SH2E Spring School (20-24 May 2024)

Welcome and introduction to the school

Javier Dufour
IMDEA Energy / Rey Juan Carlos University

Co-funded by the European Union

Clean Hydrogen Partnership

This project has received funding from the Fuel Cells and Hydrogen 2 Joint Undertaking (now Clean Hydrogen Partnership) under Grant Agreement No 101007163. This Joint Undertaking receives support from the European Union's Horizon 2020 Research and Innovation program, Hydrogen Europe and Hydrogen Europe Research.

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- 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
- Total project budget: 2,142,778.75 €
- Clean Hydrogen Partnership max. contribution: 1,997,616.25 €
- Other financial contribution: 145,162.50 €

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Clean Hydrogen Partnership

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Participant	Country
Fundación IMDEA Energía (IMDEA Energy)	Spain
GreenDelta GmbH (GD)	Germany
Forschungszentrum Jülich GmbH (FZJ)	Germany
Commissariat à l'énergie atomique et aux énergies alternatives (CEA)	France
Fundación para el Desarrollo de las Nuevas Tecnologías del Hidrógeno en Aragón (FHa)	Spain
Symbio (SYM)	France
Institute of Applied Energy (IAE)	Japan

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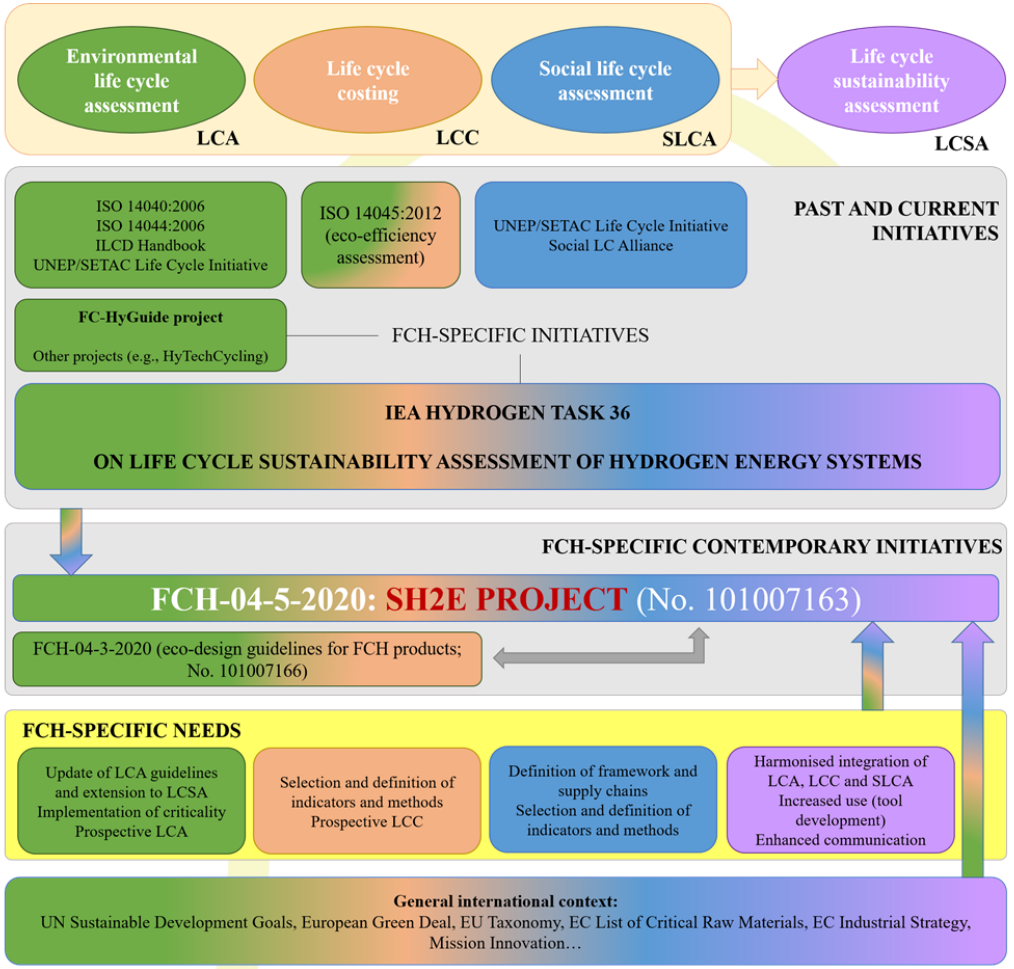
- To provide a well-defined, validated and practical framework for LCSA of FCH systems.
- To facilitate robust decision-making processes in the field of FCH by adding sustainability criteria to the characterisation and benchmarking of FCH systems.
- Development and application of specific guidelines 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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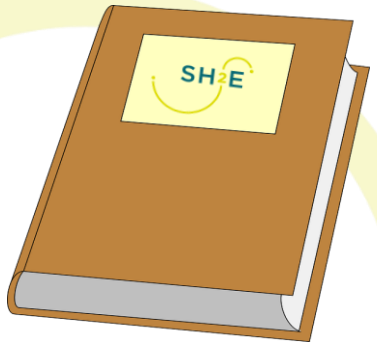
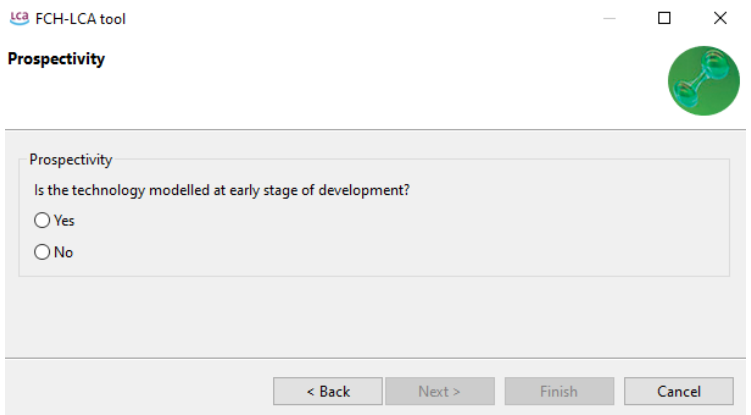
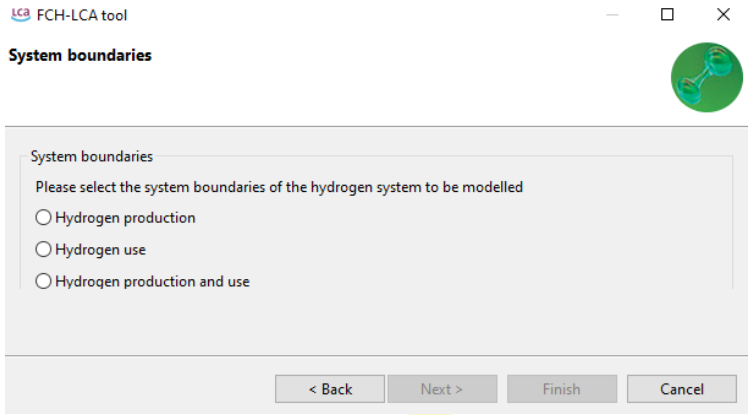
- 1 document of FCH-LCA guidelines
- 1 material criticality indicator
- 1 document of FCH-LCC guidelines
- 1 document of FCH-SLCA guidelines
- 1 document of FCH-LCSA guidelines
- 1 integrated FCH-LCA/LCC/SLCA/LCSA software tool







