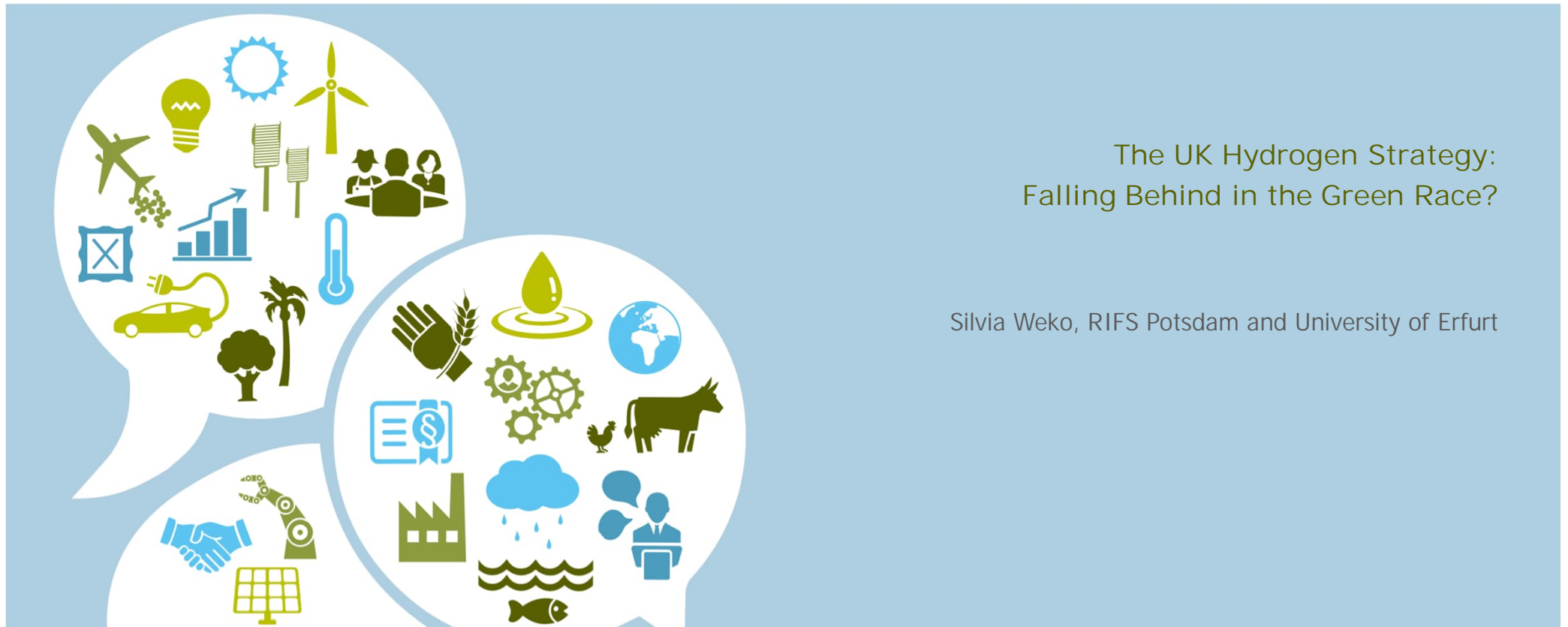


# RESEARCH AND DIALOGUE FOR SUSTAINABLE SOCIETIES



## The UK Hydrogen Strategy: Falling Behind in the Green Race?

Silvia Weko, RIFS Potsdam and University of Erfurt

## UK Climate and Energy

### UK Climate Action

- 2008 Climate Change Act
- Global climate leadership
- Lack of new investment in offshore wind

### UK-EU energy relations since Brexit

- Aim to re-negotiate electricity trading
- Obstacles to research collaboration (Euratom, Horizon Europe)
- New electricity interconnections with Norway and France, imports
- MOU with the North Seas Energy Cooperation

### Current challenges

- Decarbonization: domestic heating, important industries like chemicals
- Energy security: most UK gas is imported from Norway and Qatar
- Fossil fuel extraction moratorium ended in 2022, new projects announced

→ Hydrogen appealing for energy security, industrial development, and decarbonization

### 'Biggest clean energy disaster in years': UK auction secures no offshore windfarms

Lack of interest was widely expected after government failed to heed warnings about soaring costs

- What went wrong at UK's offshore wind auction?
- Nils Pratley: does the government still have an offshore wind strategy?



