Green Industrial Hydrogen
via Reversible High-Temperature Electrolysis

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Mission Statements:

• Proof of concept in the industrial environment of an integrated iron and steel mill
• Development of a reversible high-temperature electrolyzer towards a marketable product by GrInHy’s project outcomes
• meeting the hydrogen quality standards of the steel industry
GrInHy: Technology

Green Industrial Hydrogen via Reversible High-Temperature Electrolysis (HTE)

- **Technology**
  - At temperature levels of up to 900 °C, stacks of Solid Oxide Cells are producing H2 from steam
  - Highest electrical efficiency by integration of (waste) heat from production processes instead of electricity
  - Possibility of operating in a reversible mode

- **SZ Motivation**
  - Evaluation of the technology readiness level (TRL)
  - Techno-economical analysis of possible business cases besides hydrogen production (e.g. load management, grid balancing)
  - Experience in operating a electrolyzer and verification of meeting high quality standards

- **Project Specifications (ID 700300)**
  - Objective: Manufacturing and operation of an pilot plant of 150 kW\textsubscript{el, AC}
  - Duration: 03/2016 – 02/2019
  - Project Budget: 4.5 million €
### GrInHy: Objectives

<table>
<thead>
<tr>
<th>Category</th>
<th>Objective</th>
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<tbody>
<tr>
<td><strong>Efficiency</strong></td>
<td>proof of reaching an overall electrical efficiency of at least 80 %LHV</td>
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<td><strong>Upscaling</strong></td>
<td>SOEC unit to a power input of 150 kW\textsubscript{AC} and production of 40 Nm\textsuperscript{3}H\textsubscript{2}/h</td>
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<td><strong>Operation</strong></td>
<td>at least 7,000 h of operating the system</td>
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<td><strong>Lifetime</strong></td>
<td>greater than 10,000 h with a degradation rate below 1 %/1,000 h</td>
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<td><strong>Reversible Operation</strong></td>
<td>higher capacity utilization for stronger business cases</td>
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<td><strong>Costs</strong></td>
<td>development of dependable data on system costs and cost reductions</td>
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<td><strong>Exploitation Roadmap</strong></td>
<td>reversible high-temperature electrolyzer as a marketable product</td>
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GrInHy: Who we are

The GrInHy consortium consists of 8 partners from 5 different EU countries and is characterized by its interdisciplinary expertise.

These include a technology specialized SME, large industries, university and non-university research organizations.

This project has received funding from the Fuel Cells and Hydrogen 2 Joint Undertaking under grant agreement No 700300.

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www.green-industrial-hydrogen.com