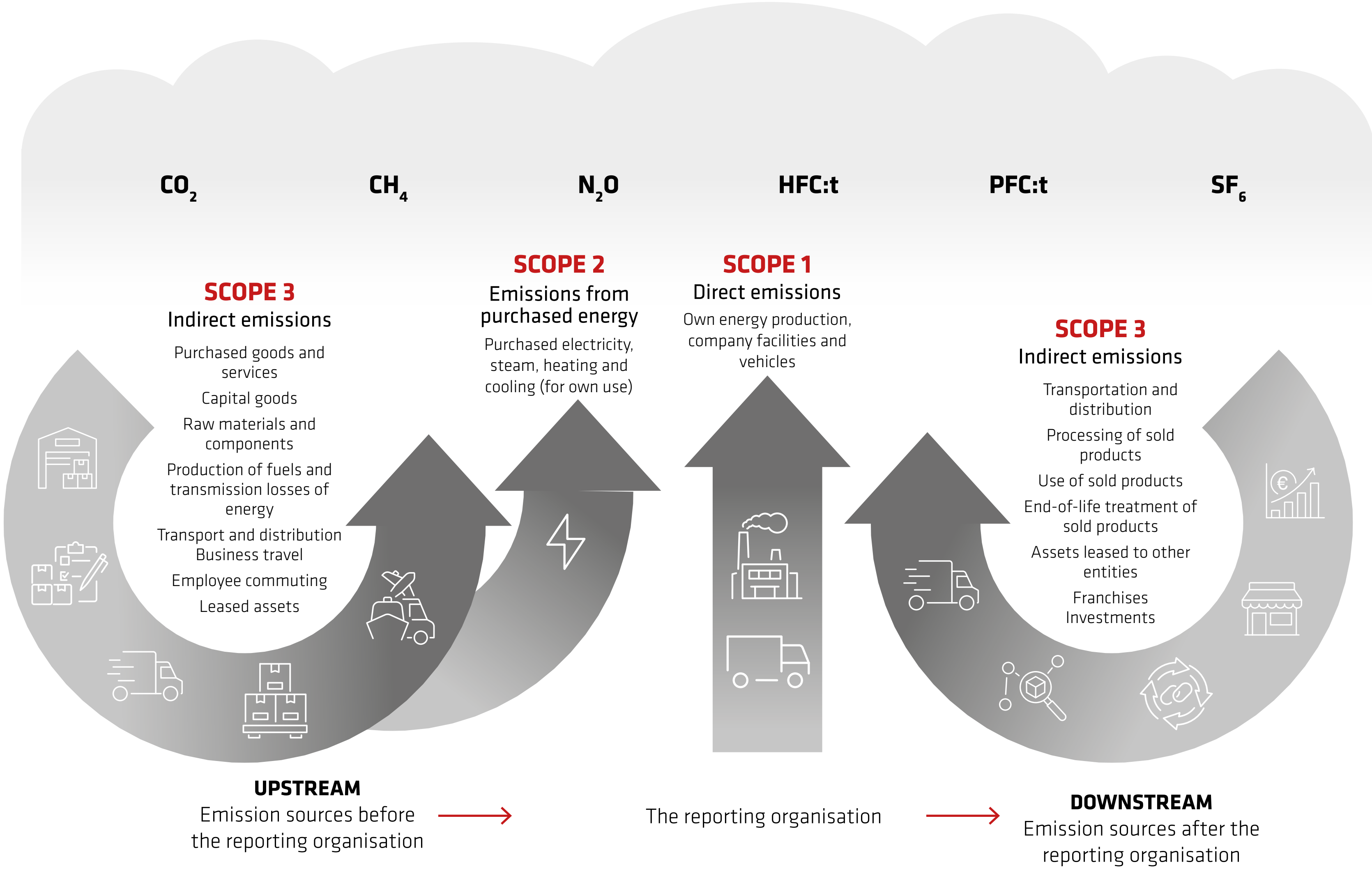
Summary of the principles of Sievi's emissions calculation

Sievi



Edited. Original image by Greenhouse Gas Protocol.

General

The carbon footprint describes the amount of greenhouse gases emitted by an organisation, individual, product or event. Increasing the amount of greenhouse gases reduces the amount of heat radiation escaping from the Earth into space causing a warming effect.

The carbon footprint emissions are classified into three scopes. Scope 1 emissions are direct emissions such as those resulting from fuel consumption of vehicles. Scope 2 emissions occur through the use of purchased energy. Scope 3 covers all other indirect emissions of the reporting organisation, such as those from the manufacturing of purchased products.

