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## **Climate risk in the Government Pension Fund Global (GPFG)**

The aim of the investments in the GPFG is the highest possible return with acceptable risk. Within this overall financial objective, the fund is to be a responsible investor. A good long-term return is dependent on economically, environmentally and socially sustainable development.

The Ministry of Finance has initiated an extensive programme of work to increase the understanding of how climate change, climate policy and the green transition might impact on the GPFG. As part of this, the Ministry asks the Bank in its letter of 5 March 2021 to assess the fund's climate risk and how climate risk and climate-related investment opportunities can be addressed in the management of the fund. The Bank's response follows in this letter and is based on the fund's role as a large, global, responsible and long-term financial investor.

Climate change is something that needs to be addressed by all investors. It is difficult to gauge how climate change will impact the fund's investments. Based on studies of the relationship between climate risk and prices for financial assets, we do not believe there is sufficient evidence to claim that climate risk is systematically mispriced. Against this background, Norges Bank believes that we should be careful about making major changes to the principles underlying the fund's investment strategy.

The fund is exposed to climate risk. Norges Bank aims to address this risk and the opportunities that arise in its operational management of the fund. The transition to a low-carbon economy requires continued adaptation at the companies we are invested in. Active ownership and contributing to standard setting are our most important tools for encouraging companies to move in this direction. We also invest in opportunities arising as a result of the climate transition, and make risk-based divestments from companies with particularly poor management of climate risk. These are investment decisions that require proximity to, and familiarity with, the markets.



Climate change is an area that may be well-suited to active management, as there is great uncertainty about which solutions will prove economically viable in the long run. Norges Bank has amassed considerable expertise in this area through its management of the environment-related equity mandates and its work on investments in unlisted infrastructure for renewable energy, active ownership and risk-based divestments.

### **Definition of climate risk**

The GPFG is invested in listed equities, tradable bonds, unlisted real estate and unlisted renewable energy infrastructure.<sup>1</sup> Climate change, climate policy and technological advances will impact on companies and economic development, and hence the fund's investments. Since we cannot be sure exactly what financial consequences climate change, climate policy and technological advances will have for our investments, the fund is exposed to climate risk.<sup>2</sup> Climate risk is one of many risk factors to which the fund is exposed.

The fund is exposed to two types of climate risk: physical risk and transition risk. Physical risk comes from exposure to acute events such as extreme weather and more gradual changes such as rising sea levels and droughts. These can affect individual investments both negatively and positively, for example by damaging production facilities or by improving growing conditions in regions currently with too cold a climate. Transition risk comes from exposure to regulatory changes, technological innovations and evolving consumer preferences as we move towards a low-carbon economy. Changes of this kind can also affect individual investments, for example via higher prices for carbon emissions or increased demand for products and services with a small carbon footprint.

### **Pricing of climate risk**

The assumption that financial markets are essentially efficient has been a key tenet in the development of the fund's investment strategy. In efficient markets, capital is allocated to the investment projects and companies that are expected to yield the highest risk-adjusted return. According to financial theory, the market portfolio will give the best trade-off between expected return and risk in a situation where markets are efficient.

One condition for efficient markets is that market prices reflect available and relevant information. Limited access to relevant, high-quality data on the climate risk faced by companies means, however, that it may be difficult for the market to price this type of risk. Mispricing of climate risk may mean that markets do not allocate capital to the investment projects and companies that yield the highest risk-adjusted return. Debate about the degree to which climate risk is reflected in prices for financial assets has grown in recent years.

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<sup>1</sup> The fund may also be invested in unlisted companies where the board has expressed an intention to seek a listing.

<sup>2</sup> For more information on the concept of climate risk, see Official Norwegian Reports NOU 2018:17 "Klimarisiko og norsk økonomi" [Climate risk and the Norwegian economy].



The physical consequences of climate change are often much further ahead in time than would normally be captured by models used to analyse financial markets. This makes it challenging to analyse the pricing of physical risks. One way of circumventing this challenge has been to limit the analysis to the most obvious and immediate cases. There are some signs that physical climate risks affect the pricing of financial assets.<sup>3</sup> One example is that the interest rate at which US counties can borrow tends to increase with the counties' expected economic losses from rising sea levels.

Various measures of greenhouse gas emissions are used to analyse the pricing of transition risk. Studies of this kind indicate that investors require a higher risk premium to invest in companies where the estimated transition risk is high.<sup>4</sup> Other studies find that climate-related news affects the pricing of financial assets.<sup>5</sup>

The academic studies referred to above indicate that climate risk seems to be priced in to some extent. However, it is worth noting that some other studies indicate that climate risk is not reflected in prices in all areas.<sup>6</sup> On this background, combined with the shortage of data and small number of academic studies, we must be careful about drawing firm conclusions about the degree to which climate risk is reflected in prices for financial assets. On balance, we do not believe there is sufficient evidence to claim that climate risk is systematically mispriced.

There is a rapidly evolving field examining the relationship between climate risk and prices for financial assets. Research can be a useful instrument in areas where there is considerable uncertainty. To increase the understanding of how climate risk might affect our investments, we have been funding academic research since 2015. We will continue to support research in this area.

### **The fund's financial climate risk**

The Ministry asks the Bank to analyse and assess the fund's financial climate risk using various models and methods, and to describe the properties of the methods and tools on which the analysis is based.

Quantifying the climate risk in the fund is no easy task. There are a number of reasons for this. Access to relevant, high-quality data is limited. Unlike assessments of other types of risk, we can make limited use of historical data. There is also considerable uncertainty about the possible financial consequences of climate change and about the likelihood and timing of specific developments. The overall uncertainty increases the further ahead we look.

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<sup>3</sup> See Painter (2020), Bernstein, Gustafson and Lewis (2019) and Giglio, Kelly and Stroebe (2020).

<sup>4</sup> See Bolton and Kacperczyk (2020) and Ilhan, Sautner and Vilkov (2021).

<sup>5</sup> See Engle et al. (2020) and Hartzmark and Sussman (2019).

<sup>6</sup> See for example Chapter 5 of the IMF's Global Financial Stability Report (April 2020) and Options for Greening the Bank of England's Corporate Bond Purchase Scheme (May 2021).



### The equity portfolio

The fund had investments in around 9,000 companies at the end of 2020. These companies have different levels of exposure to climate risk. Around 80 percent of the market value of the fund's equity portfolio is in the group of companies classified by analytics firm MSCI as having neutral exposure to transition risk.<sup>7</sup> Put simply, this means that these companies' business models are currently considered robust to higher prices for carbon emissions. They may, however, be exposed to other types of transition risk that are not captured by this measure.

Measurements of companies' carbon footprint and scenario analyses are common tools for analysing the climate risk in individual stocks and equity portfolios.<sup>8</sup> Both methods have clear weaknesses. The results below must therefore be interpreted with care.

### *Carbon footprint*

We have been calculating and reporting the carbon footprint of companies in the portfolio since 2014.<sup>9</sup> Calculations of this kind say something about how much carbon is released by the companies in which we invest, and is the most common approach to analysing transition risk.

To calculate companies' carbon footprint, we start with their direct emissions and indirect emissions from purchased energy and heat, so-called Scope 1 and Scope 2. The calculations do not take account of indirect emissions from the companies' value chains, also called Scope 3. These may be considerable but are not included in the calculations due to double-counting and different methodological approaches. Emissions from companies' value chains nevertheless provide useful information when we analyse individual companies.

