CARBON FOOTPRINT

BIOSORBE FIBER

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Methodology

The calculations and assessments were conducted using SimaPro as the LCA software, with Ecoinvent as the background database and IPCC 2021 GWP100 as the selected impact assessment method.

- SimaPro is one of the most established and extensively used LCA software, ensuring high credibility in research and industry. It enables flexible system modeling, including scenario analysis, and provides detailed insights into the calculation process, which enhances the transparency.

- Ecoinvent is a globally recognized database offering high-resolution LCI data across multiple industries and regions. It covers a broad range of industries, materials, and energy sources, making it suitable for diverse product assessments, without compromising on consistency nor reliability. For this study Ecoinvent version 3.10 is used.

- The chosen impact assessment method, IPCC 2021 GWP100, incorporates the latest findings on greenhouse gas emissions and their radiative forcing effects. This ensures that the carbon footprint assessment is scientifically up-to-date, internationally accepted, and aligned with regulatory frameworks.

MANUFACTURING AT BIOSORBE

The activity data is based on measurements from current best practices that have been tested in small scale and estimations of how inputs of raw material and electricity may change when the fiber is produced at a larger scale. It is assumed that the sludge generated from the production will be pressed before being sent to external waste treatment.

TRANSPORTATION

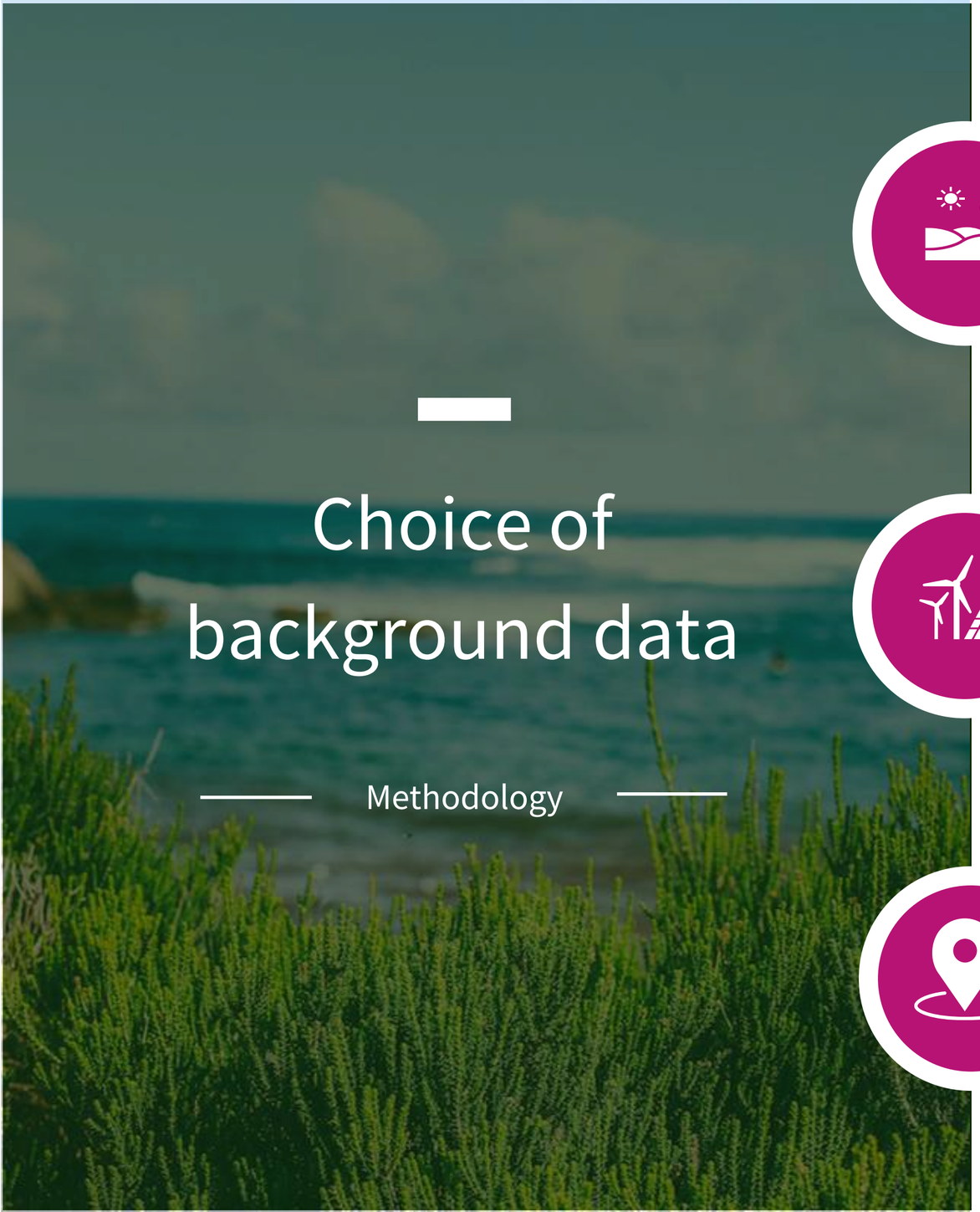
All transportation of input raw materials are carried out by truck, 16-32 ton, EURO6. Transport of generated waste that is sent to external waste treatment is modelled with *Municipal waste collection service by 21 metric ton lorry*.

