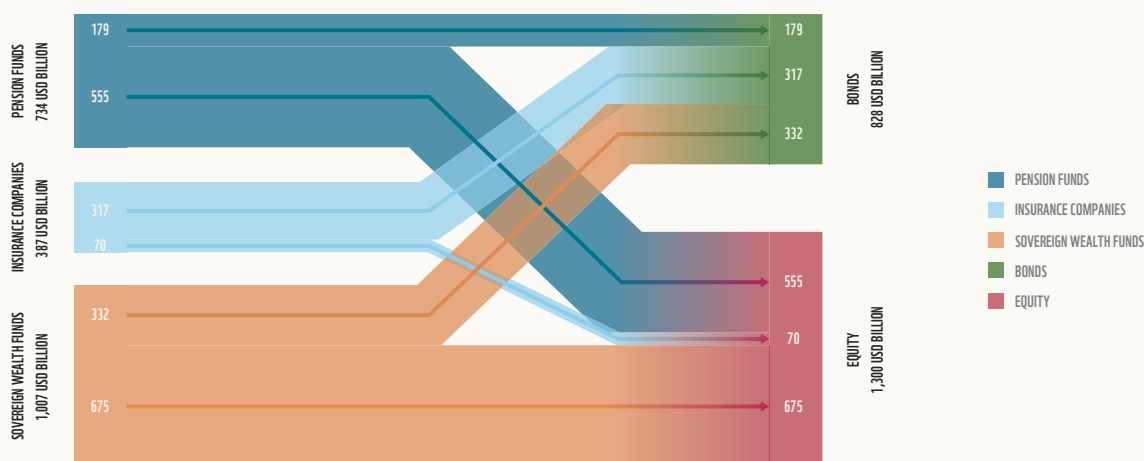
⁴² WWF contacted 88 asset owners for this research. It considers asset owners that disclose climate alignment findings as best practice examples. Figure 19 provides an overview by country of how the 88 contacted asset owners responded to WWF's request to undertake a climate alignment assessment. Annex 1 provides the full list of contacted asset owners, including the names of asset owners that did not disclose climate alignment findings.

⁴³ WWF recognizes that asset owners' presence can extend in some cases beyond the country of their headquarters. We have sought to assess the climate alignment of asset

owners at the highest organisational (i.e. group) level; in some cases this has meant combining investment portfolios of several independent subsidiaries that each make their own strategic investment decisions.

⁴⁴ The Nordea headquarters was moved to Finland as from 1 October 2018, but was located in Sweden at the time of data compilation for assessed portfolios (31/12/2017). Nordea Life and Pension has subsidiaries in Finland, Norway and Sweden, while Nordea Group is active primarily in Denmark, Finland, Norway and Sweden.

FIGURE 2. DISTRIBUTION OF HOLDINGS BETWEEN TYPE OF ASSET OWNER AND ASSET CLASS FOR THE ASSET OWNERS OF WHICH CLIMATE ALIGNMENT RESULTS ARE INCLUDED IN THE REPORT (2° INVESTING INITIATIVE)



Exposure and alignment metrics

As with the PACTA model, this report uses three separate metrics to assess the exposure of asset owners’ public equity and corporate bond portfolios. Each metric is designed to respond to a particular research question.

1) What was the portfolio’s exposure to climate-relevant technologies at the end of 2017?

- This metric identifies the share, expressed as the weight by market value, of each climate-relevant technology in the respective public equity and corporate bond portfolio. The results are obtained by first calculating the exposure of the portfolio to companies active in the climate-relevant technology, and then calculating the specific technology exposure based on the asset base of these companies.⁴⁵
- The portfolio’s exposure to the climate-relevant technology is compared to the exposure of the global public equity and corporate bond market, which respectively represent all production owned by listed companies and production owned by companies that issue bonds.
- This metric is referred to as “2017 exposure”. In this report, results are presented individually per asset owner.

⁴⁵ The nature of this metric does not allow to categorise companies in more than one sector, given that doing so will lead to double counting in terms of market value. Hence, PACTA identifies a main sector of activities for companies that are active in more than one sector (e.g. power production and coal mining or oil & gas production and power production). In addition, for companies that are categorised as coal mining companies it is assumed that their asset base is 100% coal mining - even if they have revenues from additional non-coal-related mining activities.

2) Will the portfolio increase or decrease its alignment with the IEA 1.75°C scenario between 2018 and 2023?

- This metric indicates how the investment plans of portfolio companies evolve between 2018 and 2023, relative to the production profile for the same technology under several IEA transition scenarios and to the market. The IEA scenarios that are included model a transition that corresponds to 1.75°C warming (B2DS), 2°C warming (Sustainable Development Scenario, SDS), 2.7°C warming (New Policies Scenario, NPS) and business as usual (Current Policies Scenario, CPS).
- This metric is referred to as “2018-2023 trajectory”. In this report, results of the disclosing asset owners are aggregated.

3) What is the portfolio’s exposure to climate-relevant technologies projected to be in 2023?

- This metric indicates the exposure of the portfolio relative to each climate-relevant technology (e.g. renewable power) within a sector (e.g. power sector) in 2023 and compares it to a global market that is on a pathway compatible with the IEA 1.75°C scenario (B2DS) in 2023.
- For example, if an equity or corporate bond portfolio is exposed to the equivalent of 25 megawatts of renewable power capacity (i.e. current and planned assets) in 2023 and its exposure to all technologies within that sector (renewables, coal, hydro, nuclear and gas) is 100 megawatts, then the renewable power technology share will be 25 percent.
- The addition of all the technology shares within one sector always amounts to 100 percent. Hence, an increase in share for one technology (e.g. renewable power) will lead to a decrease in share for one or more other technologies within that same sector (e.g. coal, hydro, nuclear or gas).
- This metric is referred to as the “2023 exposure”. In this report, results are presented individually by asset owner.

It is important to take in account three further points when interpreting asset owners’ results:

- **The metrics measure different components, and build on one another.** For example: an asset owner’s portfolio may have low 2017 exposure to coal power, but at the same time have portfolio companies with plans to increase coal power capacity in the next five years: given that the IEA 1.75°C scenario (B2DS) requires a drastic decrease in coal power capacity, the asset owner’s 2018-2023 trajectory for coal power will not be aligned with that particular scenario. This does not necessarily result in too high 2023 exposure relative to a global market that is aligned with the IEA 1.75°C scenario, however, given that the low 2017 exposure may compensate for the portfolio companies’ misaligned coal development plans. The metrics thus allow interesting conclusions to be drawn about how an asset owner’s 2023 exposure is influenced by both its 2017 exposure and its portfolio companies’ development plans.
- **The metrics assume that the portfolio composition remains unchanged from end of 2017.** They indicate how the portfolio’s exposure to high-carbon and low-carbon technologies are set to changes over time as a function of changes in company exposures, keeping the portfolio constant. This implies that any portfolio composition changes relating to the included technologies announced and implemented after the end of 2017 are not covered in the results. In a similar vein, corporate changes (e.g. merger, acquisitions and sell-offs) and changes in companies’ capital expenditures plans that were formalised beyond end of 2017 are not included in the assessment.

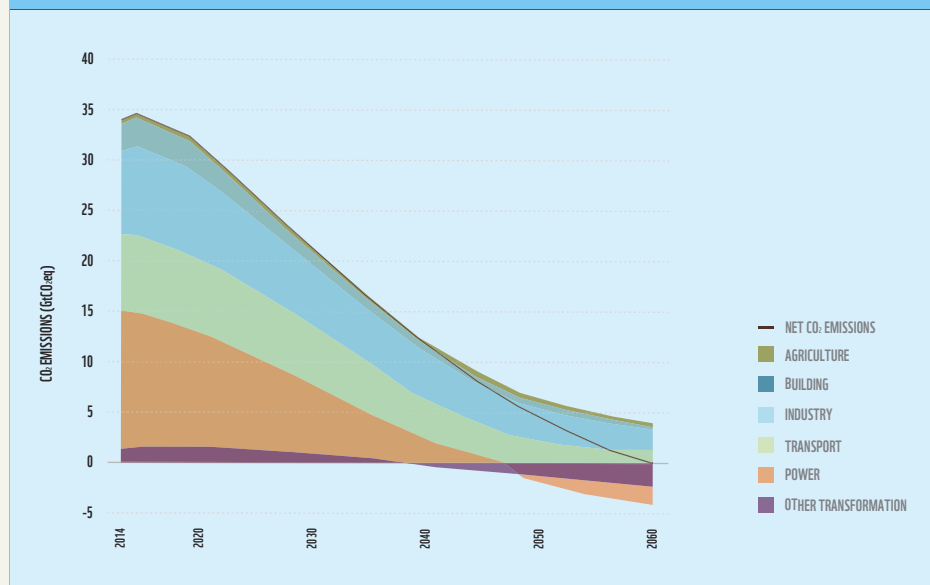
- **The metrics have changed since 2017**, when WWF published its [“European asset owners: 2°C alignment and misalignment of public equity portfolios”](#) report. Although this research report covered the same target group, results are not directly comparable. Annex 3 provides further details on the changes.

BOX 3. ASSET OWNERS WILL NEED TO INCREASE THEIR EFFORTS TO REMAIN ALIGNED WITH THE IEA 1.75°C SCENARIO (B2DS) BEYOND 2023

PACTA covers company investment plans up to five years in the future. These plans reflect (publicly) available company investment plans as collated by commercial data providers.

It is important to note that climate scenarios become stricter over time. The figure below, for example, gives the emission trajectory of the IEA 1.75°C scenario (B2DS) until 2060 divided by sector.⁴⁶ It shows that CO₂ reduction rates increase significantly in the early 2020s. Asset owners will therefore need to increase efforts to remain in line for the IEA 1.75°C scenario-aligned market beyond 2023.

FIGURE 3. REQUIRED CO₂ EMISSION REDUCTIONS IN IEA 1.75°C SCENARIO BETWEEN 2014 AND 2060 (CARBON BRIEF)



⁴⁶ Carbon Brief (6 June 2017), IEA: World can reach “net zero” emissions by 2060 to meet Paris climate goals.

RENEWABLE POWER⁴⁷

Figure 4 provides asset owners' 2017 exposure to renewable power by asset class, as well as the exposure of the global market. It indicates that a majority of asset owners' public equity portfolios is more exposed than the global market. However, the reverse is true for corporate bond portfolios.

