
ESB
Energy for generations
DRIVEN TO MAKE A DIFFERENCE
NET ZERO
BY 2040

Making a Difference, ESB Strategy for a Brighter Future - Net Zero by 2040

OUR PURPOSE

OUR PURPOSE IS TO CREATE A BRIGHTER FUTURE,
FOR THE CUSTOMERS AND COMMUNITIES WE SERVE

OUR STRATEGY

WE'RE DRIVEN TO MAKE A DIFFERENCE:
ACHIEVING NET ZERO BY 2040

DECARBONISED ELECTRICITY

RESILIENT INFRASTRUCTURE

EMPOWERED CUSTOMERS

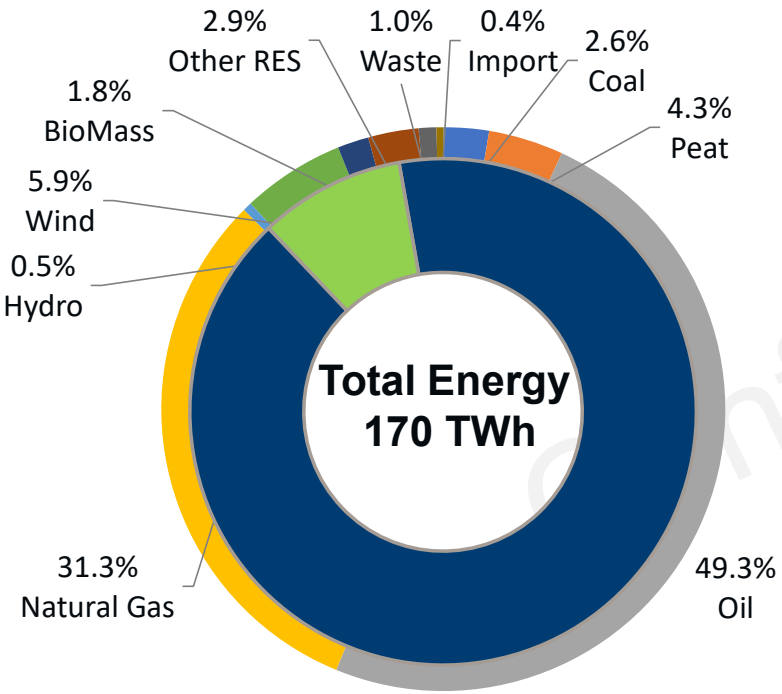
EMPOWERED PEOPLE · DIGITAL & DATA DRIVEN · FINANCIALLY STRONG · SUSTAINABLE

OUR CULTURE

OUR VALUES

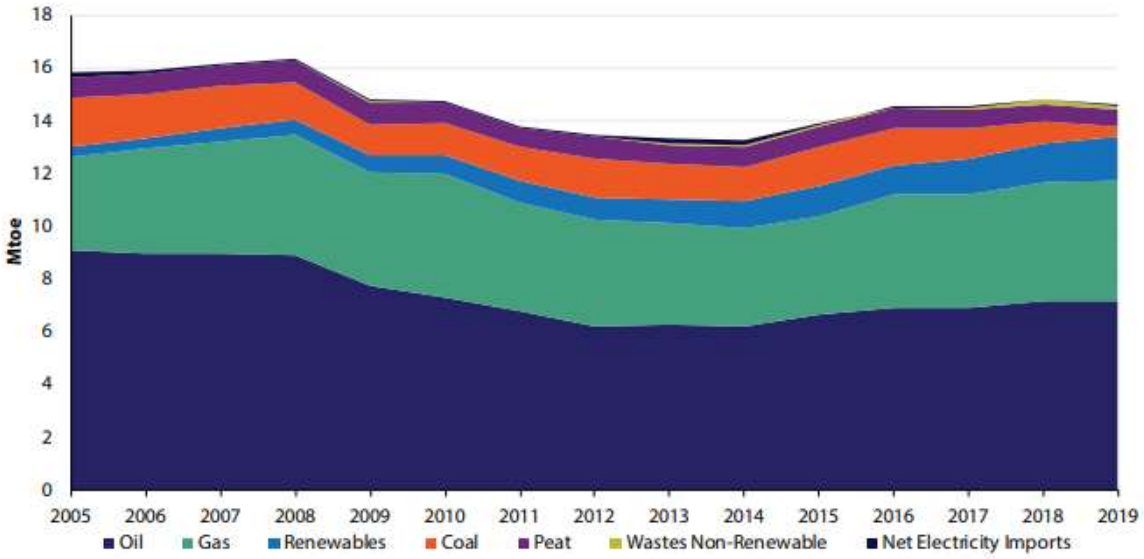
Ireland's 2019 Primary Energy Source

- 170 TWH primary energy – electricity is c. 31%
- Renewables still only account for 9% of primary energy
- Ireland must eliminate the remaining 91% by 2050



Renewables

Fossil Fuel



Source SEAI