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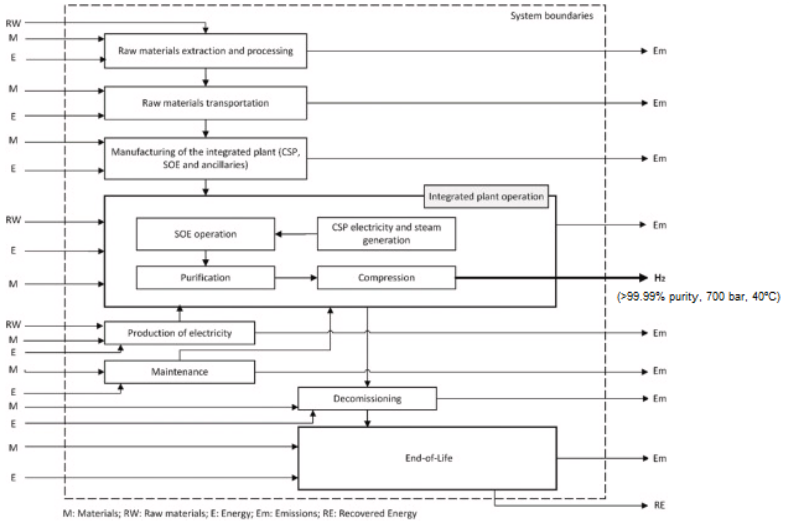
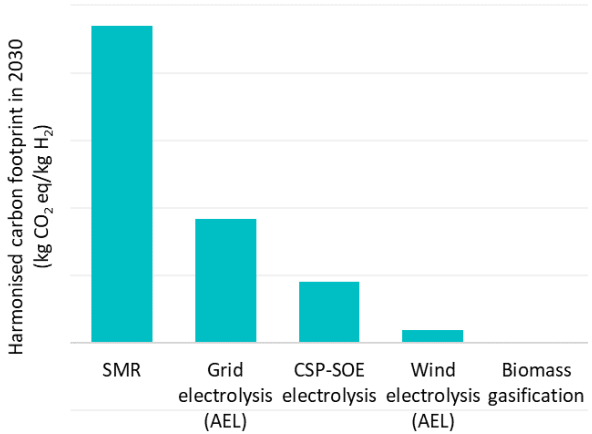
- 2 FCH systems being assessed and benchmarked from a life-cycle sustainability perspective:
  - Hydrogen production through solid oxide electrolysis coupled with a concentrated solar power plant
  - Hydrogen use in a proton-exchange membrane fuel cell electric car





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eGHOST

eco-design
Guidelines for Hydrogen
Systems and Technologies

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eGHOST Spring School (20-24 May 2024)

Title of the presentation

Name of the speaker (Organisation)

Co-funded by the European Union

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Summary

- Call year: 2020
- Call topic: FCH-04-3-2020 – Development of eco-design guidelines for FCH products
- Project dates: 1st Jan 2021 – 31st May 2024
- Total project budget: 1,133,541.25 €
- Clean Hydrogen Partnership max. contribution: 998,991.25 €
- Other financial contribution: 134,550.00 €

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Participant	Country
IMDEA Energy Foundation (IMDEAE)	Spain
French Alternative Energies and Atomic Energy Commission (CEA)	France
University of Ljubljana (UL)	Slovenia
Institute of Applied Energy (IAE)	Japan
Fundación Hidrógeno Aragón (FHa)	Spain
Symbio (SYM)	France

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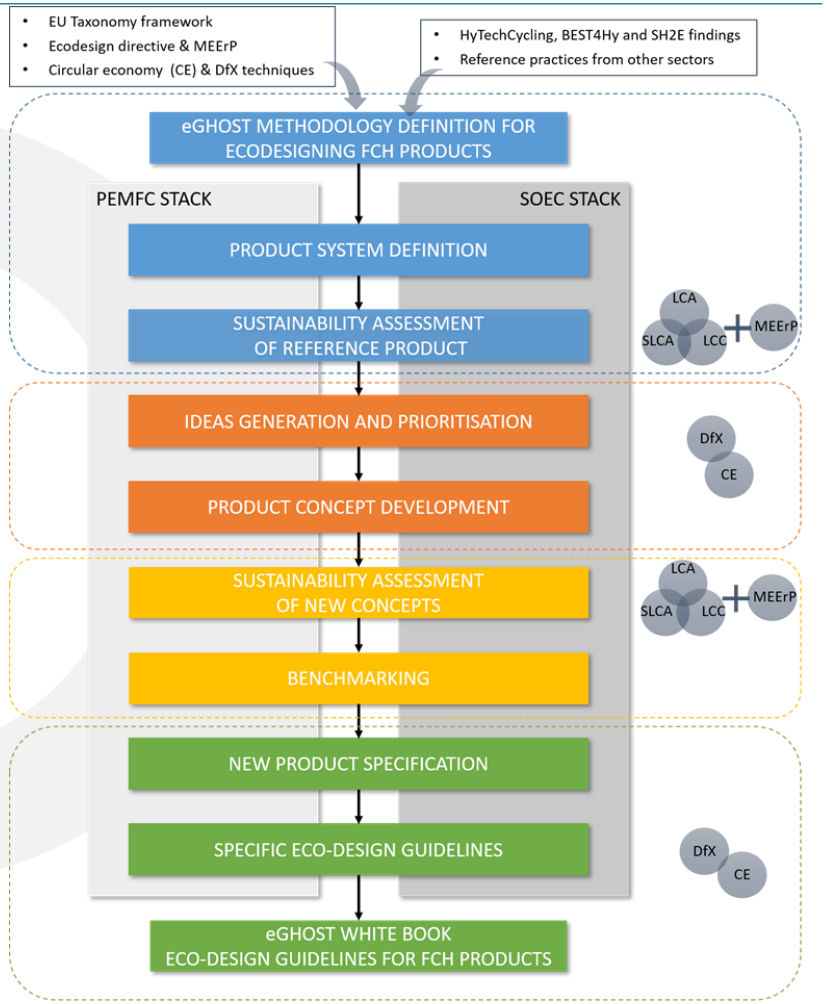
Objectives

