

Corporate Carbon Footprint 2022

SEGGER Microcontroller GmbH



The Embedded Experts

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I. General

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A brief introduction to SEGGER Microcontroller GmbH

SEGGER Microcontroller GmbH is a worldwide leading manufacturer of innovative development tools for embedded systems, generic embedded software and programming devices with more than 30 years of experience.

Our customers include the who is who of the consumer, industrial, automotive and healthcare world. We are an innovative, continuously growing company with additional offices in the USA and China (both separate legal entities). Our headquarters are in Monheim am Rhein, Germany.

Our motto "It simply works" reflects in our products which are professional and easy-to-use in a complex, highly-technical, industry. Embedded Systems are a growing part of everyday life and we at SEGGER are passionate about being a part of it.

What is a Corporate Carbon Footprint?

A Corporate Carbon Footprint (CCF) represents the greenhouse gas balance of company-related greenhouse-relevant emissions. The calculation of greenhouse gas emissions includes all six greenhouse gas categories (GHGs) defined by the Intergovernmental Panel on Climate Change (IPCC) and the Kyoto Protocol: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF₆). As of 2015, nitrogen trifluoride (NF₃) is also included.

How to compare relevant Emissions?

In order to compare the greenhouse-relevant emissions, it is necessary to standardize them with the aid of characterization factors. These are provided by the IPCC, among others, and are updated at regular intervals. The global warming potentials of the individual substances are combined into a total global warming potential with the aid of the characterization factors and reported as a total under the designation carbon dioxide equivalent (CO₂e). CO₂e represents the average warming effect over a given period of time. In this study, the global warming potential is considered for a period of 100 years.

Methodology & Reporting Standard

Description of methodology

In the following sections the procedures and underlying principles for calculating a Corporate Carbon Footprint in accordance with the guidelines of the GHG Protocol Corporate Accounting and Reporting Standard, 2004 ("GHG Protocol") are described.

Reporting Standard

The GHG Protocol Corporate Accounting and Reporting Standard, 2004, developed by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD). It is the most widely used and recognized international standard for accounting for greenhouse gas emissions from organizations. The principles of GHG calculation and information on the scope concept can be found in the appendix.

Disclaimer

For the first SEGGER Microcontroller has used two different approaches to calculate the emissions for electricity. The location-based approach and the market-based approach. The market-based approach reflects emissions from the electricity the company purchases. The location-based approach is a method of calculating emissions based on the average emission intensity of the power grid the company is physically connected to. It doesn't matter which electricity contracts the company holds. The emissions calculated based on the market-based approach can be much lower than the emissions calculated based on the location-based approach, especially in Scope 2. Therefore, the emissions for this year are much higher than the years before due to the fact that SEGGER has calculated the emissions based on both approaches to provide a complete overview.

II. System boundaries and data

1. System boundaries
2. Overview of collected data

System limits

Reporting year

For the calculation of the CCF, all relevant activity data were collected within the calendar year from 01.01.2022 to 31.12.2022.

Organizational boundaries

The GHG emissions analysis and boundaries (of the company) are based on the control-based approach. The company has both operational and financial control over operations at the site in Monheim am Rhein.

Operational Boundaries

For this CCF, mandatory Scope 1 and Scope 2 emission sources were considered for GHG inventory compilation. Scope 3 emissions are optional for CCF compilation. In the present case, selected applicable Scope 3 emissions are also included in the calculation.

Overview of emissions recorded (1/3)

	Source of Emission	
Scope 1 – direct emissions		
Scope 1 .1	Direct emissions from combustion processes of stationary combustion sources	Natural Gas
Scope 1 .2	Direct emissions from combustion processes of mobile combustion sources	Fuel & Petrol company Cars
Scope 1 .3	Direct emissions from volatile gases	No leakage from air condition units – this will be constantly reviewed in the calculation of the CCF the coming years
Scope 1 .4	Direct emissions from processes	Not relevant for SEGGER
Scope 2 – indirect emissions		
Scope 2 .1	Indirect emissions from purchased electricity	Green Electricity purchased from energy supplier
Scope 2 .2	Indirect emissions from district heating & cooling	Not relevant for SEGGER
Scope 2 .3	Indirect emissions from purchased steam	Not relevant for SEGGER

Overview of emissions recorded (2/3)

