IERE Electric Power Technology Platform

RWE

IERE Technology Foresight

IERE – RWE Technology Scouting project on Hydrogen

Summary of Phase 1 – Scouting

Status: 20.03.2020

RWE Generation SE

We have learned a lot from the first phase of the IERE Foresight Study with focus on hydrogen technology scouting.

1 We gained insights in national hydrogen activities by bilateral talks with the project participants.

- Hydrogen is gaining pace – but uneven around the world!
- We summarized individual country perspectives for 11 countries with the focus on a hype cycle analysis, current activities and future perspectives and on selected KPIs, which have been compiled and compared to each other.

2 We investigated hydrogen-related lighthouse projects and derived major market opportunities.

- 5 major market opportunities have been identified from lighthouse projects in the considered countries.
- We compiled an overview of the lighthouse projects for 4 regions: North America, Europe, Asia and Australia.
- The main market opportunities focus on the mobility sector, Power-to-X, substitution in industries, technology development and export of H_2.

3 We analysed available data of products from relevant technology manufacturers.

- A very brief techno-economic analysis of products has been done due to a limited number of feedbacks.
- We used also available online data of product specifications for an analysis of electrolysers, as this technology plays a key role in green H_2 production.
- 43 manufacturers have been selected for the inquiry - 13 offer products for more than one value chain element.
- Four electrolyser units in utility scale (10…24 MW), but some others can also be stacked to larger units.

4 Nations prepare their hydrogen strategies and a large variety of funding programs are available.

- Funding volumes in dedicated countries are in the range of ~US$ 100-160m for the development of H_2 projects.
- Japan is seen as a special case: ~US$ 350m for the development of a hydrogen society.

The main purpose of the IERE foresight project is to scout for technologies and identify R&D collaboration opportunities.

Phase 1 - Scouting

Share the international perspective on current status of technology, market and R&D and identify most relevant technology – market combinations.

Phase 2 - Research

Focus on the future perspectives and the most relevant R&D demand and collaboration opportunities.

Phase 3 - Collaboration

Develop collaborative hydrogen related projects within IERE memebers.

The scope of the project is along the hydrogen value chain.

Goals

International state of the art technology – market perspective from industries for industries.

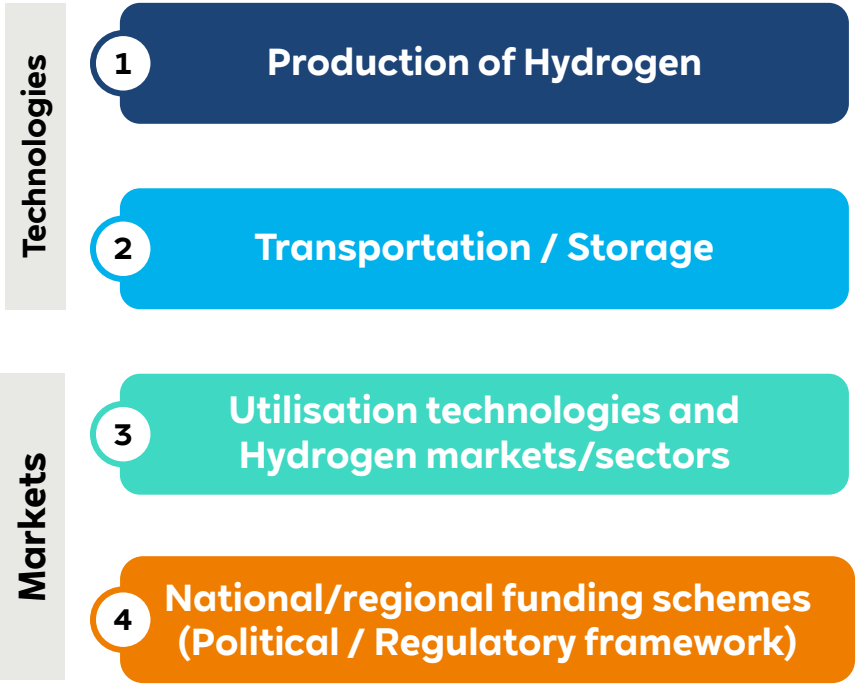
Techno-economic evaluation
Technology solutions/ -supplier
Costs and cost-reduction potential

Market opportunities
Utilisation technologies of H2 & by-products
Most relevant sectors and market value pools

