Energy for generations

Energy for generations

For a clean, secure energy future

Ireland's pathway to a net zero energy system by 2050



Overview of ESB

Energy for generations

- Established 1927 — leading Irish diversified and vertically integrated electricity utility
- 97% state-owned and regulated by the Irish Commission for Regulation of Utilities
- Operating in Ireland and Great Britain
- Net Zero by 2040 Strategy empowering low carbon living
- Currently investing >€2bn/yr in infrastructure
- c. 10,000 employees (with +3000 in past 3.5 years)

Regulated Networks



ESB NETWORKS | Northern Ireland Electricity Networks

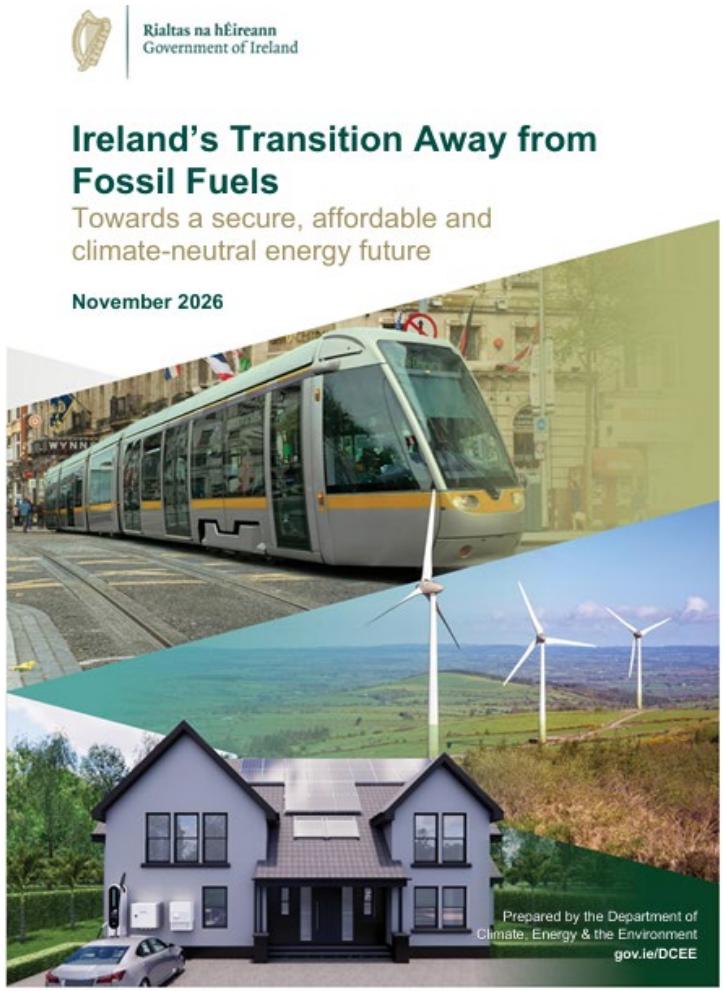
Generation & Trading

Generation & Trading

Customer solutions

electric Ireland | SO ENERGY

A nation that can’t control its energy sources can’t control its future



“As an island economy with substantial dependence on imported oil and gas, Ireland is exposed to international price volatility, geopolitical instability and external supply disruptions. Reducing that dependence will strengthen energy independence, affordability, competitiveness and resilience”.

“Renewable gases and hydrogen may have further targeted roles in hard-to-abate uses where direct electrification is impractical”.