Scope	Source of Emission	Remarks
Scope 3 - indirect emissions		
Scope 3.1	Purchased goods and services	Not relevant in this calculation of SEGGER CCF – this will be constantly reviewed in the calculation of the CCF the coming years
Scope 3.2	Capital Goods	Not relevant for SEGGER
Scope 3.3	Fuel- and energy-related emissions not included in Scopes 1 or 2	Upstream emissions from natural gas, petrol, diesel and electricity purchased (data not included in Scope 1 and 2)
Scope 3.4	Upstream transportation and distribution	Not relevant in this calculation of SEGGER CCF – this will be constantly reviewed in the calculation of the CCF the coming years
Scope 3.5	Waste generated in the operation	Waste disposed by the waste disposal company
Scope 3.6	Business Travel	Travelling by plane, car, train, taxi, ferry and hotel accommodation
Scope 3.7	Employee commuting	Travelling by car, train
Scope 3.8	Upstream leased assets	Not relevant for SEGGER
Scope 3.9	Downstream transportation and distribution	Not relevant in this calculation of SEGGER CCF – this will be constantly reviewed in the calculation of the CCF the coming years
Scope 3.10	Processing of sold products	Not relevant in this calculation of SEGGER CCF – this will be constantly reviewed in the calculation of the CCF the coming years

Overview of emissions recorded (3/3)

Scope	Source of Emission Factor	Remarks
Scope 3 - indirekte Emissionen		
Scope 3.11	Use of sold products	Not relevant in this calculation of SEGGER CCF – this will be constantly reviewed in the calculation of the CCF the coming years
Scope 3.12	End-of-Life treatment of sold products	Not relevant in this calculation of SEGGER CCF – this will be constantly reviewed in the calculation of the CCF the coming years
Scope 3.13	Downstream leased assets	Not relevant for SEGGER
Scope 3.14	Franchises	Not relevant for SEGGER
Scope 3.15	Investments	Not relevant for SEGGER

Activity data and emission factors (1/2)

Activity data

Consumption data for Scope 1 (stationary combustion and company cars) and Scope 2 (electricity) represent real consumption volumes in the period from 01.01.2022 to 31.12.2022. This is the first time that electricity has been calculated using a market-based and location-based approach. Data for Scope 3 (Fuel- and energy-related emissions not included in Scopes 1 or 2, waste generated in the operation, business travel and employee commuting) are also based on real consumption volumes in the period from 01.01.2022 to 31.12.2022.

Activity data and emission factors (2/2)

Emission factors

The emission factors used are listed in the appendix. The sources of the emission factors used are scientifically recognized and are used internationally to calculate GHG emissions. For the most part, the emission factors used in this report are from the DEFRA database (Conversion factors 2022: Full set for advanced users, accessed on 18.09.2023).

For purchased green electricity, emission factors from the UBA (Umweltbundesamt – Entwicklung der spezifischen Treibhausgas-Emissionen des deutschen Strommix in den Jahren 1990 – 2024, accessed on 06.05.2025) were used.

Activity data explanation

Source of emission	Remarks
Stationary combustion sources	The fuel used was natural gas.
Fleet vehicles	For the company fleet, the kilometres driven with the company cars with regards to required travels for company purposes were recorded.
Electricity	The purchased electricity was 100% green electricity.
Fuel and energy-related emissions	All upstream chain emissions of the fuels used and the electricity supply were taken into account.
Waste generated in the operation	The quantities of the different bins in use (due to waste separation) were calculated according to their different sizes and emptying cycles and were converted accordingly after consultation with the disposal company.
Business travel	Business trips taken into account were made by car, train or plane, hotel accommodation was also included for the first time for 2022.
Employee Commuting	Employees were asked how they commute to work and which type of car they have. Commuted kilometers were calculated accordingly and were matched to the different categories of travel (car, bike, trains).

Data quality

Activity data

Activity data were collected exclusively by SEGGER Microcontroller GmbH and are based almost exclusively on actual consumption values.

The only exemption are km driven by company cars. As private use is also permitted for company cars, the km calculated for the CCF are only those km, that relate to mandatory travels for the company.

Emission factors

The emission factors are taken from recognised specialist sources. The emission factors used are average values for certain technological and spatial conditions (DE). Supplier or supplier-specific factors were not used.

Conclusion

According to all aforementioned explanations on data procurement and data collection, the data quality of the activity data and emission factors used for evaluation of the SEGGER Microcontroller GmbH Corporate Carbon Footprint is classified as high.

