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SH2E

Sustainability Assessment of Harmonised Hydrogen Energy Systems:

Guidelines for Life Cycle Sustainability Assessment and Prospective Benchmarking

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Project Overview

- Call year: 2020
- Call topic: FCH-04-5-2020 — Guidelines for Life Cycle Sustainability Assessment (LCSA) of fuel cell and hydrogen systems
- Project dates: 1st Jan 2021 — 30th Jun 2024
- % stage of implementation 01/11/2023: 85 %
- Total project budget: 2,142,778.75 €
- Clean Hydrogen Partnership max. contribution: 1,997,616.25 €
- Other financial contribution: 145,162.50 €
- Partners: GD, FZJ, CEA, FHa, SYMBIO France, IAE, IME

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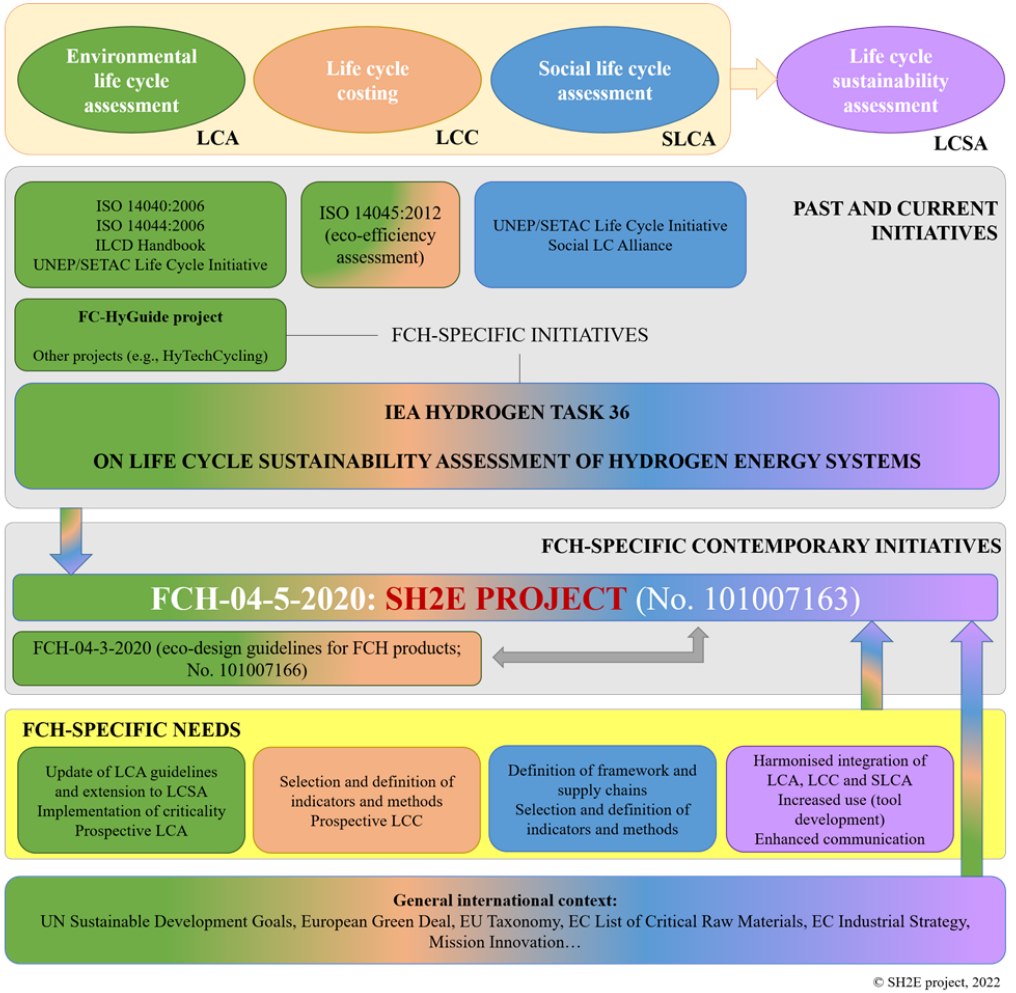
Project Summary