18th November 2026

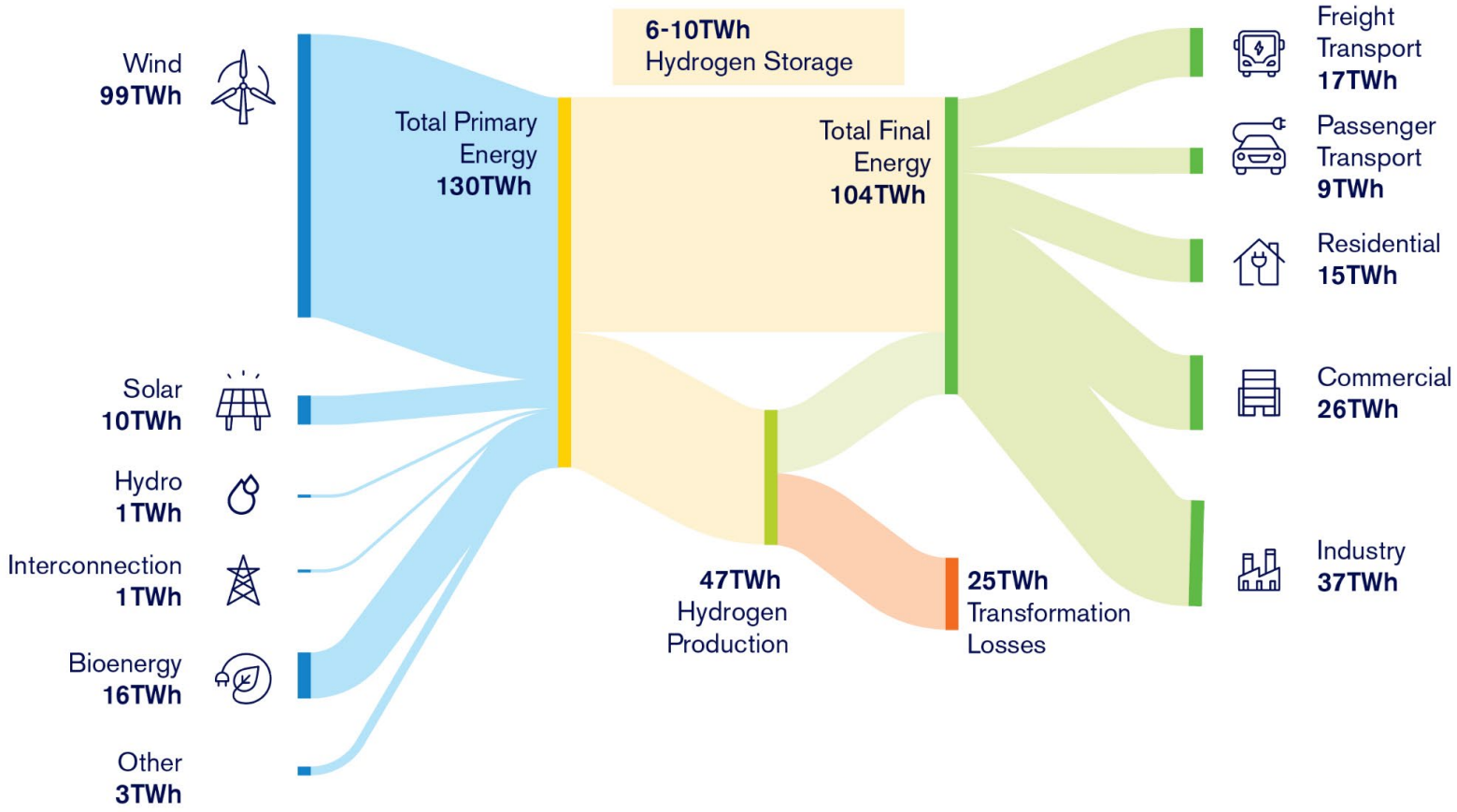
Whole energy system

What will Ireland's energy system look like in 2050?

~2.5x
increase in electricity demand in 2050 compared to 2019

>70%
proportion of final energy demand met by electricity

~80%
proportion of transport, residential and commercial energy demand met by electricity



MaREI modelling was completed using the TIMES Model. Hydrogen storage modelling was completed by ESB and complimented by MaREI modelling.

Electricity system: Backup generation and storage

With renewables as the main power source, backup solutions are essential for times of low wind and solar output. Several net-zero compatible backup options are possible:

Zero-/low-carbon fueled dispatchable generation

Open or combined-cycle gas turbines powered by low- or zero-carbon fuel

Large-scale interconnection

Large capacities are envisaged, however, periods of low wind in Ireland may coincide with similar weather across interconnected regions in Northern Europe. Local dispatchable capacity needed.

Large-scale electricity storage

Technologies are emerging for longer-term battery storage (4 hours plus), but unlikely to be feasible at volumes needed to store 10 plus days of electricity demand

Natural gas/coal/biomass with carbon capture and storage (CCS)

Nuclear electricity

Zero-/low-carbon dispatchable generation will be particularly important for a net zero system in Ireland, along with interconnection and storage.