The equity portfolio's carbon footprint at the end of 2020 was about half the size it was seven years ago.<sup>10</sup> This is not necessarily because the companies in which we invest have reduced their emissions. Much of the decrease can be attributed to the value of companies with low emissions, such as technology companies, having increased more in recent years than the value of companies with high emissions, such as oil companies. This could mean that climate risk is better reflected in prices for these companies than a few years ago, but may also have been driven by other factors.

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<sup>7</sup> See Enclosure 1 for further information.

<sup>8</sup> These are also the tools recommended by the Task Force on Climate-related Financial Disclosures (TCFD).

<sup>9</sup> Our database for the equity portfolio's carbon footprint goes back to 2013.

<sup>10</sup> For this letter, carbon footprint is defined as carbon intensity, which is how much CO<sub>2</sub> companies emit in relation to their revenue. Carbon intensity at company level is aggregated to portfolio level using the companies' weights in the portfolio. This is in line with the TCFD recommendations. See Enclosure 2. If we base the calculations on our percentage holdings in the companies, as we have reported since 2017, the equity portfolio's carbon footprint at the end of 2020 was around 8.5 percent smaller than it was in 2017. See the annual publications on responsible investment for more information.



The equity portfolio's carbon footprint will largely depend on the composition of the benchmark index. We manage the fund close to this index while also pursuing a number of investment strategies that have active elements. Risk-based divestments and investments under the dedicated environment-related mandates are carried out as part of Norges Bank's active management. These investment decisions contributed to the equity portfolio's carbon footprint being 9 percent smaller than that of the benchmark index at the end of 2020. Climate-related divestments have mainly been from small companies with particularly poor management of climate risk, companies with particularly high greenhouse gas emissions and companies that contribute to deforestation. The environment-related equity mandates invest in low-emission energy and alternative fuels, clean energy and energy efficiency, and natural resource management.

The equity portfolio's carbon footprint is dominated by a relatively small number of companies in high-emitting sectors, such as mining and metals, heavy industry, oil and gas, and power production. The 100 companies with the highest emissions in these sectors account for almost 60 percent of the equity portfolio's carbon footprint,<sup>11</sup> but only around 8 percent of the equity portfolio's value.

These annual calculations of the fund's carbon footprint provide a snapshot and say nothing about how the companies in the portfolio plan to address the low-carbon transition. For example, the calculations do not capture the fact that 30 of the 100 highest-emitting companies have set targets for reducing their emissions. Nor do they capture the fact that some of these 100 companies are integrated oil and gas companies with ambitions to be among tomorrow's most important producers of renewable energy.<sup>12</sup> According to a recent study, US oil and gas companies are among the most important developers of green patents that can help solve the climate problem.<sup>13</sup>

Despite these challenges, calculations of companies' carbon footprint may provide useful information. The Bank mainly uses calculations of companies' carbon footprint as a starting point for prioritising ownership work. Since 2018, for example, we have had a dialogue with 59 of the 100 highest-emitting companies. The information is also used to identify small companies with particularly high emissions. These companies are then analysed in greater depth before we decide on risk-based divestment.

### *Scenario analyses*

Scenario analyses are used to illustrate how the values of companies and portfolios might change in various climate scenarios. The analyses are used to shed light on both physical and transition risk in the equity portfolio. They can contribute to a better

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<sup>11</sup> This calculation is based on tonnes of CO<sub>2</sub>-equivalents in relation to the fund's percentage holding in the companies.

<sup>12</sup> Ten of these 100 companies are integrated oil and gas companies. Based on reporting for 2019 and 2020, five of those had set a target of zero emissions by 2050.

<sup>13</sup> See Cohen, Gurun and Nguyen (2020).



understanding of climate risk in the longer term, but cannot be taken as a prediction of the future.

The scenarios are based on a simplified model of the world incorporating assumptions about economic growth, climate policy, technological advances, impact on equity prices and many other factors.<sup>14</sup> The scenarios that we have looked at in this letter attempt to capture the direct effects in various climate scenarios. The scenarios do not capture the effects of dramatic climate shifts with a substantial long-term economic impact via possible second-order effects such as migration, political unrest and financial instability. The relationship between climate change and potential second-order effects is highly complex and so difficult to estimate. This is an important reason why these effects have not been included in the models that have been developed for analysing the climate risk in investment portfolios.

To analyse the equity portfolio's transition risk, we have stress-tested the portfolio with the targets in the Paris Agreement. For this letter, we have considered climate scenarios where temperatures rise by 1.5°C, 2°C and 3°C by 2080. With the 2°C scenario, we have also looked at a pathway with a delayed regulatory response, such that carbon prices follow the 3°C scenario until 2030 and then rise rapidly in the years after that. The climate scenarios we have considered are based on the same temperature rises as the scenarios presented in the report of Norway's Climate Risk Commission.<sup>15</sup>

When we stress-test the current equity portfolio with these scenarios, we find that the point estimates for long-term losses are between 1 and 9 percent. This corresponds to between 50 and 750 billion kroner based on the current value of the fund.<sup>16</sup> Each of the point estimates is associated with considerable uncertainty, and the actual outcomes may be very different. The equity portfolio's estimated losses in the various scenarios are expressed in today's value. This means that potential losses well into the future have a smaller value than those closer in time. Losses as a percentage of the equity portfolio may be much higher at the time they arise than their value today. In addition, these analyses say nothing about how individual companies plan to address the transition to a low-carbon economy.

Scenario analyses are first and foremost a tool that can be used when monitoring and assessing individual companies or sectors in the operational management of the fund. These analyses indicate, for example, that higher prices for carbon emissions could present financial challenges for some companies in sectors such as industrials, oil and gas, basic materials and utilities.

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<sup>14</sup> The calculations for this letter have been performed using MSCI's Climate Value-at-Risk model.

<sup>15</sup> For more information, see Official Norwegian Reports NOU 2018:17 "Klimarisiko og norsk økonomi" [Climate risk and the Norwegian economy].

<sup>16</sup> See Enclosure 3 for details.



To analyse physical climate risk, we have looked at a scenario with considerable warming.<sup>17</sup> In this scenario, the equity portfolio's long-term losses are estimated at around 4 percent, or 300 billion kroner with the current value of the fund. Again, there is considerable uncertainty around this point estimate. It is also worth noting that the scenarios with which we have tested the equity portfolio do not include possible second-order effects.

### The real estate portfolio

The fund's real estate investments are directly exposed to both physical and transition risk. We estimate that around 4 percent of the value of the unlisted real estate portfolio is in locations that have experienced flooding at least once in the last century. We have taken steps to protect buildings in flood zones by purchasing temporary flood barriers and moving equipment to higher floors, and through insurance arrangements.

The real estate portfolio's exposure to transition risk is dependent on changes in both regulation and demand for green buildings. One common factor across the cities in which we invest is that the local authorities have set concrete targets for carbon reductions in both the short and the long term. To address the regulatory risk, we measure emissions from our unlisted real estate investments and take action to reduce them. Many of our tenants are international companies that have set targets to reduce their greenhouse gas emissions. This may lead them to look for offices in buildings that are energy-efficient and have low emissions. At the end of 2020, 82 percent of the buildings in our unlisted real estate portfolio had a green building certification.<sup>18</sup>

### The bond portfolio

Government bonds make up around 20 percent of the fund. The issuers of government bonds are exposed to both physical and transition risk. For example, extensive weather-related damage could push up public expenditure, while the transition to a low-carbon economy could represent costs or gains for the authorities in a country. Investors' willingness to lend to governments may also be influenced by how resilient or well-prepared a country is when it comes to climate-related events. Both factors may affect the interest rate at which different countries can borrow.<sup>19</sup>

We lend primarily to governments in developed economies. These countries are considered by external research initiatives to be the most resilient with regard to climate issues.<sup>20</sup> Most of the countries to which we lend are also located in temperate zones, i.e. regions that are expected to continue to have a relatively cool climate in the future.

