

# Climate Audit

Sto Denmark A/S

Financial year 2022

In collaboration with

ATMOZ

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# Method

## GHG Protocol

Atmoz calculations and reporting are carried out in accordance with the guidelines of the GHG (Greenhouse Gas) Protocol. The GHG Protocol is based on the following principles:

- **Relevance:** Reporting should reflect the company's or organization's emissions in an adequate manner so that it can support decision making for users both internally and externally.
- **Completeness:** Reporting should cover all emissions within the specified system boundary. Any exceptions should be described and explained.
- **Consistency:** The method of calculation should be consistent so that comparisons can be made over time. Changes in the data, system boundaries, methods or similar, should be documented.
- **Transparency:** All activity data, methods, sources and assumptions should be documented.
- **Accuracy:** The calculated emissions should be as close as possible to the actual emissions.

## Scope

The GHG protocol divides greenhouse gas emissions into three so-called scopes, namely:

*Scope 1*, which includes direct emissions. These are emissions that the company has direct control over, such as emissions from company vehicles.

*Scope 2*, which includes indirect emissions from purchased energy, such as electricity and district heating.

*Scope 3*, which includes other indirect emissions. This includes emissions from all other activities, such as production, logistics, air travel, etc.

In cases where activities within scope 1 and 2 have a climate impact that arises in the life cycle but are not directly dependent on the activity, the climate impact falls within scope 3. Examples of such cases are production and transport of the fuels burned in company cars or production and maintenance of power plants that supply energy.

## Consolidation Approach

The GHG protocol allows two different consolidation approaches; equity share and control approach. The chosen method affects, to a certain extent, the scope in which the climate impact is reported, but above all it has significance for ownership in other companies and what must be included in the calculation as a result. Under the control approach, a company accounts for 100 percent of the GHG emissions from operations over which it has control. When using the control approach to consolidate GHG emissions, companies shall choose between either the operational control or financial control approach. The consolidation



approach used for Sto Denmark's climate reporting is operational control, which means that the inclusion of emissions attributed to the reporting company is based on its operative control of the respective business activities.

## Method Scope 2

According to the GHG protocol, greenhouse gas emissions from electricity must be reported in two ways in scope 2.

Location-based method, where greenhouse gas emissions are calculated based on an average value for the grid's electricity in the region / country.

Market-based method, where the climate impact is calculated based on electricity from a specific electricity agreement with guarantees of origin that has been actively purchased by the company. If the company doesn't have an agreement for a specific origin of electricity, the residual mix is used in the calculation. The residual mix is the electricity that is left when the sold guarantees of origin are removed. The Nordic residual mix is used for the Nordic countries, because of the common energy market. For other countries, the residual mix for the specific country is used.

## Base Year

For the business's long-term climate strategy, a base year can be set, against which the current accounting year is compared. Sto Denmark has a reduction target of halving the climate impact per revenue from 2017 until the end of 2025, thus the base year is set to 2017.

According to the GHG protocol, the base year needs to be recounted if certain types of changes are made within the scopes or method of calculation and the change is regarded as significant. As default, Atmoz has a threshold for recalculating the base year if the result shows a change equal to or greater than 5 % of the total emissions.

Recounting takes place if:

- Significant change in the organization's structure (e.g. addition of companies, in/out source changes)
- Significant change in calculation methodology (e.g. improved emission factors, improved activity data)
- Expansion of system boundaries that provide significant change
- Detection of significant errors or minor errors that together are significant

Recalculation of the base year does not occur due to organic growth.

## Activity Data and Emission Factors

The activity data for 2022 used in the climate calculation are stated by Sto Denmark. Atmoz has in turn utilised emission factors in the climate calculation. In some calculations, the reported data has been complemented with the necessary assumptions and average values (see Assumptions and Updates).



All calculation factors used are of the unit CO<sub>2</sub> equivalents (CO<sub>2</sub>e), which is a weighting of emitted greenhouse gases corresponding to the climate effect (Global Warming Potential) of carbon dioxide over a 100-year perspective and includes the seven greenhouse gases covered by the Kyoto Protocol: CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, HFCs, PFCs, SF<sub>6</sub> and NF<sub>3</sub><sup>1</sup>. GWP values have been applied, where possible, according to the IPCC Fifth Assessment Report, 2014 (AR5). Refrigerants may in some cases contain substances that have a high climate impact but are not part of the Kyoto Protocol, in which case these are reported separately in Appendix 2.