- First milestone in the eco-design of FCH products.
- To provide robust eco-design guidelines for FCH products at different levels of development.
- Towards sustainable-by-design FCH products.
- Specific guidelines for two different products: PEMFC stack and SOE stack.

https://www.youtube.com/watch?v=3AmJgzlHVk0



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Achievements

Guidelines for SbD PEMFC stacks

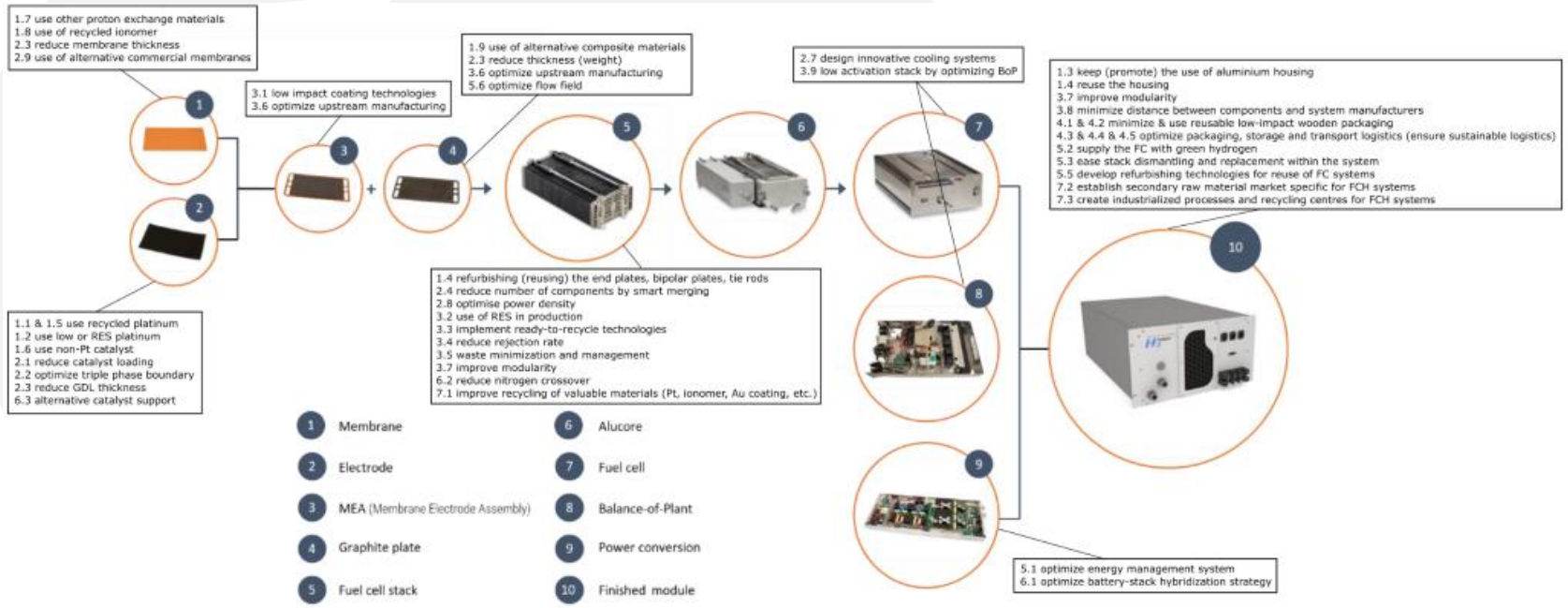
- Base case
- Product concepts:

Realistic product concept

Short-term → Medium-to-long-term

Optimistic product concept

Disruptive product concept



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Achievements

Guidelines for SbD SOE stacks

- Base case
- Realistic product concept
- Optimistic product concept

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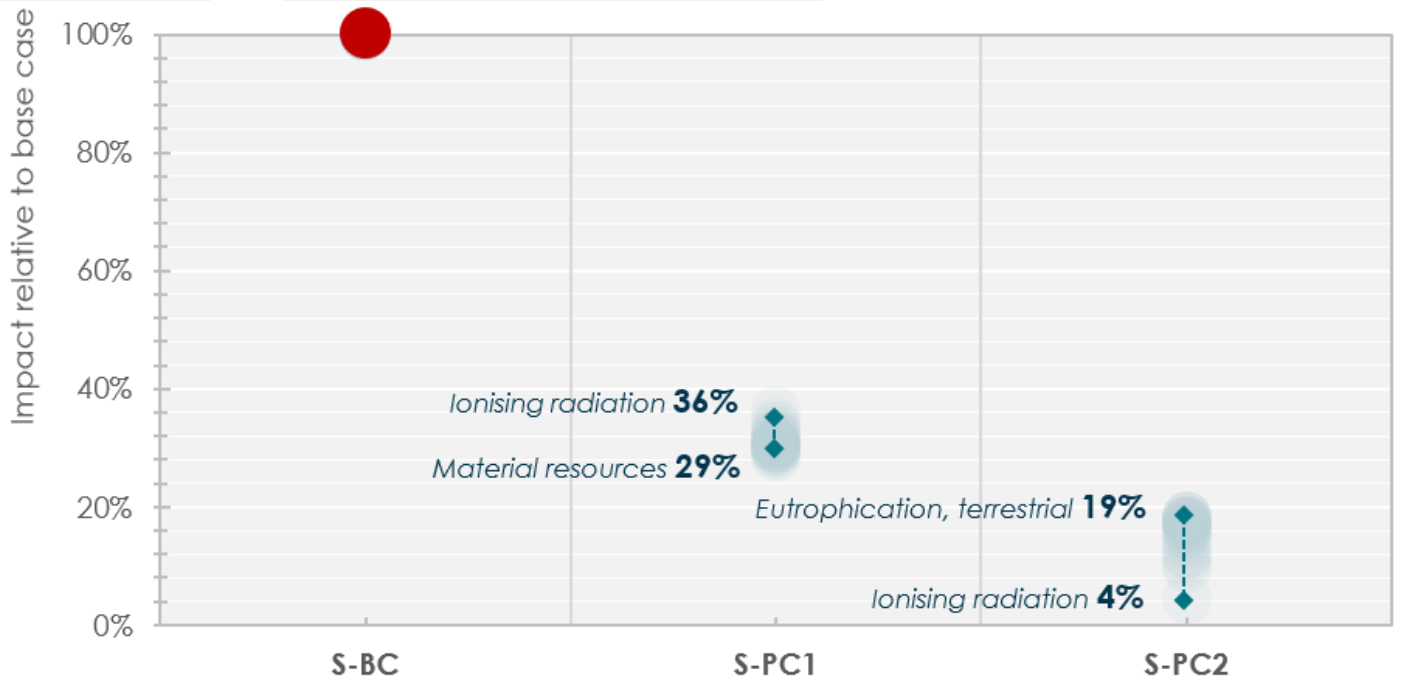
Achievements