FIGURE 4. ASSET OWNERS' EXPOSURE TO RENEWABLE POWER AT END OF 2017 (2^o INVESTING INITIATIVE)

NAME	WEIGHT (BY MARKET VALUE) OF ISSUERS EXPOSED TO RENEWABLE POWER AT END OF 2017	
	PUBLIC EQUITY	CORPORATE BONDS
GLOBAL MARKET	0.33%	0.64%
ABP	0,40%	Portfolio not provided for assessment
Alecta	0,00%	0,05%
AMF Pension	0,12%	0,00%
AP Fonden 1	0,21%	0,14%
AP Fonden 2	0,20%	0,26%
AP Fonden 3	0,13%	0,69%
AP Fonden 4	0,19%	0,04%
AP Fonden 7	0,33%	Has no corporate bond portfolio
ATP	2,74%	Portfolio not provided for assessment
CNP Assurances	0,67%	1,42%
Crédit Agricole Assurances	0,47%	1,46%
Danica Pension	0,84%	0,93%
DNB Liv	0,35%	0,13%
Elo Mutual Pension Insurance	0,54%	1,39%
Folksam	0,26%	Has no corporate bond portfolio
Government Pension Fund Global	0,43%	0,32%
Government Pension Fund Norway	0,01%	0,20%
Ilmarinen	0,43%	0,08%
Industriens Pension	0,77%	0,32%
Keva	0,51%	0,00%
KLP Liv	0,38%	0,60%
Nordea Life&Pension	0,16%	0,10%
PenSam	0,43%	0,12%
PensionDanmark	0,71%	0,53%
PFA Pension	0,61%	0,56%
PFZW	0,40%	0,85%
PKA	1,16%	Not disclosed
Rabobank Pensioenfond	0,36%	0,27%
Sampension	0,56%	0,00%
Skandia Liv	0,12%	7,06%
State Pension	0,26%	0,77%
Storebrand Liv	0,64%	0,45%
Varma	0,22%	0,85%

⁴⁷ Includes solar (Photovoltaic and concentrated solar power), wind, geothermal, biomass and tidal.

Figure 5 shows asset owners' 2018-2023 trajectory for renewable power. It indicates that the investment plans of companies in the asset owners' aggregated public equity portfolios are on the IEA 2°C pathway (SDS), while companies in the asset owners' corporate bond portfolios are closer to the IEA business as usual (BAU) pathway (CPS).

FIGURE 5. ASSET OWNERS' RENEWABLE POWER TRAJECTORY BETWEEN 2018 AND 2023

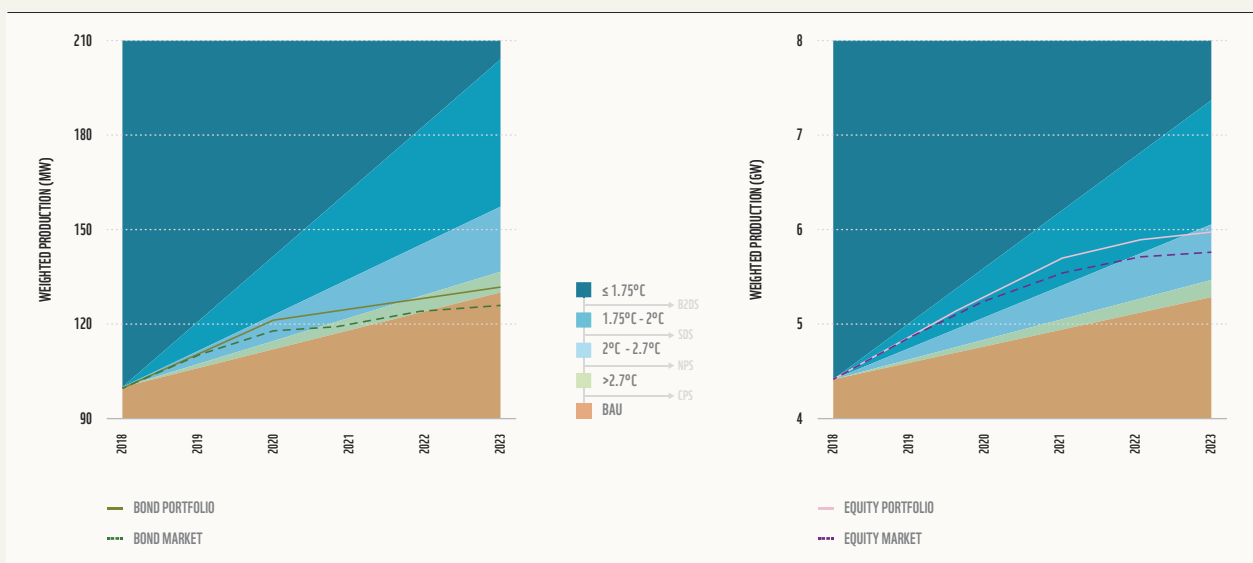
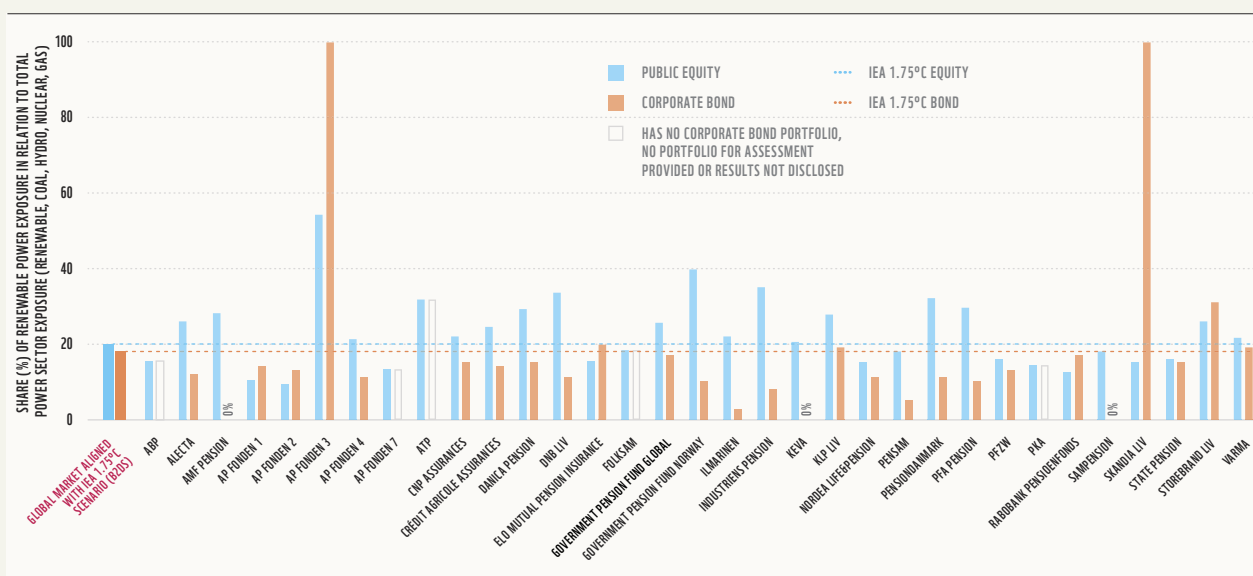


Figure 6 shows asset owners' 2023 exposure to renewable power. It indicates that a majority of asset owners will have public equity portfolios with a higher renewable power share in 2023 than a market aligned with the IEA 1.75°C pathway (B2DS). Meanwhile, most asset owners' corporate bond portfolios will have a lower share.

FIGURE 6. ASSET OWNERS' EXPOSURE TO RENEWABLE POWER IN 2023 (2^o INVESTING INITIATIVE)



COAL POWER

Figure 7 shows asset owners' 2017 exposure to coal power by asset class, as well as the exposure of the global market. It indicates that a majority of asset owners' public equity and corporate bond portfolios is less exposed than the global market.

FIGURE 7. ASSET OWNERS' EXPOSURE TO COAL POWER AT THE END OF 2017 (2° INVESTING INITIATIVE)

NAME	WEIGHT (BY MARKET VALUE) OF ISSUERS EXPOSED TO COAL POWER AT END OF 2017	
	PUBLIC EQUITY	CORPORATE BONDS
GLOBAL MARKET	0.57%	1.12%
ABP	0,56%	Portfolio not provided for assessment
Alecta	0,00%	0,20%
AMF Pension	0,12%	0,00%
AP Fonden 1	0,44%	0,21%
AP Fonden 2	0,32%	0,33%
AP Fonden 3	0,25%	0,00%
AP Fonden 4	0,25%	0,02%
AP Fonden 7	0,51%	Has no corporate bond portfolio
ATP	1,89%	Portfolio not provided for assessment
CNP Assurances	0,23%	0,65%
Crédit Agricole Assurances	0,21%	0,84%
Danica Pension	0,65%	0,74%
DNB Liv	0,27%	0,01%
Elo Mutual Pension Insurance	0,27%	0,52%
Folksam	0,20%	Has no corporate bond portfolio
Government Pension Fund Global	0,21%	0,20%
Government Pension Fund Norway	0,01%	0,00%
Ilmarinen	0,22%	0,23%
Industriens Pension	0,46%	0,55%
Keva	0,20%	0,17%
KLP Liv	0,42%	0,31%
Nordea Life&Pension	0,17%	0,09%
PenSam	0,31%	0,69%
PensionDanmark	0,56%	0,36%
PFA Pension	0,39%	0,61%
PFZW	0,49%	1,16%
PKA	1,06%	Not disclosed
Rabobank Pensioenfond	0,78%	0,33%
Sampension	0,68%	0,07%
Skandia Liv	0,20%	0,00%
State Pension	0,20%	0,96%
Storebrand Liv	0,06%	0,07%
Varma	0,05%	0,37%

Figure 8 shows asset owners' 2018-2023 trajectory for coal power. The investment plans of portfolio companies in the asset owners' aggregated public equity and corporate bond portfolios are on a path that aligns approximately with the IEA 2.7°C pathway (NPS).

