



Climate Impact Assessment

of Nasdaq Helsinki

Zurich, 14 December 2016



south pole group
South Pole Carbon Asset Management Ltd. · Technoparkstrasse 1 · 8005 Zurich · Switzerland
+41 43 501 35 50 · info@thesouthpolegroup.com · thesouthpolegroup.com

Details

Prepared for:

The Finnish Innovation Fund Sitra

Janne Peljo, Leading Specialist, Resource-wise and Carbon-neutral Society
Itämerenkatu 11-13 · 00181 Helsinki · Finland
+358 294 618 991 · janne.peljo@sitra.fi · <http://www.sitra.fi>

Prepared by:

South Pole Carbon Asset Management Ltd. (South Pole Group)

Technoparkstrasse 1 · 8005 Zurich · Switzerland
thesouthpolegroup.com

Lead Author:

Robert Rosenberg, Senior Consultant Sustainable Investment
+44 20 3770 0325 · R.Rosenberg@thesouthpolegroup.com

Co-Author:

Harshpreet Singh, Senior Consultant Sustainable Investment
+91 98100 71743 · H.Singh@thesouthpolegroup.com

Technical Support:

Fredrik Fogde, Head of Investor Research
+41 43 501 35 55 · F.Fogde@thesouthpolegroup.com

Contact person:

Anne Franziska Sinner
+41 43 501 35 63 · F.Sinner@thesouthpolegroup.com

Disclaimer:

All content contained in this document is intellectual property (IP) of SPG. The contents of this report may be used by anyone provided clear acknowledgment is given to SPG. This does not represent a license to repackage or resell any of the data or content presented in this report. If you intend to repackage or resell any of this reports content, you need to obtain permission from SPG.

NO WARRANTIES: All of the information provided in this statement is provided "AS-IS" and with NO WARRANTIES. No express or implied warranties of any type are made with respect to the information, or any use of the information, in this statement. South Pole Carbon Asset Management Ltd. ("SPG") makes no representations and extends no warranties of any type as to the accuracy or completeness of any information or content in this statement.

DISCLAIMER OF LIABILITY: SPG specifically DISCLAIMS LIABILITY FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES and assumes no responsibility or liability for any loss or damage suffered by any person as a result of the use or misuse of any of the information or content in this statement. SPG assumes or undertakes NO LIABILITY for any loss or damage suffered as a result of the use, misuse or reliance on the information and content in this statement.

Table of contents

Executive summary	4
1 Introduction	5
1.1 Paris Agreement entering into force	6
1.2 2°C Scenario	8
1.3 Impact on and response by the Investor community	10
2 Climate Impact Assessments of Investments	13
2.1 Current trends in the market	13
2.2 International context	15
2.3 Governments and Regulation	15
2.4 Disclosure, reporting standards and frameworks	17
2.5 Focus on Finnish Market activities	18
2.6 Finnish case study	19
3 Carbon Footprint	24
3.1 Updates to the Methodology	24
3.2 Analysis results - overall emissions	25
3.3 Nasdaq Helsinki - Analysis results	26
3.3.1 Sector analysis	29
3.3.2 Scope 3 emissions and fossil fuel reserves	31
3.3.3 Attribution analysis of Nasdaq Helsinki and Nasdaq Stockholm	31
4 Climate Risks and Forward looking Analyses	33
4.1 Physical and Transition Risks	33
4.1.1 Physical risks	34
4.1.2 Transition risks	35
4.2 Opportunities	36
4.3 Nasdaq Helsinki - Analysis results	37
4.3.1 Assessment of climate change risks and opportunities in cooperation with oekom research	37
4.4 Finnish case study	44
4.4.1 Finnish case study - Identifying climate risks	44
4.4.2 Finnish case study - Tapping into climate opportunities	45
4.4.3 Finnish case study - Forward looking strategies	45
5 2°C degree portfolio analysis	46
6 Recommendations	47
6.1 Dive deeper	47
6.2 Consider climate friendly investment strategies	48
6.3 Set targets	48
6.4 Transparency	49
6.5 Embrace leadership	49

7	Appendix 1 – Carbon footprint methodology	50
7.1	Investment Carbon Footprint	50
7.2	Ownership principle and allocation rules	50
7.3	Intensity Metrics	50
7.4	Explanatory power and limitations	51
8	Appendix 2 – Guidance to using the online tool	52
9	Appendix 3 – Nasdaq Helsinki company list	55
10	Appendix 4 – About South Pole Group	58
10.1	Results you can trust	58
10.2	Deeper analysis conducted together with partners	58
10.3	Reference clients	59

Executive summary

The climate impact of investors has over the past year been propelled to the top of the climate change agenda. While investors launched initiatives such as the PRI's Montreal Carbon Pledge¹ and the UNEP's Portfolio Decarbonization Coalition² to report on investment emissions and reduce greenhouse gas exposure, organizations such as 350.org have become testimony to a growing civil society movement that both puts pressure on investors and significantly raises awareness on the link between investments and climate change. Governments are also on the move, with the French finance minister recently implementing new legislation³, which makes it obligatory for institutional investors to analyse and disclose the carbon footprint of their investments.

The leading climate change specialist, South Pole Group (SPG), together with Oekom Research AG (oekom) have been commissioned by Sitra to assess the climate impact of the companies listed on Nasdaq Helsinki Main Market for the financial year 2014, reported in 2015. The results were compared against the equivalent impact of four other indexes; *Nasdaq Stockholm*, *MSCI World*, *DAX* and *Eurostoxx 50*, with a particular focus on the comparison with the Nasdaq Stockholm. This amounted to an analysis of the climate impact of 130 individual companies for their carbon footprint.

Investing one million Euros in the companies listed on Nasdaq Helsinki results in financed emissions (Scope 1 & 2) of 236 tCO₂e (294 in the previous year), while an equivalent investment in the Nasdaq Stockholm results in 66 tCO₂e, resulting in an under-performance of 257%. Furthermore, considering the indirect emissions from supply chains and product usage (Scope 3), the results of Nasdaq Helsinki listed companies shows an under-performance of 203% against the Nasdaq Stockholm, where the financed emissions amount to an annual total of 716 tCO₂e (893 in the previous year) and 237 tCO₂e respectively.

Additionally, the financed emissions by revenue was calculated, with 331 tCO₂e in 2016, a 6% reduction from the 353 tCO₂e in 2015. This is a more realistic decrease than the 20% reduction in pure financed emissions against 2015, as it does not reflect the changes in the market cap of the companies in the portfolio.

As part of the study, Finnish investors receive free access to an Excel based tool allowing them to run their own Finnish investments against the companies listed on Nasdaq Helsinki. The tool can be found on Sitra's website, www.sitra.fi.

¹ <http://montrealpledge.org/>

² <http://unepfi.org/pdc/>

³ This refers to Article 173 of the French Energy Transition Law, which came into effect on 1 January 2016

1 Introduction

There is a political consensus that climate change needs to be contained, and this is reflected in the targets set in the Paris Agreement to limit global warming to 2°C above pre-industrial levels while pursuing efforts to limit the increase to 1.5°C. To achieve this, economic activities need to shift to a state where greenhouse gas emissions are massively avoided. With the corporate sector facing a huge spectrum of challenges in achieving these objectives and politics closing in on large greenhouse gas emitters, capital markets have started analysing the associated investment risks and their own role in this transition.

Governments, civil society and an increasing number of investors are focusing on the climate impact of investment portfolios. The focus now lies on the link between capital allocation and its impact on the economy, with the need for new metrics of environmental performance measurement to ultimately achieve a net decarbonisation impact.

“Investors (...) should increase transparency regarding greenhouse gas emissions of the assets and businesses that they finance.”

UN Secretary-General
Ban Ki-moon

The following report assesses the climate impact of the Nasdaq Helsinki in three complementary aspects.

First, a carbon footprint assessment analyses the carbon intensity of investing in the Nasdaq Helsinki compared to international benchmarks. It also dives deeper and examines the main contributors and sources of the emissions.

Second, the key themes and trends in the sustainable finance universe are reviewed, analysed and incorporated into the carbon footprint assessment. Global issues such as the Paris Agreement and a 2° scenario have a significant impact on carbon-related topics within investment, and so they are useful to include in the overall analysis.

Third, the report goes beyond the static nature of a carbon footprint, conducting a forward-looking analysis of the companies within the index. This illustrates a more holistic picture of the extent to which companies in the index incorporate risks and opportunities associated with climate change in their business operations.

1.1 Paris Agreement entering into force

The Paris Agreement, which entered into force on November 4th 2016, is unique for the following reasons:

1. **The Goal:** For many years, climate specialists and scientists alike have referred to the goal of keeping global warming to “2°” above preindustrial levels. However, the Paris Agreement was the first international conference which produced a goal of “well below” this classic number, aiming instead towards 1.5° above preindustrial levels.
2. **The Approach:** Since COP 15 (Copenhagen, 2007), international climate agreements have been moving away from “top-down” approaches and towards “bottom-up”. Top-down meant the UN or another global organisation would set targets for countries to follow whereas bottom-up allows each country to set its own Nationally Determined Contributions (NDCs). By setting their own targets, which still have to fit into the overall global aim, countries can independently create local policies to achieve them.
3. **Self-determination:** Connecting with The Approach, countries that may economically (according to GDP) be on the border of developed and developing may choose which of the two to be. This will impact their carbon requirements, which vary according to the level of development.
4. **Wording:** The first piece of wording unique to the Paris Agreement was the text carefully tailored to bypass approval by U.S. Senate, who are traditionally against signing up to such international climate agreements. But choosing the text in such a way, President Barack Obama was able to bypass what would have been a drawn out and likely unsuccessful approval process. The second was connected to the term “carbon markets”, which have received mixed responses from various stakeholders. The Paris Agreement did indeed see a role in carbon market mechanisms (Article 6), but did so while avoiding the word “markets”.
5. **Transparency:** The Paris Agreement including the creation of a transparency framework. This framework is to ensure countries are implementing and achieving appropriate policies to achieve their NDCs and will be monitored by various local and international NGOs.
6. **Private sector:** The final unique element of Paris was that, for the first time in an international climate summit, the private sector was explicitly encouraged to be a part of the conversation and to act.

Regarding sustainable investment, Article 2.1. c) is particularly relevant, as it stated the importance of: ‘making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development’.

On October 5th 2016, the two key thresholds required to ensure the Paris Agreement entered into force were met:

“Over 55 Parties covering More Than 55 per cent of Global Greenhouse Gas Emissions Ratify the Paris Climate Change Agreement”

UN Framework Convention on Climate Change

This is of great positive significance for a wide variety of reasons, but none more so than (a) the speed at which this has taken place, (b) the involvement and leadership of major carbon-emitting countries such as the USA (who, despite changes in White House leadership, are fixed into the irreversible Agreement as confirmed during COP22) and China and (c) the near-universal acceptance that change is needed, and needed immediately.

However, it has to be noted that the Agreement entering into force is simply the first of many complicated and long steps, which require continued levels of commitment from multiple stakeholders such as governments, businesses and owners of capital. Details of the Agreement will be negotiated now during the next 2 years with the aim to have a concrete rulebook for implementation.

The speed and consensus reached on the Paris Agreement is a great example of positive action on a global scale, but the Agreement has only defined the overarching framework for dealing with climate change, now and in the future. Alone it will not solve the problem, and nations now have the task of fleshing out the details. With the UN Conference of the Parties (COP22) taking place in November 2016 in Morocco, the debate and discussion continued to evolve. 2016's COP 22 was merely a "working COP", where delegations started to negotiate on the implementation of the Paris Agreement. The deadline for approval of these modalities is COP24 in Warsaw, 2018. Not surprisingly, therefore, there was very little pressure on any delegation to compromise on anything, so close to no significant decision was taken at COP22. Some delegates even called it a "hangover COP", with a grotesque cocktail of celebrations of the ultra-fast entry into force of the Paris Agreement, and of horror due to a climate change denier getting elected as president of one of the two largest polluters. However, still a number of key technical issues were discussed to build a foundation for the accelerated completion of the concrete modalities, procedures and guidelines that will make the Paris Agreement implementable.

All in all, the Paris Agreement is a global commitment to take climate change seriously. It has sparked a momentum, particularly across business and investors, which promotes investments in a low-carbon world independent of regulations, as the sheer business case has taken centre stage. And ironically, the fact that the Paris Agreement is somehow weak because the specifics are not yet agreed upon, could even become its guarantor for success: A government has little incentive to quit the Agreement, as it can't win much (it

didn't "lose" much in the first place). In return, a country 'leaving' the Agreement doesn't create much incentive for others to follow (see the US). With all the other significant emitters on board for the Paris Agreement, the engagement of social and economic actors, and dedication of subnational authorities, many COP 22 delegates ventured that the world could move ahead with the transformation to a low emissions world and leave the US in the economy of the past.

Both the COP 21 and COP 22 generally show consensus about concerning action of climate change and global warming, with COP21 raising the question "will we do anything?" – to which the answer was an emphatic yes – and with COP22 asking "how do we do it?" – to which the answer is still being discussed and agreed upon.

1.2 2°C Scenario

A 2°C scenario is both daunting and enticing for investors. On one side it will constrict investments and strategies, whilst on the other it provides significant and scalable opportunities for commercially and sustainably viable investments.

For these investors considering a 2°C world, there are large scale changes to be taken into account such as the massive transitions of economies, companies and societies. With these overarching themes providing a lens for investments, the following questions need to be both presented to, and by, investors:

- Do certain investments still make sense?
- Where are the next big investment opportunities?
- What are the largest investment risks?

According to research conducted by the Climate Policy Initiative (CPI) and International Energy Agency (IEA), \$1.1 trillion was invested in "sustainable investments" between 2010 and 2014. In order to support NDCs, \$13.5 trillion is required and to achieve a 2°C limit, \$16.5 trillion is needed by 2030.

It is obvious that technology, especially in the energy sector, will be crucial in any transition scenario. The International Energy Agency has recently published some global primary energy demand developments for the respective 2°C, 4°C and 6°C degree scenarios.

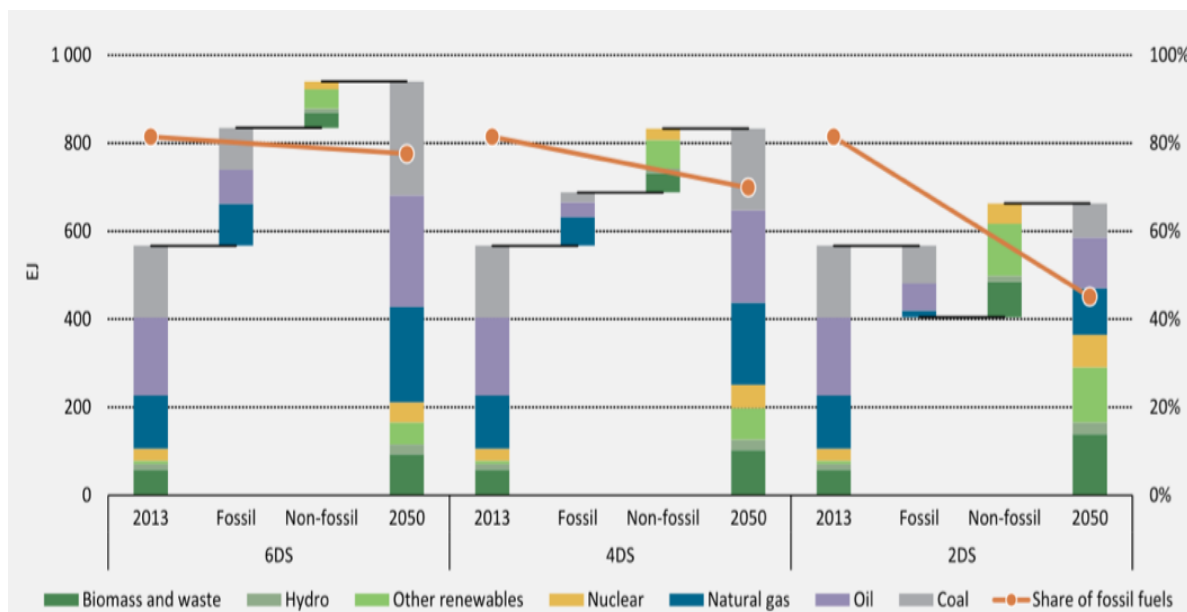


Figure 1: Global primary energy use in the 2°C, 4°C and 6°C degree scenarios for 2013-2050

Source: IEA Energy Technology Perspectives, 2016

Figure 1 above illustrates that the 6°C degree scenario is largely an extension of current trends today. Primary energy demand and CO₂ emissions would grow by about 60% from 2013 to 2050, with about 1 700 GtCO₂ of cumulative emissions. In the absence of efforts to stabilize the atmospheric concentration of GHGs and fossil fuels still dominating the primary energy sources, the average global temperature rise above pre-industrial levels is projected to reach almost 5.5°C in the long term.

The 4°C degree scenario takes into account recent pledges by countries to limit emissions and improve energy efficiency, which help limit the long-term temperature rise to 4°C. However, it would require significant changes in policy and technologies compared with the 6°C degree scenario.

And finally, the 2°C degree scenario lays out an energy system deployment pathway and an emissions trajectory consistent with at least a 50% chance of limiting the average global temperature increase to 2°C. Carbon emissions from fuel combustion and industrial processes are projected to decline due to energy efficiency and carbon neutral processes. The primary fuel mix is more balanced across different sources. Renewable energy sources would significantly grow and cover about as much of the total primary energy use as fossil fuel sources.

