

The impact of the 100 largest Luxembourg investment funds on climate change

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1 Glossary

Brown Share: is the weighted share of installed capacity of energy producers in the investment portfolio that can be allocated to environmentally harmful energy production technologies.

Carbon Budget: is the amount of CO₂ that can be emitted worldwide to maintain a high probability of limiting climate change to a certain level. The Intergovernmental Panel on Climate Change's (IPCC) stated in 2014 that 2/3 of the global carbon budget available in a <2°C scenario could already have been emitted.

Carbon Footprint: is the amount of greenhouse gases and especially CO₂ that is emitted by a person or something within a certain time frame.

Carbon Performance Score: a metric for the current carbon-related performance of a company as well as its capabilities to seize climate-related opportunities and manage its industry-specific climate risks in future (calculated by ISS ESG).

Carbon Risk Classification: a classification of a company's individual exposure to climate change risks based on its specific industry assignment and business activities (calculated by ISS ESG).

Divestment: is the opposite of investment. It means that unethical shares, bonds or investment funds are sold off.

Green Share: is the share of an energy producers installed capacity in the area of environmentally friendly energy

production technologies that can be allocated to an investor's investment portfolio.

Issuer Selection Effect: describes how emissions-intensive a company is compared to its direct industry peers. A positive number indicates an outperformance (lower emissions), and a negative number indicates an underperformance (higher emissions).

Negative Screening: Exclusion of certain companies or industries from the potential investment universe of a fund/investor that violate predefined sustainability criteria.

Norm-based Screening: Exclusion of certain companies or sectors from the potential investment universe of a fund/investor that violate minimum standards for business activities. These include national and international standards and norms such as the ILO standards, the OECD Guidelines for Multinational Enterprises, the UN Global Compact and the UN Guiding Principles on Business and Human Rights.

Potential future emissions: Proven Oil & Gas and Coal reserves converted into greenhouse gas emissions. Emission factors for combustion of such fuels are used to calculate potential future emissions for all companies with reserves. The ownership ratio is applied to show investors share of emissions.

Science Based Target: The Science Based Targets initiative is a partnership between CDP, UN Global Compact, WRI and WWF, which helps companies determine how much they must cut emissions to prevent the worst impacts of climate change.

Scope 1 emissions: are direct emissions from owned or controlled sources.

Scope 2 emissions: are indirect emissions from the generation of purchased energy.

Scope 3 emissions: are all indirect emissions (not included in scope 2) that occur in the value chain of the company, including both upstream and downstream emissions.

Sector Allocation: is the proportion of greenhouse gas emissions out/underperformance (compared to a benchmark) that can be attributed to stock allocation in emission-intensive sectors. A positive number indicates an outperformance, and a negative number indicates an underperformance.

Sectoral Decarbonization Approach (SDA): is a scientifically-informed method for companies to set GHG reduction targets necessary to stay within a 2°C temperature rise above preindustrial levels.

Stranding Risks: Climate-related stranding risks arise when production facilities cannot be used as expected over their full lifetime and have to be written off early because the business case for these facilities becomes negative due to materializing transformation risks. In addition to production plants, this also applies to fossil fuel reserves that must remain in the ground if the <2°C target is to be achieved.

2 Introduction

For a long time, the fight against climate change was seen as an issue of exclusive importance for manufacturing companies, especially those with high emissions. However, with the Paris Agreement's emphasis on the role of the financial sector as an enabler of the required <2°C compatible transformation of the economy, this picture has changed fundamentally. Since then, the pressure on financial market players to take climate criteria into account has been steadily increasing. On the one hand, the demand for sustainable financial products has been growing significantly for some time. This is due to the fact that institutional investors in particular are realizing that sustainability not only has reputational effects, but can also have a positive impact on the risk/return ratio of investments.¹

On the other hand, regulatory pressure for more ambitious climate protection has been intensifying in many countries around the world for several years, especially since the Paris Climate Summit. This affects financial market players in two ways, because both they themselves and the companies in which they invest or which they finance are affected by this development. The consequences of additional regulation are manifold. For example, the transparency requirements with regard to climate change are increasing in the financial sector and in manufacturing companies alike. In addition, there are

regulatory requirements for the integration of material climate risks into the risk management of financial institutions and, last but not least, the framework conditions of many industries, especially those with high emissions, are being changed in such a way that the profitability of climate-damaging business models is tending to decline. If financial market players ignore this, there is the threat of considerable impairments in investment portfolios and additional loan defaults in financing banks.

It is particularly important for the financial center of Luxembourg as Europe's largest and the world's second largest fund location with a managed fund volume of more than EUR 4.6 trillion² that the financial market players are not only aware of the relationships described above, but also work on integrating sustainability aspects into their core business. After all, the financial sector accounts for a significant share of the country's GDP (over 25 %) and thus also for the prosperity of its citizens.

However, it is still largely unclear whether and to what extent the funds based in Luxembourg integrate their own climate impact and the financial opportunities and risks associated with climate change into investment decision processes. However, transparency in this respect is the basis for effectively protecting the players in Luxembourg from material financial climate risks in the future and at the same time

¹ For more details see.g. [IMF \(2019\)](#), [Friede/Busch/Bassen \(2015\)](#), [S&P \(2015\)](#).

² Vgl. [CSSF \(2020\)](#).

being able to benefit from the opportunities arising from the restructuring of the global economy.

In order to improve this transparency, 100³ of the largest equity funds based in Luxembourg are analyzed below, both in

terms of their climate impact and in terms of potential climate opportunities and risks. The analysis is based on climate indicators provided by the sustainability rating agency ISS ESG, which were calculated for the investment portfolios of each of the 100 funds analyzed.

i ISS ESG is the responsible investment arm of Institutional Shareholder Services Inc. ("ISS"), a global provider of environmental, social, and governance solutions for asset owners, asset managers, hedge funds, and asset servicing providers. From integration into investment decisions to informing company engagements and execution through proxy voting, ISS ESG brings expertise across a range of sustainable and responsible investment issues, including climate change, sustainable impact, human rights, labor standards, corruption, controversial weapons, and many more. ISS ESG partners with clients to understand their unique investment and business objectives to deliver the relevant insights and data solutions needed throughout the investment process

Box 1: ISS ESG

3 Climate impact of the 100 largest Luxembourg funds

3.1 Emission intensities

The climate impact of funds can be determined using carbon footprinting approaches.⁴ The analysis of greenhouse gas

emissions associated with the investment portfolio, which is part of the standard repertoire of sustainability rating agencies,

³ The fund selection was based on the fund value of the largest equity funds domiciled in Luxembourg at the end of 2019. It was also a prerequisite that at least 60% of the holdings were included in ISS ESG's analysis universe, which covers more than 29,000 issuers.

