Relevance of Emission Accounting Methods for the Classification of Green Hydrogen

Comparison of the Delegated Act Methodolody and Life Cycle Assessment

Research Context

Forschungsstelle für Energiewirtschaft

Trans4ReaL

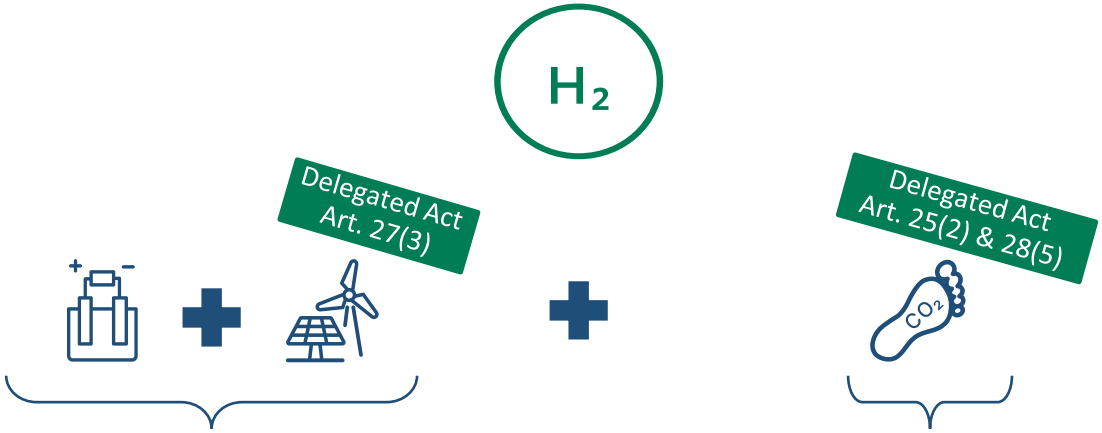
Climate neutrality requires green hydrogen

Living labs bring hydrogen into practice

Trans4ReaL scales the findings of the living labs

supported by the Federal Ministry for Economic Affairs and Climate Action (BMWK), FKZ: 003EWT001A

Why is emission accounting relevant for green hydrogen?



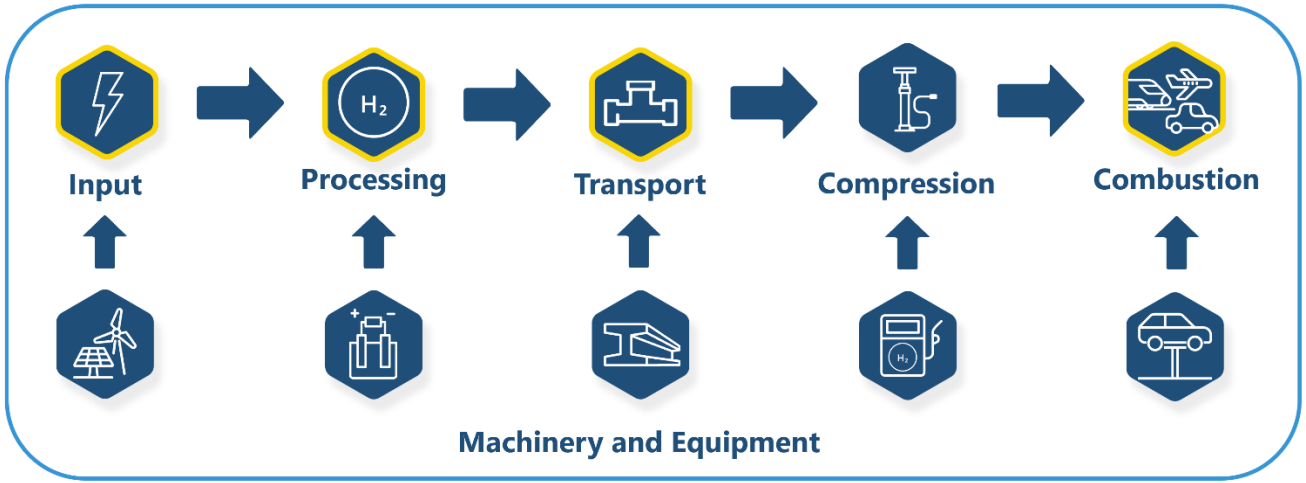
Regulatory Setting and Objective

	Renewable Energy Directive 2018/2001 (RED II)	EU taxonomy
Scope	Hydrogen as a transport sector	
Methodology	Delegated Act (DA) supplementing Art. 25(3) & 28(5): methodology for GHG emissions savings	
Greenhouse gas (GHG) threshold hydrogen	3.4 kg CO_2e / kg H_2	

