Implementation Manual

OEKO-TEX® Impact Calculator

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OEKO-TEX®
International Association for Research and Testing in
the Field of Textile and Leather Ecology

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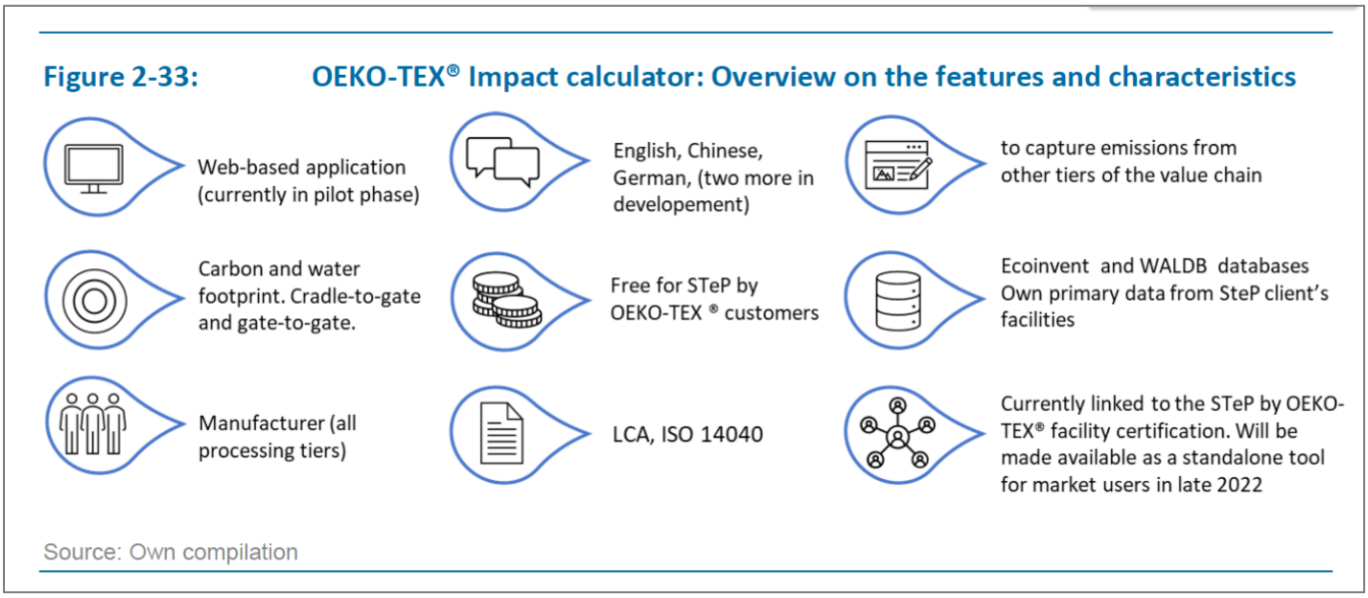
1. Introduction

To achieve the industry's 2030 goal, companies need reliable data. To promote progress and data exchange along the global supply chain, OEKO-TEX® has launched the Impact Calculator. The Impact Calculator is a tool that gives facilities insights into their carbon emissions and water usage, either per facility, processes or per kg of material.

Now, both carbon and water footprint calculations are integrated in our OEKO-TEX® STeP facility certification.

2. What is the OEKO-TEX® Impact Calculator



Overview on the features and characteristics

The OEKO-TEX® impact calculator consists of a dashboard where data entry for different categories is presented. The interface includes a side panel with guiding descriptions for each field, serving the user for orientation regarding the definition or possible data sources for the different entry fields. Primary data regarding material input and output, electricity, fuel, water per facility and per process are needed. GHG sources of on-site processes are automatically calculated.

OEKO TEX®
STeP

3. Technical Language/ Glossary

Standards/Agreements	
Paris Agreement	Legally binding international treaty on climate change. Its goal is to limit global warming to well below 2, preferably to 1.5 degrees Celsius, compared to pre-industrial levels.
Greenhouse Gas Protocol (GHG)	recommends IPCC 2013 100a approach calculating carbon emissions (Co2-eq).
Terms	
Life Cycle Assessment (LCA)	A Life Cycle Assessment (LCA) is a framework used to analyse the potential environmental impacts of products or services during their life cycle. A LCA analyses five phases: Raw Material Production, Manufacturing, Packaging & Distribution, Use and End of Life.
Screening LCA	Based on the secondary datasets and LCA data are collected for the location of all the suppliers to use the geography-specific secondary datasets, energy (electricity and thermal) sources with valid proofs at each facility and water treatment technology with certificates for each facility. In addition, information on the technology front, such as type of knitting, printing, etc. is also gathered to use the apt datasets.
Scope 1	Direct greenhouse (GHG) emissions that occur from sources that are controlled or owned by an organization.
Scope 2	Indirect GHG emissions associated with the purchase of electricity, steam, heat, or cooling.
Scope 3	Fuels and energy related activities including: upstream emissions of purchased fuels and electricity such as extraction, production, and transportation of fuels directly or indirectly consumed by the reporting company.
Climate change	Assesses alterations in the statistical distribution of the planet's weather patterns due to human greenhouse gas emissions. Climate change is represented based on the Intergovernmental Panel on Climate Change's 100-year weightings of various substances' global warming potential (IPCC 2007)
Water scarcity footprint	Assesses potential water deprivation, to either humans or ecosystems, building on the assumption that the less water remaining available per area, the more likely another user will be deprived (Boulay et al. 2017).
Methodologies	
AWARE 100 model	AWARE is to be used as a water use midpoint indicator representing the relative Available Water Remaining per area in a watershed, after the demand of humans and aquatic ecosystems has been met.
IPCC	Intergovernmental Panel on Climate Change (IPCC) is the scientific group assembled by the United Nations to monitor and assess all global science related to climate change. Every IPCC report focuses on different aspects of climate change.
Databases	
WALDB	Is internationally recognized and was developed by Quantis in collaboration with many textile companies to deliver robust data for environmental impact assessment and for footprint.
ecoinvent	The world's most consistent and transparent life cycle inventory database, supports environmental assessments of products and processes worldwide.

3.1 LCA Impact Categories

The following recognized standards are incorporated in the Impact Calculator:

- The IPCC 2013 100a approach for calculating carbon emissions (Co2-eq), recommended by the Greenhouse Gas (GHG) Protocol.
- The AWARE methodology to measure the water impacts (m3), recommended by the EU Commission.

Impact category	Model	Unit	Source
Climate change	Bern model – global warming potential (GWP) over a 100-year time horizon	Kg CO_2 eq	(IPCC 2013)
Water scarcity footprint	AWARE 100 model	m^3 world-eq	(Boulay et al. 2017)

These two impact categories describe:

- **Climate change (kg CO2 eq):** assesses alterations in the statistical distribution of the planet's weather patterns due to human greenhouse gas emissions. Climate change is represented based on the Intergovernmental Panel on Climate Change's 100-year weightings of various substances' global warming potential (IPCC 2007). Substances known to contribute to global warming are weighted based on an identified global warming potential expressed in grams of CO2 equivalents.
- **Water scarcity footprint (user deprivation potential in m3 world-eq):** assesses potential water deprivation, to either humans or ecosystems, building on the assumption that the less water remaining available per area, the more likely another user will be deprived. This indicator is based on the AWARE 100 model, the recommended method from Water Use LCA international working group (WULCA) for water consumption impact assessment in LCA and is also presented in the context of the European PEF/OEF (Organisation Environmental Footprint) initiative.

3.2 Functional units

The Functional unit(s) are used in the Impact Calculator to calculate the facility`s footprint results, as well as the results per kg of material for each processing step.

- The first functional unit is one year of facility operations.
- The second functional unit is one kg of material going through the individual processing step that takes place in the facility.

4. Methodology

OEKO-TEX® established a partnership with Quantis, a leading sustainability consultancy, to build a robust tool. The Impact Calculator uses a Screening Life Cycle Assessment (LCA) approach and covers partly comprehensive life cycle assessments approaches. In addition to the information requested for the screening LCAs, detailed data is requested and are developed for all energy and non-energy resources (raw materials, chemicals, water), followed by emissions data.

4.1 Screening LCA

A Screening LCA is easier, faster and less expensive than a full LCA – and it provides sufficient initial and credible insight into where a facility's biggest carbon emissions and water impacts occur across its processing steps and for the types of fibres used.

