HySupply – Australian update

ACHEMA – World Forum for the Process Industries
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HySupply Partnership

Joint Feasibility Study of Renewable Hydrogen

German-Australian Hydrogen Supply Chain

Module 1: Production
Renewable energy → Hydrogen

Module 2: Transport
Export → Hydrogen based energy carriers → Import

Module 3: Recovery
Recovery and distribution

Module 4: End use
Steel industry, Refineries, Chemical industry, Business cases

Key Partners
BDI, UNSW Sydney, Baringa

Lead and Administering Organization

Source: BDI/acatech
Current global energy trade

Largely an outcome of the availability of easily extracted low-cost fossil fuels

Germany a world top 5 energy importer

Australia the world’s third largest energy exporter

Global energy imports by country (PWh/year)
A mostly renewable world more self reliant

However, various countries still seem certain to require energy imports ... including Germany and some others in Europe, Japan, Korea

Potentially new renewables ‘electrostate’ exporters, likely some old ones

Global class 7 on-shore wind and tracking PV potential by country (TWh/year)
Trade relationships generally multi-faceted

Delivered price is key, but not the only consideration - existing trade relationships, stability, demonstrated capability, geopolitical considerations....

WEF Global Competitiveness Rankings

Germany – 7th
Australia – 16th
Germany a significant hydrogen market.... and equipment and services provider

- Until recently the German *Energiewende* has mostly focused on the deployment of renewable energy in the **power sector**.

- However, renewable energy only made up 15% of Germany’s final energy consumption in 2020.

- Green molecules are needed to defossilize the remaining 85% of the energy system.

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### Market shares of electrolysis technology

- **GER**: 19.0%
- **CHN**: 15.2%
- **JPN**: 17.1%
- **ROW**: 23.0%
- **EU (Rest)**: 14.0%
- **USA**: 6.5%
- **KOR**: 3.3%
- **CAN**: 1.8%

**Source**: UN (2018), Frontier Economics 2018

### Market shares of other PtX-technologies

- **GER**: 16.0%
- **JPN**: 10.5%
- **CHN**: 13.4%
- **USA**: 10.8%
- **EU (Rest)**: 31.4%
- **TWN**: 1.7%
- **MEX**: 2.0%
- **KOR**: 3.7%
- **ROW**: 6.8%
- **AUT**: 2.2%
Forthcoming – *State of Play* report and open-source value-chain models

Hourly resolution renewables + electrolyser modelling required to properly assess processes, conversion systems, buffer storage needs and firmed energy requirements.
Green H2 production costs

Location matters

Cost reductions needed

- Renewables costs down, CF up
- Electrolysers costs down, efficiency up
- Improved integration (CF optimisation) for both off-grid and NEM / SWIS / DKIS projects
- Low cost (de-risked) finance
Also modelling Storage, Conversion and Transportation Pathways
Shipping hydrogen

- Advantages for hydrogen production near point of use
- Pipelines the lowest cost, albeit less flexible, option for distances up to thousands of km, subject to route constraints
- **However**, shipping delivers 80% of global trade, flexible, low cost... *and needs clean fuels*
A growing number of export oriented / hydrogen and hydrogen derivative projects
Progress... on numerous fronts
Much to be optimistic about… but much more to be done

Questions, comments, suggestions all welcome
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