According to the GHG protocol, the seven greenhouse gases above must be calculated and reported both separately and together as CO<sub>2</sub>e. At present, Atmoz only reports the gases together, as the available emission factors from authorities and institutes etc. only are reported as CO<sub>2</sub>e.

Atmoz counts all life-cycle emissions from electricity in category 3 Fuel- and energy-related activities that are not included in scope 1 or 2.

Calculation factors used for air travel take emissions of particles, NO<sub>x</sub> and water vapor that occur at high altitude, the so-called "high altitude effect", into account. The calculation factor applied by Atmoz to take high-altitude effects during air travel into account is 1.9. The figure 1.9 has been developed by researchers at Chalmers University of Technology<sup>2</sup> and is stated by, among others, the Swedish Environmental Protection Agency and the Swedish Transport Agency.

## Assumptions and Updates

The biggest difference compared to previous annual reports is that Atmoz has changed the layout of the results in the report. This means that the category logistics has been replaced by upstream transportation and distribution, and the category business travel has been divided into vehicles (Scope 1), electric vehicles (Scope 2), fuel and energy-related activities (Scope 3) and business travel (Scope 3). This update has been made to facilitate further reporting of climate data according to the GHG Protocol.

The climate impact from fuel has been divided into Well to Tank (WTT) and Tank to Wheel (TTW) and together constitute Well to Wheel (WTW), i.e. the entire life cycle. WTT is the upstream climate impact that occurs during the production of the fuel, while TTW is the climate impact that occurs during the vehicle's combustion of the fuel. TTW is reported in scope 1 or 2 and WTT is reported in scope 3 under the category fuel- and energy-related activities. Previous years have been recalculated to only include TTW for logistics to achieve comparable results, however WTW has been used when no other value was provided.

For upstream transport and distribution, data from five months was not included in the documentation. These have been calculated by assuming the same transport emissions per month as the supplier that reported its emissions for the remaining seven months.

See the reliability analysis at the end of the report for an exact distribution of the reliability of the calculation values.

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<sup>1</sup> CO<sub>2</sub>: Carbon dioxide, CH<sub>4</sub>: Methan, N<sub>2</sub>O: Nitrous oxide, HFC: Fluorinated hydrocarbons, PFC: Perfluorocarbons, SF<sub>6</sub>: Sulfur hexafluoride and NF<sub>3</sub>: Nitrogen trifluoride.

<sup>2</sup> Kamb and Larsson *Klimatpåverkan från svenska befolkningens flygresor 1990 – 2017* 2018



# System Bounderies

Sto Denmark's system boundaries are reported below.

Table 1. System boundaries for the climate audit.

	Extent	Comment
<b>Scope 1</b>		
Refrigerants	Not relevant	
Vehicles	Included	
Stationary combustion	Not relevant	
<b>Scope 2</b>		
Electricity	Included	
District heating	Included	
District cooling	Not relevant	
<b>Scope 3</b>		
<i>Upstream Categories</i>		
1: Purchased goods	Partly included	Office material included
1: Purchased services	Excluded	
2: Capital goods	Excluded	
3: Fuel- and energy-related activities (not included in scope 1 or 2)	Included	Automatically included
4: Upstream transportation and distribution	Included	Outsourced transportation – cost paid by Sto Denmark (logistics)
5: Waste generated in operations	Included	
6: Business travel	Included	
7: Employee commuting	Excluded	
8: Upstream leased assets	Not relevant	
<i>Downstream Categories</i>		
9: Downstream transportation and distribution	Excluded	
10: Processing of sold products	Not relevant	
11: Use of sold products	Not relevant	
12: End-of-life treatment of sold products	Not relevant	
13: Downstream leased assets	Not relevant	
14: Franchisers	Not relevant	
15: Investments	Not relevant	

Direct biogenic carbon dioxide emissions that occur when burning biomass/biofuels are outside Sto Denmark's system boundaries and are not included in the climate report, in accordance with the GHG protocol. These emissions are not included because biomass/biofuels absorb as much carbon dioxide during their growth as when they are burned. For transparency, direct biogenic carbon dioxide emissions are reported separately in Appendix 1 - Biogenic Carbon Dioxide Emissions.



# Climate Impact

Sto Denmark's operations during 2022 resulted in greenhouse gas emissions of 141,0 tonnes CO<sub>2</sub>e, presented in Figure 1 and Table 2 (market-based method, see Table 3 for location-based results). The biggest climate impact is within Scope 3. The three largest categories are upstream transportation and distribution, accounting for 41,7% followed by vehicles accounting for 34,1% and fuel- and energy-related activities corresponding to 12,5% of the climate impact. The result since last year has decreased with 7,6%.