Beside technological changes, in a 2°C world, the financial markets will have to transition since they will experience both direct and indirect impacts:

Direct	Indirect
<i>Damages which directly impact the financial sector</i>	<i>Damages of the real economy, which indirectly impact the financial sector</i>
<ul style="list-style-type: none"> • Operational risks: <ul style="list-style-type: none"> ○ Impacted IT systems ○ Shortage in energy supply • Insured losses: <ul style="list-style-type: none"> ○ Increased insurance rates ○ Improved risk modelling ○ Insurance accruals 	<ul style="list-style-type: none"> • GDP losses • Loan write-offs • Lower country risk ratings • Asset accruals/Value reduction of assets • Decrease in property values

Figure 2: Direct and Indirect impacts of climate change on the financial sector
 Source: South Pole Group, 2016

Meeting the 2°C target will prove extremely difficult for governments, regulators and companies alike. To support this, the process and methodology of assessing 2°C compatibility or compliance is becoming more common and several organisations provide services to help companies achieve this. The organisations conducting these analyses include: the 2 degrees investment initiative (2dii), Carbon Disclosure Project (CDP) and World Resources Institute (WRI). Compatibility or compliance to a 2°C (or even the stretch target of 1.5°C) world remains difficult and complicated to analyse and achieve but, following the lead of the aforementioned organisations, it is something that is growing in quality and availability to the market.

1.3 Impact on and response by the Investor community

“The challenges currently posed by climate change pale in significance compared with what might come. The far-sighted amongst you are anticipating broader global impacts on property, migration and political stability, as well as food and water security.”

Governor of the Bank of England
 Mark Carney

The allocation and movement of assets and capital has an essential role to play in transitioning the world to a low-carbon or 2°C economy. By owning and controlling capital, the investor community has significant control over the emissions of investees. For pension fund members, who are technically part-owners of companies in their funds, this is a power that is seldom exercised.

The investor community already exists in a highly regulated and scrutinised world. Commitment to the Paris Agreement or compliance to 2°C will increase the requirements for various stakeholders within the sector. Although these requirements are additional considerations, they provide the opportunities to best leverage the transition to a low carbon economy and society.

For the investor community, it will be essential to understand and monitor key indicators of the “climate change status quo” at that point in time. Of the numerous indicators, the investor community should keep a careful watch on:

- Increased regulatory changes – these can be industry specific, regional or global, covering targeted markets or sectors. A key and leading example is in France, with their 2016 launch of Article 173 of the Energy Transition Law, explained further in Section 2.3 of this report
- Changing behavioural trends e.g. renewable vs. fossil energy
- Fossil fuel reserves (i.e. stranded assets, where due to regulation, reserves that are seen as assets on balance sheets become un-burnable, and as such lose their value, becoming ‘stranded’)
- Carbon pricing
- Physical changes e.g. extreme weather events, destroyed ecosystems
- Increased litigation attempts, coverage and public interest – where members of civil society have put forward legal arguments to their investments going towards unsustainable recipients.

Many investors are already demonstrating their commitment to reducing climate impacts of their portfolios, as demonstrated by their levels of commitment:

Organisation, Protocol or Pledge	Members, signatories or users	Explanation
UN Principles for Responsible Investment (UN PRI)	318 asset owners 1'046 investment managers 212 service providers 1'576 total	The PRI is the world's leading proponent of responsible investment. It works to understand the investment implications of ESG factors and support its international network of investor signatories in incorporating these factors into their investment and ownership decisions.
Greenhouse Gas (GHG) Protocol	1'000+ users	The GHG Protocol is the most widely used international accounting tool for government and business leaders to understand, quantify, and manage greenhouse gas emissions.
CDP	5'600+ respondents to questionnaire annually 533 disclosing cities 71 measuring states 827 investors requesting climate content	The CDP runs the global disclosure system that enables companies, cities, states and regions to measure and manage their environmental impacts.

<p>The Paris Agreement</p>	<p>116 countries ratified (as of December 2016)</p>	<p>The Paris Agreement brings all nations into a common cause to undertake take ambitious efforts to combat climate change and adapt to its effects, with enhanced support to assist developing countries to do so.</p>
<p>The Kyoto Protocol</p>	<p>192 countries signed and ratified</p>	<p>The Kyoto Protocol is an international agreement linked to the United Nations Framework Convention on Climate Change, which commits its Parties by setting internationally binding emission reduction targets.</p>
<p>The Montréal Pledge</p>	<p>120 investors committed</p>	<p>The Montréal Carbon Pledge allows investors to formalise their commitment to the goals of the PDC. By signing the Montréal Carbon Pledge, investors commit to measure and publicly disclose the carbon footprint of their investment portfolios on an annual basis.</p>
<p>Portfolio Decarbonization Coalition (PDC)</p>	<p>27 investors overseeing \$600bn commitments from \$3.2tn AUM</p>	<p>The PDC is a multi-stakeholder initiative that will drive GHG emissions reductions on the ground by mobilizing a critical mass of institutional investors committed to gradually decarbonizing their portfolios.</p>

Figure 3: Members, signatories or users of organisations, protocols or pledges. Data as of 10/2016. Source: Respective organisation website.

To comply with the pledges and commitments, most investors have started their reviews, analysis and reporting on the carbon footprint of relevant investment portfolios. Carbon footprints are undertaken as a current state or point-in-time analysis of the carbon being emitted by companies in the portfolio but also as a future review on the potential journey of the companies within the portfolio. Both parts of the analysis are essential as knowing where the portfolio is now can only demonstrate half the story, with the future aspirations of the companies being highly relevant to efforts made to reduce short, medium and long term footprint.

2 Climate Impact Assessments of Investments

2.1 Current trends in the market

Every day, shares amounting up to hundreds of millions of US Dollars are traded. Every share represents a part-ownership of a company and thus every investor owns “a part” of the company. Likewise, any corporate debt owned by an investor constitutes responsibility for the associated climate impact. This also means that every investor benefits from the business model of the companies they invest in. Investing in carbon intensive companies, for example those in the oil and gas industry, therefore means backing the extraction and usage of fossil fuels and thus the greenhouse gas (GHG) emissions of those companies.

As described in the chapter above, the general journey of an investor can be described along the steps of disclosure, measurement and risk integration.

First, investors disclose their alignment with ESG, and sometimes 2°C, thinking. This is often done via the above-mentioned initiatives or networks, allowing members to publish their view on climate change, policies and targets as pledges or commitments. Then, to start the climate impact assessment of a portfolio, an investment greenhouse gas footprint is measured. It provides the basis for constructing or optimising an investment portfolio based on greenhouse gas exposure, as well as reporting and positioning an investment product towards stakeholders. It is easily replicable for measuring progress on portfolio climate impacts.

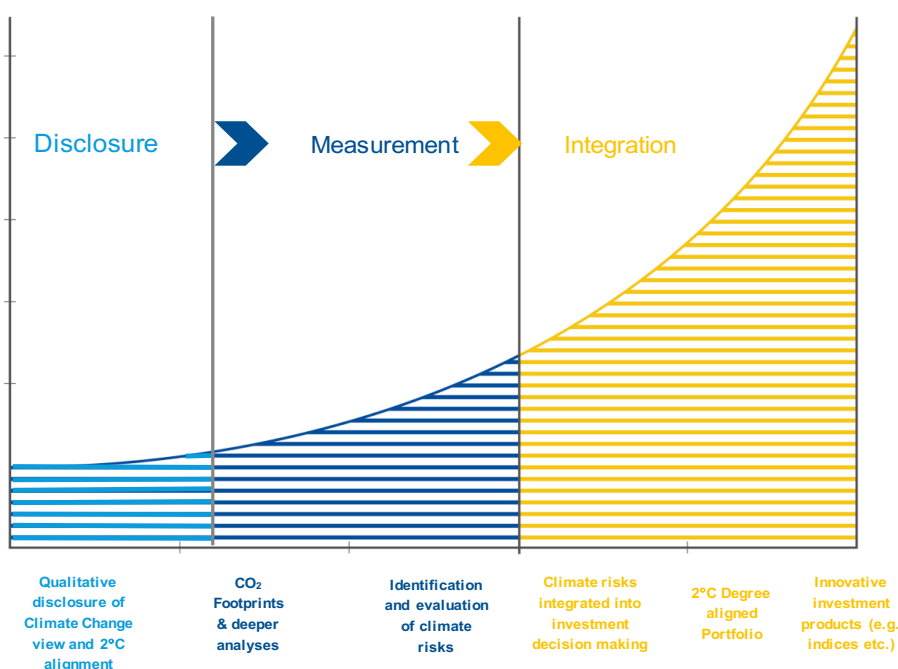


Figure 4: Illustration of the typical journey of investors to assess climate impacts
Source: South Pole Group, 2016

Although carbon footprinting is still a major part of the efforts of companies' and investors to address sustainability issues, there is a general trend towards conducting climate risk analyses that are the next step along the journey. Investors are trying to identify climate risks, quantify them and integrate them into investment decisions e.g. through inclusion into the risk management framework. Traditional climate risks and opportunities in this field are as follows:

Risks:

- Climate change effects on global economy and physical assets
- Carbon pricing (taxes, cap & trade systems)
- Regulatory effects (limiting emissions from power plants, energy efficiency of buildings, etc.)
- Litigation against high-carbon emitters and investors
- The “Carbon Bubble”: Potentially overvalued portfolio holdings due to stranded assets
- Technology risk/innovation disruption

Opportunities

- Financial outperformance of leaders or disruptors
- New asset classes related to clean energy or water markets for example
- Identification of new and/or tilted investment approaches and strategies (e.g. divestment, low-carbon and decarbonisation strategies, etc.)
- Contributing to climate resilient investees by means of engagement and shareholder action

COP 21 and the Paris Agreement have created more awareness for climate risks and triggered a strong development of new research and studies on the different types of climate risks, their implications for the financial market and how to assess and quantify them. The following risk categorisation, and impacts on the financial markets, has been established:

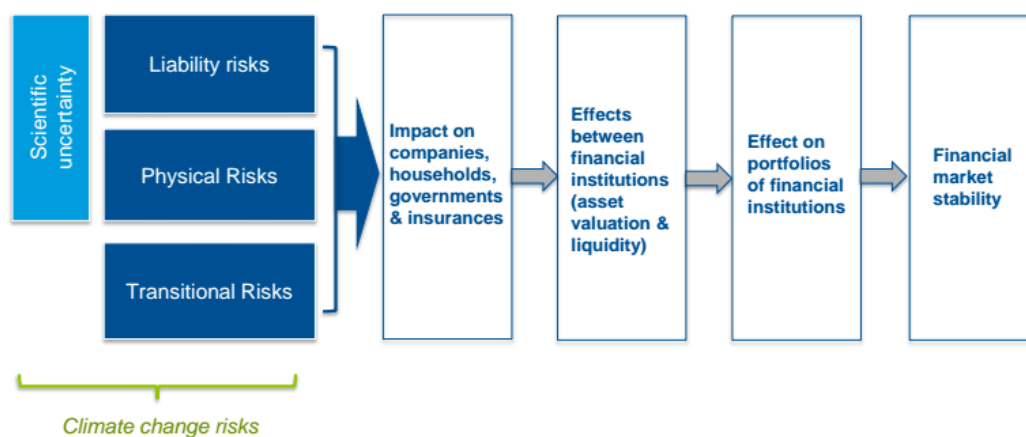


Figure 5: Climate risk categorisation and their financial market impacts

Source: South Pole Group, 2016

2.2 International context

There is an increasing interest amongst governments and civil society actors in the environmental consequences of large investors' behaviour, with the "divest from fossil fuels" movement driving climate change up the agenda, especially in the US. Moreover, governments are becoming increasingly proactive in demanding that institutional investors disclose their climate impact.

At the same time, a growing number of institutional investors and asset managers are committing to measure and reduce the greenhouse gas emissions of their portfolios and to disclose them under initiatives such as the Montreal Carbon Pledge (www.montrealpledge.org) and the Portfolio Decarbonization Coalition (www.unepfi.org/pdc/).

Although reactions and actions may differ significantly, it has become increasingly apparent that, in the mid-term, every investor will need to find a position in this discourse.

2.3 Governments and Regulation

For many years, governments have been becoming progressively more involved with the topic of climate change, some noticeably more so than others. In recent years, and particularly post-COP21 and the Paris Agreement, there has been an incredible surge of government and regulatory activity. The mere act of signing up to the Paris Agreement is a clear indication of the intentions of governments, with the October 2016 ratification and November 2016 coming into effect of the Agreement, demonstrating how widespread this commitment is. However, in order to "walk the talk", governments must work alongside their regulators to create a business and finance environment whereby reducing carbon emissions of investment portfolios is both required by regulation and commercially necessary.

Before going through the complex commitment of issuing regulation, a number of governments have conducted fact-finding research projects to better understand the effects of climate change on local financial markets. Switzerland were one of the first governments to conduct such research, and launched their "Carbon Risks for the Swiss Financial Centre" report in August 2015⁴. This was followed by other countries such as Germany ("Climate change and financial markets", 2016⁵), The Netherlands ("Time for Transition – an exploration of the transition to a climate neutral economy", 2016⁶) and Sweden ("The effects of climate change on financial stability", 2016⁷).

⁴http://www.bafu.admin.ch/klima/index.html?lang=en&download=NHZLpZeg7t,Inp6i0NTU042i2Z6In1ad1iZn4Z2qZpnO2Yug2Z6gpJCHeYF4f2ym162epYbg2c_JjKbNoKSn6A

⁵http://www.bundesfinanzministerium.de/Content/EN/Standardartikel/Topics/Financial_markets/Articles/2016-09-19-Climate-change-and-financial-markets.html

⁶https://www.dnb.nl/en/binaries/TimeforTransition_tcm47-338545.pdf

⁷http://www.fi.se/upload/43_Utredningar/20_Rapporter/2016/climat-change-financial-stability-sweden.pdf

Moving further on than conducting research, other governments and regulators from across the globe are demonstrating strong commitment to climate change via either regulation or public verbal commitments:

The most well-known and prominent climate change action from a government or regulator has taken place in France. The December 2015 (in line with COP21) adoption of Article 173 of the French Energy Transition Law has demonstrated the impact that regulation can have on sustainability efforts of the finance and investment community. This regulation requires the following:

- Inclusion of ESG criteria and objectives in the investment policy and the means deployed to contribute to the energy and ecological transition in the annual report.
- Disclosure of environmental objectives including the exposure to climate risk (e.g. GHG emissions) and the investor's contribution to the fight against global warming's international objectives and to the energy transition.
- Contribution evaluated in the light of indicative targets set up by business sector and investment type, in coherence with the French national low carbon strategy.

Outside of France, significant efforts have been made by multiple markets to encourage, and potentially regulate, climate change disclosure and action.

Two notable examples are in Sweden and California:

"I want Sweden to aggressively tackle the climate challenge by investing and acting in a sustainable way, both in the financial markets and in our role as smart consumers."

Minister for Financial Markets,
Sweden
Per Bolund, 2015

"I require (...) insurance companies to provide detailed and specific disclosures of their investments in the carbon economy including coal, oil and gas. We will make this new information public."

Commissioner, California
Department of Insurance
Dave Jones, 2016

2.4 Disclosure, reporting standards and frameworks

From an intra-governmental perspective, there are a number of groups promoting and supporting companies in their efforts to improve carbon disclosure, reporting standards and frameworks.

One of these groups encouraging action on disclosing climate impacts of investments are the Financial Stability Board (FSB)'s Task Force on Climate-related Financial Disclosures (TCFD). Chaired by Michael Bloomberg and including PRI's Chair Martin Skancke, the TCFD is considering the physical, liability and transition risks associated with climate change and what constitutes effective financial disclosures. It aims to develop voluntary, consistent, climate-related financial risk disclosures for use by companies in providing information to investors, lenders, insurers and other stakeholders. On 31st March 2016, the taskforce published its Phase I Report, setting out its scope, objectives and principles of disclosure, and opened a one-month public consultation. The taskforce's recommendations for voluntary corporate disclosures will be presented to the FSB on 14th December 2016.

There is an argument as to the long-term and 'real' impact of voluntary initiatives, especially in comparison with national or international regulation. However, the stature and prominence of the TCFD will ensure that governments and companies alike will review and consider their recommendations. Once approved, this initiative will provide the impetus for investors and other members of the finance industry to disclose their carbon footprint, helping them to measure and respond to the many climate change risks impacting them and the wider industry.

In addition to the work being conducted by the TCFD, the Sustainability Accounting Standards Board (SASB) in the US is also supporting companies with their sustainable disclosure requirements and needs. Their objective is to build an industry-wide non-financial sustainability disclosure standard. Beyond the standards, the SASB also conducts research and recently published a report on climate risks⁸ and, via 'materiality mapping', identified their relevance for multiple asset classes.

One country-level example of attempts to improve carbon disclosure is Sweden, where the National Pension (AP) Funds are coordinating their carbon footprint reporting for investment portfolios. The AP Funds manage the national pension system, including both income-based and premium pension contributions. There are currently six AP Funds, all with different investment strategies and asset allocations. This in turn, means that climate footprint will vary between each one. However, with all six of the AP Funds committed to reducing the climate impact of their investment portfolios, there is discussion surrounding a joint approach to both calculation and reporting. This methodology standardisation will take some time to be fully implemented but the belief is that through consistent

⁸ <http://using.sasb.org/sasb-climate-risk-framework/>

measurement and reporting standards, the overall carbon footprint calculation will be more robust, accurate and ultimately effective at reducing the climate impact of the Funds.

2.5 Focus on Finnish Market activities

The Finnish market is ideally placed for increased activity in the sustainable or climate finance space. The 2015 online tool that allows investors to calculate the carbon footprint of their Finnish listed holdings has been received with strong interest. This demonstrates the desire of Finnish investors to understand how their own Finnish investments match up against the companies listed on the Nasdaq Helsinki. It also means that assessing climate impact of investments is growing in importance and popularity across the finance market.

A significant number of large Finnish investors, including pension funds Varma, Ilmarinen, Elo and the Church Pension Fund, are developing, improving and implementing carbon footprinting within their organisations. The topic is rapidly rising on their agendas, due to key factors such as multi-stakeholder pressure, the threat of policy changes and their own management or senior leadership appetites to decarbonise portfolios. All content below covering these investors are based on publically available content, on company websites or publications.

