

Wales

Overview of Energy Contexts in Wales

- Wales has a diverse generation mix dominated by **renewables, gas and imports/exports with England**. Renewable electricity (mainly wind, solar, hydro and biomass) provides around **36%** of total generation, equivalent to **54%** of Welsh electricity consumption¹.
- Two **major industrial clusters** are located in South and North Wales, covering, steel, oil refining, chemicals, manufacturing, and flexible power generation. These energy-intensive industrial assets create substantial gas demand and are key candidates for decarbonisation via electrification, hydrogen, and carbon capture.
- Emerging hydrogen developments** include two funded projects under Hydrogen Allocation Round 1 (HAR1), totalling 19.4MW, and three shortlisted projects in HAR2, all located in South Wales.

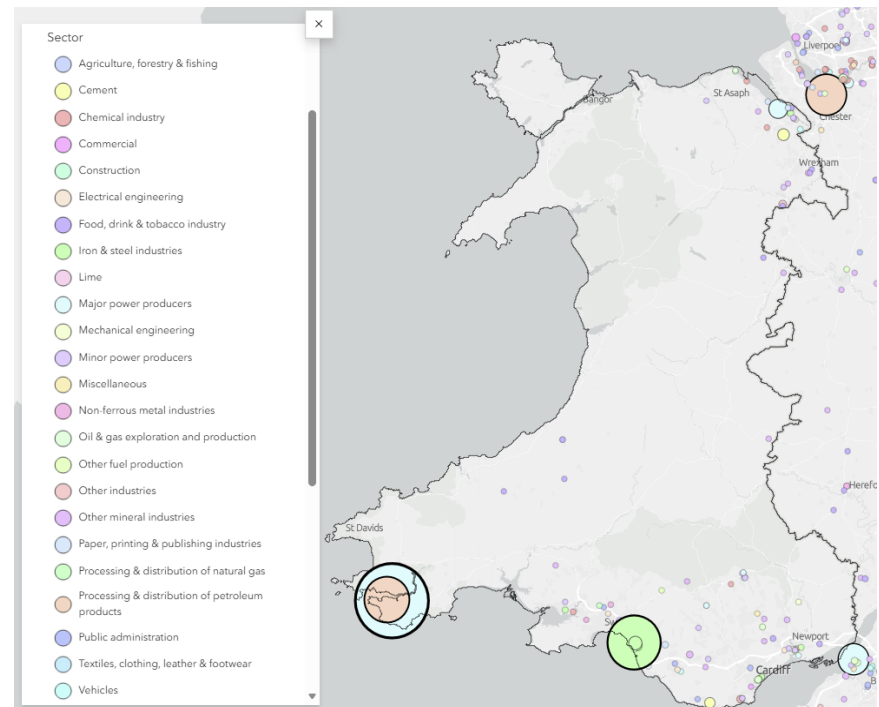


Figure 1 – Industrial and commercial emissions in Wales (Source – NESO tRESP)

Challenges

- Hydrogen production and energy infrastructure development requires close alignment with credible anchor demand.
- Large-scale hydrogen production and fuel switching may significantly impact future grid reinforcement.

Opportunities

- Concentrated industrial demand in South and North Wales presents anchor H₂ demand potential.
- Strong offshore wind and renewable potential supports low-carbon hydrogen production.

Research Questions

- Where will anchor H₂ demand emerge in South Wales and what's the H₂ production potential?
- How to quantify the impacts of hydrogen developments on regional electricity networks under uncertainty?

HI-ACT Research Plan (Focus on South Wales)

- To project hydrogen anchor demand nodes and capacities using fuel switch analysis and spatial clustering.
- To map hydrogen production potential based on renewable resource assessment and techno-economic analysis of candidate production pathways (green/blue...).
- To develop a South Wales electricity network model and evaluate the impacts of hydrogen offtakes with probabilistic/interval energy flow analysis.

Stakeholder Engagement List

- National Energy System Operator (RESP Wales modelling team)
- Net Zero Industry Wales
- Tata Steel
- National Grid Electricity Distribution
- Local councils (e.g., NPT Council)

¹Regen, Energy generation and use in Wales: first combined report (for Welsh Government), 2026.