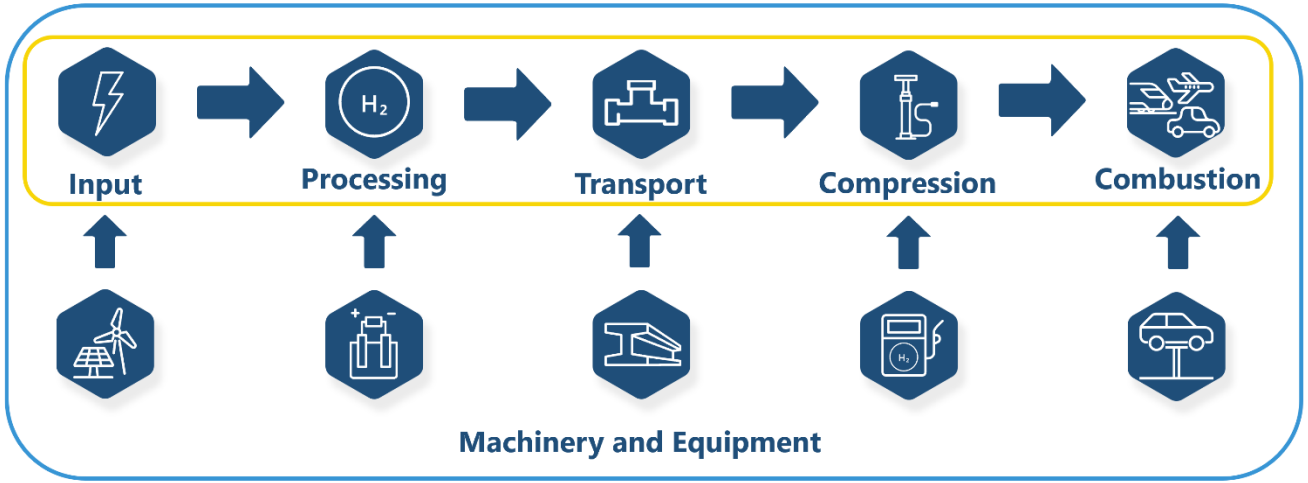
DA is adopted

show methodological differences between the emission accounting methods by comparing the carbon footprint of hydrogen from Proton-Exchange-Membrane (PEM) electrolysis

System Boundary



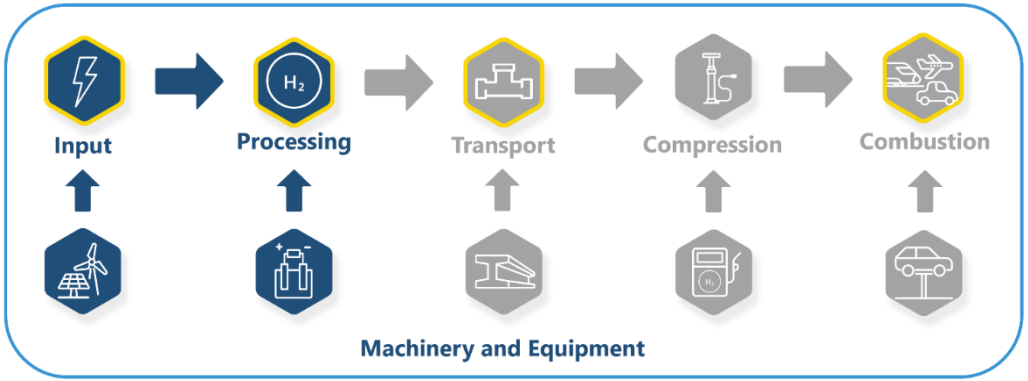
System Boundary – adopted DA



System boundary Life Cycle Assessment

System boundary Delegated Act

System Boundary - methodology comparison



	DA	Life Cycle Assessment
electricity mix in Germany 2018	Annex of DA	Umweltbundesamt (UBA) (incl. upstream emissions)
renewable electricity	0	wind: UBA solar: UBA, ecoinvent 3.8