- To provide a well-defined, validated and practical framework for LCSA of FCH systems.
- To facilitate robust decision-making processes in the field of FCH by adding sustainability criteria to the characterisation and benchmarking of FCH systems.
- Development and application of specific guidelines for the environmental, economic and social life cycle assessment of FCH systems, and their consistent integration into a sound LCSA framework.

https://www.youtube.com/watch?v=UWgCjLK9QHI



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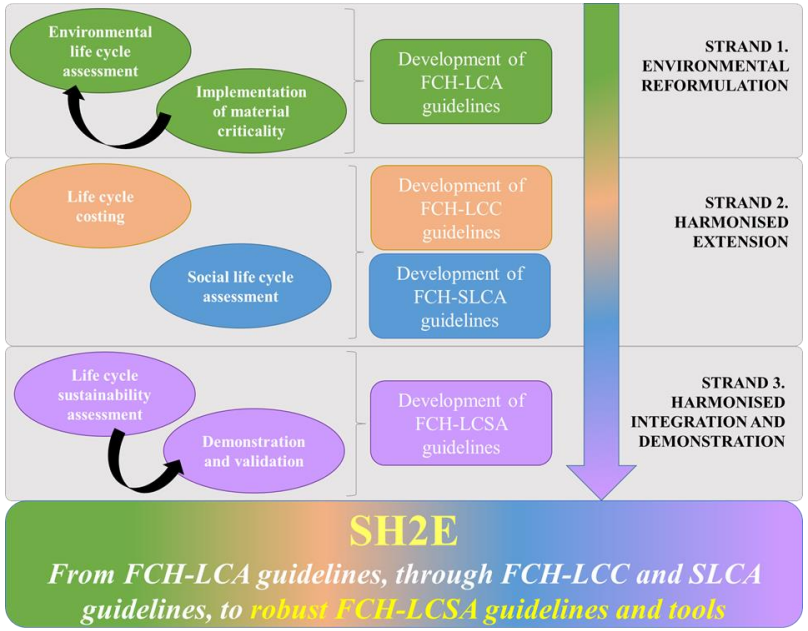
FCH-LCSA guidelines

Achievement to-date

0 docs

1 doc

25% 50% 75%



- 1 document of FCH-LCA guidelines
- 1 material criticality indicator
- 1 document of FCH-LCC guidelines
- 1 document of FCH-SLCA guidelines
- 1 document of FCH-LCSA guidelines

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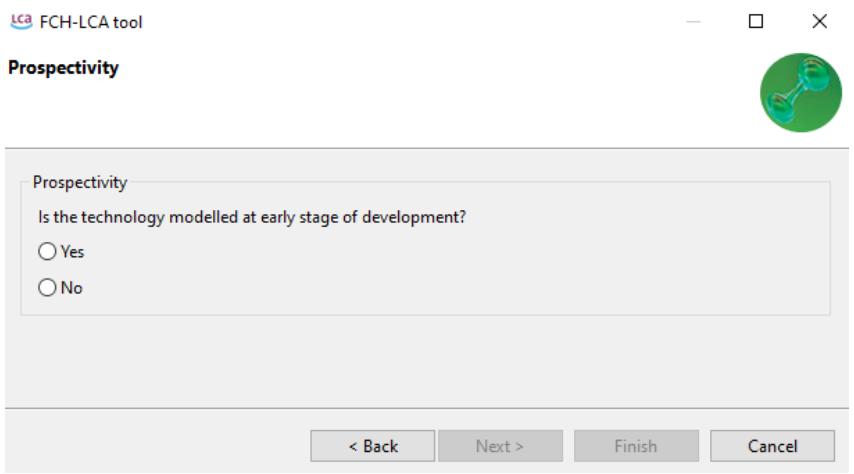
FCH-LCSA tool