## The status of UK hydrogen developments

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“twin track” approach: promotes both blue and green hydrogen

“low-carbon hydrogen”:

- green hydrogen made with renewable electricity
- blue hydrogen from natural gas with carbon capture and storage (CCS)
- biomass/waste conversion to hydrogen with or without CCS.

### Hydrogen production and use

- ~30 industrial sites in the UK, 2.5 GW capacity, 40km pipelines
- 2/3 by-product of industrial processes, used onsite
  - Retrofitting with carbon capture technology, supported by Industrial Carbon Capture Business Model
- 1/3 produced by SMR without carbon capture, used as feedstock for ammonia production
  - Purchasing low-carbon hydrogen

### Previous initiatives

- Low Carbon Hydrogen Supply (£33 million)
- Hy4Heat project (£25 million)
- Ultra-low emission vehicles (£500 million total)
- Industrial Strategy Challenge Fund (£170 million)

## UK hydrogen policy: Framework and use cases

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Ten Point Plan (2020): 5 GW low-carbon hydrogen by 2030, £1 billion funding for net zero innovation

Hydrogen Strategy (2021): next steps for hydrogen development

British Energy Security Strategy (2022): increases goal to 10 GW

Low Carbon Hydrogen Standard (2023): sets out definition of “low carbon” (20 gCO<sub>2</sub>e/MJLHV)

### Use cases

- Greatest demand before 2030 from steel and chemicals industry, fuel-switching
- Potential for flexible power generation, heavy transport, domestic heating
- Gas grid blending decision by 2023
- Heating decision by 2026

### Local hydrogen offtakers

- No need for a phaseout plan for carbon-intensive hydrogen, nor R&I facility for hydrogen use in industry (July 2022 Update to the Market)
- Ongoing gas blending and heating trial projects
- Funding for hydrogen transport and refueling facilities

→ Broad use cases to find offtakers, rather than low-regret and strategically important industries

## UK hydrogen policy: Funding and production

### Hydrogen funding: support along the value chain

- innovation and demonstration projects
- hydrogen production projects
- revenue support for production (HPBM) + transport and storage (forthcoming)

### Hydrogen funding sources

- NZIP, industrial decarbonization and CCUS schemes
- Revenue support: hydrogen levy on gas shipping industry from 2025 in energy bill






### Results of Net Zero Hydrogen Fund round 1 (March 2023)

- 15 successful applicants, £37.9 million for production
- Some include offtakers (most transportation, only 2 from industry)

### Infrastructural uncertainties

- Depending on uses: by 2035, between 0.6-13.2 TWh storage, 700-26,000km pipeline
- Project Union focus on industrial clusters: 2,000km
- Potential for exports mentioned, but lacks official plans for trade infrastructure

**Why Project Union is vital:**

-  **Urgency, pace and scale** is required to ensure energy security and independence, benefitting all UK consumers to realise the UK's decarbonisation challenge and deliver **legally binding net zero 2050** commitments
-  **Low carbon hydrogen** is required for all net zero scenarios
-  UK Hydrogen Strategy sets a target of **10GW** of hydrogen production – equivalent to **6x million homes**
-  **Low carbon hydrogen** can enable decarbonisation of industry and provide **optionality** for transport and domestic heating
-  **Investment in hydrogen transmission infrastructure** is required to link supply and demand, **de-risk investment decisions**, and **secure inward investment** to realise a hydrogen economy and reduce the impact on the consumer



# The UK in the global green race: strengths and weaknesses

## Potential as a hydrogen leader:

- Excellent local wind resources, salt caverns
- Industry experience, demand for hydrogen
- Skilled labor and innovative capacity

