

The Energy Transition: Problem, or huge opportunity?

28th June 2022

Graham Cooley, CEO | ITM Power



ITM Power Positioning:

- ITM Power manufactures world leading PEM electrolyzers
- ITM Power has the largest PEM electrolyser factory in the world

Operations:

- Target annual capacity of 5GW pa by the end of 2024
- Current total projects backlog of 755MW | 400 staff
- Significant skills and experience added over the last year



Market leader | Strong momentum | Global markets | Strong partnerships



Fourth Industrial Revolution:

- 1.0 Manual to Machine Coal
 - 2.0 Infrastructure Rail & Phone Oil
 - 3.0 Digitization Gas
 - 4.0 Interconnectivity and automation NetZero
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- NetZero by 2050 is an industrial revolution | Industry 4.0
 - NetZero requires the deployment of £trillions of Capital
 - We should be manufacturing those products in the UK



NetZero by 2050 is an industrial revolution



The Energy Transition:

- World uses energy in two forms; electrons and molecules
- Molecules to Electrons | Electrons to Molecules
- To get to NetZero green hydrogen is essential
- Splitting water | **Electrolysis**
- Energy Storage | NetZero replacement for Natural Gas



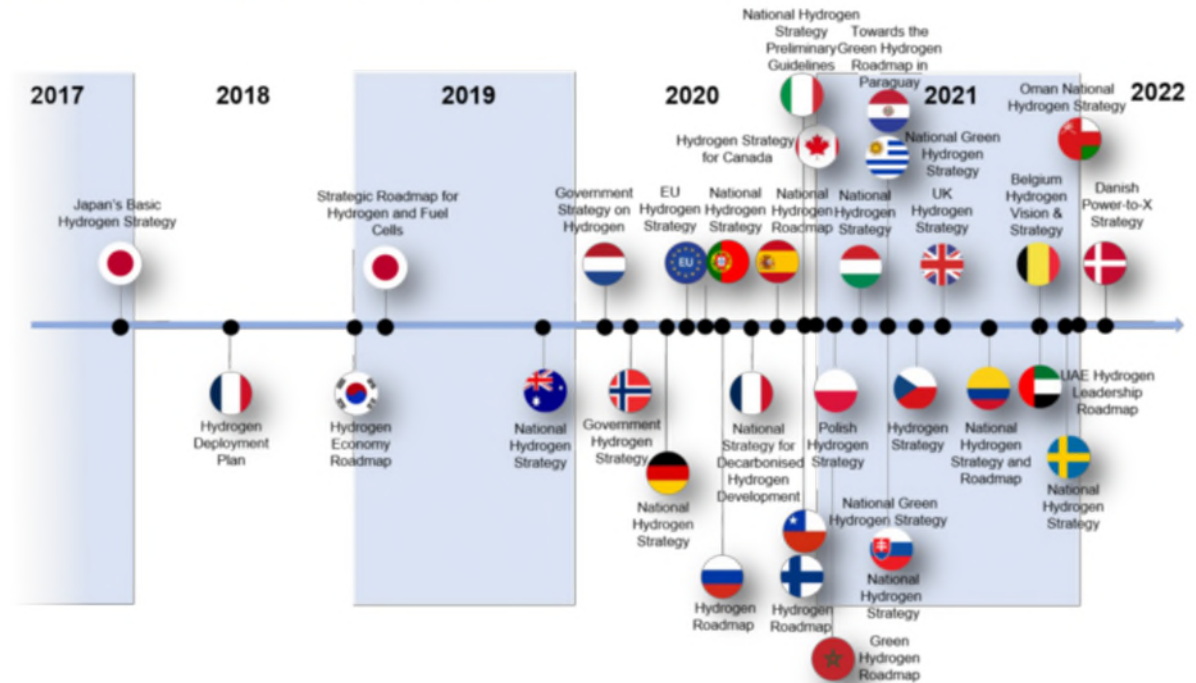
World uses energy in two forms; electrons and molecules