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<sup>17</sup> This scenario, known as RCP8.5, assumes an average global temperature increase of around 3.7°C towards the end of the century relative to the period 1986-2005.

<sup>18</sup> Buildings with a lettable area of more than 2,000 square metres. Green building certification involves an independent third party assessing a property against a set of criteria, such as energy and water consumption, use of renewable energy, and proximity to public transport.

<sup>19</sup> See, for example, IMF Working Paper No. 20/79.

<sup>20</sup> See, for example, the Notre Dame Global Adaptation Initiative Country Index.



Corporate bonds make up around 10 percent of the fund. We calculate the carbon footprint of these bonds in the same way as for equities. The carbon footprint of the corporate bond portfolio was 14 percent smaller than that of the bond benchmark at the end of 2020. This was due mainly to the industrial companies in the portfolio having lower emissions than the corresponding companies in the bond index.

### **Alternative ways of addressing climate risk in the fund**

The Ministry's letter of 5 March 2021 asks Norges Bank to assess and present alternative ways of addressing financial climate risk and climate-related investment opportunities in the management of the fund, based on the principles underlying the investment strategy and new climate-related understanding.<sup>21</sup> We begin by looking at alternatives in the operational management of the fund within the current mandate. We then discuss various alternatives that would require the Ministry to amend the management mandate.

#### The operational management of the fund

Assessments of climate risk and climate-related investment opportunities are integrated into our portfolio and risk management and our work on responsible investment.

#### *Portfolio and risk management*

Within the constraints of today's mandate, we seek to reduce the fund's exposure to climate risk while also exploiting opportunities arising as a result of changes in climate policy, the emergence of new technology, and evolving consumer preferences. It may be a risk in itself not exploiting the opportunities that arise.

Climate-related investment opportunities could emerge in all asset classes and across markets and sectors. The investment universe defined in the management mandate specifies which of these opportunities the fund may participate in. The fund can currently be invested in equities listed on a regulated and recognised marketplace, tradable debt instruments, unlisted real estate, unlisted renewable energy infrastructure, and unlisted companies where the board has expressed an intention to seek a listing.

We invest in companies that can contribute to solutions to climate challenges both through the environment-related mandates and in the rest of our equity management. At the end of 2020, around 9 percent of the equity portfolio was invested in stocks classified as environmental.<sup>22</sup> Investments under the environment-related mandates accounted for 1 percentage point of this. We have been able to invest in unlisted renewable energy

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<sup>21</sup> We discuss alternatives within the fund's investment universe. Some of the solutions for the climate transition will be developed by unlisted companies, in which the fund cannot be invested. These opportunities are expected to be relatively small in relation to the value of the fund.

<sup>22</sup> Either through the environment-related mandates or in companies included in FTSE Russell's broad environmental index (FTSE EO).





infrastructure since the end of 2019, and we plan to gradually build up a portfolio of high-quality wind and solar power assets.

Climate risk is one of a number of types of risk that our portfolio managers consider when investing in individual companies. Our investment decisions are based on assessments of the outlook for different sectors and companies' future earnings. In some sectors, such as power production, mining and other heavy industry, developments in climate regulation and new technology are an important part of these assessments.

Assessments of climate risk are also an integral part of investment decisions in the unlisted real estate portfolio. We measure emissions and energy efficiency as part of our management of the buildings we own. We take action continuously to reduce their emissions. We have found that green building certifications are increasingly valued by large tenants. This may help increase the value of the portfolio over time. Our goal is for all of our office and retail properties to have a green building certification.

We carry out extensive risk monitoring of the companies in which the fund is invested, both on an ongoing basis and in annual thematic reviews. This work plays an important part in climate-related risk-based divestments. These divestments are active investment decisions and result in deviations from the benchmark index. We plan to further reduce our exposure to companies with particularly high long-term risks in the coming years.<sup>23</sup>

We plan to strengthen our risk monitoring of companies before they enter the equity index. This means that we may choose not to invest in some companies even if they are included in the benchmark. As is the case today, such decisions will mainly concern small companies with particularly poor management of climate risk, companies with high emissions and companies that contribute to deforestation. Our assessments will build partly on some of the indicators on which climate-adjusted indices are based.

### *Responsible investment*

The Bank's work on responsible investment is principles-based and takes its starting point in our role as manager of a large global fund with a long investment horizon.<sup>24</sup> The transition to a low-carbon economy requires changes at the companies in which we invest. Active ownership and contributing to standard setting are our most important tools for encouraging companies to move in this direction. This is in line with the ambitions of global investor initiatives such as the Net Zero Asset Owner Alliance and Net Zero Asset Manager Alliance. In both cases, active ownership is highlighted as a key means of achieving the goal of zero emissions.

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<sup>23</sup> Read more about the fund's strategy plan for 2021-2022 at [www.nbim.no](http://www.nbim.no).

<sup>24</sup> The Executive Board's principles for responsible investment management are available at [www.nbim.no](http://www.nbim.no).



There are a variety of international climate initiatives targeting companies and investors. Norges Bank supports standards and initiatives that we believe are particularly relevant to our activities. Data availability and quality are a challenge for work on measuring climate risk at the companies in which we are invested. We have therefore supported CDP (formerly the Carbon Disclosure Project) for more than a decade to help improve corporate climate reporting. We have an ongoing dialogue with the Task Force on Climate-related Financial Disclosures (TCFD) and encourage portfolio companies to report in line with its recommendations. We also contribute actively to the Sustainability Accounting Standards Board (SASB), the Institutional Investor Group on Climate Change (IIGCC) and the Transition Pathway Initiative, where we are on the steering group. Consistent requirements and standards will put us in a better position to assess climate risk for both companies and the fund.

As a long-term, global investor with holdings in thousands of companies, we have a financial interest in companies adequately addressing the risks and opportunities that climate change may bring. We expect the companies in which we invest to adapt to the low-carbon transition over time, and we are seeing signs that this process has begun. In 2020, 67 percent of the 1,500 companies in the portfolio where we have assessed climate reporting had set emission reduction targets, up from 50 percent the year before.

Our expectations of the companies in which we invest are set out in our expectation document on climate change, which was first published in 2009 and has been updated several times since. These expectations form the basis for the dialogue we have with companies, and contribute to transparency and predictability around the principles and priorities we apply as an owner. One guiding principle for our expectations is that the board is ultimately responsible for a company's climate strategy and climate reporting. In 2020, we published both an asset manager perspective and a position paper on sustainability reporting.

We assess the climate disclosures of the largest and highest-risk companies in our portfolio each year. Reporting on climate strategy, climate risk management and climate targets are key elements in these reviews. The results give us important information on companies' handling of climate risk. We use this information in our ownership work and as a basis for our investment decisions. Our annual assessment of corporate climate disclosures is also a good starting point for providing input for standard setters.