III. Results of the Corporate Carbon Footprint (CCF) calculation

1. Results based on the data collection form
2. Climate performance
3. Explanation of results

Results CCF (1/4)

The total emissions for the year 2022 are 102 t CO₂e

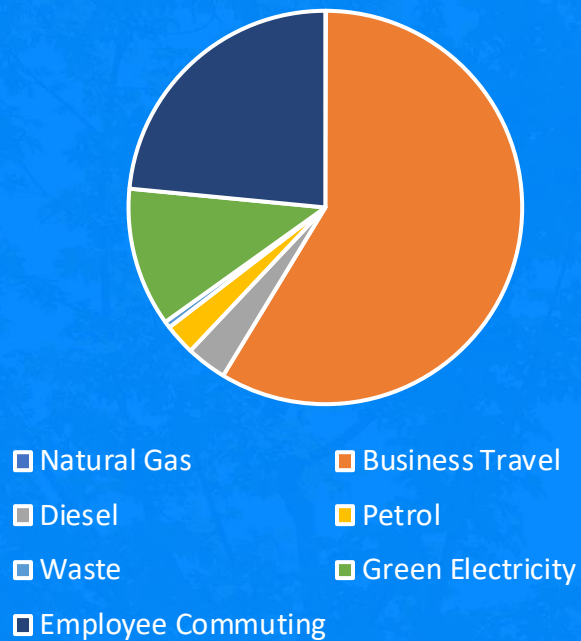
Emission overview Scope 1 & Scope 2

Scope	Source of emission	Quantity	Unit	CO ₂ e [t]
Scope 1 - direct emissions				
Scope 1.1	Natural Gas	1.149	kWh	0,23
Scope 1.2	km (diesel)	69.804,56	km	10,99
	km (petrol)	40.430,44	km	7,04
	km (plug-in hybrid)	106.119,1	km	7,04
Scope 2 - indirect emissions				
Scope 2.1	Green Electricity	145.459,63	kWh	64,15

Results CCF (2/4)

Emission overview Scope 3

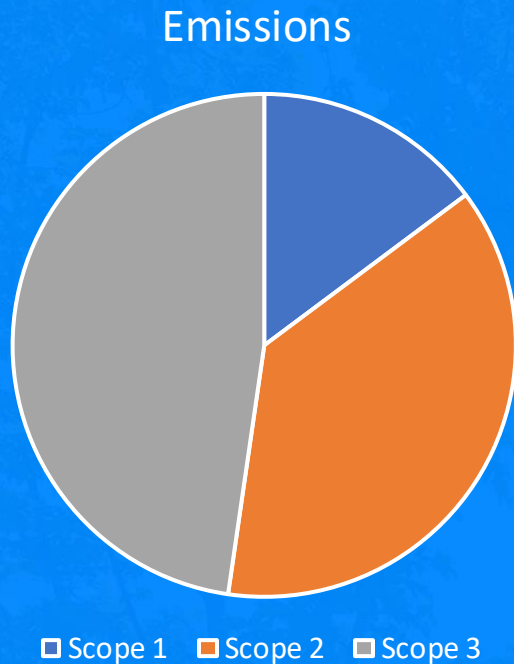
Overview Scope 3 emissions



Scope 3 – indirect emissions				
Scope	Source of emission	Quantity	Unit	CO2e [t]
Scope 3.3 (Upstream)	Natural Gas	1.149	kWh	0,04
	Green Electricity	145.460	kWh	9,01
	Diesel	69.805	Km	2,63
	Petrol	40.430	Km	2,01
	Plug-in Hybrid	105.619,1	Km	2,67
Scope 3.5	(Waste – Paper, plastics, residual)	19.864	t	0,43
Scope 3.6	Business Travel (Plane, Taxi + 100 nights hotel)	114.825,63	km	46,27
Scope 3.7	Employee Commuting	113.931	km	18,52

Results CCF (3/4)

Emission overview total (all Scopes)