⁴ To be able to make high-quality statements based on the carbon footprint, both direct and indirect emissions of the company must be considered. While data availability and quality for Scope 1 and Scope 2

emissions can already be rated as "good" today, there are unfortunately still considerable shortcomings for Scope 3 emissions. For this reason, only Scope 1 and Scope 2 emissions have been considered in the analysis. Especially for funds with a high share of scope 3 intensive sectors (e.g. automotive, financial sector etc.) the climate impact may be significantly underestimated. For more information on the relevance of Scope 3 emissions see Box 2

is particularly useful when the emissions of the investment portfolio are compared to the emissions of other indices (hereinafter the MSCI World Index⁵). Only then can statements be made about the relative emission intensity of the investment portfolio.

Variations in the emission intensity of two funds can in principle be traced back to two causes: On the one hand, the sector allocation of the funds can differ and on the other hand, deviations can also be attributed to the issuer selection. If the sector allocation would be the only reason for differences in emission intensity, investors investing according to this criterion would simply divest from funds with a large exposure to emission-intensive industries.⁶ The climate impact of the so invested money would be lower in the short term. However, such a divestment is not always to be evaluated as effective from a sustainability point of view. Finally, it is crucial for a successful transformation of the economy that sufficient capital is available for climate-friendly investments in emission-intensive sectors. A broad divestment of many investors, however, would lead to falling share prices and a more difficult raising of capital for all companies in emission-intensive sectors. Instead of sector allocation, investors and fund managers

should therefore focus on whether the companies in their portfolios are emission-intensive or low-emission compared to their direct sector competitors. The comparison with the sector peers provides information on whether the company has already achieved initial successes in the transformation of its own business activities and is thus better equipped to seize any materializing transformation opportunities or to avoid transformation risks⁷, or whether it belongs to the climate laggards of the sector.⁸

The analysis of the emission intensities of the 100 Luxembourg funds (see Table 2, p. 25.) shows that they are on average about 10% more emission-intensive than the benchmark.

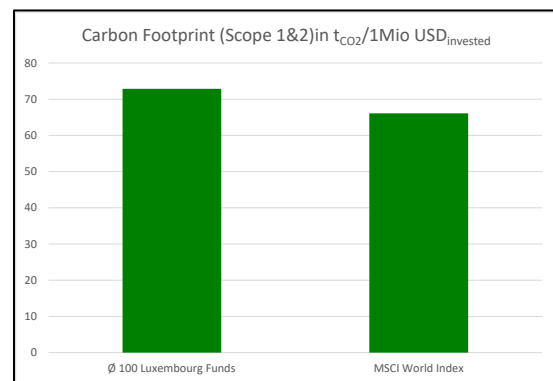


Figure 1: Carbon Footprint compared to MSCI World Index

⁵ Of particular interest for the evaluation of individual funds is the comparison with relevant benchmark indices. Nationally investing funds should therefore also be compared with national benchmark indices. In this analysis, however, the MSCI World Index was used as a benchmark for all 100 funds in order to be able to evaluate the 100 funds relative to each other.

⁶ A comprehensive and radical divestment from all emission-intensive industries would, however, make access to fresh capital much more difficult for the companies concerned, which is necessary to initiate a transformation of these companies. Divestment from

entire industries should therefore only take place very selectively, e.g. if these industries are associated with severe sustainability controversies (e.g. Arctic Drilling).

⁷ This includes, for example, more ambitious climate protection laws or changes in consumer behavior. For a detailed analysis of transformation risks, see Chapter 4, p. 12.

⁸ An exception to this logic are companies (especially pure players) from non-transformable industries (such as the coal industry).

There are, however, some significant differences to the MSCI World Index in the individual fund analysis. For example, all of the 10 funds with the lowest emissions have an emission intensity of at least 90 % lower than the MSCI World Index with respect to Scope 1 and 2 emissions. The detailed analysis shows that for all 10 funds this significant deviation is attributable to the investment focus. These are either thematic funds with a focus on low-emission sectors (e.g. healthcare) or funds that invest in growth companies - a category of companies that is less frequently found in the emission-intensive sectors like the energy and the cement sectors.

In contrast, the 10 most emission-intensive funds in the analysis have significantly higher emission intensities than a comparable fund based on the MSCI World Index would do. The range here extends from a 100% to a more than 900% higher emission intensity. This difference is not only due to a different sector allocation. In nine out of ten cases, there are also negative issuer selection effects, which indicates that these funds have not integrated climate criteria into their investment decision processes.

Negative sector allocation effects in combination with negative issuer selection effects are particularly problematic because these funds not only invest primarily in emission-intensive sectors, but have also selected the climate laggards as investment objects in these sectors, and these

are likely to be particularly threatened by transformation risks.

If the 100 funds are analyzed exclusively on the basis of the Issuer Selection Effect (see Table 3, p. 26), it becomes apparent that some sustainability funds are already represented among the 10 best funds, which have integrated corresponding climate criteria for the selection of relatively low-emission industry leaders into the investment process.⁹

Even though the focus on emission intensities is very popular today in the design of sustainable investment portfolios, the value of this indicator for assessing the sustainability of individual companies or even entire investment portfolios should not be overestimated (see box below). Several sustainability indicators should always be included in investment decisions to avoid strong distortions due to structural or methodological weaknesses in the calculation of individual indicators.

⁹ Furthermore, some mining funds are among the top performers. This is due to a methodical weakness in the allocation of companies to sectors. For example, gold mining companies are assigned to the materials

sector, which also includes companies with much higher emissions, e.g. in the cement industry.