CUT-OFF

Inputs or outputs of materials comprising less than 1% of the total material flow has been excluded as it is assumed that the climate impact from these flows is insignificant. This includes packaging material for input raw materials, mainly consisting of paper packaging.

Assumptions and estimations

Methodology



Choice of background data

Methodology

RAW MATERIAL EXTRACTION

To model raw material extraction, generic data provided in the Ecoinvent database (version 3.10) has been adjusted. This includes regionalizing the dataset to better represent the geographic area where the suppliers operate as well as switching from a market mix to residual mix, if it cannot be guaranteed that the supplier purchases renewable energy.

ELECTRICITY PURCHASED BY BIOSORBE

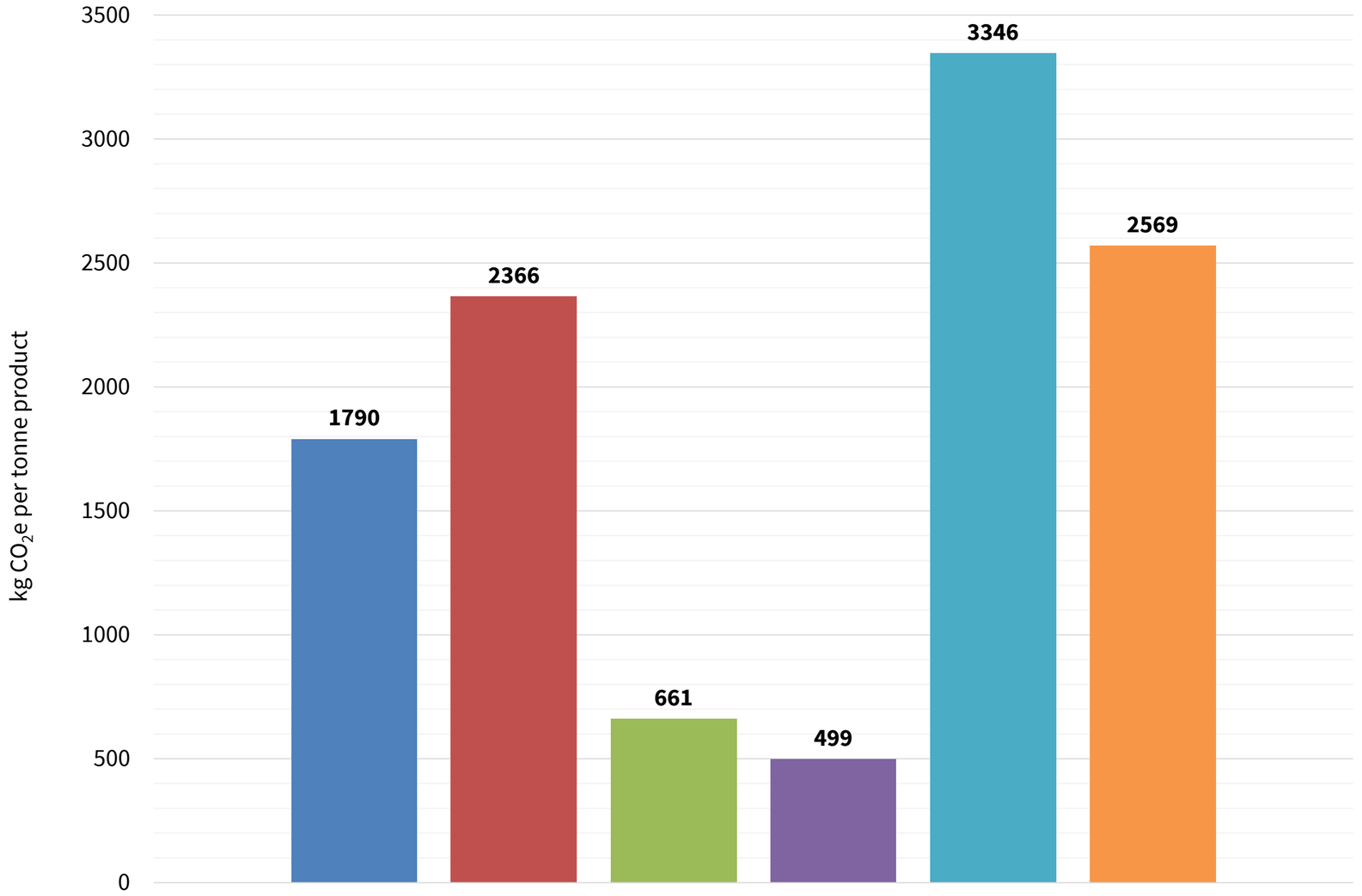
Electricity used during the manufacturing at Biosorbe has been modelled based of Guarantees of Origin provided by Biosorbe's energy supplier, Kristinehamn Energi. The climate impact from a life cycle perspective, including production and losses during transformation and transmission, are based on data from the Ecoinvent database.