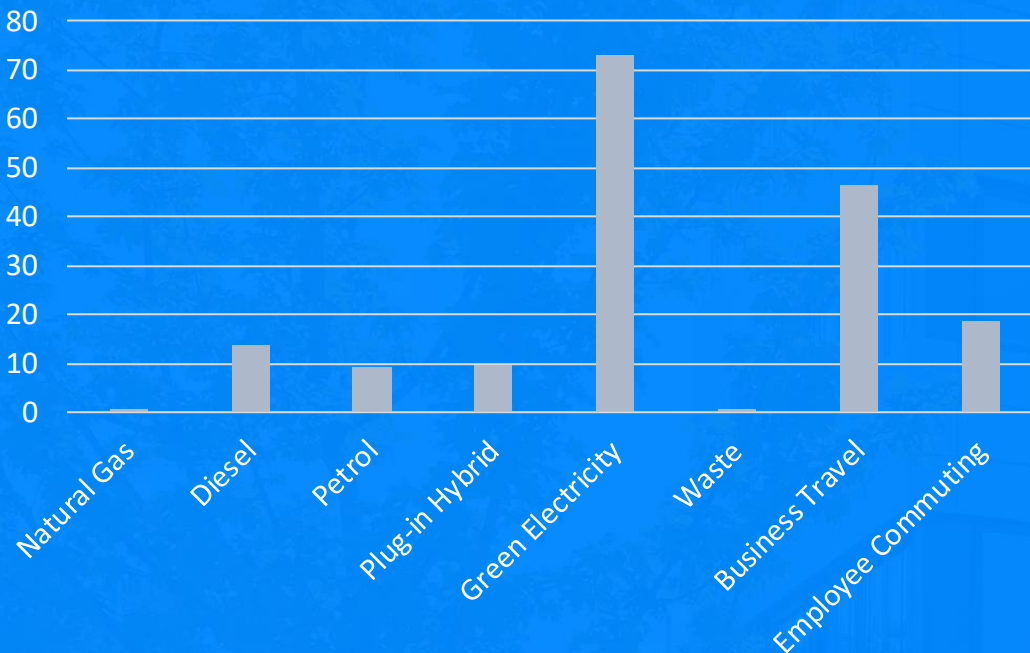
Source of emission	Quantity	Unit
Scope 1	25,30	t CO ₂ e./Year
Scope 2	64,15	t CO ₂ e./Year
Scope 3	81,59	t CO ₂ e./Year
Total	171,04	t CO ₂ e./Year

Results CCF (4/4)

Emission overview based on emission sources

(Scopes combined)

CO₂e (t) in 2022 based on emission sources



Emission from	CO ₂ e [t]
Natural Gas	0,27
Diesel	13,62
Petrol	9,05
Plug-in Hybrid	9,71
Green Electricity	73,16
Waste	0,43
Business Travel (Plane, Taxi)	46,27
Employee Commuting	18,52

Climate performance

In order to be able to interpret and evaluate the results of the company's accounted GHG emissions, the climate performance offers a possibility to interpret emission developments of the company in a year-on-year comparison. Thus, by comparing the collected CCF data with relevant company key figures, meaningful performance indicators on the company's climate performance can be made.

For SEGGER Microcontroller GmbH, the performance indicator "climate intensity per employee" is considered in this initial survey. In 2022, 60 employees worked for SEGGER Microcontroller GmbH, resulting in a performance indicator for 2022 of 2.85 t CO₂e/employee.

Explanation of results (1/2)

As a first step, the creation of a CCF served SEGGER to quantify the greenhouse-relevant gases, i.e. to determine the current status. In a second step, a reduction of greenhouse gas emissions can be achieved or unavoidable emissions can be offset.

For SEGGER Microcontroller GmbH, total GHG emissions of approx. 171.04 t CO₂e were generated for the calendar year 2022.

Explanation of results (2/2)

Due to the fact that SEGGER Microcontroller already obtains green electricity from MEGA Monheim, there are no emissions in Scope 2 within the market-based approach, as the production of green electricity does not generate any GHG emissions for Scope 2, which is why it is accounted for according to the GHG Protocol with the emission factor 0.0 kg CO₂e/kWh. Using the location-based approach, the emission factor in Scope 2 for electricity is 0.441 kg CO₂e/kWh.

