



LCA Consulting  
Navigators of Sustainability™



# Calculation of Scope 3 emissions of SSAB according to the GHG Protocol

Results 5.2.2019



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# Background

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- For year 2017, SSAB calculated their Scope 3 emissions for the first time. An Excel based tool was developed by Gaia Consulting for the scope 3 calculation then. Additionally, SSAB have assessed its scope 1 and scope 2 emissions for several years.
- Scope 3 emissions for the reporting year of 2018 were calculated by LCA Consulting Oy. Additionally, the developed Excel tool (calculation, assumptions, emission factors etc.) was reviewed.
  - Calculation of emissions from upstream transportation and distribution were added in the scope 3 calculation. Other categories of scope 3 calculation were included to the calculation already in year 2017.
- Scope 3 calculation was performed following the requirements of Greenhouse Gas Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard (WRI & WBSCD 2011).

# Method used

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- Scope 3 calculation was performed following the requirements of Greenhouse Gas Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard (WRI & WBCSD 2011).
  - In this report, the included and excluded categories, data and assumptions used in the calculation are presented.
  - Inventory data of SSAB operations is gathered by SSAB itself. Gathered data represents time period of 1.12.2017-30.11.2018. Only waste and energy and fuel related data is gathered from 1.1.-31.12.2018.
- Greenhouse gas emissions are calculated as CO<sub>2</sub> equivalents.
  - Biogenic emissions are not included in the calculation. Neither the emission credits, emission offsets etc. are studied here.
- The results of Scope 3 calculation are to be reported according to CDP and GRI reporting requirements.

# Included categories

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- Included categories in the calculation of SSABs Scope 3 emissions:
  - Purchased goods and services
  - Capital goods
  - Fuel- and energy related activities
  - Upstream transportation and distribution
  - Waste generated in operations
  - Business travel
  - Employee commuting
  - Downstream transportation and distribution

# Excluded categories

Excluded category	Justification of exclusion	Relevancy of the category and additional information
Upstream leased assets	<i>This category is not relevant for SSAB's operations, no upstream leased assets.* Not relevant, not calculated.</i>	
Processing of sold products	<i>No reliable data available for the calculating purposes.*</i>	<i>Relevant but not calculated due to the lack of efficient data collection procedure and reliable data.* The products of SSAB are further processed for multiple purpose of usages for the use of various industry sectors.</i>
Use of sold products	<i>SSAB sells products that are not consuming electricity or fuels in the use phase.*</i>	<i>Not relevant, not calculated.*</i>
End of life treatment of sold products	<i>Majority of steel is recycled over and over again.*</i>	<i>Not relevant, not calculated.*</i>
Downstream leased assets	<i>This category is not relevant for SSAB's operations, no downstream leased assets.*</i>	
Franchises	<i>Not relevant, not calculated. SSAB does not have any franchise business.*</i>	
Investments	<i>Not relevant, not calculated. The main investments of SSAB are included in the capital goods.*</i>	

\*Gaia Consulting. 2018. SSAB Scope 3 calculation report. Laura Descombes, Minna Päällysaho and Anna Heino.

# Modelling data

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- Data collection
  - All the inventory data is gathered by SSAB.
  - The data used here is gathered mainly from SSABs own operations. Additionally, a primary data from third parties (value chain partners) have been gathered by SSAB.
  - The inventory data was gathered by SSAB using the same questionnaires as in year 2017.

# Modelling data

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- The secondary data used:
  - Emission factors used in the study are gathered mainly from the secondary datasets.
    - The exception is emissions from business travel. The CO<sub>2</sub> eq. emissions from business travel (flights) are provided by travel agency and the source of emission factor used by them is not known.
  - The same secondary datasets are used for defining emission factors as earlier. The emission factors were only updated.
    - If other data sources/datasets for emission factors would have been used, the impact of emission factors to overall emissions would have increased. Thus, the changes in operations would not have been seen that clearly.
    - However, the data sources and factors used were checked to ensure they represent the studied situation appropriately.