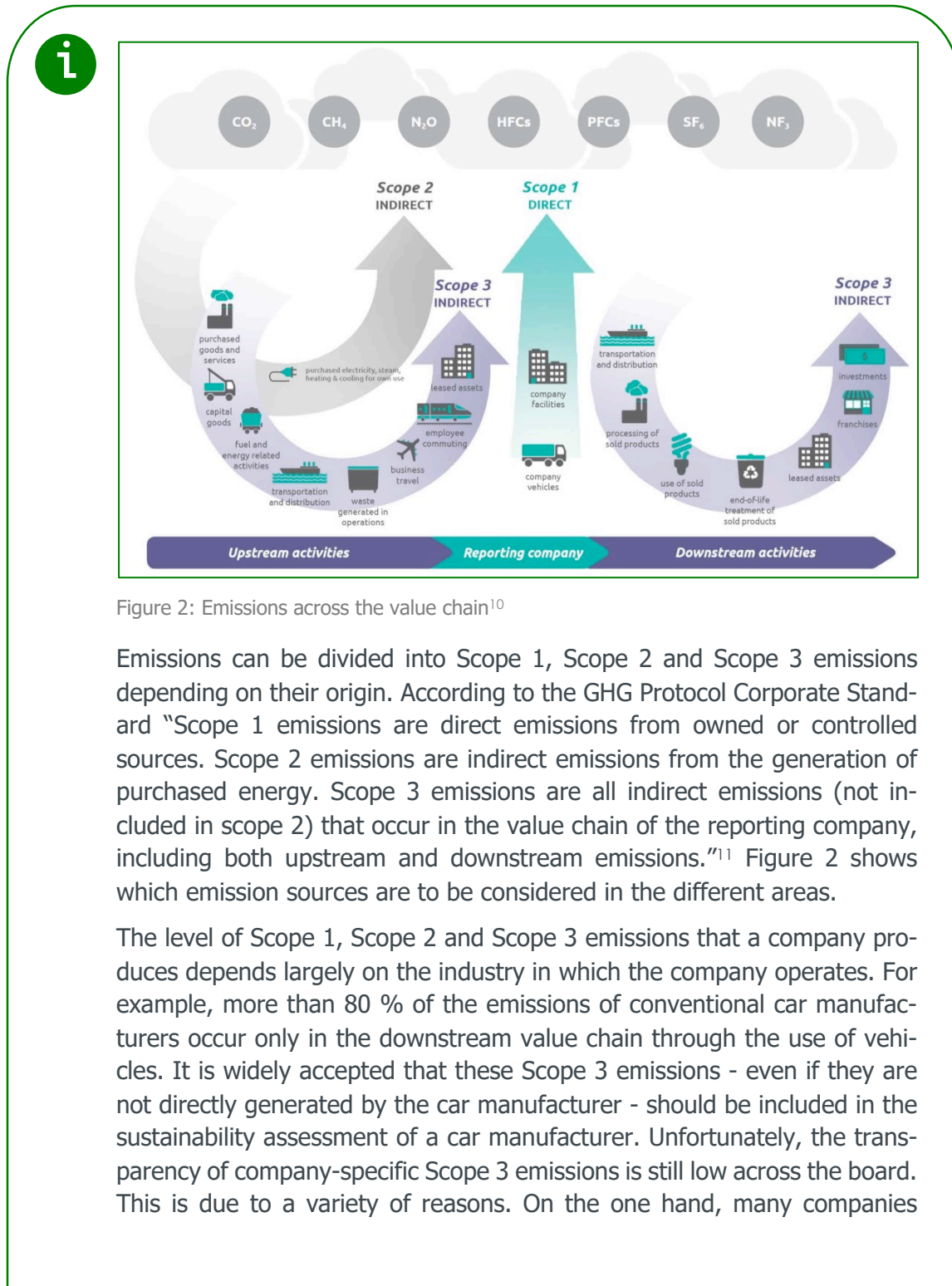


Figure 2: Emissions across the value chain¹⁰

Emissions can be divided into Scope 1, Scope 2 and Scope 3 emissions depending on their origin. According to the GHG Protocol Corporate Standard “Scope 1 emissions are direct emissions from owned or controlled sources. Scope 2 emissions are indirect emissions from the generation of purchased energy. Scope 3 emissions are all indirect emissions (not included in scope 2) that occur in the value chain of the reporting company, including both upstream and downstream emissions.”¹¹ Figure 2 shows which emission sources are to be considered in the different areas.

The level of Scope 1, Scope 2 and Scope 3 emissions that a company produces depends largely on the industry in which the company operates. For example, more than 80 % of the emissions of conventional car manufacturers occur only in the downstream value chain through the use of vehicles. It is widely accepted that these Scope 3 emissions - even if they are not directly generated by the car manufacturer - should be included in the sustainability assessment of a car manufacturer. Unfortunately, the transparency of company-specific Scope 3 emissions is still low across the board. This is due to a variety of reasons. On the one hand, many companies

¹⁰ See [GHG Protocol \(2013\)](#).

¹¹ See [GHG Protocol \(2019\)](#).

simply lack information on the emission intensity of upstream or downstream stages of the value chain. On the other hand, the complexity of

preparing a greenhouse gas inventory increases considerably, especially when emissions from several hundred or even several thousand value chains have to be considered. In addition, from a regulatory perspective, there is no obligation in most countries to analyze Scope 3 emissions in depth, so that companies today often report incomplete information in this area. The type of Scope 3 emissions reported by companies often depends on the cost of data collection rather than the relevance of the emission sources in the value chain. A comparison of the Scope 3 emissions of different funds - as would actually be appropriate in the context of this analysis - is therefore not meaningful at the present time due to the qualitatively weak data basis (independent from the data provider).

Box 2: Data Quality of Scope 3 Emissions

3.2 Scenario Compliance

When analyzing the carbon footprint, a comparison with the requirements of a <2°C compatible transformation scenario is also helpful. Here it is shown whether and, if so, how long individual positions in the investment portfolio or the entire portfolio are in line with the emission reduction requirements of a climate change scenario. The basis of this analysis is the theory that until a certain point in time (e.g. the year 2050) only a certain amount of CO₂ may be emitted globally in order to achieve certain goals in limiting global warming with a high probability. The available carbon budget increases the less

ambitious the scenario for limiting climate change is.¹² Such a global budget can be broken down first to sectors and countries and then to individual companies using various approaches¹³, for example to calculate the carbon budget available for a specific company in a <2°C scenario.

An analysis of the 100 Luxembourg funds under consideration of the emission reduction requirements of a <2°C scenario¹⁴ (see Table 4; p. 27.) shows which part of the carbon budget the companies included in the investment portfolio of the funds have already used at a certain point in

¹² See for instance the transition scenarios of the International Energy Agency (IEA).

¹³ E.g. the Sectoral Decarbonization Approach of the Science Based Targets Initiative.

¹⁴ Here the IEA 2DS scenario from the Energy Technology Perspectives Report (2015). The IEA scenarios are based on a holistic approach, according to which the set climate goal is to be achieved with minimal economic costs. The transformation requirements vary significantly from sector to sector according to the costs of avoiding emissions. The scenarios of the IEA are currently some of the most frequently used and widely accepted scenarios worldwide.

time. A look at the figures shows that this share was already over 100% in 24 of the 100 funds in 2020. This means that the companies represented in the portfolios of these funds have caused more emissions in the past 6 years than they would have been allowed to do in a 2°C scenario by 2050.

However, looking into the future is much more relevant. An analysis of all 100 funds shows that the companies included in the investment portfolios will already emit as much CO_2 in the next 7 years as would have been available in a 2°C scenario until 2050. The analyzed funds invest therefore on average not 2°C - but rather 4°C -compatible.