Our use of tools in our work on responsible investment is tailored to the risks the companies face. One important aim of our dialogue with companies on climate risk is understanding their strategic choices and the rationale for them, including assumptions about future carbon pricing and the need for transition strategies. This knowledge puts us in a better position to manage the portfolio. We plan to increase our engagement with the highest-emitting companies in the portfolio and pay particular attention to companies that have not published climate plans and companies with weak climate reporting. We will



encourage companies to set themselves goals for emissions that take account of the Paris Agreement, with concrete targets for the short, medium and long term. For most companies in the portfolio, the direct climate risk, as measured by their carbon footprint, is low to moderate. This does not mean that these companies are not also indirectly exposed to climate risk. It is difficult, however, to identify indirect exposure by measuring their carbon footprint. These companies' reporting on emissions in their value chains (Scope 3) will therefore be important in improving our understanding of their exposure to climate risk. In our work with these companies, collaboration with standard setters, establishing principles and climate disclosure in line with our expectation document will be key.

We also follow up our climate expectations in our voting. We will normally support companies by voting in line with the board's recommendation if this is in keeping with our expectations. In recent years, we have seen an increase in the number of shareholder proposals on climate targets and climate disclosure. We may also vote in favour of these proposals if they are in keeping with our expectations. If a company has particularly poor management of climate risk, we may vote against the re-election of board members.

#### The management mandate

The fund's investment strategy is set out in the management mandate issued by the Ministry of Finance. The Ministry could include new guidance in the mandate on how climate risk is to be addressed in the management of the fund.

For example, the Ministry could quantify a target for the fund's carbon footprint, either explicitly in the mandate or implicitly by choosing a climate-adjusted benchmark index. Such a change would have consequences for how we manage the fund and which assets it is invested in. Changes of this kind constitute an investment decision. Such decisions need to be based on an assumption that climate risk as a financial risk factor is systematically mispriced in the market, that the fund has an advantage or systematically better information on climate risk than other investors, or that the fund should be managed with a view to achieving objectives other than the highest possible return. The last of these would need to be specified in the management mandate.

#### *Climate goals for the portfolio*

Climate goals can be expressed in many ways. There could, for example, be a requirement that the portfolio's carbon footprint is reduced by a set percentage each year, or that the portfolio should have net zero emissions by a certain year.

One important principle for the investment strategy set by the Ministry is that the fund is to be managed close to the benchmark index. All of the fund's investments are therefore managed within a limit for expected relative volatility (tracking error) of 1.25 percentage points. If a target is set for carbon emissions from the portfolio, Norges Bank would have to draw on this limit for relative volatility to meet the target. This deviation from the index

would not necessarily improve the fund's return and risk characteristics. How much implementing such a target would draw on the limit is difficult to estimate, as it would depend partly on the type of target set and how it is operationalised.

Developments in the portfolio's carbon footprint will also depend on factors that are largely beyond the Bank's control, such as how companies in the index adapt to a low-carbon economy and how the market value of low emitters moves relative to that of high emitters. We mentioned above that the equity portfolio's carbon footprint has halved since 2013, and that this can be explained primarily by the value of companies with low emissions having risen further than that of companies with high emissions. Were this trend to reverse, the portfolio's carbon footprint would increase.

More and more institutional investors have announced climate-related goals and targets for their portfolios, for example by taking part in the Net Zero Asset Owner Alliance. As the Ministry wrote in Report to the Storting No. 20 (2018-2019), many of these investors differ from the GPFG in that the role of the benchmark index is to set general limits for risk, while the detailed composition of the portfolio is delegated to the manager. The strategy for the GPFG means that the fund's return and risk largely mirror the benchmark index. If the Ministry does choose to set a climate-related goal, it should be reflected in the composition of the benchmark index.

#### *Climate-adjusted benchmark indices*

The principle of having a broad spread of investments is an important starting point for the investment strategy for the GPFG, and is expressed through the composition of the benchmark index. The transition to a low-carbon economy will involve the transformation or gradual decline of existing companies and the rise of new companies. How this process unfolds is not a given. A broad, market-weighted index will be a good starting point for ensuring that the fund is exposed to the opportunities that arise. The Bank has previously noted that any departures from market weights should be justified and have a concrete purpose.<sup>25</sup>

There are a number of climate-adjusted equity indices put together by different index providers. However, there is no industry standard for the design of such indices.<sup>26</sup> Climate-adjusted indices will therefore be less transparent and verifiable than the current benchmark index.

We have looked more closely at climate-adjusted indices from FTSE Russell and MSCI. These contain far fewer companies than the fund's equity benchmark. This is partly because small companies are not included in these indices, and partly because other

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<sup>25</sup> See Norges Bank's letter of 21 August 2019.

<sup>26</sup> The indices are often based on different data and have different climate-related objectives. The EU Low-Carbon Benchmark Regulation aims to make climate-related indices of this kind more transparent and comparable by setting some minimum criteria for them to be labelled as climate benchmarks.

companies are screened out on the basis of various climate criteria. As a result, these climate-adjusted indices are less representative of the global equity market and far less diversified.<sup>27</sup>

A decision to replace the current equity index with a climate-adjusted index would affect the fund's return and risk characteristics. To what extent is difficult to gauge, partly because the climate-adjusted indices are rapidly evolving and have a short track record. It would nevertheless be natural to assume that such a decision would increase the fund's volatility, due to the climate-adjusted indices containing far fewer companies. In addition, the transaction costs for tracking the index will increase as a result of more frequent changes in the climate-adjusted indices.

The fund's average percentage holding in the companies in the benchmark index is currently around 1.5 percent and would increase if today's index is replaced with a climate-adjusted index. Our calculations show holdings of more than 10 percent for 13 percent of the companies in MSCI's climate-adjusted index, and holdings as high as 30-40 percent in some companies. This is because these indices are not market-weighted. It would be very challenging and expensive to achieve such exposure to individual companies. These climate-adjusted indices are not therefore investable for a large investor such as the fund.<sup>28</sup>

At present, a number of special adjustments are made to the fund's equity index. For example, the index has a different regional distribution to a market-weighted index, and some companies with the largest carbon footprint have already been removed from the index under the ethical guidelines for observation and exclusion. An alternative to using one of the climate-adjusted indices supplied by FTSE Russell and MSCI might be for the Ministry to make further special adjustments to the equity index based on selected climate criteria.

A custom index of this kind could be tailored more closely to the fund's special characteristics, but would retain many of the challenges of the standard climate-adjusted products. A custom climate-adjusted index would be more complex and less transparent and verifiable than the current benchmark index. The fund's return and risk characteristics, and the cost of tracking the index, may also be affected, depending on which climate criteria are used to screen companies.

Further customisation of the benchmark index may also increase operational risk in the operational management of the fund. Standard index products include regular communication with users, enabling them to be tracked closely and cost-effectively. They

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<sup>27</sup> See Enclosure 4 for further information and analysis of these climate-adjusted indices.

<sup>28</sup> From Report to the Storting No. 24 (2020-2021): "Investability is defined as the degree to which an investment rule or idea can be implemented in practical investment management. This may be different for small and large funds".

are also subject to additional quality assurance to the extent that other investors follow the index. It would be difficult to gain a full overview of the extent of operational challenges of this kind before a new index is taken into use.

A climate-adjusted index will not include companies or sectors that currently fail to meet given climate-related criteria but may play a role in the climate transition in the future. A decision to replace the current equity index with a climate-adjusted index would mean that the fund misses out on opportunities where companies not included in the index undergo a transformation. Not investing in companies or sectors by using a climate-adjusted index is not a very suitable tool for bringing about changes in corporate behaviour.