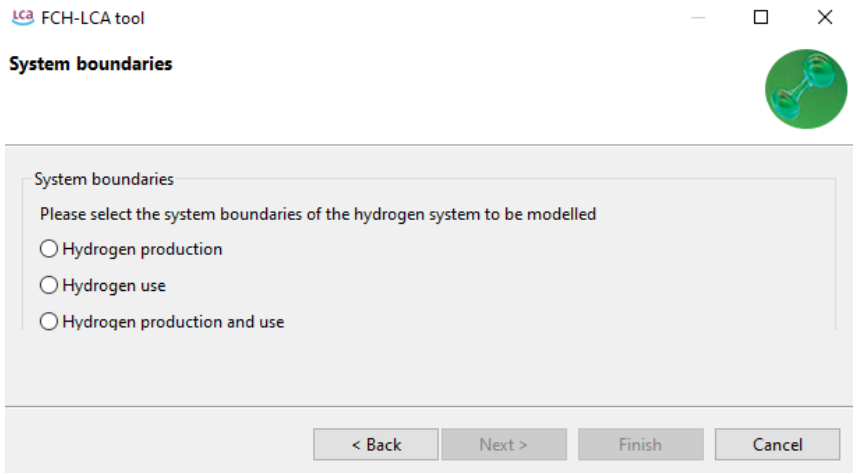
Achievement to-date

0 tools → 1 tool

25% 50% 75%

- 1 integrated FCH-LCA/LCC/SLCA/LCSA software tool





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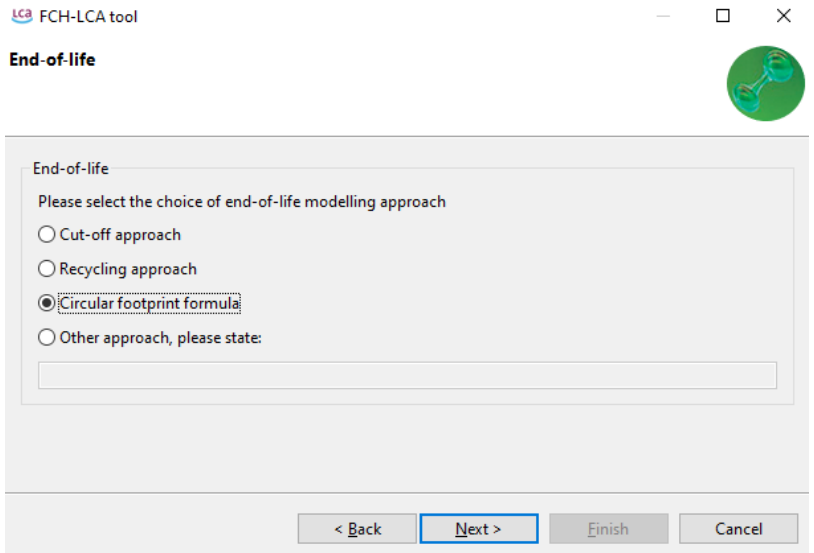