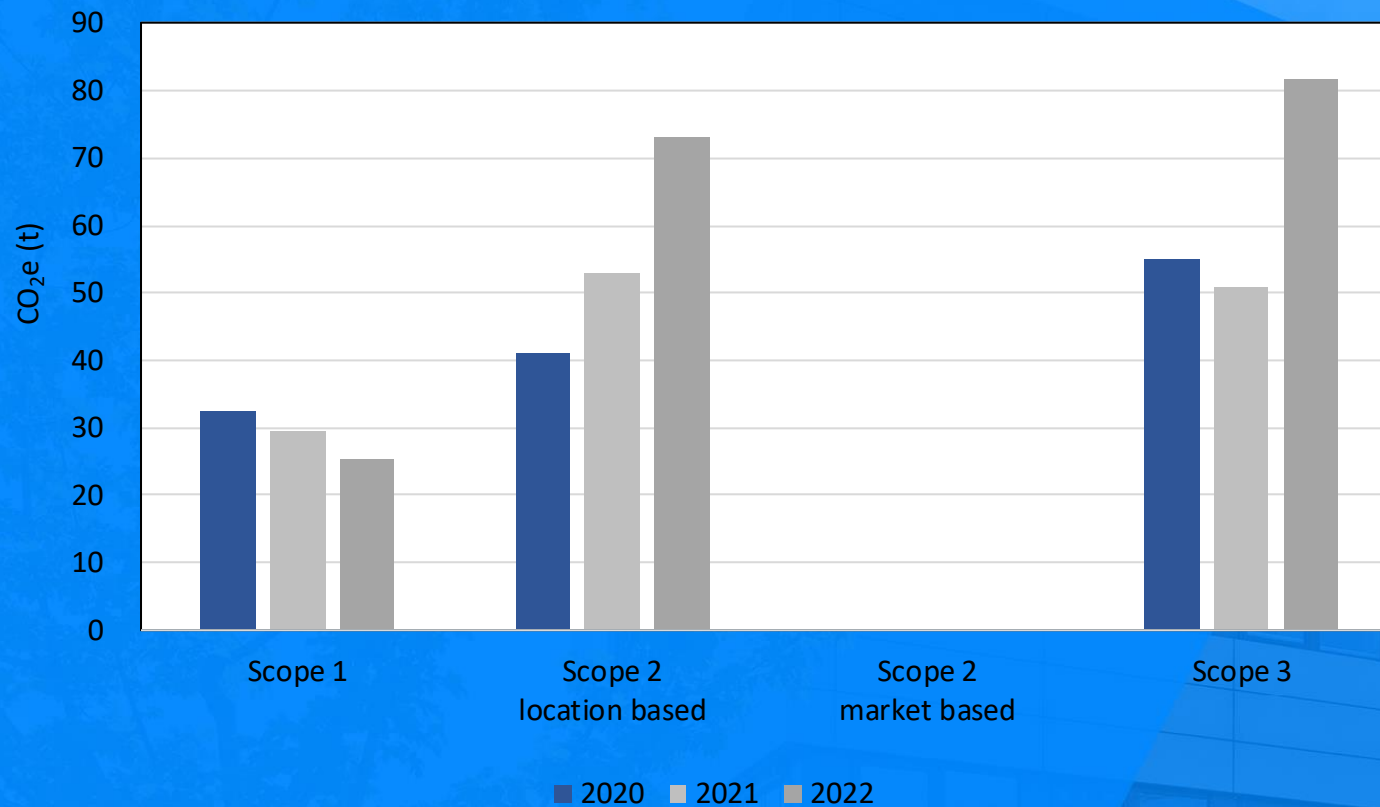
However, in the upstream chains of electricity generation (Scope 3.3), e.g. through the construction and maintenance of plants, greenhouse gas-relevant emissions occur for the assumed energy sources (mean value from hydropower, solar power and wind power). The emission factor for the upstream chains of electricity generation that have been taken into account here have an emission factor of 0.062 kg CO₂e/kWh.

IV. Comparison

Comparison (1/3)

This GHG balance provides a transparent overview of the GHG emissions generated by SEGGER Microcontroller GmbH for Scope 1, 2 and 3 of the calendar year 2022. It is the third calculation for the GHG – inventory. Due to the pandemic, the emissions in 2021 have been on a lower level, so the first „real“ comparison can be made for the years 2022 and 2023. According to the calculation for 2022, the main emission sources are still business travels, commuting (either with a company car or a private car) and green electricity.

Comparison of emissions in Scopes 1-3 for the years 2020 - 2022 (in CO₂e (t))



