LCA & Planetary Boundaries: Experience at L'Oréal

SCORE LCA Seminar – 19 March 2026

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RESEARCH & INNOVATION | L'ORÉAL FOR THE FUTURE & GREEN SCIENCES

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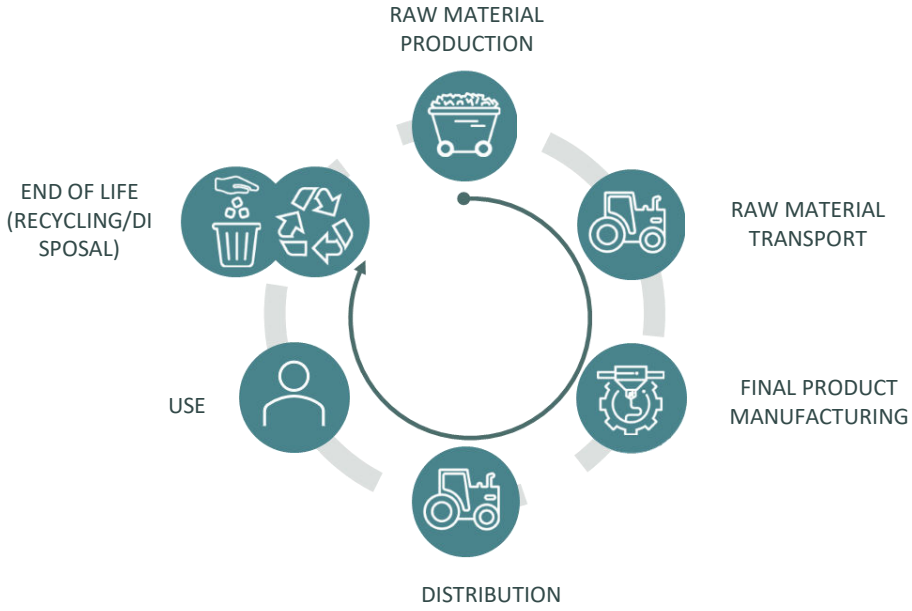
EXPERIENCE IN INTEGRATING PLANETARY BOUNDARIES INTO LCA

- **Between 2014 and 2016**, L'Oréal developped an eco-design tool for cosmetic products called SPOT aligned with PEF methodology.

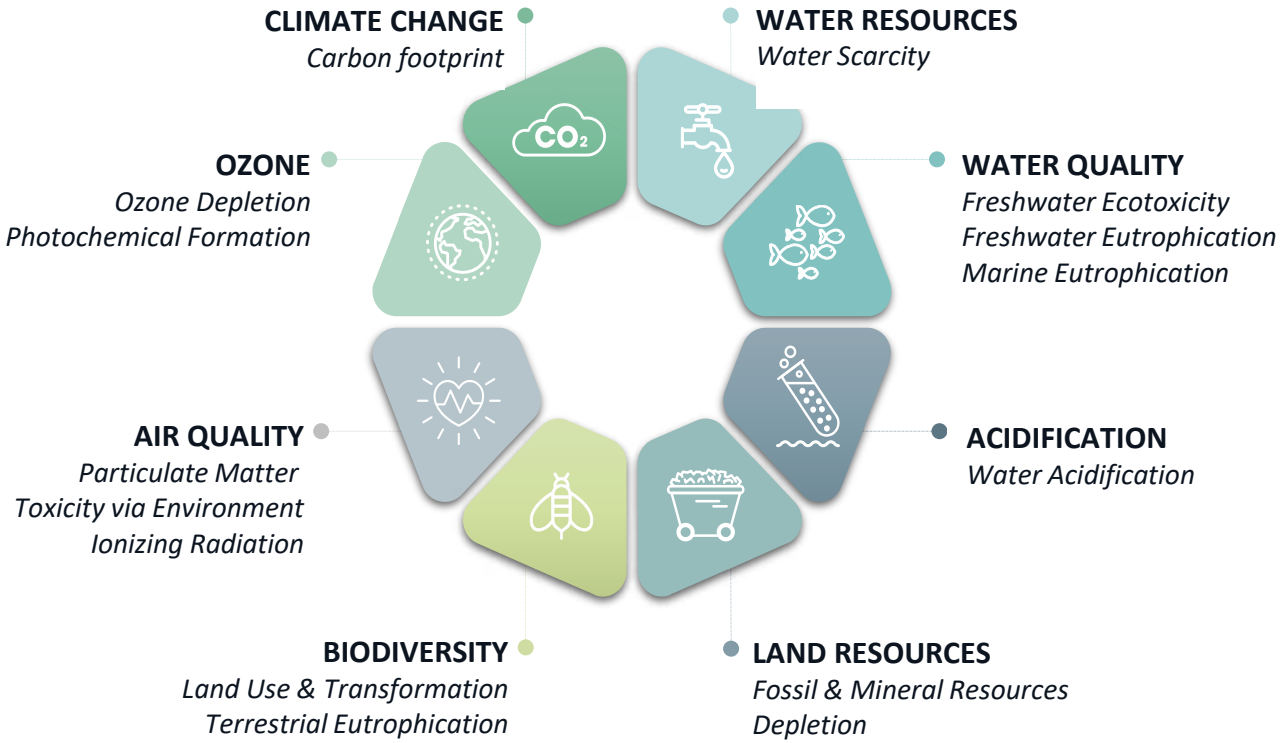
SPOT
SUSTAINABLE PRODUCT OPTIMISATION TOOL