The Impact Calculator is a customized solution for calculating carbon and water footprints addressing the specific needs and processes of textile production facilities. Elements from the Product LCA to measure the impacts at the material output level, and the Corporate LCA to measure the impacts at the overall facility level are applied. The data collection relies as much as possible on data already collected by OEKO-TEX® during the certification process, to simplify data collection for the stakeholders. Data gaps have been filled using various databases (ecoinvent and the World apparel life cycle database - WALDB) and by relying on the experience and advice of OEKO-TEX® experts. Once a facility has entered its data into the tool, the totals are allocated across the production processes and multiplied with emissions factors from ecoinvent v.3.5 and the World Apparel and Footwear Database - WALDB.

4.2 Simplicity and applicability

Why is it crucial to collect the data of your supply chain and calculate the carbon and water footprint?

Consumers and brands alike are increasingly selecting products and companies that demonstrate climate action and commitments. In response, over 100 fashion brands have signed the Fashion Industry Charter for Climate Action, committing to reducing GHG emissions 30% by 2030. In addition to carbon emissions, water risk is growing, and the apparel sector is underperforming in measurement and monitoring its water impacts (according to a CDP industry comparison report).

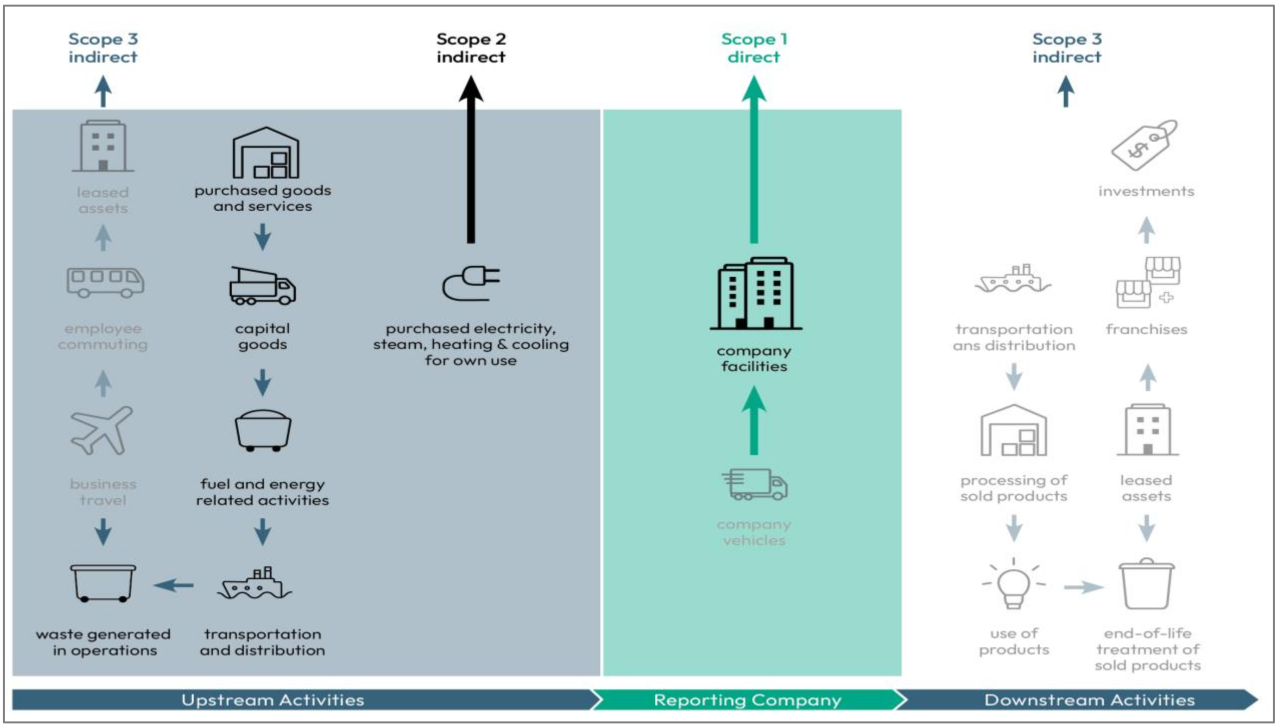
One major milestone to increase efficiency and identify hotspots is getting to know the supply chain and their impact. To get an idea what the carbon and water footprint of the facilities across the supply chain are facilities can use now the Impact Calculator. Each facility in the value chain can measure its carbon and water footprint by using the Impact Calculator and thus contribute to transparency and resource reduction of a products footprint. The benefits of using the Impact Calculator are simple. Facilities can better understand production related carbon emissions and water usage at factory-level, per process step or per kg of produced material. They can identify which processes have the highest environmental impact. They can act to reduce the water usage and carbon emissions in the future. To increase transparency and strengthen trust it is important that the facility's internal and external stakeholders are informed about carbon & water reductions so that commitments are communicated and reported with robust facts & figures.

5. What is covered by the Impact Calculator

5.1 Scopes covered according to the GHG Protocol

- **Scope 1** emissions are direct greenhouse (GHG) emissions that occur from sources that are controlled or owned by an organization (e.g., emissions associated with fuel combustion in boilers, furnaces or company-owned vehicles. The entered consumption of fuels (direct) and electricity (direct) in the "Energy & Water" section are accounted in Scope 1.
- **Scope 2** emissions are indirect GHG emissions associated with the purchase of electricity, steam, heat, or cooling. Although Scope 2 emissions physically occur at the facility where they are generated, they are accounted for in an organization's GHG inventory because they are a result of the organization's energy use. The entered consumption of fuels (indirect) and electricity (indirect) in the "Energy & Water" section are accounted for in Scope 2.
- **Scope 3** emissions are all indirect GHG emissions (not included in scope 2) that occur in the value chain of the reporting company, including both upstream and downstream emissions. Fuels and energy related activities including: upstream emissions of purchased fuels and electricity such as extraction, production, and transportation of fuels directly or indirectly consumed by the reporting company. This can be purchased goods and materials (e.g. raw materials, chemicals, packaging), capital goods, upstream transportation and waste generated in operations.

  Overview of GHG Protocol scopes and emissions across the value chain:



Having a look at the Greenhouse Gas Protocol Corporate Value Chain the Impact Calculator is covering the crucial part of "Scope 3 emissions":

- **Purchased goods and services**: "Extraction, production and transportation of goods and services purchased by a company"

  Advantage: In case all facilities in a brands supply chain are calculating their impact than 78.5 % of the scope 3 emissions are covered.

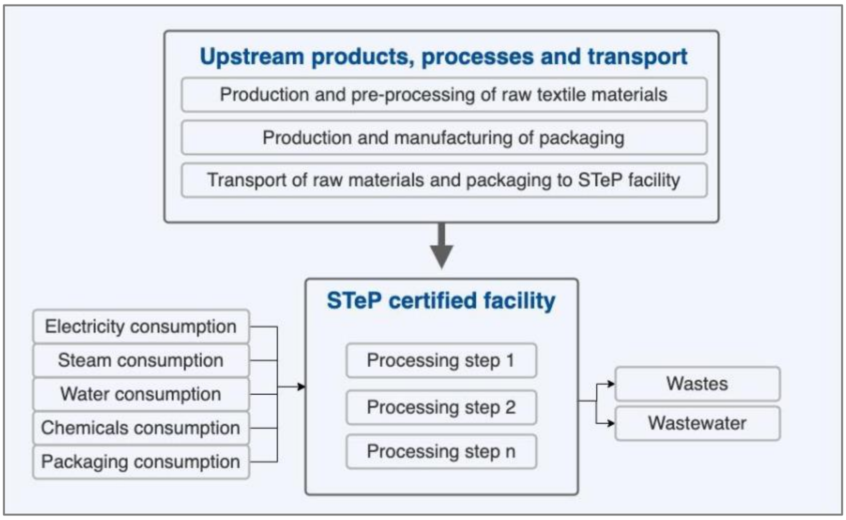
- **Fuel and energy related activities**: "Extraction, production, and transportation of fuels and energy purchased or acquired by the reporting company in the reporting year, which have not been included in scope 1 or scope 2

  Advantage: The quantity, origin and type of electricity generation are stored in the tool as scientifically verified data sets: the data set is a mix of industry data and scientific data coming from WALDB and ecoinvent.

- **Transportation and distribution**: "Transportation and distribution of products purchased by the reporting company in the reporting year between a company`s tier 1 suppliers and its own operations (in vehicles and facilities not owned or controlled by the reporting company).

  Advantage: Outbound logistics (transport of sold products) is not covered, as duplications should be avoided when calculating the impact of an entire supply chain.