Sitra's Carbon-neutral Industry project throughout 2014-2016 has provided information on Finnish investment organisations about the approach of, and strategies around, climate change. Summarising the studies and tools developed in the project, Sitra has published a 'toolkit with building blocks for carbon neutrality', complemented by a series of articles on key dimensions of carbon neutrality. In the article on reducing carbon footprint of investments, Ilmarinen has been portrayed as an example of carbon footprinting. They have put this at the forefront of their sustainability strategy, and intend to conduct annual assessments of their investment portfolio. In addition, Ilmarinen puts key emphasis to investing in companies that provide solutions to global challenges and sustainable development as part of their business.

"Climate change is a major challenge, but for many companies it can also offer unique business opportunities. We actively seek companies that benefit from the business opportunities brought by climate change and sustainable development goals, aiming to double the amount of these investments by 2020."

Senior Advisor, Responsible Investments
Tiina Landau, Ilmarinen

2.6 Finnish case study

This case study reviews a number of relevant investment strategies established by the Finnish pension funds Varma, The Church Pension Fund and Ilmarinen. Due to the size, significance and scope of their investment portfolio, the sector has the potential to act as a driver towards climate change awareness whilst simultaneously acting as an example of applying efficient climate change mitigation measures.

Investment portfolios with climate focus are becoming increasingly common, especially among investors with a strong long-term vision. While the primary objective of pension funds is to invest in a profitable and secure manner to provide incomes for retirement, a conservative risk profile must be maintained.

For this case study, the three pension funds will be reviewed to understand their commitment to investing sustainably via six factors:

1. Signing up to external organisations
2. Responsible or sustainable investment policies
3. Approach to real estate investment
4. Investment screening approach and implementation to date
5. Climate strategies
6. Engagement.

These climate related actions can act as triggers in pushing the Finnish market towards higher level of climate change awareness and responsibility.

Commitment to investing sustainably:

The Church Pension Fund has a strong and long commitment to investing sustainably. It has been a signatory to the UN PRI for many years and in 2014 released responsible investment guidelines, which oversee its full investment strategy. The Finnish pension fund Ilmarinen is a signatory of the PRI already since 2006, has joined the Montreal Carbon Pledge initiative as the first pension insurance company in Finland, complies with the UN Global Compact principles and has a process in place to deal with any noncompliance from the part of the companies it owns. In addition, similarly to many other institutional investors in Finland, Ilmarinen is a member of the Carbon Disclosure Project (CDP), where investors aim at improving companies' disclosure of their climate impacts. Varma has joined the United Nations Environment Programme Finance Initiative (UNEP FI) as well as the Montreal Carbon Pledge initiative, where investors commit on an annual basis to measure and publicly disclose the carbon footprint of their listed equity investments. In general, these types and levels of commitment are suitable for communicating environmental, social, economic and good governance practices with companies' stakeholders. However, in addition to committing to comply with external principles, both companies and

investors need to carefully analyse their operating environment to understand their sustainability impact and context.

Responsible investment policies:

As mentioned in Section 2.4, companies are being encouraged to integrate climate change analysis in their investment decisions. In 2014, the Church Pension Fund released responsible investment guidelines which oversee its full investment strategy. The guidelines build on the UN PRI and have three main approaches: responsibility analysis, active ownership and engagement, and impact investing. Varma has established asset-specific responsible investment policies for their equity, private equity, real estate, listed bonds, and hedge investments. Ilmarinen first published its ownership policy in 2002, including aspects of ownership, governance, environmental and social sustainability. Ilmarinen has been annually updating and developing this policy ever since, and in 2015 separated it into two: an Ownership Policy focusing on ownership aspects and expectations towards companies and a Responsible Investment Policy, which covers the principles and policies they comply with when making investment decisions. Within the responsible investment policy, Ilmarinen provides an example on how they integrated sustainability into their investment operations in a more systematic manner. This was achieved by adopting responsible investment ratings that combine third party sustainability rating standards with analyses from internal and external sources. A responsible investment policy document also established minimum requirements for companies where Ilmarinen has holdings in. For example, Ilmarinen specifically excludes certain types of investments whenever not in compliance with the minimum requirements set for responsibility.

Real estate investment:

Finnish pension funds have traditionally played an active role as real estate investors. By adjusting their real estate investment portfolios' carbon intensity through increased energy efficiency or renewable energy usage, pension funds have an opportunity to reduce their emissions. Varma states that their most significant buildings are mainly certified under BREEAM environmental rating system, with an objective to reach a minimum rating of Good or Very Good by year 2025. Ilmarinen invests in real estate responsibly by utilizing environmentally friendly and recyclable materials in their constructions. In addition, they require their construction projects to have at least LEED Gold environmental certification. The Church Pension Fund considers environmental, social and good governance aspects in direct real estate investments and in property fund investments.

Carbon footprint analysis:

Within the responsible investment approach, there has been a rapidly growing interest from governments, regulators and civil society for climate responsible

strategies and actions. Conducting a footprint calculation is the first step in understanding individual company, and therefore total investor, climate impact.

Varma measures and discloses their investment carbon footprint on an annual basis across asset classes including listed equity, corporate bond and real estate investments. Their low footprint in comparison with the benchmark index was a result of large holdings in zero emissions sectors and stock selection in emissions intensive sectors, favouring the less intense Finnish utilities when compared to their global peers. They are the first Finnish earnings-related pension fund to publish a climate policy steering investments.

The table below provides an example of a carbon footprint calculation for Varma's listed equity investments. The figures include direct greenhouse gas emissions from sources owned or controlled by the companies (Scope 1), and indirect emissions from the generation of mostly purchased energy (Scope 2). For Varma's listed equity investments, the carbon intensity is obtained based on the companies' weight in equity investments. The figure is then calculated by adding up the carbon intensity (emissions/revenue) of the companies in the portfolio, and multiplying it by the company's weight in investments.

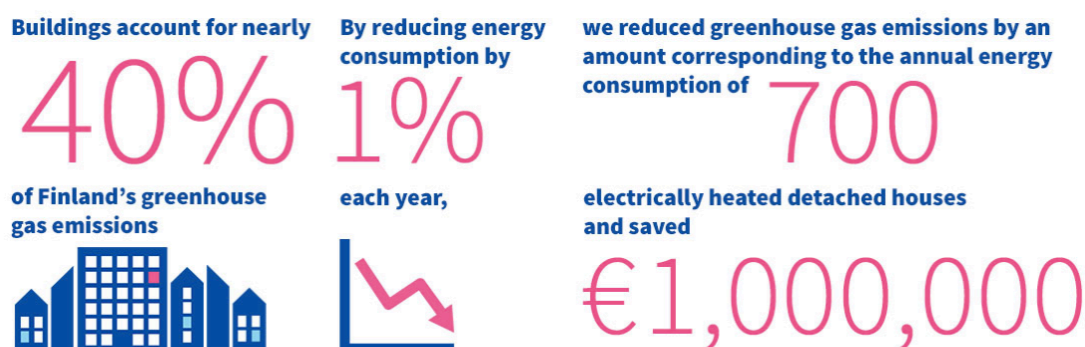
Varma's listed equities	Varma	Benchmark Index	Difference
Market value – 10.8bn			
Carbon footprint (tCO ₂ e)	1,810,908	2,648,391	-837,482
Share of disclosing companies (in relation to capital)	85%	83%	
Carbon footprint in relation to revenue (financed tCO ₂ e/€ mill. financed revenue)	237	324	-27%
Carbon footprint in relation to invested capital (tCO ₂ e/€ M invested)	168	246	-32%
Carbon intensity (weighted emissions tCO ₂ e/€ M Weighted revenue)	163	188	-13%

Figure 6: Varma's listed equities against a benchmark

Source: Varma presentation (http://www.slideshare.net/tyoelakeyhtio_varma/varmas-carbon-footprint), calculations by South Pole Group

After calculating the carbon footprint, investors and companies can identify actions to reduce their emissions. Addressing the level of energy consumption is an efficient measure to achieve emission reductions and cost savings. In 2011-2015 Varma reduced their real estate investments' greenhouse gas emissions. They present the results, and the actions that led to the emission reduction, in their Annual Report 2015.

We reduced the annual carbon footprint of our real estate by 3,000 CO₂ tonnes in 2011–2015. 🐦



This is how we did it:
 We adjusted and optimised ventilation, lighting and heating.
 We invested in ventilation equipment.
 We introduced remote use and monitoring.

Saving energy pays off.

Figure 7: Varma real estate carbon footprint reduction 2011-2015
 Source: Varma Annual Report 2015

The Church Pension Fund has a strong and long commitment to investing sustainably. They have been signatories to the UN PRI for many years and released responsible investment guidelines in 2014 which oversee their full investment strategy. They also conduct annual carbon footprint assessments of their investment portfolio, about which Magdalena Lönnroth said “*The Premium Climate Impact Assessment is a meaningful way of monitoring the asset managers’ commitment to ESG analysis. It also helps an asset owner to better understand where the portfolio’s climate impact originates from. The results can be very eye-opening*”.

In 2016 Ilmarinen published their climate policy, where it sets goals to contribute to mitigating climate change and to guide the investee companies and asset managers to take sustainability aspects better into account. Ilmarinen had their carbon footprint calculated for the first time in 2015, and now carry out the calculation annually. Their scope of carbon footprinting covers direct investments in listed equity, corporate bonds, real estate and forestry. They apply a twofold general approach to responding to carbon risks: they either try to influence the company through engagement, or if necessary, divest from the investments.

Climate strategy:

As soon as the carbon footprint has been calculated, the results can be used to guide the design of a corporate climate strategy and to establish clear targets for the climate policy. Varma has included the 2°C goals in its investment strategies, which means that the company’s long term goal is to focus on low carbon investments or investments with a climate strategy and low carbon

targets. In the short term, Varma's goal is to reduce its investments' carbon footprint by 25% in listed equity, 15% in corporate bond investments and 15% in real estate investments by 2020. Ilmarinen incorporated climate-change related risk factors into their investment decisions in 2015. Considering climate matters is now part of their responsible investment strategy. In Ilmarinen's climate policy, they set targets to increase the share of business related to sustainable solutions of the net sales of direct listed equity investments from 6,0% in 2016 to 12,0 % in 2020, to reduce the carbon footprint of their real estate portfolio by 10 % by 2020 and 20 % by 2025 compared to 2015 levels. Ilmarinen reduced the carbon footprint of the listed equity portfolio by 27 % from 2015 to 2016 and aims at further reductions in both equity and corporate bond portfolios, as well as increasing the share of renewable energy in investments in power companies. As a long term goal Ilmarinen has set that their investments would be in line with the two degrees scenario. The Church Pension Fund include environmental aspects in its responsible investment policy, and stress that these issues are considered in all their investment activities.

In addition to integrating climate issues in their investment strategies, an emerging tendency within the sector has been to build portfolios solely focused on climate change mitigation. Varma recently announced it will have a portfolio which only includes companies whose businesses benefit from climate change mitigation, or companies that are ready to adjust their operations in order to achieve lower levels of carbon emissions. Ilmarinen also actively seeks investees whose business relates, for example, to renewable energy, clean water or improving resource efficiency. In the first stage, this identification has been done as part of internal equity selection and has been the work of the portfolio managers of the equity teams.

Engagement and co-operation:

In general, increased disclosure has led to a better understanding of climate change related impact. However, to be able to generate a more significant positive impact on the economy, investors need to assume a more active role in engaging with the companies they own. For example, Ilmarinen has assumed an active ownership role by participating in the general meetings and Board nomination processes of the companies they own. The engagement can be direct (e.g. attending general meetings) or indirect. The Church Pension Fund includes in its indirect engagement activities dialogues with the companies they invest in, carried out by their asset managers or consultants. In addition to holding engagement dialogues, it participates in investor initiatives, and supports the development of corporate reporting practices. In its climate policy, Varma commits to participate in public debate on the impacts of climate change at events and through co-operative initiatives. Ilmarinen, on their own as well as together with other Nordic institutional investors, has made an effort in influencing the companies they own through (joint) investor letters and discussions with companies, where they stress responsible business practices, and they also participate in Nordic Engagement Cooperation in order to improve sustainability as well as CDP's and Shareaction's joint engagements.

3 Carbon Footprint

A carbon footprint is a “point in time” snapshot of current emission exposure and does not reveal the climate strategy and trends of the underlying company. It is one of many important tools in this field which has a number of strengths and weaknesses associated.

Carbon footprinting provides users – both the company itself and its stakeholders – a way in which to see how the company is currently performing from a carbon perspective. Depending on the quality of data available and provided, carbon footprint analyses can vary in accuracy. However, the methodologies undertaken by South Pole mitigate the drop in quality from missing information as much as possible. Another benefit is the link between carbon emissions and other environmental impacts. Although not always the case, there is often a correlation between the two sets of factors, and so by understanding the carbon impacts, a degree of knowledge can be gained about additional environmental impacts.

Carbon footprinting is an essential first step for any investment organisation seeking to both understand and reduce its environmental impact. It is however not the long-term solution, but a guidance strategy to inform where a company is and what they need to do in order to get where they want to be.

There are a number of useful and relevant conclusions that can be drawn from a carbon footprint analysis. In the first instance, it can clearly and simply show how much carbon the company emits, through direct and indirect impacts, and can compare and benchmark this against a relevant local index. The benchmark is essential, as it helps to garner how a company is performing against relevant peers. Beyond this, the assessment can also show areas of greatest carbon exposure or liability. The deep dive and sector analyses, alongside a view of the Top 10 emitters, can put investors in a strong position to find the quick wins in reducing their environmental impact.

3.1 Updates to the Methodology

Investment greenhouse gas accounting enables quantification and management of greenhouse gas emissions and is the first step towards understanding an investor’s impact on climate change. Measuring the climate impact of an investment portfolio requires several steps. First, it is important to understand what the climate impact of each underlying investment is. Secondly, it is necessary to define how a company’s climate impact is allocated to an investor.

The methodology used by SPG has been developed jointly with researchers of the Swiss Federal Institute of Technology (ETH) in Zurich and presents the state of the art of such assessments. This methodology is constantly evolving, and over the years since its inception, has grown and developed into the most robust and efficient in the market. South Pole are constantly enhancing and extending

the methodological boundaries. This covers both asset classes that are already reviewed but not fully assessed and those currently outside of the scope of analysis. The full explanation of the methodology can be found in Appendix 1 of the Annex document.

3.2 Analysis results - overall emissions

The Nasdaq Helsinki is more emissions intense compared to several of the indexes analysed for this report, based on direct greenhouse gas emissions and emissions from electricity and heat procurement (Scope 1 & 2). Investing one million Euros in the Nasdaq Helsinki results in financed annual emissions (Scope 1 & 2) of 236 tCO₂e, while an equivalent investment in the Nasdaq Stockholm results in 66 tCO₂e. Considering the emissions from supply chain and product usage (Scope 3), Nasdaq Helsinki shows a significant under-performance of 203% against Nasdaq Stockholm, where the financed annual emissions (Scopes 1, 2 & 3) are 716 tCO₂e and 237 tCO₂e respectively.

The following table compares the results against all analysed indexes, based on a EUR 1 million investment into each:

	Nasdaq Helsinki	Nasdaq Stockholm	MSCI World	Dax	Eurostoxx 50
Total Emissions Scope 1&2 (tCO ₂ e)	236	66	181	465	247
Total Emissions Scope 1, 2 & 3 (tCO ₂ e)	716	237	716	1'212	929
Financed emissions (tCO ₂ e) per €1m revenue	331	82	297	379	220
Percentage of disclosing holdings	33%	25%	69%	90%	96%

Figure 8: Emissions of Nasdaq Helsinki and four benchmarks

Source: South Pole Group, 2016

Compared to the cited indexes above, the Nasdaq Helsinki comes up as the 3rd most emissions intense index for Scopes 1 & 2, moving to the 2nd least intense when including Scope 3. What is notable is that the Nasdaq Helsinki is more emissions intense than the MSCI World which includes several large emitters. Here it is important to keep in mind the weighting in these indexes, where the large amount of companies in the MSCI World absorbs higher concentration of carbon exposure. Taking revenue into account, the Nasdaq Helsinki is the 4th highest emitter, with the Nasdaq Stockholm comfortably the lowest of the benchmarks.

Following COP21 in 2015 and the subsequent Paris Agreement, several companies and investors are looking for ways to internalize the costs of carbon into their business practices. Some companies have such internalization of a “shadow price” on carbon as part of the climate strategy. One approach is to

analyse what the cost would be at today’s pricing to reduce the equivalent amount of greenhouse gases by financing projects that save emissions. Based on an average cost of EUR 11 per ton (EU-ETS average price across Q1-Q3 2016), the cost of offsetting a EUR 1 million investment in the Nasdaq Helsinki would amount to EUR 2’422, or 0.24%.

The emissions of the Nasdaq Helsinki are heavily influenced by the top 5 contributors to the company mix, responsible for 77% of the financed Scope 1 & 2 emissions. These will be further analysed in the subsequent chapters.

3.3 Nasdaq Helsinki - Analysis results

The following section examines the main contributors, and where the emissions come from. The charts below show the top 10 companies in terms of their contribution to the total financed emissions of the portfolios, based on a hypothetical investment of one million EUR in the Nasdaq Helsinki and Nasdaq Stockholm respectively.

Company	Weight in Portfolio	tCO ₂ e In portfolio	% of Total	Source
FORTUM OYJ	5.1%	82	35.0%	Disclosed
SSAB AB	0.9%	38	16.3%	Disclosed
UPM-KYMMENE OYJ	4.0%	27	11.5%	Disclosed
STORA ENSO OYJ	2.5%	18	7.7%	Disclosed
NESTE OYJ	3.9%	14	6.1%	Disclosed
OUTOKUMPU OYJ	1.0%	10	4.3%	Disclosed
FINNAIR OYJ	0.2%	9	4.0%	Disclosed
HUHTAMAKI OYJ	1.8%	4	1.6%	Disclosed
KEMIRA OYJ	0.7%	4	1.6%	Disclosed
VIKING LINE ABP	0.1%	3	1.5%	Approx

Figure 9: Top 10 emitters in the Nasdaq Helsinki portfolio

Source: Nasdaq Nordic, 2016

For the second year running, Fortum, the only Utility company in the index, has the highest carbon emissions of the portfolio. However, it has the 7th highest weighting in the index, which of course influences the results.