FIGURE 8. ASSET OWNERS' COAL POWER TRAJECTORY BETWEEN 2018 AND 2023 (2° INVESTING INITIATIVE)

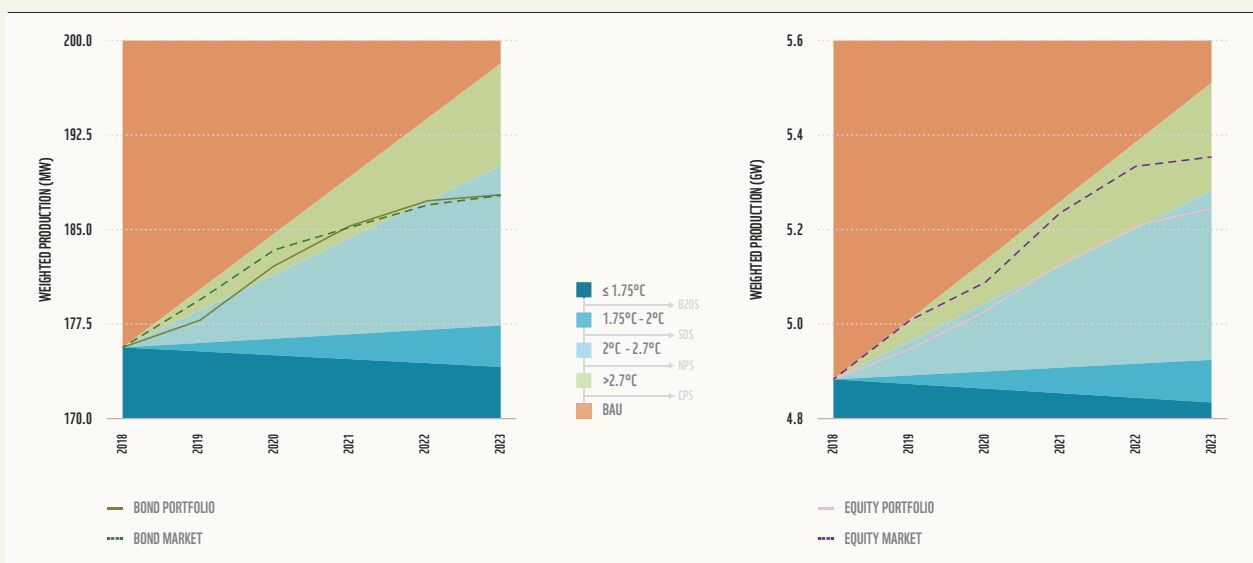
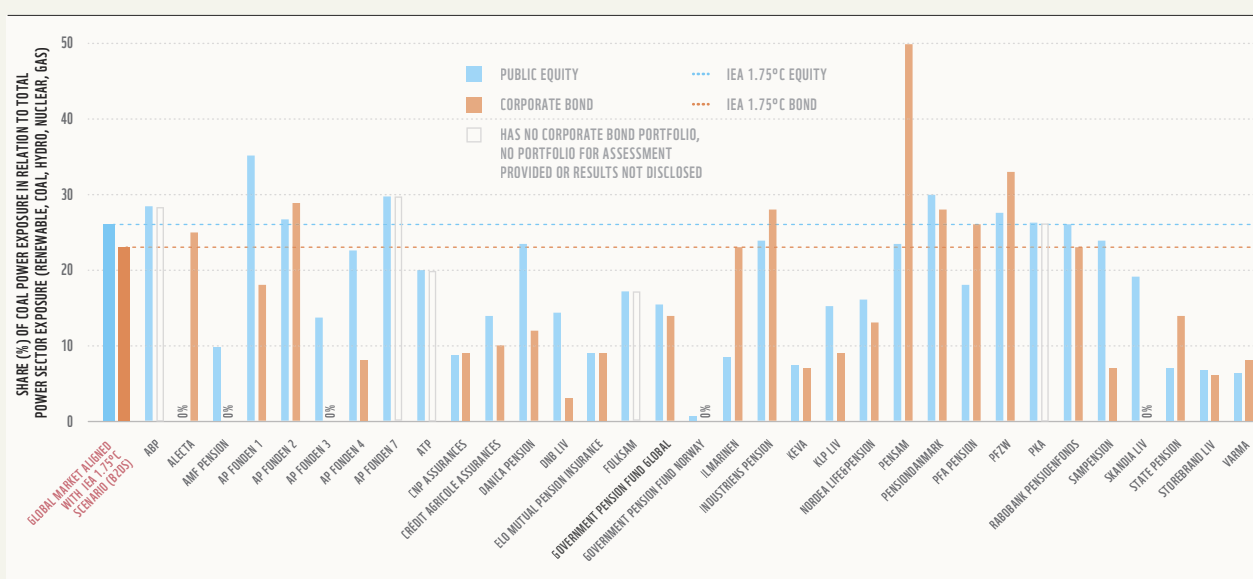


Figure 9 shows asset owners' 2023 exposure to coal power. The majority of asset owners' public equity and corporate bond portfolios will have a lower share of coal power in 2023 than that of a market aligned with the IEA 1.75°C pathway (B2DS).

FIGURE 9. ASSET OWNERS' EXPOSURE TO COAL POWER IN 2023 (2° INVESTING INITIATIVE)



COAL MINING

Figure 10 shows asset owners' 2017 exposure to coal mining by asset class, as well as the exposure of the global market. It indicates that a majority of asset owners' public equity and corporate bond portfolios is less exposed than the global market. It should be noted that coal mining in this report covers both thermal and metallurgical coal.

FIGURE 10. ASSET OWNERS' EXPOSURE TO COAL MINING AT THE END OF 2017 (2^o INVESTING INITIATIVE)

NAME	WEIGHT (BY MARKET VALUE) OF ISSUERS EXPOSED TO COAL MINING AT END OF 2017	
	PUBLIC EQUITY	CORPORATE BONDS
GLOBAL MARKET	0.67%	0.68%
ABP	0.62%	Portfolio not provided for assessment
Alecta	1.01%	0.00%
AMF Pension	0.06%	0.00%
AP Fonden 1	0.32%	0.18%
AP Fonden 2	0.25%	0.40%
AP Fonden 3	0.34%	0.00%
AP Fonden 4	0.45%	0.00%
AP Fonden 7	0.52%	Has no corporate bond portfolio
ATP	0.00%	Portfolio not provided for assessment
CNP Assurances	0.12%	0.90%
Crédit Agricole Assurances	0.11%	0.52%
Danica Pension	0.36%	1.14%
DNB Liv	0.48%	0.02%
Elo Mutual Pension Insurance	0.98%	1.26%
Folksam	0.28%	Has no corporate bond portfolio
Government Pension Fund Global	0.61%	0.04%
Government Pension Fund Norway	0.00%	0.00%
Ilmarinen	0.17%	0.45%
Industriens Pension	0.23%	0.35%
Keva	0.17%	0.00%
KLP Liv	0.22%	0.12%
Nordea Life&Pension	0.18%	0.02%
PenSam	0.61%	0.26%
PensionDanmark	0.35%	0.47%
PFA Pension	0.19%	0.38%
PFZW	0.45%	1.38%
PKA	0.62%	Not disclosed
Rabobank Pensioenfonds	0.65%	0.49%
Sampension	0.60%	0.00%
Skandia Liv	0.71%	0.00%
State Pension	0.00%	0.00%
Storebrand Liv	0.21%	0.00%
Varma	0.00%	0.00%

Figure 11 shows asset owners' 2018-2023 trajectory for coal mining. Investment plans for portfolio companies in the aggregated asset owners' public equity and corporate bond portfolios are on a trajectory that approximately aligns with the IEA BAU pathway (CPS).

FIGURE 11. ASSET OWNERS' COAL MINING TRAJECTORY BETWEEN 2018 AND 2023 (2° INVESTING INITIATIVE)

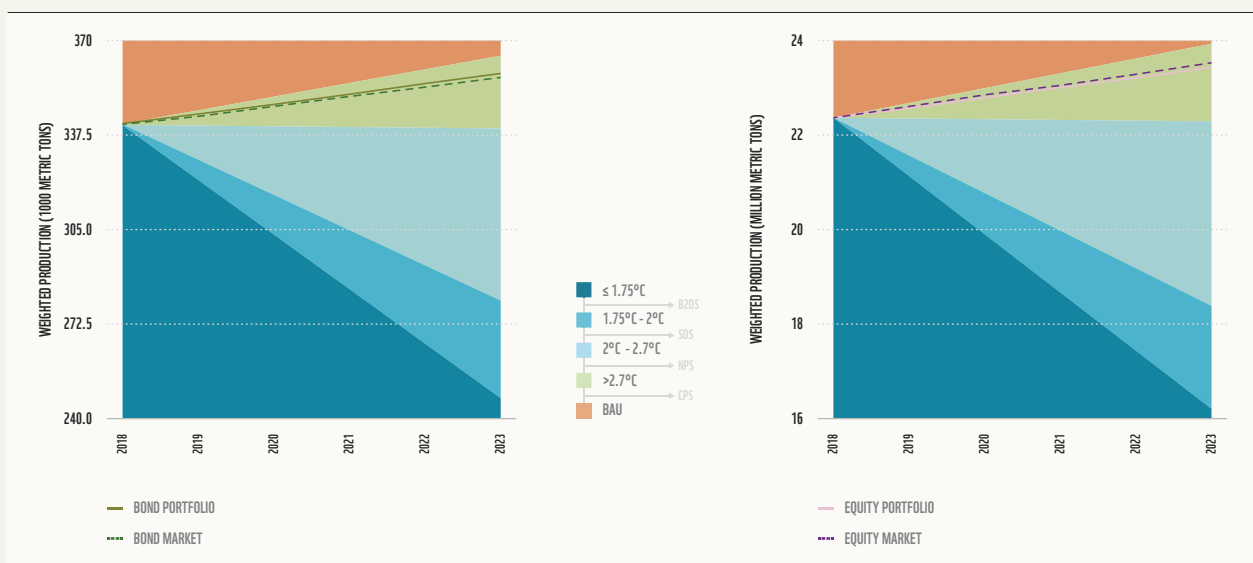
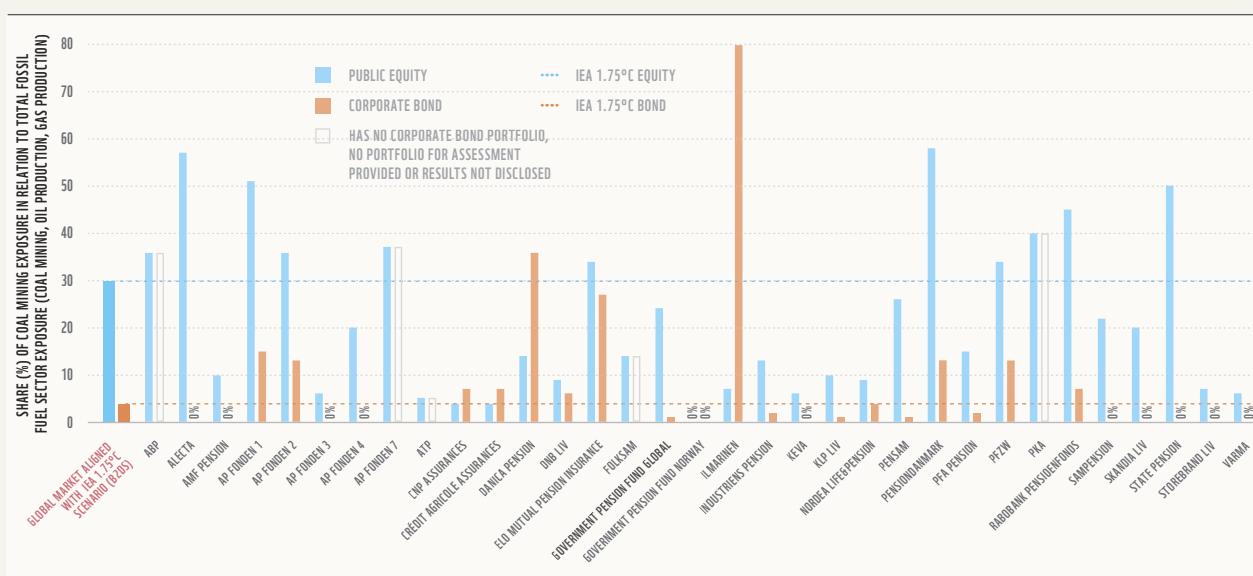


Figure 12 shows asset owners' 2023 exposure to coal mining. A majority of asset owners' public equity and corporate bond portfolios will have a lower coal mining share in 2023 than that of a market aligned with the IEA 1.75°C pathway (B2DS).