SUPPLIER-SPECIFIC DATA

For the production of polymer, a specific carbon footprint was provided by the supplier Solenis. For the remaining suppliers, information communicated externally, e.g. in sustainability reports, has been used as a basis for any adjustments made to generic dataset provided in the Ecoinvent database.

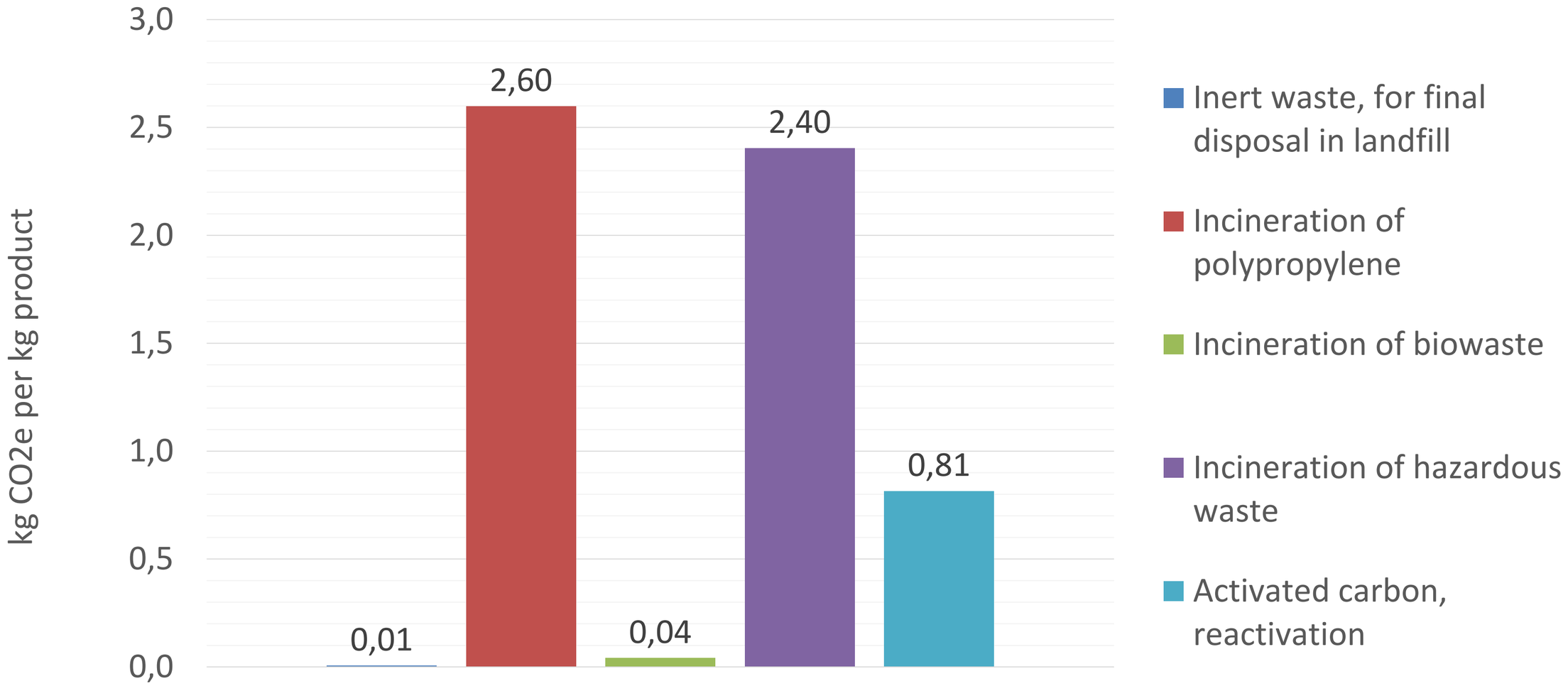
	Emission source	Climate impact (kg CO_2e)	Cause of emissions	Recommendations for emission reductions
UPSTREAM	**Production of input raw materials and process chemicals**	315	For production of input raw materials such as TMP, the main emissions are caused by energy consumption and use of chemicals. For unbleached sulfate pulp, emissions are mainly generated by the consumption of energy and chemicals and forestry harvesting practices.	Encouraging the suppliers of TMP and sulfate pulp to transition to renewable energy for their production has a great potential of reducing the climate impact from these raw materials.
	Transport to Biosorbe	84	Emissions from transport primarily derives from combustion of fossil fuels such as diesel. However, the production of the vehicle and road infrastructure will also have a contribution to the climate impact per tkm.	Choosing alternatives with a low climate impact, such as biobased diesel, HVO or electrified vehicles, can significantly reduce the climate impact from incoming transports.
CORE	**Electricity consumption**	95	Biosorbe purchases electricity produced with 100% hydropower, an alternative with an overall low climate impact. The climate impact associated with the electricity consumption mainly derives from transformation from high voltage to medium voltage.	As renewable electricity is already procured by Biosorbe, the main focus for reducing the climate impact from the manufacturing lies in finding ways to make the production processes more energy efficient.