Norges Bank is of the view that the Ministry should not replace the fund's broad, global equity index with a climate-adjusted index. Such an investment decision would have to be based on an assumption that financial climate risk is systematically mispriced and that this is easily reflected in a climate-adjusted index. Alternatively, it could be based on an assumption that the Ministry or the index provider has better information about financial climate risk than the market. The Executive Board does not believe these assumptions to hold.

That does not, however, mean that there opportunities will not arise in the operational management of the fund. There will, as today, be companies or sectors where climate risk is not adequately reflected in prices. Risk-based divestments will also still be appropriate for exiting companies that present a particularly high long-term risk.

#### *Other alternatives*

The management mandate currently requires Norges Bank to invest in environment-related mandates. Norges Bank launched the first such mandates in December 2009. In 2019, the Ministry decided that the fund could invest in unlisted renewable energy infrastructure within the limit for the environment-related mandates. The market value of these investments should normally be in the interval of 30-120 billion kroner. In its letter of 29 October 2018, Norges Bank wrote that a large part of this limit may come to be used for investments in unlisted renewable energy infrastructure in the longer term. Norges Bank does not see a need to increase the limit for the environment-related mandates at this time, but this is something to which we may return, depending on market developments and the projects to which the fund has access.

The Ministry sets requirements for Norges Bank's reporting in the management mandate. The mandate currently requires Norges Bank to report separately on the environment-related mandates. However, the fund's total exposure to companies that could help solve climate challenges goes well beyond the environment-related mandates. In the future, therefore, it might be appropriate also to include those investments in the fund's reporting on climate-related investments. We will return to this in our response to the Ministry's



letter on Norges Bank's assessment of the reporting requirements for the environment-related mandates.<sup>29</sup>

### **Closing remarks**

The fund is exposed to climate risk. It is difficult to establish the size of this risk and how climate change might impact on the fund in the future. Based on studies of the relationship between climate risk and prices for financial assets, we do not believe there are grounds to claim that climate risk is systematically mispriced. Against this background, Norges Bank believes that major changes to the principles underlying the fund's investment strategy until now should be made with caution.

As is the case today, opportunities will arise in the operational management of the fund as a result of the transition to a low-carbon economy. Climate risk and climate-related investment opportunities are factors that our portfolio managers consider before deciding to invest in individual companies. Risk-based divestments may also be appropriate for some investments with particularly high long-term risk. Such adjustments require proximity to, and familiarity with the markets, and their implementation should therefore be delegated to Norges Bank as it is today. Our use of tools in our work on responsible investment is tailored to the risk to which the investment is exposed. Through our contributions to standard setting, clear expectations, dialogue with companies and voting, we will seek to ensure that the companies in our portfolio are well-equipped for the low-carbon transition.

The fund's work on climate risk has developed over the past 15 years and will continue to evolve in the years ahead based on new insights. There is a need for better understanding of climate risk as a financial risk factor. Norges Bank looks positively on the Ministry of Finance's initiation of an extensive programme of work to generate more knowledge in this important area.

Yours faithfully

Øystein Olsen

Trond Grande

Enclosures

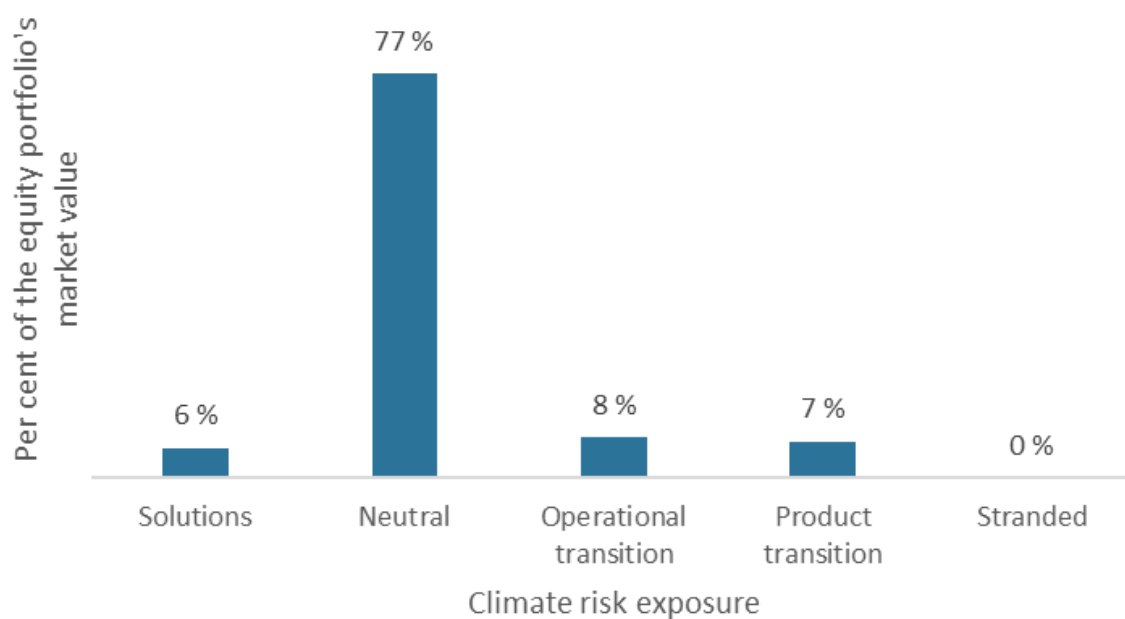
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<sup>29</sup> See the Ministry's letter of 10 June 2021.

## Enclosures

### Enclosure 1: Equity portfolio classified according to MSCI's five categories of transition risk

**Chart 1:** Share of the equity portfolio's market value based on MSCI's five categories of transition risk, 25 March 2021



Source: MSCI and Norges Bank Investment Management

The measure includes companies' emissions (Scopes 1-3), emissions avoided through the use of climate-related technology, and a measure of the management of transition risk. 3.1 percent of the equity portfolio's market value is not included in the chart above. This is because the fund's equity index is based on the FTSE Global All Cap index. The fund is therefore invested partly in companies that are not covered by the MSCI's categories for transition risk.





## **Enclosure 2: The equity portfolio's carbon footprint**

When calculating companies' carbon footprint, we follow the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD). We start from the greenhouse gas emissions of each individual company, measured as tonnes of CO<sub>2</sub>-equivalents. The emissions data cover companies' direct emissions (Scope 1) and indirect emissions from purchased energy and heat (Scope 2). For this letter, carbon footprint is defined as carbon intensity, which is how much carbon companies emit in relation to their revenue. Carbon intensity at the company level is aggregated to portfolio level using companies' weights in the portfolio.

One key challenge for these analyses is access to relevant, high-quality data. Despite numerous initiatives to increase corporate climate disclosure, there are still many companies that do not report emissions data.<sup>30</sup> In the calculations in this letter, 10 percent of emissions are taken directly from companies' own reports or from CDP (formerly the Carbon Disclosure Project). A further 55 percent are based on company-specific information, while 34 percent are estimated using models. This results in considerable uncertainty about actual emissions. The final 1 percent of emissions are simply based on the median for the sector.

