

IEA Hydrogen – Task 38

Power-to-Hydrogen and Hydrogen-to-X: System Analysis of the techno-economic, legal and regulatory conditions

Task #38, entitled: “Power-to-Hydrogen and Hydrogen-to-X: System Analysis of the techno-economic, legal and regulatory conditions”, is a Task of the Hydrogen Implementing Agreement of the International Energy Agency. It was approved by the Executive Committee, to examine hydrogen as a key energy carrier for a sustainable and smart energy system.

The “**Power-to-hydrogen**” concept means that hydrogen is produced via electrolysis. Electricity supply can be either grid, off-grid or mixed systems. “**Hydrogen-to-X**” implies that the hydrogen supply concerns a large portfolio of uses:

- transport (hydrogen for fuel cells, biofuels, synthetic methane for transport etc.),
- natural gas grid (by blending hydrogen directly with natural gas or synthesising methane and blending it into the natural gas grid),
- re-electrification through hydrogen turbines or fuel cells,
- general business of merchant hydrogen for energy or industry, especially refinery, steel industry, ammonia, etc.,
- ancillary services or grid services for the electricity grid, transport or distribution grid. Hydrogen provides a flexible energy storage and carrier option which could defer the need for new lines and would alleviate the transmission difficulties.

The general **objectives** of the Task are:

- to provide a comprehensive understanding of the various technical and economic pathways for power-to-hydrogen applications in diverse situations;
- to provide a comprehensive assessment of existing legal frameworks;
- and to present business developers and policy makers with general guidelines and recommendations that enhance hydrogen system deployment in energy markets.

A final objective will be to develop hydrogen visibility as a key energy carrier for a sustainable and smart energy system, for different time frames.

The work is slated to take place over a four-year period, and is structured in two phases:

- a general state of the art survey of existing studies on techno-economic and business cases, existing legal framework and macro-economic impacts, including demo/deployment projects;
- detailed specific cases studies, based on detailed targets defined during the first phase, together with elaboration of legal and regulatory conditions, policy measures, and general guidelines for business developers as well as public and private financial mechanisms and actors.

Over 50 experts from 16 countries are involved in this Task which is coordinated by the French CEA/I-tésé, supported by the French ADEME. Participating IEA HIA ExCo Members are: Australia, Austria, Belgium, European Commission, France, Germany, Hychico, Japan, The Netherlands, New Zealand, Norway, Southern Company, Spain, Sweden, and United Kingdom.