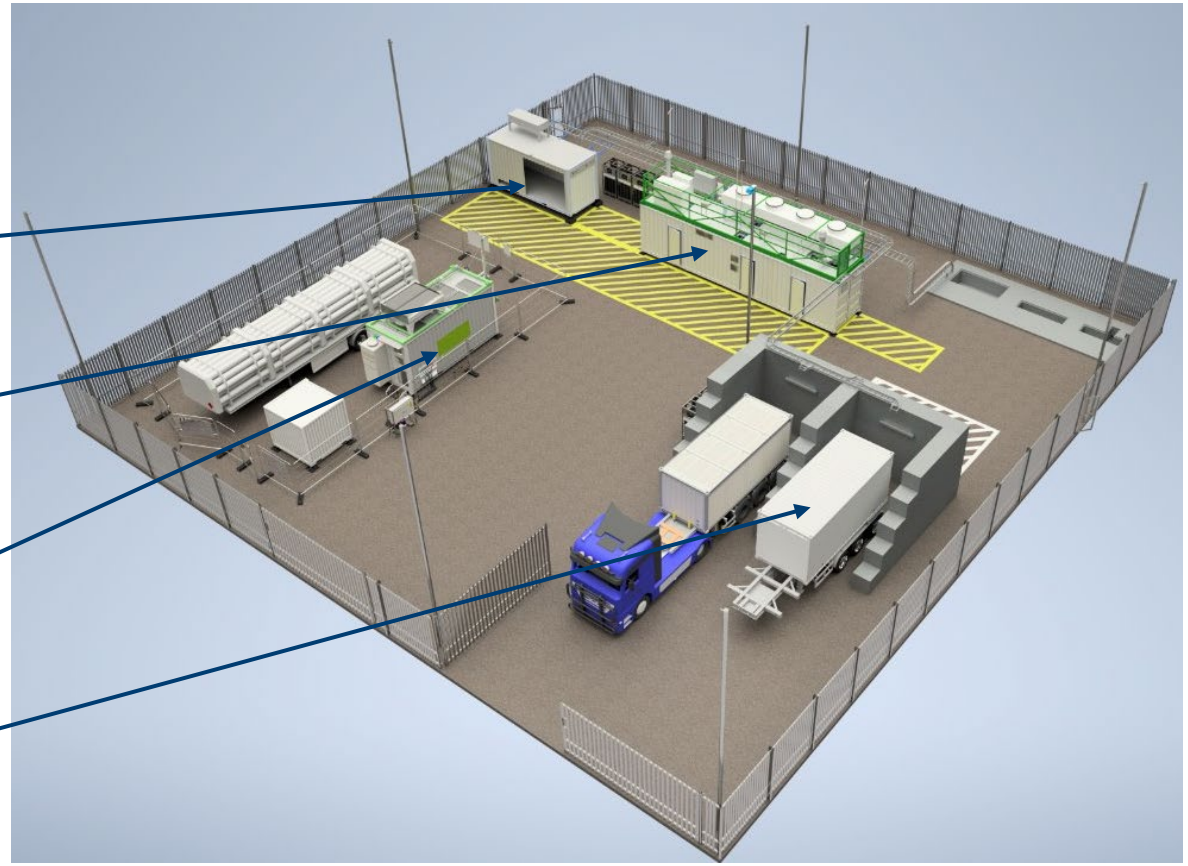
Hydrogen Production and Storage Demonstration Facility Aghada, Co. Cork

Gas Compressor

900kW Electrolyser
380kg H_2 / day

2 no. Hydrogen Fuel-Cell Generator Units (250kW)

2no. Hydrogen Storage Trailers
300kg at 300bar



- Site works commenced
- Fully operational Q3 2027
  - 2 MEGC transport trailers
  - Certification processes
  - HPU demonstration units
  - Hydrogen off-takers



