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# 2022年英国・欧州エネルギー転換

UK/Europe Energy Transition

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# Introduction



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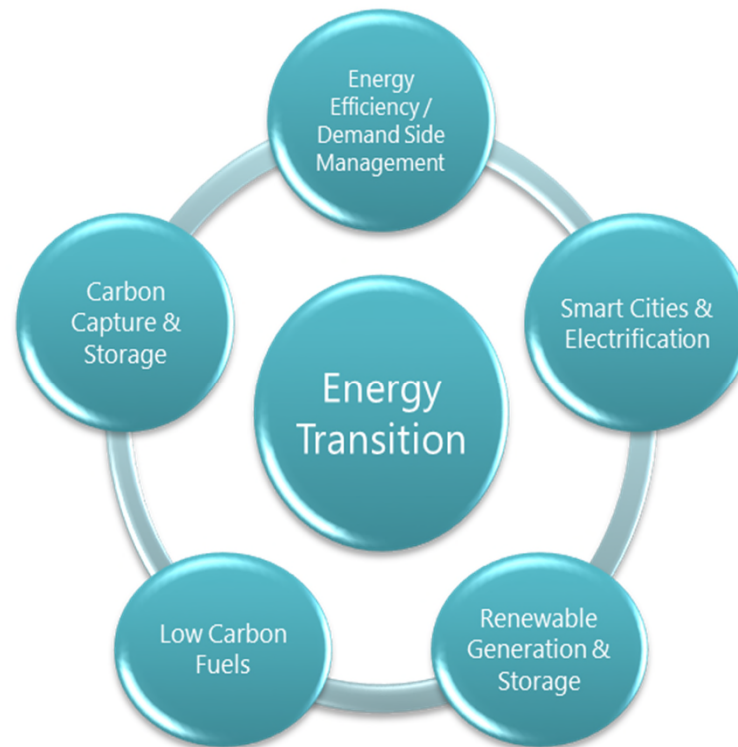
# UK/Europe Energy Transition: What We Will Cover

- What is the “Energy Transition”?
- Energy Transition – UK Regulatory Issues
  - Offshore Wind
  - Hydrogen Strategy & Regulatory Framework
  - Carbon Capture, Use and Storage Strategy
- Financing the Energy Transition
  - Hydrogen
  - Carbon Capture, Use and Storage Projects



What is the “Energy Transition”?

# What is the “Energy Transition”?





# Energy Transition - UK Regulatory Issues



# UK Offshore Wind

- UK target 40GW installed offshore wind by 2040
- Round 4
  - 7GW in England and Wales
  - Scotwind – 10GW January 2022
- OFTO Tender Round 9
  - Launched 20/1/22
  - Seagreen wind farm 1GW





# UK Offshore Wind Process

- 5 Stages to Process
  - (i) Pre-Qualification Questionnaire – Technical and financial focus
  - (ii) Invitation to Tender (ITT) Stage 1
  - (iii) ITT Stage 2
  - (iv) Habitats Regulation Assessment (HRA)
  - (v) Agreement to Lease



# Hydrogen – UK Strategy

- 5 GW of **low carbon** hydrogen production
  - “Green” and “blue” approach
  - Close connection with renewables strategy particularly in the offshore wind sector
  - “Twin track” approach
  - 1GW of production by 2025
- £240m Net Zero Hydrogen Fund
- £60m Low Carbon Hydrogen Supply completion
- Hydrogen Business Model



# Hydrogen – UK Strategy

- Hydrogen Industrial Clusters
  - 6 clusters in the UK
- Downstream market development
  - Transportation
  - Power generation
  - “Blending” in gas networks



# Hydrogen – UK Regulatory Framework

- Reliance on existing energy regulatory and planning regimes – fragmented approach currently
- Gas Act 1986

# Hydrogen – UK Regulatory Framework

- Planning Act 2008 - “significant infrastructure”
  - Development Consent Order regime
- Town & Country Planning Act 1990
- Environmental Impact Assessment?
- Health & Safety regulatory regime
- International Carriage of Dangerous Goods by Road – European Agreement?



# CCUS – Strategy

- UK Cluster Sequencing:
  - UK target of building 4 CCUS hubs by 2030, selecting 2 CCUS projects best placed to deploy by mid-2020s (to be awarded CfD type contracts)
  - Subject to fulfilling strict criteria
  - GBP 1 billion CCS Infrastructure Fund to support successful CCUS projects – capital co-funding
- Norway support of up to \$1.7bn for Longship project
- EU Projects obtaining PCI status through fulfilling Ten-E Regulation requirement: Benefits (planning and funding) and challenges (scope of TEN-E Regulations)?
- Access to European Commission’s Innovation Fund?