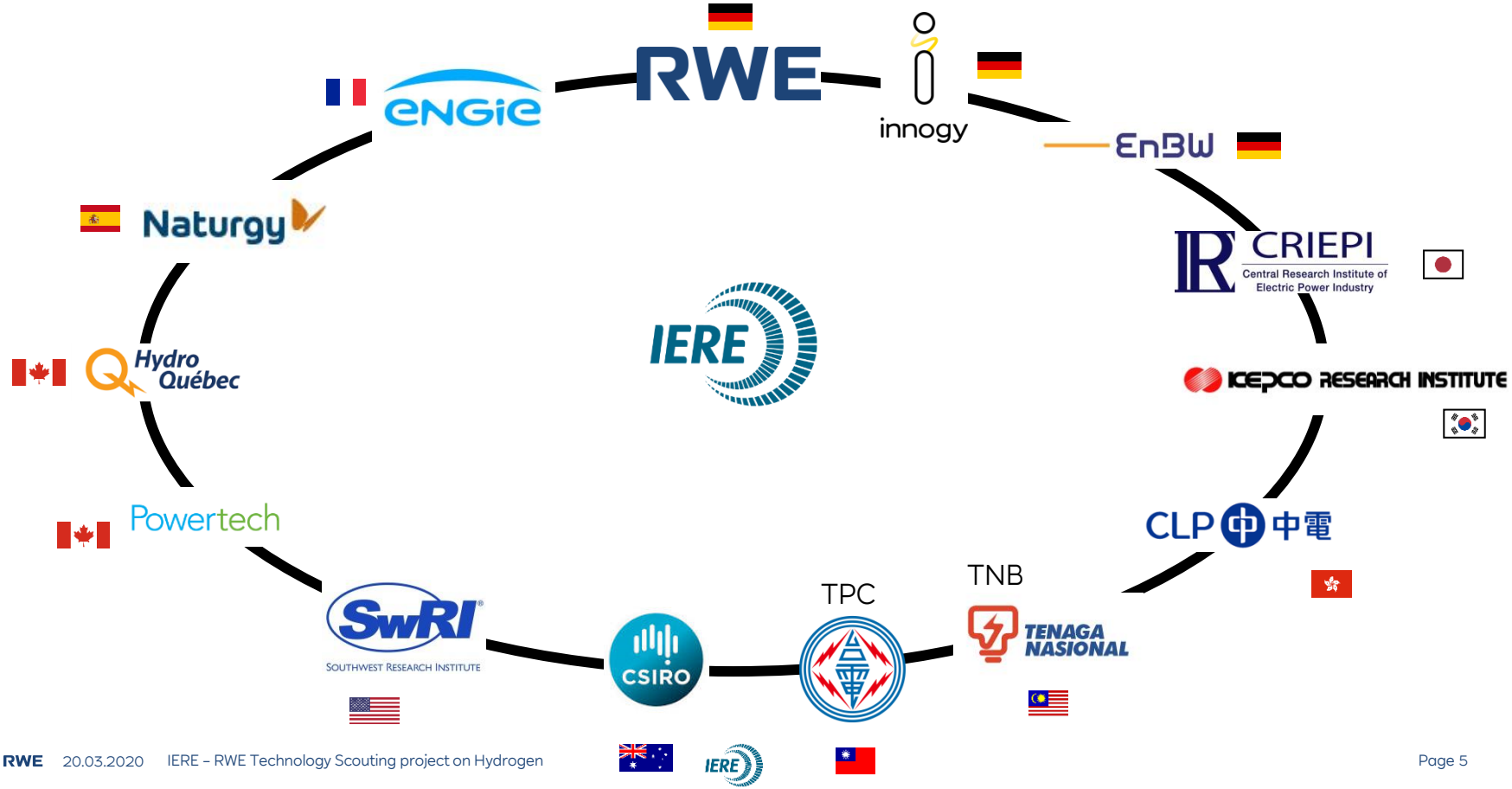
Framework
National targets and political/regulatory frameworks
Relevant funding programs and volumes

Future perspective
Aggregating and analysing findings: Interpretation and guidance for indications for Innovation, Research & Development and business opportunities.

Scope



14 IERE member companies around the world joined the project.



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Open discussion on trend or hype of national hydrogen activities

Main market opportunities derived from lighthouse projects

Tech Scouting

Funding & national hydrogen strategies

Manufacturer online data analysis

Conclusion

– **The scouting project offers a helpful starting point for all participants for**
  - learning from others – project ideas, ways of funding or market opportunities
  - get in touch with market players or manufacturers
  - and having a base for deeper technology discussion.

- **The development of a hydrogen economy requires in short term**
  - supply of reliable technologies for a variety of applications
  - further development of commercial scale projects of market players
  - and broad and comprehensive covering funding regimes.

- **The development of new technologies will pave the way to**
  - increase the implementation of hydrogen in industries
  - offer alternatives in or the replacement of rare or hazardous materials
  - and further reduce the emissions of CO_2.