

National Grid & CCS

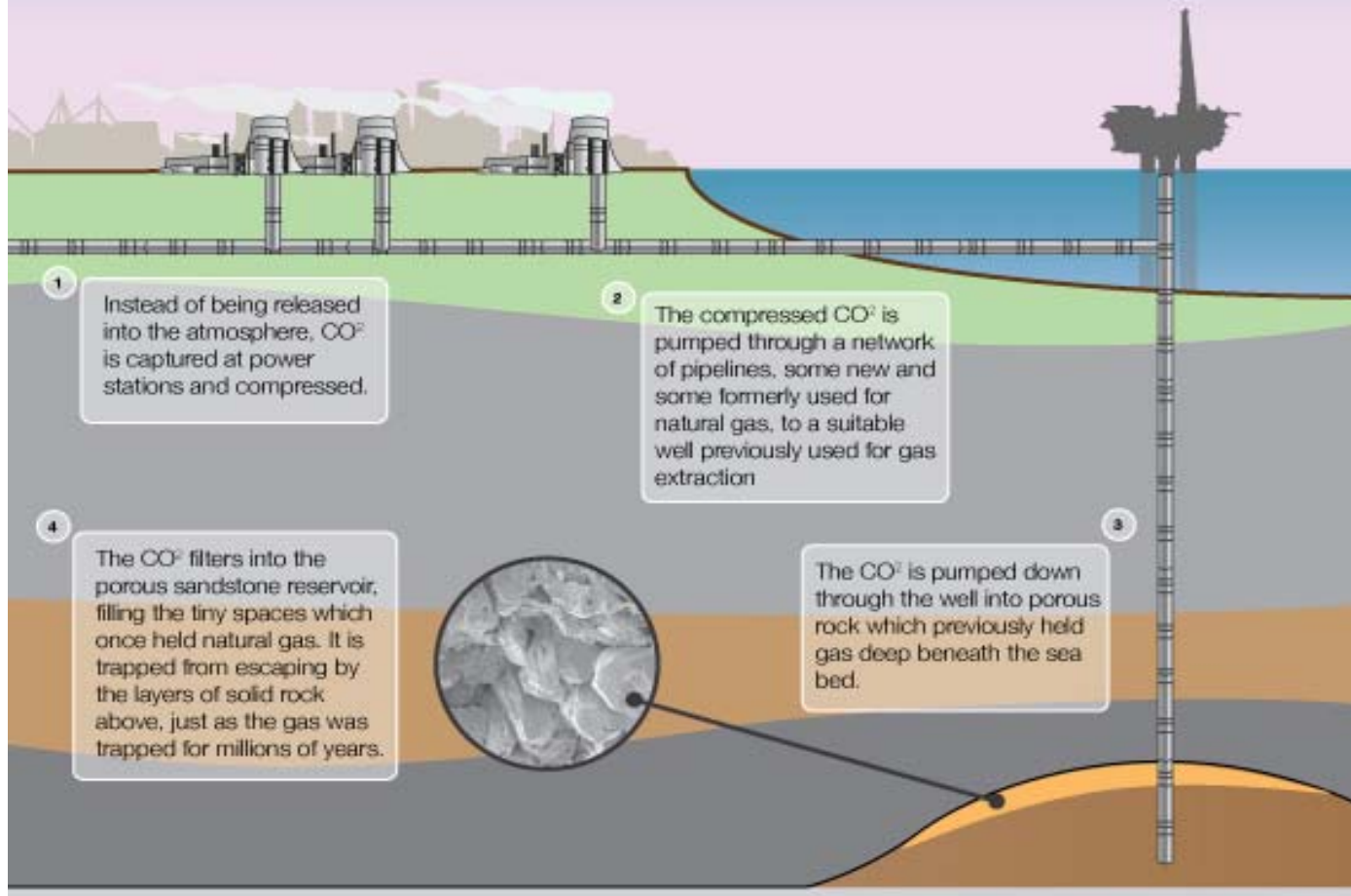
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