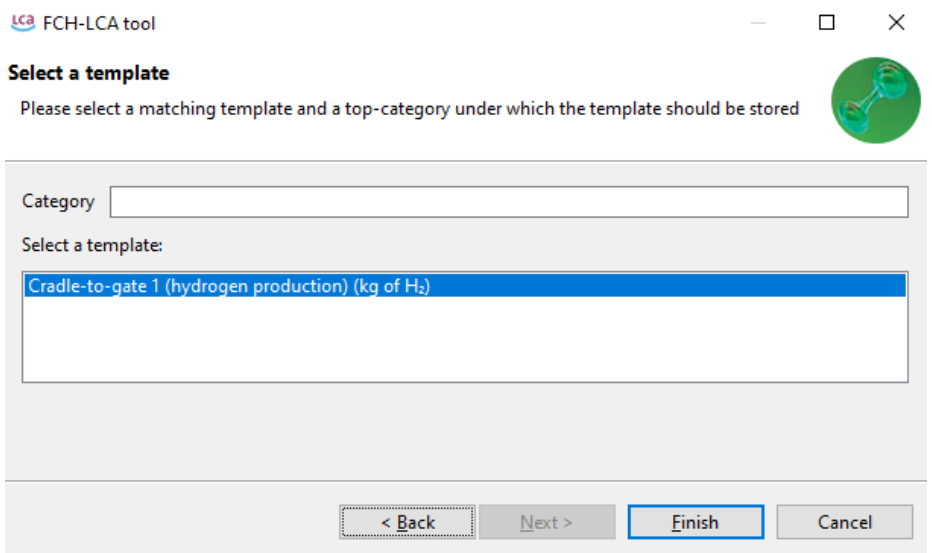

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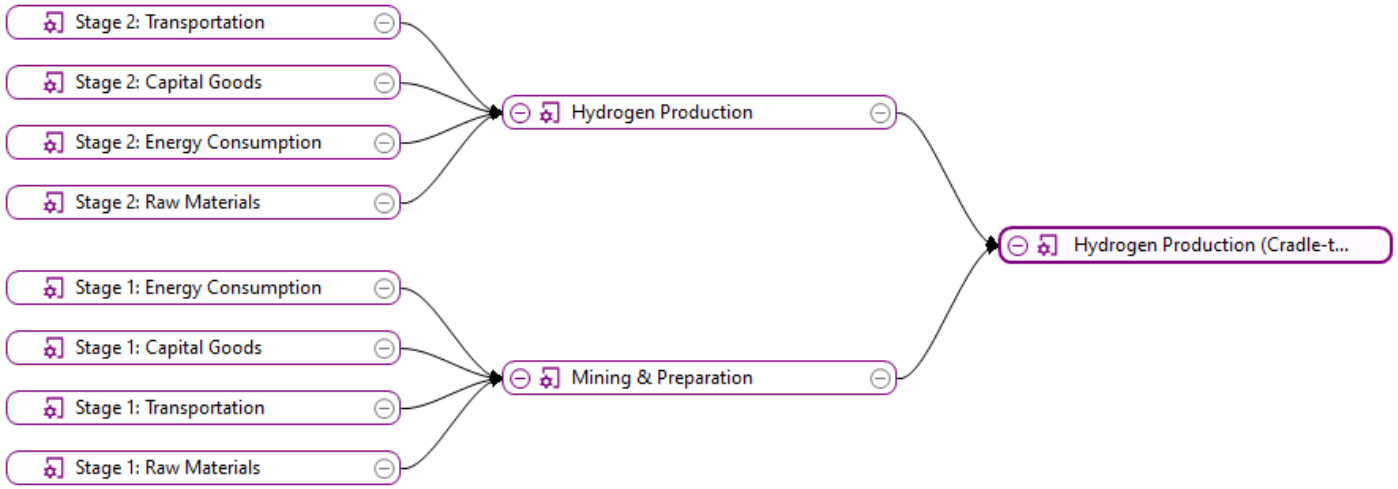