# Financing the Energy Transition

A blurred city skyline is visible in the background, featuring various skyscrapers and buildings. The image is overlaid with a dark blue gradient that is lighter in the center and darker towards the edges.

# Hydrogen Finance – State of the Market

- For these purposes, focus on blue and green hydrogen
- Report from Hydrogen Council/McKinsey (2021)
  - Projects H<sub>2</sub> investment of more than US\$300 bn through 2030.
  - Figure includes *“a tally of project announcements, investments required to reach government production targets and spending projections across the value chain”*
  - Estimates for “mature” investments are closer to US\$80 bn:
    - US\$45 bn in “Planning” stage – feasibility studies, FEED
    - US\$38 bn in “Realized” stage – FID taken, or under construction or operational
  - 75% of these investments involve announcements but not committed funding
  - 17 announced “giga-scale” production projects





# Hydrogen Finance – How are Projects Funded?

- Who is funding hydrogen projects?
  - Primarily equity for the moment
  - Government subsidies and incentives play a large role
  - Limited project finance at present
- Project finance
  - Will require addressing/mitigating some of the key risks (to be discussed)
  - The role of “blended finance” in de-risking hydrogen projects

# Hydrogen Finance – Some Challenges

Scaling/cost issues

Value chain complexity

“Stranded asset” risk?

Project-on-project risk

Offtake risk

Performance risk

Technology risk

Regulatory/change in law risk



# Hydrogen Finance – Viewpoints

- There are certain hydrogen projects shaping up to be early bets in the finance space:
  - Industrial clusters/H<sub>2</sub> hubs
  - Blending
  - Blue hydrogen
- There will be variation between regions
- Financiers will be attracted by strong sponsors, and the race to form JVs is on
- “Blended finance” will be critical for some time

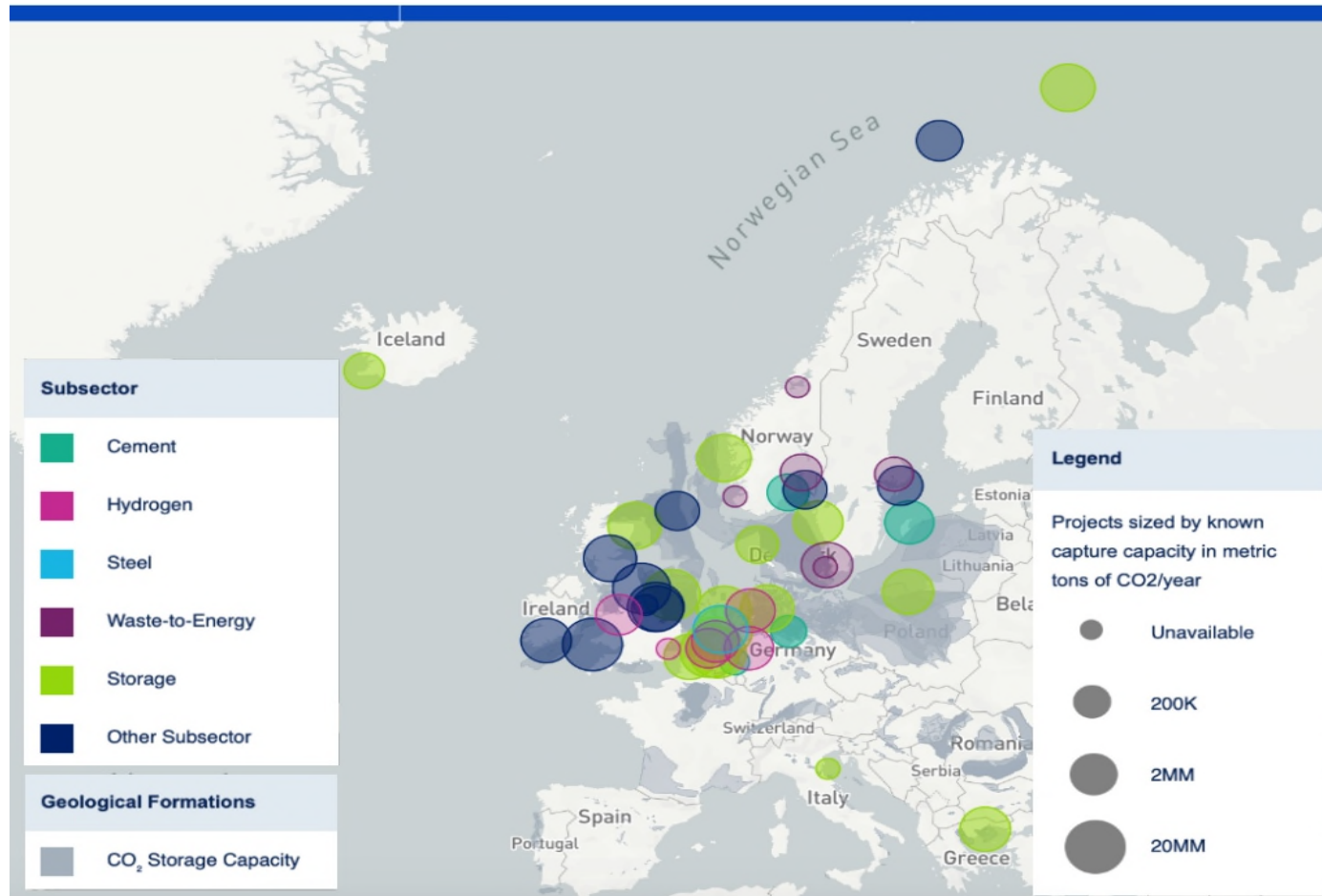
# Hydrogen – National Strategy Comparison