FIGURE 12. ASSET OWNERS' EXPOSURE TO COAL MINING IN 2023 (2° INVESTING INITIATIVE)



OIL PRODUCTION

Figure 13 shows asset owners' 2017 exposure to oil production by asset class, as well as the exposure of the global market. It indicates that a majority of asset owners' public equity and corporate bond portfolios is less exposed than the global market.

FIGURE 13. ASSET OWNERS' EXPOSURE TO OIL PRODUCTION AT THE END OF 2017 (2^o INVESTING INITIATIVE)

NAME	WEIGHT (BY MARKET VALUE) OF ISSUERS EXPOSED TO OIL PRODUCTION AT END OF 2017	
	PUBLIC EQUITY	CORPORATE BONDS
GLOBAL MARKET	2.45%	2.00%
ABP	2,10%	Portfolio not provided for assessment
Alecta	0,00%	0,00%
AMF Pension	1,69%	0,00%
AP Fonden 1	0,87%	0,33%
AP Fonden 2	0,82%	0,73%
AP Fonden 3	2,28%	0,00%
AP Fonden 4	1,82%	0,00%
AP Fonden 7	1,92%	Has no corporate bond portfolio
ATP	0,21%	Portfolio not provided for assessment
CNP Assurances	7,12%	2,24%
Crédit Agricole Assurances	2,44%	1,30%
Danica Pension	2,06%	1,23%
DNB Liv	3,95%	0,20%
Elo Mutual Pension Insurance	1,34%	1,14%
Folksam	1,45%	Has no corporate bond portfolio
Government Pension Fund Global	2,48%	0,44%
Government Pension Fund Norway	8,33%	3,75%
Ilmarinen	1,54%	0,67%
Industriens Pension	1,88%	2,86%
Keva	2,94%	0,00%
KLP Liv	3,59%	1,72%
Nordea Life&Pension	0,98%	0,11%
PenSam	1,95%	2,40%
PensionDanmark	0,60%	1,43%
PFA Pension	2,00%	2,46%
PFZW	1,63%	4,20%
PKA	1,34%	Not disclosed
Rabobank Pensioenfond	1,60%	0,73%
Sampension	2,61%	0,00%
Skandia Liv	1,48%	0,00%
State Pension	0,18%	0,00%
Storebrand Liv	3,51%	0,00%
Varma	0,20%	0,11%

Figure 14 shows asset owners' 2018-2023 trajectory for oil production. The investment plans of portfolio companies in their aggregated public equity portfolios are well above the IEA 2.7°C pathway (NPS), while for corporate bond portfolios they are closer to—but still above—the IEA 2°C pathway (SDS).

FIGURE 14. ASSET OWNERS' OIL PRODUCTION TRAJECTORY BETWEEN 2018 AND 2023 (2° INVESTING INITIATIVE)

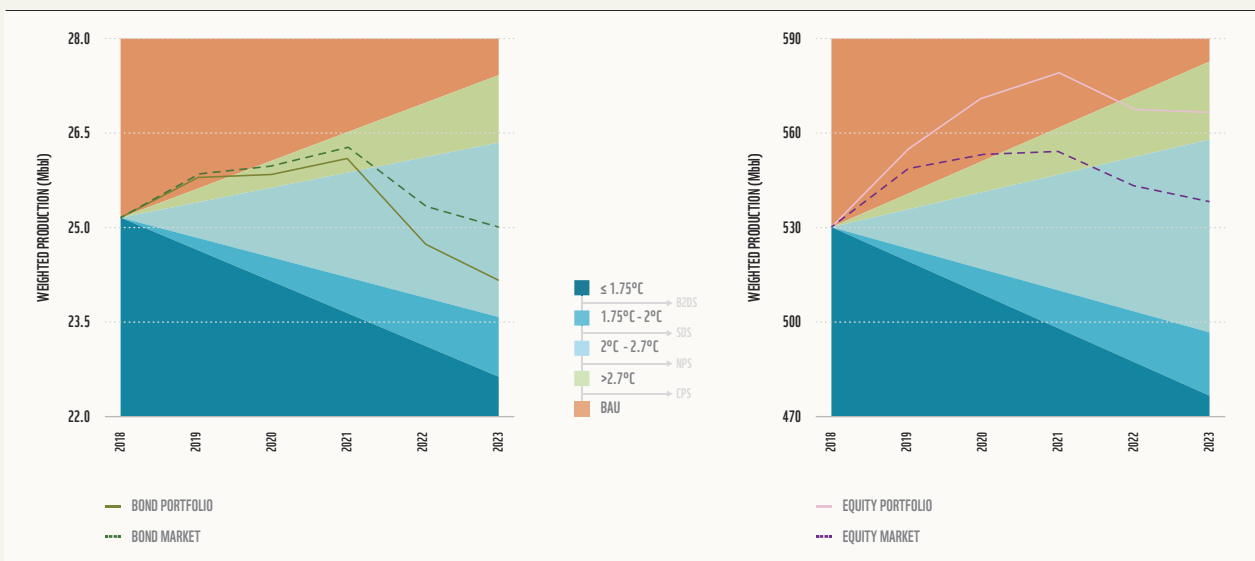
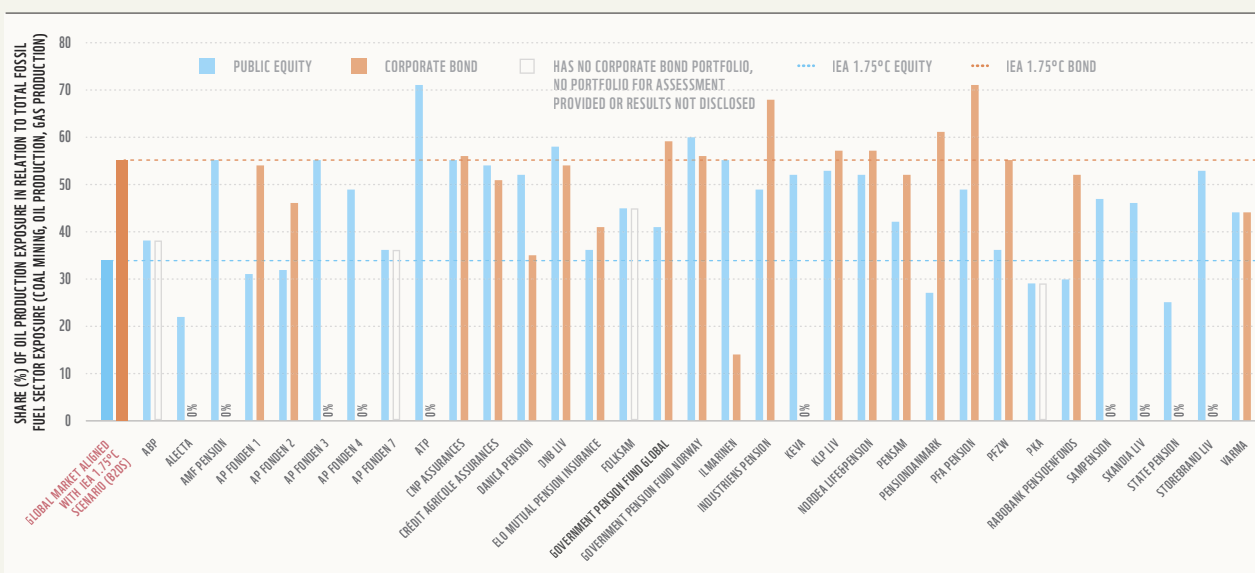


Figure 15 shows asset owners' 2023 exposure to oil production. The majority of asset owners' public equity portfolios will have a higher oil production share in 2023 than that of a market aligned with the IEA 1.75°C pathway (B2DS). However, the reverse is true for corporate bond portfolios.

FIGURE 15. ASSET OWNERS' EXPOSURE TO OIL PRODUCTION IN 2023 (2° INVESTING INITIATIVE)



GAS PRODUCTION

Figure 16 shows asset owners' 2017 exposure to gas production by asset class, as well as the exposure of the global market. It indicates that a majority of asset owners' public equity and corporate bond portfolios is less exposed than the global market.

FIGURE 16. ASSET OWNERS' EXPOSURE TO GAS PRODUCTION AT THE END OF 2017 (2° INVESTING INITIATIVE)

NAME	WEIGHT (BY MARKET VALUE) OF ISSUERS EXPOSED TO OIL PRODUCTION AT END OF 2017	
	PUBLIC EQUITY	CORPORATE BONDS
GLOBAL MARKET	1.72%	1.52%
ABP	1.70%	Portfolio not provided for assessment
Alecta	0.00%	0.00%
AMF Pension	0.99%	0.00%
AP Fonden 1	0.59%	0.24%
AP Fonden 2	0.70%	0.56%
AP Fonden 3	1.55%	0.00%
AP Fonden 4	1.18%	0.00%
AP Fonden 7	1.25%	Has no corporate bond portfolio
ATP	0.19%	Portfolio not provided for assessment
CNP Assurances	5.38%	1.65%
Crédit Agricole Assurances	1.90%	1.12%
Danica Pension	1.17%	1.40%
DNB Liv	2.70%	0.11%
Elo Mutual Pension Insurance	1.25%	1.58%
Folksam	1.16%	Has no corporate bond portfolio
Government Pension Fund Global	1.83%	0.27%
Government Pension Fund Norway	7.49%	3.75%
Ilmarinen	0.88%	0.17%
Industriens Pension	1.27%	2.27%
Keva	2.45%	0.00%
KLP Liv	2.76%	1.20%
Nordea Life&Pension	0.63%	0.07%
PenSam	1.44%	2.16%
PensionDanmark	0.58%	1.21%
PFA Pension	1.61%	0.99%
PFZW	1.27%	3.26%
PKA	1.29%	Not disclosed
Rabobank Pensioenfond	1.37%	0.66%
Sampension	1.79%	0.00%
Skandia Liv	1.13%	0.00%
State Pension	0.02%	0.00%
Storebrand Liv	2.86%	0.00%
Varma	0.19%	0.19%

Figure 17 shows asset owners' 2018-2023 trajectory for gas production. The investment plans of portfolio companies in the asset owners' aggregated public equity and corporate bond portfolios are below the IEA 1.75°C pathway (B2DS).

