

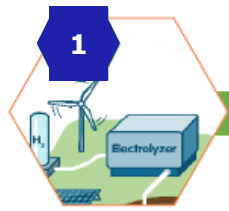


H_2

Why H2?

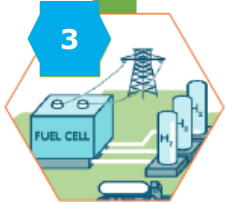
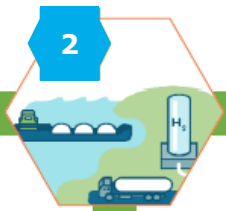
H₂ Generation

Enable **large-scale renewables integration**



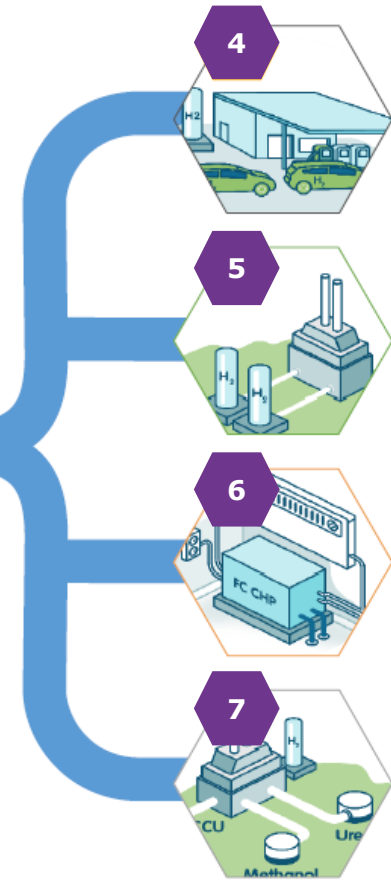
Transport

Distribute / transport energy across sectors and regions