In terms of absolute Scope 1 & 2 emissions, SSAB is the second largest contributor after Fortum for a second year running, and despite a relatively low weighting, are responsible for 16.3% of the emissions of the portfolio.

With the exception of Viking Line, all top 10 contributors to the emissions in the Nasdaq Helsinki report on climate related strategies to the CDP. This is a positive sign of the overall climate strategy of the portfolio, indicating the importance given to climate change aspects among the companies in the exchange.

The Nasdaq Helsinki top emitter, SSAB AB, represents over 10% less than Fortum does respectively for Nasdaq Stockholm. In addition, across the Top 10 emitters, only one has more than a 1% weighting in the portfolio. Only seven of the companies disclose their emissions, showing less transparency in comparison with the nine disclosing companies of the Nasdaq Helsinki Top 10.

Company	Weight in Portfolio	tCO ₂ e In portfolio	% of Total	Source
SSAB AB	0.4%	16	23.8%	Disclosed
SAS AB	0.2%	11	16.3%	Disclosed
SVENSKA CELLULOSA AB	3.0%	5	7.5%	Disclosed
NCC AB	0.4%	3	4.6%	Disclosed
BOLIDEN AB	0.9%	2	2.5%	Disclosed
RATOS AB	0.3%	1	2.3%	Approx
STORA ENSO OYJ	0.2%	1	2.3%	Disclosed
FASTIGHETS AB BALDER	0.7%	1	2.2%	Approx
VIKING SUPPLY SHIPS AB	0.0%	1	1.4%	Approx
ENQUEST PLC	0.0%	1	1.4%	Disclosed

Figure 10: Top 10 emitters in the Nasdaq Stockholm portfolio

Source: Nasdaq Nordic, 2016

The below tables show the 10 largest holdings in the indexes and their contribution to the emissions of the portfolios. As shown, the overall Nasdaq Helsinki carbon footprint benefits from high weightings in emission light companies such as Nordea, Nokia and Sampo. The weighting in the portfolio thus has a significant impact on the overall intensity of the portfolio.

Company	Sector (GICS)	Portfolio Weight	Data Source	Emissions (tCO ₂ e)	% of Total
NORDEA BANK AB	Financials	14.29%	CDP	0	0.02%
NOKIA OYJ	Information Technology	12.1%	CSR	1	0.46%
SAMPO OYJ	Financials	8.8%	CDP	0	0.00%
KONE OYJ	Industrials	8.1%	CDP	1	0.23%
TELIA CO AB	Telecommunication Services	6.9%	CDP	2	0.71%
FORTUM OYJ	Utilities	5.1%	CDP	82	34.97%
UPM-KYMMENE OYJ	Materials	4.0%	CDP	27	11.52%
NESTE OYJ	Energy	3.9%	CDP	14	6.08%
WARTSILA OYJ	Industrials	3.2%	CDP	0	0.19%
STORA ENSO OYJ	Materials	2.5%	CDP	18	7.71%

Figure 11: Largest holdings in the Nasdaq Helsinki portfolio

Source: Nasdaq Nordic, analysis conducted by South Pole Group, 2016⁹

⁹ CSR refers to information gained from companies' Corporate Social Responsibility or Sustainability reports, where they disclose emissions alongside other environmental and social factors. CDP refers to information gained from formal disclosure with the Carbon Disclosure Project

For Nasdaq Stockholm, five of the top 10 holdings of the index are financial institutions and none are in utilities or materials, two of the highest emitting sectors. This is one of the key contributing factors to the difference in financed emissions of the portfolios.

Company	Sector (GICS)	Portfolio Weight	Data Source	Emissions (tCO ₂ e)	% of Total
HENNES & MAURITZ AB	Consumer Discretionary	6.0%	CDP	0.06	0.7%
NORDEA BANK AB	Financials	5.8%	CDP	0.06	0.0%
ATLAS COPCO AB	Industrials	5.2%	CDP	0.05	0.3%
INVESTOR AB	Financials	4.0%	APPROX	0.04	0.2%
SVENSKA HANDELSBANKEN	Financials	3.9%	CDP	0.04	0.0%
SWEDBANK AB	Financials	3.9%	CDP	0.04	0.1%
VOLVO AB	Industrials	3.5%	CDP	0.04	1.0%
ERICSSON LM	Information Technology	3.5%	CDP	0.03	0.8%
SKANDINAVISKA ENSKILDA BAN	Financials	3.2%	CDP	0.03	0.0%
ASSA ABLOY AB	Industrials	3.1%	CDP	0.03	1.1%

Figure 12: Largest holdings in the Nasdaq Stockholm portfolio
 Source: Nasdaq Nordic, analysis conducted by South Pole Group, 2016

The first step for an investor looking to understand its climate impact, risks and opportunities, is to conduct a carbon footprint on a company level. In most cases, the result of such an exercise is published in the public domain and subsequently collected by SPG. Not publishing such results is usually an indicator for the absence of a climate strategy, which, from an investor’s point of view, constitutes a risk. South Pole therefore emphasises greenhouse gas disclosure within an index as a separate indicator for risk assessments.

Within the Nasdaq Helsinki, there are a few smaller companies that do not report their emissions. This means that when looking at the percentage of companies in the portfolio that disclose, the number is quite low at 33%, which is a 1% decrease from the previous year. The number in the Nasdaq Stockholm is 8% lower at 25%, as shown in the charts below.

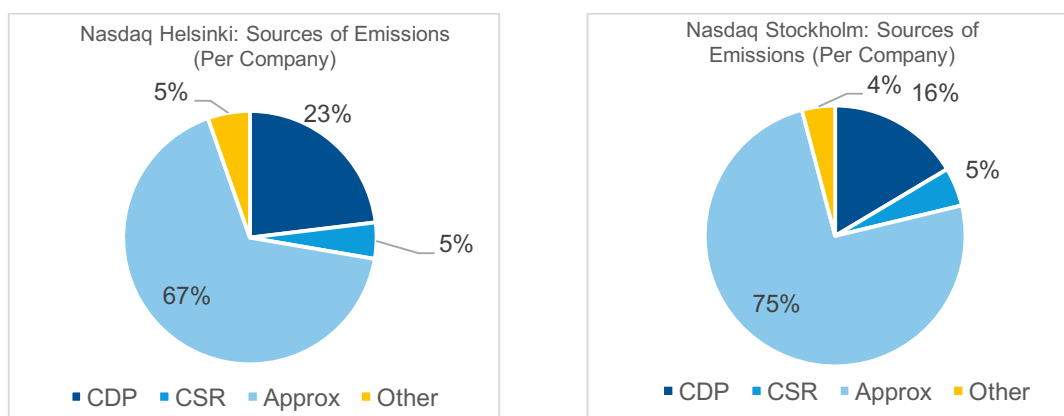


Figure 13: Company disclosure of Nasdaq Helsinki and Stockholm
 Source: South Pole Group, 2016

When looking at the total share value in companies that report their emissions, these numbers increase in both indexes to 93% and 74% respectively.

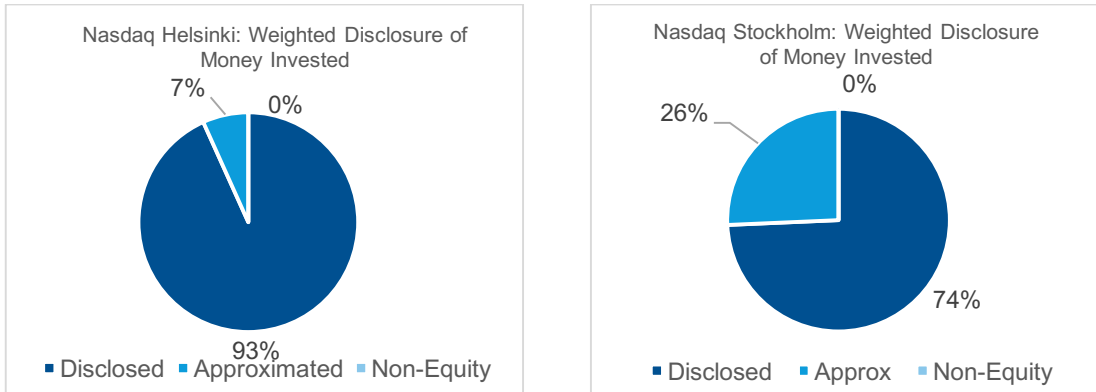


Figure 14: Weighted company disclosure of Nasdaq Helsinki and Stockholm

Source: South Pole Group, 2016

3.3.1 Sector analysis

The sector allocation has an impact when looking at the sources of the emissions in an index. For Scope 1 & 2 emissions, the largest amount of greenhouse gas emissions come from the Materials and Utilities sectors. When including indirect Scope 3 emissions, the main contributions stem from the energy sector. The following graph compares the asset allocation with the % contributions of the financed Scope 1 & 2 emissions of the Nasdaq Helsinki.

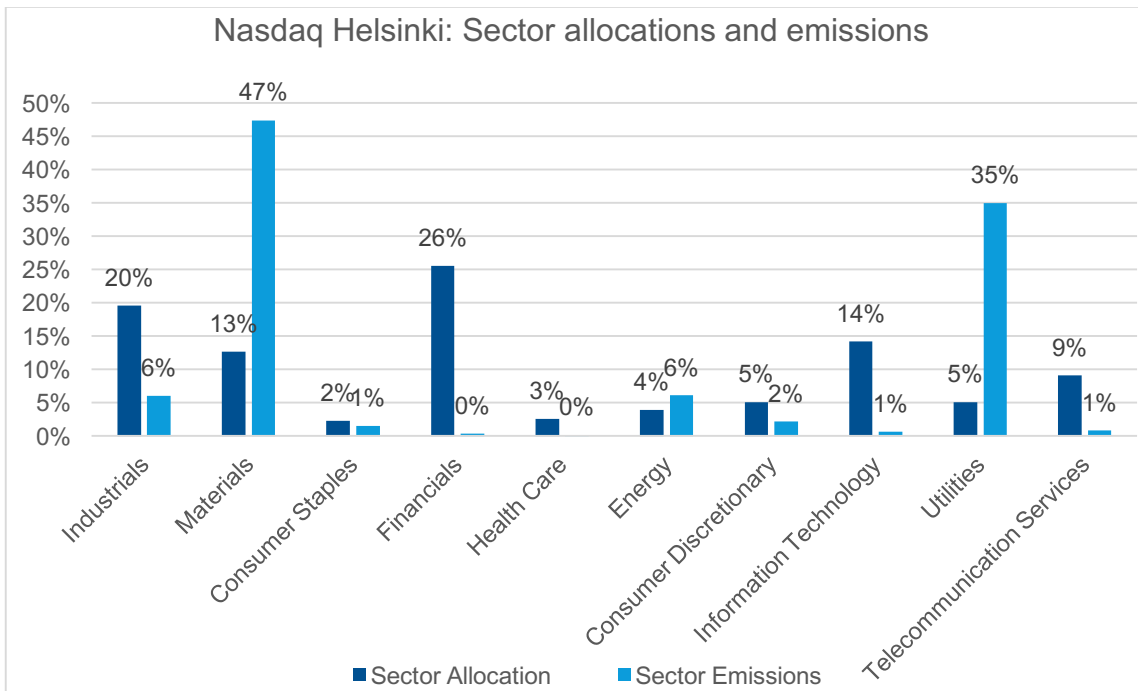


Figure 15: Sector allocations and emissions for Nasdaq Helsinki

Source: South Pole Group, 2016

For both indexes, the Materials sector is the largest emitter, despite having low allocations. For Nasdaq Helsinki, the second highest emitter is Utilities, due to the allocation in Fortum. Nasdaq Stockholm however has no Utilities allocation and it is Industrials which is the second highest emitting sector.

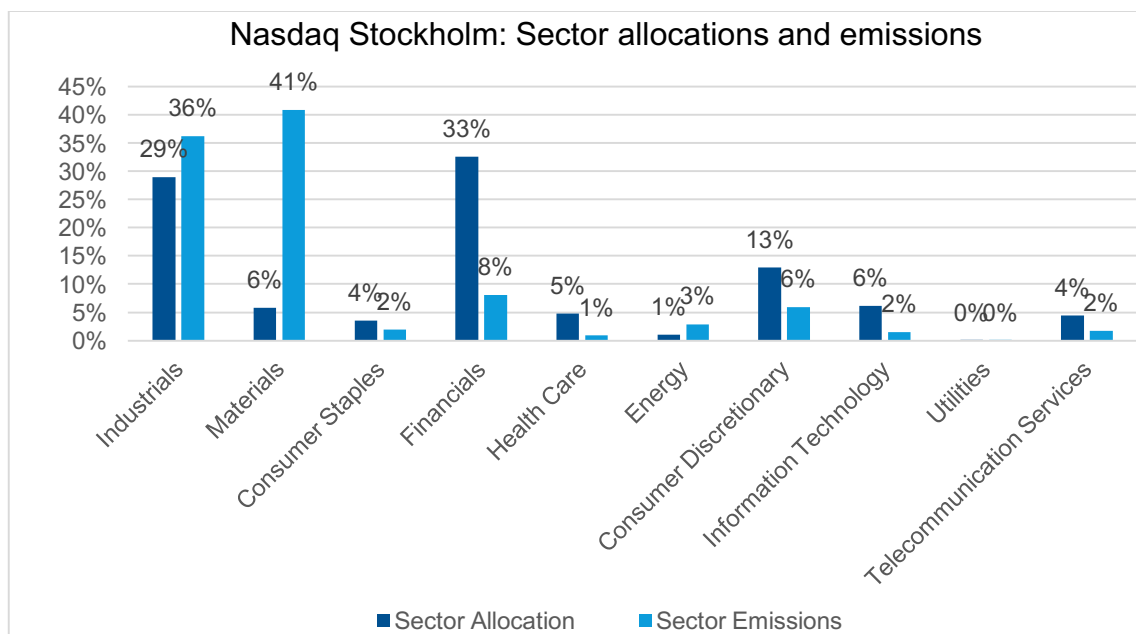


Figure 16: Sector allocations and emissions for Nasdaq Stockholm

Source: South Pole Group, 2016

As a third example, DAX – the most emissions intensive index in the benchmark - is heavily influenced by the Utilities sector, where companies with a combined value of 2% are responsible for 57% of the portfolio’s emissions.

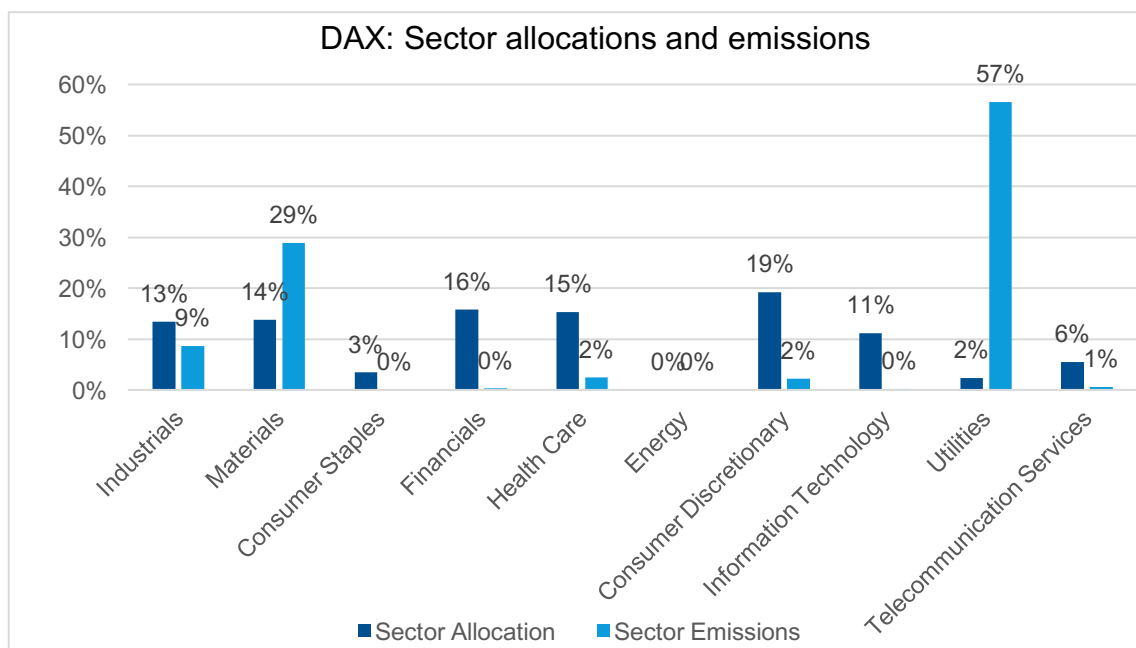


Figure 17: Sector allocations and emissions for DAX

Source: South Pole Group, 2016

3.3.2 Scope 3 emissions and fossil fuel reserves

The risks associated with exposure to fossil fuel reserves is a topic that has climbed to the top of the sustainable investing agenda. SPG works together with Fossil Free Indexes (FFI) to analyse the potential emissions from reserves from investments in different indexes. FFI have developed a list of companies referred to as the Carbon Underground 200™, a list that identifies the top 100 public coal companies globally and the top 100 oil & gas companies globally, ranked by the potential carbon emissions content of their reported reserves.

No companies listed on the Nasdaq Helsinki or Stockholm are part of this list.

The top contributors in the Nasdaq Helsinki generally have their largest climate impact in their Scope 1 and 2 emissions, most notably in the Utilities and the Materials sectors, where emissions created during the process of production are highest. For companies in the energy sector, the largest proportion of emissions come from Scope 3 emissions. The difference can be seen in the graph below.

