

An abstract graphic consisting of numerous thin, parallel green lines that curve and fan out from the top left towards the center, creating a sense of motion and depth against a black background.

HTS Dynamics

**Carbon Footprint
Report 2020**

24 March 2022 Revised

Author: HTS Dynamics AS | Footprint AS
Calculations: HTS Dynamics AS | Emisoft AS
Quality Assurance: Footprint AS

Methodology

Framework

The calculation of the carbon footprint for HTS Dynamics is based on the framework specified in the GHG-protocol. This is the most used methodology for calculating climate impact. The climate impact is divided into the following sections "Scopes":

Scope 1:

Direct emissions from the company's own equipment, e.g., combustion of fuel in vehicles or generators or emissions from industrial processes.

Scope 2:

Indirect emissions from energy production that the company buys. According to the GHG protocol, emissions from Scope 2 are calculated in two ways:

- Location-based method bases the calculations on where in the world the electricity is produced, factor is based on average electricity mix among the electricity producers.
- Market-based method bases the calculations on whether the company has purchased guarantees of origin for its electricity consumption. Such guarantees are a support scheme for producers of renewable electricity and show that a guaranteed renewable electricity has been purchased. If you do not buy guarantees of origin, this method dictates that you should use an emission factor based on the electricity that is not renewable (also known as "residual mix").

Scope 3:

All other indirect emissions that the business may affect. The 15 categories include e.g. production of purchased materials, flights, waste treatment and transport performed by others. Scope 3 also includes indirect emissions from energy production; production of fossil fuels and energy lost in the grid on the way to business.

Calculations

Climate impact from gases other than CO₂ has been converted to CO₂ equivalents ("CO₂e"); this means that you can add up the figures to get an estimated sum of climate impact. Climate impact is usually expressed in "tCO₂e", i.e. tonnes of CO₂ equivalents.

Factors for calculation for Scopes 1 and 3 originates from [Defra \(2020\)](#). Factors for Scope 2 originates from NVE ([\(Nasjonal varedeklarasjon\)](#), 2020). Emisoft software.

All quantity data (e.g. liters of fuel, kWh of electricity or kg of material) are provided by HTS Dynamics AS.

Summary

The following table summarizes the greenhouse gas emissions in Scopes 1, 2 and 3 as well as what falls under the individual categories. For a more detailed overview, see the complete table on page 8 and the appendix on page 10. This table shows the power consumption with a location-based method. For a more comprehensive description, see information on location-based and market-based methods under methodology.

Carbon estimate with location-bases method	Climate impact (tCO ₂ e)
Scope 1 – Direct emissions	
Vehicle – diesel	3.33
SUM Scope 1 (tCO ₂ e)	3.33
Scope 2 – Indirect emissions	
Electricity with guarantees of origin	45.46
SUM Scope 2 (tCO ₂ e)	45.46
Scope 3 – other Indirect emissions	
Purchase of materials and services	376.37
Emissions related to fuel consumption and energy	2.11
Business travel	10.15
Waste	1.93
Processing of sold products	7.55
Transport downstream	82.13
Transport upstream	12.43
SUM Scope 3 (tCO₂e)	429.24
TOTAL Scope 1 + 2 + 3 location-based method (tCO₂e)	541.03
TOTAL Scope 1 + 2 + 3 Marked-based method (tCO₂e)	659.59
* SUM Scope 2 and 3 marked-based method (tCO ₂ e)	656.26

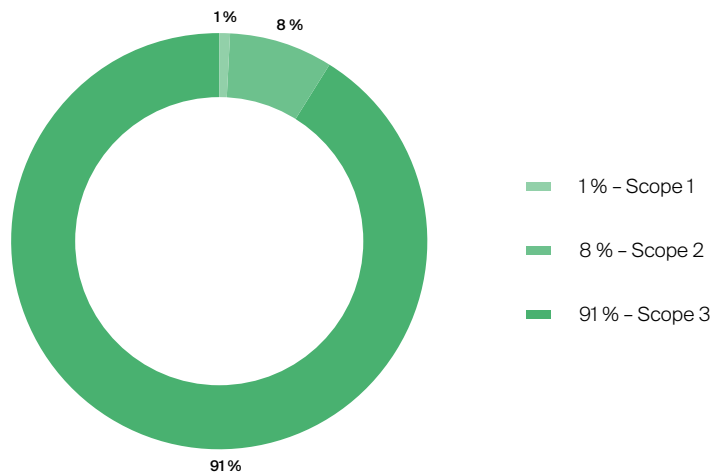
Mapping of greenhouse gas emissions for 2020