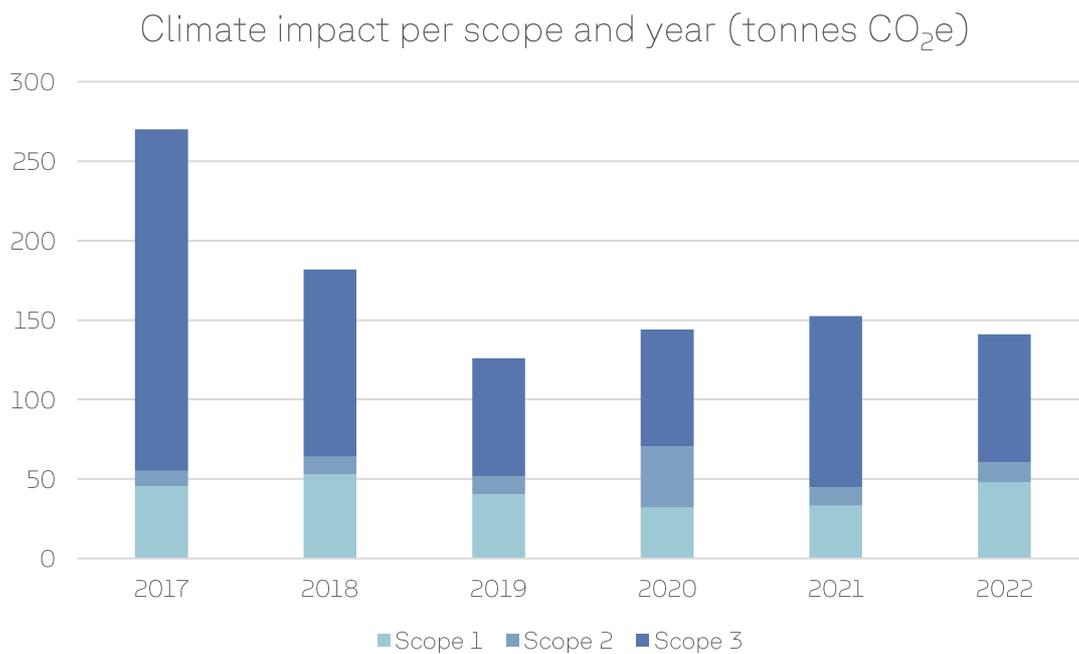


Figure 1. Climate impact (tonnes CO<sub>2</sub>e) per scope with market-based method.



Table 2. Total climate impact (tonnes CO<sub>2</sub>e) during 2017 – 2022 with market-based method. Change since previous year is shown both in tonnes CO<sub>2</sub>e and %.

Climate impact (tonnes CO <sub>2</sub> e)	2017	2020	2021	2022	% of total 2022	Change 2021 - 2022	Change % 2021 - 2022
<b>Scope 1</b>	45,4	32,0	33,2	48,0	34,1%	14,8	44,6%
Vehicles	45,4	32,0	33,2	48,0	34,1%	14,8	44,6%
<b>Scope 2</b>	9,6	38,4	11,6	12,3	8,7%	0,7	6,2%
District heating	9,6	21,7	11,6	6,2	4,4%	- 5,4	-46,7%
Electric vehicles				6,0	4,3%	6,0	
Electricity	0	16,7	0	0,1	0,1%	0,1	
<b>Scope 3</b>	215,0	73,7	107,8	80,6	57,2%	- 27,1	-25,2%
Business Travel	19,5	3,2	0,1	1,5	1,1%	1,4	1751,0%
Fuel- and energy-related activities	10,3	3,5	5,9	17,7	12,5%	11,8	201,6%
Purchased goods	4,0	3,5	3,4	2,6	1,8%	- 0,9	-25,4%
Upstream transportation and distribution	180,3	63,0	98,0	58,8	41,7%	- 39,2	-40,0%
Waste	0,9	0,5	0,4	0,1	0,1%	- 0,3	-71,5%
<b>Total</b>	<b>270,0</b>	<b>144,1</b>	<b>152,6</b>	<b>141,0</b>	<b>100%</b>	<b>- 11,6</b>	<b>-7,6%</b>

Table 3 shows the results with the location-based method, there are only values for 2021 and 2022.