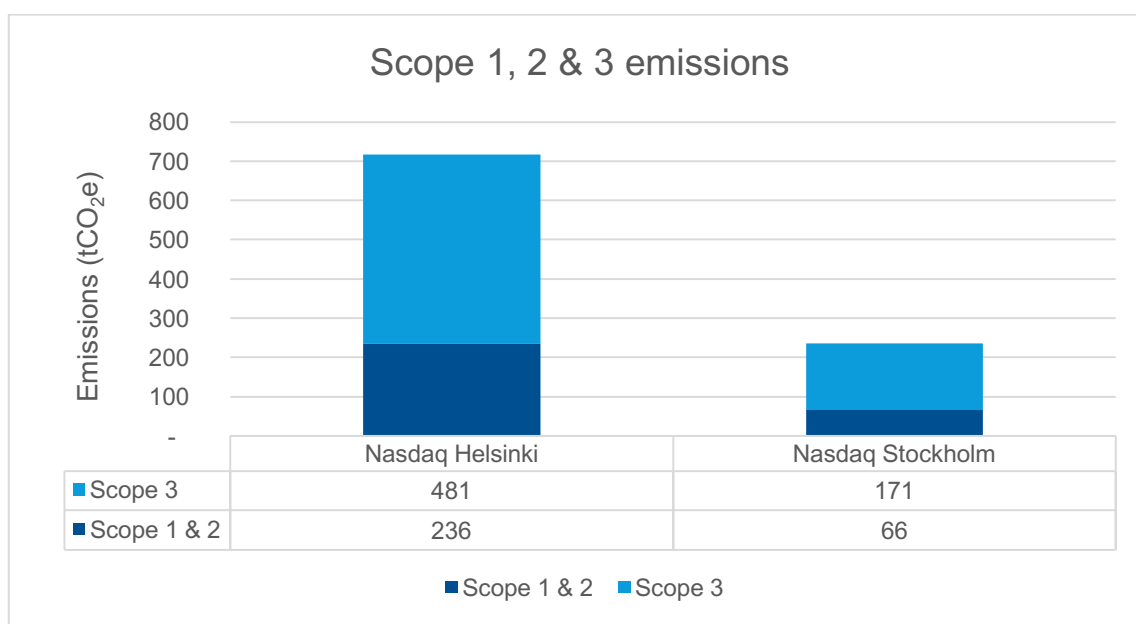


Figure 18: Scopes 1, 2 & 3 emissions for Nasdaq Helsinki and Nasdaq Stockholm
Source: South Pole Group, 2016

3.3.3 Attribution analysis of Nasdaq Helsinki and Nasdaq Stockholm

To compare the performance of the Nasdaq Helsinki in relation to the Nasdaq Stockholm, the following attribution analysis provides a starting point for pinpointing the reasons for the difference in carbon performance, and whether or not this is primarily due to the allocation of assets to emission intense sectors, or because of the performance of the companies within those sectors. Figure 19 below shows the attribution analysis of Nasdaq Helsinki and Nasdaq Stockholm, with the positive or negative numbers showing the impact that weightings into specific sectors have on overall emissions. There are two sectors that stand out in the attribution analysis: Utilities and Materials.

The effect of the attribution analysis is the impacts on where the main investments go and subsequently where the financed emissions come from.

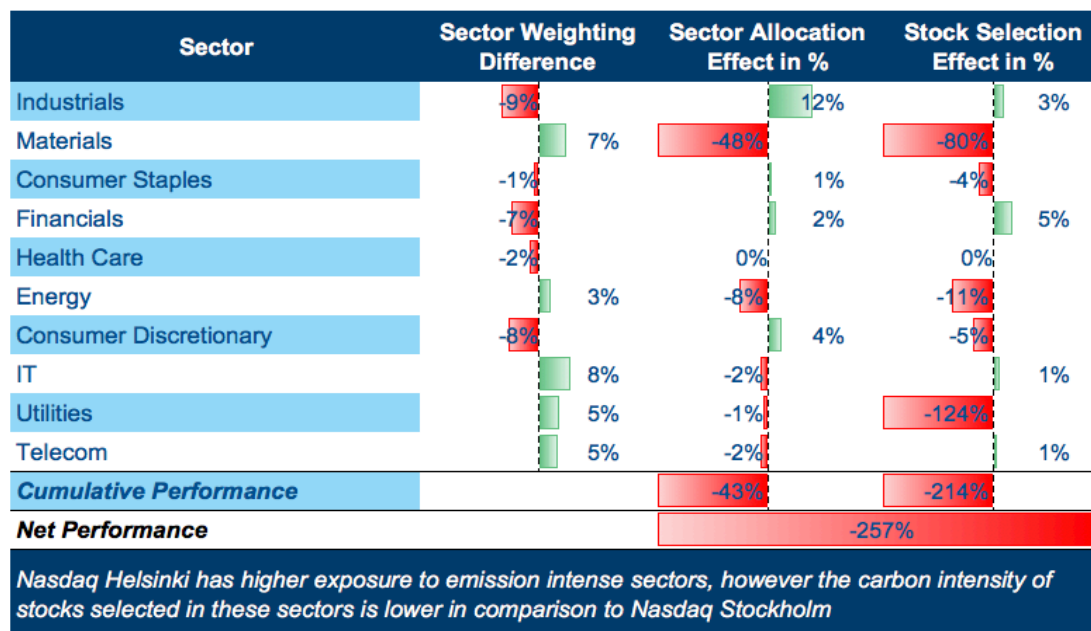


Figure 19: Attribution analysis of Nasdaq Helsinki and Nasdaq Stockholm
 Source: Nasdaq Helsinki, analysis conducted by South Pole Group, 2016

Figure 19 shows results for Nasdaq Helsinki compared to Nasdaq Stockholm. So, Nasdaq Helsinki has 7% more of its assets invested in the materials sector compared with Nasdaq Stockholm (*Sector Weighting Difference* column). Materials companies thus have a larger presence in the Finnish economy, with companies such as UPM-Kymmene and Stora Enso being important players in the market. Emissions from the materials sector are also influenced by SSAB which is listed on both exchanges.

The higher weighting of the materials sector in the Nasdaq Helsinki has a negative effect on overall emissions, as demonstrated by the -48% sector allocation effect in the attribution analysis (*Sector Allocation Effect* column). However, the stock selection in the Materials sector also has a negative effect (*Stock Selection Effect* column). On a broader level, this suggests that investments in Materials by the Nasdaq Helsinki will produce more financed emissions than Materials investments in the Nasdaq Stockholm. However, when taking into account the oekom Carbon Risk Rating (oCRR, explained in Section 4.3), the Materials companies invested in by Nasdaq Helsinki are more aware of their carbon risks on average (31.6) than Nasdaq Stockholm (25.4).

The Utilities sector also has a large influence on the difference between the two indexes. Fortum is the largest contributor of financed emissions in the Nasdaq Helsinki, contributing 35% of portfolio emissions. There is no equivalent utility on the Swedish index that produces the amount of electricity that Fortum does. This is further influenced by the fact that Fortum produced 35% of the electricity in 2015 from thermal sources.

4 Climate Risks and Forward looking Analyses

As discussed above, carbon footprint is a “point in time” view of emission exposure and does not reveal the climate strategy and trends of the underlying company. Therefore, the present analysis is complemented with a “forward looking” segment that tries to evaluate the climate strategies, trends, risks and opportunities of all examined holdings. For example, it is important to note that Fortum, largest emitter in the index, scores comparatively well on the oCRR (explained in Section 4.3), with a score of 57, only beaten by Outokumpu (59).

To conduct a forward-looking analysis, the ‘risks’ and ‘opportunities’ must be considered and assessed.

4.1 Physical and Transition Risks

Climate risks have the potential to affect investments across the financial markets (see Figure 5). The relationship between climate risks and the financial market can have a direct impact on the financial market (primary effects), indirectly through investment by financial market players in affected financial assets (secondary effects), or even more indirectly through investment in affected financial market actors (tertiary effects). The attainment of the 1.5°C to 2°C limit means that investments in fossil energies can lose value. More frequent natural catastrophes can lead to significant losses in value and insurance losses.

This analysis of risks distinguishes the distinction between physical risks (e.g. increased storm damage) and transition risks (e.g. the introduction of regulation that severely limits fossil fuel consumption). This review of these risks is based on the definitions of the Financial Stability Board (2015):

- **Physical risks** are direct physical influences on economic value chains (for example, damage to buildings and production facilities, reduced snowfall in tourism areas, changed agricultural productivity) caused by longer-term climate change and weather-related events, the intensity and frequency of which will increase as a result of climate change.
- **Transition risks** refer to risks that arise following the transition to a low-carbon economy and lead to a revaluation of investments.

These two types of climate risk are interrelated. A negative correlation is, for example, possible – the stronger the policymakers intervene to mitigate climate change, which is associated with more comprehensive adjustments for emission-intensive industries and therefore transition risks, the lower the physical risks that are to be expected. This assumes that mitigation measures can be implemented without undesirable side effects. At the same time, a positive correlation is also conceivable – e.g. an extreme physical damage event could lead to sudden strong policy measures.

Following the definitions in the diagram above, both sets of climate risks can have primary, secondary and tertiary impacts:

Risk type	Primary effect (sectors)	Secondary effect (portfolios)	Tertiary effect/ spillover between financial market participants
Physical risks	Insurance, agriculture, health sector, tourism, energy sector, water sector, infrastructure	All financial market participants depending on the exposure to industries affected by physical risks	All financial market participants, depending on the exposure to affected financial market participants
Transition risks	Emissions-intensive sectors	All financial market participants, depending on the exposure to emission-intensive industries (e.g. cement) and industries with high emissions in the value chain (e.g. automotive)	All financial market participants, depending on the exposure to affected financial market participants

Figure 20: Primary, secondary and tertiary effects of physical and transition risks.

Source: South Pole Group, 2016

4.1.1 Physical risks

Physical risks can manifest in a wide variety of ways. These include (but are not limited to):

1. Acute extreme weather events, such as flooding, droughts, and hurricanes.
2. Chronic weather changes, such as increased average temperatures, changing precipitation patterns, and rising sea levels.
3. Tipping points, which are points at which global warming leads to radical changes in the climate system, which can over the long term intensify extreme weather events as well as chronic changes. An example of a tipping point could be that, starting from a certain concentration of greenhouse gasses in the atmosphere, the Arctic ice cap or the Greenland ice will melt, resulting in the acceleration of climate change due to a change of the albedo.

In terms of the impacts they can have on investment portfolios and the wider financial market, physical risks can be categorised into those which are either direct or indirect.

Direct physical risks (primary risks) for financial market stability include operational risks in the financial sector and increased or difficult to predict losses for the insurance industry. If an extreme event occurs for which the insurances

do not have sufficient technical reserves, they would have to raise capital and sell assets on short notice and thus could lose creditworthiness and, in extreme cases, even solvency. Such primary effects arise predominantly from extreme events such as floods, hail, wind storms, or cyclones.

Indirect physical risks (secondary effects) for financial stability are results of direct physical risks and damage to the real economy (mainly energy, water, agriculture, tourism, and healthcare sectors) that are not insured, and which affect the financial sector (e.g. changes in value and depreciation of assets after disastrous catastrophes, downgrade of creditworthiness, etc.). Indirect risks also exist in cases where the insurer can no longer fully cover the insured losses during an extreme event, has to execute massive asset sales, or increases the premiums due to climate change while no longer insuring certain risks, thus reducing the insurance coverage. Such secondary effects result from extreme events as well as due to chronic changes (temperature, sea level, etc.).

4.1.2 Transition risks

The more rigorously the 2° Celsius limit in question is targeted, the greater the transition required by CO₂ intensive industries. A problem for financial organisations to consider is that unexpected, massive regulatory interventions to reduce CO₂ emissions could lead to abrupt price drops.

From the perspective of financial market actors, two concepts are pivotal in the context of transition risks: financed emissions and stranded assets:

- **Financed emissions** refers to the concept of allocating emissions to investors of companies, projects, and organizations with the pro rata share of their investment.
- **Stranded assets** are defined as investments, which are subject to an unexpected devaluation due to unforeseen changes in regulation, the physical environment, social standards, or technology.

Transition risks require various considerations for investment organisations:

1. Legislation and environmental policy regulation on an international, regional, national and sub-national level, which aim at mitigation of climate change.
2. Technology risks, such as the development of low-carbon technologies and their propagation. This includes changes in industry standards and production costs. One example is the emergence of renewable energies, which, by means of the merit-order effect tend to push the cost-intensive gas power plants out of the market.
3. Changes in the sales market and the economy as a reaction and consequence of the transition to a low carbon economy. Examples include changes in demand for oil and gas and negative effects for the reputation of climate-damaging companies.

4.2 Opportunities

Understanding the climate impact of investments is not only about avoiding the risks detailed above, but using the knowledge of the risks to turn them into investment and growth opportunities, through both revenue and reputation gains.

A carbon opportunity can be defined as opportunities for companies to increase sales and profits via improving product offerings which have incorporated carbon considerations. In essence, high quality carbon risk management is an opportunity. This can apply to both investors and individual companies. For investment companies, such as pension funds and other asset managers, returns can be improved by seeking out companies who are actively managing their carbon risks. These companies can range from those with clear carbon-conscious strategies and objectives, or to those with products that support climate benefits, such as renewables or electric vehicles. They can also attract investors to their portfolios, who themselves are looking to align their investments with their personal values. This is particularly true for the millennial generation, whose worth and asset ownership is growing rapidly, and will continue to do so both from their own earnings and inheritance from their parents and grandparents.

For individual companies, the carbon opportunities are two-fold. Firstly, they can benefit from reduced costs in supply chains and energy usage. By working with climate-friendly suppliers, or changing their energy policies, these companies can make significant long-term cost reductions, which can turn into increased profits via improved margins or lower prices for customers, attracting higher demand. The second carbon opportunity relates to employee attraction and retention. Linking to the comment above regarding millennials, many people entering the workforce are keen to be employed by companies who are trying to make a positive impact on the environment as part of what they do.

4.3 Nasdaq Helsinki - Analysis results

4.3.1 Assessment of climate change risks and opportunities in cooperation with oekom research

The oekom Carbon Risk Rating (oCRR) is a comprehensive assessment of the carbon-related performance of companies, based on over 100 mainly industry-specific indicators and a carbon risk classification at the industry and sub-industry levels.

The oCRR, showing scores on a scale from 0 to 100¹⁰, indicates how a company is managing its industry-specific climate risks, not just in production but over the entire life cycle of its products and services, including supply chains, product use and disposal. The oekom Industry Carbon Risk Classification is part of the rating and categorises a company’s exposure to carbon risk due to business activities. The methodology favours industries with a high share of clean tech solutions and penalises companies from sectors causing the highest GHG emissions along their value chain. Lower scores indicate a worse performance and therefore a higher overall carbon risk.

The tables below show the average oCRR of both Nasdaq Stockholm and Nasdaq Helsinki. On both an average and weighted average scale, the Nasdaq Helsinki scores higher, meaning it is performing better in its approach to carbon risk. It’s average oCRR is 24, compared with 20 for Nasdaq Stockholm whilst the weighted average goes up to 39, with Nasdaq Stockholm at 36.

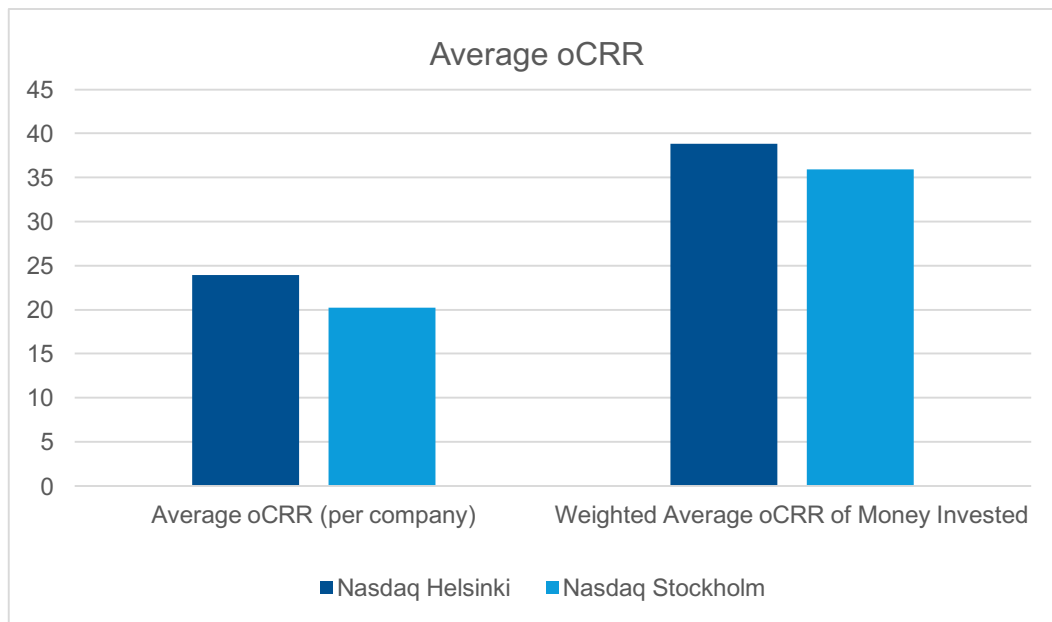


Figure 21: Average oCRR

Source: oekom research AG, 2016

¹⁰ The oCRR classification:

0-25 = climate laggard, 25-49 = climate underperformer, 50-74 = climate performer, 75-100 = climate leader

The below graph indicates that 55.3% of Nasdaq Helsinki is invested in companies with a mid-range score of 40-50, compared with 36% of Nasdaq Stockholm. Nasdaq Helsinki outperforms Nasdaq Stockholm for the worst carbon risk ratings, with only 2.3% in the 0-10 score, compared with 9%.