Guidelines for SbD SOE stacks

- Base case
- Realistic product concept
- Optimistic product concept



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Achievements

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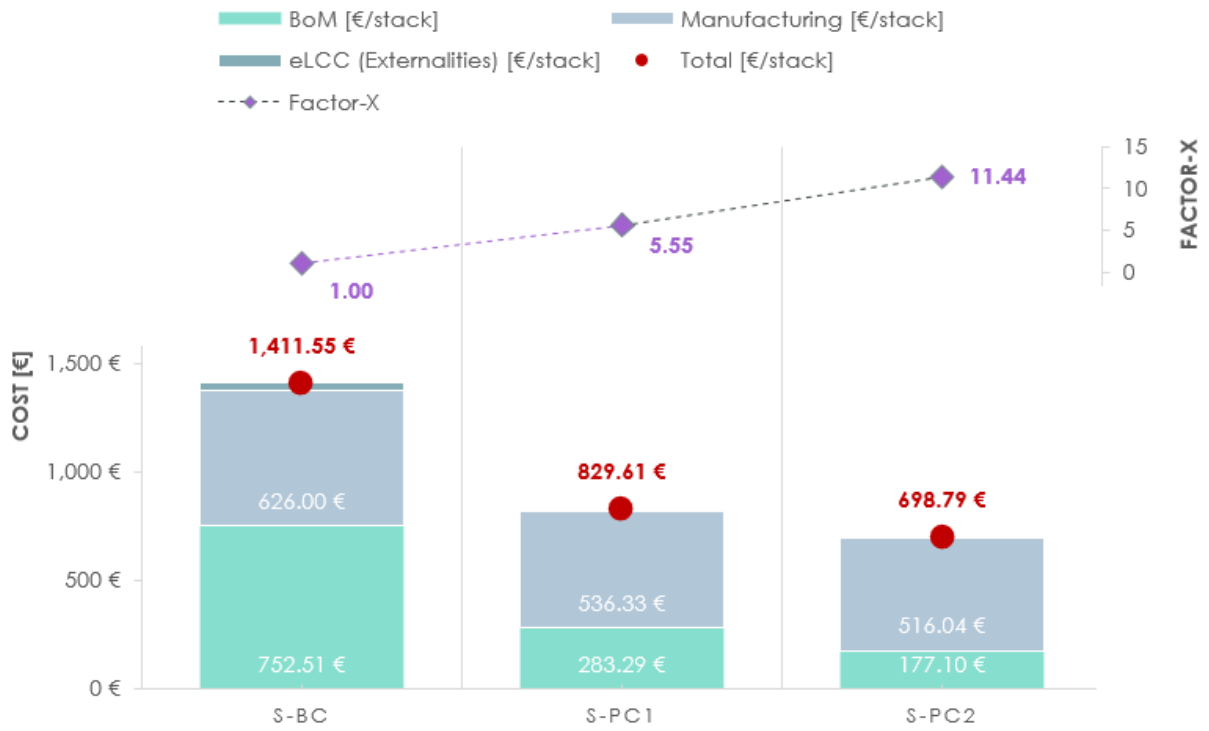

