

A sustainable, circular European hydrogen economy



Guidelines and tools like life-cycle assessments, eco-design guidelines, recycling and dismantling strategies and certification schemes for fuel cell and hydrogen (FCH) technologies have been developed by projects supported by the Clean Hydrogen Partnership. This boosts the circularity and sustainability of Europe's hydrogen sector and helps to achieve EU and global environmental goals.

Measuring environmental footprints

As well as possessing qualities like high performance and reliability, FCH technologies must be sustainable and circular, creating economic and societal value while minimising the environmental impacts. Clean Hydrogen Partnership-funded projects have developed sustainable approaches along the hydrogen value chain, ensuring that the sector is in line with good environmental principles.

Sustainability relates to economic, environment, social aspects while circularity encompasses reduction, recyclability and reuse of products, components and materials.

To determine the ecological footprint of FCH technologies, FC-HYGUIDE has provided guidance, training materials and courses on life-cycle assessments, case studies and datasets. SH2E has expanded the scope of the FC-HYGUIDE guidelines to encompass economic and social aspects through life-cycle sustainability assessments (LCSAs) and life-cycle costing.

Design, recycling and certification

To promote environmentally friendly design, eGHOST has formulated eco-design guidelines for FCH technologies, and HYPEF has devised product environmental footprint category rules. HYTECHCYCLING, BEST4HY and SUSTAINCELL have researched recycling, dismantling and reuse strategies for FCH technologies and their components. For hydrogen sourcing, CERTIFHY has created the first EU-wide Guarantee of Origin certification scheme.

In addition partnership-funded projects work closely with the European Commission's Joint Research Centre (JRC) on sustainability and circularity. The JRC also compiles an annual inventory of life-cycle assessments by the projects and develops a checklist for performing and reporting on these assessments.

ADDRESSING SUSTAINABILITY AND CIRCULARITY

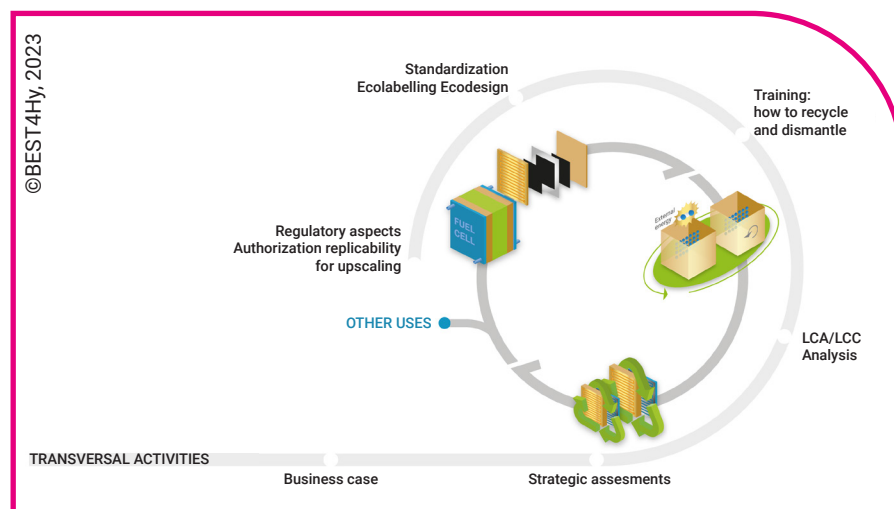
The hydrogen sector needs to be a sustainable and circular in line with the EU's strategy and rules on energy system integration and also contribute towards the achievement of the UN's Sustainable Development Goals (SDGs) and the objectives of the Paris Agreement.

DRAWING ON EXPERTISE

The partnership organises various activities to get experts' views on increasing sustainability and circularity. In 2024, it launched the European Hydrogen Sustainability and Circularity Panel and it also runs workshops. These have led to the development of new projects, such as HYDRA and NHYRA, which began in 2023 and 2024 respectively to focus on climate impacts.

The goal? The environmental impact of the hydrogen economy must be minimal, and resource reduction, recyclability and reuse must be maximised.

Key results? The projects are changing mindsets in the hydrogen industry and fostering a commitment to developing sustainable, circular technologies.



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MORE

www.fch.europa.eu/page/fch-ju-projects

fc-hyguide.eu

sh2e.eu

eghost.eu

www.hypef.eu

hytechcycling.eu

best4hy-project.eu

sustaincell.eu

www.certifhy.eu

nhyra.eu



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KEY ACHIEVEMENTS

SYSTEMS THINKING TOOLS

on technology life cycles

ECO-DESIGN GUIDELINES

for FCH technologies

ENVIRONMENTAL FOOTPRINT RULES

RECYCLING AND DISMANTLING

research

GUARANTEE OF ORIGIN

scheme a first-of-its-kind
for clean hydrogen

2 NEW PROJECTS –

NHYRA and HYDRA, which focus
on the hydrogen sector's climate
impacts

IMPACTS

ENVIRONMENTAL FOOTPRINTS

were measured for FCH technologies.

RECYCLING AND DISMANTLING

actions were demonstrated.

GREATER COOPERATION

will lead to informed decision-making.

GREATER REDUCTION, RECYCLING AND REUSE

strategies adopted
by the hydrogen sector.

A path toward LIFE-CYCLE SUSTAINABILITY ASSESSMENTS, RECYCLING AND ECO-DESIGN

has been charted by the projects.

Progress has been made by the sector
towards achieving

EU AND GLOBAL SUSTAINABILITY GOALS.



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