FIGURE 17. ASSET OWNERS' GAS PRODUCTION TRAJECTORY BETWEEN 2018 AND 2023 (2° INVESTING INITIATIVE)

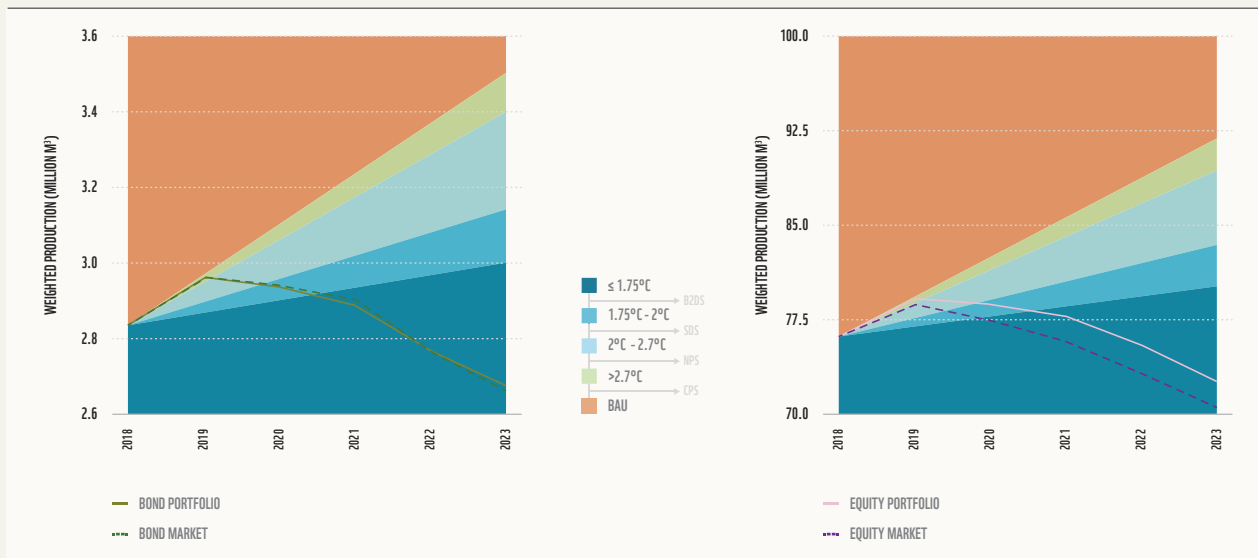
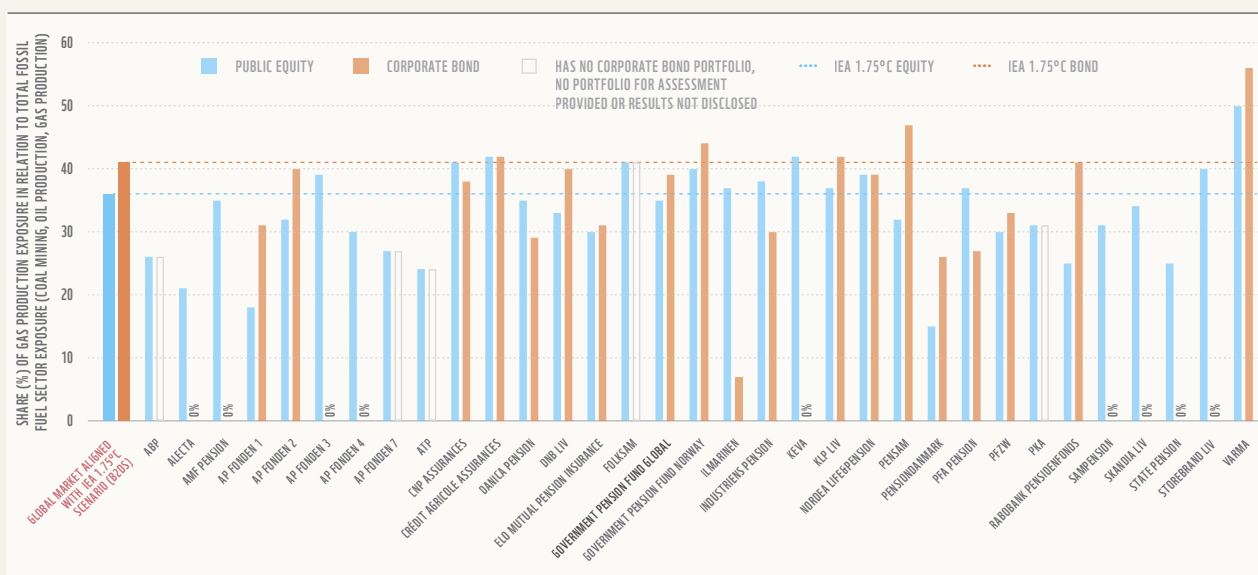


Figure 18 shows asset owners' 2023 exposure to gas production. The majority of asset owners' public equity and corporate bond portfolios will have a lower share of gas production than that of a market aligned with the IEA 1.75°C pathway (B2DS).

FIGURE 18. ASSET OWNERS' EXPOSURE TO GAS PRODUCTION IN 2023 (2° INVESTING INITIATIVE)



**Interpretation
of findings**

**MUCH GREATER EFFORTS
ARE NEEDED TO ENSURE
THAT PUBLIC EQUITY AND
CORPORATE BOND
INVESTMENTS ALIGN WITH
THE IEA 1.75°C SCENARIO.**

Overall, the 33 asset owners' climate alignment findings show that much greater efforts are needed to ensure that public equity and corporate bond investments align with the IEA 1.75°C scenario.

There are encouraging indications that asset owners are partly aligned with the IEA 1.75°C scenario for some of the technologies included in this research. This may reflect a combination of factors such as engagement with portfolio companies, portfolio reallocation and divestment, a portfolio's geographic distribution, prevalence of investments in domestic markets, investment mandates, etc. However, we observe that none of the asset owners is aligned for all technologies.

These results are unsurprising, as diversified and universal asset owners' public equity and corporate bond portfolios typically aim to reflect the global economy,⁴⁸ which itself is on a path to an estimated 3.4°C warming.⁴⁹ Research by Mirova shows that most mainstream equity and bond indices (e.g. S&P 500, MSCI World) are actually on a 5°C warming path.⁵⁰

⁴⁸ More precisely, those listed companies and companies that have issued corporate bonds.

⁴⁹ Climate Action Tracker (November 2017), The CAT thermometer.

⁵⁰ Mirova (January 2018), Estimating Portfolio Coherence with Climate Scenarios.

ASSET OWNER DISCLOSURE

Undertaking these climate alignment assessments relies on being able to access asset owners’ underlying public equity and corporate bond portfolio holdings. WWF identified the largest asset owners in 11 countries and asked 88 of them to share the holding information required for this analysis. Figure 19 provides an overview of how asset owners responded to this outreach, broken down by country of headquarters (at the end of 2017).⁵¹

42 out of 88 asset owners agreed to assess their public equity and corporate bond holdings in the context of this project, and **33 asset owners agreed to disclose their climate alignment results in this report.**⁵² **WWF applauds these asset owners for demonstrating best practice by disclosing forward-looking climate scenario analyses.**

54 OUT OF 88 CONTACTED ASSET OWNERS (61 PERCENT) ARE ACTIVELY ENGAGING IN FORWARD-LOOKING CLIMATE SCENARIO ANALYSIS.

Compared to a similar outreach effort in 2017, WWF is encouraged to find that asset owner participation has increased. In addition, a new category of asset owners—those that conduct their own forward-looking climate scenario analyses, either internally or with consultants—emerged this year; recent developments such as the article 173(iv) of the French Energy Transition Law and the TCFD recommendations have contributed to this positive trend. Taken together, the number of asset owners actively engaging in forward-looking climate scenario analysis now stands at 54, which represents 61 percent of the total.

On the opposite side of the spectrum, the share of asset owners that did not respond or that declined to participate without providing a valid explanation decreased compared to 2017 (from 48 to 39 percent).⁵³ **These development indicate a growing recognition among asset owners of the importance of climate-related financial risks and opportunities.**

⁵¹ WWF recognizes that asset owners’ presence can extend in some cases beyond the country of their headquarters. We have sought to assess the climate alignment of asset owners at the highest organisational (i.e. group) level: in some cases this has meant combining investment portfolios of several independent subsidiaries that each make their own strategic investment decisions.

⁵² Asset owners that shared holdings data solely with WWF (or its technical partner 2° Investing Initiative) were asked if they were willing to disclose the climate alignment

findings. For asset owners that publicly disclose public equity and/or corporate bond holdings data – either voluntarily or as a result of domestic regulation – the climate alignment findings for the respective asset class(es) were automatically included in the research.

⁵³ The findings of the 2017 outreach are included in the WWF (2017) European asset owners: 2°C alignment and misalignment of public equity portfolios.

FIGURE 19. OVERVIEW OF HOW THE 88 ASSET OWNERS RESPONDED TO WWF'S REQUEST TO UNDERTAKE A CLIMATE ALIGNMENT ASSESSMENT

COUNTRY OF HEADQUARTERS (AT END OF 2017)	DID THE ASSET OWNER AGREE TO UNDERTAKE A CLIMATE ALIGNMENT ASSESSMENT?				
	YES, AND AGREED TO DISCLOSE RESULTS IN THE REPORT ⁵⁴	YES, BUT DID NOT DISCLOSE RESULTS	NO, BUT IT IS ENGAGED IN OTHER CLIMATE INITIATIVES	NO, BUT CONSIDERED OUR REQUEST	DID NOT RESPOND
Belgium		1 asset owner			
Denmark	ATP, Danica Pension, Industriens Pension, Pensam, PensionDanmark, PFA Pension, PKA, Sampension				
Finland	Elo Mutual Pension Insurance, Ilmarinen, Keva, State Pension, Varma				
France	CNP Assurances, Crédit Agricole Assurances	2 asset owners	4 asset owners		3 asset owners
Germany		2 asset owners		2 asset owners	7 asset owners
Italy				1 asset owner	
Netherlands	ABP, PFZW, Rabobank Pensioenfond	1 asset owner	1 asset owner	4 asset owners	5 asset owners
Norway	DNB Liv, Government Pension Fund Global, Government Pension Fund Norway, KLP Liv, Storebrand Liv				
Spain			1 asset owner		
Sweden	Alecta, AMF Pension, AP1, AP2, AP3, AP4, AP7, Folksam, Nordea Life&Pension, Skandia Liv				
United Kingdom		3 asset owners	6 asset owners	6 asset owners	6 asset owners
TOTAL (percentage of 88 contacted asset owners)	33 (37%)	9 (10%)	12 (14%)	13 (15%)	21 (24%)

WWF OBSERVES A CLEAR DIFFERENCE BETWEEN COUNTRIES IN TERMS OF WILLINGNESS TO PARTICIPATE AND DISCLOSE CLIMATE ALIGNMENT FINDINGS.