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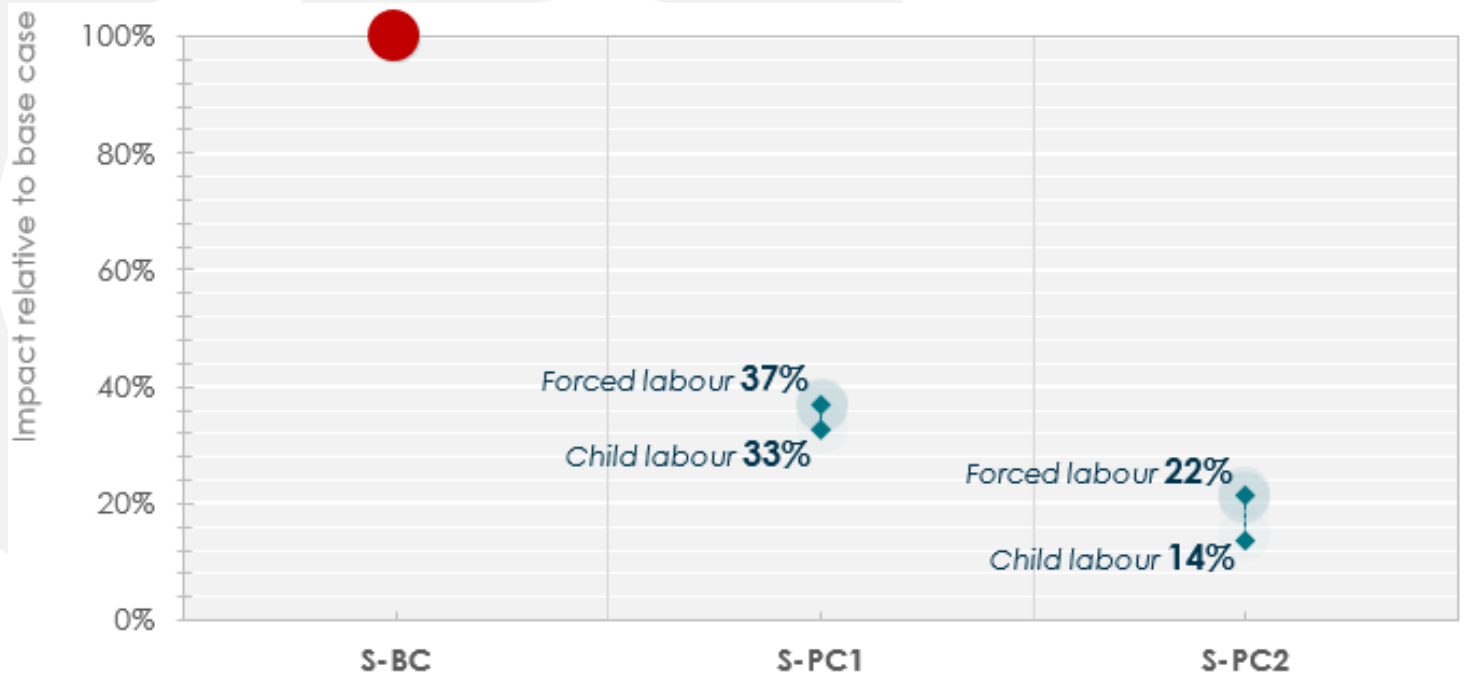

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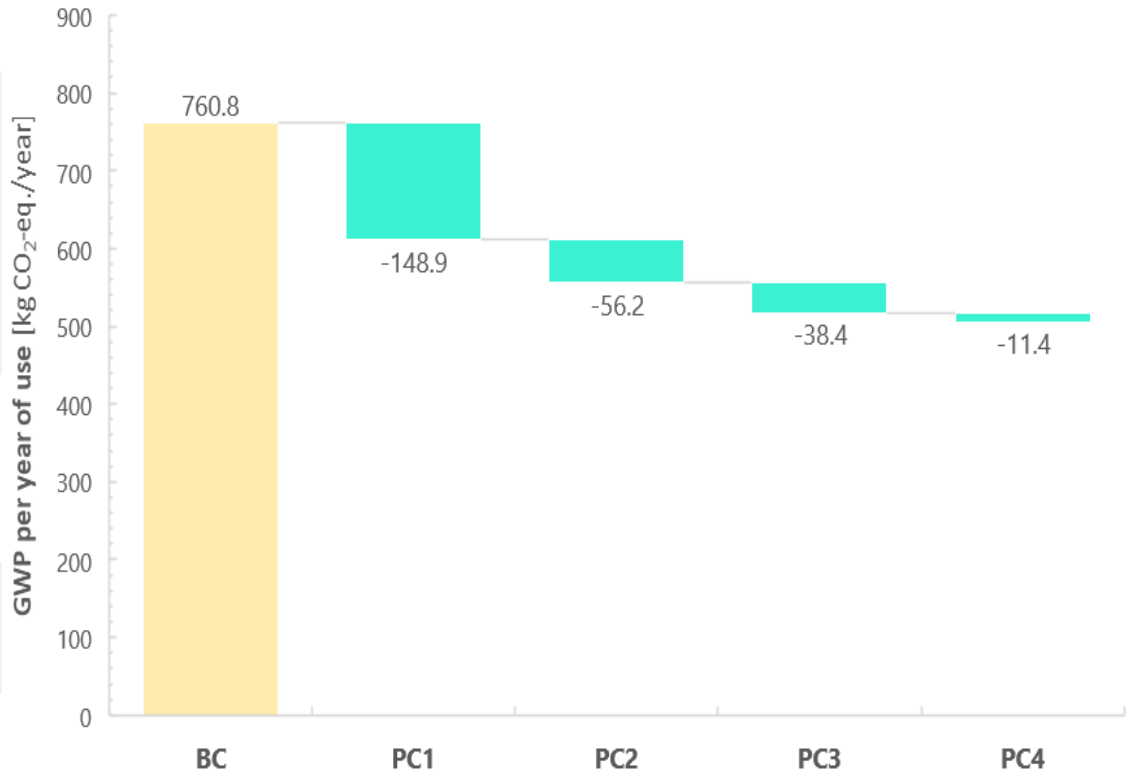
Achievements