Introduction

The purpose of this report is to map HTS Dynamics' greenhouse gas emissions for Scopes 1, 2 and 3 in accordance with the GHG protocol. This will provide an overview of which areas are important to work with in the future. HTS Dynamics has collected the data base and several types of data have been collected for the first time. Figures obtained are based on data from 2020, which has been a different year due to pandemic. Since this is the first time HTS Dynamics has mapped the emissions and due to the pandemic, it may therefore be that there is a complete lack of data and that the estimates are not completely accurate. In addition, a number of assumptions have been made, because there are no specific emission factors for all purchases. The table shows a graphical representation of the emissions distributed in Scopes 1, 2 and 3.

- **Scope 1** – Direct emissions produce only 3.33 tCO₂e coming from the fuel consumption of the van. HTS Dynamics has no other direct emissions from production. The greenhouse gas emissions in Scope 1 make up 1 % of the total carbon emissions.
- **Scope 2** – Indirect emissions from energy account for 8 % of greenhouse gas emissions and are calculated using a location-based method. Since HTS Dynamics buys guarantees of origin, the electricity is calculated at 0 tCO₂ with a market-based method, while with location-based emissions, the emission is 45.46 tCO₂e.
- **Scope 3** – Other indirect emissions constitute the largest emissions with 91 % of the total emissions. Categories included in Scope 3: Purchase of materials, emissions related to fuel consumption and energy, business travel, waste, processing of sold products as well as upstream and downstream transport. Only material purchases of production materials are included in upstream transport.

Climate accounts for Scope 1, 2 and 3



Scope 1 – Direct emissions

The climate impact in Scope 1 originates from vehicles and various machinery that consumes fossil fuel at HTS Dynamics and the consumption is relatively minor compared to other emissions that the company has. No other emissions in Scope 1 have been detected in production.

Scope 2 – Indirect emissions

According to the GHG protocol, Scope 2 is calculated using two methods; location-based and market based method.

Location-based method is based on how the electricity is produced in the country where the business is located. In Norway, the electricity comes mainly from producers with a high degree of renewable energy such as hydropower. The Norwegian factor for location-based method was 17 g CO₂e / kWh in 2019.

The calculation for Scope 2 with a market-based method shows that the total greenhouse gas emissions will be 0 tCO₂e. The factor for electricity with guarantees of origin is set as such because it is a support scheme for producers of renewable energy and guarantees that the electricity comes from renewable sources. The method used to calculate the emission factor after the guarantees of origin for renewable shares have been sold is called a residual mix.

If you do not buy guarantees of origin, the residual mix factor must be used. The factor for this method was 396 gCO₂e / kWh in 2019.

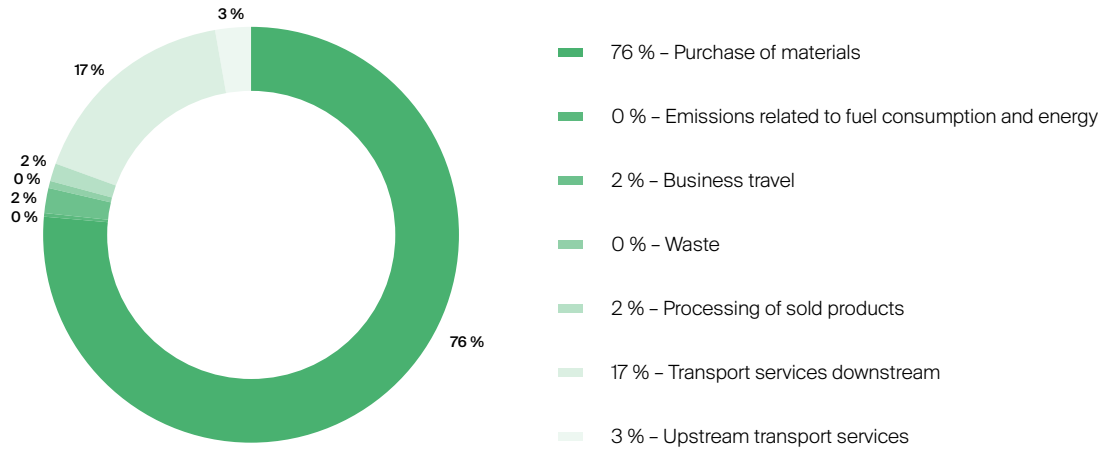
Scope 3 – Other Indirect emissions

The largest greenhouse gas emissions are in Scope 3 – other indirect emissions. There are 15 different categories in Scope 3. The categories in this carbon account have been chosen based on materiality and that eventually it is desirable to have a complete Scope 3 account. Some categories are not included based on inadequate data, or because the categories are not relevant for the company's operations.