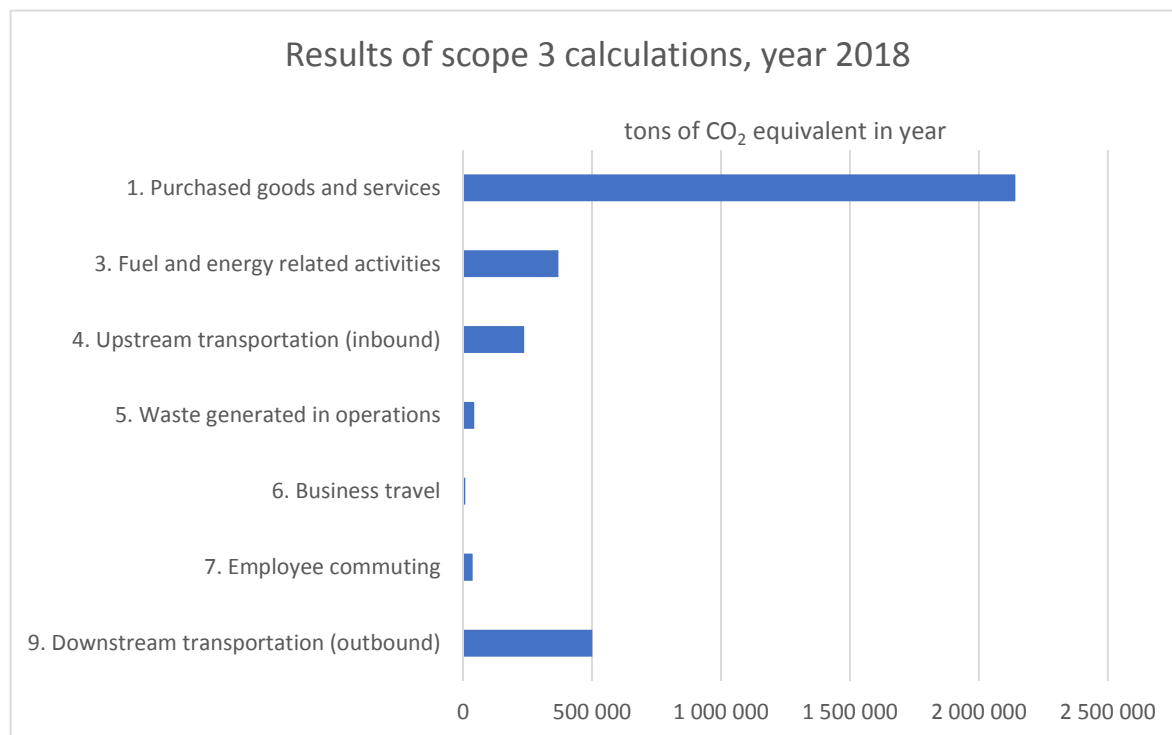


# Data and assumptions

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- Data quality and uncertainty
  - SSAB is responsible for the quality of the primary data provided by them. We assume that proper instructions are given for data providers of SSAB to ensure the provided data is accurate and comprehensive.
  - Emission factors and modelling procedure used here are presenting the average situation in the market, for example emissions factor used for coke production is based on average technologies, average emissions of bulk carriers for certain transportation distance are used, average emissions of landfilling waste all over the world are used in the calculation.
    - However, this calculation procedure is proper for scope 3 calculations.
  - The category that has the highest uncertainty is *purchased goods and services (1b)*. The emission factors for purchased services are categorized in broad categories with spend-based method. The emissions factors of different categories has high uncertainty and the categorization process of inventory data of purchased services and goods may cause more uncertainty to this category.
  - Also in the *waste generated in operations* category quite high uncertainty exists, since emissions from incineration and landfilling various wastes in different countries cause very different emissions in reality. Currently used emission factors are presenting very average situation.

# Summary of the results



Raw materials, purchased goods and services and capital goods (category 2) are summarized in category 1.