WWF observes a clear difference between countries in terms of willingness to participate and disclose climate alignment findings. In Nordic countries (Denmark, Finland, Norway, Sweden) there is extensive disclosure of climate alignment results. In the Netherlands and France - which has pioneered an innovative comply-or-explain approach to climate-related disclosures under article 173(vi) of its energy transition law⁵⁵, there is some degree of disclosure. In other countries (Belgium, Germany, Italy, Spain, United Kingdom) there is zero disclosure.

WWF calls on governments, central banks and financial regulators to establish harmonised frameworks that guarantee transparency of holdings data and forward-looking climate scenario assessment. WWF will also continue to engage with asset owners to encourage them to consider and implement good voluntary disclosure practices.

⁵⁴ WWF included asset owners in the category 'yes, and agreed to disclose results in the report' as soon as they disclosed climate alignment results for one asset class.

⁵⁵ UN PRI (2016), French Energy Transition Law: Global investor briefing on Article 173.

BOX 4. OVERVIEW OF CURRENT INITIATIVES ON FORWARD-LOOKING CLIMATE ASSESSMENTS

The recommendations by the TCFD⁵⁶ have spurred an increasing number of forward-looking climate assessment initiatives from asset owners, governments, central banks and financial regulators.

Asset owner initiatives:

- In March 2018, UN Environment, together with nine investors from six countries—representing close to US\$ 3 trillion of assets under management—formed a leadership group to promote climate transparency by the investor community.⁵⁷ This group will focus on developing the analytical tools and indicators needed to assess and disclose their exposures to the risks and opportunities presented by climate change. It will make the jointly-developed scenarios, models and approaches publicly available at the end of the project.
- AXA was the laureate of the 2° Invest Award, organised by the French Ministry of Environment in 2016 to “enable the fostering of innovation and promotion of existing best-practices in climate disclosure aligned with the requirements of Article 173(vi) of the French Energy Transition Law” adopted in 2015.⁵⁸ Since then, multiple French asset owners, including 13 French insurance companies have also used, and partially disclosed, forward-looking climate assessments in their annual reports and filings under article 173(vi). A first assessment of climate-related disclosures according to Article 173 by French insurance companies was published by WWF in November 2017⁵⁹ and a second edition of this publication, conducted in cooperation with the French think-tank Institute for Climate Economics (I4CE) was published in November 2018.
- TPT Retirement Solutions in the UK was the second laureate of the 2° Invest Award. Their reporting discloses results from multiple forward-looking climate scenario assessment tools.⁶⁰

⁵⁶ FSB Task Force on Climate-related Financial Disclosures (2017a), Final report: recommendations of the Task Force on Climate-related Financial Disclosures.

⁵⁷ UN Environment (2018), Pilot project on implementing the TCFD recommendations for investors. The group of 20 investors includes the following asset owners/asset owners’ internal investment managers that are also part of the WWF project: Aviva, Caisse des Dépôts, NBIM (investment manager of GPF), Nordea Investment Management and Storebrand Asset Management.

⁵⁸ AXA (2016), Award on Investor Climate-related Disclosures. 2° Investing Initiative (2018), Lighting the way to best practice: climate reporting aware case studies.

⁵⁹ WWF-France (2017), Reporting de l’Article 173(vi). Des épargnants lost in translation!

⁶⁰ TPT Retirement Solutions (2016), Climate Change Disclosure Report Risk and opportunities in the growth portfolio.

BOX 4. OVERVIEW OF CURRENT INITIATIVES ON FORWARD-LOOKING CLIMATE ASSESSMENT continued

Governments, central banks and financial regulators:

- Article 173(vi) of the French Energy Transition Law requires institutional investors to report on climate-related risks, their contribution to the international climate goals and their contribution to the ecological and energy transition.⁶¹ WWF-France has been conducting detailed evaluations of climate-related disclosures of major insurance companies since 2017.⁶²
- The Swiss Federal Office for the Environment (FOEN) and the State Secretariat for International Financial Matters (SIF) have asked all Swiss pension funds and insurers to assess how their portfolios align with the 2°C scenario. The aggregated results were published in a dedicated research report.⁶³
- The California Insurance Commissioner has assessed the climate alignment of all insurance companies within its jurisdiction and published aggregated results online.⁶⁴
- The UK Parliament's Environment Audit Committee has written to the 25 largest pension funds asking whether and how they address climate-related financial risk; it has published an assessment of their responses.⁶⁵
- The Dutch central bank, DNB, published a new report focused on energy transition risk, testing four energy scenarios and their impact on the Dutch financial system.⁶⁶
- The Governor of the French central banks, François Villeroy de Galhau, publicly stated in April 2018 that "we should develop forward-looking carbon stress tests for both insurance companies and banks".⁶⁷
- Other central banks and financial regulators are currently undertaking or considering climate scenario assessments, most notably as part of the global Central Banks and Supervisors Network for Greening the Financial System. This network that gathers 17 national central banks and financial supervisors, the European Central Bank, and additional observers like the Bank for International Settlements (BIS) has integrated climate scenario analysis in its two-year work plan.⁶⁸

⁶¹ UN PRI (2016), French Energy Transition Law: Global investor briefing on Article 173.

⁶² WWF-France (2017), Reporting de l'Article 173 (vi): Des épargnants lost in translation!

⁶³ 2° Investing Initiative (2017), Out of the fog: quantifying the alignment of Swiss pension funds and insurances with the Paris Agreement.

⁶⁴ California Department of Insurance (2018), Scenario analysis: assessing climate change transition risk in insurer portfolios.

⁶⁵ UK Parliament (25 May 2018), UK's top 25 Pension funds show mixed response to climate change.

⁶⁶ DNB (2018), An energy transition risk stress test for the financial system of the Netherlands.

⁶⁷ François Villeroy de Galhau, Governor of the Banque de France, Keynote speech at the High-Level International Climate Risk Conference for Supervisors, 6 April 2018.

⁶⁸ Central Banks and Supervisors Network for Greening the Financial System (2018), WorkStream 1 (Microprudential/supervisory workstream) mandate and workplan from 2018 to April 2020.



WWF RECOMMENDATIONS

Recommendations to asset owners

WWF's Climate Guide to Asset Owners is summarised in a 15-step journey that allows asset owners to begin aligning their investments with the Paris Agreement. These topline recommendations, presented below, are aimed at traditional well-diversified asset owners with long-term investment horizons, irrespective of whether they have any commitment to being responsible.

LEARNING AND SEEKING ADVICE

1. Assess the evidence of climate-related financial risks and opportunities.
2. Use tools to measure portfolio climate risks and portfolio alignment with climate goals.
3. Assess the regulatory and policy context and ensure TCFD-aligned reporting.

DECISION-MAKING

4. Adopt climate-related investment beliefs.
5. Establish a climate governance structure.
6. Integrate climate change in investment policy.
7. Adjust strategic asset allocation to harness climate-related opportunities.
8. Adopt sector-specific policies.
9. Develop tools and metrics to set climate science based targets.

MONITORING SERVICE PROVIDERS AND ENGAGING WITH KEY STAKEHOLDERS

10. Work collectively with other institutional investors.
11. Closely monitor investment managers.
12. Closely monitor other service providers.
13. Engage forcefully with portfolio companies.
14. Engage forcefully with policy makers.
15. Engage with members and beneficiaries.

BOX 5. WWF ASSET OWNER GUIDES

WWF has published a range of guides for asset owners, providing recommendations on how asset owners can address climate-related risks and opportunities and gradually align their investment portfolios with the Paris Agreement. WWF developed an overarching [Climate Guide to Asset Owners](#), summarised in a [15-step journey](#). In addition, WWF believes that asset owners need to develop more granular climate policies in key sectors in terms of climate impact. These should include:

- Criteria that identify companies within the given sectors able to align their business model with the Paris Agreement.
- Guidance on how asset owners will urge investee companies to adopt well below 2°C transition plans through active ownership.
- An indication how and when asset owners will reduce their exposure or divest from companies that are unable or unwilling to transition in a timely manner.

WWF has developed criteria for [electric power utilities](#) and [coal mining](#) companies in its sectoral guides; it is currently working on an additional guide for the oil and gas sector. These guides could be helpful to asset owners wishing to act on those climate-relevant technologies included in this research.

The findings of this research report highlight the need for asset owners to undertake and disclose forward-looking climate assessment as part of their 15-step journey, as well as to work towards full disclosure of underlying holdings data.

Asset owners have different strategies and operate under different jurisdictions. WWF therefore aims to establish constructive bilateral dialogues with asset owners, to support them in better capturing the specifics of their own situation and adequately tailoring their recommendations.

BOX 6. SCIENCE-BASED TARGET INITIATIVE FOR FINANCIAL INSTITUTIONS

Asset owners that are climate leaders have started to consider how to complement the measurement of climate risk and portfolio alignment of their investments with setting climate science-based targets that will allow to measure actual progress against their commitment, and how to align their investment portfolio with the Paris Agreement.

The Science-Based Targets initiative (SBTi) is championing voluntary science-based target setting as a powerful way of boosting companies' competitive advantage in transitioning to the low-carbon economy. This is a collaboration between the United Nations Global Compact (UNGC), CDP, World Resources Institute (WRI), and WWF. In October 2018, 498 companies in 43 different economic sectors and 38 countries globally had committed or validated a Science-Based Target. That number is growing every week.

The SBTi partners are currently developing target-setting methods and implementation guidance for financial institutions to set science-based targets for their investing and lending activities. Ecofys, part of Navigant, and the 2° Investing Initiative are providing technical support on developing the methodology. A prototype tool will be built by early 2019, and the final tool will be ready by early 2020.

The target-setting framework is being developed through an inclusive, multi-stakeholder process, ensuring its practicality and validity for financial institutions. We warmly encourage asset owners to contact WWF to join the Stakeholder Advisory Group of this initiative.

Recommendations to policy makers

WWF recommends that policy makers put in place the necessary frameworks for investors to: (1) assess and disclose the degree of alignment of their portfolio with the Paris climate goals and their climate-related value at risk and (2) incentivise such portfolio alignment to contribute to the Paris Agreement, reduce investors' climate-related value at risk and maximise climate-related investment opportunities. Such framework measures should include:

- **Swiftly transpose the recommendations of the Financial Stability Board's Task Force on Climate-related Financial Disclosures (TCFD) into EU and/or national regulation**, including the TCFD highlight on forward-looking climate scenario analysis that enables investors to assess and disclose their degree of alignment with the Paris climate goals. Major opportunities include the Disclosure regulation, the European Supervisory Authorities package and the forthcoming review of the Non-Financial Reporting Directive.
- **Building on national best practice, gradually ensure greater public disclosure of holdings data** across a broad range of asset classes, to the benefit of asset owners, their members and regulators. Publication of those assessments and the underlying holdings data increases confidence, and builds momentum across the investor community. There is scope for voluntary commitments to become mandatory overtime. Climate alignment assessments can be carried out internally, by the regulator or by third parties.