Ecodesign Directive context

- Reference documentation for a preparatory study according to the Ecodesign Directive
- PEMFC stack case study



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MONDAY, 20TH OF MAY	
9:00-9:30	Welcome and introduction to the school - Javier Dufour (IMDEA Energy)
9:30-10:30	Introduction to hydrogen systems - Emilio Nieto (Director of National Centre for Hydrogen Research)
10:30-11:30	Hydrogen storage - Stefano Barberis (UNIGE)
11:30-12:00	Coffee break
12:00-13:00	Hydrogen use technologies (Symbio)
13:00-13:30	Introduction to life cycle thinking - Javier Dufour (IMDEA Energy)
13:30-15:00	Lunch break
15:00-17:30	Visit to URJC/IMDEA Energy facilities - Félix Marín (IMDEA Energy)

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TUESDAY, 21ST OF MAY	
9:00-10:00	Hydrogen production technologies - Julie Mougin (CEA)
10:00-11:30	Environmental life cycle assessment of hydrogen systems SH2E LCA guidelines - Javier Dufour and Diego Iribarren (IMDEA Energy)
11:00-11:30	Coffee break
11:30-13:30	Environmental life cycle assessment of hydrogen systems II. Criticality assessment of hydrogen systems - Christina Wulf (Forschungszentrum Jülich)
13:30-15:00	Lunch break
15:00-17:30	SH2E tool for environmental life cycle and criticality assessment of hydrogen systems - Ashrakat Hamed (GreenDelta)

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WEDNESDAY, 22ND OF MAY	
9:00-11:00	Life cycle costing of hydrogen systems, SH2E LCC guidelines - Christina Wulf (Forschungszentrum Jülich)
11:00-11:30	Coffee break
11:30-13:30	Social life cycle assessment of hydrogen systems. SH2E S-LCA guidelines - Ashrakat Hamed (GreenDelta)
13:30-15:00	Lunch break
15:00-17:30	SH2E tool for economic and social life cycle assessment of hydrogen systems - Ashrakat Hamed (GreenDelta)

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THURSDAY, 23RD OF MAY	
9:00-10:00	Life cycle sustainability assessment of hydrogen systems. SH2E LCSA guidelines - Diego Iribarren (IMDEA Energy)
10:00-11:00	SH2E tool for life cycle sustainability assessment of hydrogen systems - Ashrakat Hamed (GreenDelta)
11:00-11:30	Coffee break
11:30-13:30	Eco-design of hydrogen systems. eGHOST approach - Emmanuelle Cor (CEA)
13:30-15:00	Lunch break
15:00-17:30	eGHOST eco-design guidelines - Mitja Mori and Jure Gramc (University of Ljubljana)

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FRIDAY, 24TH OF MAY	
9:00-11:00	Practical workshop of eco-design - Jade Garcia (Symbio) and Agata Horwacik (Fundación Hidrógeno Aragón)
11:00-11:30	Coffee break
11:30-13:00	Hydrogen research in Europe - Luigi Crema (FBK and President of Hydrogen Europe Research)
13:00-13:30	Conclusions and farewell - Javier Dufour (IMDEA Energy)
13:30-15:00	Lunch

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eGHOST

eco-design Guidelines for Hydrogen Systems and Technologies

Javier Dufour

(IMDEA Energy / Rey Juan Carlos University

javier.dufour@imdea.org

For further information please visit:

https://eghost.eu

http://sh2e.eu

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