- **Waste generated in operations**: Calculation of the quantity of waste is considered and calculated, but not the treatment and disposal. The total footprint of a facility is calculated by taking into account all necessary operational flows of the facility for one year, including the following elements, as indicated in the visual below:



The impact of upstream transport, processing and production of materials entering the facility are also considered in the tool. For the impact calculation of fibre production/raw material production the tool only uses secondary (no primary) data.

6. Input: What data is needed from the facilities?

6.1 Materials & Processes

Facilities need to provide information about their material use and processes applied in their production.

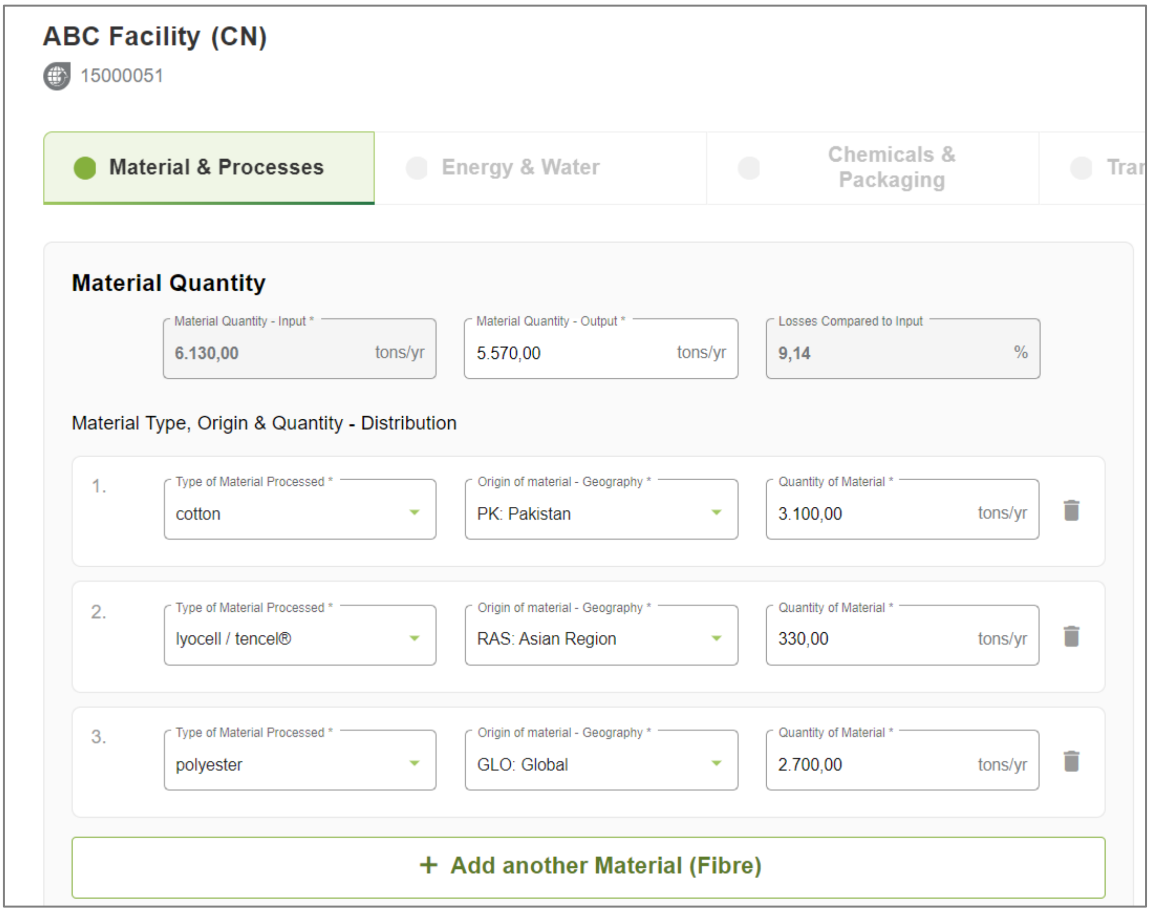
6.1.1 Materials

What materials are used in the facility and where are they coming from?

The quantity of material input can be fibers (staple and/or filament), yarn, fabrics (woven and/or knitted) and any other kind of textiles like semi-finished products etc., is entering the facility to be processed. This quantity does not refer to other materials such as chemicals, packaging etc.

The quantity of material output can be fibers (staple and/or filament), yarn/twisted yarn, fabrics (woven and/or knitted), semi-finished products and any other kind of products like garments, home textiles, accessories, etc., which is leaving the facility. This quantity does not include any waste (fibers, yarn, fabric, etc.). It should not be differentiated between own business or commission business, since the quantity can be calculated regarding output (materials processed).

Example:

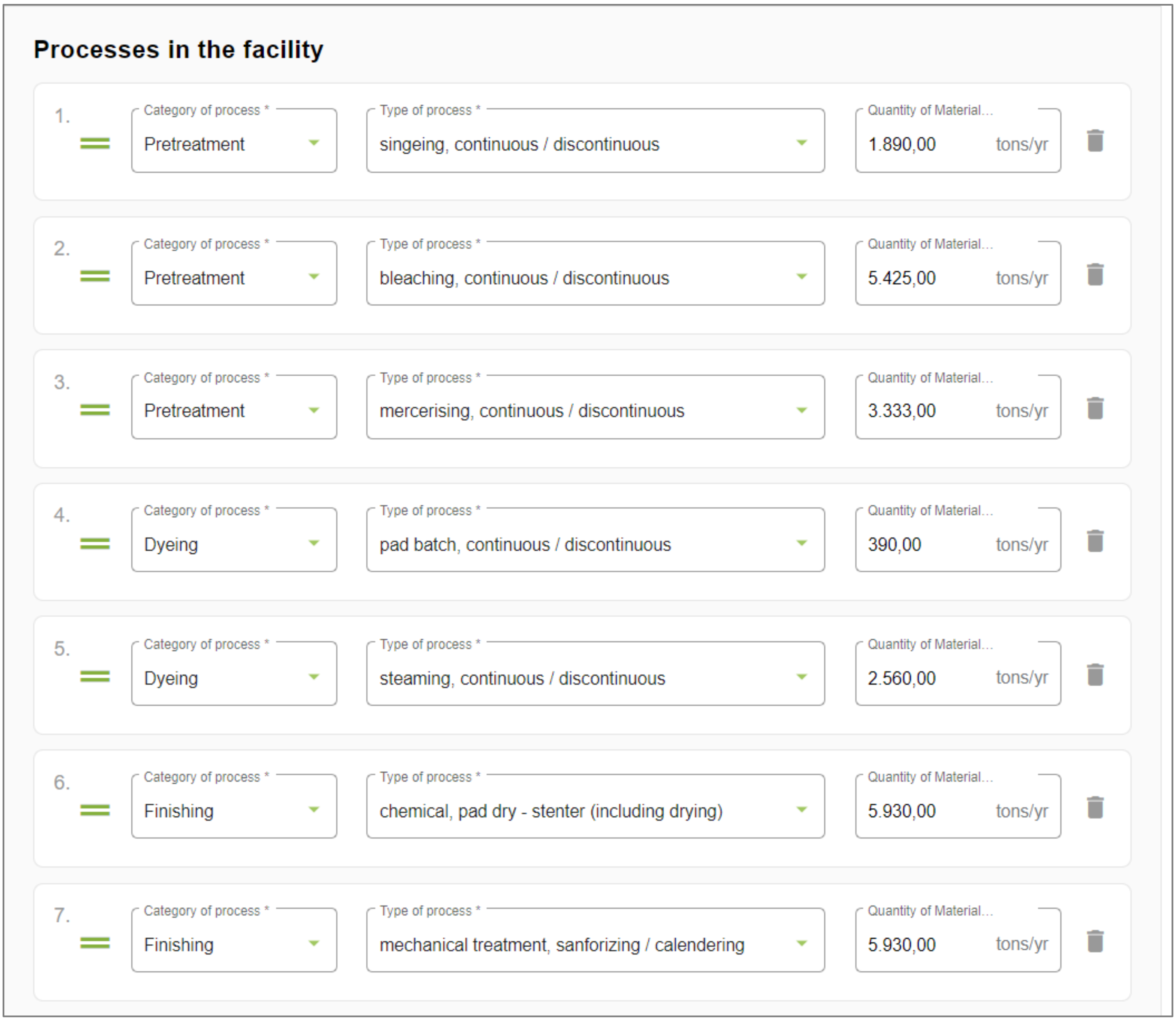


6.1.2 Processes

Which processes are conducted and how much material is running through these processes?