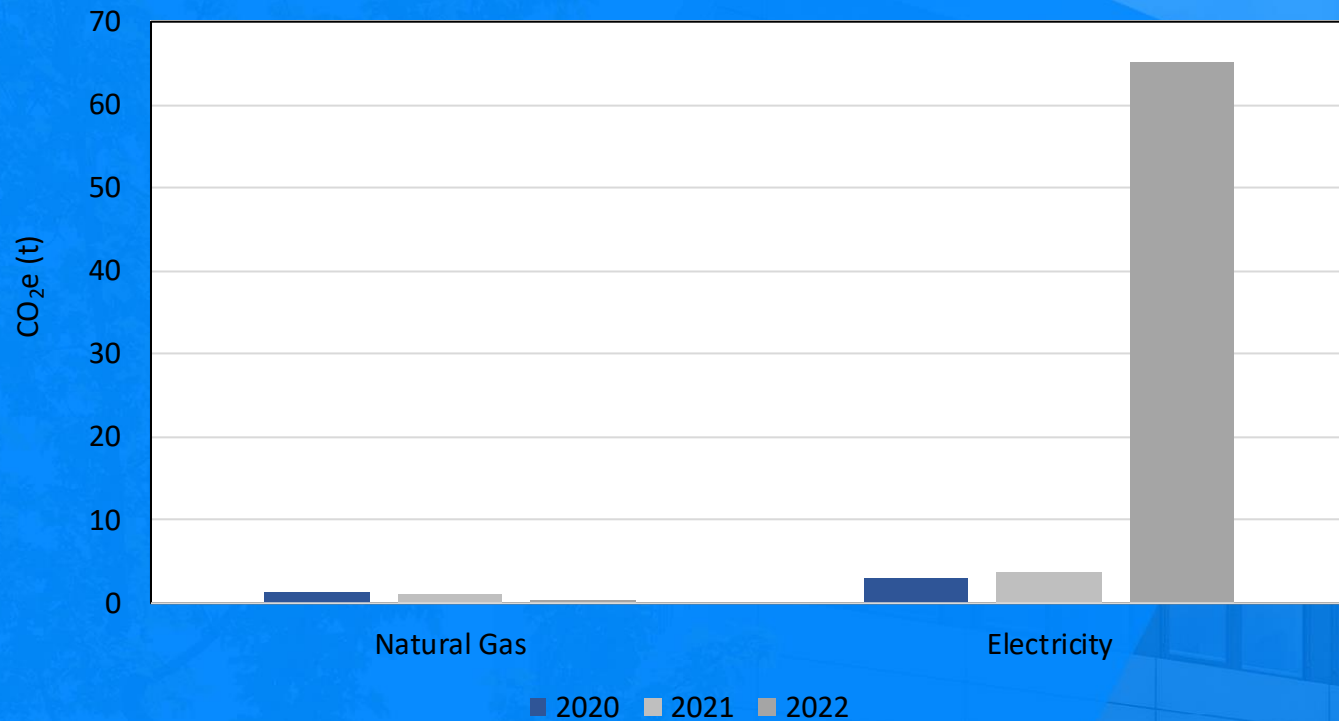
Comparison (2/3)

The consumption of natural gas has decreased significantly in comparison to 2020 due to the warmer weather and the shorter heating period that could not be covered by the installed heat pump.

The energy consumption of green electricity has increased by 1/5 in comparison. This is due to several factors, the main ones definitely are the purchase of hybrid vehicles for the company fleet which are charged in Monheim, the increase in employee-numbers and also the air filters which were bought and used in each office with more than 2 employees during the pandemic.

But as the diagram shows, SEGGER does not produce emissions for electricity in Scope 2 due to the decision that only green electricity is purchased from MEGA Monheim.

Comparison of the consumption of natural gas for the years 2020 - 2022 (in CO₂e (t))