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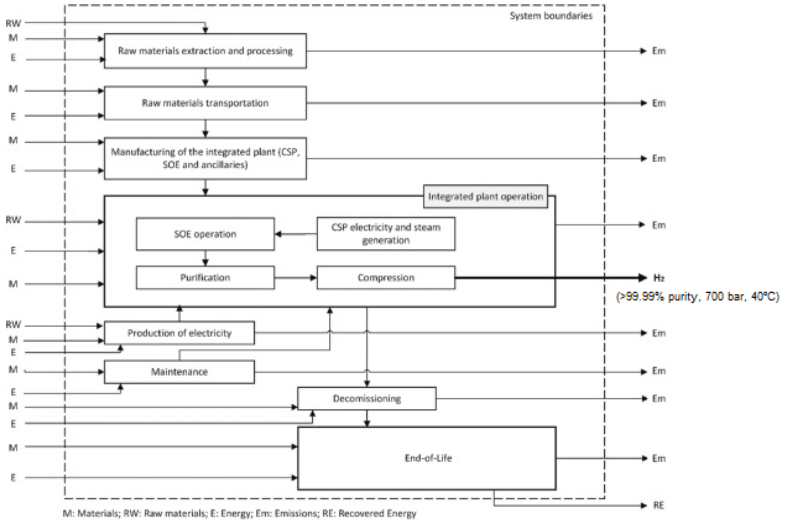
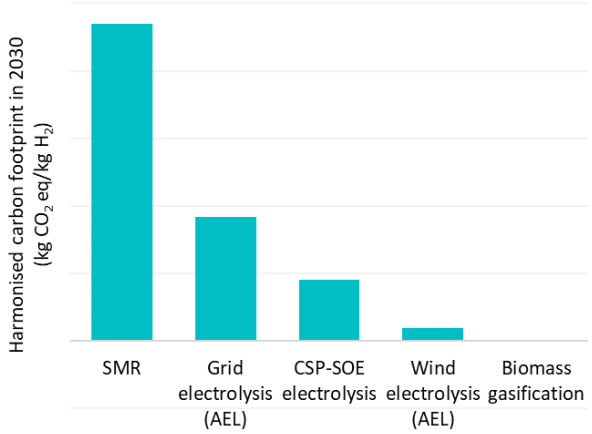
FCH-LCSA case studies

Achievement to-date 0 case studies → 2 case studies

25% 50% 75%

- 2 FCH systems being assessed and benchmarked from a life-cycle sustainability perspective:
  - Hydrogen production through solid oxide electrolysis coupled with a concentrated solar power plant
  - Hydrogen use in a proton-exchange membrane fuel cell electric car





https://doi.org/10.1016/j.renene.2022.07.066

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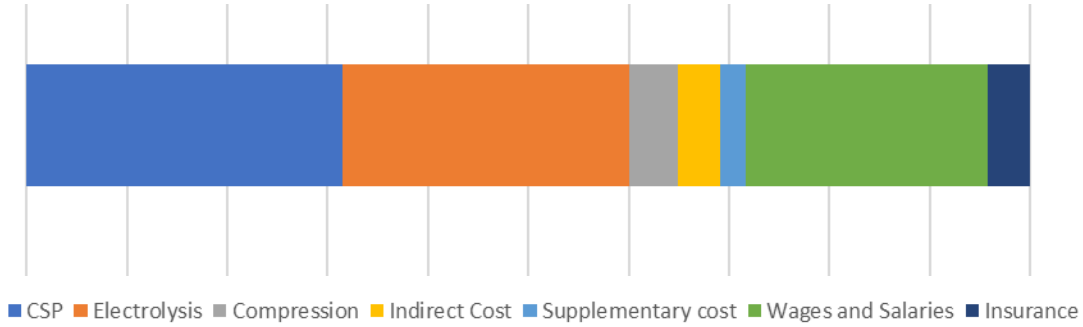