Carbon Footprint of Hydrogen

Comparison of Emission Accouting Methodologies

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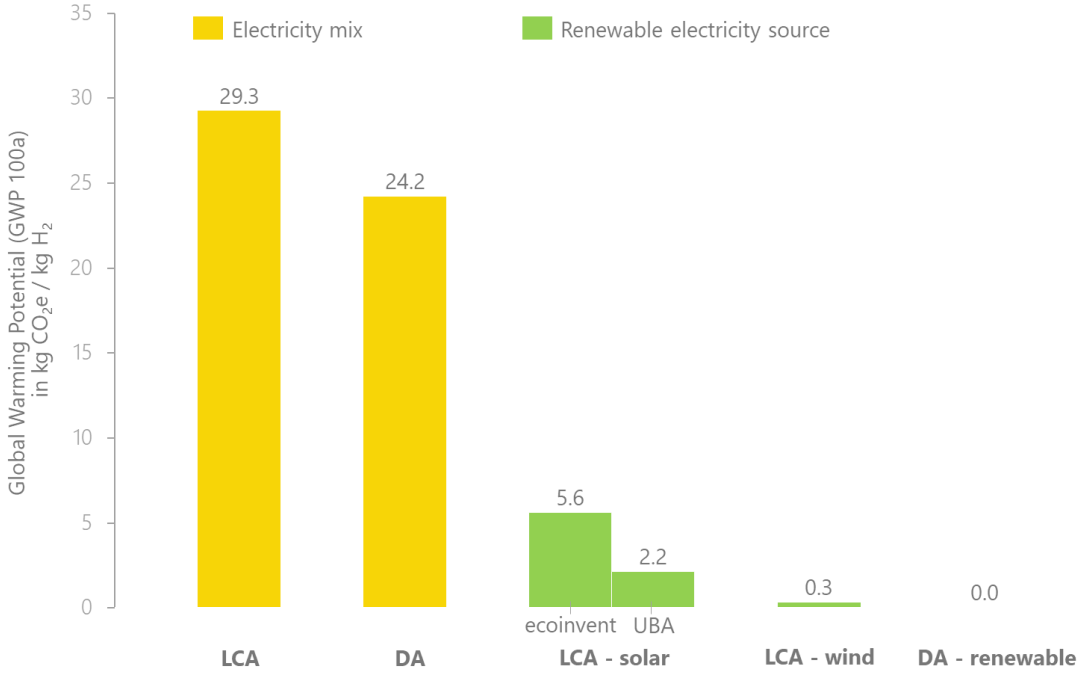
Carbon footprint comparison of hydrogen



Key results

Carbon footprint according to **LCA methodology is higher than according to DA methodology**

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hydrogen produced from the **German electricity mix is significantly higher than from renewable electricity**