The processes refer to production steps in textile and leather industry, which are conducted in the facility. With a drop-down menu all relevant categories and types of processes conducted can be chosen and the corresponding material in kg running through these processes can be indicated. If the exact quantity is not known, it can also be estimated. Nevertheless, the total quantity of the material type must correspond to the total material input data. This is calculated automatically.

Example – processes applied in the facility:



6.2 Energy & Water

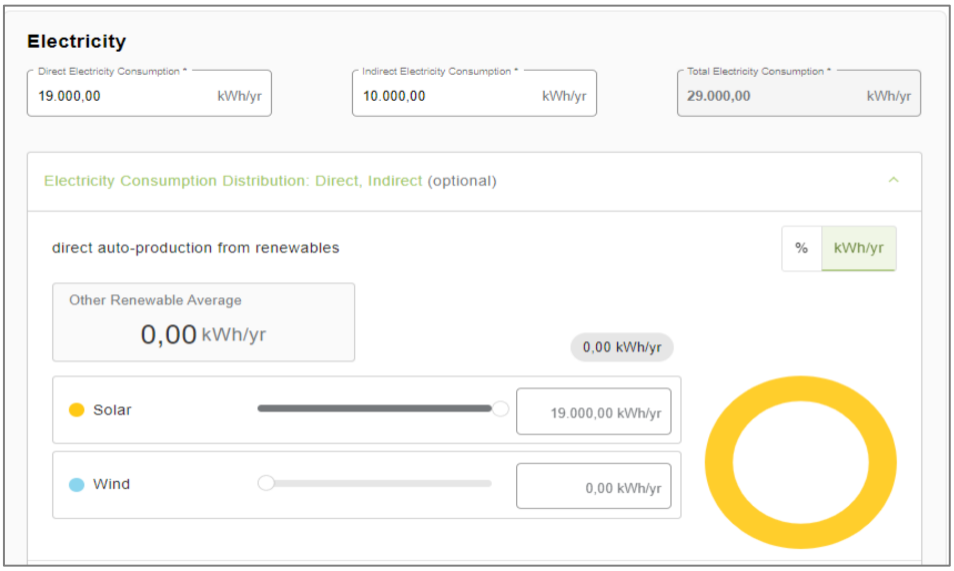
Direct electricity consumption	Total electricity that is produced on-site. Only the direct auto-production from renewable energy sources (fuels are considered in the fuel section) should be considered.
Direct fuel consumption	Emissions associated with fuel combustion in boilers, burning fuels on-site for, or backup power generators.
Indirect electricity consumption	Electricity purchased from a third party. For Example specific electricity shares associated with the purchase of electricity from renewable energy sources as solar and wind.
Indirect fuel consumption	Specific energy sources associated with the purchase of heat and steam.

6.2.1 Electricity

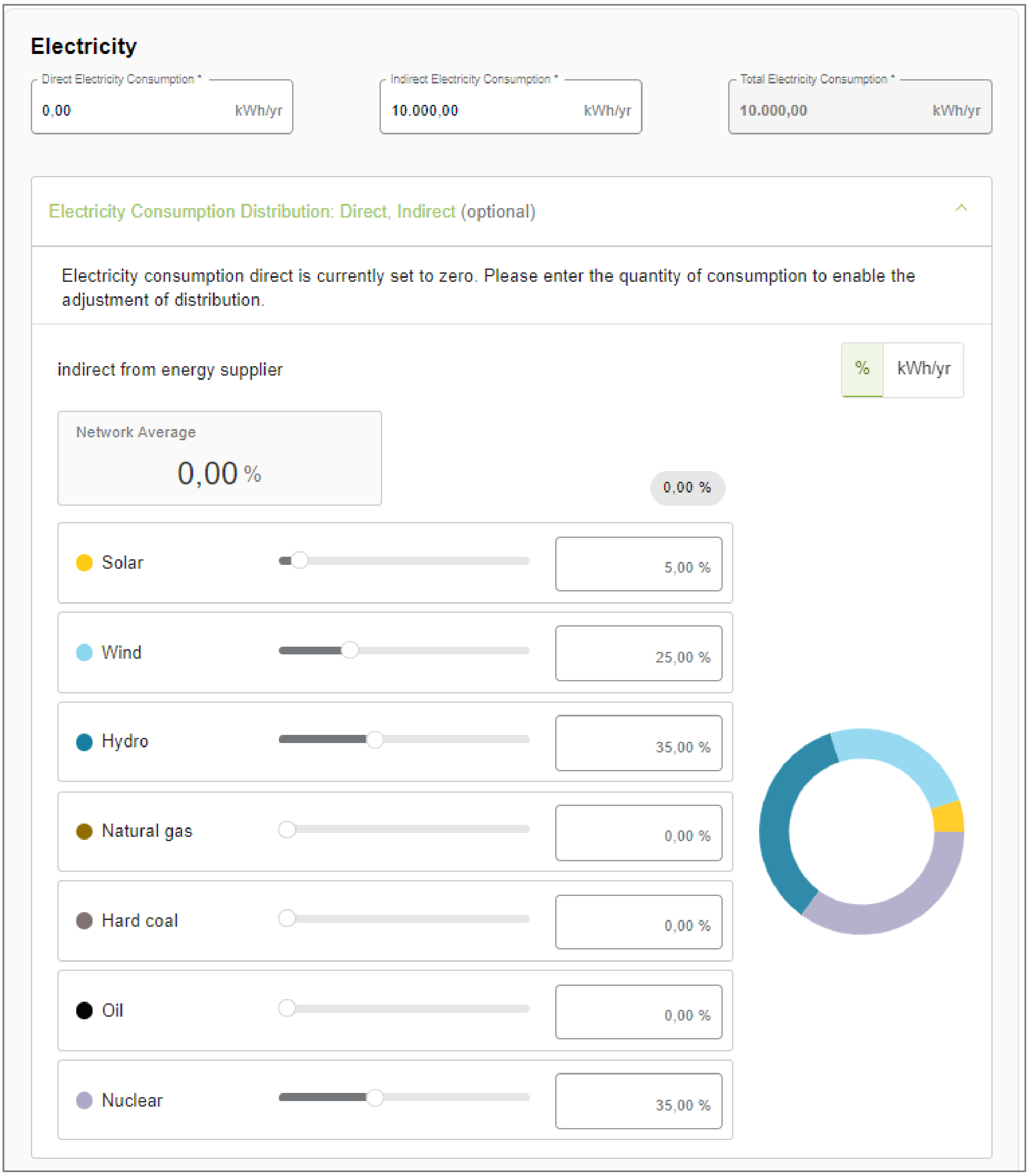
How much energy in form of electricity in kWh/year is used in the entire facility and what is the supplier distribution (e.g. Solar, Hydropower, nuclear etc.), as well as the consumption per process (if known)?

The total amount of electricity in kWh/year used should be indicated. If the facility has its own renewable energy source like photovoltaic system or hydro power, the percentage can be indicated (direct consumption). But only the direct auto-production from renewables should be considered. In case it is unknown, a generic renewable mix is used instead (renewable average). If renewable energy produced within the company is sold to the grid and then purchased, the energy consumed should be considered "indirect from energy supplier". If the facility has not its own renewable energy source, the distribution in percentage (%) given by electricity supplier can also be indicated accordingly (indirect consumption). Furthermore, the electricity used for each process can be indicated when measured or known from machine supplier.

Example - direct electricity consumption: The facility has its own photovoltaic system which produces 19000kWh/year. This value can be used for direct auto-production from renewables as follows:



Example - indirect electricity consumption: The facility’s energy supplier confirms in writing the mix of energy delivered in percentage with the following share: Solar 5% (500 kWh/year), Wind 25% (2500 kWh/year), Hydro power 35% (3500 kWh/year) and Nuclear 35% (3500 kWh/year).