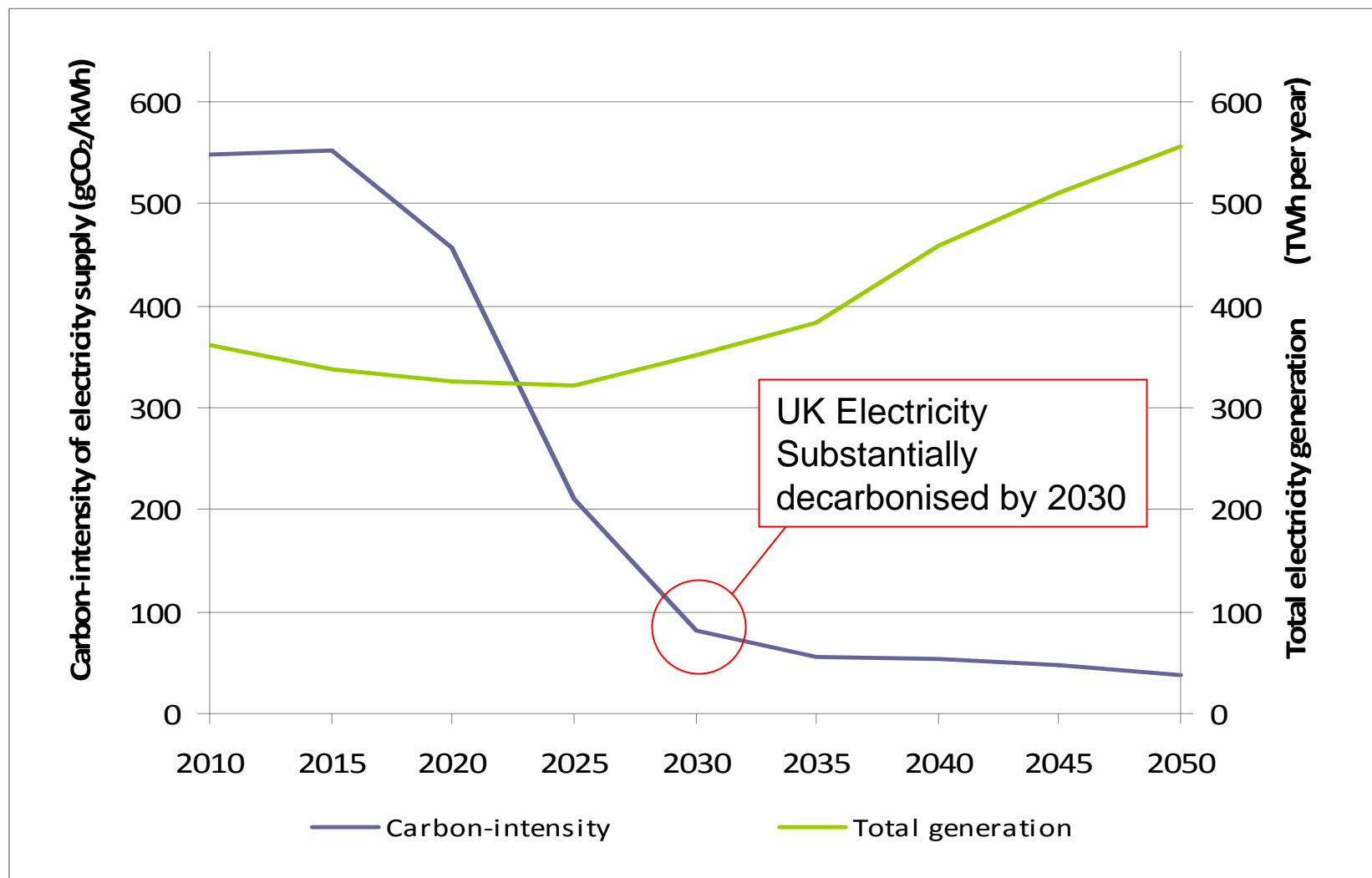
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How does CCS help?