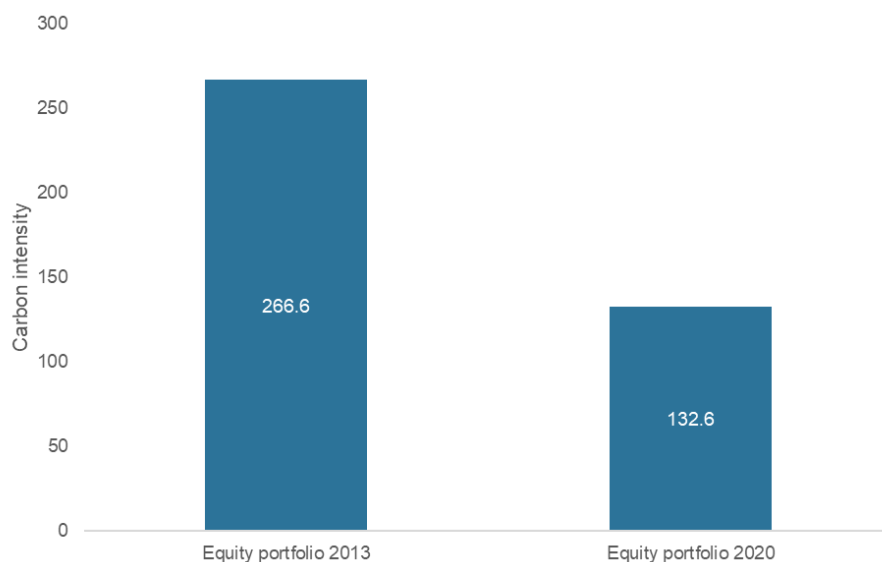
Where companies do publish emissions data, there will often be a time lag. The calculations performed for this letter are based primarily on data for 2019 published in the course of 2020. The carbon footprint calculations do not take account of indirect emissions in companies' value chains (Scope 3). This is due to large gaps in the available data, and to the data for Scope 3 emissions being largely model-based. Due to double-counting and different methodological approaches, they cannot be included directly in the analysis.

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<sup>30</sup> Examples of initiatives to increase corporate climate disclosure are the EU's Non-financial Reporting Directive, the TCFD, the Global Reporting Initiative (GRI), the Sustainability Accounting Standards Board (SASB) and CDP.



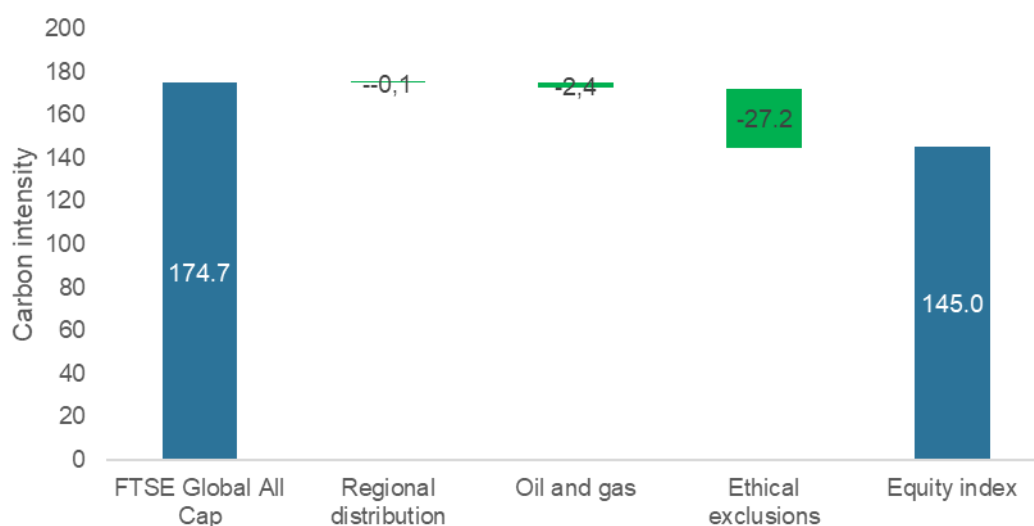
**Chart 1:** The equity portfolio's carbon footprint over time



Tonnes of CO<sub>2</sub>-equivalents per million US dollars of revenue. Carbon intensity at the company level is aggregated to portfolio level using companies' weights in the portfolio.

The design of the management mandate means that the fund's carbon footprint will largely mirror the benchmark index set by the Ministry. The benchmark index for equities differs from a global market-weighted index. These differences mean that the carbon footprint of the equity index at the end of 2020 was 17 percent smaller than that of a float-adjusted global market-weighted index. The most important contributor was ethical exclusions, and in particular the exclusion of coal companies, which reduced the index's carbon footprint by almost 16 percent relative to a global market-weighted index. The Ministry has also decided to remove upstream oil and gas companies from the index, reducing the carbon footprint by a further percentage point. The fund's equity index has a different regional distribution to a market-weighted index, which also has a minor effect on the equity index's carbon footprint.

**Chart 2:** Carbon footprint of the FTSE Global All Cap and the fund's equity index, 31 December 2020



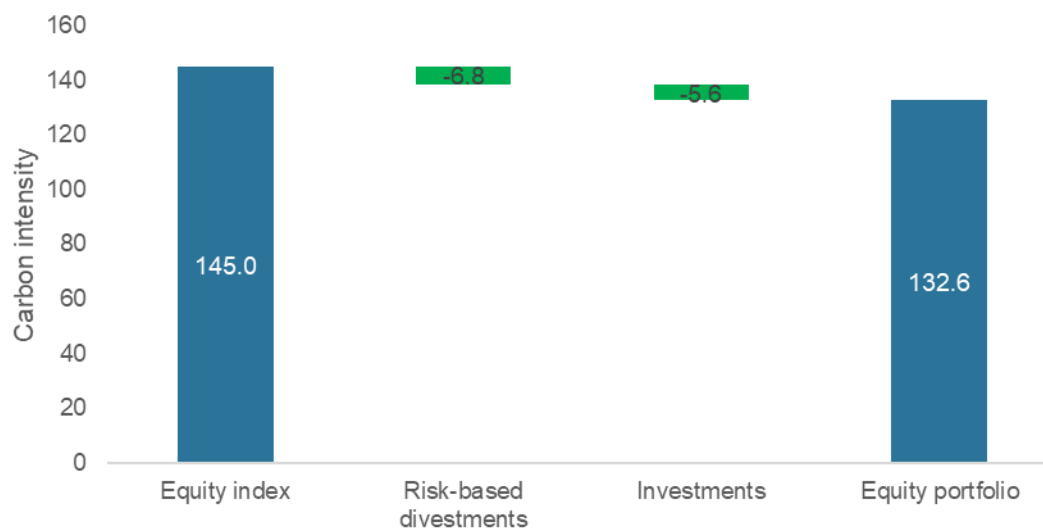
Tonnes of CO<sub>2</sub>-equivalents per million US dollars of revenue. Carbon intensity at the company level is aggregated to portfolio level using companies' weights in the portfolio.

The portfolio has had a smaller carbon footprint than the index for a number of years. At the end of 2020, the equity portfolio's carbon footprint was 9 percent smaller than that of the equity index. This is a result of the Bank's risk-based divestments and investments under the environment-related mandates.

Risk-based divestments are carried out within the general limits in the management mandate, which means that the Bank is taking investment decisions that result in deviations from the benchmark index. Since 2012, we have made 170 climate-related divestments. The Bank's risk-based divestments made the portfolio's carbon footprint 5 percent smaller than that of the equity benchmark index at the end of 2020.