- **Purchase of materials:** The company's purchases of goods account for 76.46 % of the total climate impact in Scope 3. The category also includes operating supplies for own use, such as food, beverages and electronics. Several assumptions have been made when calculating estimates, which may therefore deviate from actual purchases.
- **Upstream transport services:** Upstream transport services are in the accounts for 2020 only intended for the purchase of materials for production, but in terms of weight, this includes the main quantity and is where the company has good enough insight to calculate the transport emissions. Upstream transport services account for 2.52 % of the total climate impact from Scope 3.
- **Emissions related to fuel consumption and energy:** This category includes fuel production and the effect of grid losses. The category accounts for 0.42 % of the emissions in Scope 3. This is, for example, the extraction, production and transport of fuel. Another example is that the electricity grid in Norway can have a grid loss of up to 10 %. This means that the electricity supplier must produce 110 kWh for every 100 kWh purchased.
- **Business travel:** The number of flights has been lower than normal due to pandemic. An average for typical travel over three years has therefore been calculated. Based on the estimate, this is 2.06 % of the total emissions in Scope 3.
- **Waste:** For waste, a report has been obtained from Ragn Sells which provides a good basis for calculation and the emissions account for 0.39 % of the carbon emissions in Scope 3. As GHG123 calculates emissions, only the transport of the waste for treatment is included. The waste treatment for recycled materials or district heating is calculated in Scope 1 for renovators who treat the waste.
- **Transport services downstream:** When the product is sold FCA and ExWorks by the company and the customer pays for the shipping, this must be entered in downstream transport services. Based on the knowledge of whether it is air freight or van and destinations it calculated an estimate of 17.10 %.
- **Processing of sold products:** HTS Dynamics resells metal chips from production. This category accounts for 1.53% of greenhouse gas emissions in Scope 3 using a location-based method. By using a market-based method, the emission is calculated to 171.14 tCO₂e, if the company has not purchased guarantees of origin.
- Scrap metal from production is in demand because it can be recycled with an energy saving of up to 95 % compared to primary metal. The energy savings obviously depend on the types of metal that are

recycled. An average of 85 % is estimated in this carbon account. The estimate is calculated with a location based method. For the calculation of energy consumption, several assumptions have been made, where all the fractions are calculated with a general average.

Distribution of emissions Scope 3



Further work

The results from this carbon account show that the highest emissions are in Scope 3. Collection of data in Scope 3 is demanding, and there are not always emission factors for all categories / products. For future reporting, it may be appropriate to set requirements for the largest suppliers. As it becomes more common to document emissions in a carbon account, people will to a greater extent expect to get greenhouse gas emissions from shipping and purchasing. This will make it easier to report. In the long term, efforts should also be made to establish good routines for collecting data. In summary, the most relevant measures, and goals in the years to come:

- Become climate neutral by reducing greenhouse gas emissions and compensating by purchasing quotas / guarantees of origin
- Achieve better categorization for purchasing goods and services in SAP
- Set requirements for suppliers to deliver EPD or greenhouse gas emissions per order
- Attain complete climate accounts for Scope 3

Carbon account for 2020 with location-based method

Scope 1 – Direct emissions

Category	Type	Amount	Unit	Climate impact (tCO2e)
Fuel consumption	Diesel for van/Truck	1,237.00	l	3.33
SUM Scope 1 (tCO2e)				3.33

Scope 2 – Indirect emissions purchased energy

Category	Type	Amount	Unit	Climate impact (tCO2e)
Energy consumption	Power with guarantees of origin	2,674,373.00	kWh	45.46
SUM Scope 2 (tCO2e)				45.46