	Does CCS help this?
Balanced generation portfolio	✓
Operable and stable grid	✓
Security of supply	✓
Climate change target compliance	✓
Least cost to consumers	?

Enabling future decarbonisation of Heat and Transport

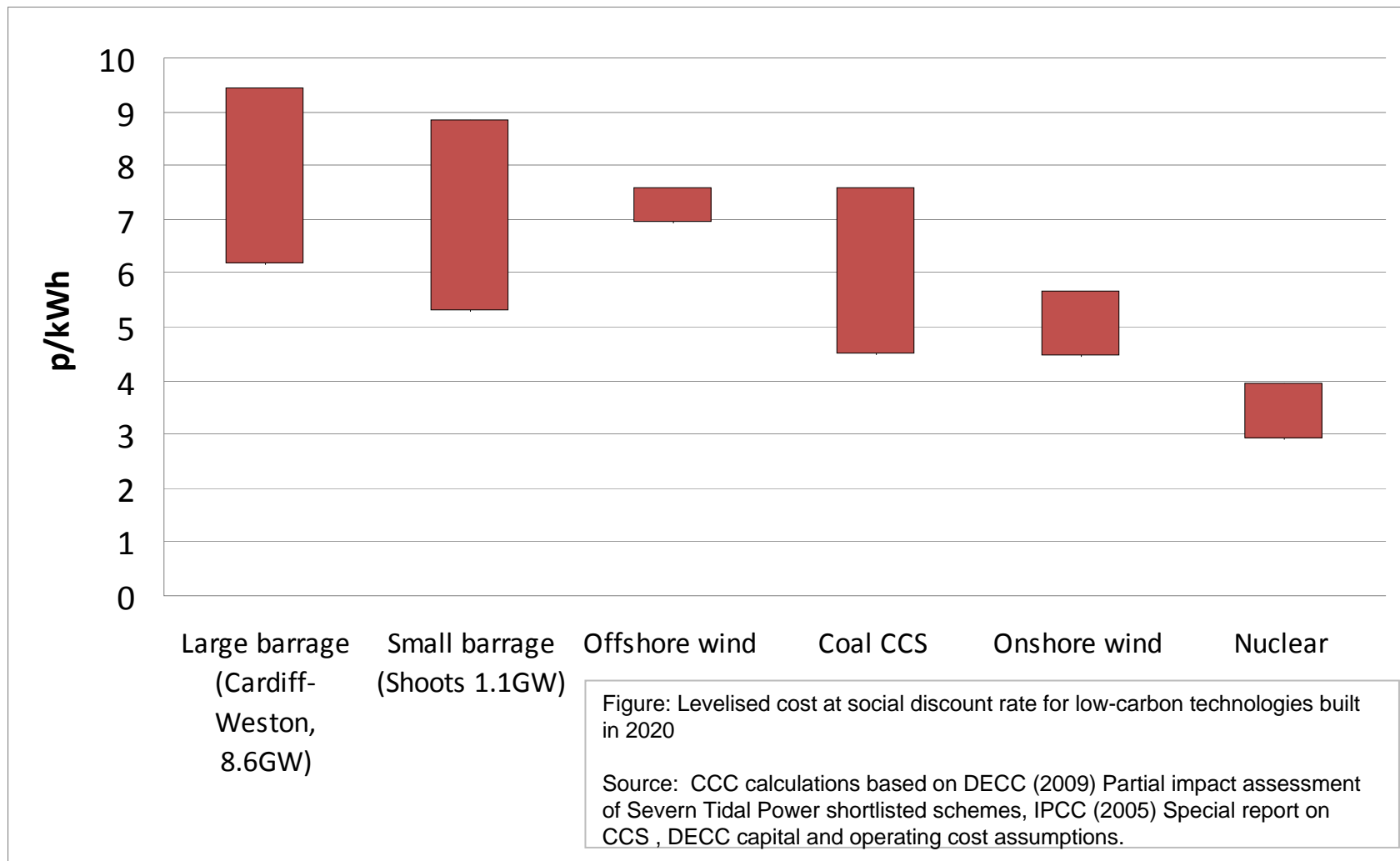


Source: Committee on Climate Change 2008. [Based on AEA (2008) MARKAL-MED model of long-term carbon reduction targets in UK]