The management mandate from the Ministry contains a requirement for the Bank to invest in environment-related mandates. This requires the Bank's investment management to be active, and the composition of the portfolio to deviate from the benchmark index. At the end of 2020, around 100 billion kroner was invested in equities under the environment-related mandates. This reduced the portfolio's carbon footprint by a further 4 percent. The contribution from the environment-related mandates depends both on which shares we buy and on which shares we sell to fund those purchases.

**Chart 3:** Carbon footprint of the equity index and the equity portfolio, 31 December 2020



Tonnes of CO<sub>2</sub>-equivalents per million US dollars of revenue. Carbon intensity at the company level is aggregated to portfolio level using companies' weights in the portfolio.

**Table 1:** Carbon footprint by sector, 31 December 2020

Sector	Equity portfolio	Equity index	FTSE Global All Cap
Basic materials	689	711	767
Consumer goods	67	68	73
Consumer services	62	61	59
Financials	41	38	43
Health care	34	33	31
Industrials	195	230	215
Oil & gas	436	453	530
Technology	46	44	40
Telecommunications	44	45	43
Utilities	956	1137	2013
Weighted total	133	145	175

Tonnes of CO<sub>2</sub>-equivalents per million US dollars of revenue. Carbon intensity at the company level is aggregated to portfolio level using companies' weights in the portfolio.



**Table 2: Carbon footprint by region, 31 December 2020**

Region	Equity portfolio	Equity index	FTSE Global All Cap
US and Canada	108	116	150
Developed Europe	136	134	148
Other developed markets	105	118	145
Emerging markets	244	307	377
Weighted total	133	145	175

Tonnes of CO<sub>2</sub>-equivalents per million US dollars of revenue. Carbon intensity at the company level is aggregated to portfolio level using companies' weights in the portfolio.

**Table 3: Carbon footprint by sector, US and Canada, 31 December 2020**

	Equity portfolio	Equity index	FTSE Global All Cap
Basic materials	648	726	720
Consumer goods	76	87	83
Consumer services	55	54	54
Financials	56	55	55
Health care	23	23	23
Industrials	169	151	141
Oil & gas	422	453	517
Technology	25	25	25
Telecommunications	34	34	34
Utilities	1508	1799	2409

Tonnes of CO<sub>2</sub>-equivalents per million US dollars of revenue. Carbon intensity at the company level is aggregated to portfolio level using companies' weights in the portfolio.

**Table 4: Carbon footprint by sector, European developed markets, 31 December 2020**

	Equity portfolio	Equity index	FTSE Global All Cap
Basic materials	629	588	583
Consumer goods	51	48	47
Consumer services	61	61	60
Financials	18	15	15
Health care	36	34	34
Industrials	193	204	191
Oil & gas	230	237	240
Technology	29	23	23
Telecommunications	54	45	47
Utilities	653	676	929

Tonnes of CO<sub>2</sub>-equivalents per million US dollars of revenue. Carbon intensity at the company level is aggregated to portfolio level using companies' weights in the portfolio.



**Table 5:** Carbon footprint by sector, other developed markets, 31 December 2020

	Equity portfolio	Equity index	FTSE Global All Cap
Basic materials	611	563	591
Consumer goods	47	55	55
Consumer services	94	92	92
Financials	39	43	43
Health care	36	36	36
Industrials	102	107	107
Oil & gas	382	360	742
Technology	78	80	80
Telecommunications	27	26	26
Utilities	544	774	1608

Tonnes of CO<sub>2</sub>-equivalents per million US dollars of revenue. Carbon intensity at the company level is aggregated to portfolio level using companies' weights in the portfolio.

**Table 6:** Carbon footprint by sector, emerging markets, 31 December 2020

	Equity portfolio	Equity index	FTSE Global All Cap
Basic materials	1085	1330	1345
Consumer goods	129	119	129
Consumer services	65	64	66
Financials	49	34	33
Health care	115	113	111
Industrials	539	1026	1099
Oil & gas	983	970	898
Technology	125	121	120
Telecommunications	84	96	88
Utilities	1125	1552	2914

Tonnes of CO<sub>2</sub>-equivalents per million US dollars of revenue. Carbon intensity at the company level is aggregated to portfolio level using companies' weights in the portfolio.

### Enclosure 3: Scenario analyses

There is no standard method for scenario analyses of climate risk. Ideally, the scenarios should be based on well-founded assumptions about future carbon emissions, physical climate changes and macroeconomic conditions. The scenarios must also use reasonable assumptions for companies' future earnings and development based on their industry, regulatory and technological developments, and their assets. The scientific basis for such assumptions is uncertain, and so the scenarios need to be used and interpreted with caution. They provide an illustration of possible outcomes but do not express predictions of the future.

To analyse the equity portfolio's transition risk, we have stress-tested the equity portfolio with the targets in the Paris Agreement. For this letter, we have considered climate scenarios where temperatures rise by 1.5°C, 2°C and 3°C by 2080. With the 2°C scenario, we have also looked at a pathway with a delayed regulatory response, such that carbon prices follow the 3°C scenario until 2030 and then rise rapidly in the years after that. To analyse physical climate risk, we have looked at a scenario with considerable warming.

The relationship between transition risk and physical risk is not captured by scenario analyses. One key assumption is therefore that scenarios with a large increase in temperature result in considerable physical risks and modest requirements for adaptation, whereas scenarios with limited warming bring smaller physical risks but require rapid adaptation. Many of the physical processes happen very slowly, so even if global net emissions fall quickly to zero, the accumulated physical risk as a result of previous greenhouse gas emissions will persist for a long time.

**Table 1:** Estimated losses through to 2080 for the equity portfolio in various scenarios, in percent and billions of kroner, 31 December 2020

Scenario	Estimated losses in percent by 2080	Estimated losses in kroner by 2080
Transition risk: 1.5°C	8%	650
Transition risk: 2°C	4%	300
Transition risk: 2°C (delayed)	9%	750
Transition risk: 3°C	1%	50
Physical risk: RCP 8.5	4%	300

Calculations performed using MSCI's Climate Value-at-Risk model. The equity portfolio's potential losses in the various scenarios are expressed in present value. This means that potential losses well into the future have a smaller value today than those. Losses as a percentage of the equity portfolio may be much higher at the time they arise than their present value today.



#### Enclosure 4: Climate-adjusted indices

As part of our work on this letter, we have obtained data from MSCI and FTSE Russell to enable more detailed analysis of their Paris-aligned indices (PAIs). In our analysis here, we compare the MSCI PAI and FTSE PAI with the MSCI ACWI, which is a global market-weighted index of large- and mid-cap companies.

**Table 1:** Characteristics of the fund’s current equity index, MSCI ACWI, MSCI PAI and FTSE PAI

	Equity index	MSCI ACWI	MSCI PAI	FTSE PAI
Return	9.1%	10.1%	11.1%	11.8%
Standard deviation	13.8%	14.2%	14.0%	14.3%
Max drawdown	-34.0%	-33.7%	-33.0%	-32.5%
Number of constituents	8900	2978	1030	1323
Average turnover	7.6%	7.2%	16.4%	15.4%

Source: MSCI, FTSE Russell, Norges Bank Investment Management.

Daily return data from January 2014 to March 2021 measured in US dollars. Figures for average turnover for the equity index and MSCI are for one-way turnover. The calculations take account of all index dynamics. Turnover for the FTSE PAI has been estimated by FTSE based on the average for 2019 and 2020. This period includes new index rules and is thus more representative of turnover in the index going forward. Number of companies is at the end of March 2021.