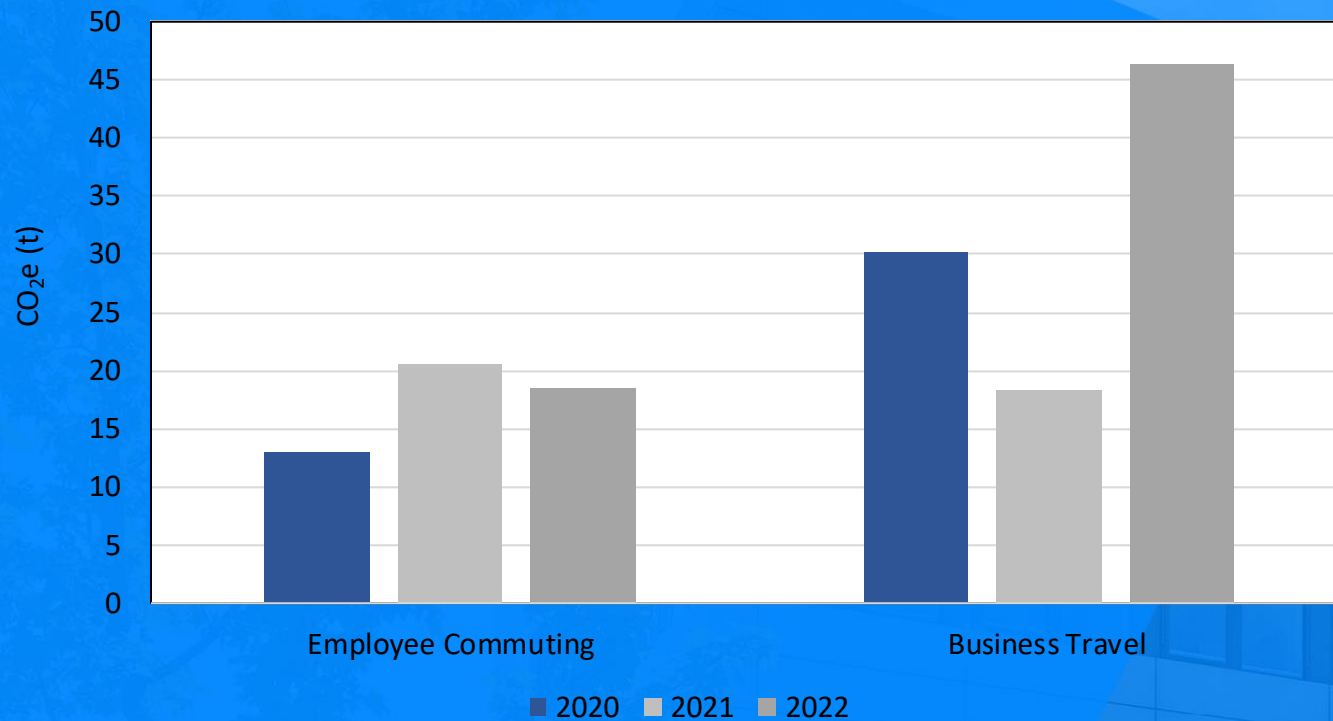


Comparison (3/3)

The km travelled for commuting have increased in 2021 due to the fact that SEGGER has hired 7 additional employees who did not come from a direct neighborhood.

Emissions for business-travels decreased by more than 1/3 compared to 2020 – this was due to the fact that meetings were held online as well and trade shows were cancelled.

Comparison of the emissions for commuting and business travels for the years 2020 - 2022 (in CO₂e (t))



V. Summary and outlook

Summary and outlook (1/3)

Potential for optimisation still includes paying attention to lower fuel consumption when purchasing new vehicles. This is already being taken into account, as new additions and replacements to the company fleet have to be a hybrid or a fully-electric vehicle. This company policy was implemented in 2020 and shows effects in 2022 where emissions for diesel were lower than in 2020, but emissions for petrol (also hybrids) went up as we exchanged older diesel cars for new petrol-hybrid and fully electric vehicles.

Summary and outlook (2/3)

The company still keeps up the offer to all employees to get a company bicycle to encourage climate-friendly commute to work, which will keep showing an impact in future calculations as employees make use of this especially in summer.

Additionally the company will continue to replace diesel and petrol company cars with plug-in hybrid and fully electric cars.

The company will set off unavoidable emissions.

Summary and outlook (3/3)

For 2022 SEGGER Microcontroller GmbH has offset their emissions of 171,04 tons of CO₂e in a Global Safe Water Program in Nigeria and Kenia.

The project offers low-cost, reliable water treatment technologies as well as installation, maintenance, and repair services to primarily public schools in Sub-Saharan Africa.

The project has reached over 60,000 schools and more than 24 million schoolchildren and adults. Its total climate impact equals more than 2 million tonnes of avoided carbon emissions per year. By the end of 2025, several tens of thousands of schools will directly benefit from the project.

V. Appendix

1. Principles of GHG calculation
2. Information on the scope concept
3. Abbreviations
4. Sources

Principles of GHG calculation (1/2)

Relevance

GHG accounting must adequately capture and present all significant emissions of a company.

Completeness

The calculation must capture all relevant emitted GHG emissions. If certain emission sources are not included, this must be clearly stated and justified.

Consistency

The calculation must be based on uniform methods so that the results can be compared over time. Any changes in the data basis, the calculation limits and the emission factors must be reported.

Principles of GHG calculation (2/2)

Transparency

Clear and comprehensible presentation of the data used, emission factors, calculations and results for external third parties must be documented.

Accuracy

It must be ensured that the quantification of greenhouse gases is neither systematically above nor below the actual emissions and that uncertainties and distortions are minimised as far as possible.

Information on scope concept (1/3)

The operational system boundaries define which emission sources are considered within the previously defined organisational boundaries. The operational boundaries are subdivided into Scope 1, 2 and 3 according to the GHG Protocol. For this CCF, the mandatory emission sources from Scope 1 and Scope 2, as well as selected Scope 3 categories, were considered for the preparation of the GHG balance.

The individual scopes in detail

Scope 1 - Direct emissions

Scope 1 includes all GHG emissions that occur directly in the organisation, e.g. GHG emissions from combustion by stationary sources or mobile sources (company-owned fleet), GHG emissions from processes, and GHG emissions from fugitive gases.

Information on scope concept (2/3)

Scope 2 - Indirect emissions

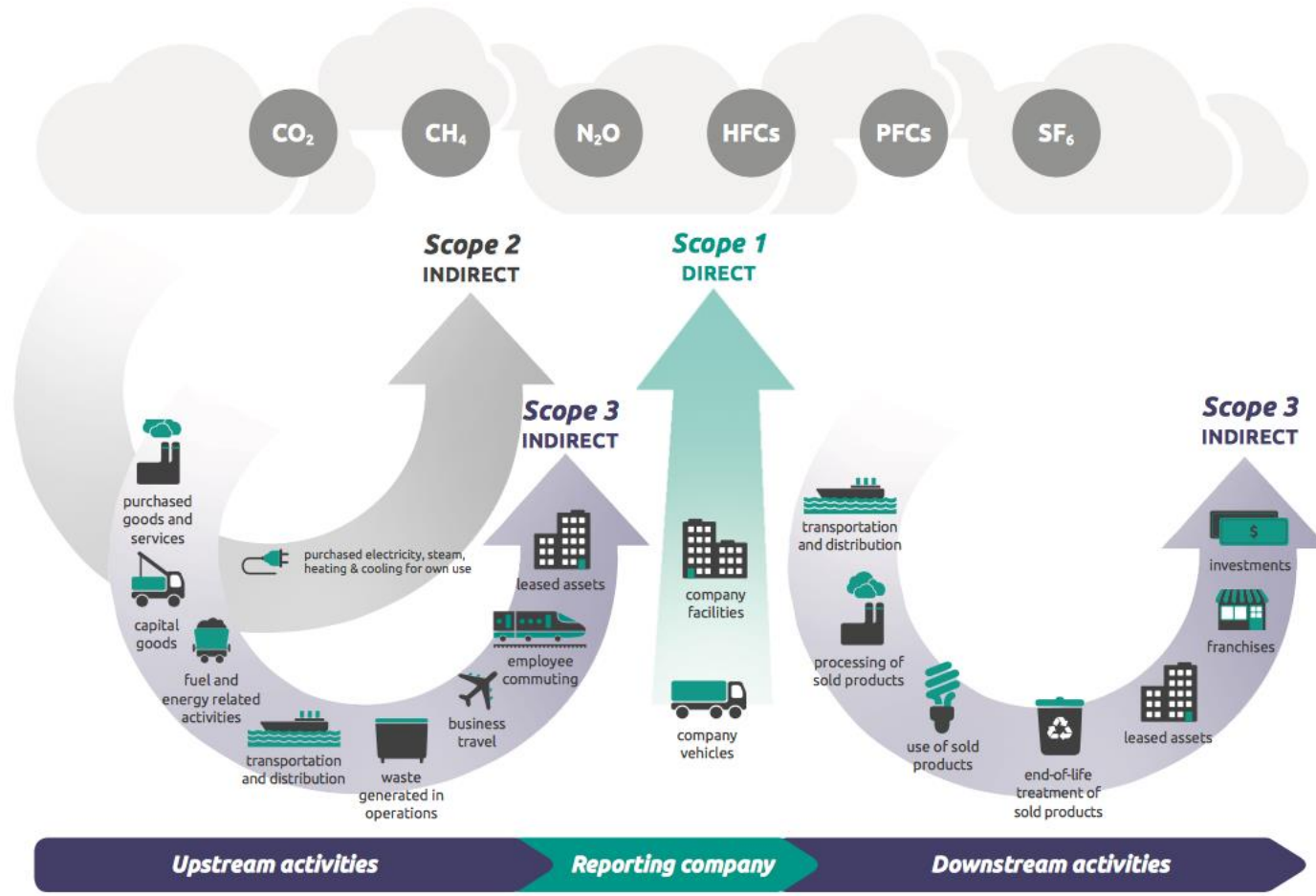
Scope 2 includes all indirect GHG emissions resulting from the provision of energy outside the organisation by a utility company. This includes electricity, steam, district heating and district cooling. The indirect emissions have been calculating the amount of emissions using the market-based approach as well as the location-based approach.

Scope 3 - Indirect other emissions

Scope 3 includes all emissions that occur before (upstream) or after (downstream) the corporate activity. These include, for example, GHG emissions in the supply chain, employee commuting or the assembly and use of the goods produced.

Information on scope concept (3/3)

Figure [1.1] Overview of GHG Protocol scopes and emissions across the value chain



Abbreviations

CCF	Corporate Carbon Footprint
CO ₂	Carbon dioxide
DEFRA	Department for Environment Food & Rural Affairs
e	Equivalent
GHG	Greenhouse Gas
IPCC	Intergovernmental Panel on Climate Change
UBA	Umweltbundesamt

Sources

DEFRA database

Full set for advanced users 2021, version 2.0, accessed on 22.09.2022

<https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2021>

GHG Protocol


2004, accessed on 22.09.2022

<https://ghgprotocol.org/corporate-standard>

UBA

Entwicklung der spezifischen Treibhausgas-Emissionen des deutschen Strommix in den Jahren 1990 – 2024, accessed on 06.05.2025

https://www.umweltbundesamt.de/sites/default/files/medien/11850/publikationen/13_2025_cc.pdf



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