The Macro Market | The last 5 years

- **2017:** Japanese Hydrogen Strategy
- **2019:** UK Climate Act | Net Zero by 2050
- **2020:** EU Hydrogen strategy | 80GW 2030 electrolyser target
- **2021:** IEA: electrolyser capacity of **3,585GW** needed by 2050
- **2021:** National 2030 electrolyser targets total hit **149GW**
- **2022:** REPowerEU 2030 electrolyser targets hit **~200GW**
- **2022:** UK Energy Security Plan 2030 electrolyser target **5GW**

Exhibit 32: The past two years have seen a new wave of policy interest and support for clean hydrogen across the globe, reflected through a rapid increase in national hydrogen strategies and roadmaps



Source: Various sources; data compiled by Goldman Sachs Global Investment Research



Strong global policy momentum



The Energy Transition and Natural Gas

- Green Hydrogen **parity** with Blue & Grey
- Price **volatility** of PPA linked Green H2 is low
- Fuel **security** a key driver in the energy transition
- Geopolitics driving the current price increases
- Carbon pricing at €60/tCO₂ to €100/tCO₂



Price parity | Low price volatility | Energy security | Zero carbon



The Energy Transition and Natural Gas

- Fuel **security** a key driver in the energy transition
- Food security is also a key driver
- Ammonia production accounts for 55% of industrial H₂
- Ammonia is the world's fertiliser
- Triple F Crisis: Fuel | Fertiliser | Food

HEGRA (Herøya Green Ammonia), Yara in Porsgrunn, Norway.



Price parity | Low price volatility | Energy security | Zero carbon



The REPowerEU | Energy Security Plan | 8th March 2022

Green Hydrogen Accelerator:

- Builds on the 2020 EU Hydrogen Roadmap (2x 40GW plan)
- Builds on the 2021 Fit for 55 decarbonisation plan
- Increased EU target for Green H₂ to ~20Mtpa by 2030
- Requiring ~200GW of installed electrolyser capacity by 2030



REPowerEU: Joint European action for more affordable, secure and sustainable energy

European Commission

MARCH 2022

In recent months Europe has been facing high and volatile energy prices. After Russia's unprecedented military attack on Ukraine, security of supply concerns exacerbate the situation.



A Hydrogen Accelerator to develop infrastructure, storage facilities and ports, and replace demand for Russian gas with additional 10 mt of imported renewable hydrogen from diverse sources and additional 5 mt of domestic renewable hydrogen.



Significant EU green hydrogen policy acceleration



The Delegated Acts | Renewable Hydrogen | 20th May 2022

- Clarify the rules for electrolysers under the recast RED directive
- ‘Additionality’ suspended until 2027
- ‘Temporal Correlation’ monthly until 2027, hourly thereafter
- ‘Geographical Correlation’ based on grid zones and PPAs
- Grandfathered for deployments prior to the end of 2027
- Incentivises early deployment | Legal act in 2022



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Low Carbon Hydrogen Standard:

- Permits grid-connected & off-grid electrolysers
- No requirement for additionality
- Requires 30 min temporal correlation
- Hydrogen produced must be $<20\text{gCO}_2\text{e/MJ}$ (using LHV)
- Blue hydrogen needs a capture rate of $>85\%$
- 30 bar minimum pressure and 99.9% minimum purity
- Does not valorize O_2
- Operators report monthly to prove compliance with LCHS



The UK Gov. set to be the first to publish an H_2 Business Model



HBM to be published in July/August 2022:

- Developed by BEIS and the Hydrogen Advisory Council
- Clean Hydrogen incentive scheme
- Rolled out using a CfD projects call | 5MW minimum
- No £/kg value stated, determined on a projects basis
- HBM Stakeholder Forum established
- Electrolytic Hydrogen working group established
- Can use HBM or RTFO for mobility



The UK Gov. set to be the first to publish an H₂ Business Model



Green Hydrogen RTFO:

- Currently in revision | Consultation was April 2021
- Additionality and correlation should be aligned with UK LCHS
- Green Hydrogen | Renewable Fuels of Non-Biological Origin
- RFNBOs receive 9.16 RTFC's per kg | currently up to £7/kg
- Partially renewable fuels can be eligible for RTFCs
- DfT submissions require verification by an RTFO verifier



Motive HRS | Tyseley Energy Park | June 2022



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A huge manufacturing opportunity:

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Thank you for listening



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