Governments with adopted national hydrogen strategies; announced targets; priorities for hydrogen and use; and committed funding



Country	Document, year	Deployment targets (2030)	Production	Uses	Public investment committed
Australia	<a href="#">National Hydrogen Strategy, 2019</a>	None specified	Coal with CCUS Electrolysis (renewable) Natural gas with CCUS		AUD 1.3 bln (~USD 0.9 bln)
Canada	<a href="#">Hydrogen Strategy for Canada, 2020</a>	Total use: 4 Mt H <sub>2</sub> /y 6.2% TFEC	Biomass By-product H <sub>2</sub> Electrolysis Natural gas with CCUS Oil with CCUS		CAD 25 mln by 2026 <sup>(1)</sup> (~USD 19 mln)
European Union	<a href="#">EU Hydrogen Strategy, 2020</a>	40 GW electrolysis	Electrolysis (renewable) Transitional role of natural gas with CCUS		EUR 3.77 bln by 2030 (~USD 4.3 bln)
United Kingdom	<a href="#">UK Hydrogen Strategy, 2021</a>	5 GW low-carbon production capacity	Natural gas with CCUS Electrolysis		GBP 1 bln (~USD 1.3 bln)
Japan	<a href="#">Strategic Roadmap for Hydrogen and Fuel Cells, 2019</a> <a href="#">Green Growth Strategy, 2020, 2021 (revised)</a>	Total use: 3 Mt H <sub>2</sub> /yr Supply: 420 kt low-carbon H <sub>2</sub> 800 000 FCEVs 1 200 FC buses 10 000 FC forklifts 900 HRSs 3 Mt NH <sub>3</sub> fuel demand <sup>(4)</sup>	Electrolysis Fossil fuels with CCUS		JPY 699.6 bln by 2030 (~USD 6.5 bln)

# CCUS - Europe Wide Projects



Source: Clean Air Task Force ([www.catf.us](http://www.catf.us))

# CCUS – Hynet Cluster (UK)



Source: Eni ([www.eni.com](http://www.eni.com))

# CCUS - Revenue Models

- Comparison of revenue models
  - CfD type contracts:
    - Porthos (SDE++ funding the difference between the cost to capture, transport and store CO<sub>2</sub> and the cost to emit CO<sub>2</sub> under the EU emissions trading system)
    - UK model – Industrial Carbon Capture Contract (for ICCs), Dispatchable Power Agreement (with CCUS annex for CCUS with power), revenue support through Hydrogen business model (a type of CfD contract) or Capture as a Service (CaaS) – in each case usage to be reduced over time
  - Longship (source-to-storage decarbonization on a pay per tonne of captured CO<sub>2</sub>; 'Carbon Capture as a Service')
  - Other revenues (EOR? New revenue streams?)
- The US position (majority of existing CCU+S projects)
  - Tax credits (45Q which can be stacked with others)
  - Revenue from EOR



# CCUS - Finance – Viewpoints

- There are certain carbon capture use and storage projects that are being developed:
  - Industrial clusters
  - CCUS hubs
  - CCUS connected with production facilities
- Transnational nature of some projects
- Strong sponsors participating in various projects
- Government support and thus blended finance will be critical for some time – is current level enough?
- Revenue streams outside the CfD type of contract will need to be developed – existing business or new applications



# Hydrogen and CCUS Projects – Viewpoints on Transport

- Projects like Longship, Porthos, Hynet and others to include requirement for liquid CO2 carriers.
- Existing fleet (for existing CO2 markets)
- Green finance in shipping accounts for 10% of all new ship financings, likely to grow
- Hydrogen transport technically challenging; more likely to be transported in carrier substance (e.g. ammonia)?
- Due diligence on value chain





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