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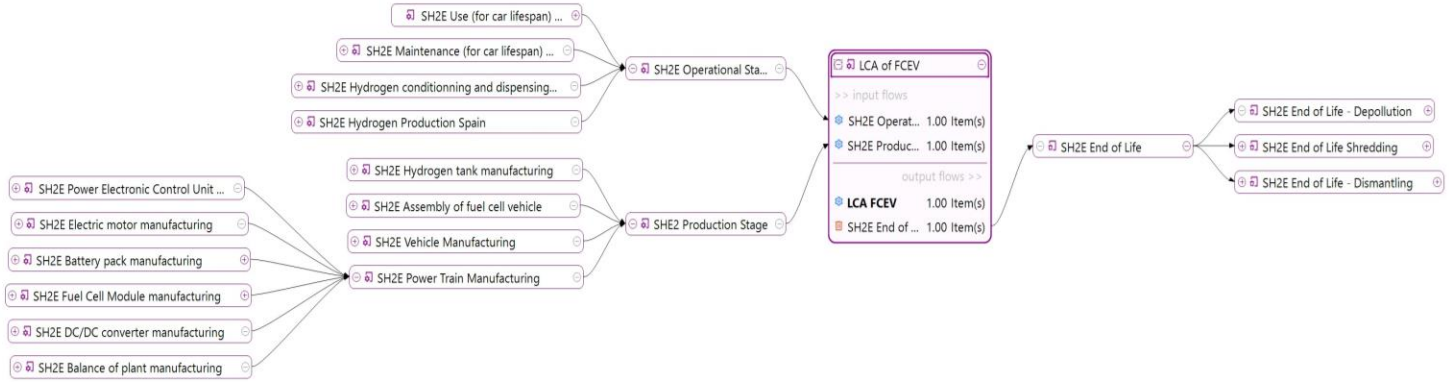

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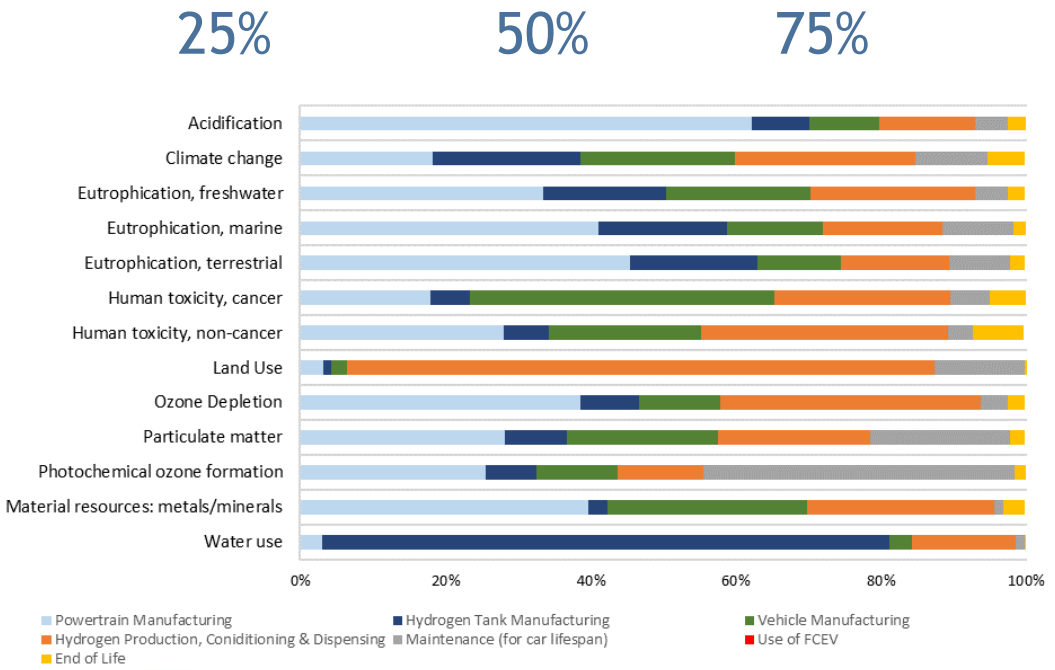

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Risks, Challenges and Lessons

- No deviations
- Challenges:
  - Widespread use → upcoming dissemination events (EHEC2024, URJC Summer School, etc.)
- Next steps:
  - Final version of the guidelines
  - Final version of the tool
  - Final version of the case studies
  - Third-party review

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Exploitation Plan/Expected Impact

Exploitation

- RCS strategy for LCSA of FCH systems
  - Guidelines
  - Tool
- Exploitation plan (June 2024)

Impact

- Robust framework for a transparent, harmonised and up-to-date LCSA of FCH systems as well as for a fair comparison between competing technical solutions

- Robust decision-making processes

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