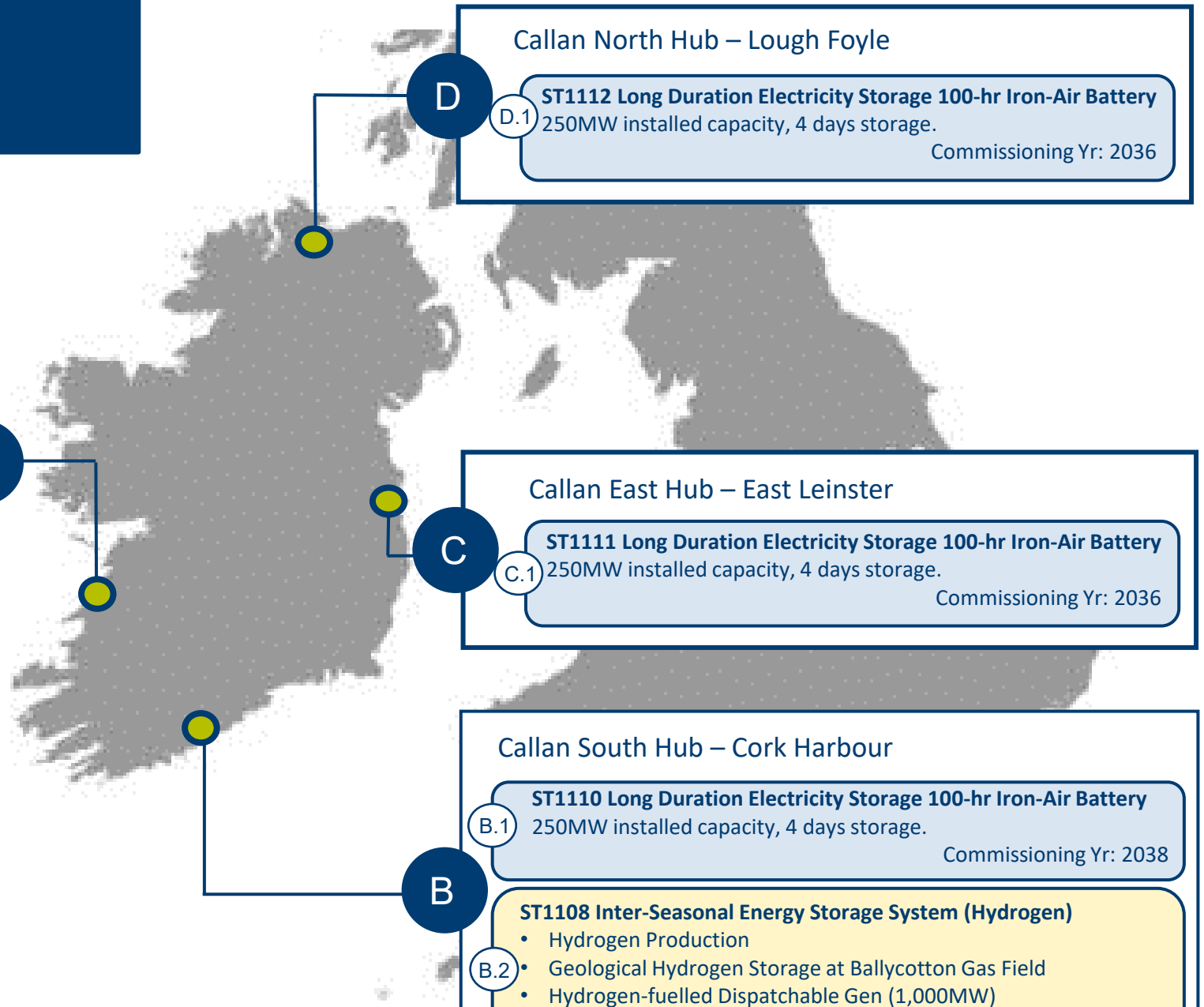
Dublin Bay Power – potential to burn h_2 blends



- GE Vernova's Gas Power and Power Conversion & Storage solutions selected to increase performance of the existing GT26 gas turbines powering ESB's Dublin Bay power station
- Modernization is expected to add nearly 30 megawatts (MW) of reliabl power, helping to improve stability of the national grid and power more Irish homes
- The project aims to assist ESB's decarbonization plans by installing upgrades with the potential to burn hydrogen blends in the future

ESB Project Callan
Electricity Storage Infrastructure

PCI Application



Callan West Hub – Shannon Estuary

A.1 **ST1109 Long Duration Electricity Storage 100-hr Iron-Air Battery**
250MW installed capacity, 4 days storage.
Commissioning Yr: 2040

A.2 **ST1107 Inter-Seasonal Electricity Storage System (E-Fuels)**
- E-Fuel Production
- E-Fuel above-ground Storage
- E-Fuel-fuelled Dispatchable Gen (960MW)

645GWh Storage Commissioning Yr: 2044

A

Callan North Hub – Lough Foyle

D

D.1 **ST1112 Long Duration Electricity Storage 100-hr Iron-Air Battery**
250MW installed capacity, 4 days storage.
Commissioning Yr: 2036

Callan East Hub – East Leinster

C

C.1 **ST1111 Long Duration Electricity Storage 100-hr Iron-Air Battery**
250MW installed capacity, 4 days storage.
Commissioning Yr: 2036