Scope 3 – Other Indirect emissions

Category	Type	Amount	Unit	Climate impact (tCO2e)
Purchased materials	Steel (primary metal)	172,561.00	kg	357.20
	Plastics	62.97		0.20
	Food and drinks	2,236.00		8.28
	Electronics	20.00		0.02
	Cabinets (metal construction)	500.00		1.95
	Mineral oil	3,744.00	l	5.25
Business travels	Car	381.00	km	0.08
	Taxi	234.00		0.04
	Train	270.00		0.01
	Flights – Domestic	11	Number of trips	1.07
	Flights – Europe	4		0.93
	Flights – The rest of the world	6		8.02
Emissions related to fuel consumption and energy	Diesel and Energy	-	tCO2e	2.11
Waste	Park and garden waste	1.460	t	0.01
	Mixed EE waste	0.002		0.00
	Oil-contaminated mass	0.494		0.23
	Paint, glue and varnish	0.018		0.00
	Spray cans	0.015		0.00
	Fluorescent tubes and energy-saving bulbs	0.026		0.00
	Mixed industrial waste for sorting	24.52		0.52
	Wastewater / washing water / oil separation	54,900.00	l	1.17
Transport downstream	Cargo flight	64,462.00	km	81.93
	Van	459.00		0.20
Transport upstream	Cargo ship	7,400	km	1.39
		900		
		600		
	Van	125		11.05
		127		
		500		
		7		
		1,177		
40				
Processing of sold products	Van	114.19	t	7.55
Sum Scope 3 (tCO2e)				492.24
TOTAL Scope 1 + 2 + 3 location based method (tCO2e)				541.03
*TOTAL Scope 1 + 2 + 3 marked based method (tCO2e)				659.59
*SUM Scope 2 og 3 marked based method (tCO2e)				656.26

Attachments

The tables show estimates for material types, emission factor and travel

Material	Material or alloy type	Weight (t)	Climate impact (t/t)
Plast	KETRON 1000 PEEK Round Bolt Nature Ø16x3000mm	1.72	
	KETRON 1000 PEEK Round Bolt Nature Ø120x1000mm	30.90	
	KETRON 1000 PEEK Round Bolt Nature Ø10x1000mm	1.10	3.12
	KETRON 1000 PEEK Round Bolt Nature Ø16x1000mm	2.85	
	KETRON 1000 PEEK Round Bolt Nature Ø35x1000mm	4.02	
Steel (primary metal)	ERACETAL C-POM Round Bolt Black	22.38	
	UNS N06625 9.52mmx1,65mm wall seamless EX25,4x3,05mmRSO	401.30	
	UNS N06625 15.88mmx2,11mm wall	904.10	2.07
	Steel S355	150.00	
	Steel S355I2+N	8,542.00	
	Stainless steel 304	0.20	
	Iron fragments and iron shavings	13.40	
	Acidproof steel 316	18.02	
	Acidproof spon	3.26	
	Acidproof duplex	48.30	
Metal shavings and scrap metal	Superduplex	1.60	
	Alu shavings	2.02	17.00
	Alu fragments	19.62	
	PH 17 - 4	0.20	
	Copper alloy shavings PH 15-5	1.18	
	Inconell	0.76	
	Inconell shavings 625/725	1.69	
	Beryllium shavings	3.94	

Category	From	To	Km per trip	Number of trips (one way)	Total travel length km
Car	Drammen	Kongsberg	35	8	280
	Drammen	Fornebu	40	2	80
Train	Aberdeen Airport	Sentrum	11	2	21
	Drammen	Oslo	45	6	270
	Oslo Airport	Oslo Airport		6	-
Flight	Oslo Airport	Oslo Airport		5	-
	Oslo Airport	Sao Paulo Airport, Brasil	-	4	-
	Oslo Airport	Aberdeen Airport	-	2	-
	Oslo Airport	Europa	-	2	-
	Oslo Airport	Houston, USA	-	2	-
Taxi	Stavanger Lufthavn	Stavanger	15	6	87
	Flesland	Bergen	20	6	120
	Houston Airport	Houston City Center	18	2	36

Sources

- CSIRO, Terry Norgate 2013 – 15.11.2021
<https://publications.csiro.au/rpr/download?pid=csiro:EP135565&dsid=DS2>
- Hydro “The world’s most energy-efficient aluminium production technology” – 15.11.2021
<https://www.hydro.com/en/about-hydro/stories-by-hydro/the-worlds-most-energy-efficient-aluminium-production-technology/>
- EuRIC – Recycling: Bridging Circular Economy and Climate Policy. Metall recycling factsheet – 18.11.2021
- NVE – Strømforbruk i Norge
<https://www.nve.no/nytt-fra-nve/nyheter-energi/stromforbruk-i-norge-har-lavt-klimagassutslipp/05.01.2022>