**Recommendations to
financial regulators and
central banks**

WWF recommends financial regulators and central banks to:

- **Perform forward-looking climate scenario analysis** to assess the degree of alignment of national and EU financial markets with the Paris climate goals and disclose aggregate results, building on the precedents of several central banks and financial regulators (see Box 4).
- **Develop common methodologies and guidance** for forward-looking climate scenario analysis of financial portfolios, building on standardised climate scenarios including a well below 2°C scenario consistently with the Paris Agreement - including through the global Central Banks and Supervisors Network for Greening the Financial System. This is necessary to help financial institutions swiftly familiarise themselves with, and integrate these approaches.



ANNEX 1: LIST OF ASSET OWNERS CONTACTED BY WWF

WWF has engaged with 88 of Europe's 100 largest asset owners across 11 countries, with the aim of establishing a constructive conversation on how their public equity and corporate bond portfolios can align with the Paris climate goals.

While WWF does engage on portfolio alignment with Swiss asset owners, these have not been included here in order to avoid duplication of the work of the Swiss Federal Office for the Environment (FOEN) and the State Secretariat for International Financial Matters (SIF). All Swiss pension funds and insurers were asked to assess the alignment of their portfolio with the 2°C scenario. The aggregated results were published in a dedicated research report.⁶⁹ The Swiss association Klima Allianz encouraged asset owners to disclose individual climate alignment results, with three asset owners committing to do so.⁷⁰

WWF had initially included Old Mutual and Standard Life in its contact list. These two asset owners underwent significant corporate changes over the last year: WWF engaged with the relevant new entities, but considered it too preliminary to include in the report.

The names of those asset owners whose climate alignment results are disclosed in this report are indicated in bold. WWF encourages other asset owners to reach out to the relevant WWF national offices if they wish to consider undertaking a forward-looking climate alignment assessment.

⁶⁹ 2° Investing Initiative (2017), *Out of the fog: quantifying the alignment of Swiss pension funds and insurances with the Paris Agreement*.

⁷⁰ Klima Allianz (23 October 2017), *Pensionskassen ohne Transparenz finanzieren Klimakatastrophe*.

NAME	COUNTRY OF HEADQUARTERS (AT END OF 2017) ⁷¹
ABN AMRO Pensioenfonds	Netherlands
ABP	Netherlands
Achmea IM	Netherlands
Aegon	Netherlands
Ageas Group	Belgium
Alecta	Sweden
Allianz Group	Germany
AMF Pension	Sweden
AP Fonden 1	Sweden
AP Fonden 2	Sweden
AP Fonden 3	Sweden
AP Fonden 4	Sweden
AP Fonden 7	Sweden
ATP	Denmark
Aviva	U.K.
AXA Group	France
BAE Systems Pension Fund	U.K.
Barclays Bank U.K.	U.K.
Bayerische Versorgungskammer	Germany
BNP Paribas Cardif	France
BP Pension Fund	U.K.
British Airways Pension Fund	U.K.
British Coal Pension Schemes	U.K.
BT Group Pension Scheme	U.K.
BVV	Germany
Caisse des Dépôts	France
CNP Assurances	France
Covéa Group	France
Crédit Agricole Assurances	France
Daimler Pension Fund	Germany
Danica Pension	Denmark
DNB Livsforsikring	Norway
Electricity Supply Pension Fund	U.K.
Elo Mutual Pension Insurance	Finland
Entsorgungsfond	Germany
ERAFP	France
Folksam	Sweden
FRR	France
Generali Group	Italy
Government Pension Fund Global	Norway
Government Pension Fund Norway	Norway
Greater Manchester Pension Fund	U.K.
Groupama	France
Hannover Re	Germany
HSBC Bank Pension Fund	U.K.
Ilmarinen	Finland

NAME	COUNTRY OF HEADQUARTERS (AT END OF 2017) ⁷¹
Industriens Pension	Denmark
ING Pensioenfonds	Netherlands
Keva	Finland
KLP Livsforsikring	Norway
Legal & General Group	U.K.
Lloyds Banking Group Staff Pension Plans	U.K.
Mapfre	Spain
Munich Re Group	Germany
National Grid Pension Fund	U.K.
Natixis Assurances	France
NN Investment Partners	Netherlands
Nordea Life&Pension⁷²	Sweden
Nürnbergger	Germany
Phoenix Group	U.K.
Pensam	Denmark
Pensioenfonds Metaal en Techniek (PMT)	Netherlands
Pensioenfonds Metalelektro (PME)	Netherlands
Pensioenfonds PGB	Netherlands
Pensioenfonds Vervoer	Netherlands
Pensioenfonds voor de Bouw (bpfBOUW)	Netherlands
PensionDanmark	Denmark
PFA Pension	Denmark
PFZW	Netherlands
PKA	Denmark
Prudential	U.K.
Rabobank Pensioenfonds	Netherlands
Railways Pensions	U.K.
Royal Bank of Scotland Group	U.K.
Royal Dutch Shell Pension Fund	Netherlands
Royal London Group	U.K.
Sampension	Denmark
Skandia Liv	Sweden
Société Générale SOGECAP	France
State Pension	Finland
Storebrand Livsforsikring	Norway
Strathclyde Pension Fund	U.K.
Talanx Group	Germany
Unilever Pension Fund	U.K.
Universities Superannuation Scheme	U.K.
Varma	Finland
VBL	Germany
Versicherungskammer Bayern	Germany

⁷¹ WWF recognizes that asset owners' presence can extend in some cases beyond the country of their headquarters. We have sought to assess the climate alignment of asset owners at the highest organisational (i.e. group) level: in some cases this has meant combining investment portfolios of several independent subsidiaries that each make their own strategic investment decisions.

⁷² The Nordea headquarters was moved to Finland as from 1 October 2018, but was located in Sweden at the time of data compilation for assessed portfolios (31/12/2017). Nordea Life and Pension has subsidiaries in Finland, Norway and Sweden, while Nordea Group is active primarily in Denmark, Finland, Norway and Sweden.

ANNEX 2: RESEARCH METHODOLOGY

This research aims to identify how the public equity and corporate bond holdings of the largest European asset owners align with the internationally-agreed target of keeping global warming well below 2°C from the Paris Agreement. It covers five climate relevant technologies: coal power, renewable power, coal mining, oil production and gas production. The following research steps were undertaken to reach the overarching objective:

- Identification and selection of asset owners;
- Choice and characteristics of assessment tool (PACTA);
- Outreach to asset owners;
- Inclusion of climate alignment results in this research report.

Identification and selection of asset owners

The first research step involved identifying the largest European asset owners:

- Asset owners were defined as pension funds, insurance companies and sovereign wealth funds.
- European pension funds and sovereign wealth funds were selected from the Willis Towers Watson World 300 largest pension funds in 2016. European insurance companies were added from the Willis Towers Watson World 500 largest asset managers in 2016. This list was consolidated by using the insurance list compiled by the Asset Owner Disclosure Project (AODP) based on Bloomberg data. Finally, national WWF offices verified that the list correctly reflected the national asset owners.
- WWF selected the 100 largest asset owners in the 12 European countries that are participating in the WWF project aiming to align asset owners' energy portfolios with the Paris Agreement. They are located in Belgium, Denmark, Finland, France, Germany, Italy, the Netherlands, Norway, Spain, Sweden, Switzerland and the UK.
- WWF ultimately entered into dialogue with a total of 88 asset owners (for the full list see Annex 1).

The assessment tool: Paris Agreement Climate Transition Assessment (PACTA)

This assessment builds on a methodology developed by the Sustainable Energy Investment Metrics (SEIM) consortium. The consortium was led by 2° Investing Initiative with the Frankfurt School of Finance and Management, the University of Zurich, CDP, Kepler-Cheuvreux, Climate Bonds Initiative, SMASH, the WWF European Policy Office and WWF Germany. SEIM was funded by the European Commission through the research program Horizon 2020.

Main characteristics

PACTA is a forward-looking climate scenario analysis tool for equity and corporate bond portfolios. It measures the alignment of financial portfolios by comparing them with different climate scenarios, for example the 1.75°C scenario (Beyond 2°C Scenario, B2DS) of the International Energy Agency (IEA). The assessment has a global scope and covers results for the power (renewables, coal, gas, hydro, nuclear), fossil fuels (coal, oil, gas), automotive (electric, hybrid, fossil fuel light duty vehicles), steel, cement, shipping and aviation sectors.⁷³

PACTA links a climate scenario with the holdings of an investment portfolio. It has four steps:

1. Building production databases that link assets to financial instruments

Asset-level data are harvested from databases (e.g. Globaldata for the power sector) that provide production capacity at asset level (e.g. gigawatt for power plants) as well as ownership information.

In the first step, the asset-level data are aggregated to the ultimate owner.

- The asset-level databases provide information about the ownership stake at asset level: for example, if several companies own a single power plant, all companies - as well as their ownership share - are given. The production is allocated to the owner based on these associated ownership stakes. In the event that no ownership stake is provided, the production is distributed equally between all owners.
- The company-level data are then rolled up to the ultimate owner: this step uses Bloomberg company ownership tree information as well as the asset-level data providers.
- The energy technology exposure is forward-looking as it considers company investment plans up to five years into the future. The asset-level data sources used reflect (publicly) available company investment plans as collated by commercial data providers. These use a range of methods including data mining from websites, press releases and project applications as well as interviews with companies, governments and other stakeholders. The asset-level databases do not include company announcements not backed up by concrete actions.

In a second step, production is rolled up to its ultimate owner following company ownership trees and connected to a financial ID: Bloomberg ID for equity and corporate ticker for corporate bonds.

2. Roadmap translation

The framework starts with the quantitative targets set in the International Energy Agency's energy technology roadmaps, specifically: 1.75°C (B2DS), 2°C (Sustainable Development Scenario, SDS), 2.7°C (New Policies Scenario, NPS) and 6°C (Current Policies Scenario, CPS).

WWF uses the IEA 1.75°C scenario (B2DS) to define a well-below 2°C benchmark to assess asset owners' portfolios. This scenario is consistent with a 50 percent chance of limiting average future temperature increases to 1.75°C. The quantitative targets of this scenario are adapted to public equity and corporate bond markets to reflect the role of companies in deploying technologies and energy production in different geographies. This creates a global market aligned with the IEA 1.75°C scenario.

⁷³ A comprehensive forward-looking climate scenario analysis is performed for the power, fossil fuel and automotive sectors, based on granular economic activity data provided by the climate scenarios of the IEA. The available scenario data for the steel, cement,

shipping and aviation sectors only offer carbon intensity reduction targets. This insufficient granularity of necessary data points only permits a preliminary analysis.