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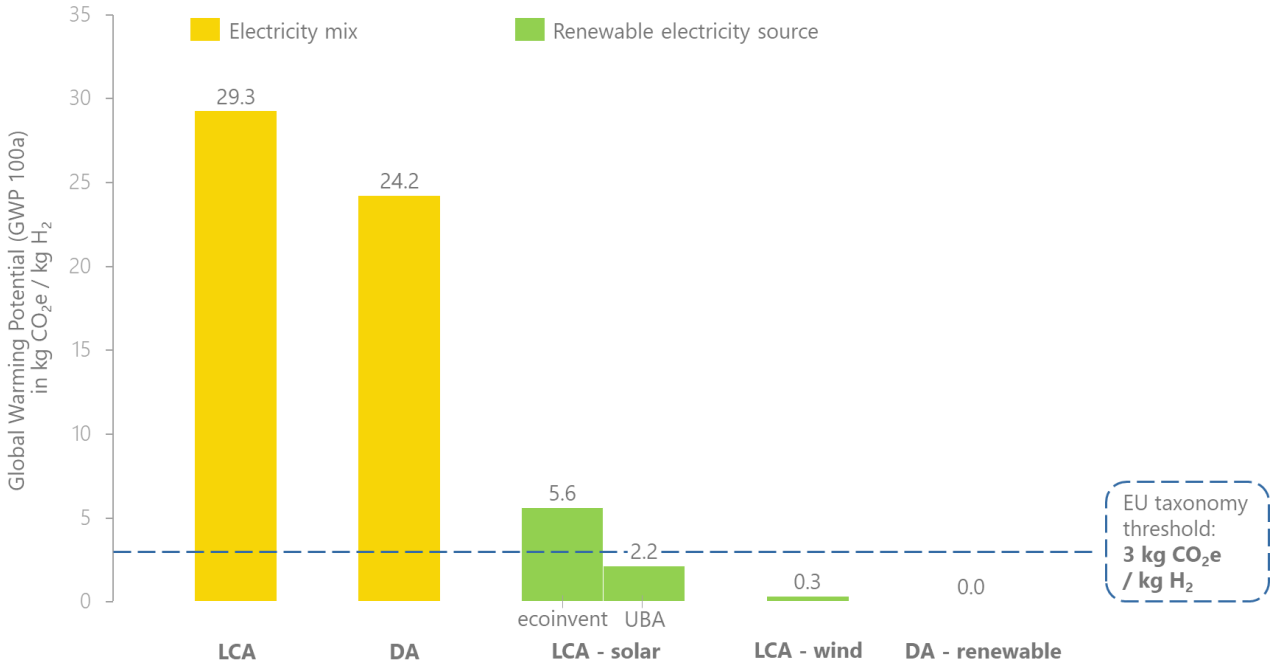
Applying **LCA** methodology, the carbon footprint of hydrogen from **solar power is higher than wind**

Regulatory carbon footprint threshold



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With **LCA** the **data source** for the emission factor of **solar power is decisive** for exceeding the EU taxonomy threshold

Conclusion

- Creation of reliable and consistent regulatory framework for emissions accounting of green hydrogen
- Alignment of the carbon footprint threshold with the defined methodology
- Standardization of emission accounting methodology and data base to ensure comparability of the carbon footprint of green hydrogen


Thank you.

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Sources

- European Commission (2022). Delegated Act supplementing Directive (EU) 2018/2001 of the European Parliament and of the Council by establishing a minimum threshold for greenhouse gas emissions savings of recycled carbon fuels and by specifying a methodology for assessing greenhouse gas emissions savings from renewable liquid and gaseous transport fuels of non-biological origin and from recycled carbon fuels (Draft from May 2022) https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12713-Renewable-energy-method-for-assessing-greenhouse-gas-emission-savings-for-certain-fuels_en.
- European Commission (2021) Delegierte Verordnung (EU) 2021/2139 der Kommission vom 04. Juni 2021 zur Ergänzung der Verordnung (EU) 2020/852 des Europäischen Parlaments und des Rates durch Festlegung der technischen Bewertungskriterien, anhand deren bestimmt wird, unter welchen Bedingungen davon auszugehen ist, dass eine Wirtschaftstätigkeit einen wesentlichen Beitrag zum Klimaschutz oder zur Anpassung an den Klimawandel leistet, und anhand deren bestimmt wird, ob diese Wirtschaftstätigkeit erhebliche Beeinträchtigungen eines der übrigen Umweltziele vermeidet. Ausgefertigt am 2021-06-04, Version vom 2021-06-04; Brüssel
- FfE (2021). Ökobilanzen synthetischer Kraftstoffe – Methodikleitfaden https://www.ffe.de/wp-content/uploads/2018/06/20210906_Methodikleitfaden_BEniVer.pdf.
- Umweltbundesamt (2022). Entwicklung der spezifischen Treibhausgas-Emissionen des deutschen Strommix in den Jahren 1990 – 2021 https://www.umweltbundesamt.de/sites/default/files/medien/1410/publikationen/2022-04-13_cc_15-2022_strommix_2022_fin_bf.pdf.
- Umweltbundesamt (2021). Aktualisierung und Bewertung der Ökobilanzen von Windenergie- und Photovoltaikanlagen unter Berücksichtigung aktueller Technologieentwicklungen https://www.umweltbundesamt.de/sites/default/files/medien/5750/publikationen/2021-05-06_cc_35-2021_oekobilanzen_windenergie_photovoltaik.pdf.
- The ecoinvent Database, Version 3.8: www.ecoinvent.org; Zürich: ecoinvent, 2022.