Table 3. Total climate impact (tonnes CO<sub>2</sub>e) with location-based method.

Climate impact (tonnes CO <sub>2</sub> e)	2021	2022	% of total 2022	Change 2021 - 2022	Change % 2021 - 2022
<b>Scope 1</b>	33,2	48,0	32,3%	14,8	44,6%
Vehicles	33,2	48,0	32,3%	14,8	44,6%
<b>Scope 2</b>	19,8	21,8	14,6%	1,9	9,8%
District heating	11,6	6,2	4,2%	- 5,4	-46,7%
Electric vehicles	-	3,8	2,5%	3,8	-
Electricity	8,2	11,8	7,9%	3,6	43,3%
<b>Scope 3</b>	107,4	79,0	53,1%	- 28,3	-26,4%
Fuel- and energy-related activities	5,5	17,5	11,8%	12,0	216,3%
Purchased goods	3,4	2,6	1,7%	- 0,9	-25,4%
Upstream transportation and distribution	98,0	58,8	39,5%	- 39,2	-40,0%
Waste	0,4	0,1	0,1%	- 0,3	-71,5%
<b>Total</b>	<b>160,4</b>	<b>148,8</b>	<b>100%</b>	<b>- 11,6</b>	<b>-7,2%</b>



According to the Paris Agreement, global warming must not exceed 1.5 degrees °C. To be in line with the Paris Agreement, according to the Carbon Law<sup>3</sup>, companies need to halve their emissions every decade from 2020 onwards, preferably faster. This means an annual reduction rate of at least 7% of total emissions (scope 1,2 and all of scope 3).

To know what this corresponds to in tonnes, Sto Denmark needs to expand its system boundaries, which Atmoz recommends. Based on existing data, 7% would mean a reduction of 9,9 tonnes by next year, which Atmoz recommends striving for as a minimum.

## KPIs

Table 4. KPIs for the total climate impact for 2017 – 2022 with market-based method. Change since previous year is shown both in tonnes CO<sub>2</sub>e and %.

KPI	2017	2020	2021	2022	Change 2021 - 2022	Change % 2021 - 2022	Unit
Climate impact per employee	13,50	9,30	9,95	10,07	0,12	1,2%	t CO <sub>2</sub> e / FTE
Climate impact per revenue	4,39	3,67	3,69	2,86	- 0,83	-22,5%	t CO <sub>2</sub> e / MDKK

After two years of increased emissions, Sto Denmark has succeeded in reducing its climate impact between 2021 and 2022. Since the calculations started in 2017, the lowest level so far has been 2019. Between 2021 and 2022, the climate impact per turnover has decreased, while the climate impact per employee has increased.

In order to reach the target of halving the climate impact per turnover from 2017 to 2025, Sto Denmark needs to continue implementing measures to reduce the climate impact. However, the business is well on its way with a reduction of 35% so far. Although upstream transport and distribution decreased by 40% between 2021 and 2022, it is still the largest source of emissions. Sto Denmark should therefore continue to make efforts to reduce emissions within this category, for example using train and shipments when possible and switching to electric cars/trucks that are charged with renewable electricity or using HVO as fuel. The same recommendations are given for the company's own vehicles, which are the second largest source of emissions.

In the future, the business should include more categories to get a comprehensive picture of the company's climate impact.

<sup>3</sup> Rockström et al. *A roadmap to decarbonization* 2017



# Reliability Analysis

The reliability analysis classifies the result into three categories, measured, estimated and spend (financial data) based on the reliability of the activity data. The purpose is to evaluate the activity data and see whether the data collection can be improved. The analysis is based on whether the data is measured or estimated by the company or whether financial data has been used. Generalizations and average values for emission factors are not evaluated because the company have no influence on these.

Data that are estimated can be replaced with measured data to give a higher reliability of the result. Spend data should be used to a limited extent to achieve higher reliability. Climate impact calculated on spend data gives an overall picture and it can be difficult to reduce climate impact based on such a basis. This is because prices can vary, which falsely makes it look like the climate impact has changed. The distribution of measured, estimated and spend based values is presented in Figure 2 below.