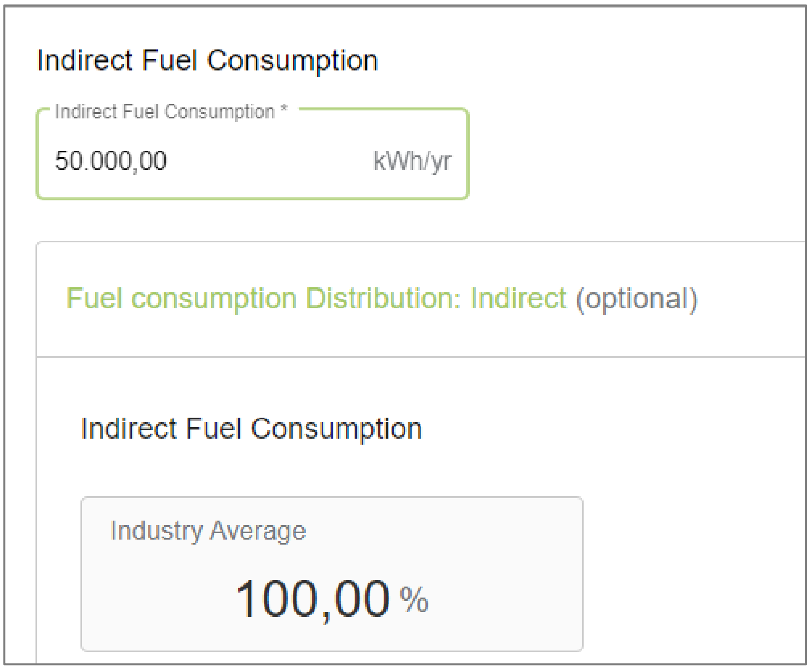
6.2.2 Fuel

How much fuel is directly and/or indirectly used in the facility?

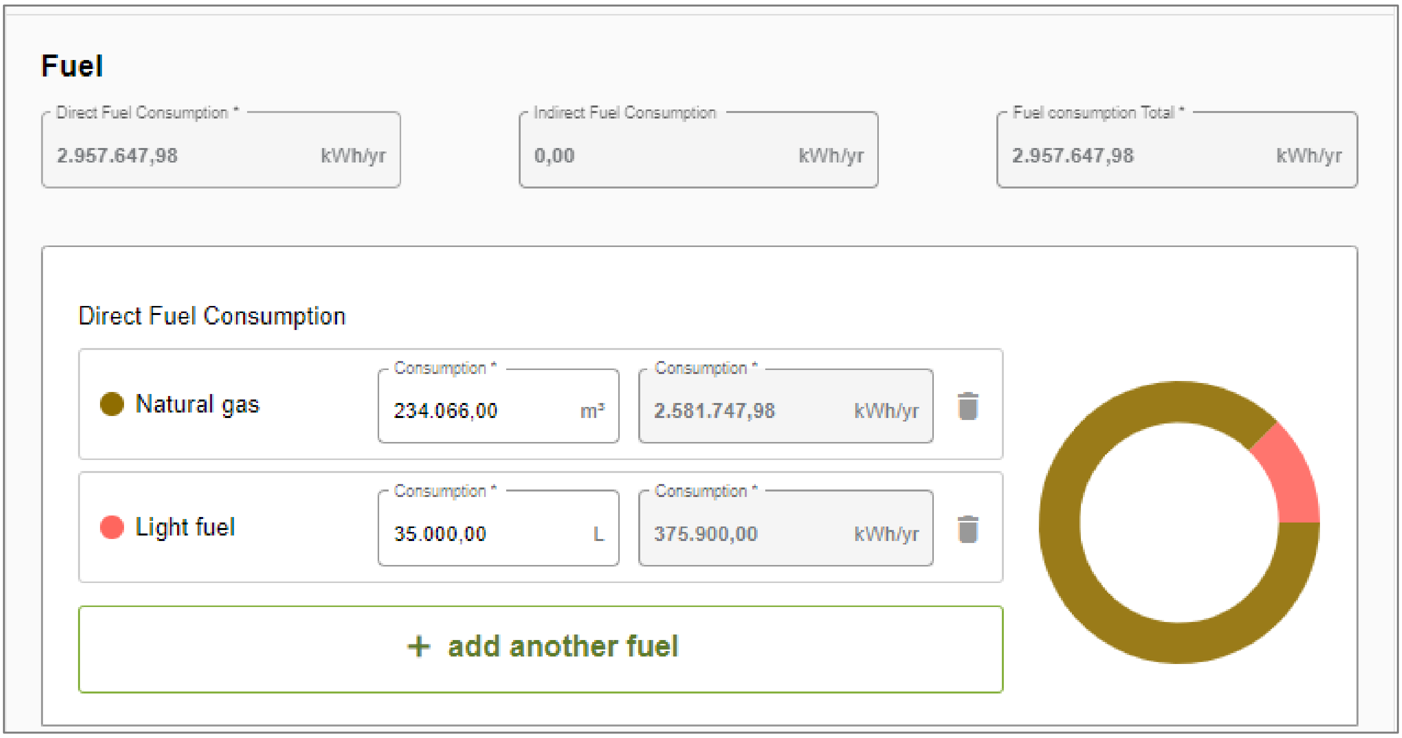
The direct consumption is most of the times associated with fuel consumption for boilers, on-site fuel consumption for manufacturing processes (e.g. natural gas for stenters) or backup power generators.

The indirect consumption refers to fuels like coal, oil, natural gas etc. which is indirectly used to generate steam purchased by the company, in the respective units/year (m^3/year, L/year). This value is then calculated by the system into kWh/year. In both ways all applied fuels can be indicated and also the fuel consumption per process. In case the steam supplier does not indicate the source in the beginning, the source and its shares should be asked to the steam/heat supplier. It is always better to indicate the specific energy sources associated with the purchase of heat and steam. If this is not known, an industry average for district heating will be used as indicated in the field "Industry Average".

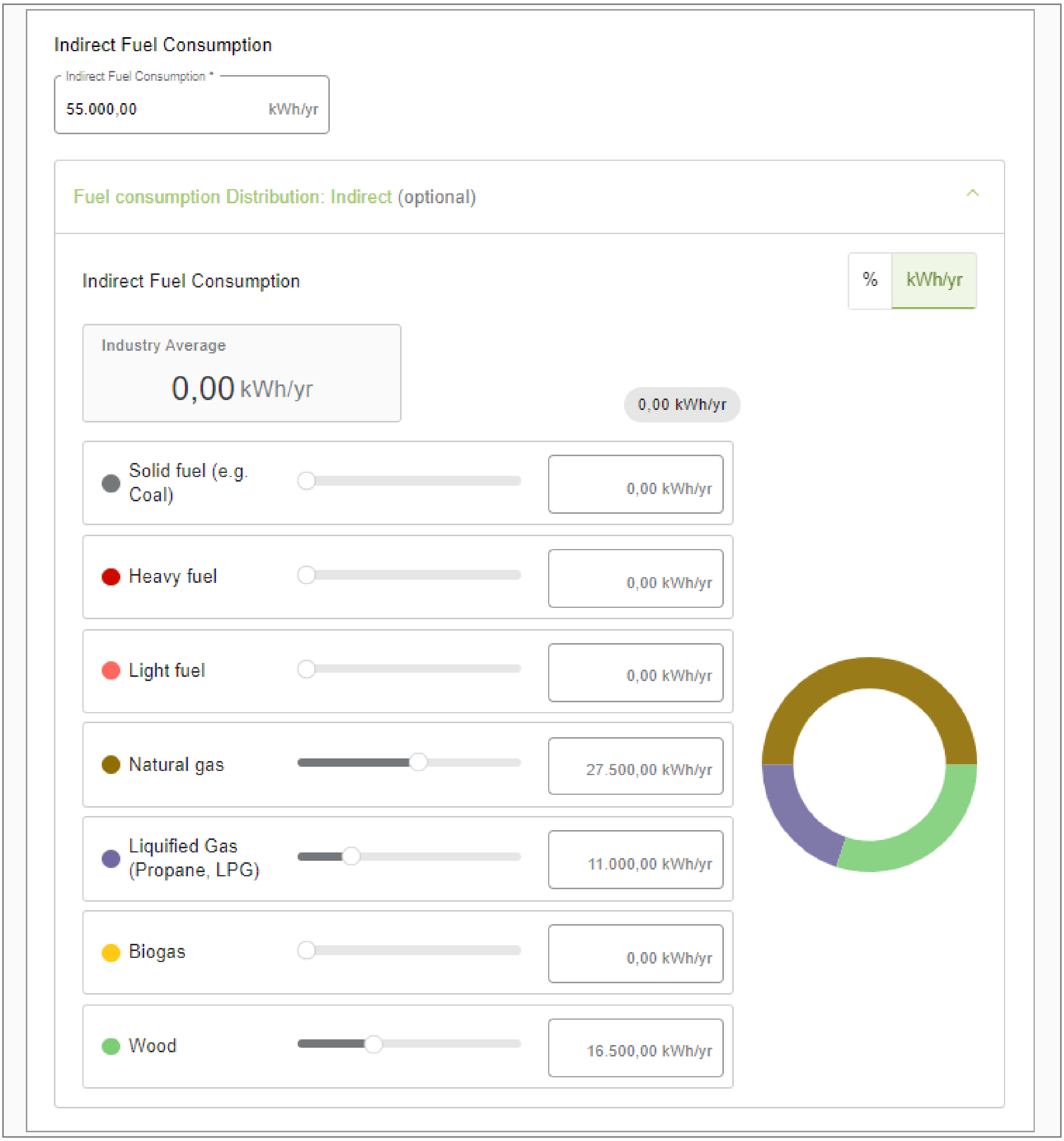
Example – industry average, fuel consumption:



Example - direct fuel consumption: The facility has two boilers. The first one (main boiler) is running with natural gas with yearly consumption of 234.066 m^3 and the second boiler with light fuel oil with yearly consumption of 35.000 L.