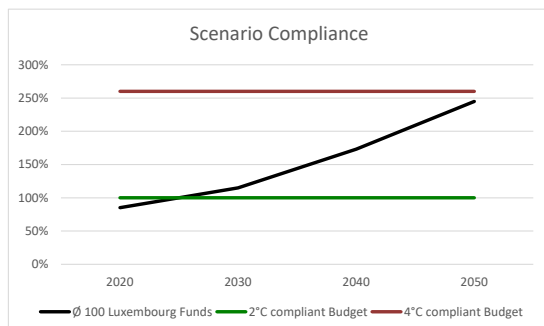


Figure 3: Scenario Compliance of Luxembourg Funds

The results for the year 2050 show that based on the current portfolio structure only 28 of the 100 investment portfolios meet the requirements of a 2°C scenario.

Since the calculation of these figures has already taken into account the individual sector allocation, the indicator can also serve as a measure of the efforts (and related investment needs) that would be required from the companies in the portfolio to realize an ambitious transformation of these companies. The greater the deviation from the 2°C budget, the more serious the impairment of the companies in the portfolio is likely to be if an ambitious climate policy is implemented in the future. Considering that some funds exceed the 2°C requirements regarding emissions by more than a factor of 10 and would therefore not even be compatible with a 6°C scenario, it becomes clear how fundamentally some investment portfolios are affected by transformation risks.



Physical Risks:

Physical risks resulting from climate change may result from a specific event (acute) or may arise from long-term climatic changes (chronic). Physical risks can have financial implications for organizations, such as direct damage to assets from storms or heavy rainfall. However, they can also have indirect consequences, for example, by leading to an interruption of the supply chain. The financial performance of organizations can also be affected by changes in water availability, food security, or extreme temperature fluctuations.

Transformation Risks:

The transition to a low-carbon economy can entail extensive political, legal, technological and market-related changes. Some of these are unavoidable and absolutely necessary in order to achieve a limitation of greenhouse gas emissions in line with the Paris climate goals, but also to adapt locally to the consequences of climate change that are already becoming visible. Depending on the nature, speed and focus of these changes, the level of transition risks can vary significantly, and with it the associated financial risks and reputational risks for organizations.

Box 3: Climate-related risks for organizations

3.3 Interim Conclusion

An analysis of emission intensities is the classical and most common approach to assess the climate impact of investment portfolios. The analysis of Scope 1 and Scope 2 emissions of the 100 Luxembourg funds showed that they are on average about 10% more emission-intensive than the benchmark. Nevertheless, it also showed that there are considerable differences between the funds. These differences are partly due to different investment focuses (sector allocation) but often

also to the selection of individual issuers. Especially those funds that invest more in emission-intensive sectors and, within these sectors, in particularly emission-intensive companies, are likely to not only have a particularly negative impact on climate, but also be exposed to high climate-related impairment risks.

The comparison with the requirements of a <2°C scenario also showed that so far only about a quarter of the funds examined are in line with such a transformation

scenario in the long term, whereas the companies in the remaining investment portfolios will have to make considerable (financial) efforts to meet the requirements of such a scenario in the future. On

average, the analyzed funds invest rather according to a 4°C scenario and are thus far away from Paris compatibility.

4 Transformation risks of the 100 largest Luxembourg funds

The previous chapter already referred to the importance of transformation risks in fund analysis from a climate perspective. Transformation risks are one of the ways in which climate change affects companies, apart from the physical risks¹⁵. They arise from the change processes initiated

to limit climate change. Transformation risks can arise from a change in consumer behavior due to a changing regulatory framework or the development of new climate-friendly technologies. Transformation risks also include reputation risks and litigation risks.

4.1 Carbon Risk Rating

Statements about the level of climate risks of a fund can be derived on the basis of different indicators. As explained above, indicators based on emission intensities can also be used. Another possibility, based on a broader data base, is the use of explicit carbon risk ratings. The Carbon Risk Rating (CRR) provided by ISS ESG is according to its own statements "*a comprehensive assessment of the carbon-related performance of companies, based on a combination of quantitative indicators (e.g. current intensity and trend of greenhouse gas emissions, carbon impact of the product portfolio including revenue shares of products or services associated with positive as well as negative climate impact), forward-looking qualitative indicators (e.g. corporate policies, ongoing shift in product and services portfolio, emission*

reduction targets and action plans, etc.), and a classification of the company's absolute climate risk exposure due to its business activities." It consists of two components - the company-specific Carbon Performance Score and the sector-specific Carbon Risk Classification and is displayed on a scale of 0 (very poor performance) to 100 (excellent performance). The carbon risk rating of the individual positions of an investment portfolio can be combined to a weighted overall score for the fund's investment portfolio. The analysis of the "CRR laggards" among the 10 most emission-intensive individual positions of the fund is also revealing.

The analysis of the Carbon Risk Rating calculated by ISS ESG for the 100 funds shows that the average rating is 34 out of

¹⁵ E.g. extreme weather events, rise in sea level etc.

100 points and that none of the Luxembourg funds achieves a score above 50. According to ISS ESG's assessment scale, that places all funds in the range of the Climate Laggards or Medium Performers. This also applies to the three sustainability funds. These funds rank 28th, 35th and 91st in terms of the Carbon Risk Rating.

The poor performance of the sustainability funds shows how different climate criteria are operationalized. Norm-based screening criteria are applied to all three sustainability funds. However, these criteria generally represent a minimum standard with regard to sustainability aspects and are also used by many funds that are not explicitly designated as sustainable.

For example, even in some of the "sustainable" funds, applying the sustainability criteria allows investments in companies that generate up to 30% of their revenues in the coal sector.

The differences between the funds are sometimes substantial. While one of the sustainability funds applies norm-based screening and negative screening and also invests explicitly in companies that manufacture products to mitigate climate change (CRR Ranking 35th), a second sustainability fund (CRR Ranking 91st) invests in all companies from developing countries that meet the minimum criteria for norm-based screening. A look at the ten most emission-intensive positions of the second fund shows that four oil and gas companies are represented (LUKOIL, PTT Public

Co, CNOOC Ltd. and China Gas Holdings Ltd.). The example illustrates that not every sustainability fund is characterized by low emissions or reduced climate risks.

An analysis of the 10 funds with the highest and lowest CRR rating (see Table 5, p. 28.) also shows that the geographical focus of the funds has a major influence on the position in the ranking. Funds with an investment focus on European countries tend to perform better in the Carbon Risk Rating than those that invest in emerging markets. It is also striking that the four funds with the worst carbon risk rating invest exclusively in China. The correlation applies both to the rating of the entire funds and to the analysis of the CRR Laggards among the 10 most emission-intensive positions of the funds.

The high correlation with the geographical focus of the funds is based on the fact that sustainability criteria still play a secondary role in many companies from developing countries. Even more important for the position in the Carbon Risk Rating is the fact that sustainability reporting in companies from developing countries is by far not as elaborate as in European companies. However, a high reporting quality is crucial with regard to the rating of ISS ESG, as the score¹⁶ is largely based on data from the sustainability reporting. An analysis of the share of non-reporting companies in the 10 most emission-intensive positions of the funds further supports this assumption.