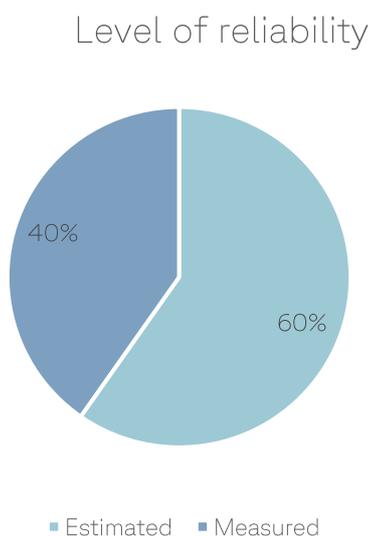


Figure 2. Reliability analysis of data for the climate audit.



# References

Sources for 2022's calculation
District heating
Atmoz 2022
Electric vehicles
Atmoz 2022
The Swedish Energy Markets Inspectorate 2022
Electricity
Atmoz 2022
The Swedish Energy Markets Inspectorate 2022
Fuel- and energy-related activities
Atmoz 2022
The Swedish Energy Markets Inspectorate 2022
Purchased goods
Atmoz 2022
Exiobase 2022
Inrego and IVL Swedish Environmental Research Institute 2020
Waste
DEFRA 2022
Vehicles
Atmoz 2022



# Appendix 1 - Biogenic Carbon Dioxide Emissions

Here, biogenic carbon dioxide emissions that occur within the business and its value chain are reported. Biogenic carbon dioxide emissions occur during the combustion of biomass or biofuels. According to the GHG protocol, biogenic carbon dioxide emissions are not included in the business's reporting limits as the biomass absorbs as much carbon dioxide as is emitted when it is incinerated. According to the GHG protocol, however, biogenic emissions must be reported separately, which is done in this appendix. Biogenic methane and nitrous oxide are included in the GHG protocol and are therefore already included in previously presented results.

In 2022 55,6 tonnes of biogenic carbon dioxide were emitted. Figure A1 and Table A1 are showing in which scope the emissions arise. The emissions come from biofuels used in cars and trucks, combustion of biomass for district heating and electricity. In scope 3 there should be emissions from transportations, however no value was reported.

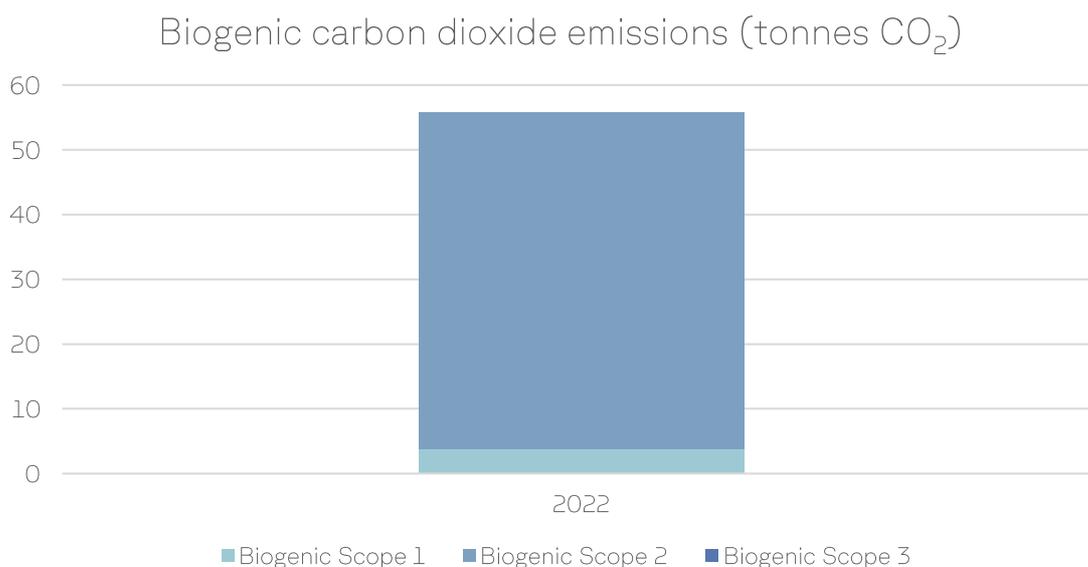


Figure A1. Biogenic emissions (tonnes CO<sub>2</sub>).



Table A1. Biogenic emissions (tonnes CO<sub>2</sub>).

Climate impact (tonnes CO <sub>2</sub> )	2022	% of total 2022
Biogenic Scope 1	3,8	6,8%
Vehicles	3,8	6,8%
Biogenic Scope 2	51,9	93,2%
District heating	43,9	78,9%
Electric vehicles	0,2	0,4%
Electricity	7,8	13,9%
Biogenic Scope 3	0	0%
Total	55,6	100,0%