Callan South Hub – Cork Harbour

B

B.1 **ST1110 Long Duration Electricity Storage 100-hr Iron-Air Battery**
250MW installed capacity, 4 days storage.
Commissioning Yr: 2038

B.2 **ST1108 Inter-Seasonal Energy Storage System (Hydrogen)**
- Hydrogen Production
- Geological Hydrogen Storage at Ballycotton Gas Field
- Hydrogen-fuelled Dispatchable Gen (1,000MW)

672GWh Storage Commissioning Yr: 2042

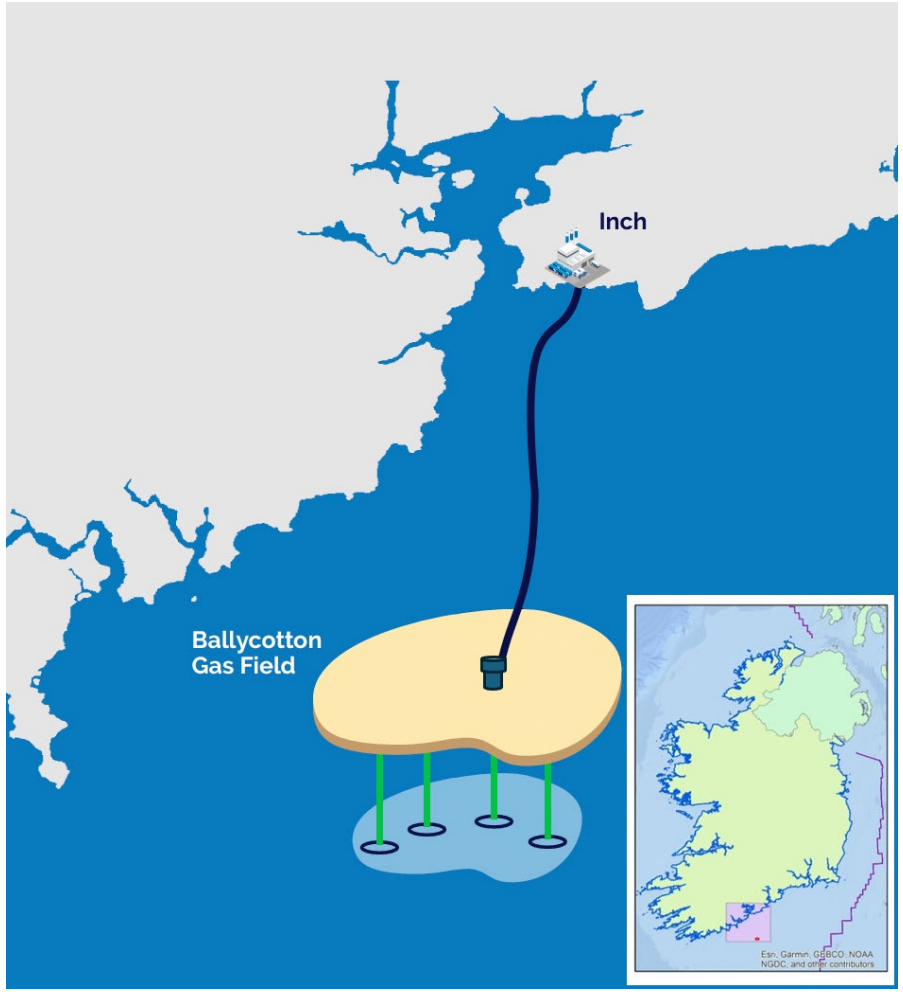
Project Kestrel

Partnership: JV between ESB (33.3%), BGE (33.3%) and dCarbonX (33.3%)

Capability: JV comprises capability of Europe's largest gas storage operator (Snam) and UK's leading gas storage operator (Centrica)

Data: JV have secured, archived and analysed all previous Kinsale proprietary technical and operational data (40 years)

Field modelling: Using available data, new detailed field storage modelling has been carried out confirming storage parameters including hydrogen compatibility using legacy data



Selective, staged and secure

1

Electrify first

Use electricity directly wherever it is practical and efficient.

2

Target hydrogen

Focus on real industrial demand, renewable fuels and longer-duration system needs.

3

Scale with evidence

Build capability in stages and let each stage earn the next investment.

Ireland has the renewable resource and along with hydrogen, Ireland can control its future