Act as a **buffer** to increase system resilience

H₂ Use

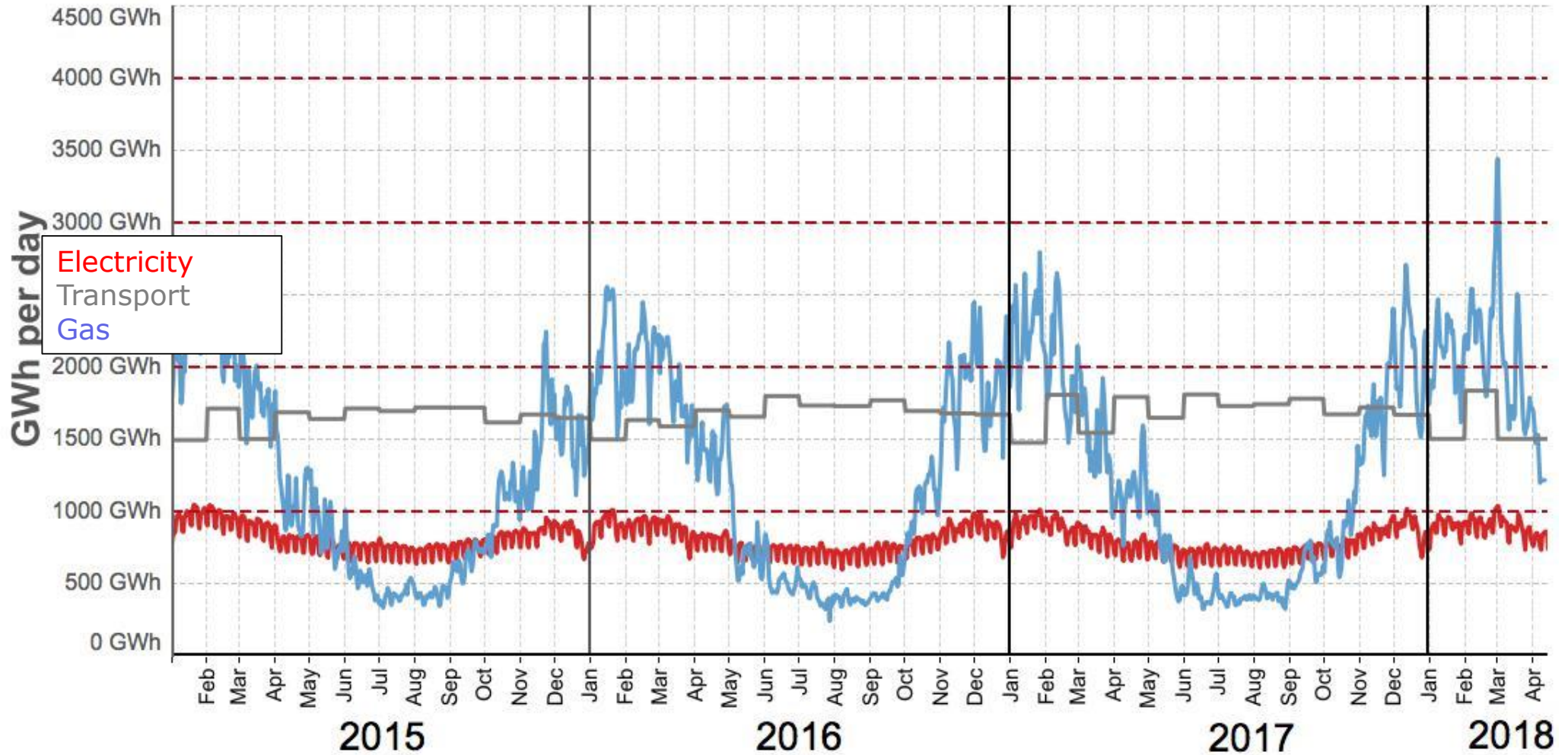


Decarbonise **transportation**

Decarbonise **industry energy use and power generation**

Decarbonise **building heating and power**

Serve as clean feedstock for industry

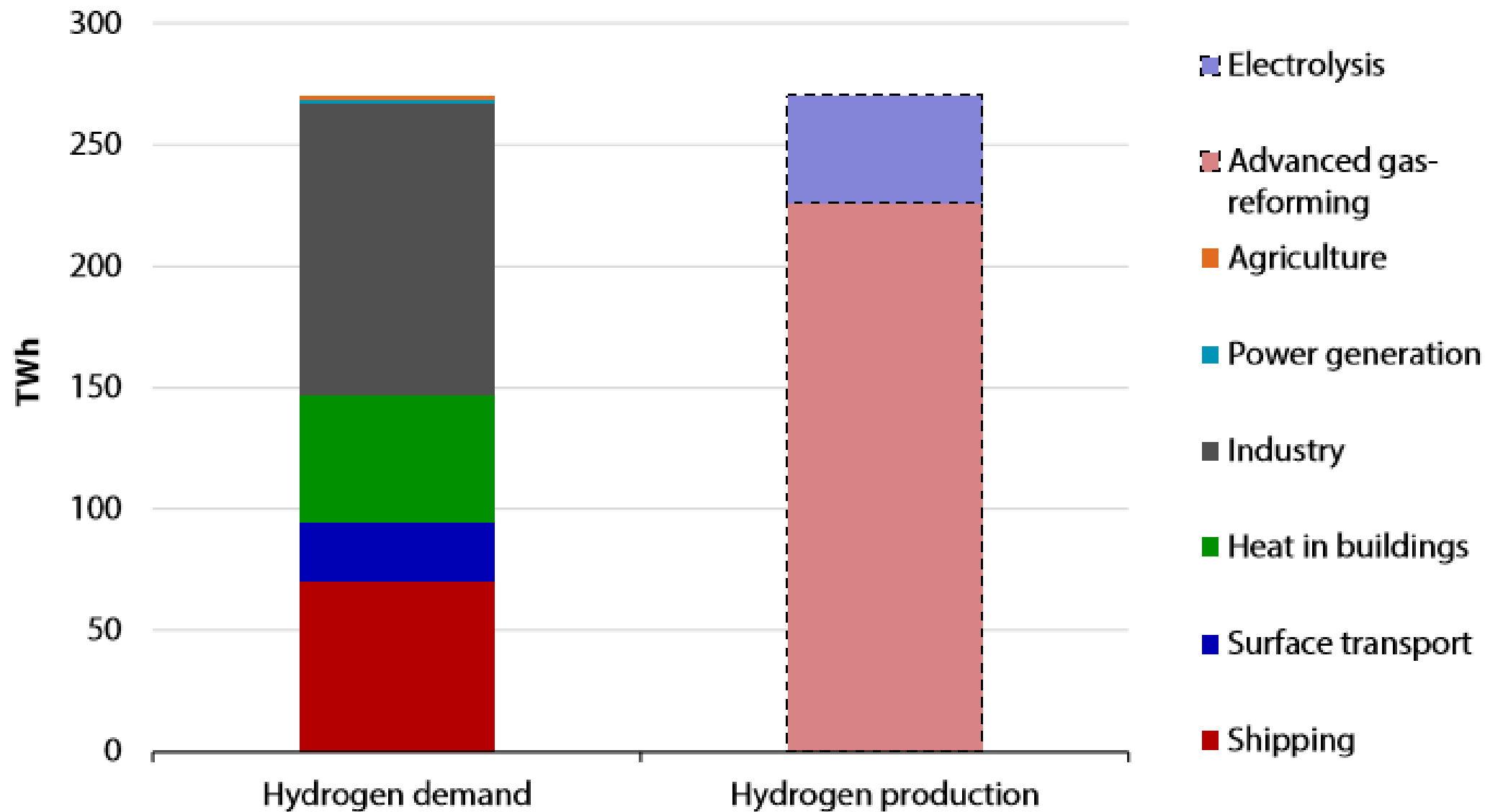


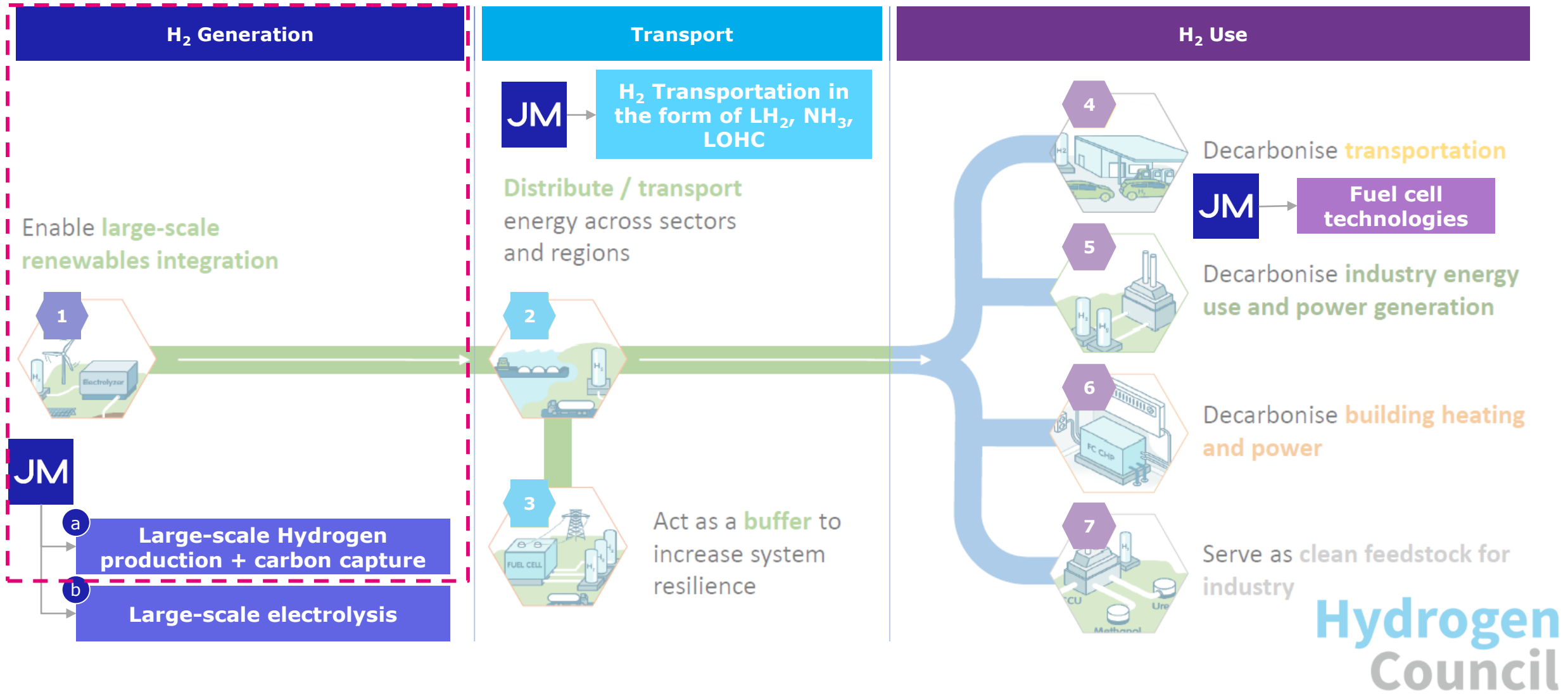
Data are from National Grid, Elexon and BEIS. Charts are licensed under an Attribution-NoDerivatives 4.0 International license
 Charts can be downloaded from <http://bit.ly/energycharts>



by Dr Grant Wilson grant.wilson@sheffield.ac.uk

In the UK, moving beyond an 80% target changes hydrogen from being an option to an *integral part of the strategy*







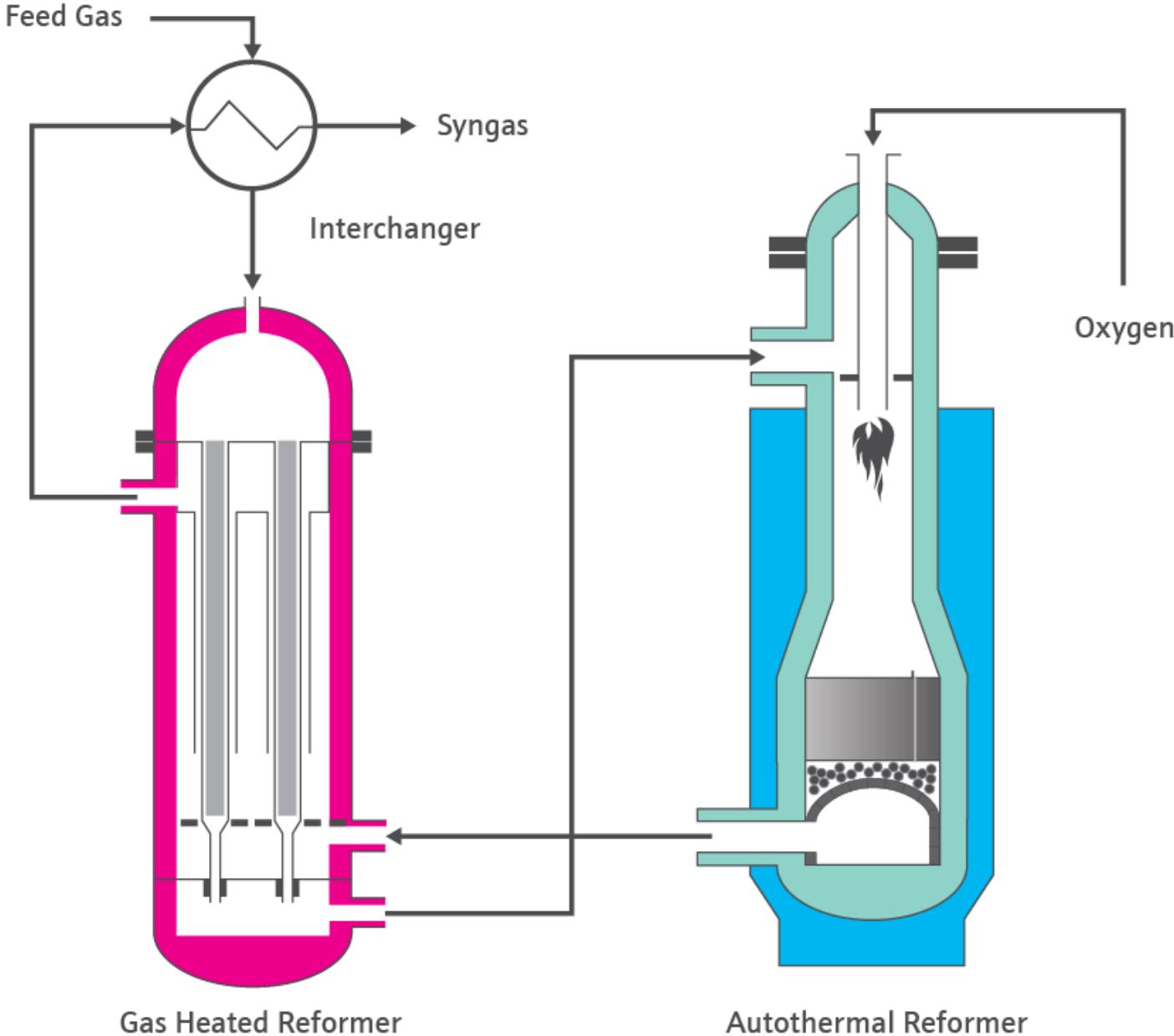
H₂





H₂

GHR/ATR







vs



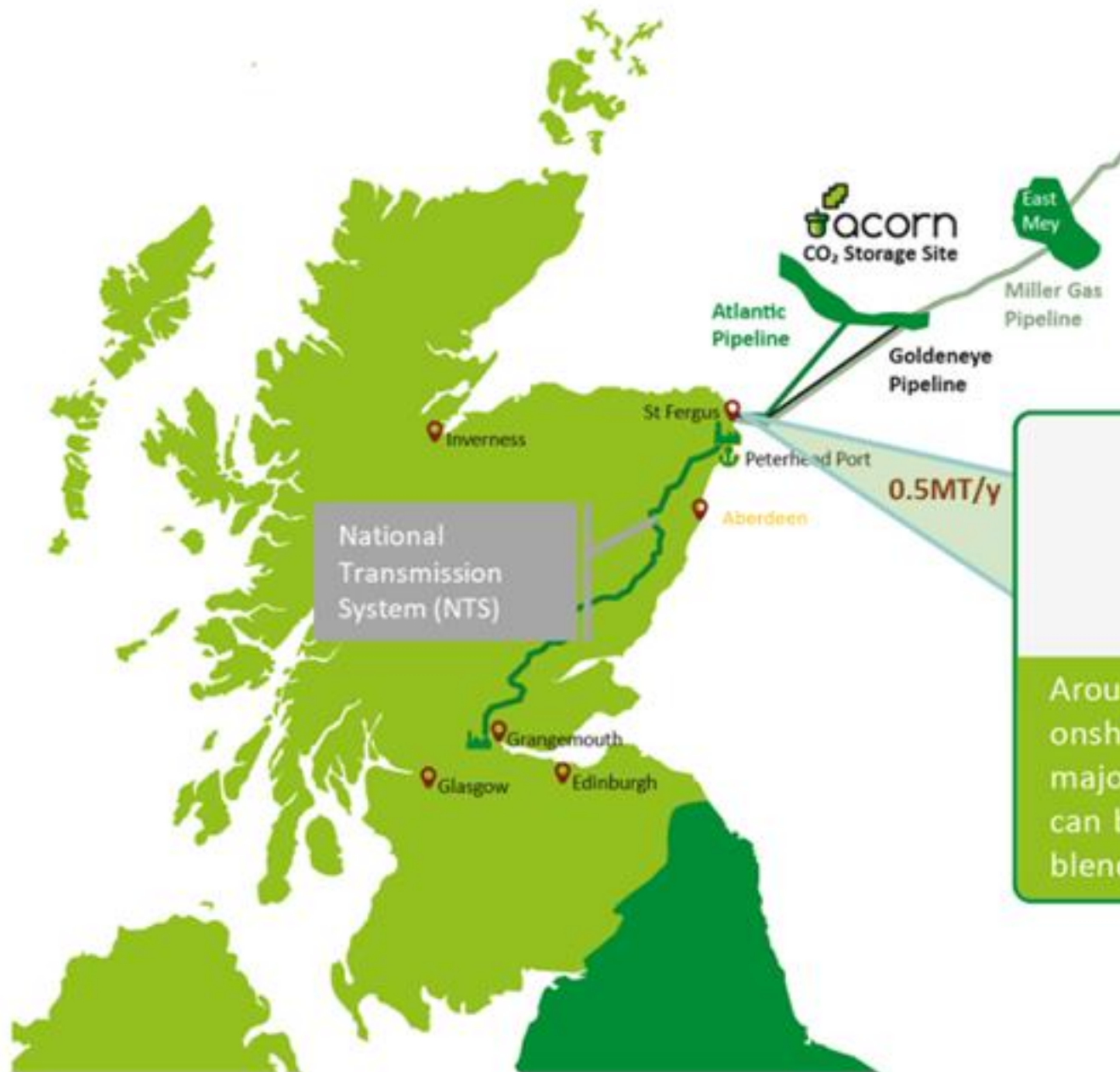
Cadent

— H₂ Pipeline
— CO₂ Pipeline





TOTAL



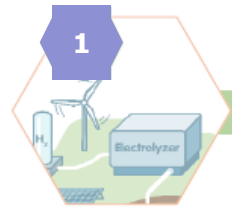
H₂ Production Hub

Around 35% of all UK natural gas comes onshore at St Fergus - an ideal site for a major H₂ production hub. H₂ at St Fergus can be fed directly into the gas grid from blending and decarbonising gas.



H₂ Generation

Enable **large-scale renewables integration**



JM

a

Large-scale Hydrogen production + carbon capture

b

Large-scale electrolysis

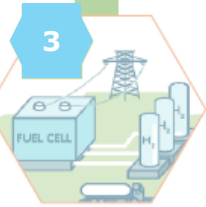
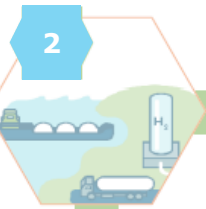
JM

Transport

JM

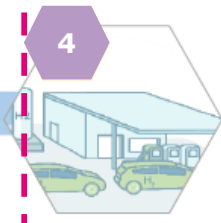
H₂ Transportation in the form of LH₂, NH₃, LOHC

Distribute / transport energy across sectors and regions



Act as a **buffer** to increase system resilience

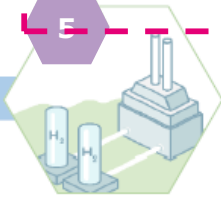
H₂ Use



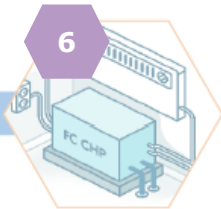
Decarbonise **transportation**

JM

Fuel cell technologies



Decarbonise **industry energy use and power generation**



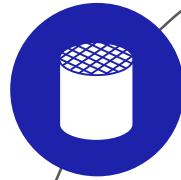
Decarbonise **building heating and power**



Serve as **clean feedstock** for industry

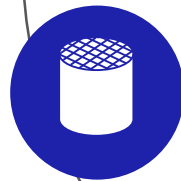
ICE

Emission Control Catalysts
Gasoline and Diesel



PHEV

Emission Control Catalysts
Li-Ion Battery Materials



BEV

Li-Ion Battery Materials



FCEV

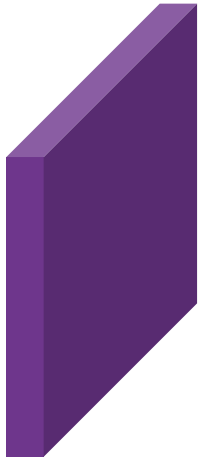
Coated Catalyst Membranes
Membrane Electrode Assemblies
Li-Ion Battery Materials





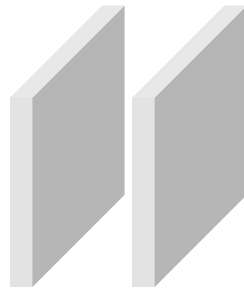
Membrane

Membrane and associated supports



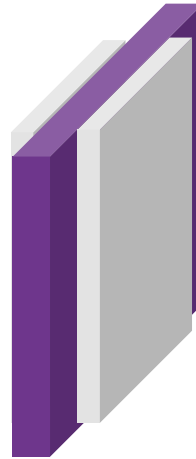
Catalysts

Anode and cathode layers



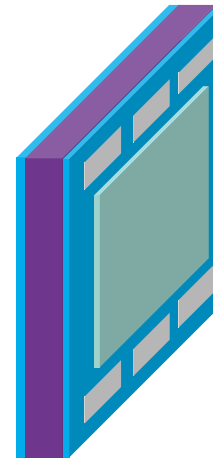
CCM – catalyst coated membrane

'3-layer system'



Sealed CCM

'5-layer system'



MEA – membrane electrode assembly

'7-layer system'