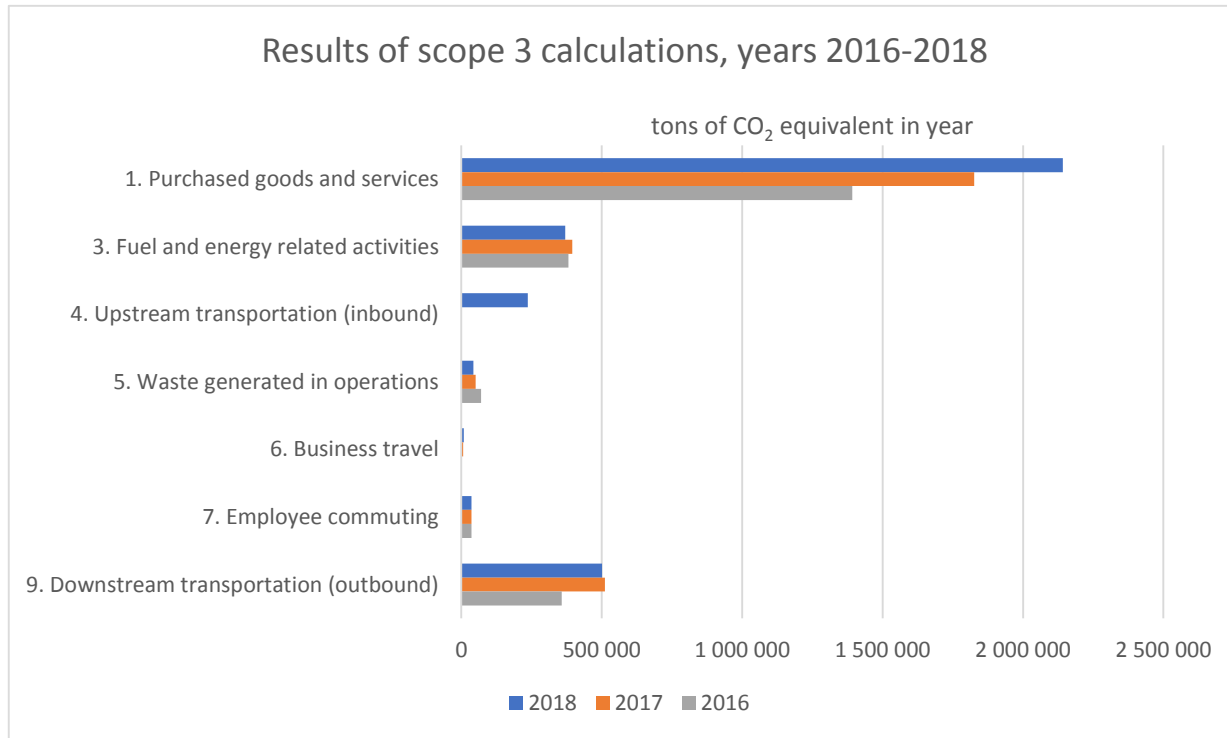
Scope 3 category	GHG emissions [t CO <sub>2</sub> eq./a]	Share of total emissions [%]
1a. Raw materials	1 888 450	56,6 %
1b. Purchased goods and services, capital goods	253 200	7,6 %
3. Fuels and energy	369 740	11,1 %
4. Upstream transportation (inbound)	236 430	7,1 %
5. Waste	43 210	1,3 %
6. Business travel	8 150	0,2 %
7. Employee commuting	36 280	1,1 %
9. Downstream transportation (outbound)	500 550	15,0 %
<b>Total</b>	<b>3 336 010</b>	<b>100 %</b>

# Summary of the results

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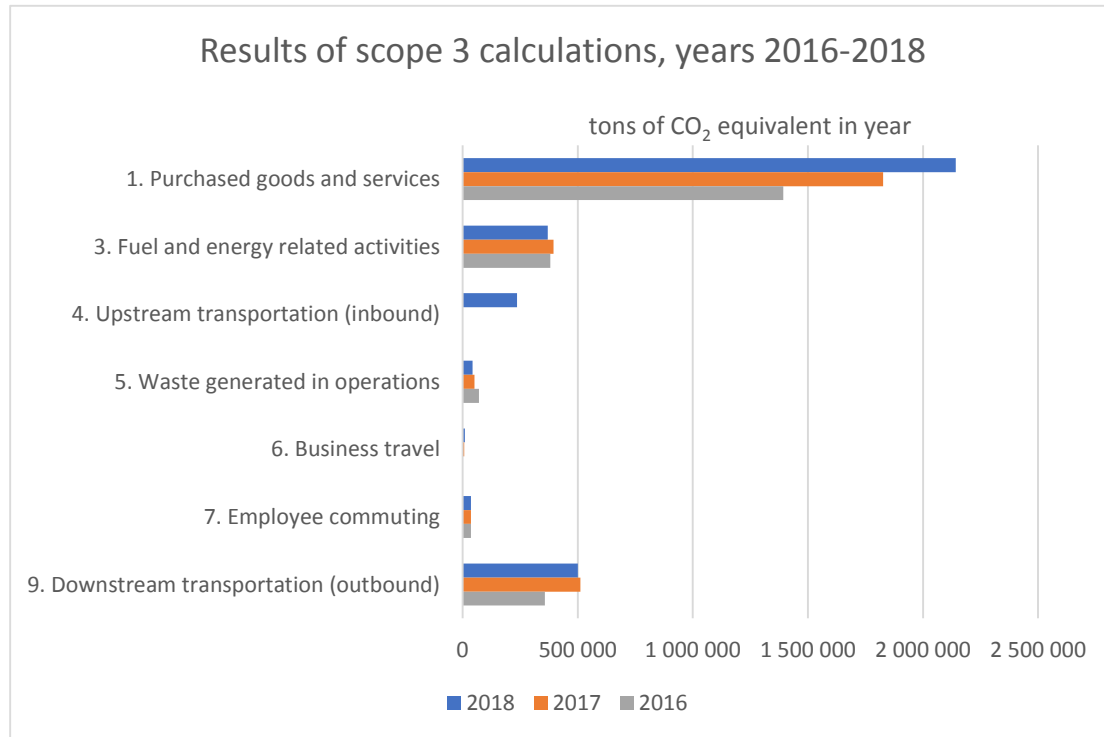
- The categories causing the majority of the scope 3 emissions are:
  - 1) Purchased goods and services (including also raw materials and capital goods), 64,2 % of total scope 3 CO<sub>2</sub> eq. emissions
  - 2) Downstream transportation, 15 % of total scope 3 CO<sub>2</sub> eq. emissions
  - 3) Fuels and energy related activities, 11,1 % of total scope 3 CO<sub>2</sub> eq. emissions
- Additionally, it has been identified that one of the excluded categories, *Processing of sold products*, is most likely among the most relevant categories.
  - However, it was identified that at the moment there exists no appropriate method for assessing the emissions occurred due to this category.

# Comparison of the results: 2016-2018



- There are several factors that have impact on the CO<sub>2</sub> eq. results.
  - 1) Changes in operations and thus changes in the raw materials used, transportations, business travel etc.
  - 2) Updated emission factors.
  - 3) Additions and corrections made in the calculation tool.

# Comparison of the results: 2016-2018



- In this case (year 2018), the major improvements and updates were:
  - Upstream and downstream transportations (inbound and outbound transportations) were separated.
  - The calculation of upstream transportation category was added. In 2016 and 2017, only the USA upstream transportations were included (in the downstream transportations category). In the newly added upstream (inbound) transportation category, the raw material shipments to the Europe and other inbound transportations related to European operations were included in the calculation.
  - Few new raw materials were reported. Additionally, emission factors were added to these and to few raw materials used already in year 2017.
  - Purchased goods and services were calculated (categorized) in a slightly different manner as earlier.
- The newly added upstream transportation category increased emissions of about 199 900 tons of CO<sub>2</sub> equivalent. Total increase of the emissions compared to year 2017 was 509 740 tons of CO<sub>2</sub> eq.

# Assumptions and data used

Category	Inventory data	Data used for emission factors (data type and sources and methods for modelling)
<b>Raw materials</b>	Raw materials used (masses) were gathered from production sites via questionnaire.	Emission factors (kg CO <sub>2</sub> eq./t) for the raw materials are from Ecoinvent 3.5 database.  Characterization model used: ReCiPe 2016 v1.1 Midpoint (H) - Climate change, default, excl. biogenic carbon (kg CO <sub>2</sub> eq.).
<b>Purchased goods and services and capital goods</b>	Spending in SEK for different service categories are gathered from IFC and SAP listings.	Emission factors used are from DEFRA 2013. The emission factors are representing year 2009. Spend-based calculation is used in this category.
<b>Fuels- and energy related activities</b>	The amount of electricity and fuels used on the production sites were gathered via questionnaire.	For transmission and distribution loss rates, the World Bank 2014 data is used.  The emission factors for the lost electricity (T&D loss) are from IEA 2017. These emission factors include also the straight emissions from energy production (emissions from incineration).  Emission factor for the used electricity and the emission factors of fuels are from DEFRA 2018. These emission factors include only upstream emissions, not emissions from fuel use (included in the scope 1 or 2).

# Assumptions and data used

Category	Inventory data	Data used for emission factors (data type and sources and methods for modelling)
<b>Inbound transportation</b>	Data (total kilometres, total transportation volumes and tonne-kilometres) for different transportation vehicles were gathered via questionnaires.	<p>The upstream and downstream transportation and distribution information was not available based on who pays the transportations. Thus, the transportations were categorized for inbound and outbound transportations.</p> <p>Transportation distances for bulk carriers used for raw material shipments were estimated using searates website.</p> <p>Emission factors of DEFRA 2018 were used (both tkm-based and km-based factors were used depending on the form of inventory data provided). The raw material transportation and other inbound transportations of European operations were added in the calculation this year. Thus, the emissions of transportation categories are higher than in year 2017.</p>
<b>Waste</b>	Amount of industrial waste, hazardous and non-hazardous waste directed to third party treatment was gathered from production sites via questionnaire.	<p>Emission factors of DEFRA 2018 were used. It is assumed that waste is either landfilled or incinerated: hazardous waste is assumed to be incinerated, non-hazardous and industrial wastes are assumed to be landfilled regardless of the country in question.</p> <p>It should be noted that only minority of production wastes are directed to third party treatment.</p> <p>Waste water directed to treatment (by third party) is not included in this category.</p>

# Assumptions and data used

Category	Inventory data	Data used for emission factors (data type and sources and methods for modelling)
<b>Business travel</b>	Travel agency has delivered the CO <sub>2</sub> equivalent emissions from business flights.	<p>Only the business flights are included.</p> <p>Business travels via trains were assessed in year 2017 but were excluded since those have only minor impact to overall emissions of this category.</p>
<b>Employee commuting</b>	<p>Number of employees was gathered from SSAB.</p> <p>Assumptions of average distance and number of commuting trips in year were discussed with SSAB.</p>	<p>Primary data of commuting is not available. The same assumptions and calculation procedure for employee commuting were used as earlier. It is assumed that all the commuting is performed with passenger car, average distance/single trip is 30 km, and all together 440 trips/year/person.</p> <p>Emission factor from DEFRA 2018 was used for average passenger car with unknown fuel.</p>
<b>Outbound transportation</b>	Data (total kilometres, total transportation volumes, tonne-kilometres) for different transportation vehicles were gathered via questionnaires.	<p>Emission factors of DEFRA 2018 were used (both tkm-based and km-based factors depending on the inventory data provided).</p> <p>Outbound logistics are not the same as downstream transportation and distribution. However, all the transportations defined in GHG protocol Scope 3 document are included in the calculation.</p>



# Suggestions for improvements

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## Updating the emission factors and other secondary data (1/2)

- The emission factors of DEFRA are updated on yearly bases. Thus, those are suggested to be updated in the calculation tool yearly.  
DEFRA factors are used for:
  - Upstream and downstream transportation, upstream purchased fuels and upstream purchased electricity, waste treatment, employee commuting and purchased goods and services (excluding the raw materials).
- During the last four years, the Ecoinvent database have been updated on yearly basis. However, the updates does not concern all the inventory data yearly.
  - It should be noted that Ecoinvent database is purchasable, not free and thus not available for all parties. However, Ecoinvent has a very wide set of inventory data for various materials and it is widely used for LCA studies.
  - Emission factors from Ecoinvent are suggested to be checked yearly. At least the emission factors for new raw materials reported are recommended to be added yearly.