Emissions calculation standards and boundaries

In our emissions calculations, we follow the Greenhouse Gas Protocol (GHG protocol), which comprises two standards:

- Corporate Standard
- Product Life Cycle Accounting and Reporting Standard

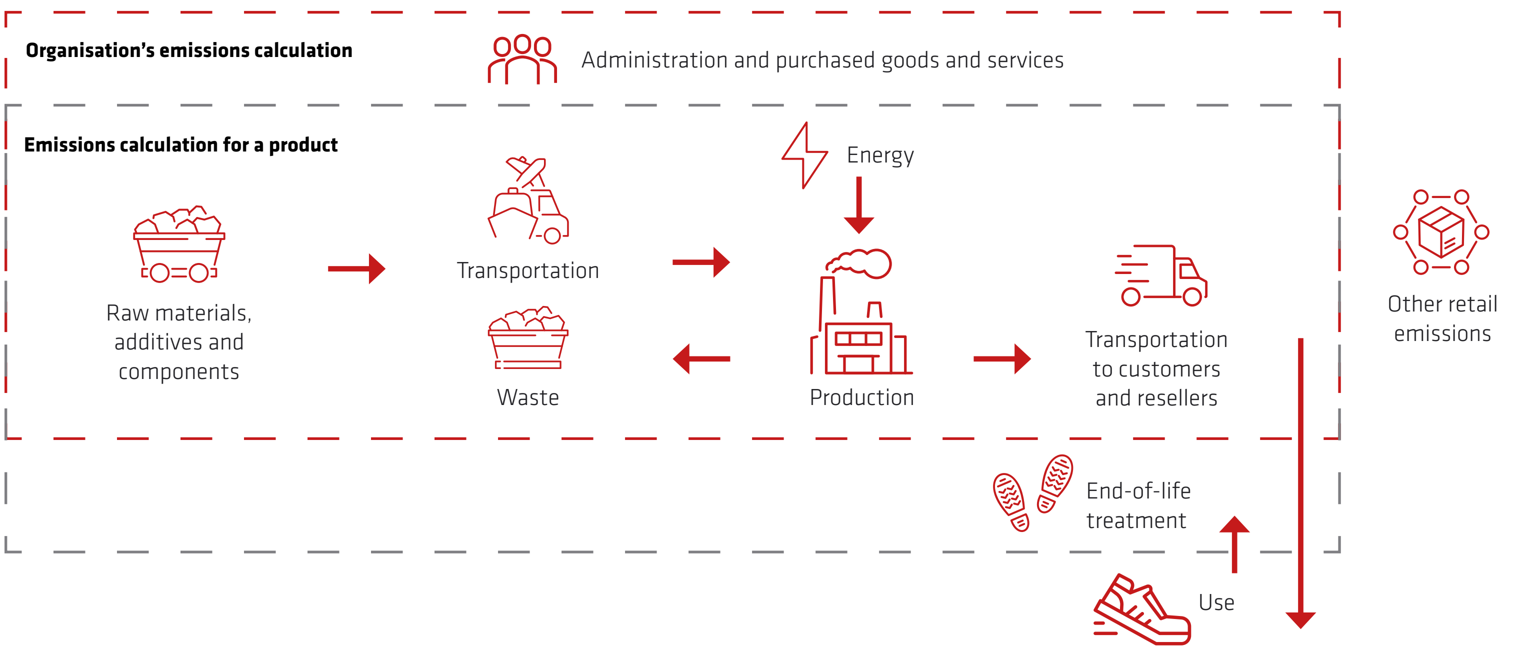
Our calculations include emissions from our entire organisation and the carbon footprint of our most important products.

We apply the operational control approach as the boundary, which means that we include leased assets under our control, such as facilities and vehicles, in our own sources of emissions.

Our organisation's emissions calculations cover all scope 1 and 2 emissions. Scope 3 covers categories: 1) purchased goods and services, 2) capital goods, 4) upstream transportation and distribution, 5) waste, 6) business travel, 7) employee commuting and 9) downstream transportation and distribution. Categories that are excluded, for now, from the calculations are 3) indirect emissions from energy-related activities, 11) use of sold products and 12) end-of-life treatment of sold products. We have not identified any other sources of emissions in our organisation.

According to standard, in product life cycle accounting purchases that are not directly related to production, such as financial accounting services are excluded from the calculation. In the calculation of category 12 we have included emissions from end-of-life treatment of sold products.

Use of sold products is a relevant emissions category in the textile industry. However, safety and occupational footwear are not washed or dried nearly as often as clothes in general. Treatments and repairs also create in-use emissions, but these are insignificant sources of emissions. We have not been able to find a reliable source for estimating the in-use emissions of safety and occupational footwear yet, and as we believe these to be very low, we have excluded them from our calculation for now.



Special features of safety and occupational footwear

Safety and occupational footwear are different from other workwear, and some features, such as the proportion of recycled materials, cannot be directly compared to those of other types of workwear that is made almost 100% of different textiles. One of the reasons behind this is that the sole accounts for a significant part of the weight in a shoe, and to ensure that it is resistant to chemicals and oils, sole materials must comply with the international standard EN ISO 20345/20347. However, these materials (polyurethane and nitrile rubber) cannot yet be made from recycled materials in a financially viable and reliable manner. This issue is, nevertheless, important, and we are working resolutely with our suppliers on developing solutions for the use of recycled materials.