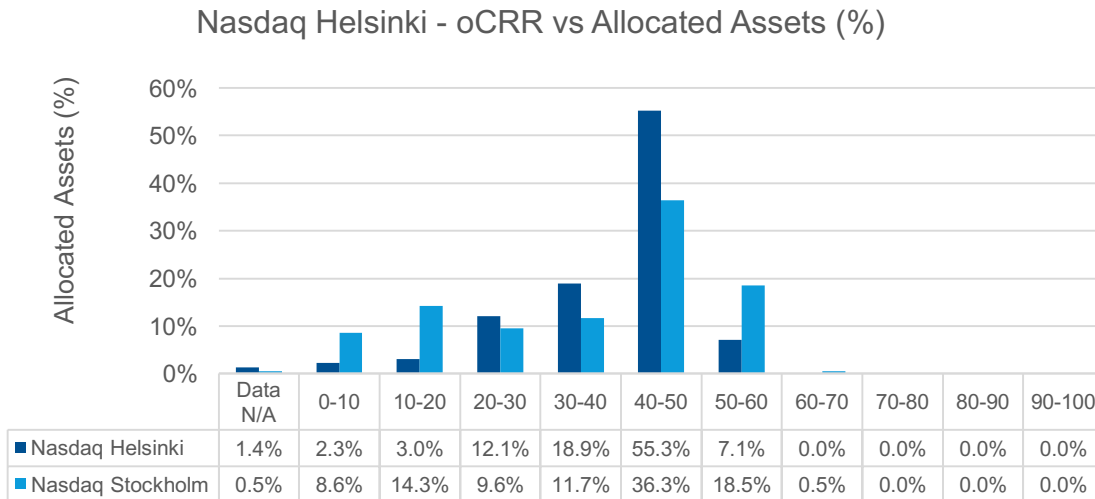


Figure 22: oCRR against allocated assets

Source: oekom research AG, 2016

The below graph indicates that the largest percentage of financed emissions comes from companies within the score bracket of 40-50. The low percentage of companies with a score of 0-10 or lower is a positive indicator of carbon risk consideration. This indicates that the largest part of emissions in the portfolio comes from companies who integrate climate risks into their strategy.

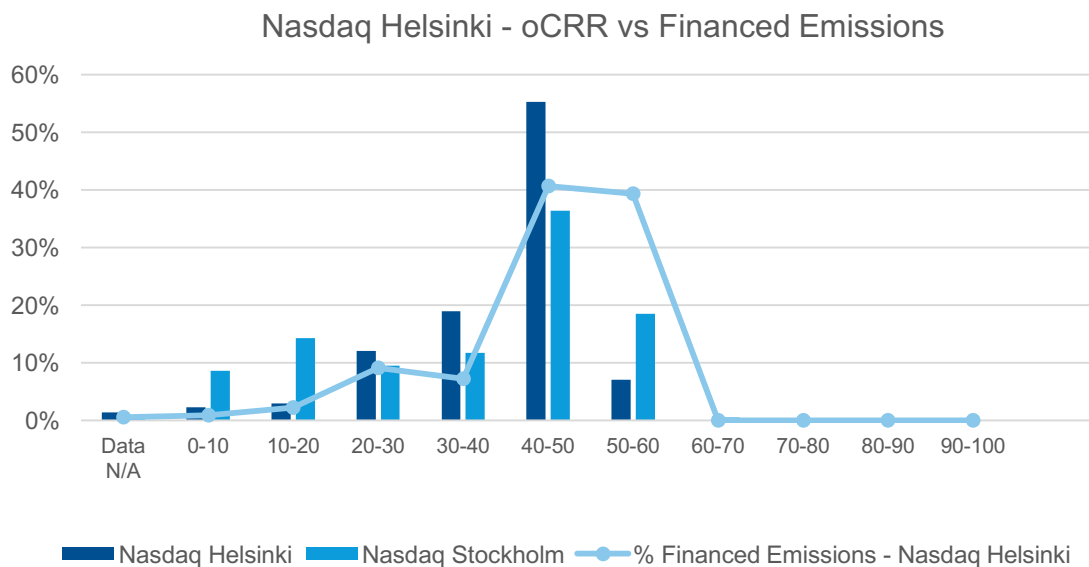


Figure 23: oCRR against allocated assets

Source: oekom research AG, 2016

Diving deeper into the portfolio companies, the below graph shows the absolute yearly emissions of the 10 largest absolute emitters in the portfolio in comparison to their oCRR.

The level of maturity in managing climate change related issues increases from left to right on the chart. On the Y axis, the carbon footprint of companies is ranked from smallest to largest from bottom to top.

Companies on the top left hand side are therefore doubly exposed to climate change risks: they have both a high yearly emissions and a weak strategy for managing climate change risks.

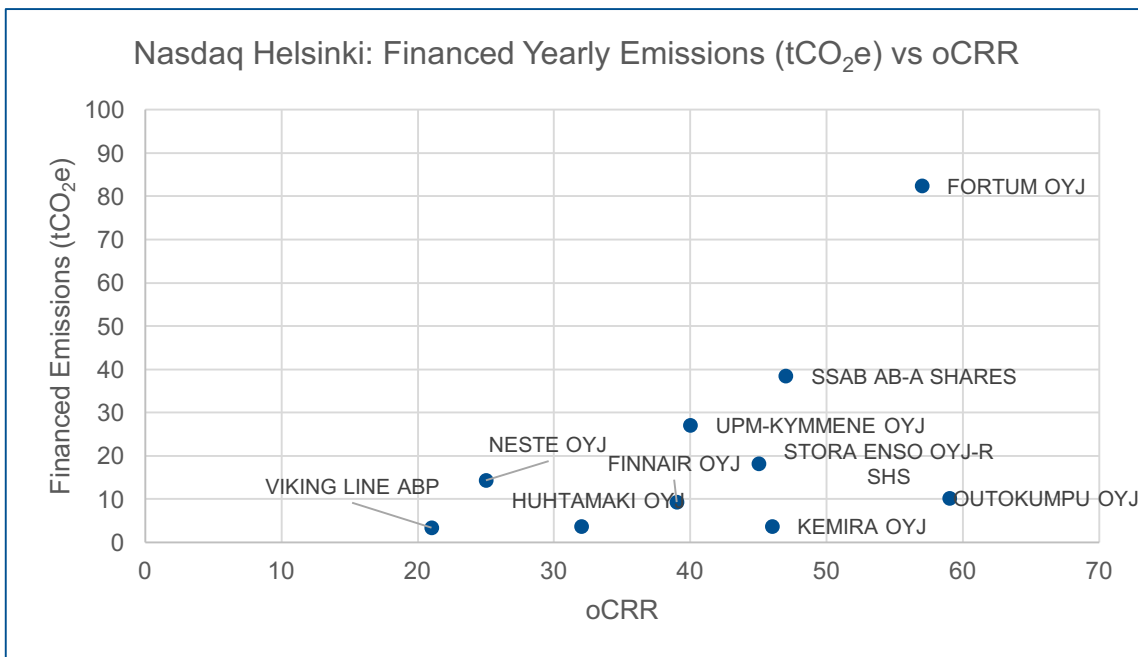


Figure 24: Nasdaq Helsinki emissions against oCRR

Source: oekom research AG, 2016

This view of Nasdaq Helsinki shows that the companies being the highest emitters also generally have solid oCRR scores. Below is the same graph for the Nasdaq Stockholm, which demonstrates a by far weaker performance in the oCRR.

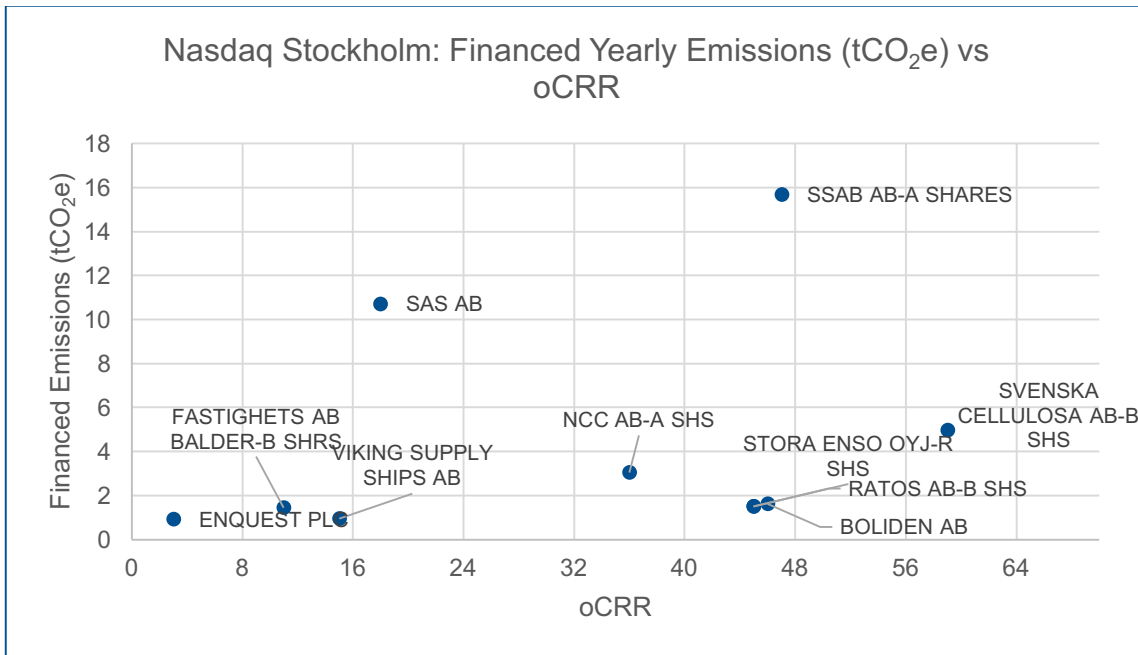


Figure 25: Nasdaq Stockholm emissions against oCRR

Source: oekom research AG, 2016

Whilst the oCRR summarizes corporate performance, we can also look into some key performance indicators (KPIs) individually. The diagram below highlights some of these, including position on climate change, transparency of the company’s climate change risk mitigation strategy, and the setting of targets related to GHG emissions.

For the KPI scores, the scale is from 0 (low corporate performance on carbon risk management) to 4 (excellent corporate performance on carbon risk management).

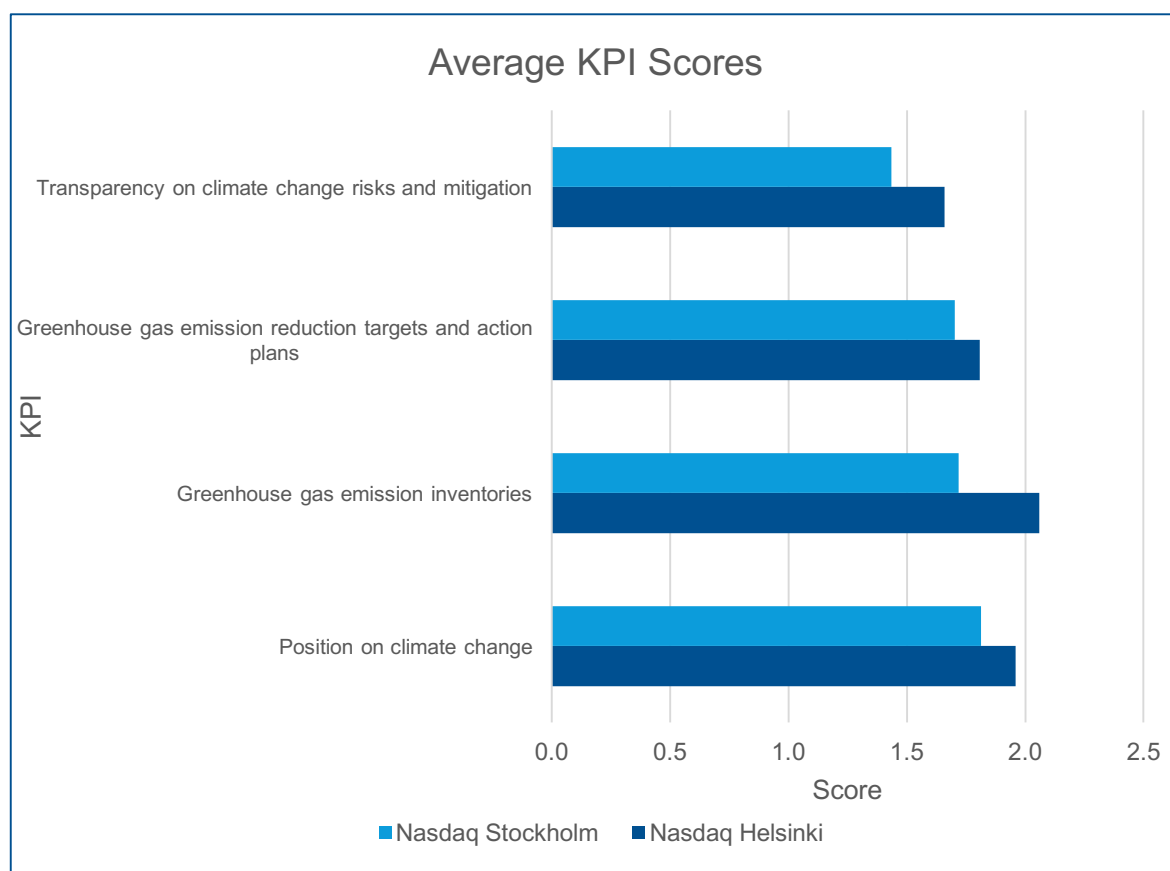


Figure 26: oekom KPI scores for Nasdaq Helsinki and Nasdaq Stockholm

Source: oekom research AG, 2016

The following table shows the performance of the 10 largest contributors to the portfolio, according to each of the KPIs.

Name	Financed Emissions (tCO ₂ e) in Portfolio	oCRR	Position on climate change	GHG emission inventories	GHG emission reduction targets and action plans	Transparency on Climate change risks and mitigation strategy
FORTUM OYJ	82	57	A+	A+	D+	A
SSAB AB	38	47	A+	B	A	C
UPM-KYMMENE OYJ	27	40	B	A-	B	B+
STORA ENSO OYJ	18	45	B	A+	B	B+
NESTE OYJ	14	25	B	A+	A-	C
OUTOKUMPU OYJ	10	59	B-	A+	A+	C
FINNAIR OYJ	9	39	C	A+	A	A
HUHTAMAKI OYJ	4	32	A+	C+	A	C
KEMIRA OYJ	4	46	D+	A-	B	B+
VIKING LINE ABP	3	21	D-	D	D+	D-

Figure 27: Breakdown of KPI scores for Nasdaq Helsinki's Top 10 emitters

Source: oekom research AG, 2016

Delving deeper into each of these four KPIs, it is interesting to understand how the scoring of each relates to the percentage of both financed emissions and allocated assets respectively.

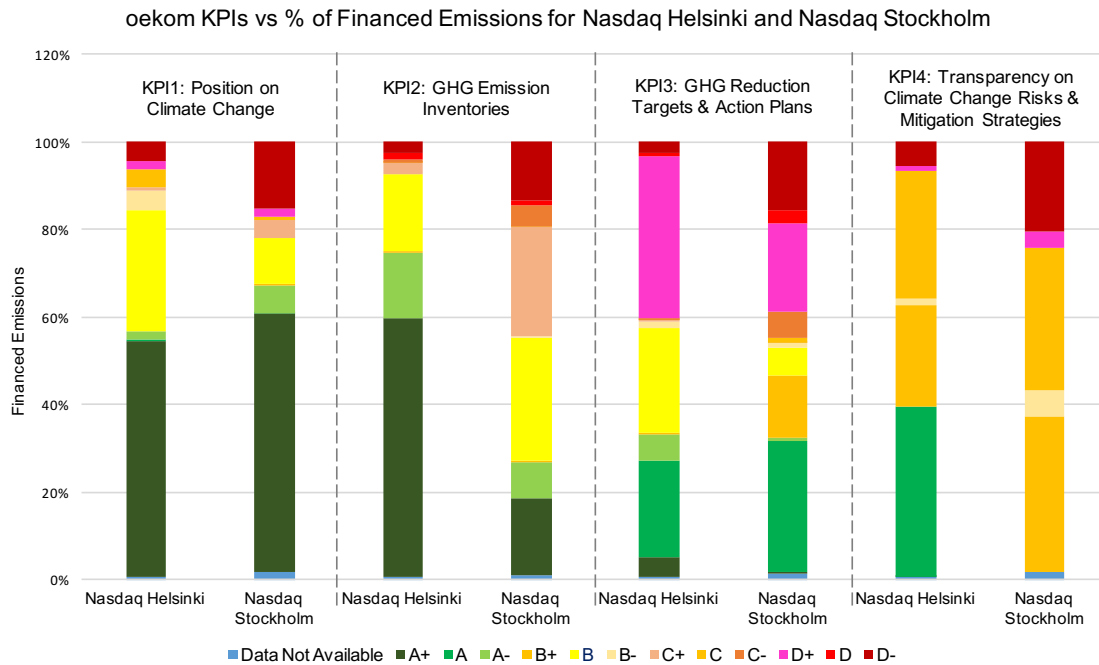


Figure 28: KPIs vs % of Financed Emissions
 Source: oekom research AG, 2016

On the whole, this graph shows a relatively similar performance between Nasdaq Helsinki and Nasdaq Stockholm for all four KPIs against the percentage of financed emissions. Despite this, there are some key differences within each KPI. For all four KPIs, Nasdaq Stockholm has a far greater proportion at D- than Nasdaq Helsinki. For KPI 3, this difference is offset by Nasdaq Helsinki's higher proportion scored at D+. Equally, Nasdaq Helsinki has a larger amount of companies in A+ for KPI 2 and in A for KPI 4.