Example - indirect fuel consumption: The facility requires for its production also external sources like steam which is delivered from external supplier with the following share: Natural gas 27.500 kWh/year, Liquified gas 11.000 kWh/year and wood 16.500 kWh/year.

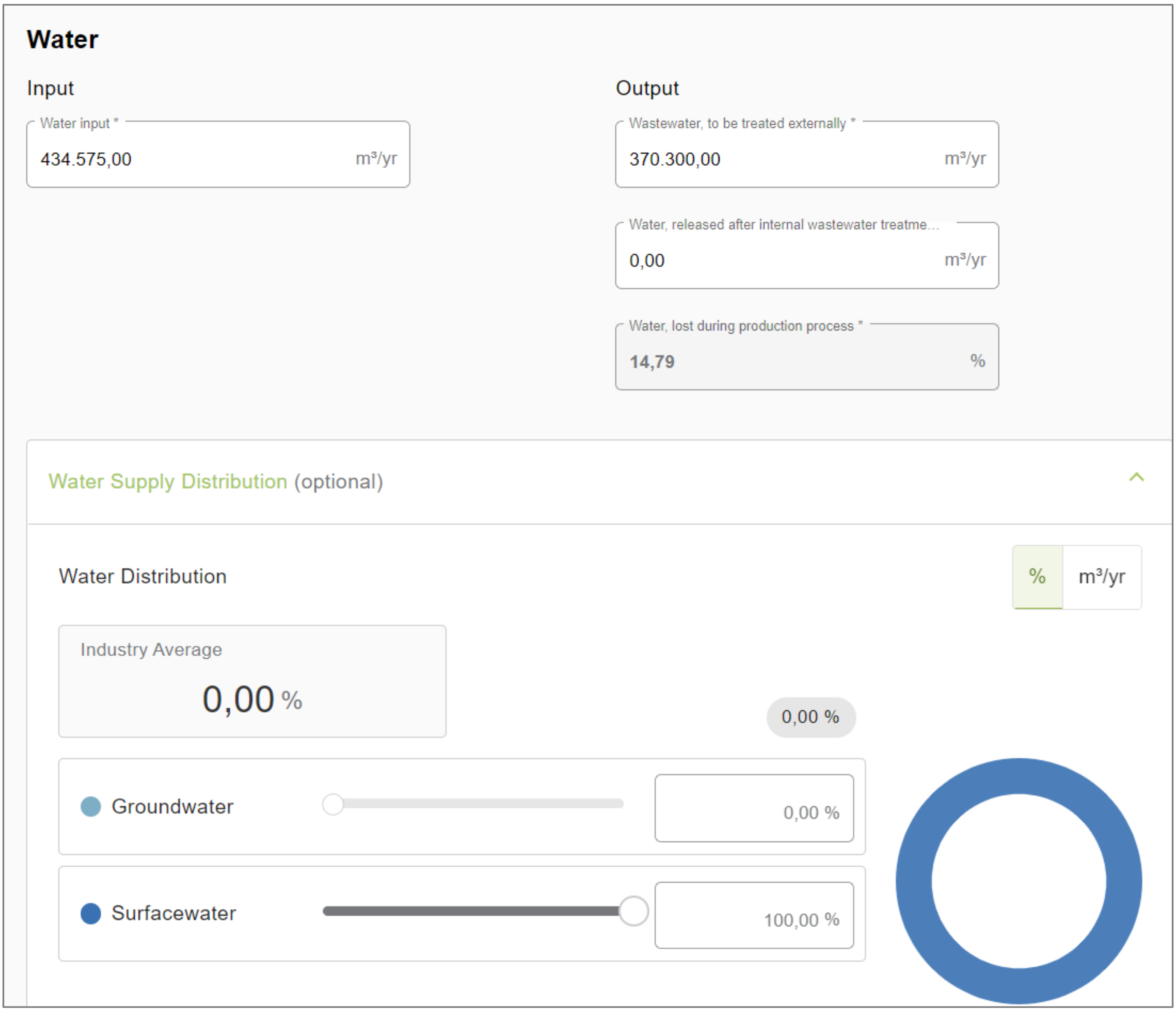


6.2.3 Water

How much water in m^3/year is used in the facility, and where is it sourced from (groundwater and/or surface water), as well as the consumption per process (if known)?

The total amount of water in m^3/year used for production processes and humidification system should be indicated. Water used for sanitary installations, drinking, irrigation etc. shall not be considered. The source of water can be indicated as well as the water consumption for each process when measured or known from machine supplier. The water consumption figures from processes shall not exceed the total of input water.

Example – water use:



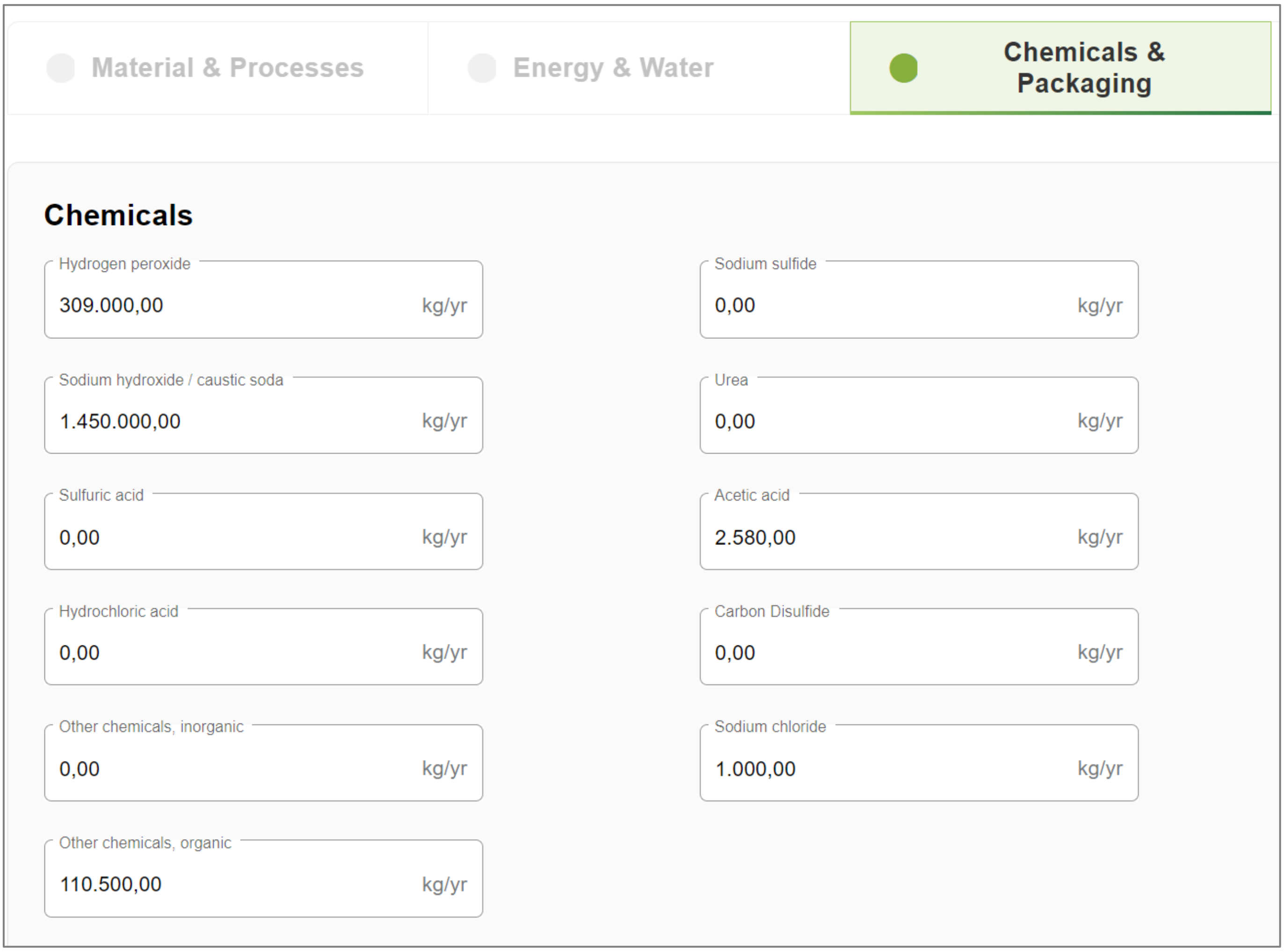
6.3 Chemicals & Packaging

6.3.1 Chemicals

Which chemicals are used in your facility?