- SPOT is based on cradle-to-grave LCA and takes into account the formula, the packaging and the manufacturing & distribution of products.

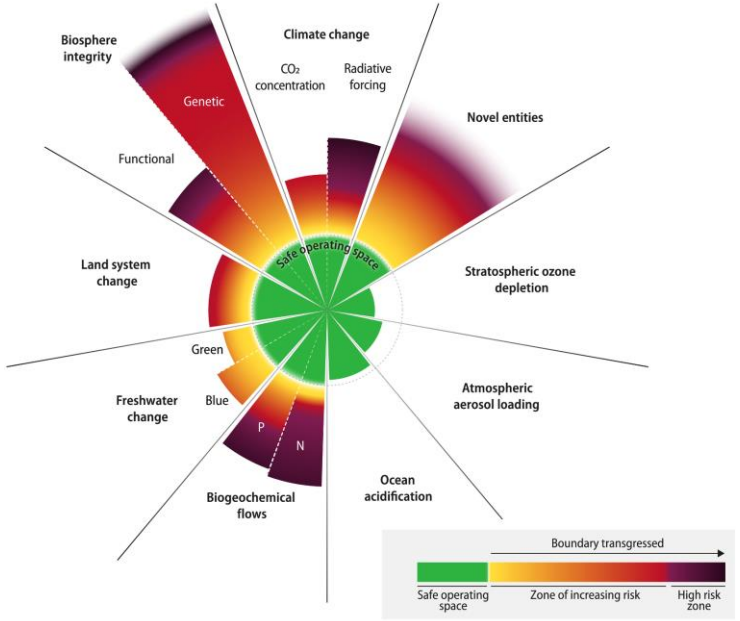


EXPERIENCE IN INTEGRATING PLANETARY BOUNDARIES INTO LCA

- SPOT measures the environmental impacts recommended by the PEF methodology.



- These environmental impacts are normalized, **weighted according to the planetary boundaries approach** and then aggregated in a single footprint.



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Why weighting the normalized impacts according to the planetary boundaries approach?

- Approach initially proposed in the PEF methodology as an alternative to the panel-based approach.
- Weighting factors based on science only.
  - Assumed to better reflect the level of criticity of the different environmental stakes for the planet compared to the PEF panel-based approach.
- Approved by the international panel of experts consulted to build the SPOT methodology and tool between 2014 and 2016.

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How weighing factors based on planetary boundaries were implemented in SPOT?

