Alleima at Green steel Europe 2025

Challenges of comparing life cycle assessments (LCA) to make informed choices

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Alleima

Agenda

- Introduction of Alleima
- Challenges to Compare Results and Defining Green Steel
- Self-regulation of the Industry or Increased Consumer Awareness?
- Influencing Factors on Carbon Footprint
- Case Study: Sanmac 316L Stainless Steel Bar
- Alleima's Approach to Carbon Footprint Calculation and reporting
- Six questions for evaluating the carbon footprint

A world-leading advanced materials company

High value-added products in advanced stainless steels and special alloys as well as products for industrial heating

Revenues	Recycled steel	Originates from	# FTE's
20,669	>80%	1862	~6,500
SEK M, 2024	in products		

Sales

80 markets

5 R&D centers

40+ sales offices

26 production sites across the globe

Customer segments

Industrial

Chemical and Petrochemical

Oil and Gas

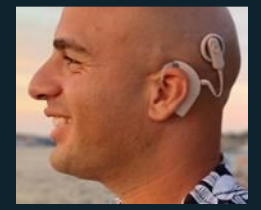
Industrial Heating

Consumer

Nuclear

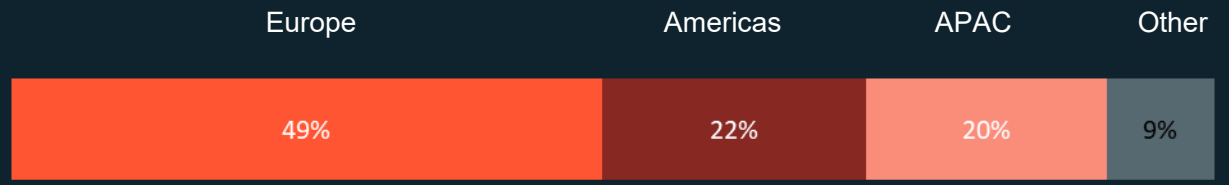
Mining and Construction

Transportation



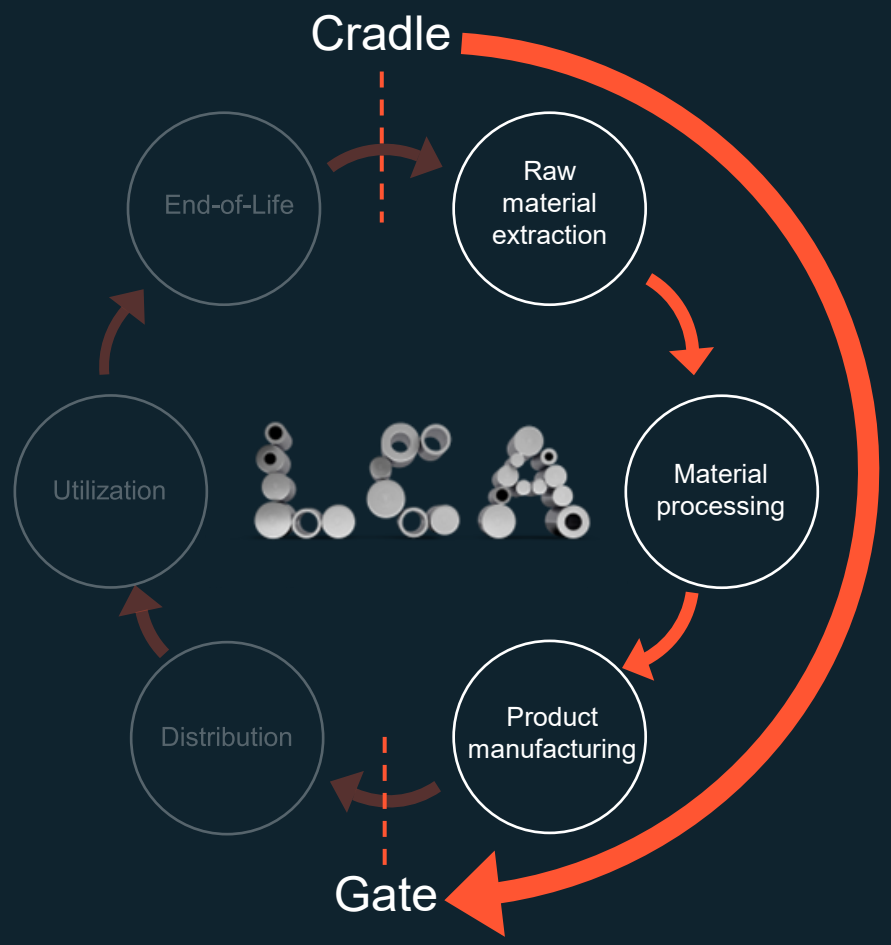
Medical

Hydrogen and Renewable energy



Challenges to compare results

- Lack of dedicated industry standards for the steel industry currently allows for inconsistent carbon footprint calculations and reporting among material producers, with no clear definitions for terms like "green steel" and "low-emission steel.“
- Calculations of the carbon footprint may differ, due to variations in setting of system boundaries (scopes;1,2,3). And if all routes and production yield losses are included.
- Organizations like IEA, Worldsteel association, and ISO are addressing these issues, but we can expect it to take some time to get stricter regulations into the industry.
- Heavy burden at the consumer to understand the differences in carbon footprint calculations and reporting between material producers and/or products.



Self-regulation of the industry or increased end-user awareness?

- Self-regulation of the steel industry with ambition to reach consensus on calculation and reporting of carbon footprint of products.
- Informing the industry end-users to enable self-assessment of product carbon emissions, to avoid misguided purchasing decisions.

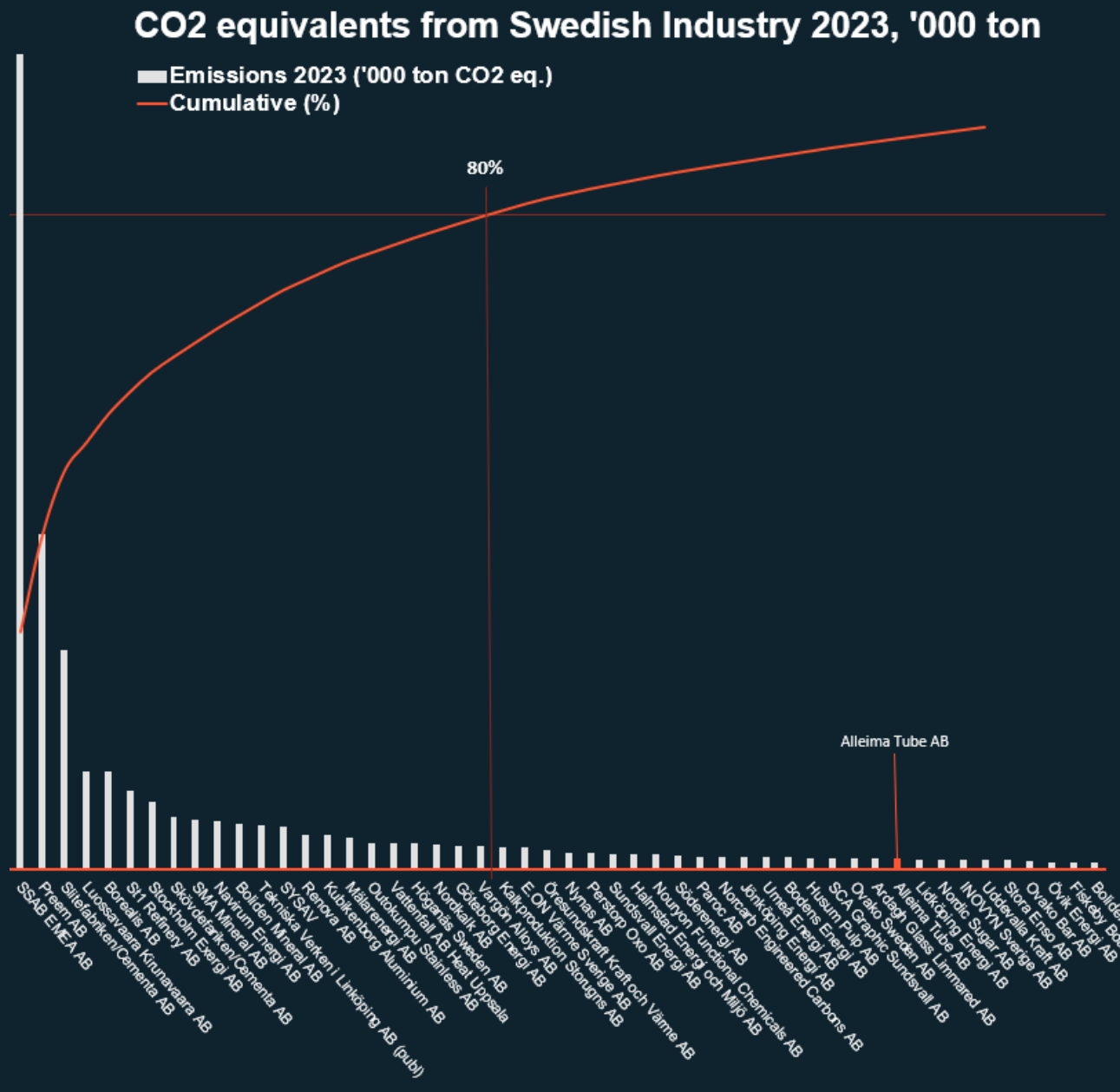
Official data of emissions reporting

— Alleima stands for 1.2% of the CO_2 emissions under EU ETS in Swedish iron & steel industry
  — This was 1.5% in 2021
  — Since 2021 Alleima reduced CO_2 emissions under the ETS by 27%

— Alleima moved down from 33rd largest emitter in Swedish industry in 2021 to 41st in 2023

— Alleima -27% in the two-year period compares well with our Swedish peer companies

'000 ton CO2 eq.	2021	2023	%
SSAB	5035	4984	-1
Outokumpu	173	163	-5
Ovako Sweden	80	64	-20
Alleima	87	64	-27



What are the influencing factors for carbon footprint when producing stainless steel?

CO2 impact from raw materials related to sourcing

12.8tonneCO2e/tonne

Generic data with South African origin

- Example when sourcing Ferro-chromium

2,2tonneCO2e/tonne

LCA data from one Alleima supplier origin Scandinavia

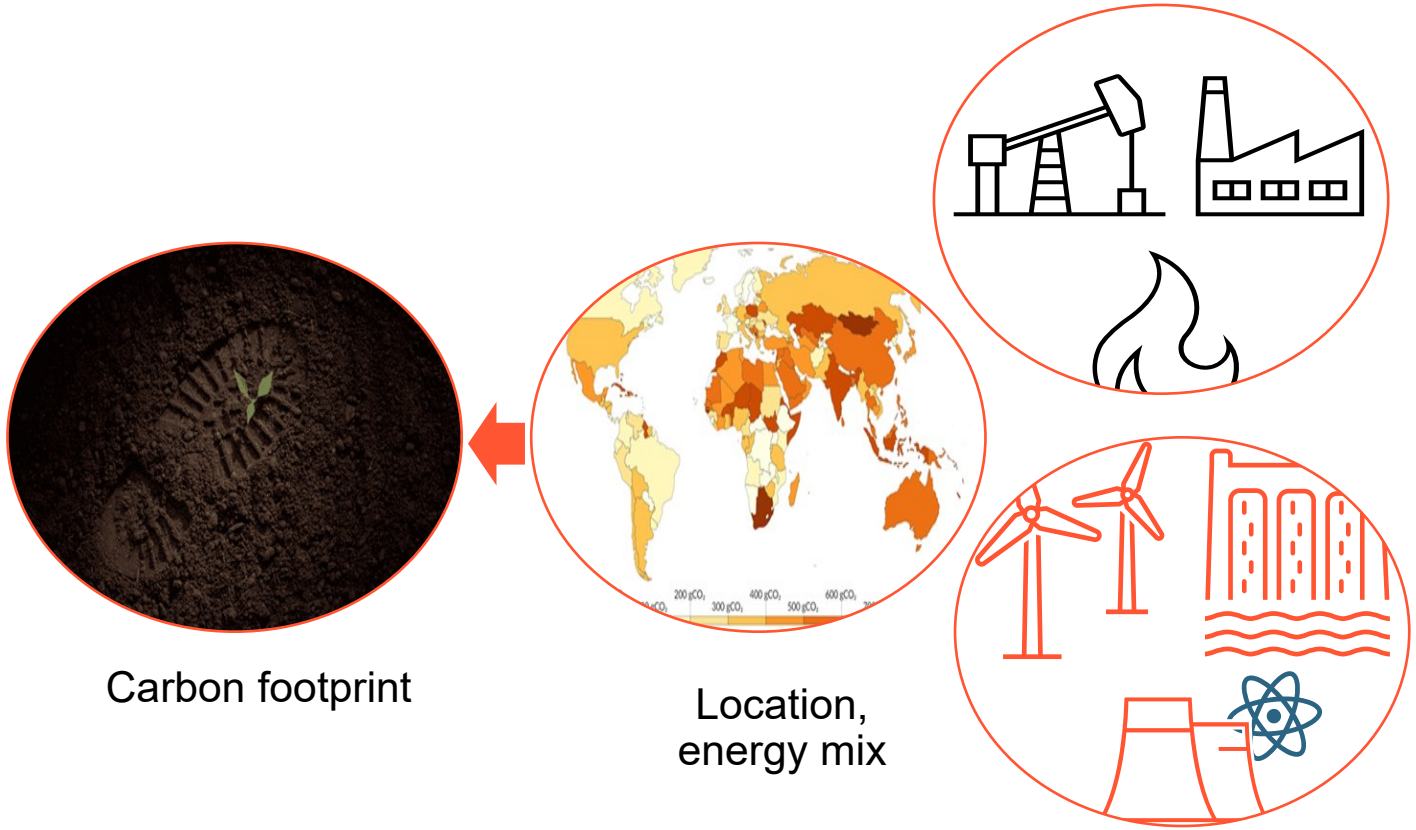
Using recycled material

Raw materials virgin or recycled

Process BF or EAF

Carbon footprint

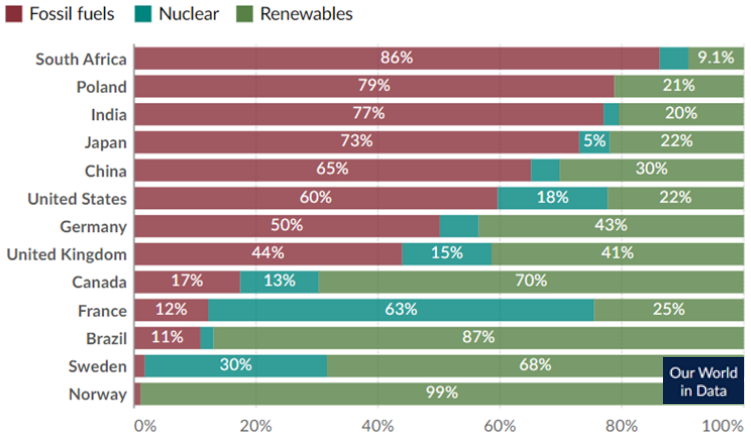
What are the influencing factors for carbon footprint when producing stainless steel?



Carbon footprint

Location, energy mix

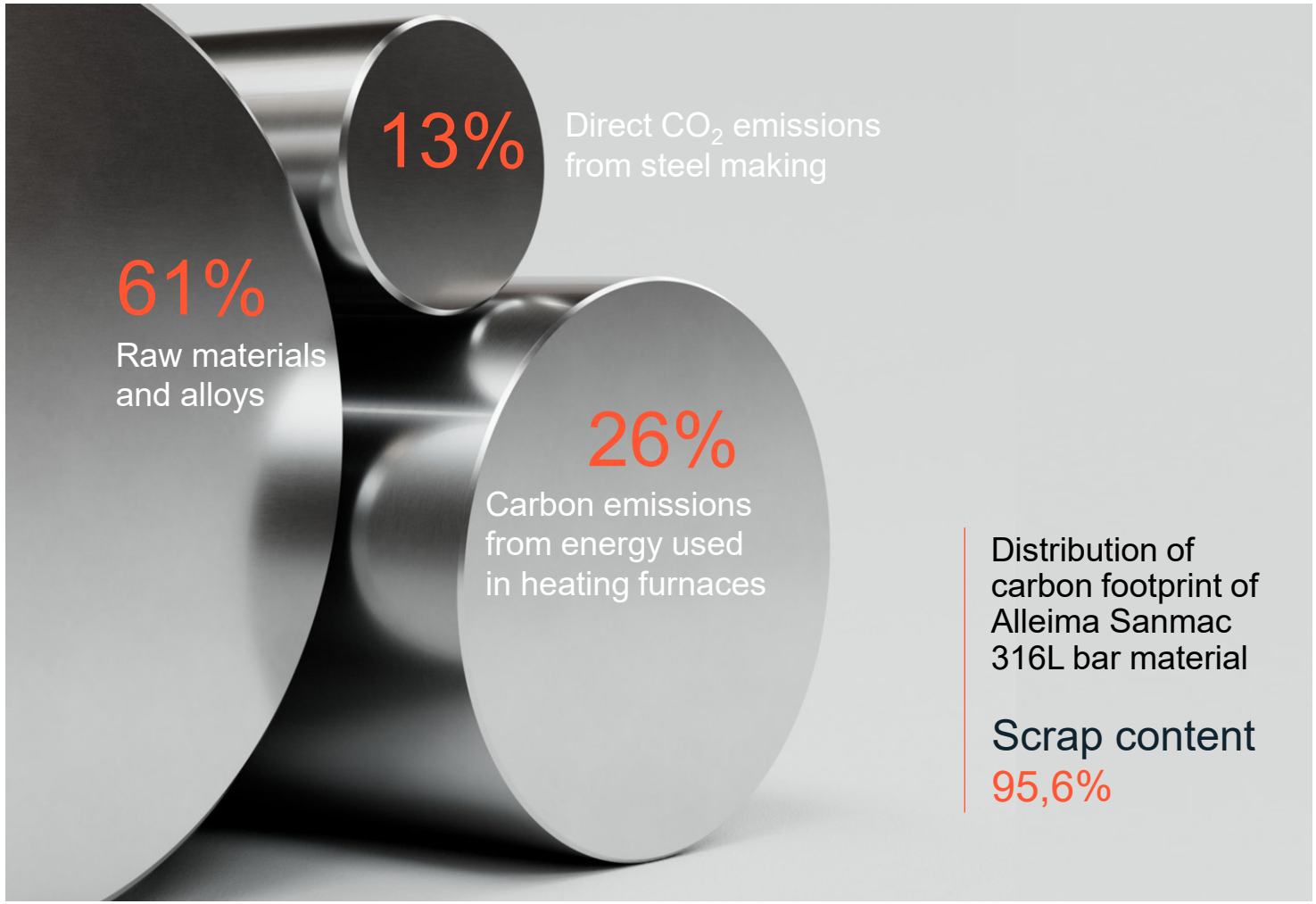
Source of energy, fossil or non fossil



Electricity generation from fossil fuels, nuclear and renewables, 2022

The carbon emission (CO_2) to make 1kW in Sweden is 45gr. Comparing to Germany (385gr), China (534gr), India (633gr).

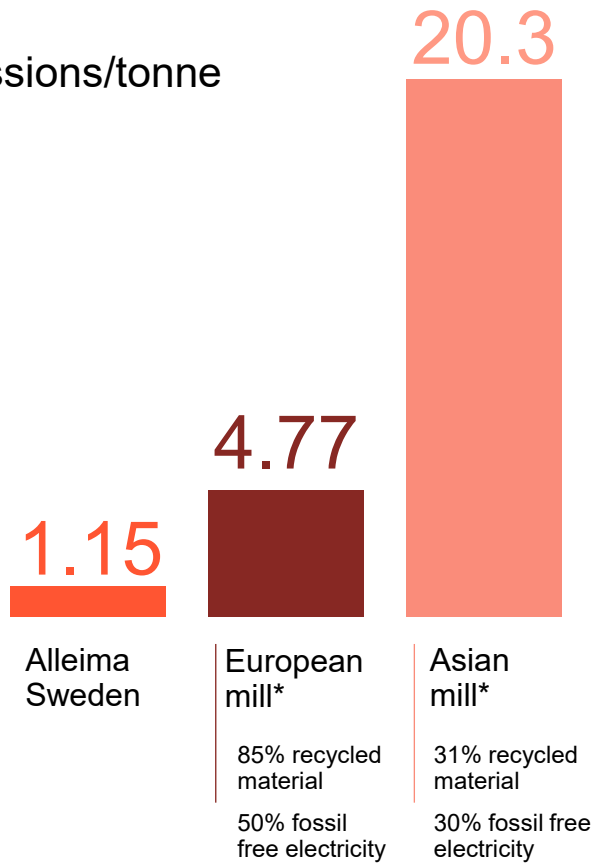
Case study Sanmac 316L bar material



Distribution of carbon footprint of Alleima Sanmac 316L bar material

Scrap content
95,6%

Tonne CO_2 emissions/tonne



* Alleima calculations based on industry average from:

worldstainless

Our World in Data

Alleima's Approach to Carbon Footprint Calculation and reporting

How Alleima calculate Sanmac 316L stainless steel bar

- Following ISO 14067 and the ISO 14040/14044 family.
- All scopes (1,2,3 upstream) included, cradle to gate.
- Including production yield losses.
- No calculations using mass balance allocation.
- 3rd party reviewed by LCA expert (Swedish research and environmental institute).
- Accuracy of LCA compared to total carbon footprint of 93%.
- Cut off below 7% of total carbon footprint.
- No carbon offsetting (wind farms, planting trees, etc.)
- **Result 1,15 tCO2e/ton material.**

Example: Sanmac 316L using minimum requirements, offsetting and mass balance allocations:

- Following ISO 14067 and the ISO 14040/14044 family.
- All scopes (1,2,3 upstream) included, cradle to gate.
- Not Including production yield losses (calculate as co-product).
- Calculations using mass balance allocation. (bio-gas instead of LNG).
- Not 3rd party reviewed, (not a shall criteria if following ISO 14067).
- Accuracy of LCA compared to total carbon footprint of 80%.
- Using the highest possible cut off allowed of 20%.
- Carbon offsetting of 10%.
- **Result 0,65 tCO2e/ton material**

Six questions for evaluating the carbon footprint

1. What is the content of recycled raw material used in the melting process?
2. Are production yield losses accounted for in the calculations?
3. What is the energy mix of fossil versus non-fossil electricity used?
4. Are all scopes (1, 2, 3 up-stream) included in the calculations?
5. Have the following standards been applied in calculating the LCA; ISO 14067 and the ISO 14040/14044 family?
6. Is the result verified by a 3rd party, and do you recognize them?

Thank you

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