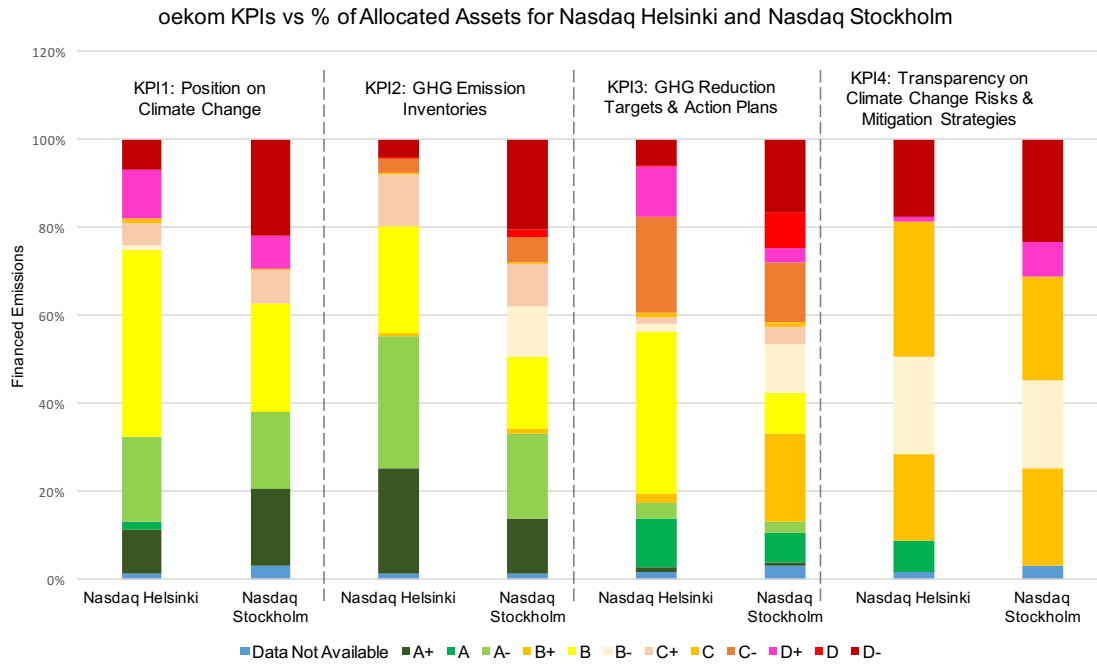


Figure 29: KPIs vs % of Allocated Assets
 Source: oekom research AG, 2016

Similarly to the financed emissions graph above, this graph shows a relatively similar performance between Nasdaq Helsinki and Nasdaq Stockholm for all four KPIs against the percentage of allocated assets. Despite this, there are some key differences within each KPI, and these are more varied across the KPIs. For all four KPIs, Nasdaq Stockholm has a greater proportion at D- than Nasdaq Helsinki. Looking at KPIs 1, 2 and 3, Nasdaq Helsinki has around half of its portfolio in high to mid-range scores of A- and B. KPI 4 is by far the weakest performer of the KPIs for both indexes.

4.4 Finnish case study

Following the Section 2.7's case study on investment screening, this case study focuses on climate risks, opportunities and forward-looking strategies of three Finnish asset managers – OP Financial Group, Mandatum Life and Nordea.

4.4.1 Finnish case study - Identifying climate risks

As explained in Section 2.4, the TCFD is an initiative that helps companies to understand what financial markets want in terms of disclosure to be able to respond to climate change risks. On 14th December 2016, TCFD will give a recommendation for companies to analyse and reveal how they will be affected by policies introduced to restrict global warming to no more than 2°C. Although the FSB has no mandatory powers, this type of recommendation would encourage companies to perform scenario analyses and further develop their disclosure on climate risks, their effects on companies' operations and strategies to address them.

Whether an investment company or an individual company, climate risk assessment should be carried out to identify the physical and transitional climate risks, and their possible impacts on investments, assets and overall changes in business environment and operations. Nordea has identified climate risks in their operations and address these issues within their responsible investment strategy's *Stewardship & Engagement* segment. The *Stewardship & Engagement* is further split into *Climate change, water, human rights and corruption*. The first stage they undertake in their strategy is exclusion, with 28 businesses who have 75% of their revenue derived from sales of coal products, excluded from all portfolios. Following this, they require that investees demonstrate how they integrate climate change challenges into their business strategies, investment decisions and risk management. They believe in transparency and that companies should be able to disclose how their long-term business strategy and profitability will be impacted by a different regulatory and physical environment. On the other hand, OP Financial Group excluded tens of coal companies from active direct investments in 2016. Exclusion covers coal mining companies that derive more than 25% of their turnover from thermal coal and also ten largest thermal coal producers in absolute terms. In addition to coal miners OP also excludes several coal burning utilities. If a clear strategy to divest from coal operations exists, a company can have avoided being excluded. All in all, around 60 coal companies were put into exclusion list in 2016.

Nordea include environmental factors in their lending processes when relevant. They have created ESG Risk Assessment tools, which aim at integrating environmental, social and governance issues in their lending decisions. Companies operating within higher-risk sectors may be required to demonstrate their ability to adapt to future regulatory changes, and have a strategy for addressing their contribution to climate change.

4.4.2 Finnish case study - Tapping into climate opportunities

Providing low-carbon alternatives can help investment companies to distinguish themselves as responsible and forward-looking actors. OP Financial group was the first fund management company in Finland to publish the carbon footprint of its equity funds. This was to ensure that investors have a better understanding of the carbon leaders and laggards within their portfolios, and the relative impact on financial returns. In April 2015, OP launched the OP Low-carbon World fund, aiming to reduce carbon footprint, including companies that have low carbon intensity compared to their sector peer companies. Nordea's Star Funds are responsible investment funds, which invest in companies with high ESG-related performance. Mandatum Life's ML Future Climate index investment basket has the objective of reducing CO₂ emissions by 50% relative to the broad MSCI World Index without compromising returns.

Beyond risk mitigation, climate actions can generate cost-reductions. By monitoring and reducing energy usage or switching to renewable energy, companies are both reducing their carbon footprint and creating bottom line savings. Mandatum Life aim to reduce their operations environmental impact by decreasing paper usage in customer communications and by developing their digital services. Nordea's Ecological Footprint Programme addresses energy, air travel, paper, waste, buildings and procurement, setting long-term targets for emission reduction. For both investment and individual companies, growing climate change awareness represents an opportunity to attract new customers by offering climate friendly products or developing green services.

4.4.3 Finnish case study - Forward looking strategies

Mandatum Life, who just in the beginning of December 2016 finalized screening of its investments and announced its commitment to join Montreal Pledge, has a strong commitment to decarbonising their investment portfolios. In 2015, it became the first Finnish company to join the Portfolio Decarbonization Coalition (PDC), an international network encouraging investors to reduce their carbon footprint. Mandatum's commitment to this field is demonstrated by the following statement from their CEO, Petri Niemisvirta:

"The investor has the power to change the world for the better. We signed the UN PRI in 2011 and now have applied to become the first Finnish financial company member of the PDC. We believe that responsible companies are successful in the future: they attract more capital and know-how, with customers responding to responsibly acting companies who operate in terms of the future now, and therefore they are also of interest to investors."

Investors can also assume a more proactive role by joining in relevant cooperative initiatives. Investment companies and individual companies alike can engage in public discussion, cooperate with policy makers to promote renewable energies, and support low-carbon technologies. For example, Nordea Asset Management is a part of the Institutional Investors Group on Climate Change (IIGCC, one of a number of organisations in the space), which encourages public policy, investment practices and corporate behaviour that addresses climate change related risks and opportunities.

5 2°C degree portfolio analysis

This analysis, offered together with the think tank 2degree Investment Initiative (2dII), measures the difference between an equity portfolio today and a 2degree compliant (by 2020) portfolio. It is based on combining the economy decarbonisation roadmaps of the IEA with bottom-up company trajectory information for carbon-sensitive sectors.

Due to the minimal coverage of sectors currently included in the 2dII analysis (energy, oil & gas and automotive), it is not yet relevant to conduct the check for Nasdaq Helsinki or Nasdaq Stockholm. However, following Paris, the 2°C analysis is a growing trend globally, one which is important to understand as more companies and portfolios will be looking to conduct it. An example of this analysis can be seen below for the Stoxx 1800 portfolio. It shows the portfolio as overexposed to sectors with colours outside the circle, including nuclear, coal and ICE as well as underexposure to renewables and hybrid.

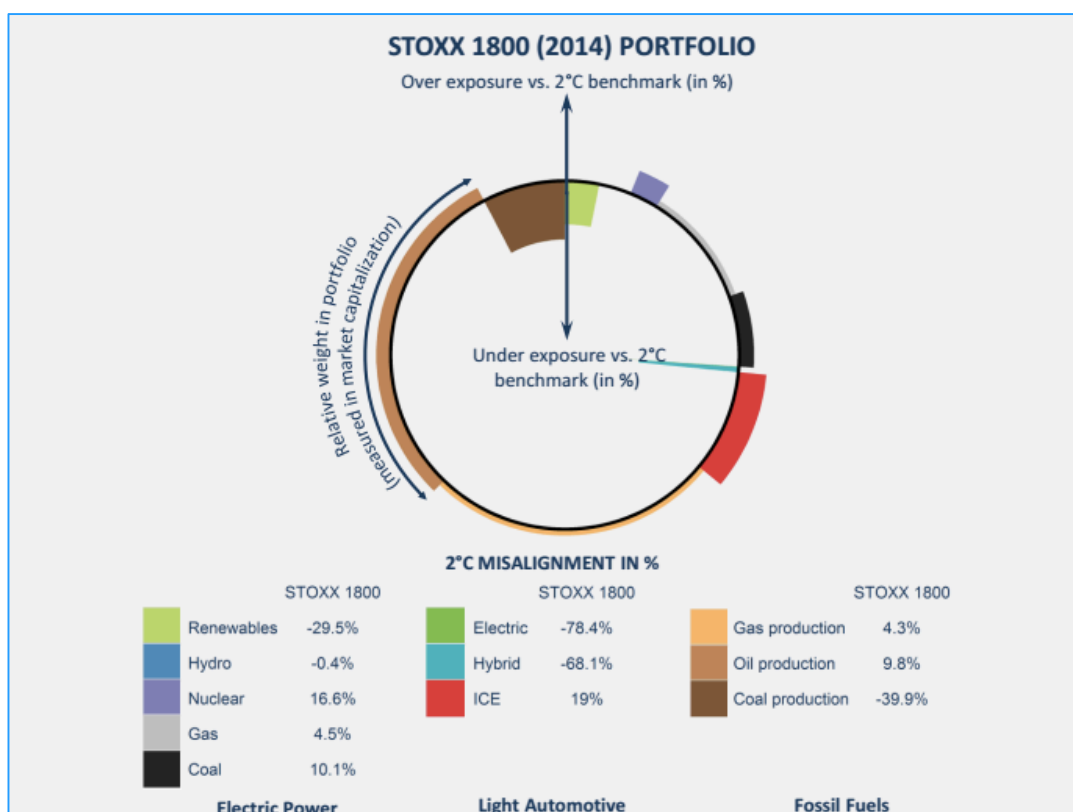


Figure 30: Estimates 2°C alignment of the Stoxx 1800 (2014) portfolio in 2020

Source: 2dII and Stoxx, 2015

2dII is one of a number of organisations who are looking to provide such a service, with demand increasing by companies and investors to know how resilient their portfolios are to a 2°C world. Science-based or 2°C targets are the natural progression from, or useful additions to, traditional carbon footprinting and will soon become a standard across organisations who are keen to understand their long-term carbon emissions.

6 Recommendations

Following the above quantitative analysis and qualitative research and findings, South Pole Group has the following recommendations for Finnish investors in relation to assessing the climate impact of their portfolios, and to further integrate climate risk into their investment strategies.

6.1 Dive deeper

An investment footprint is the first step towards a full-fledged climate impact assessment. While the footprint is a point-in-time snapshot, an impact assessment aims at revealing trends, measuring net impact and diving deeper into specific climate relevant themes.

As a potential next step to deepen the understanding, investors could conduct more specific deep-dives on the Top 10 emitters shown earlier in this report. It is important to understand the Top 10 companies' climate strategies and targets in detail, as well as a comparison with international peers. In addition, it enables to closer identify how each portfolio company's business model is positioned towards the risks and opportunities associated with climate change effects and legislation going forward. It would in some cases also provide a more holistic picture of some of larger emitters in portfolios, where certain companies might be large contributors, but at the same time be amongst the leading companies in their sector when it comes to integrating climate impact reduction into their business strategies.

Further, fossil fuels and the risks of stranded assets are becoming increasingly material as governments are coming under pressure to reduce emissions and reduce economies' dependence on fossil fuels. Investors could therefore run a deeper analysis into the companies that fall into the Utilities and Energy sectors to better understand their future plans as to fossil fuel versus alternative energy investment, and the subsequent impact on profits. In addition, investigations could take place on how both physical and transition risks impact these organisations in their day to day operations.

The other key topic to investigate deeper would be the Materials sector, which represents 47% of the total portfolio's emissions, while representing only 12% of the allocation, and has six companies in the Top 10 emitters of Nasdaq Helsinki. Looking into the Materials companies in the portfolio, as well as the sector as a whole, would provide an important understanding of the future outlook of the portfolio.

Aside from deepening the current analysis, investors could also consider to widen their scope of climate analysis towards international listed equities and other asset classes, such as Fixed Income, Real Estate or Private Equity.

6.2 Consider climate friendly investment strategies

With the topic of investments and climate change on the rise and associated risks unfolding, an ever-growing amount of climate friendly investment alternatives is emerging. A few shall be briefly described here for the consideration of Finnish investors:

Divestment: Similar to exclusion lists on social and governance issues, a range of investors have started to exclude companies with a certain exposure to fossil fuels. The line of exposure may differ from case to case but the underlying logic is to “divest from fossil fuels”.

Engagement: An increasing number of investors use an active ownership approach to help their portfolio companies in developing meaningful climate strategies and – by that – enable their investments to become more climate resilient. This can take forms of individual engagement activities, shareholder action as well as collective initiatives with other investors¹¹. A close dialogue with investees gives investors a clearer picture of the level of integration of climate related matters within the company, and their strategies going forward. The investment footprint above enables to prioritize such efforts.

Climate friendly funds and indexes: With the ability to measure investment footprints and climate impact, both index providers and fund managers have started to offer alternative investment vehicles and indexes that try to resemble traditional strategies with a low-carbon tilt. This can be achieved by reduction or exclusion of emission-heavy holdings and is available on sector neutral basis and with remarkably low tracking errors and is therefore also an option for mainstream investors with traditional risk/return profiles.

Emission reducing investment options: A growing amount of investment strategies try to reduce greenhouse gas emissions. Often, these are specialized theme funds in the renewable energy, energy efficiency or green real estate space.

6.3 Set targets

Based on the tool and results above, Finnish investors can measure their climate performance over time. Without targets in mind, such result will always be somewhat coincidental. Therefore, it is recommended that investors define and set climate friendlier investment targets. These may take a wide range of forms, from committing to allocate more assets towards climate change solutions, to reducing carbon exposure or decreasing climate impact. Such efforts may be set in an international context by joining initiatives like the Portfolio Decarbonization Coalition (PDC) or the Montreal Pledge.

¹¹ Examples of this include “Aiming for A” or “Climate Action.”

6.4 Transparency

Public pension funds and asset managers have an immense responsibility for the assets of a significant number of people within Finland. These clients as well as other political and civil society stakeholders increasingly demand to understand how the assets' impact influences their future well-being.

With the analysis above and tool created for the use of Finnish investors, the opportunity exists for investors to create transparency about their investments greenhouse gas exposure. These outcomes can be reported through various communication channels but also broken down to individual reports. Further, Finnish investors can join the Montreal Carbon Pledge to show transparency leadership in an international context.

6.5 Embrace leadership

By committing to publicly disclose the carbon footprint of its investment portfolios and, for example, joining the Montreal Pledge, Finnish investors can demonstrate leadership in the financial industry. This means that investors can also help other investors embrace the link between climate change and investments. Such leadership can be provided through actively engaging in ongoing discussions, co-publishing white papers, conference appearances, proactive communication, guiding asset managers and allowing peer benchmarking, among others.

7 Appendix 1 – Carbon footprint methodology

7.1 Investment Carbon Footprint

The carbon footprint of all underlying companies has been assessed based on an aggregated list of public equity investments. This is based on self-reported data of companies that South Pole Group (SPG) validates for trustworthiness. The greenhouse gas information for all non-reporting companies has been approximated with SPG's 800 subsector-focused models.

Greenhouse gas accounting distinguishes between direct emissions from own operations (also known as "Scope 1" emissions) and indirect emissions. Indirect emissions are usually divided into "Scope 2" and "Scope 3" emissions. Scope 2 emissions are all emissions that stem from buying electricity and heat and are apportioned according to the company's consumption. Scope 3 emissions cover all other indirect emissions up- and downstream, such as those from a company's supply chain or product usage.

7.2 Ownership principle and allocation rules

In line with the Greenhouse Gas Protocol's "ownership principle", the study's greenhouse gas accounting allocates the emissions to those investors who "own" and can change them. This is the equity investor, as he/she owns part of a company and therefore, in theory, part of the company's greenhouse gas emissions. In accordance, the greenhouse gas emissions are proportionally allocated "per share" to the investor. If an investor owns 0.1% of a company, 0.1% of that company's greenhouse gas emissions have been apportioned. On a fund level, these greenhouse emissions are being aggregated based on the respective ownership of each holding.

7.3 Intensity Metrics

There are three main metrics used by investors for presenting the results of a carbon footprint. Over the past year, several standards have emerged in terms of metrics to report, with the Swedish AP pension funds reporting standards being one example. In this coordination document, the funds are asked to report on metric 1 and 2 as listed below. These two metrics are directly connected to an investors ownership of the companies and thus the emissions. The third metric is has no connection to ownership, but rather gives an indication on the intensity of the portfolio based purely on the weighting and the portfolio's composition. This metric can be useful in particular when looking at multi-asset portfolios where allocation rules are less standardized.

In this study, SPG presents the results with a primary intensity metric of emissions per EUR invested, attributing an investment's share of emissions to the investor. Secondary metrics are provided as well and described below and the formulas per metric are provided beneath each one.