The amount of chemicals with a significant impact of greenhouse gas emissions like caustic soda, sulfuric acid, acetic acid, sodium chloride etc. (see example below) can be selected and the amount used in kg/year can be indicated. Only these chemicals are considered in the calculation based on WALDB database.

Example – chemical use:



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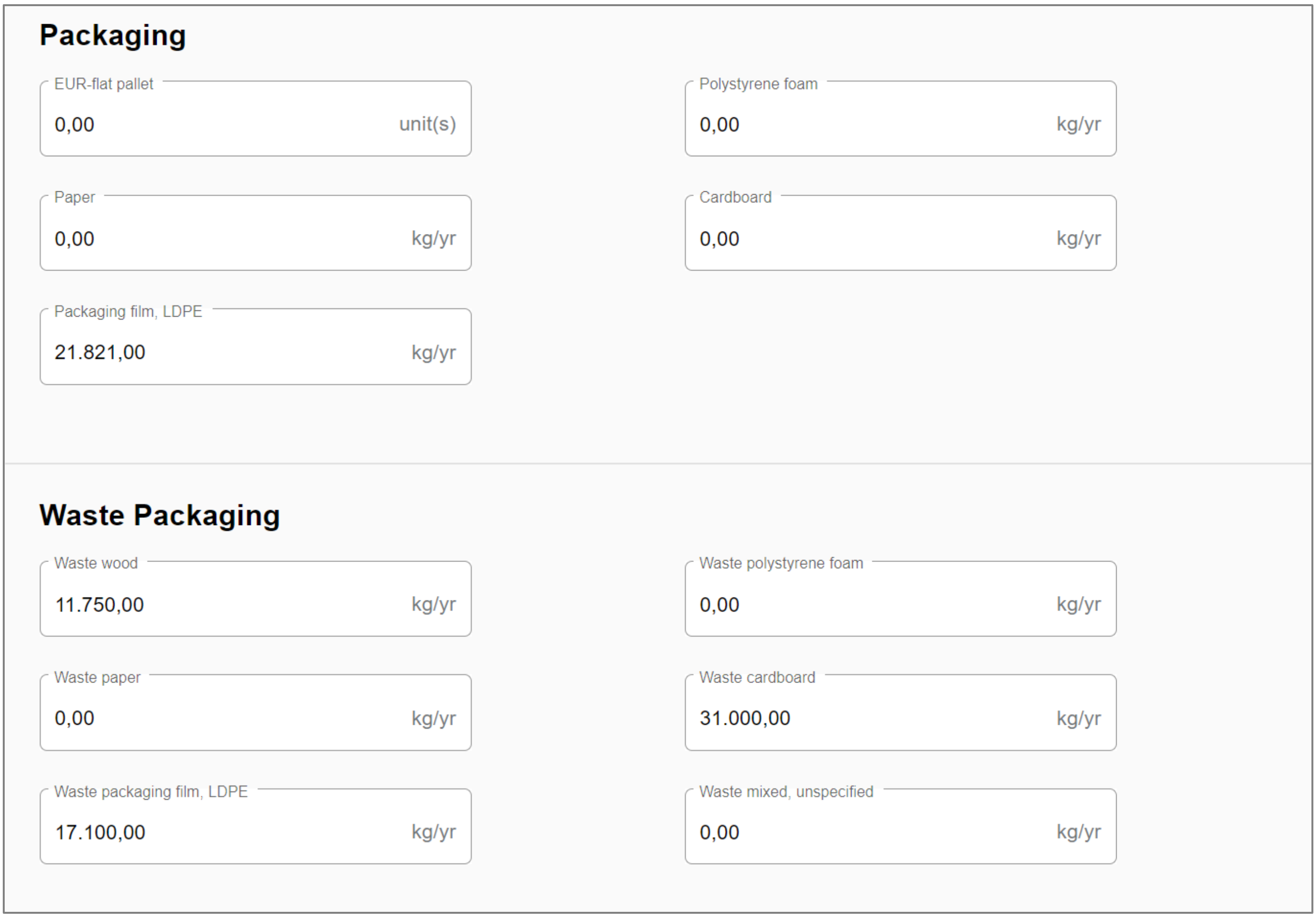
6.3.2 Packaging

How much packaging is used in your facility and how much waste packaging is recorded?

The amount of packages like EUR pallet, paper, cardboard etc. (see example below) can be indicated. The waste packaging like waste cardboard, waste packaging film etc. (see example below) can also be indicated. The calculation of the carbon footprint upon given amounts is based on WALDB database.

Example – packaging:



Packaging

EUR-flat pallet
0,00 unit(s)

Polystyrene foam
0,00 kg/yr

Paper
0,00 kg/yr

Cardboard
0,00 kg/yr

Packaging film, LDPE
21.821,00 kg/yr

Waste Packaging

Waste wood
11.750,00 kg/yr

Waste polystyrene foam
0,00 kg/yr

Waste paper
0,00 kg/yr

Waste cardboard
31.000,00 kg/yr

Waste packaging film, LDPE
17.100,00 kg/yr

Waste mixed, unspecified
0,00 kg/yr

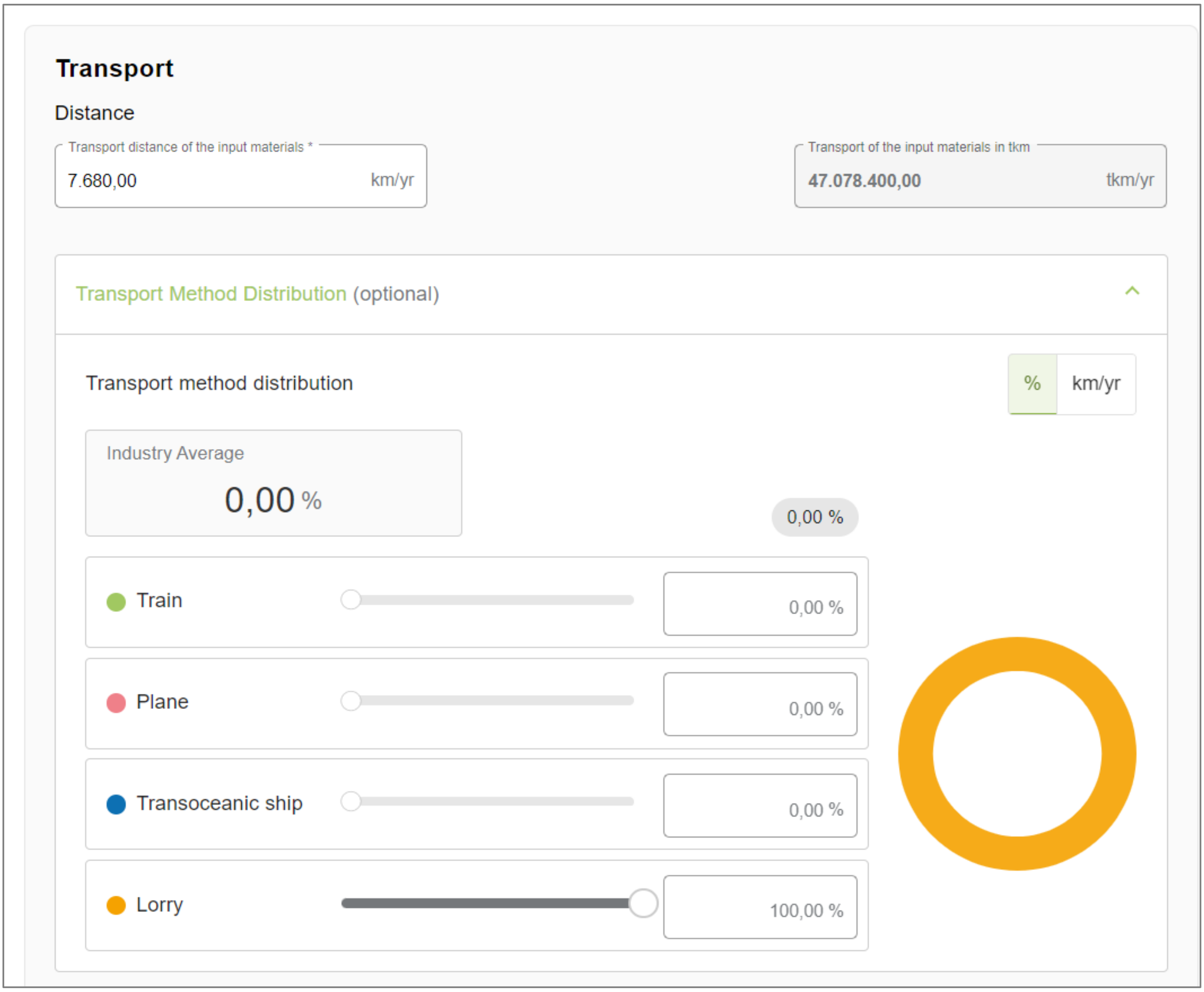
6.4 Transport

What distance travelled the incoming material until supplied to facility?