	Generated waste	5	Emissions from the treatment of biowaste, through incineration, are generated by consumption of heat as well as waste facility infrastructure.	As the waste treatment is carried out externally, the most effective way of reducing these emissions is to implement processes and routines that minimize the generation of waste during the production of fiber.

Comparison with the production of alternatives



Further processing and additional materials required to produce either an oil absorbent or an air filter have been excluded from the assessment. This assumption is based on the premise that these factors remain constant regardless of the choice of input material, allowing the analysis to focus solely on the differences in carbon footprint between the biobased fiber and conventional alternatives.

Scenario analysis of end-of-life treatment



Conclusions

Using a biobased alternative for absorbing oil spills or filtering water and air presents significant climate impact reduction potential. This advantage stems not only from the lower potential climate impact of fiber production but also from its benefits during end-of-life treatment. When incinerated, biobased materials emit less fossil-based GHG emissions compared to polypropylene or other hazardous waste.

Additionally, biobased fibers offer an alternative with less climate impact to processes like the reactivation of spent activated carbon, which can be energy-intensive and therefore contribute to a greater climate impact.

Contact

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Katja works as a Sustainability Consultant at Greengoat and has deep knowledge of GHG accounting, Life Cycle Assessment (LCA), and sustainability reporting. She helps companies map and calculate their climate impact and analyze the environmental impacts of their products from a life cycle perspective according to the ISO 14040 standard series.

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