**Table 2:** Number of companies in MSCI PAI by the size of the fund’s estimated ownership share, 31 March 2021

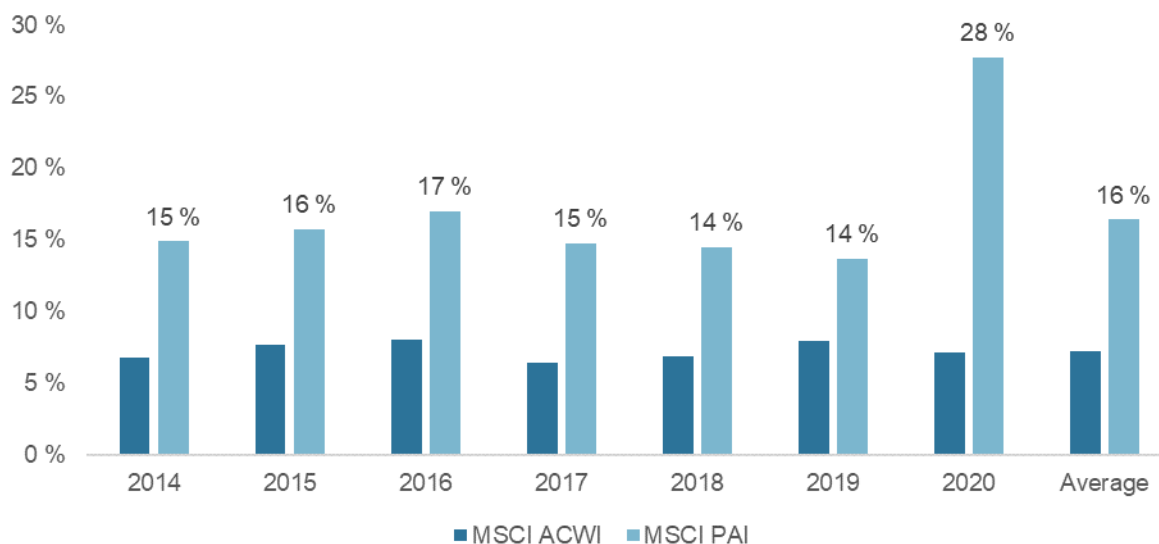
	<1%	1-2.5%	2.5-5%	5-10%	10-20%	>20%
America	113	245	85	35	20	12
Europe	4	39	60	47	23	25
Asia and Oceania	23	92	64	64	22	34
Total	140	376	209	146	65	71

Source: MSCI and Norges Bank Investment Management.

The calculations take account of the fund’s regional distribution and ethical exclusions.

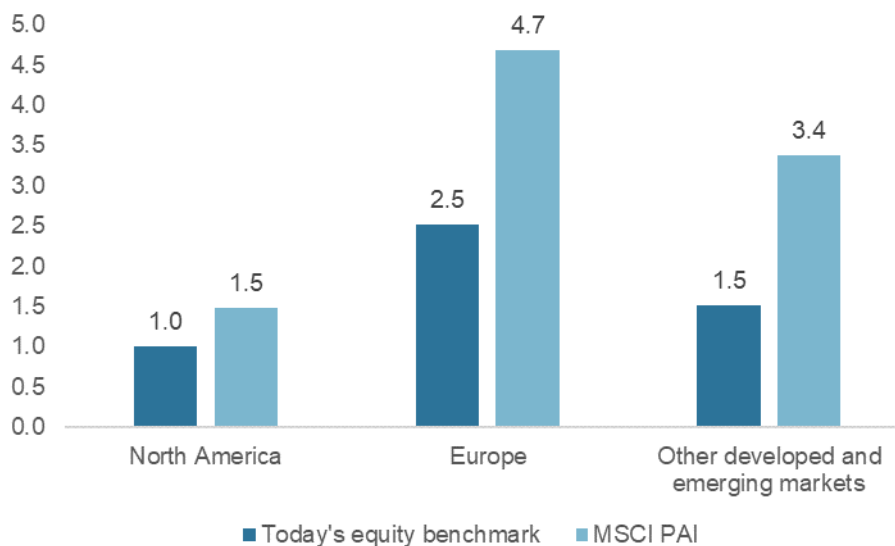


**Chart 1: Annual one-way turnover, percent**



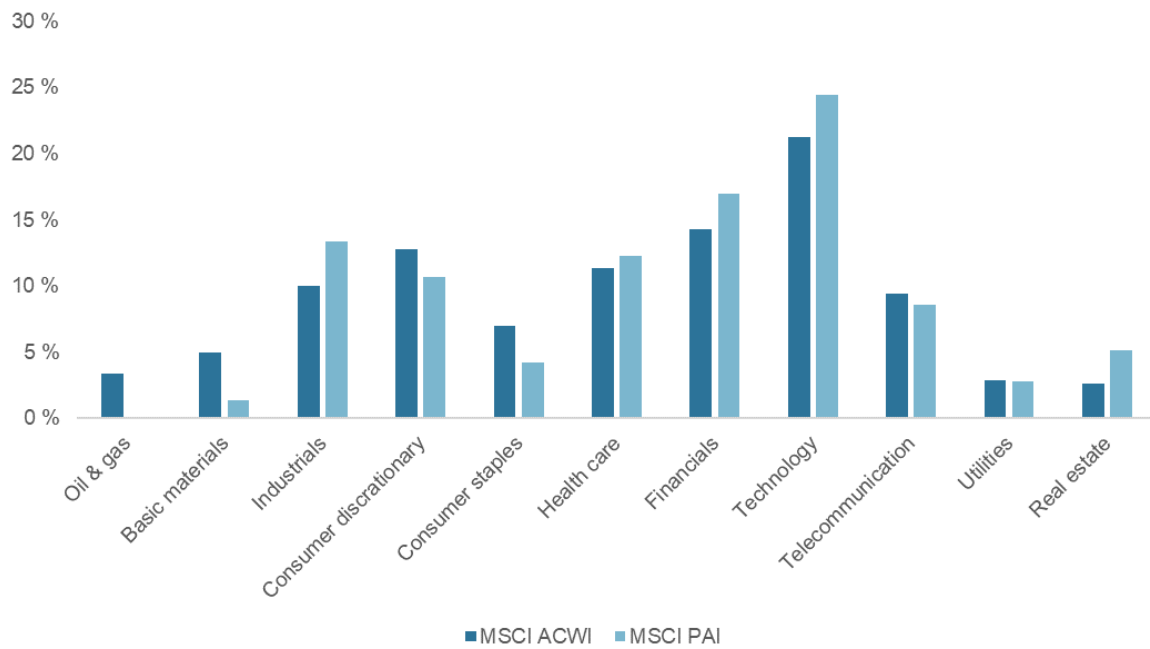
Source: MSCI and Norges Bank Investment Management.  
Average daily turnover from January 2014 to the end of March 2021. The calculations take account of all index dynamics.

**Chart 2: The fund's average percentage holding, 31 March 2021**



Source: MSCI and Norges Bank Investment Management.  
Median percentage holding at the end of March 2021. The MSCI PAI is not market-weighted, and so the fund's percentage holding in some companies could be as high as 30-40 percent. We have taken account of the fund's regional distribution and ethical exclusions in these calculations.

**Chart 3: Sector distribution, 31 March 2021, percent**



Source: MSCI and Norges Bank Investment Management.