¹⁶ Especially the company specific Carbon Performance Score is based on climate-specific indicators from the ISS ESG Corporate Rating and a metric for how well the company manages its current and future climate

risks. A company's failure to disclose, or lack of transparency, will impact a company's performance negatively..

Therefore, the Carbon Risk Rating is not used as the only indicator for the

assessment of risk exposure in this analysis, and is supplemented by additional KPIs.

4.2 Climate Strategy Assessment

The analysis of the climate strategy is of particular importance for the assessment of climate risks. If a company sets up a so-called science-based target, this indicates the fundamental transformability of the business model on the one hand, and on the other hand it is also an indication of the willingness to transform. The setting of a science-based target usually requires a comprehensive analysis process to determine the company's own climate impact and potential emission reduction measures. If a corresponding target is submitted to the Science Based Targets Initiative and accepted, the company commits itself to communicate this and at the same time is requested to report annually on the progress made in achieving the target. Thus, in addition to the intrinsic motivation of the company, there are several reasons for the company to pursue the set target. With the gradual implementation of the emission reduction target, potentially material financial climate risks will decrease for the company as well as for the company's investors.

An analysis of the 100 Luxembourg funds (see Table 6, p. 29.) according to the share of the investment portfolio for which a 2°C strategy exists, shows that in some funds such 2°C strategies exist for more than 50% of the investment portfolio. However, among the 100 funds there are also those in which the share is 0%. On average, the share is 21% and thus slightly below the benchmark (23%).

The analysis is interesting also because so far only very few funds define the existence of a 2°C strategy for potential Investees as a central criterion for investments. Since such an approach would in principle also allow investments in emission-intensive companies, it is probably not an option for many sustainability funds. Conventional funds, on the other hand, probably recoil from rapidly limiting the potential investment universe due to a climate criterion.¹⁷ This also explains why the three sustainability funds in this section are only to be found in positions 32, 46 and 79.

4.3 Exposure to critical sectors

In order to make more precise statements about the potential climate risks of a fund,

an analysis of the fund's exposure to critical sectors can also be helpful. Energy

¹⁷ So far, about 950 companies have committed to set an SBT and about 430 of the 950 companies have had their targets verified by SBTi.

production and the mining of fossil fuels are particularly critical sectors.

4.3.1 Power Generation

In energy production, the share of green (environmentally friendly) and brown (environmentally harmful) energy production types is of high importance. Following the Sectoral Decarbonization Approach (SDA) of the Science Based Targets Initiative, it becomes clear that the achievement of the <2°C target depends significantly on the transformation successes in energy production.¹⁸ In a 2°C scenario, this sector will have to undergo a fundamental transformation from large-scale fossil fuel combustion to the almost exclusive use of sustainable energy production technologies. The share of these technologies in the current energy mix of energy producers can also serve as an indication of the companies' future viability.

On average, the 100 largest Luxembourg funds have a green share¹⁹ of about 19%, which is above the benchmark.²⁰ The top 10 funds (see Table 7, p. 30), sorted by Green Share, all have a share of green energy production technologies that is at least twice as high as the MSCI World Index. At the same time the brown share in all 10 funds is also significantly below the benchmark. The top performer even

outperforms the MSCI Green Share by a factor of six and has no shares in brown energy production technologies. It is one of the sustainability funds whose energy sector investments are obviously exclusively pure players in the renewable energy sector.

Sorted according to brown share the ranking list shows that also one of the sustainability funds leads the ranking list measured at the highest brown share portions. It exceeds the value of the MSCI World index by 58%. The third sustainability fund shows with 54 % above the benchmark the third highest brown share of the 100 analyzed funds. Once again, it becomes clear that not all investment approaches of sustainability funds are necessarily associated with a currently low climate impact and/or reduced climate risks and that sustainable investors should check the investment approach before investing in sustainability funds.

It is also remarkable that many emerging markets funds have a high brown share.²¹ This is due to the fact that in many developing countries, energy is primarily generated from fossil fuels and that new power plants based on fossil fuels are still being built in order to meet the increasing energy requirements of the population and the economy.

¹⁸ See Figure 4, p. 16.

¹⁹ ISS ESG defines green technologies in the context of power generation as Solar PV, CSP (concentrated solar power), Wind turbines both onshore and offshore,

geothermal-, hydro- and biomass-based energy production.

²⁰ The installed capacity of energy producers in the MSCI World Index has a green share of 14.4 %.

²¹ See Table 7, p. 30.

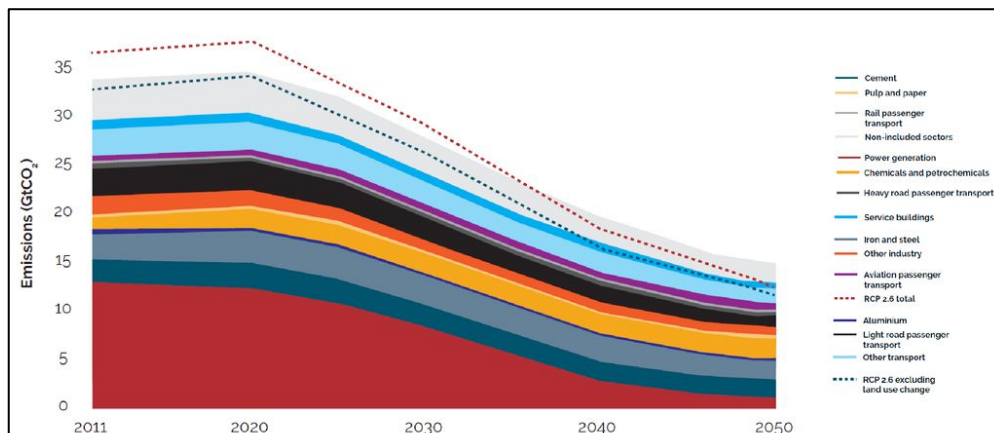


Figure 4: Sectoral breakdown of absolute CO₂ emissions budget (2011-2050)²²

4.3.2 Extraction of fossil fuels

With regard to the exposure to fossil fuels, the question arises as to how many companies in the investment portfolio have developed their own fossil fuel reserves and to what extent these reserves are available.

Both the share of brown energy production and the exposure to fossil fuel reserves can be interpreted as indicators for so-called stranding risks²³. Coal reserves are particularly problematic with regard to stranding risks, since in a <2°C scenario, there will have to be a far-reaching phase-out of coal-fired power generation until 2030 at the latest. Pure players and companies that are highly exposed to coal are therefore exposed to considerable climate risks and in many cases can hardly be transformed.