The distance in km/year for the transport options like transoceanic, lorry, train etc. (see below example) can be indicated. This refers only to materials supplied from direct suppliers. The calculation of the carbon footprint upon given distances is based on WALDB database

Example 1 – transport: The facility has every week 2 lorry loads to be sent to customer. The distance to customer is 40km, which leads to 160km per week times 48 weeks a year results in 7.680km/year.

Example 2 – no relevant transport: The facility is a commission dyer and material is sent to him by his customer and also taken from his customers on their costs and responsibility. No data entry is necessary.



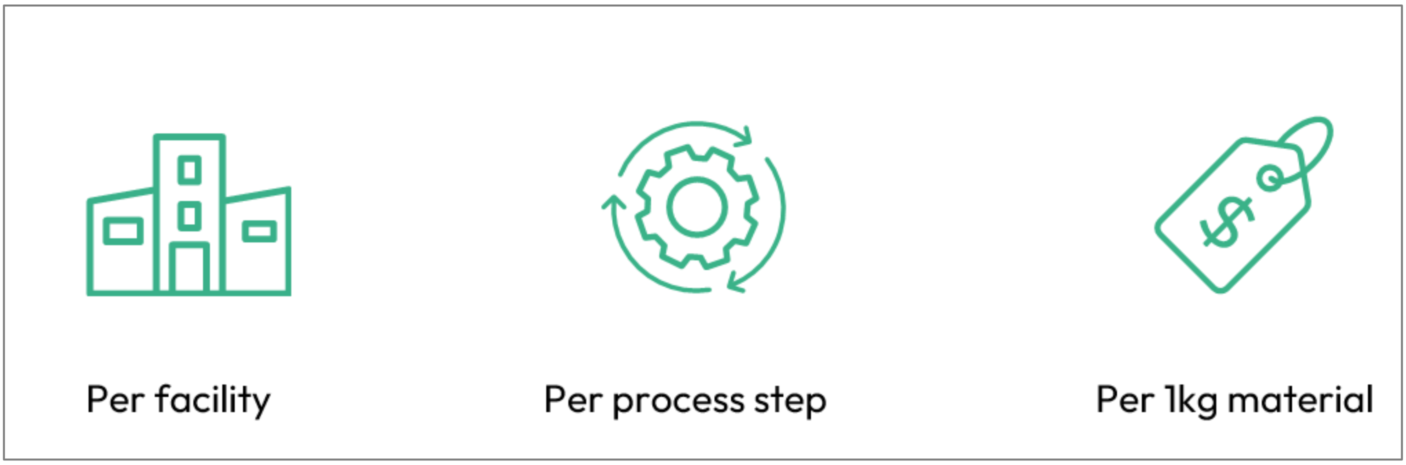
7. Output

7.1 Summary

What is the output of the tool?

In the summary section of the tool you can see all the data that has been entered in previous sections all at once. To be sure that the data is correct and can be submitted for calculation, it is recommended to check and review it again.

The general out is given as per the following:



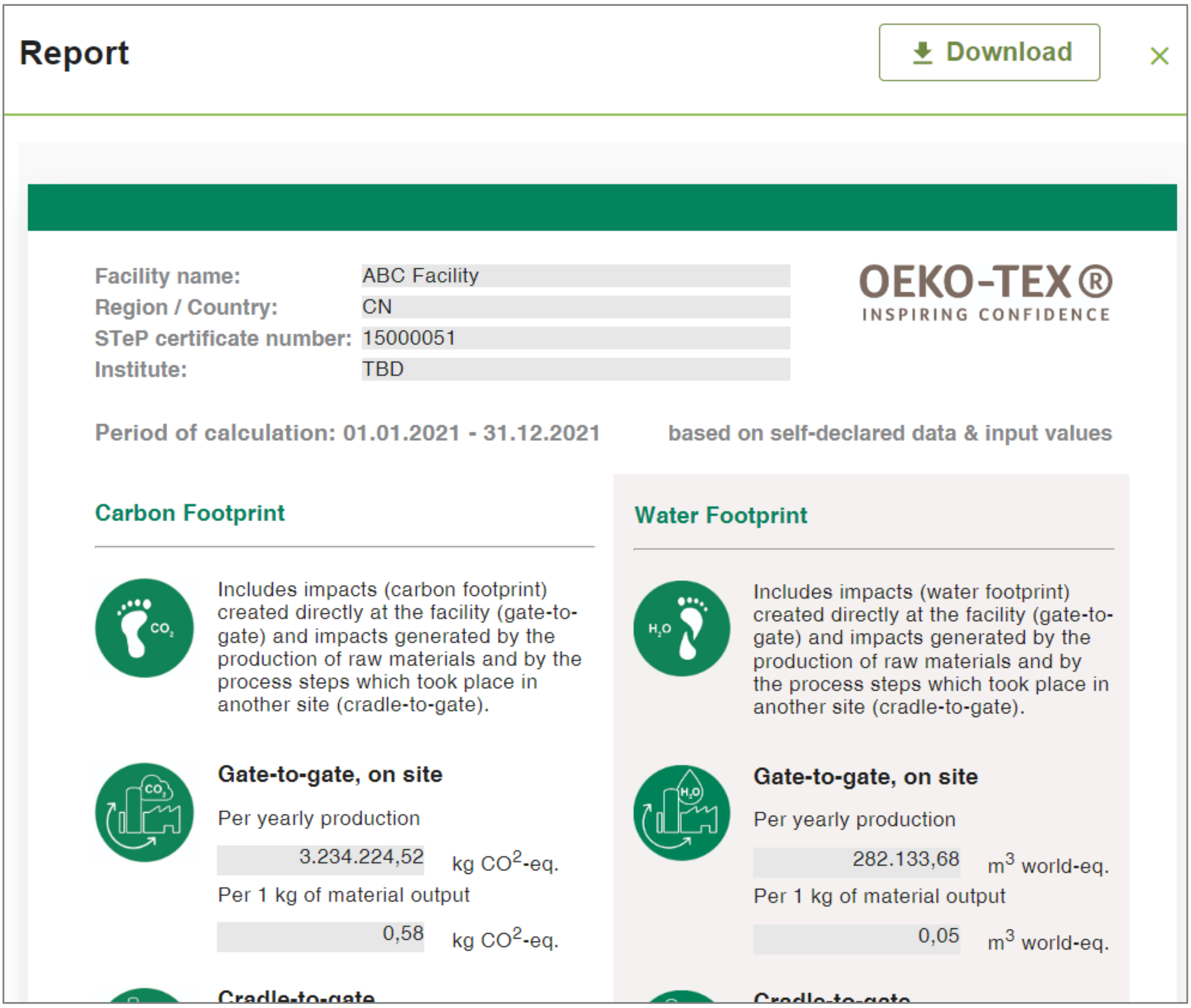
7.2 Analysis

Once calculated, the Carbon and Water Footprint results can be analysed with reference to different life cycle stages:

a. Cradle-to-gate
b. Gate-to-gate
c. Facility Operations
d. Different impact of the processes
e. Scopes and their impact

7.3 Reporting

A report can be generated and downloaded once all data entry is confirmed. This report is based on self-declared data & input values. If the institute is requested to review the data entered, this can only be combined during an upcoming STeP audit.



8. Verification by Institute

As mentioned in 7.3 the verification can be done by the institute and the sentence “based on self-declared data & input values” will be removed by institute after successful verification.