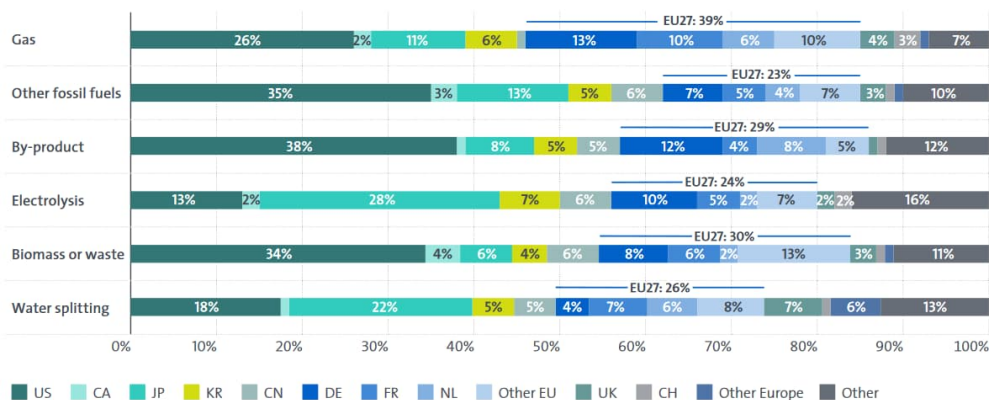
## Policy trade-offs:

- Cost vs. competitive advantages
- Technology openness vs. targeted use of resources
- Use case openness vs. targeted use of resources

## IEA (2023), Hydrogen patents for a clean energy future

Figure 3.2

Origins of patents related to hydrogen production, 2011–2020



Note: The calculations are based on the country of the IPF applicants, using fractional counting in the case of co-applications. The value labels are not reported for shares below or equal to 1%. For the purposes of this chart, technologies related to low-emission hydrogen production from gas and other fossil fuels have been pooled with the respective categories of established technologies.

Source: author's calculations

## Challenges in "green race":

- Competition for electrolyzer manufacturing, innovation from other countries
- Less support than other countries for R&I, hydrogen production
- Concern about failure to build industry as in RE sector being repeated

## International engagement

### Diplomacy and political dialogue :

- Promoting hydrogen at G7, UNFCCC, Breakthrough Agenda
- Standards and technology collaboration: IEA Hydrogen Collaboration Program, International Partnership on Hydrogen and Fuel Cells in the Economy, Mission Innovation
- Clean Energy Ministerial:
  - member of expert panel for CEM-led Northwest European Hydrogen workstream, co-funded IEA Hydrogen in Northwest Europe Report (2022)
  - Participation in International Hydrogen Trade Forum, co-led by the Netherlands and UAE

### CEM Roundtable on the North-West European Region

Goal: Develop a new regional hydrogen market in North-West Europe through convening government representatives and key industrial stakeholders in the region to identify opportunities, tackle barriers, and explore policy and regulatory requirements to develop the region.

Participants: led by the Netherlands, participants include the UK, Germany, Norway, Belgium, Denmark and France

## International engagement

### Cooperation announcements with hydrogen potential

#### UK government

2022: North Sea Energy Cooperation (NSEC)  
2023: Belgium, France, Norway, UAE, Ireland, Kazakhstan, Singapore

#### Scottish government

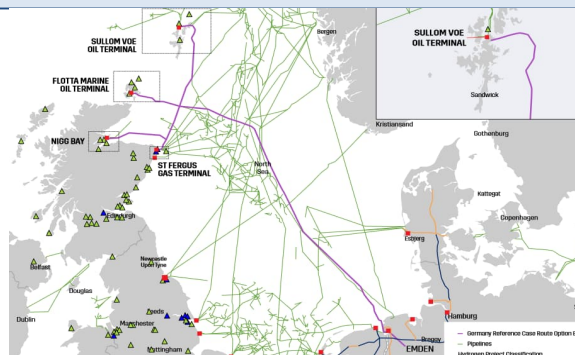
2021: Denmark  
2022: German regions (Hamburg, Bavaria, North Rhein-Westphalia)