3. Energy technology exposure

As with the PACTA model, this report uses three separate metrics to assess the exposure of asset owners' public equity and corporate bond portfolios to each of the five climate-relevant technologies. Each is designed to respond to a particular research question.

3.1 What was the portfolio's exposure to climate-relevant technologies at the end of 2017?

- This metric identifies the share, expressed as the weight by market value, of the climate-relevant technology in the respective public equity and corporate bond portfolio. The results are obtained by first calculating the exposure of the portfolio to companies active in the climate-relevant technology, and then calculating the specific technology exposure based on the asset base of these companies.
- The portfolios exposure to the climate-relevant technology is compared to the exposure of the global public equity and corporate bond market, which respectively represent all production owned by listed companies and production owned by companies that issue bonds.
- This metric is referred to as "2017 exposure". In this report, results are presented individually per asset owner.

3.2 Will the portfolio increase or decrease its alignment with the IEA 1.75°C scenario between 2018 and 2023?

- This metric indicates how the investment plans of portfolio companies evolve between 2018 and 2023, relative to the production profile for the same technology under several IEA transition scenarios and to the market. The IEA scenarios that are included model a transition that corresponds to 1.75°C warming (B2DS), 2°C warming (Sustainable Development Scenario, SDS), 2.7°C warming (New Policies Scenario, NPS) and business as usual (Current Policies Scenario, CPS).
- This metric is referred to as "2018-2023 trajectory". In this report, results of the disclosing asset owners' are aggregated.

3.1 What is the portfolio's exposure to climate-relevant technologies projected to be in 2023?

- This metric indicates the exposure of the portfolio relative to each climate-relevant technology (e.g. renewable power) within a sector (e.g. power sector) in 2023 and compares it to a global market that is on a pathway compatible with the IEA 1.75°C scenario (B2DS) in 2023.
- For example, if an equity or corporate bond portfolio is exposed to the equivalent of 25 megawatts of renewable power capacity (i.e. current and planned assets) in 2023 and its exposure to all technologies within that sector (renewables, coal, hydro, nuclear and gas) is 100 megawatts, then the renewable power technology share will be 25 percent.
- The addition of all the technology shares within one sector always amounts to 100 percent. Hence, an increase in share for one technology (e.g. renewable power) will lead to a decrease in share for one or more other technologies within that same sector (e.g. coal, hydro, nuclear or gas).
- This metric is referred to as the "2023 exposure". In this report, results are presented individually by asset owner.

PACTA uses two accounting methods for calculating the technology exposure of an investment portfolio's exposure, either based on its ownership or financing in the parent companies:

- **The balance sheet approach** is used to calculate the 2018-2023 trajectory and the 2023 exposure of public equity portfolios. It calculates the technology exposure based on the portfolio's ownership in companies. The (technology) ownership per company is calculated by dividing the holdings of a portfolio by the total outstanding shares of the company, giving the percentage ownership. This is multiplied by the company's capacity for each technology, region and year and aggregated at portfolio level. The final expression of technology exposure is in production units (e.g. oil production in barrels per day, power capacity for the power sector, numbers of cars produced by the automotive sector, etc.).
- **The portfolio weight approach** is used to calculate the 2017 exposure for public equity portfolios. It is also used to calculate all three metrics for corporate bonds (i.e. 2017 exposure, 2018-2023 trajectory and 2023 exposure). It calculates technology exposures based on the weighting of each position within the portfolio in weighted technology share (i.e. percentage values). For example, if a company has a 20 percent renewable power technology share (i.e. share of renewable capacity in total power capacity) and its weight in the investment portfolio is 1 percent (e.g. €1 million of bonds in a €100 million portfolio), the weighted technology share is 0.2 percent (1 percent* 20 percent). This calculation is performed for all holdings in the portfolio as well as all technologies. In a last step, the weighted technology shares are aggregated at portfolio level to reflect its weighted technology share.

4. Gap analysis

As indicated above, the technology exposure of the assessed portfolio can be compared with that of the global public equity/corporate bond market or a global market aligned with the IEA 1.75°C scenario. WWF considers a portfolio aligned when it is on the same or a better path than the climate benchmark, which for this study is built on the IEA 1.75°C scenario. This implies over-exposure to a low-carbon technology, and under-exposure to a high-carbon technology.

Further considerations when interpreting the findings

It is important to take in account three additional points when interpreting asset owners' results:

- **The metrics measure different components, and build on one another.** For example: an asset owner's portfolio may have low 2017 exposure to coal power, but at the same time have portfolio companies with plans to increase coal power capacity in the next five years: given that the IEA 1.75°C scenario (B2DS) requires a drastic decrease in coal power capacity, the asset owner's 2018-2023 trajectory for coal power will not be aligned with that particular scenario. This does not necessarily result in too high 2023 exposure relative to a global market that is aligned with the IEA 1.75°C scenario, however, given that the low 2017 exposure may compensate for the portfolio companies' misaligned coal development plans. The metrics thus allow interesting conclusions to be drawn about how an asset owner's 2023 exposure is influenced by both its 2017 exposure and its portfolio companies' development plans.
- **The metrics assume that the portfolio composition remains unchanged from end of 2017.** They indicate how the portfolio's exposure to high-carbon and low-carbon technologies are set to changes over time as a



function of changes in company exposures, keeping the portfolio constant. This implies that any portfolio composition changes relating to the included technologies announced and implemented after the end of 2017 are not covered in the results. In a similar vein, corporate changes (e.g. mergers and acquisitions) and changes in companies' capital expenditures plans that were formalised beyond end of 2017 are not included in the assessment.

- **The metrics have changed since 2017**, when WWF published its first research "[European asset owners: 2°C alignment and misalignment of public equity portfolios](#)". Although this research report covered the same target group, results are not directly comparable. Annex 3 provides further details on the changes.

**Outreach to
asset owners**

Participation request

Undertaking climate alignment assessments relies on being able to access asset owners' underlying public equity and corporate bond portfolio holdings. WWF identified the largest asset owners in 11 countries and asked 88 of them to share the holding information required for this analysis.

The asset owners were informed that a research report would be published with climate alignment results for five technologies covered by PACTA: renewable power, coal power, coal mining, oil production and gas production. It was explained that asset owners' response to the outreach would be reflected in this research report, which is aggregated on country level.

Collection of holdings data

42 asset owners responded favourably to WWF's request. They received a template to provide their public equity and corporate bond holding data. Data were requested for the end of 2017.

Inclusion of climate alignment results in research report

All asset owners that participated in the research received an individual climate alignment briefing that contained results for all the technologies covered by PACTA.

For asset owners disclosing public equity and/or corporate bond holdings data on their website, WWF chose to include the climate alignment findings for the selected technologies' respective asset class(es)—renewable power, coal power, coal mining, oil production and gas production—in the research.

Asset owners that shared holdings data solely with WWF (or its technical partner 2° Investing Initiative) were asked if they were willing to disclose the climate alignment findings. Ultimately, 33 asset owners disclosed this information.



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ANNEX 3: MAIN CHANGES IN RESEARCH METHODOLOGY BETWEEN 2017 AND 2018

WWF used an earlier version of PACTA for a [research report](#) with the same target group published in 2017.⁷⁴ The climate alignment results in the two reports cannot be directly compared due to improvements in the assessment model and metrics. These improvements were undertaken based on inputs from investors. The table below provides an overview of these changes, each of which are further detailed below.

CHANGE	2017 REPORT	2018 REPORT
Asset Class Coverage	Equity	Equity, Corporate Bonds
Reference Scenario	IEA 450S (2°C benchmark)	IEA B2DS (1.75°C benchmark)
Regional Coverage	OECD	Global
Time horizon	2015-2020	2018-2023
Real Economy Asset-Level Data	Q4 2016	Q4 2017
Alignment Metric	1 metric: Comparison of absolute exposure in 2020 to an aligned portfolio benchmark	3 metrics: Comparison of (1) 2017 exposure to the global market, (2) the technology trajectory between 2018 and 2023 to various IEA scenarios, (3) the 2023 exposure to a global market aligned with the IEA 1.75°C scenario (B2DS)

Inclusion of corporate bonds: The methodology has been upgraded to include an analysis of the asset owners’ corporate bond holdings. The 2017 report only included results for public equity.

Change in scenario: WWF uses the IEA B2DS from the Energy Technology Perspective 2017 for the 2018 research report, consistent with a 50 percent chance of limiting the average future temperature increase to 1.75°C: this is a “well below” 2°C scenario, aligned with the upper range of the Paris Agreement’s goals. The 2017 report used the IEA 450S from the World Energy Outlook 2016, consistent with a 50 percent chance of limiting the average future temperature increase to 2°C.

Expansion to global analysis: The 2018 research report covers all regions and assets across both the OECD and non-OECD instruments and assets. The 2017 report only covered instruments and assets within the OECD region.

Time horizon: The time horizon of the 2018 report is 2018-2023, while the 2017 report used a 2015-2020 time horizon.

Upgrade to data sources: The underlying asset-level data have been updated. The 2018 research report includes asset-level information for the final quarter of 2017, while the 2017 report included asset-level data from the final quarter of 2016. The current data also has improved coverage and an upgraded company ownership structure, reducing errors and improving the linkage of asset production to ultimate owner.

⁷⁴ WWF (2017), European asset owners: 2°C alignment and misalignment of public equity portfolios.

Climate alignment metrics:

- The 2017 report used an alignment metric that was calculated at a different end point (2020) for the five-year trend metric. The approach was to combine both the current market misalignment and the technology trajectory into a single metric. However, this made it nearly impossible for investors to unravel the two.
- The updated metrics used by PACTA, used in the 2018 research report, aim to resolve the above issues: they separate the current exposure to the market at end of 2017 from portfolio companies' build-out plans (i.e. the technology trajectory for 2018-2023). Both current exposure and the build-out plans are then combined in a metric for 2023 exposure. Three metrics are thus used instead of one previously.



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EUROPEAN ASSET OWNERS: CLIMATE ALIGNMENT OF PUBLIC EQUITY AND CORPORATE BOND PORTFOLIOS

SHAPING CONVERSATIONS

WWF aims to inform and shape conversations on how investor strategies and financial policies can contribute to delivering a well-below 2°C transition.

54 ASSET OWNERS

54 out of 88 contacted asset owners (61 percent) are actively engaging in forward-looking climate scenario analysis.



ACT

Asset owners, policy makers, financial regulators and central banks must accelerate efforts to ensure that the financial system aligns with the Paris climate goals.

US\$2.1 TRILLION

Climate alignment results for 33 asset owners were disclosed in this report. The combined value of their analysed public equity and corporate bond portfolios is US\$2.1 trillion.

	<p>Why we are here To stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature.</p> <p>wwf.eu</p>
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