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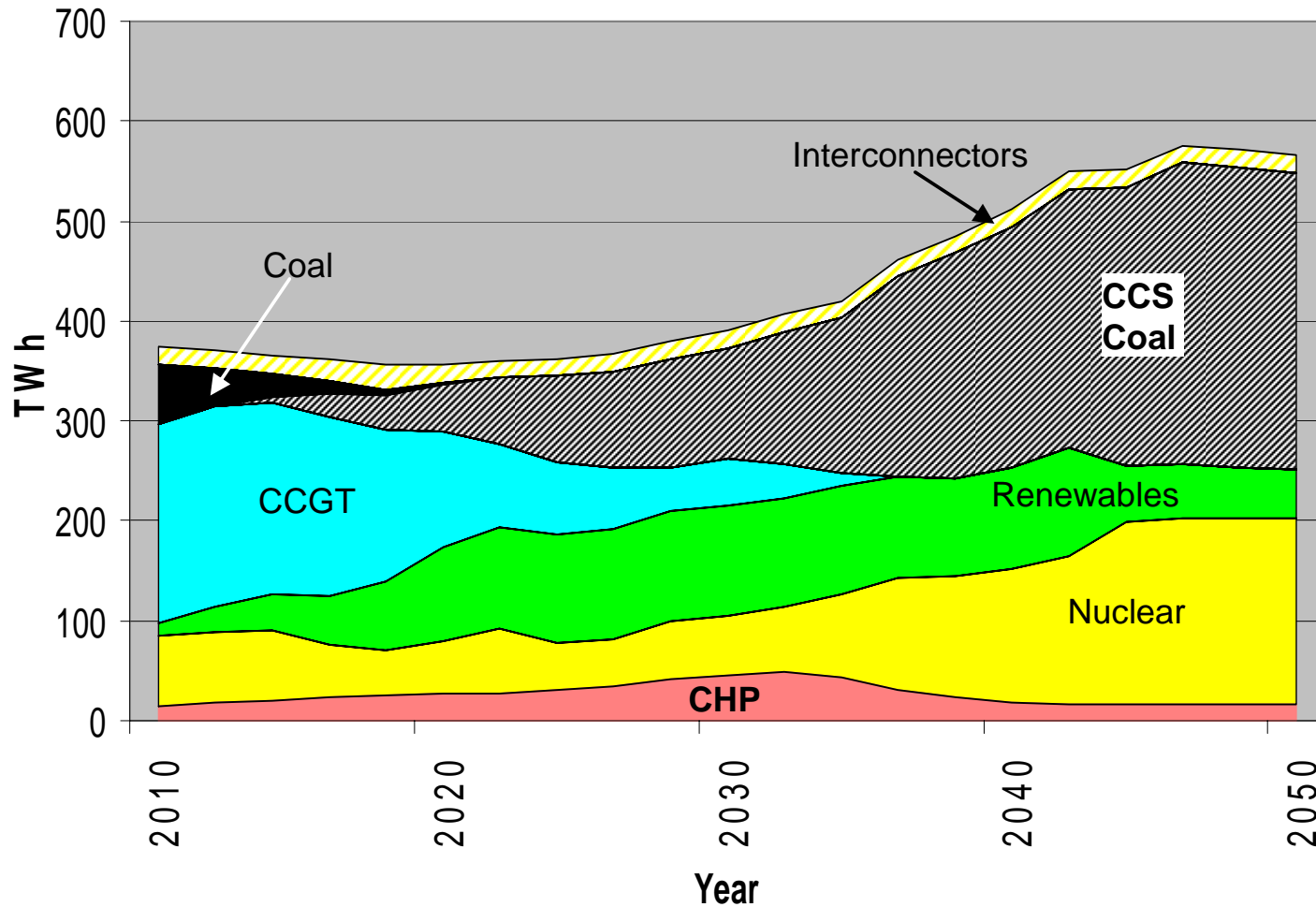
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Early CCS cluster development is “no or low regret”