# Suggestions for improvements

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## Updating the emission factors and other secondary data (2/2)

- Transmission and distribution rates of electricity in different countries have not been updated since 2014 in the currently used data source (World Bank). It could be considered to change the data source into one where the T&D losses are updated yearly.
- The emission factors currently used in the calculation of lost electricity (T&D losses) could be checked also on yearly basis. This emission factor include the whole life cycle of electricity production, also emissions from the incineration phase.
  - However, the currently used IEA dataset is purchasable, not free and thus not available for all parties. Instead, publicly available emission factors of electricity production in different countries could have been used.

# Suggestions for improvements

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## Questionnaires/data collection templates

- All categories:
  - Questionnaires used for data collection from SSABs operations are suggested to be reviewed and corrected to avoid supplementary questions in data collection phase. Compact instructions could also be added to data collection template.
- A calculation procedure of purchased goods and services could be discussed in more detail with SSAB. Additionally, instruction for SSAB could be made for SAP and IFS listings needed to calculate purchased goods and services (and capital goods).
- Inbound transportation:
  - Data collection of raw material shipments could be delivered in a same form every year. The excel form delivered this year is appropriate.
- All the transportation information (except raw material shipments):
  - In a questionnaire excel it should be asked for total kilometres, total load and average distance (or number of loads) for every transportation vehicle. Then, the appropriate emission factors could be used automatically.

# Suggestions for improvements

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## Suggestions for improving the calculation procedure in scope 3 (1/3):

- The category presented in this page are identified as *not relevant* in terms of scope 3 emissions. However, e.g. improvements made within this category could be exploited in marketing and communication purposes internally and externally.
- Calculation of employee commuting could be improved with primary data. An open questionnaire form could be launched e.g. in SSAB intra. The following questions could be asked:
  - Commuting form in summer, autumn, winter and spring: by bike, car, train, bus etc.
  - Distance from home to work.

# Suggestions for improvements

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## Suggestions for improving the calculation procedure in scope 3 (2/3):

- The categories presented in this page are identified as *not relevant* in terms of scope 3 emissions. However, e.g. improvements made within these categories could be exploited in marketing and communication purposes internally and externally.
- To business travel calculations, other transportation vehicles and emissions due to these could be added (by car, by train).
- To waste generated in operations category:
  - The treatment of wastewater (directed to municipal waste water treatment plants) could be added to calculations.
  - The accurate treatment options could be figured out for different waste fractions in different countries: share of waste fractions to incineration, material recovery or landfill.

# Suggestions for improvements

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## Suggestions for improving the calculation procedure in scope 3 (3/3):

- Raw materials and purchased materials and services:
  - A clear classification could be made to identify which kind of raw materials and substances are reported in the listing of raw materials. Thus, it could be ensured that no double-counting exists between raw materials and purchased materials and services.
  - At least the most commonly used raw materials could be cross-checked once to ensure the used emission factors are the most accurate ones.
  - Raw materials are having the highest contribution to overall scope 3 emissions.
  - The calculation of purchased services could be revised and find out if more reliable and sufficient emission factors could be used. Additionally, the categorization of IFS and SAP listings of purchased services and materials could be improved and checked.
- Calculation of upstream and downstream transportation is currently performed in a proper manner.

# Data sources

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- DEFRA. 2018. Conversion Factors for greenhouse gas (GHG) reporting. Full set.
- DEFRA. 2013. Environmental reporting Guidelines: Including mandatory greenhouse gas emissions reporting guidance. June 2013.
- Ecoinvent 3.5. database.
- IEA. 2017. CO2 emission from fuel combustion 2017 –Complement.
- Searates.com
- World Bank. 2014. Electric power transmission and distribution losses (% of output).
- WBSCD Chemicals. 2013. Guidance for Accounting and Reporting Corporate GHG Emissions in the Chemical Sector Value Chain.

# Disclaimer

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- SSAB has delivered the inventory data which is a basis of this calculation. We assume that the delivered data of SSAB is comprehensive, consistent and accurate enough for the purposes of this calculation. Relevancy of scope 3 categories is assessed by SSAB and Gaia Consulting in 2017. Additionally, we assume that no double counting exists between scope 1, 2 and 3 calculations based on delivered data of SSAB.
- The results presented in this report are presenting the time period, categories and operations in question. Thus, the results could be used only to report scope 3 emissions of SSAB.
  - If the results of scope 3 calculation are to be presented or used in other purposes LCA Consulting Oy should be consulted first.





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