The Renewable and Clean Hydrogen Challenge of Mission Innovation

Hydrogen Energy Ministerial Meeting
Plenary Session: Potential of Hydrogen Energy for Energy Transition

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Tokyo, Japan

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Mission Innovation

- 23 countries plus EU
- formed in 2015 to accelerate the transition to clean energy
- doubling R&D-efforts by 2020
- generating greater private sector engagement in commercializing clean energy innovation

MI-3
(Malmö, 23-24 May 2018)
launched the Renewable and Clean Hydrogen Challenge (IC#8)

The global renewable energy picture

Different nations / regions have different energy systems and boundary conditions

Figure 43: Achievable full-load hours with PV/wind hybrid generation (Fasihi et al., 2016a)

Decarbonizing the energy sector

Technology mix is needed to achieve climate change targets

Shifting from electrons (power) to molecules (hydrogen, PtX) provides:
- flexibility
- consumer benefits

An integrated energy system provides the overall least cost solution to decarbonize the energy sector.

Elements of an integrated energy system
Source: REMod-D Renewable Energy Model Germany (FhG ISE)
Hydrogen technology is a key part of the energy transition

Water electrolysis is a key technology for decarbonization

Technology is available – next step is scaling up production volume

Potential production capacity in 2020 by manufacturer (anonymised). Depending on corresponding demand growth on the market.

Order of Magnitude:
- 5 MW/a
- 50 MW/a
- 500 MW/a

https://www.now-gmbh.de/content/service/3-publikationen/1-nip-wasserstoff-und-brennstoffzellentechnologie/indwede-studie_v04_1.pdf (German)
IC#8
Renewable and Clean Hydrogen Challenge

Our objective
To accelerate the development of a global hydrogen market by identifying and overcoming key technology barriers to the production, distribution, storage, and use of hydrogen at gigawatt scale.

- Launched in May 2018
- 14 countries
- 3 years to make a difference

The challenge will focus **multinational research and large scale demonstration efforts** from both public and private sectors on industry-directed breakthroughs which have a realistic prospect of underpinning commercial renewable and clean hydrogen industries.

Co-lead: Australia, Europan Commission, Germany
Deep Dive Workshop, Oct. 17-18, 2018, Berlin

Base for the workplan of the Renewable and Clean Hydrogen Innovation Challenge

**Attendees**

- Total: 63
- Countries: 13
- Workshops: 6

**Governmental representatives from:**
Australia, Austria, Canada, Chile, France, Germany, India, Japan, Netherlands, Norway, UK

**Workshop attendees from:**

- Government
- Organisation
- Private Company
- Scientific Institute

*Absolute numbers of attendees

- Identify key barriers in the hydrogen value chain
- Set clear, quantifiable targets for each key barrier
- Identify targeted collaboration opportunities and research gaps (including public–private initiatives)
Short-term opportunities exist to reduce CO2-emissions in industrial processes (e.g. ammonia production, refinery processes) depending on country specific conditions (energy prices, CO2-regimes, investment schemes, etc.)

Longer-term perspective for large scale renewable and clean hydrogen production depending on further cost reduction via economies of scale and appropriate policy frameworks:

• hydrogen in an integrated energy system (power, heat and transportation)
• hydrogen in CO2-intensive industry processes (e.g. steel)

Due to higher cost of innovative solutions with renewable and clean hydrogen compared to incumbent systems the main challenge is to manage the transition towards industry and energy relevant volumes (production capacity, system integration):

• public interest: achieve climate change targets
• private interest: unlock business opportunities

The next step is to scale up from MW to GW.
Identified focus areas

‘Innovation‘ covers the full spectrum along the value chain from basic and applied R&D to measures for market activation. Industrial integration combining technology, business models, market design and system operation is a key element of the innovation process.

The Renewable and Clean Hydrogen Challenge of Mission Innovation has the ambition to enable cross-border

1. **Research and Development** activities

2. **Large scale demonstration** along the full value chain including hydrogen production, distribution and usage

**International information sharing** leveraging existing structures and organizations creates awareness, increases visibility accelerates deployment.
Timeline for the Innovation Challenge #8

Mission Innovation is set up until 2020

Launch
Malmö

Workshop
Berlin

Working Plan

Workstreams

23rd October, 2018

Dr. Klaus Bonhoff

May 2018  October 2018  December 2018  2019 / 2020

Industry participation is key!

- input for member states regarding large scale hydrogen systems (success stories, barriers, etc.) to shape respective publicly funded programs
- include hydrogen technologies in national R&D-programs and secure/increase sufficient funding

- monitor national deployments
- initiate multi-national projects demonstrating the full value chain with a scope to
  - proof the feasibility of innovative concepts and new technologies
  - create awareness and acceptance

initiate R&D

enable large scale projects

information sharing platform

The Renewable and Clean Hydrogen Challenge
A global hydrogen alliance\(^1\) could provide a platform for a high-level public-private dialogue, increasing the awareness regarding the potential impact of hydrogen in the context of global CO2-reduction targets.

Existing international organizations can support this global dialogue by providing networks, expertise and analysis:

- **IPHE** – intergovernmental exchange on policies and international standards
- **IEA TCPs** – academia and industry participation providing technical expertise (studies and research networks)
- **MI H2 Challenge** – government, academia and industry participation to accelerate deployment based on targeted R&D

\(^1\) as discussed at the San Francisco CEO-meeting of the Hydrogen Council (09/2018)
Thank you very much for your attention!

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