- To implement weighting factors based on planetary boundaries in SPOT, Quantis and L'Oréal developed a **dataset of weighting factors completing and improving the one created earlier by Bjorn *et al.***
- This dataset included **new weighting factors for Human Health and Resource Depletion** indicators and **improved existing factor on Photochemical Ozone Formation**.
- For **all other indicators** (Climate Change, Ozone Depletion, Acidification, Terrestrial Eutrophication, Freshwater Eutrophication, Marine Eutrophication, Land Use, Freshwater Ecotoxicity and Water Resource Depletion), the **initial values** generated by Bjorn *et al.* were **considered**.

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How weighing factors based on planetary boundaries were implemented?

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Original Articles

Operational Life Cycle Impact Assessment weighting factors based on Planetary Boundaries: Applied to cosmetic products

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Table 2
List of suggested weighting factors to comply with the PEF impact assessment method.

Impact Assessment Indicator	Weighting Factor as presented by Bjørn (2015) (Reduction Factor)	Improved Weighting Factor, including values from Bjørn (2015) as well as revised or developed values (Reduction Factor)
Climate change	9.36	9.36
Ozone depletion	0.28	0.28
Human toxicity (cancer effects)	N/A	0.26
Human toxicity (non-cancer effects)	N/A	0.90
Particulate matter	N/A	5.97
Ionizing radiation	N/A	0.01
Photochemical ozone formation	12.91	0.54
Acidification	0.53	0.53
Terrestrial eutrophication	0.30	0.30
Freshwater eutrophication	3.22	3.22
Marine eutrophication	0.55	0.55
Land use	9.33	9.33
Freshwater ecotoxicity	0.85	0.85
Water resource depletion	0.51	0.51
Mineral & fossil resource depletion	N/A	4.08

Weighting factors are applied in SPOT as % of their total sum

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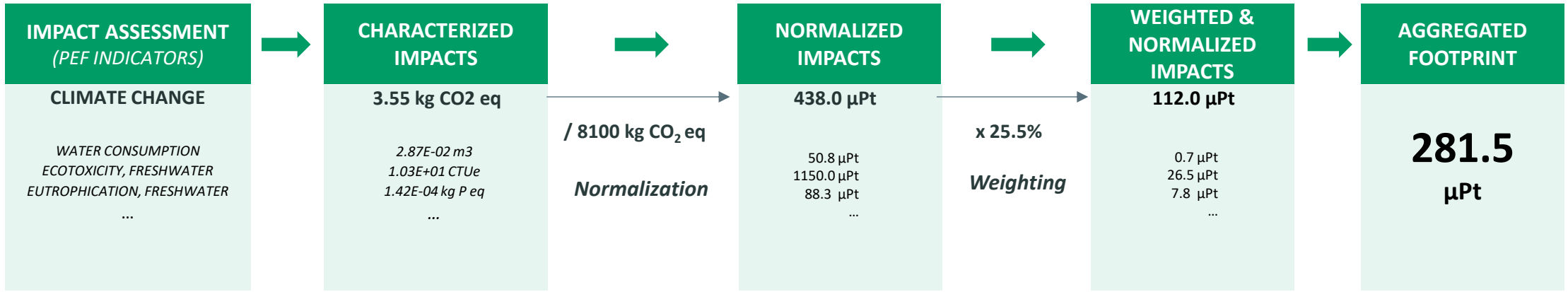
Case study: calculation of the single footprint of 1kg of glycerin in SPOT

CASE STUDY

1 kg of rapeseed oil-based glycerin*



*Generic LCI from Ecoinvent calculated with L'Oréal LCIA method.

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LIMITATIONS IN INTEGRATING PLANETARY BOUNDARIES INTO LCA

- Planetary boundaries are global threshold values while **most environmental impacts occur at smaller geographic scale** (country, region, watershed, etc.).

- Today, most companies and consultants using single environmental footprints apply the **panel-based weighting factors** in accordance with the PEF framework.

- Although scientific works on planetary boundaries by the EU Commission Joint Research Center have been ongoing for several years (e.g. updated set of weighting factors published in 2020, AESA approach), **no implementation in the PEF methodology** is planned in the near future.

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