### UK Bilateral partnerships and initiatives:

- Most high-level announcements focused on fellow hydrogen frontrunners with trade potential
- Interest in collaboration with geographically further partners including Australia, Chile
- Innovation collaborations: Australia and Korea, MOU with South Africa on scientific cooperation expanded to include hydrogen

### Competing for innovation leadership and investment

- Department for Business and Trade published investor roadmap, engaging with overseas stakeholders
- UK government working with foreign investors to enter UK markets
- Dedicated trade team for trade, investment, and export opportunities
- Export Finance: Export development guarantees to include hydrogen





## International engagement on infrastructure

### National government

- Not involved in CEM Global Ports Coalition, or working groups on large-scale hydrogen supply chains
- Trade infrastructure not prioritized in strategy

### Interest from private actors

#### The UK Hydrogen backbone

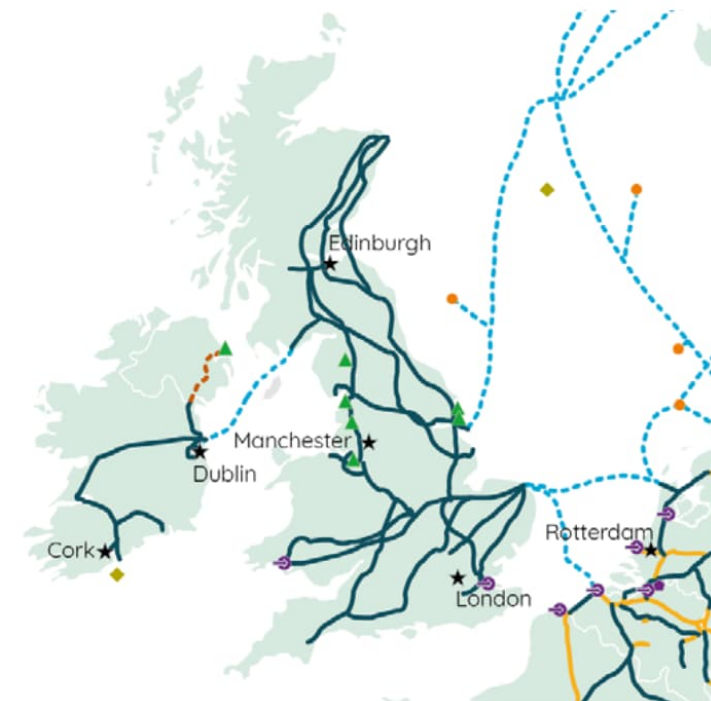
- Initiative of energy infrastructures across Europe, UK Nationalgrid / National Gas Transmission

*"A converted pipeline to Bacton could enable future hydrogen flows across the interconnectors between GB and Belgium and GB and the Netherlands...Further repurposed pipelines may start to emerge between 2035 and 2040, including...between GB and Ireland."*

### NGT's Project Union

- Connection to the European Hydrogen backbone project, operational by the early 2030s

## Great Britain



## Discussion and conclusions

Ambitious goals...

- Moved quickly on hydrogen, announced ambitious goals, supporting hydrogen innovation and production ... but remaining challenges to vision of industry leadership:
- Focus on consumers (heating, transport) rather than industrial demand
- Tension between openness to different technologies and uses vs strategic industry-building
- May be insufficient to establish UK as a hydrogen technology leader

Current international cooperation:

- Engagement through international fora with potential trade partners
- UK leaving infrastructure to business
- Scotland pursuing own export strategy



## OSTEND DECLARATION

ON

### THE NORTH SEAS AS EUROPE'S GREEN POWER PLANT

DELIVERING CROSS-BORDER PROJECTS

AND ANCHORING THE RENEWABLE OFFSHORE INDUSTRY IN EUROPE

Possible future developments:

- Lack of coordination: Europe prioritizes trade with other partners
- Closer European cooperation enables trade

## Contact

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Silvia Weko  
Research Associate  
[swo@gfz-potsdam.de](mailto:swo@gfz-potsdam.de)  
@SilviaWeko

Research Institute for Sustainability  
Berliner Straße 130  
D – 14467 Potsdam  
Web: [www.rifs-potsdam.de](http://www.rifs-potsdam.de)