Sievi is one of the first manufacturers of safety and occupational footwear to calculate carbon dioxide emissions per pair of shoes. We have now calculated emissions for nine models, and more models will be included soon.

Greenhouse gases included in the calculations

The calculations cover, where possible, the following greenhouse gases: CO_2, SF_6, CH_4, N_2O, NF_3 as well as HFC and PFC compounds. The results were expressed as CO_2 equivalents using the 100-year global warming potential (GWP100).

Global Warming Potential (GWP) describes how much impact greenhouse gases have on atmospheric warming over a certain period of time (most commonly 100 years) compared to carbon dioxide. Each greenhouse gas has a different GWP value that depends on their atmospheric lifetime and their efficiency in absorbing long-wave radiation.

Methodology and assessment of uncertainties

We collect extensive data from the emission sources in our organisation. As a rule, we have been able to collect accurate data on the consumption of raw materials and energy, for example. The biggest uncertainty concerning our emissions is related to the emission factors for the materials and components used in production due to their large share of our total emissions. We have been unable to obtain accurate data on the production of materials from our suppliers and their suppliers, so we use literature sources to determine their emission factors. The uncertainty is typically in the order of 10 % for the emission factors of the materials that we use. Since the consumption data is accurate, the uncertainty related to materials as a whole is reasonably low.
We have used the purchased volumes to estimate the emissions from sources other that scope 3 category 1) purchased goods and services associated with production. The biggest uncertainties in these cases are related to investments in factories, which cause large emissions in individual years.

The data for the other sources of emissions (approximately 10-15 % of total emissions) is generally accurate, though some estimates and assumptions have had to be made in categories such as employee commuting because accurate data has not been available.

Emission factors

The emission factors of our largest source of emissions, i.e. shoe materials, have been collected from the publications listed below, supplemented by the ecoinvent and Defra emission factor databases. Not all of the following publications have been used in the final emission factors, but some have been used to verify the accuracy of the main source.

For most materials, we have combined data from several publications, as many of the available emission factors relate to emissions from fibres, while we source raw materials directly as fabrics or components. Our calculation assumes that raw materials come to us as fabric, in the case of textiles, the calculation takes into account the manufacture of the fibre, yarn and fabric. In terms of non-textile components, we have estimated a similar level of emissions from the production of virgin raw material into a component as in the case of textiles, from fibre to fabric, if more detailed information has not been available.

Cherret et al., 2005, Ecological footprint and water analysis of cotton hemp and polyester

Lenzing, 2020, https://www.lenzing.com/?type=88245&tx_filedownloads_file%5bfileName%5d=fileadmin/content/PDF/04_Nachhaltigkeit/Nachhaltigkeitsberichte/EN/NHB_2020_key_figures_EN.pdf

Patagonia, 2022, https://eu.patagonia.com/fi/en/our-footprint/recycled-cotton.html

Monfort et al., 2010, https://www.qualicer.org/recopilatorio/ponencias/pdfs/2010239.pdf

de Beus et al., 2019, http://eiha.org/media/2019/03/19-03-13-Study-Natural-Fibre-Sustainability-Carbon-Footprint.pdf

Schmutz et al. (2021), Mélanie Schmutz, Roland Hischier and Claudia Som; Factors Allowing Users to Influence the Environmental Performance of Their T-Shirt

Hasanbeigi et al (2012), Energy-Efficiency Technologies and Benchmarking the Energy Intensity for the Textile Industry, Berkeley National Laboratory

Kalliala&Nousiainen (1999), Tampere University of Technology; "Life Cycle assessment - Environmental profile of cotton and polyester-cotton fabrics"

Li Shena et al (2010), Open-loop recycling: A LCA case study of PET bottle-to-fiber recycling, Resources, Conservation and Recycling 55 (2010) 34–52

Maraseni et al (2010), An assessment of GHG emissions -implications for the Australian cotton industry, Journal of Agricultural Science 148. (2010) 501-510

S.G. Wiedemann et al. / Journal of Cleaner Production (2016); Resource use and greenhouse gas emissions from three wool production regions in Australia

Steinberger et al (2009), A spatially explicit life cycle inventory of the global textile chain, Int J Life Cycle Assess

Gruppo Dani S.p.a - Sustainable leather (2011); Environmental Product Declaration

Barber & Pellow (2006), The Agribusiness Group; "Life Cycle Assessment: New Zealand Merino Industry, Merino Wool Total Energy Use and Carbon Dioxide Emissions"

WRAP Carbon Footprint Report 2012 (no longer available)

Other sources used for emission factors include our energy supplier, Statistics Finland, Motiva, Finnish Government publications, the Finnish Environment Institute (Syke), VTT Technical Research Centre of Finland, WWF as well as some individual scientific publications and emissions reported by service providers.

Sievin Jalkine's emissions calculation for 2020–2023 and this report was produced by Third Rock Finland Oy.

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