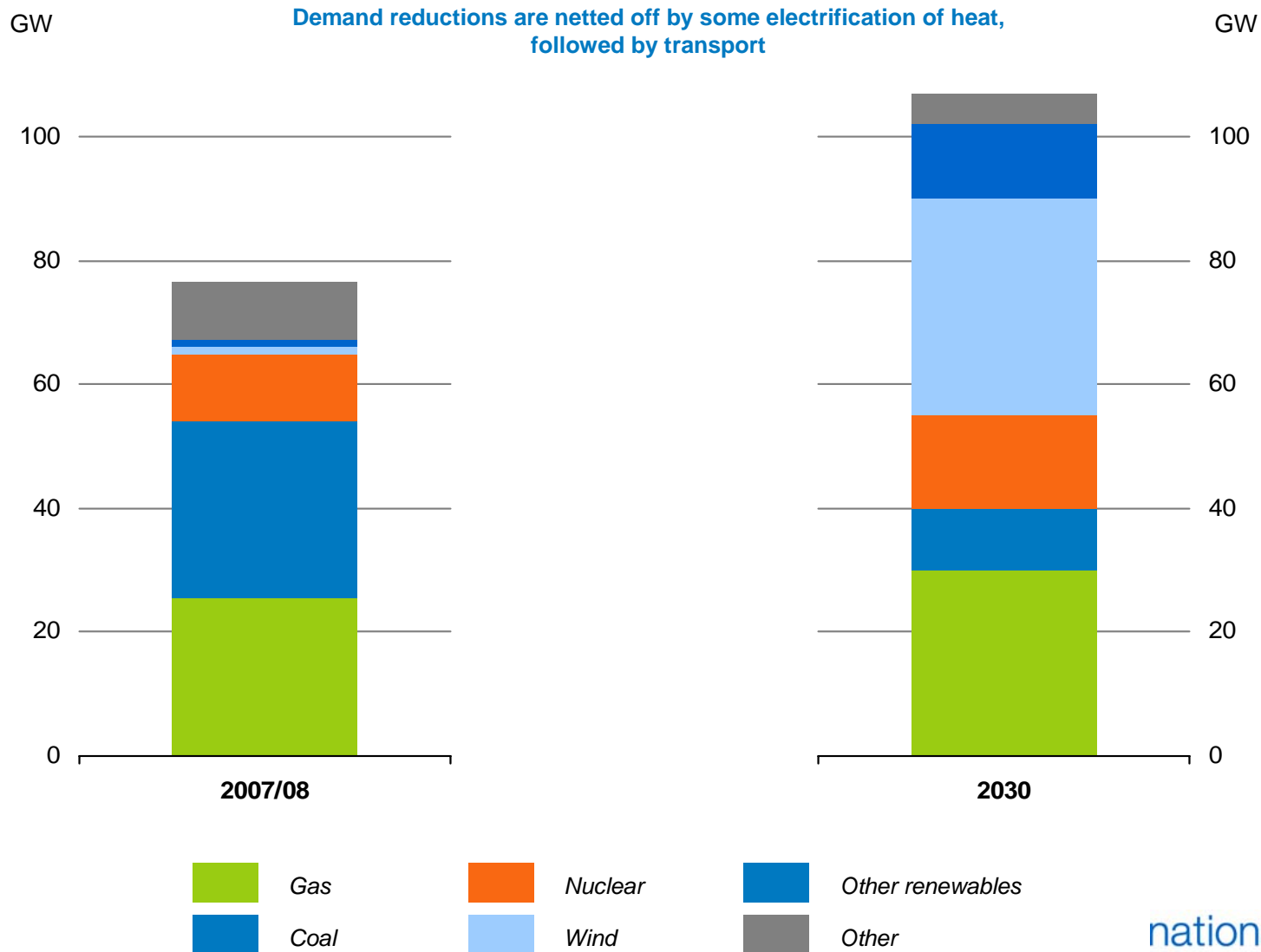
Source: Committee on Climate Change Oct 09

To meet climate change targets in the most economic manner, CCS/Coal, offshore wind and nuclear may form the basis of the generation fleet by the mid-2020s



There will have to be a massive change in the composition of electricity generation to meet climate change commitments.

Electricity generation capacity 2008 – 2030

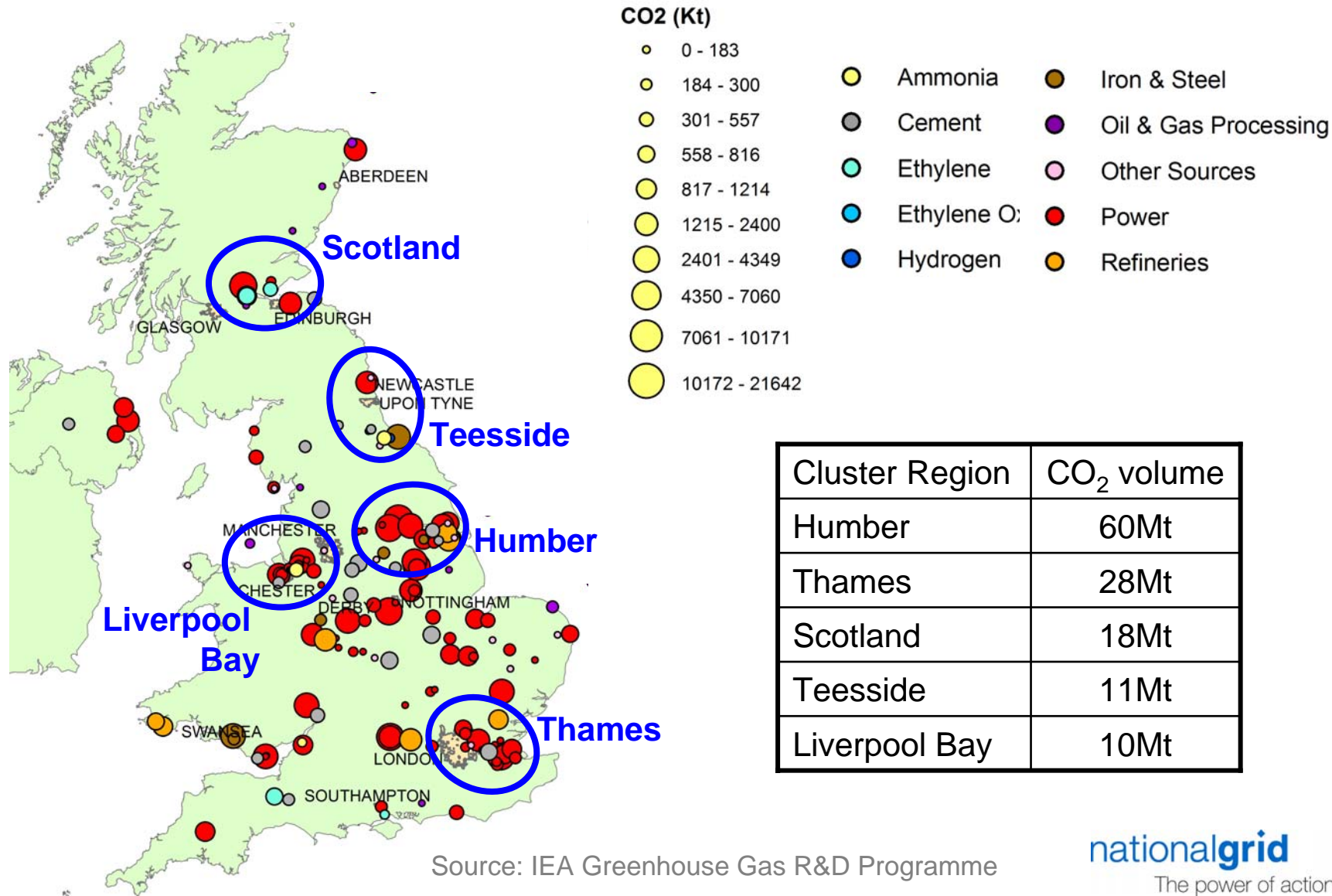


Why National Grid for transportation?

National Transmission System - Recent Investments – South Wales (316km)



Natural Clusters



Source: IEA Greenhouse Gas R&D Programme

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Comparing two approaches

What might it look like by the year 2030?

- ◆ Project Specific:
 - ◆ “**Demo-only**” sized transportation infrastructure
 - ◆ Lack of scalability
 - ◆ Barrier / Delay to CCS commercial rollout
 - ◆ Two bites at the necessary investment?

Transport investment:
~€4bn

Cumulative CO2 stored:
~400Mt

**Avg Capex per tonne
CO2 transported: ~€10/t**

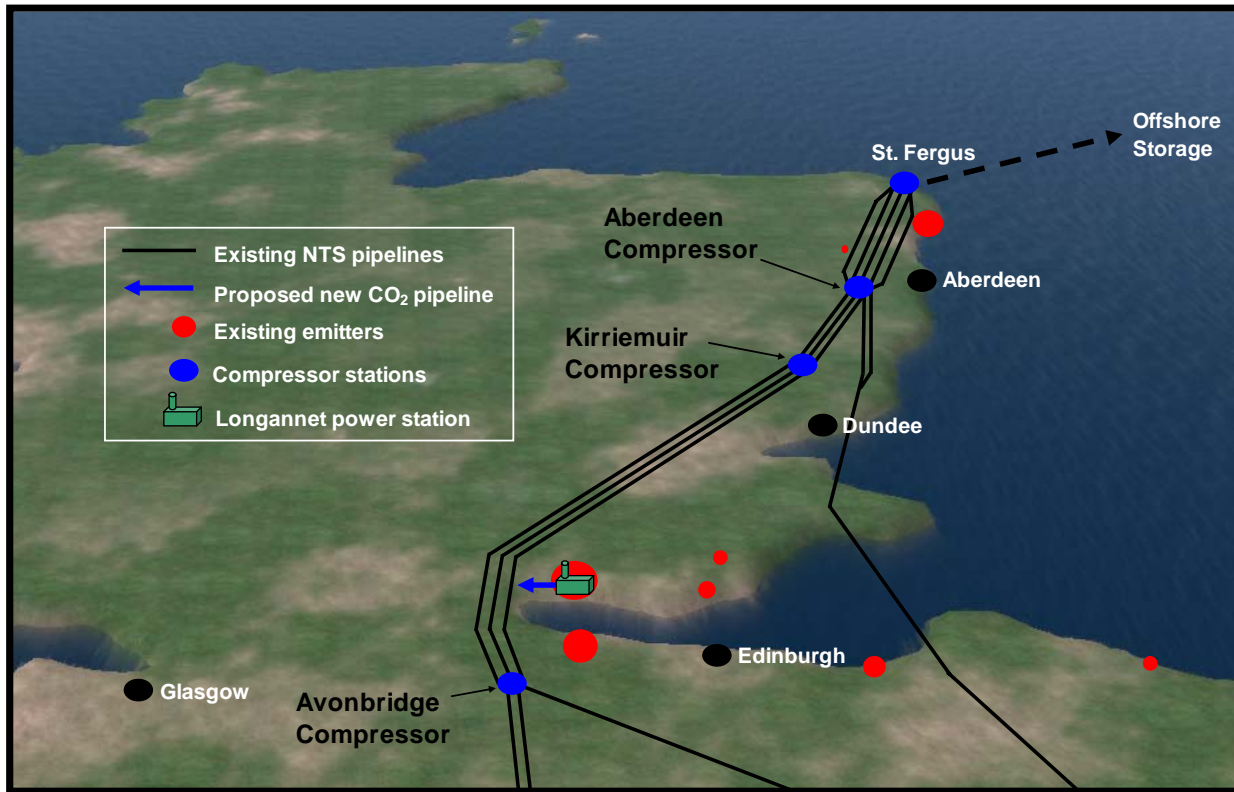
- ◆ Anticipatory:
 - ◆ “**Cluster sized**” transport backbone from the outset
 - ◆ “Least regret” anticipatory optimised network design to facilitate future connection of likely emitters
 - ◆ Key enabler for fastest CCS commercial rollout

Transport investment:
~€3bn

Cumulative CO2 stored:
~1,000Mt

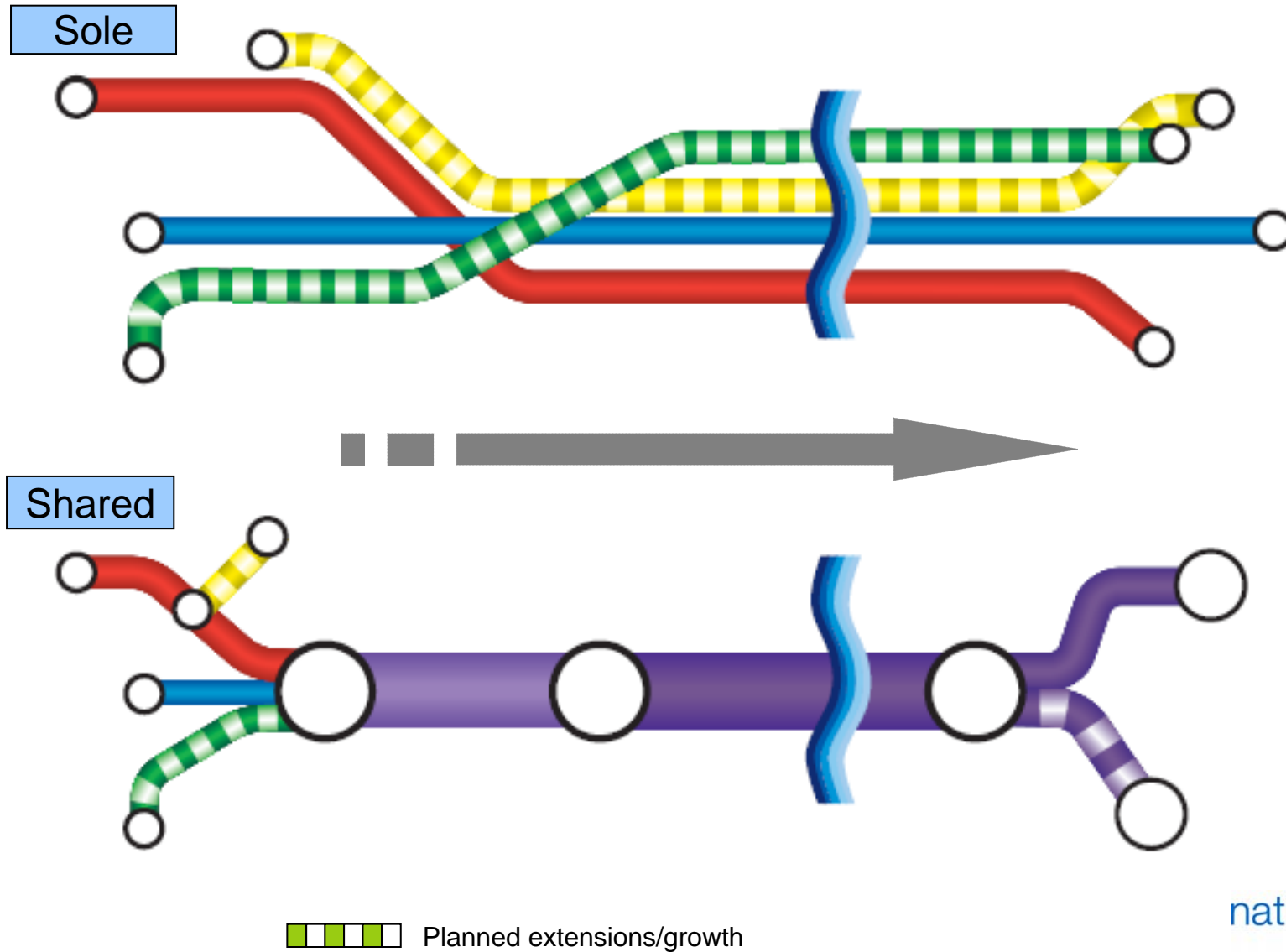
**Avg Capex per tonne
CO2 transported: ~€3/t**

National Grid Identified Re-use in Scotland



- Part of Scottish Power consortium in DECC 1
- 300km pipe section to be transferred to CO₂ use, subject to Ofgem consent
- Additional connections at Longannet (20km), St Fergus (<1km)
- CO₂ compression at St Fergus

Clusters in practice – transportation perspective



Key Challenges

- ◆ Maintain market and corporate momentum
- ◆ Storage
 - ◆ Scarce characterisation monies
 - ◆ Residual liability
 - ◆ Limited players
- ◆ These are complex multi-party projects
 - ◆ keep simple
 - ◆ avoid cost duplication
 - ◆ collaborate where possible