1. **Emissions per EUR invested:** This metric displays how many tonnes of CO₂e an investor would finance in relation to the respective ownership in a certain company or portfolio. It describes the carbon intensity of an investment amount. A company's share of emissions is determined by the value of shares held / the company's market cap. For accuracy, it is important to control for the measurement date and financial information.

$$\frac{\sum_{i=1}^n \frac{\text{Investment into Title}_i}{\text{Market Cap of Title}_i} \times \text{Total Emissions of Title}_i}{\text{Total Investment (Portfolio)}}$$

2. **Financed Emissions / Financed Revenue:** This metric combines the above emissions / EUR invested approach with a similar logic to determine an investor's share of revenue and subsequently dividing one by the other. By linking to revenue, the metric aims at describing the greenhouse gas efficiency of the underlying companies.

$$\frac{\sum_{i=1}^n \frac{\text{Investment into Title}_i}{\text{Market Cap of Title}_i} \times \text{Total Emissions of Title}_i}{\sum_{i=1}^n \frac{\text{Investment into Title}_i}{\text{Market Cap of Title}_i} \times \text{Revenue of Title}_i}$$

3. **Weighted Emissions / Weighted Revenue:** This metric is not connected to an investor's ownership of the different companies, but rather looks at the composition of the fund, and the different weightings therein. The results from this analysis cannot be considered as a carbon footprint, but provide a unit for comparing the carbon intensity of the fund, again with a focus on underlying revenue.

$$\frac{\sum_{i=1}^n \text{Weight of Title in Portfolio}_i \times \text{Total Emissions of Title}_i}{\sum_{i=1}^n \text{Weight of Title in Portfolio}_i \times \text{Revenue of Title}_i}$$

7.4 Explanatory power and limitations

The 800 subsector-specific models as developed by South Pole jointly with ETH Zurich University, with their combination of financial and company information, have been proven to yield highly reliable results. However, extrapolating from reporting companies to non-reporting ones still carries a degree of uncertainty. While any model remains necessarily an approximation, the methodology provides a robust and improved reduction of such uncertainty and attempts to apply the best techniques to deal with today's situation. In the long run, only full and externally verified climate impact disclosure by an ever increasing number of companies themselves will be able to further eliminate this uncertainty.

A second limitation is the availability of relevant data. The process of analysing activities of a company is time consuming and presents several challenges, such as interpreting nonstandard reports and a lack of available information. The model is thus always dependent on the quality of the available data.

8 Appendix 2 – Guidance to using the online tool

The excel tool allows users to calculate the carbon footprint of a portfolio comprised of companies that are part of the Nasdaq Helsinki and compare the results with the Nasdaq Helsinki in a detailed report.

The financial data used is from 30 September 2016, for best results, and therefore holdings data from the same date should be used.

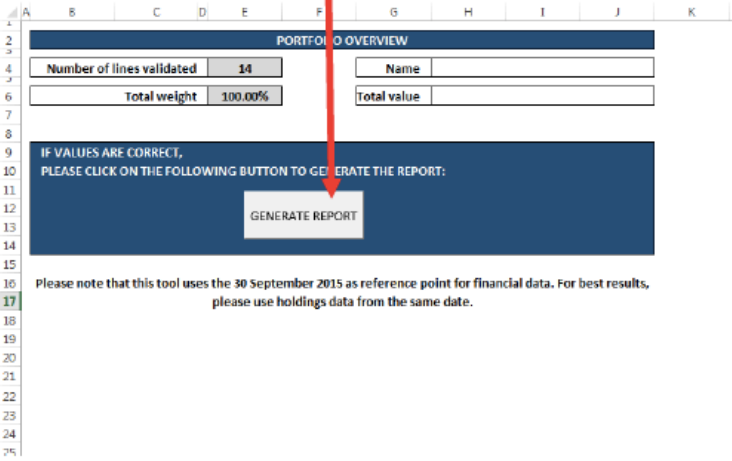
The tool is composed of three tabs:

1. **Portfolio:** Table that allows the user to create its own portfolio. Please use ISINs or Tickers. If a ticker is not recognized the cell will become red, the company can then be selected from a drop down in the second column. If the row is green, company name is not required.
2. **Check:** Once the portfolio has been created in the first spreadsheet, the user can quickly check if the amount of validated lines corresponds with the amount of holdings inserted, select a name and a total value of the portfolio, and run the calculation.
3. **PDF:** This spreadsheet discloses several indicators regarding the carbon footprint of the portfolio and can be saved as a PDF report

Tab 1 – Portfolio:

	B	C	D	E
	IDENTIFIER	or CHOOSE COMPANY NAME IN THE LIST		WEIGHT
3	UPM1V FH Equity			0.12%
4	STERV FH Equity			12.00%
5	SSABA SS Equity			11.00%
6	OUT1V FH Equity			8.00%
7	KRA1V FH Equity			2.10%
8		AHLSTROM OYJ		4.35%
9		EKEL COMPOSITES OYJ		10.00%
10	FI0009014716			9.00%
11	FI0009010391			12.00%
12	FI0009007306			15.00%
13	SE0001803131			4.00%
14	SE0001057910			5.00%
15	FI0009013403			4.43%
16	FI0009007835			3.00%
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
..				

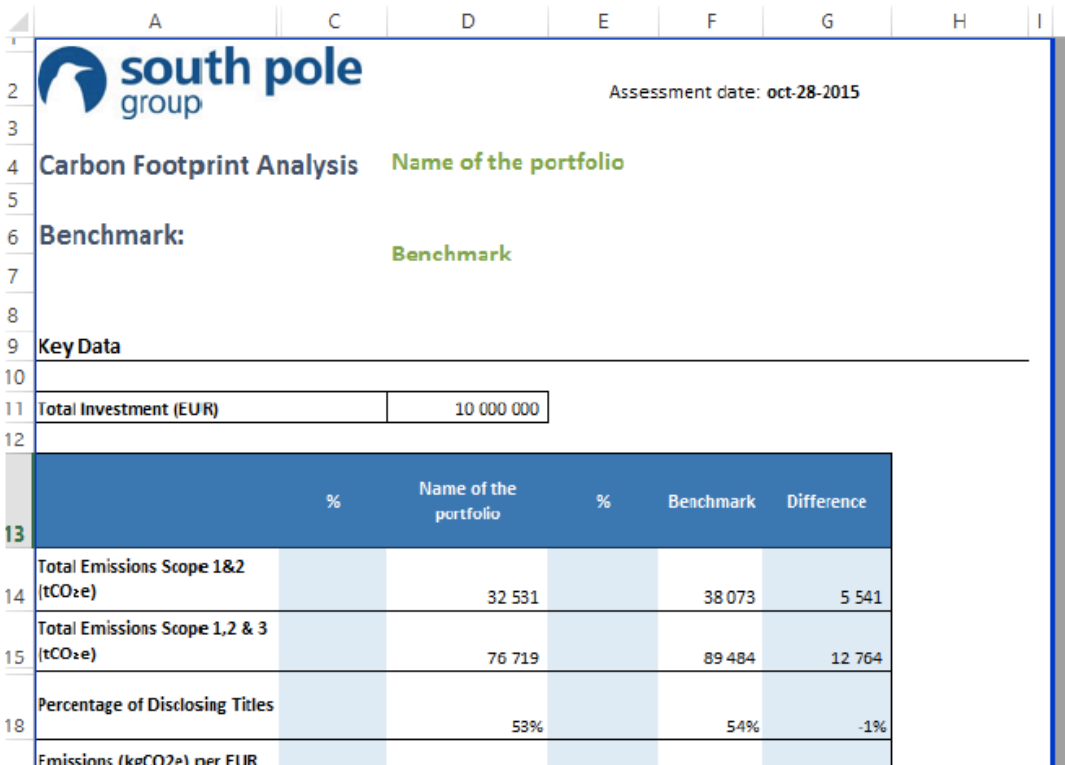
If all data is correct and the total value / name of the portfolio filled in, the user can click on this button to launch the calculations.



Please note that this tool uses the 30 September 2015 as reference point for financial data. For best results, please use holdings data from the same date.

Tab 3 – Portfolio:

This tab displays the results of the calculation using several tables and indicators. Feel free to save it as a PDF report.



Key Data

Total Investment (EUR)	10 000 000
------------------------	------------

	%	Name of the portfolio	%	Benchmark	Difference
Total Emissions Scope 1&2 (tCO ₂ e)		32 531		38 073	5 541
Total Emissions Scope 1,2 & 3 (tCO ₂ e)		76 719		89 484	12 764
Percentage of Disclosing Titles		53%		54%	-1%
Emissions (tCO ₂ e) per EUR					

9 Appendix 3 – Nasdaq Helsinki company list

Company Name	Financed Emissions* (tCO ₂ e)	Source
ASPOCOMP GROUP OYJ	0.01	APPROX
AFARAK GROUP OYJ	0.51	APPROX
AFFECTO OYJ	0.01	APPROX
AHLSTROM OYJ	2.12	CDP
AKTIA OYJ-A SHS	0.01	APPROX
ALANDBANKEN-A	0.01	APPROX
ALMA MEDIA CORP	0.01	CDP
AMER SPORTS OYJ-A SHS	0.13	CDP
APETIT OYJ	0.20	APPROX
ASPO OYJ	0.09	APPROX
ASIAKASTIETO GROUP OYJ	0.01	APPROX
ATRIA PLC	0.90	APPROX
BASWARE OYJ	0.01	APPROX
BIOHIT OYJ-B	0.00	APPROX
BITTIUM OYJ	0.04	APPROX
BIOTIE THERAPIES OYJ	0.00	APPROX
CAVERION CORP	0.17	CDP
CARGOTEC OYJ-B SHARE	0.13	CSR
CONSTI YHTIOT OY	0.03	APPROX
CAPMAN OYJ-B SHS	0.00	APPROX
CRAMO OYJ	0.06	CO ₂
COMPONENTA OYJ	0.20	APPROX
COMPTEL OYJ	0.01	APPROX
CITYCON OYJ	0.28	CDP
DIGIA PLC	0.01	APPROX
DOVRE GROUP OYJ	0.01	APPROX
EFORE OYJ	0.02	APPROX
ELECSTER OYJ-A SHS	0.01	APPROX
ELISA OYJ	0.20	CSR
ENDOMINES AB	0.06	APPROX
EQ PLC	0.00	APPROX
ETTEPLAN OYJ	0.01	APPROX
EVLI BANK PLC	0.01	APPROX
EXEL COMPOSITES OYJ	0.02	APPROX
FINNAIR OYJ	9.35	CDP
FISKARS OYJ ABP	0.12	APPROX
F-SECURE OYJ	0.01	APPROX
FORTUM OYJ	82.38	CDP
GLASTON OYJ ABP	0.02	APPROX
HKSCAN OYJ-A SHS	1.02	APPROX
HONKARAKENNE OYJ	0.01	APPROX
HUHTAMAKI OYJ	3.73	CDP
INCAP OYJ	0.00	APPROX

INNOFACTOR PLC	0.00	APPROX
ILKKA-YHTYMA OYJ-II	0.01	APPROX
INVESTORS HOUSE OYJ	0.00	APPROX
KONECRANES OYJ	0.25	CDP
KESLA OYJ-A	0.01	APPROX
KEMIRA OYJ	3.65	CSR
KESKO OYJ-B SHS	0.82	CDP
KONE OYJ-B	0.55	CDP
KESKISUOMALAINEN OYJ-A SHS	0.03	APPROX
LASSILA & TIKANOJA OYJ	0.21	CDP
LEHTO GROUP OYJ	0.01	APPROX
LEMMINKAINEN OYJ	0.44	APPROX
MARTELA OYJ	0.15	APPROX
METSA BOARD OYJ	3.39	CDP
METSO OYJ	0.59	CDP
MARIMEKKO OYJ	0.00	CO2
MUNKSJO OYJ	3.31	APPROX
NORDEA BANK AB	0.05	CDP
NEO INDUSTRIAL OYJ	0.02	APPROX
NESTE OYJ	14.31	CDP
NURMINEN LOGISTICS PLC-A	0.07	APPROX
NOKIA OYJ	1.08	CSR
NORVESTIA OYJ ABP	0.00	APPROX
NOKIAN RENKAAT OYJ	0.54	CDP
ORIOLA-KD OYJ B SHARES	0.03	APPROX
OKMETIC OYJ	0.08	APPROX
OLVI OYJ-A SHARES	0.21	APPROX
ORAVA RESIDENTIAL REIT PLC	0.01	APPROX
ORION OYJ-CLASS B	0.18	CO2
OUTOTEC OYJ	0.05	CSR
OUTOKUMPU OYJ	10.14	CDP
PIHLAJALINNA OYJ	0.01	APPROX
KOTIPIZZA GROUP OYJ	0.02	APPROX
PKC GROUP OYJ	0.16	APPROX
POHJOIS-KARJALAN KIRJAPAINO	0.03	APPROX
PANOSTAJA OYJ	0.02	APPROX
PONSSE OYJ	0.06	APPROX
POYRY OYJ	0.06	APPROX
QPR SOFTWARE OYJ	0.00	APPROX
QT GROUP OYJ	0.00	APPROX
RAISIO PLC-V SHS	0.29	APPROX
RAPALA VMC OYJ	0.10	CO2
REVENIO GROUP OYJ	0.00	APPROX
RESTAMAX OYJ	0.04	APPROX
RAMIRENT OYJ	0.09	APPROX
RAUTE OYJ-A SHS	0.02	APPROX

SANOMA OYJ	0.16	APPROX
SAGA FURS OYJ	0.02	APPROX
SAMPO OYJ-A SHS	0.01	CO2
SIEVI CAPITAL PLC	0.00	APPROX
SCANFIL PLC	0.05	APPROX
SPONDA OYJ	0.24	CDP
SIILI SOLUTIONS OYJ	0.00	APPROX
SOPRANO OYJ	0.00	APPROX
SOTKAMO SILVER AB	0.01	APPROX
SRV GROUP PLC	0.05	APPROX
SSAB AB-A SHARES	38.44	CO2
SSH COMMUNICATIONS SECURITY	0.00	APPROX
STOCKMANN OYJ ABP-A SHARE	0.33	CSR
STORA ENSO OYJ-R SHS	18.16	CDP
SOLTEQ OYJ	0.00	APPROX
SUOMINEN OYJ	0.04	APPROX
TAALERI OYJ	0.00	APPROX
TAKOMA OYJ	0.00	APPROX
TELIA CO AB	1.67	CDP
TECNOTREE OYJ	0.01	APPROX
TIETO OYJ	0.08	CDP
TIKKURILA OYJ	0.41	APPROX
TELESTE OYJ	0.04	APPROX
TALVIVAARA MINING CO PLC	0.62	CDP
TOKMANNI GROUP CORP	0.08	APPROX
TECHNOPOLIS OYJ	0.13	CO2
TRAINERS' HOUSE PLC	0.00	APPROX
TULIKIVI OYJ-A SHS	0.13	APPROX
UPONOR OYJ	0.15	CDP
UPM-KYMMENE OYJ	27.15	CDP
UUTECHNIC GROUP OYJ	0.00	APPROX
VAISALA OYJ- A SHS	0.03	CDP
VALMET OYJ	0.34	CDP
VALOE OYJ	0.00	APPROX
VIKING LINE ABP	3.47	APPROX
WARTSILA OYJ	0.45	CDP
WULFF-GROUP PLC	0.01	APPROX
IXONOS OYJ	0.00	APPROX
YLEISELEKTRONIIKKA OYJ	0.00	APPROX
YIT OYJ	0.20	CDP

*The Financed Emissions relate to the company's emissions per €1m invested.

10 Appendix 4 – About South Pole Group

The South Pole Group is one of the world's leading climate action solution providers, measuring and reducing climate impact for its clients. Headquartered in Zurich, Switzerland, with 17 offices around the globe and over 130 climate change professionals, the company has achieved savings of over 50 million tonnes of CO₂ since being incorporated in 2006.

With the largest and deepest coverage of high quality company GHG information in its proprietary database, South Pole Group has screened over USD 500 bn assets under management for their climate impact. The company pioneered high volume portfolio carbon screening that is now available on Bloomberg terminals (APPS CARBON), YourSRI.com and CleanCapitalist.com. South Pole Group has been a strong contributor to the Montreal Carbon Pledge (www.montrealpledge.org).

Further details about South Pole Group can be seen in Appendix 3 below.

10.1 Results you can trust

SPG's unique and powerful approach to measuring the climate impact of investment portfolios delivers the largest coverage, highest data quality and most transparent analysis in the market that is both standardized and can be customized to your specific needs.

The methodology was developed over three years with the Swiss Federal Institute of Technology and includes over 800 sector and subsector specific models, allowing SPG's researchers to calculate the GHG emissions of companies based on those criteria that are most relevant to their line of business. All holdings are manually reviewed by SPG experts to ensure maximum reliability.

10.2 Deeper analysis conducted together with partners

SPG partners with a wide range of other specialists on a non-exclusive base to complement research and service with best market offerings out there. Partners include the CDP, Fossil Free Indexes, oekom research, CAER, Global Footprinting Network, Ethifinance, 2 Degree Investment Initiative and others.

SPG is for example the only provider of carbon emissions data to work directly with the CDP (formerly Carbon Disclosure Project) to conduct forward-looking examinations of individual portfolio holdings. Together with the CDP, SPG evaluates each company's specific climate change related risks and opportunities, and assesses how each company addresses these issues through its climate strategy. In addition, on behalf of the CDP, SPG evaluates the water management practices of 300 largest companies by market capitalization. The data offers unique insights into how different companies embrace water stewardship and will be affected by the coming water crisis. The SPG is also the only partner of Fossil Free Indexes to screen investment

portfolios against the Carbon Underground 200™ and the Tar Sand 20™. This bridges the gap between investment footprinting, which focuses on the current consumption of fossil fuels with embedded emission analysis, that focussing on the producers of coal, oil and gas.

This additional data is provided to Sitra through SPG and integrated in SPG's reporting. Sitra is also entitled to use the names and logos of the partner organisations in its communication.

10.3 Reference clients

SPG has over 1'000 clients, including countless clients in the financial industry. In addition to the above references, we are also proud to count some of the world's biggest banks, investors and insurance companies amongst our clients. These include:

