



Bacton Energy Hub Hydrogen Demand

Progressive Energy

December 2022



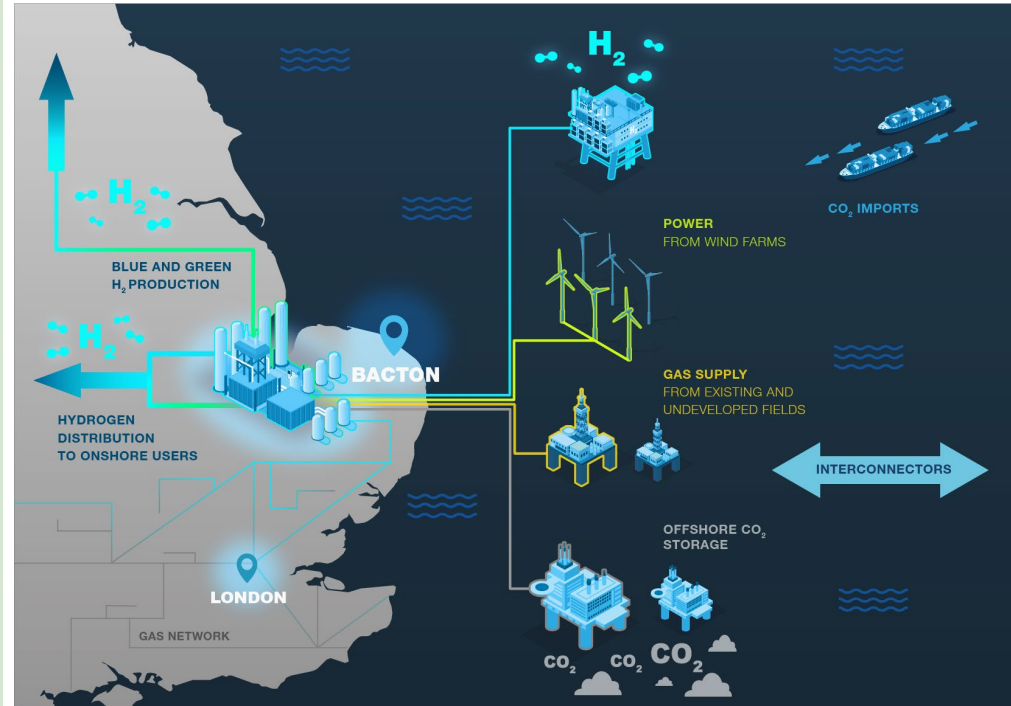
Progressive Energy

- Low carbon power project developer
- Active in CCS, and low carbon power for 20+ years
- Originator and lead partner on Track 1 HyNet cluster
- Commissioned to deliver phase 1 Bacton Net Zero report (late 2020)



SIG key objectives

- Quantify potential hydrogen demand in Bacton catchment area by sector from 2030-2050
- Understand seasonal and diurnal variability in demand across sectors
- Understand key sensitivities, drivers and blockers to demand cases
- Assess hydrogen storage requirements and identify storage scenarios
- Inform supply and infrastructure SIGs

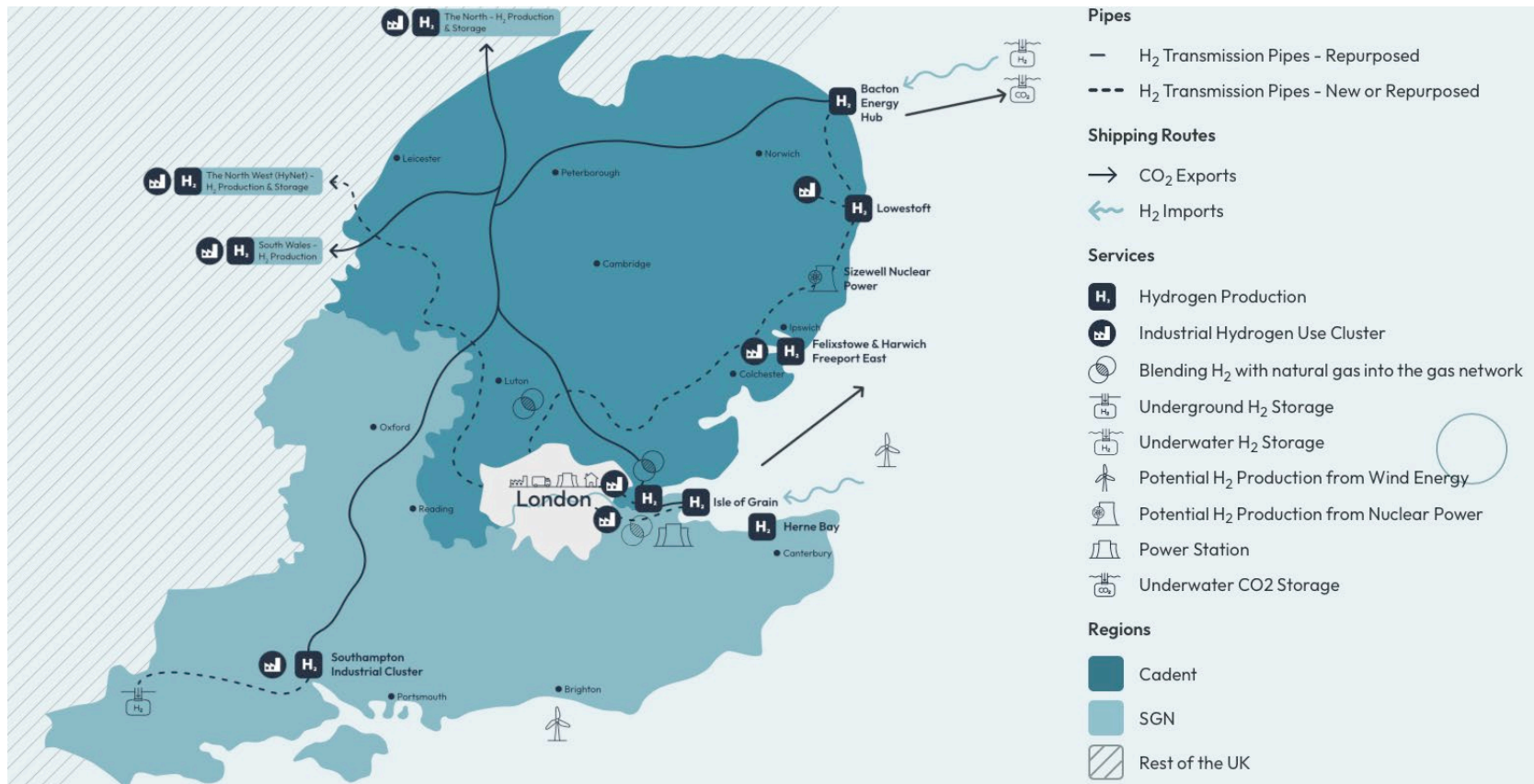


Demand forecasting



- Develop demand forecasts for BEH
 - Context of the core project and buildout scenario (for 2030, 2040, 2050)
- Approach based on current natural gas use
 - Modified to reflect electrification, energy efficiency and technology developments
- Local industrial and power demand
- Blending into NTS to serve London
- Full conversion of NTS to hydrogen
- But first: Bacton's connections...

Bacton connections



Pipes

- H₂ Transmission Pipes - Repurposed
- - - H₂ Transmission Pipes - New or Repurposed

Shipping Routes

- CO₂ Exports
- ← H₂ Imports

Services

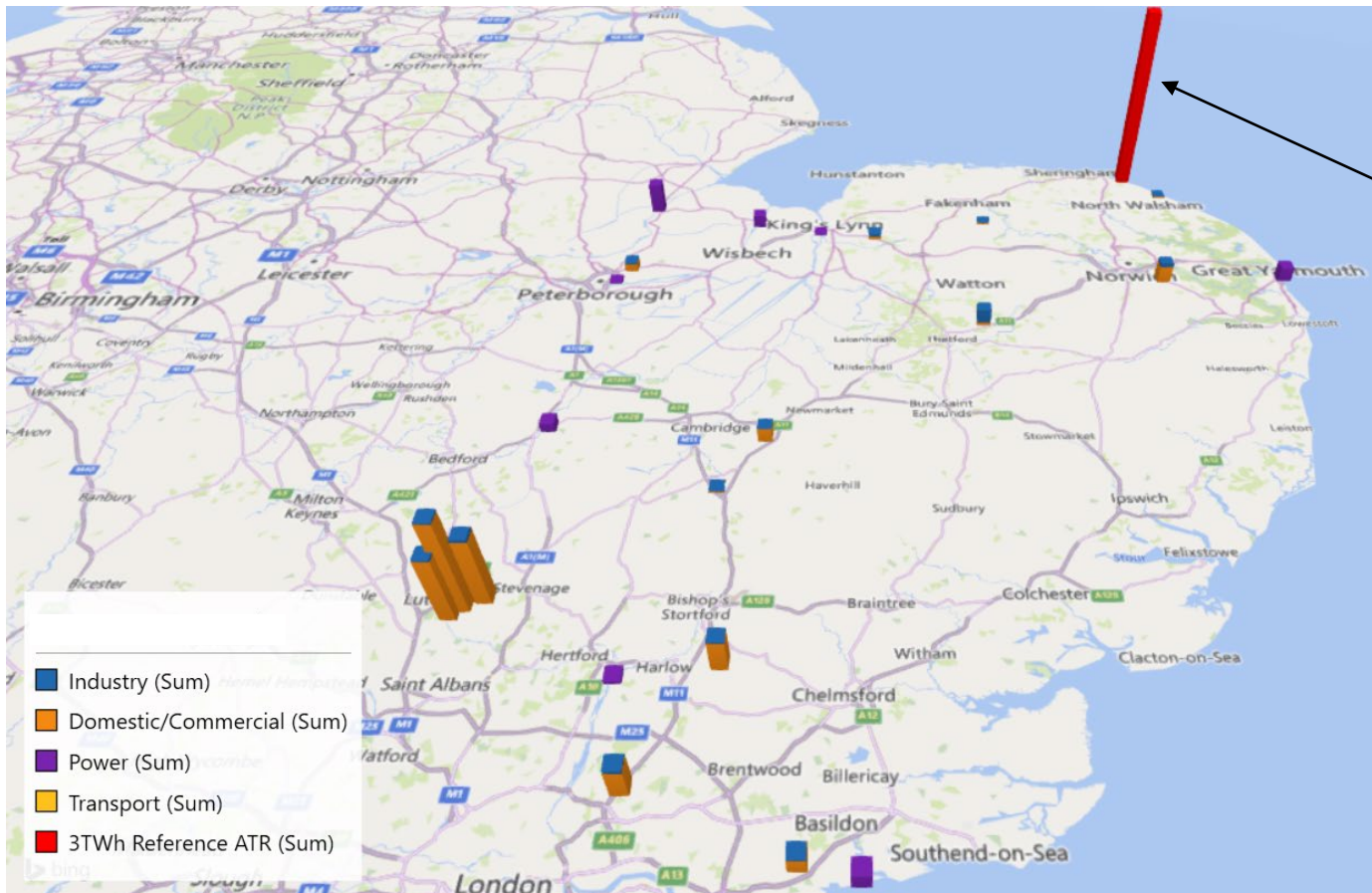
- H₂** Hydrogen Production
- Industrial Cluster** Industrial Hydrogen Use Cluster
- Blending** Blending H₂ with natural gas into the gas network
- Underground Storage** Underground H₂ Storage
- Underwater Storage** Underwater H₂ Storage
- Wind Energy** Potential H₂ Production from Wind Energy
- Nuclear Power** Potential H₂ Production from Nuclear Power
- Power Station** Power Station
- Underwater CO₂ Storage** Underwater CO₂ Storage

Regions

- Cadent** (Dark Blue)
- SGN** (Light Blue)
- Rest of the UK** (Hatched)



2030 demand

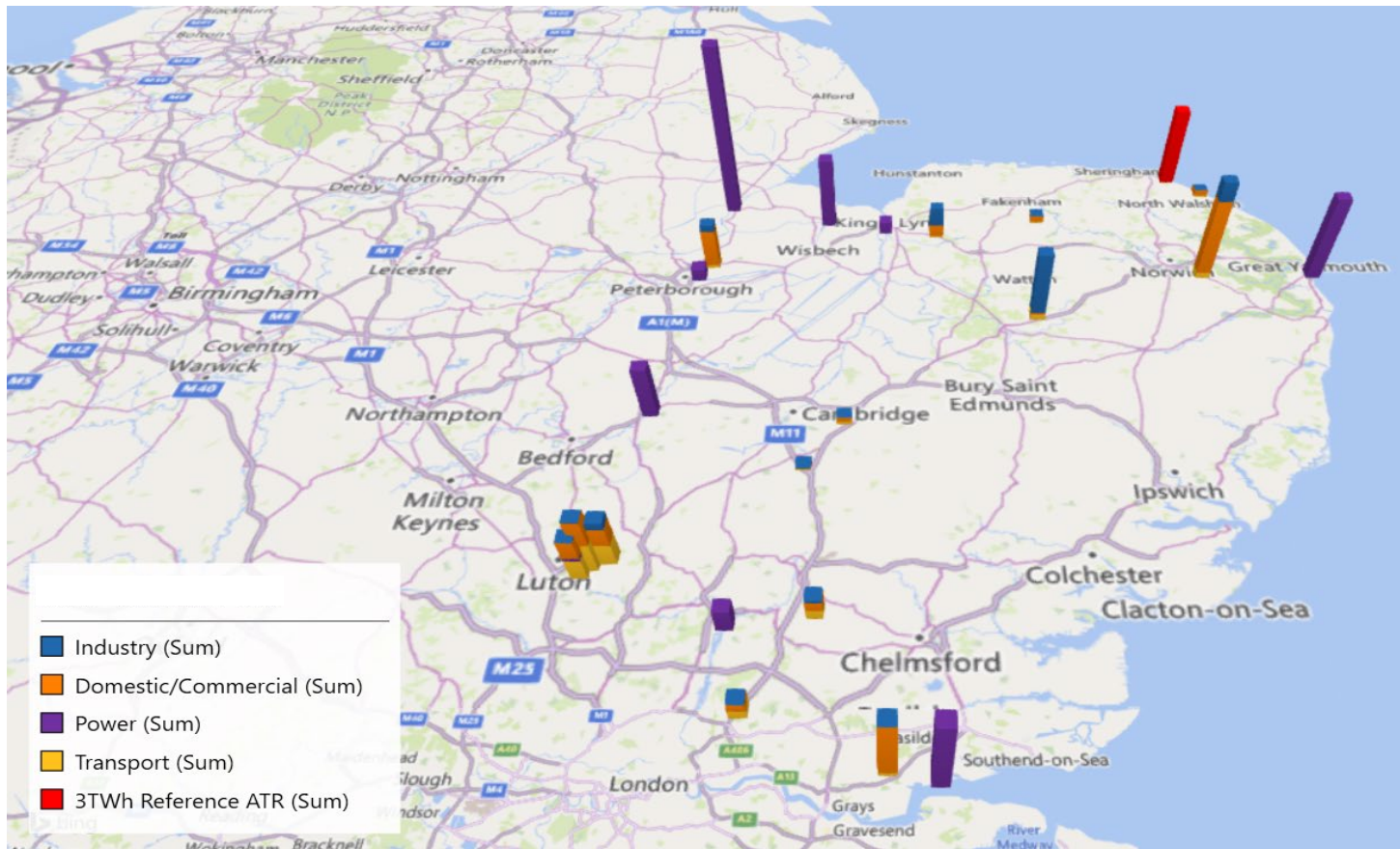


This column shows production from 350 MW core project

Demand dominated by blending to London



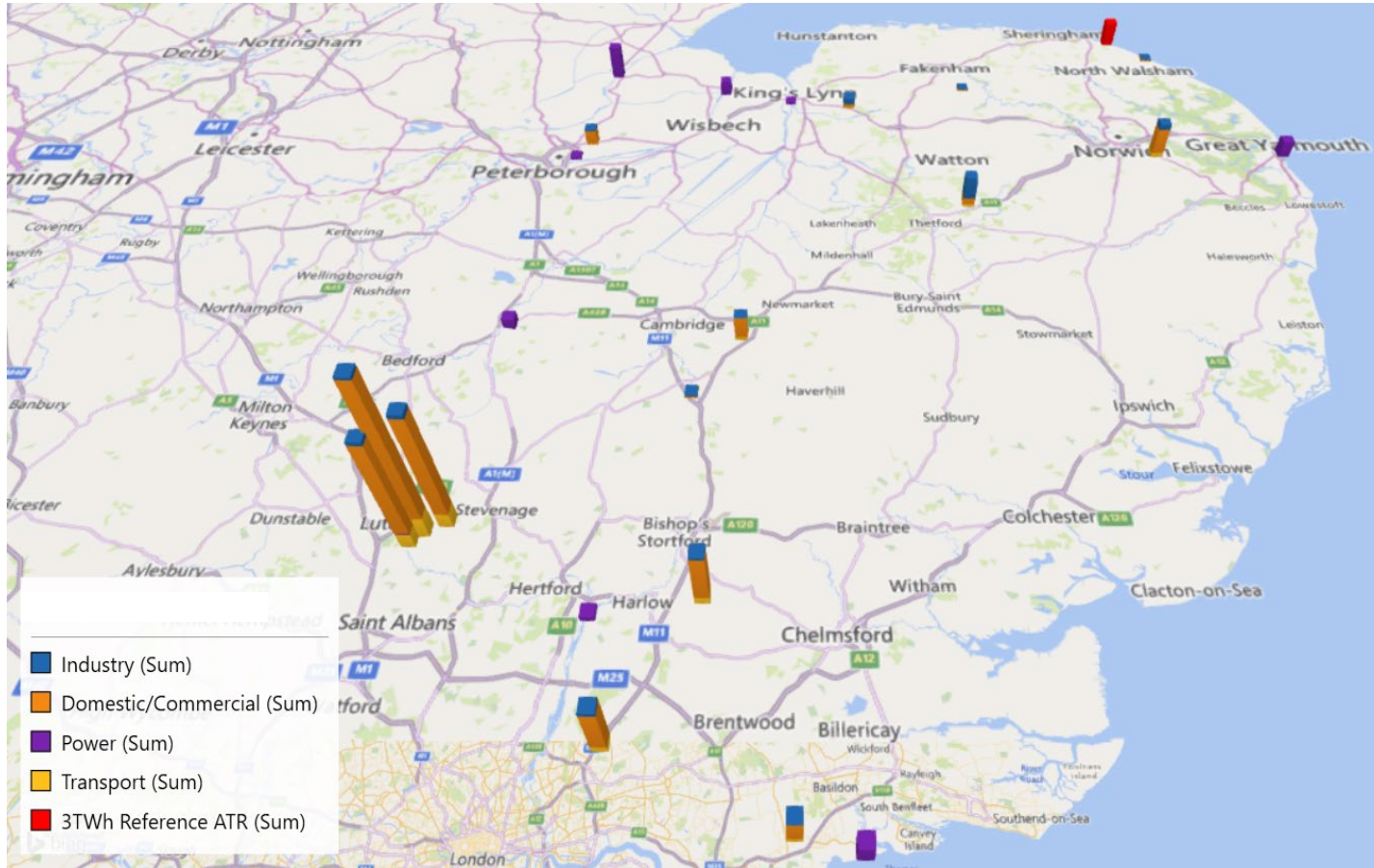
2040 demand



London shifting to 100% hydrogen

Other domestic, power and industry demand emerging

2050 demand



London shifting to 100% hydrogen

Other domestic, power and industry demand emerging



Demand forecasts (TWh/yr)



Sector	2030	2040	2050
Domestic / commercial	5.7 (blending)	28.4	61.8
Industry	0.6	4.8	6.5
Power	1.6	20.0	12.0
Transport (excl marine/aviation)	0.2	1.9	5.6
Total	8.1	55.1	85.9

Note:

(depending on load factors, especially for electrolysis)

Core scenario	350 MWth 'blue'	Produces: c. 3 TWh/yr
Buildout scenario	3.6 GW 'blue' 6.3 GW 'green'	Produces: c. 40-50 TWh/yr

Storage assessment

- Mismatch between supply and demand: drives need for storage
 - Domestic demand is much higher in winter
 - Electrolytic hydrogen production relies on available renewable electricity
- Storage options in a hierarchy
 - Linepack
 - Local tank storage
 - Salt caverns
 - Depleted gas fields/aquifers
- Findings:
 - Core scenario – linepack is adequate
 - Buildout case - depleted gas fields/aquifers – dependent on wind climate