The analysis (see Table 8, p. 31.) of fossil fuel reserves in the companies in the investment portfolio shows that 36 of the 100 funds do not contain any companies with fossil fuel reserves. The reasons for this are manifold and may be due to the fact that the funds are theme funds that have no connection to critical sectors. Exclusion criteria will also be responsible for the lack of exposure to fossil fuels in some of the funds.

On the other hand, the 10 funds with the highest exposure to fossil fuel reserves have at least three times higher potential future emissions than the MSCI World Index. It should be noted that the level of potential future emissions does not yet allow any statement to be made about the type of fossil fuel or the level of stranding risks. Coal reserves, for example, will

²² See SBT (2015).

²³ Climate-related stranding risks arise when production facilities cannot be used as expected over their full lifetime and have to be written off at an early stage because the business case for these facilities becomes negative due to materializing transformation risks. In addition to production plants, this also applies to fossil fuel reservoirs that must remain in the ground if the <2°C target is to be achieved, see e.g. Unburnable Carbon Report of the Carbon Tracker Initiative (2011).

generally be associated with significantly higher stranding risks than gas reserves, since even in a 2°C scenario some of the energy will still be generated in gas-fired power plants until 2050. It is remarkable that the average exposure of the Luxembourg funds is significantly below the benchmark, but the potential future emissions associated with these reserves are above the benchmark. This is due to the fact that the Luxembourg funds are much more exposed to particularly emission-intensive coal reserves.

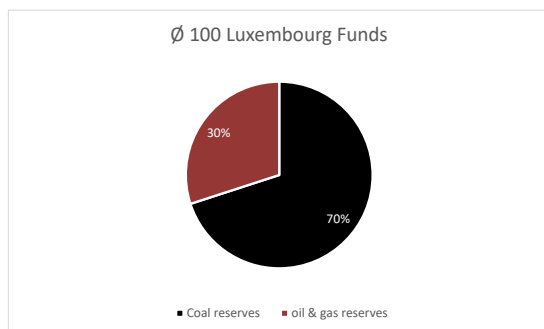


Figure 5: Exposure of Luxembourg funds to fossil fuel reserves

The fund with the highest value in this category is a mining fund. It thus explicitly focuses on the profit potential of the mining industry and will be significantly affected by a coal exit or a drop in coal prices due to falling demand. As the only fund in this analysis it invests in at least 5 of the TOP 100 coal companies.²⁴ Many of these companies will have to leave a large part of their coal reserves in the ground in a <2°C transformation scenario and will thus be exposed to considerable stranding risks.

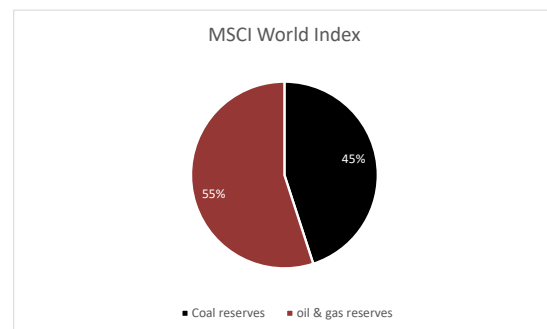


Figure 6: Exposure of MSCI World Index to fossil fuel reserves

4.4 Interim Conclusion

The analysis of climate-related risks based on the Carbon Risk Rating calculated by ISS ESG showed that without exception all of the 100 Luxembourg funds can be assigned to the Climate Laggards or the Climate Medium Performers. Even the three sustainability funds included in the analysis achieved only low scores with regard to this indicator. The result is significantly

influenced by the reporting quality of the companies included in the investment portfolios. For this reason, especially funds with a focus on the emerging markets perform poorly.

Similarly, the Climate Strategy Assessment depends on the basic reporting quality, so that Emerging Markets funds tend to perform worse. However, the analysis of the

²⁴ This list compiled by ISS ESG contains the 100 largest coal companies in the world measured by their coal reserves.

100 largest Luxembourg funds showed very diverse results. While in some funds a 2°C strategy already existed for a large part of the positions, there were also a number of funds that contained hardly or no companies with such a strategy in their investment portfolios. All in all, the portfolio shares with a 2°C strategy were slightly below the benchmark in the funds analyzed.

Many emerging markets funds were also found among the low performers in the analysis of the brown share. The particularly high importance of fossil fuels in establishing and expanding the energy

supply in many developing countries is a major reason.

The analysis of future emissions showed that a considerable proportion (37 %) of the funds analyzed had no climate risks in this area. 75 % of the 100 largest Luxembourg funds show a lower exposure to fossil reserves compared to the MSCI World Index. At the same time, however, the analysis showed that some extreme cases are particularly exposed to fossil reserves and thus also to stranding risks, and that the share of coal reserves in particular was significantly increased across all Luxembourg funds.

5 Conclusion

Climate protection is a megatrend that does not even stop at the financial sector. Driven by changing customer preferences, increasing regulatory pressure and structural changes in many sectors, more and more financial market players are recognizing that integrating climate criteria into their core business not only helps to reduce their own carbon footprint, but also to manage the financial transformation risks associated with the change processes that are taking place.

For the financial center Luxembourg as Europe's largest fund location, it is of particular importance that the financial sector in general and the Luxembourg-based funds in particular understand their own impact on climate change and vice versa the impact of climate change on investment portfolios and take this into account in stock picking.

An analysis of the 100 largest equity funds based in Luxembourg shows that this process is still in its early stages. The analysis showed that the 100 funds are on average about 10% more emission-intensive than the broadly diversified MSCI World Index and that the companies in the investment portfolios of the funds will have exhausted the carbon budget within 7 years, which would have been available in a <2°C scenario until 2050. Consequently, the funds do not invest in a 2°C but in a 4°C compatible way.

The analysis of the transformation scenarios also showed that the 100 Luxembourg funds underperformed the broadly diversified MSCI World Index. The Carbon Risk Rating determined by ISS ESG, for example, was on average 34 out of a possible 100 points and none of the funds analyzed achieved a rating score of more than 50 points. In addition, the companies in the

100 investment portfolios had a significantly weaker sustainability reporting and were also less likely to demonstrate company-specific 2°C transformation targets and corresponding strategies than the companies in the MSCI World Index. Although the funds invested significantly less in companies that owned fossil fuel reserves, the exposure to coal companies that were considered particularly critical was significantly higher than in the benchmark.

The results of the analysis show that so far there is no systematic consideration of climate criteria in the 100 funds analyzed. In order to contribute to limiting climate change and avoiding negative financial effects on the Luxembourg funds, measures must be taken immediately by politicians and fund managers:

We call on politicians to adapt the general conditions for funds domiciled in Luxembourg so that they take greater account of climate criteria in their investment decisions in the future. This includes among other things

1. The obligation to consider sustainability risks in the investment and risk management process in all funds domiciled in Luxembourg.
2. a clear commitment from the political side that the consideration of climate risks is to be understood as part of the fiduciary duties of asset managers
3. the extension of the disclosure requirements for all funds so that they provide detailed information on their sustainability objectives and how their climate targets

are compatible with the <2°C target set by politics.

4. improvement of the available data through extended disclosure obligations, especially for emission-intensive companies or companies with emission-intensive value chains

5. support the development of additional methodological know-how in the funds. The government and related authorities should facilitate the work of the fund managers through a catalog of supporting measures, leverage the transfer potential of existing best practices for the funds, and at the same time ensure an exchange of knowledge that helps the funds in Luxembourg to align their investment portfolios with the Paris climate targets.

We also call on the fund managers of the Funds domiciled in Luxembourg:

1. to make a clear commitment to achieve the Paris Climate Targets
2. to immediately create transparency regarding its own sustainability performance.
3. to expand its own methodological know-how in dealing with sustainability risks and to incorporate this into risk management and investment decision processes
4. to participate in the further development and use of forward-looking climate-related scenario analyses and stress tests
5. to engage for more transparency and improved management of transformation risks at Investee companies

Courageous action is now required on the part of politicians and investment funds in order to contribute to limiting climate change and to prepare the Luxembourg financial center for upcoming future developments. Given the rapidly changing conditions and ongoing climate change, "business as usual" cannot be in the interest of either the funds or the politicians.

6 Annex

6.1 Funds analyzed

Fund Number	Fund Name
1	AB SICAV I - American Growth Portfolio
2	AB SICAV I - Low Volatility Equity Portfolio
3	AB SICAV I - Select US Equity Portfolio
4	Aberdeen Standard SICAV I - China A Share Equity Fund
5	Allianz Global Investors Fund - Allianz Best Styles US Equity
6	Allianz Global Investors Fund - Allianz Euroland Equity Growth
7	Allianz Global Investors Fund - Allianz Europe Equity Growth
8	Allianz Global Investors Fund - Allianz European Equity Dividend
9	Amundi Funds - Euroland Equity
10	Amundi Index Solutions - Amundi Euro Stoxx 50
11	Amundi Index Solutions - Amundi Index MSCI Emerging Markets
12	Amundi Index Solutions - Amundi Index MSCI North America
13	Amundi Index Solutions - Amundi MSCI Emerging Markets
14	Amundi Index Solutions - Amundi MSCI Europe
15	Amundi Index Solutions - Amundi SEP 500
16	Nordea 1 - Emerging Stars Equity Fund
17	BlackRock Global Funds - Continental European Flexible Fund
18	BlackRock Global Funds - World Gold Fund
19	BlackRock Global Funds - World Healthscience Fund
20	BlackRock Global Funds - World Mining Fund
21	Capital International Fund - Capital Group New Perspective Fund (Lux)
22	Deka-Globale Aktien LowRisk
23	Eastspring Investments - Eastspring Investments-DevelEEmerg Asia Equity Fd
24	Edgewood L Select - US Select Growth
25	Fidelity Funds - America Fund

26	Fidelity Funds - Asian Special Situations Fund
27	Fidelity Funds - China Consumer Fund
28	Fidelity Funds - China Focus Fund
29	Fidelity Funds - Emerging Markets Fund
30	Fidelity Funds - European Dynamic Growth Fund
31	Fidelity Funds - European Growth Fund
32	Fidelity Funds - Global Dividend Fund
33	Fidelity Funds - Global Technology Fund
34	Fidelity Funds - World Fund
35	Franklin Templeton Investment Funds - Franklin Technology Fund
36	Franklin Templeton Investment Funds - Franklin U.S. Opportunities Fund
37	Franklin Templeton Investment Funds - Templeton Asian Growth Fund
38	Franklin Templeton Investment Funds - Templeton Growth (Euro) Fund
39	Fundsmith Equity Fund Sicav
40	Goldman Sachs Funds - GS Emerging Markets Core Equity Portfolio
41	Goldman Sachs Funds - GS Emerging Markets Equity Portfolio
42	Goldman Sachs Funds - GS Europe Core Equity Portfolio
43	Goldman Sachs Funds - GS Global Core Equity Portfolio
44	Nordea 1 - Global Climate and Environment Fund
45	T Rowe Price Funds SICAV - Emerging Markets Equity Fund
46	INVESCO Funds - Invesco Pan European Structured Equity Fund
47	Investec Global Strategy Fund - Asian Equity Fund
48	Investec Global Strategy Fund - Global Franchise Fund
49	Janus Henderson Horizon Fund - Janus Henderson Horizon Global Technology Fund
50	JPMorgan Funds - Emerging Markets Equity Fund
51	JPMorgan Funds - Emerging Markets Opportunities Fund
52	JPMorgan Funds - Japan Equity Fund
53	JPMorgan Funds - US Select Equity Plus Fund
54	MFS Investment Funds - Global Equity Fund

55	MFS Meridian Funds - European Research Fund
56	MFS Meridian Funds - European Value Fund
57	MFS Meridian Funds - Global Equity Fund
58	Morgan Stanley Investment Funds - Global Brands Fund
59	Morgan Stanley Investment Funds - Global Opportunity Fund
60	Morgan Stanley Investment Funds - US Advantage Fund
61	Multi Units Luxembourg - Lyxor SEP 500 UCITS ETF
62	Nordea 1 - Global Stable Equity Fund
63	Nordea 2, SICAV - Global Sustainable Enhanced Equity Fund
64	Pictet - Digital
65	Pictet - Global Megatrend Selection
66	Pictet - Robotics
67	Pictet - Security
68	Pictet - USA Index
69	Pictet - Water
70	Pictet Global Selection Fund - Global Utilities Equity Fund
71	Robeco Capital Growth Funds - RCGF-Robeco BP US Large Cap Equities
72	Robeco Capital Growth Funds - RCGF-Robeco BP US Premium Equities
73	Robeco Capital Growth Funds - RCGF-Robeco Global Consumer Trends
74	Robeco Capital Growth Funds - RCGF-Robeco QI Emerging Conservative Equities
75	Schroder International Selection Fund - Asian Opportunities
76	Schroder International Selection Fund - Asian Total Return
77	Schroder International Selection Fund - Emerging Asia
78	Schroder International Selection Fund - Emerging Markets
79	Schroder International Selection Fund - Euro Equity
80	SEB Fund 3 - SEB Ethical Global Index Fund
81	Ssga (lux) Sicav - World Index Equity Fund
82	The Genesis Emerging Markets Investment Company - Global Sub-Fund
83	UBS (Lux) Equity Fund - China Opportunity (USD)

84	UBS ETF SICAV - UBS ETF - MSCI Emerging Markets UCITS ETF
85	UBS ETF SICAV - UBS ETF - MSCI EMU UCITS ETF
86	UBS ETF SICAV - UBS ETF - MSCI Japan UCITS ETF
87	Variopartner Sicav - MIV Global Medtech Fund
88	Vontobel Fund - Emerging Markets Equity
89	Vontobel Fund - Global Equity
90	Vontobel Fund - MTX Sustainable Emerging Markets Leaders
91	Vontobel Fund - US Equity
92	Wellington Management Funds (Luxembourg) - Wellington Global Quality Growth Fund
93	Wellington Management Funds (Luxembourg) - Wellington US Research Equity Fund
94	Xtrackers - Dax UCITS ETF
95	Xtrackers - Euro Stoxx 50 UCITS ETF
96	Xtrackers - MSCI Europe Index UCITS ETF
97	Xtrackers - MSCI Japan Index UCITS ETF
98	Xtrackers - MSCI USA Index UCITS ETF
99	Xtrackers - MSCI World Index UCITS ETF
100	Xtrackers - SEP 500 Swap UCITS ETF

Table 1: List of funds analyzed

6.2 Emission intensities

Fund Number	Net Performance Scope 1/2 Emissions	Sector Allocation Effect	Issuer Selection Effect	Ranking
1	- 96%	70%	26%	1
24	- 96%	56%	40%	2
60	- 95%	19%	77%	3
35	- 95%	81%	14%	3
48	- 95%	83%	11%	5
87	- 94%	83%	11%	6
58	- 94%	77%	17%	7
19	- 93%	80%	13%	8
59	- 93%	55%	38%	9
36	- 93%	80%	13%	10
...
∅	-10%	-2%	-8%	
...
38	110%	-13%	-97%	90
46	115%	-70%	-45%	91
11	122%	-11%	-112%	92
20	164%	-519%	355%	93
4	167%	53%	-220%	94
37	183%	22%	-205%	95
94	193%	-59%	-135%	96
74	197%	-86%	-111%	97
79	273%	-30%	-243%	98
28	397%	-2%	-395%	99
70	926%	-746%	-180%	100

Table 2: Emission intensities (Scope 1 und 2) compared to MSCI World Index

6.3 Issuer Selection Effects

Fund Number	Issuer Selection Effect	Ranking
18	451%	1
20	355%	2
69	194%	3
44	134%	3
8	99%	5
56	81%	6
60	77%	7
90	71%	8
65	66%	9
55	57%	10
...
∅	-8%	
...
74	-101%	91
11	-111%	92
45	-112%	93
94	-129%	94
70	-135%	95
37	-180%	96
4	-205%	97
79	-220%	98
28	-243%	99
84	-395%	100

Table 3: Issuer Selection Effects (compared to MSCI World Index)

6.4 2°C Scenario compliance

Fund Number	Share of 2°C compliant carbon budget used until 2050	Share of 2°C compliant carbon budget used until 2030	Share of 2°C compliant carbon budget used until 2020	Ranking
59	9%	5%	4%	1
92	22%	14%	11%	2
24	26%	19%	15%	3
30	30%	27%	25%	3
60	31%	23%	19%	5
1	33%	23%	17%	6
64	35%	22%	16%	7
73	36%	33%	29%	8
7	36%	21%	17%	9
48	41%	32%	24%	10
...
∅	245%	114%	85%	
...
4	388%	287%	260%	91
94	392%	162%	103%	92
75	419%	287%	204%	93
76	481%	332%	244%	94
79	552%	179%	99%	95
100	625%	187%	116%	96
17	643%	194%	106%	97
69	769%	685%	597%	98
18	1247%	923%	672%	99
70	1302%	169%	101%	100

Table 4: 2°C Scenario compliance

6.5 Carbon Risk Rating

Fund Number	CRR Rating	Share of CRR lag-gards among the 10 most emission-intensive positions	Share of companies without sustainability reporting among the 10 most emission-intensive positions	Ranking
32	47	0%	0%	1
8	47	20%	0%	2
95	45	10%	0%	3
10	45	10%	0%	4
31	44	40%	10%	5
9	44	30%	0%	6
96	43	20%	0%	7
85	42	0%	0%	8
94	42	0%	0%	9
42	42	10%	0%	10
...
∅	34	30%	0%	
...
90	27	50%	10%	91
84	27	60%	20%	92
20	27	30%	0%	93
74	27	60%	40%	94
82	27	40%	20%	95
18	25	50%	20%	96
83	24	60%	60%	97
27	23	80%	10%	98
28	23	80%	60%	99
4	16	70%	60%	100

Table 5: Carbon Risk Rating

6.6 2°C Climate Strategy Assessment

Fund Number	Share of holdings with 2°C climate strategy	Ranking
9	62%	1
8	56%	2
95	53%	3
10	51%	4
58	51%	4
56	48%	6
39	47%	7
96	46%	8
85	43%	9
32	42%	10
...
∅	21%	
...
40	6%	89
66	6%	89
41	6%	89
82	6%	89
74	4%	93
28	3%	94
87	3%	94
4	0%	96
27	0%	96
83	0%	96
20	0%	96
18	0%	96

Table 6: Share of holdings with 2°C compatible climate strategy

6.7 Exposure to Green/Brown Power Generation

Fund Number	Net Performance Green Share	Net Performance Brown Share	Ranking
63	590%	-100%	1
55	195%	-28%	2
56	194%	-34%	3
21	184%	-13%	4
14	182%	-29%	5
74	158%	-9%	6
65	142%	-26%	7
42	132%	-8%	8
32	131%	-24%	9
2	131%	-13%	10
...
∅	33%	-2%	
...
97	-38%	28%	91
86	-38%	28%	92
69	-63%	33%	93
51	-52%	48%	94
29	-52%	48%	94
41	-54%	48%	96
28	-71%	51%	97
90	-83%	54%	98
78	-88%	56%	99
44	-96%	58%	100

Table 7: Share of green/brown installed capacity (compared to MSCI World Index)

6.8 Exposure to fossil fuel reserves

Fund Number	Net Performance Share of investments exposed to fossil fuels	Potential future emissions from holdings' fossil fuel reserves	Number of TOP 100 Coal company holdings	Ranking
48	-100%	-100%	0	1
49	-100%	-100%	0	1
52	-100%	-100%	0	1
54	-100%	-100%	0	1
6	-100%	-100%	0	1
56	-100%	-100%	0	1
16	-100%	-100%	0	1
57	-100%	-100%	0	1
24	-100%	-100%	0	1
58	-100%	-100%	0	1
...				...
∅	-37%	19%		
70	141%	350%	2	91
84	35%	377%	3	92
79	-42%	419%	1	93
99	-42%	482%	1	94
11	49%	490%	3	94
23	143%	515%	1	96
74	108%	580%	2	97
98	15%	671%	3	98
28	88%	845%	1	99
20	527%	1522%	5	100

Table 8: Exposure to fossil fuel reserves and coal sector