Delivering Net-Zero, a Secure Integrated **Energy** System

Renewables

Storage

Backup Zero-Carbon Power Generation

Renewable Enablers Technology

Hydrogen

Ireland has the potential to attain very high levels of energy security
ESB is actively investing in all elements of the Energy Transition

Offshore Wind Programme – Ireland and UK

Onshore Wind:

- c. 600MW in operation today;
- Pipeline ~500MW

Onshore Solar:
1000MW Pipeline

Offshore Wind:

- C. 5,000MW of offshore wind under development;
- Further multi GW pipeline being assessed

Reference	Project
1	Oriel
2	Clogherhead
3	Seastacks
4	Hibernia
5	Loch Garman
6	Helvik Head
7	Celtic One
8	Celtic Two
9	Moneypoint One
10	Moneypoint Two
11	Sealtainn
12	Mhairi
13	Sheena
14	Inch Cape
15	NNG
16	Galloper
17	Five Estuaries
	Total

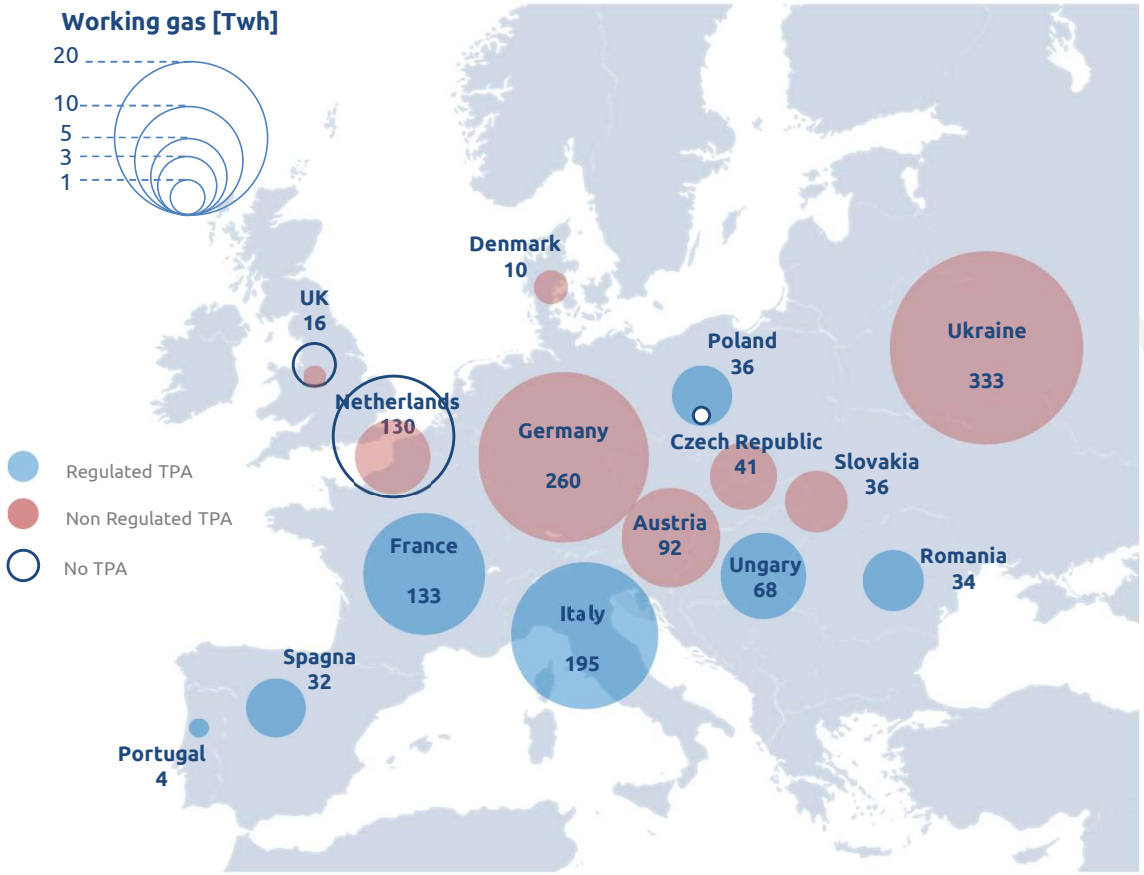
Offshore Wind:

- 2,000MW under dev/const;
- Assessing Scotwind Opportunities

Onshore Wind:

- C. 120MW in operation today;
- C. 1,500MW pipeline with c. 200MW consented

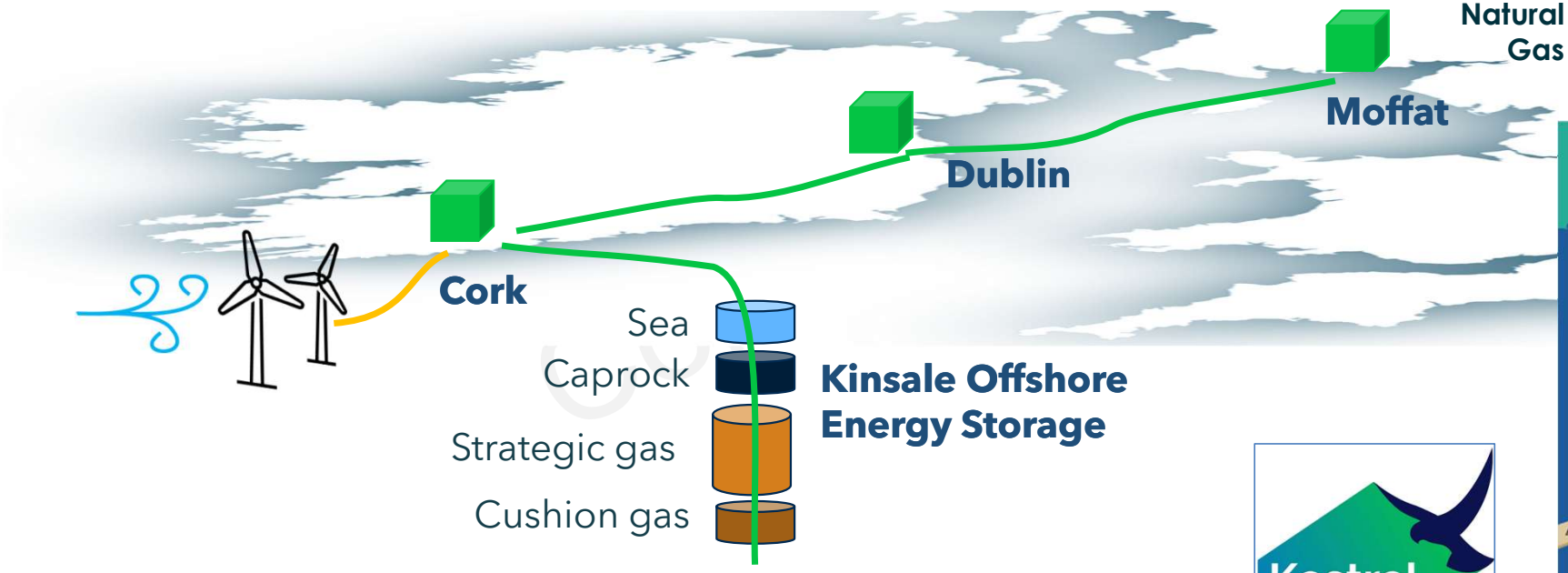
Ireland - No large scale energy storage



- Ireland does not comply with EU Security of Supply directives requiring two EU gas interconnections
  - One non-EU interconnection – Moffat, Scotland
- Whilst Ireland adheres to IEA & EU directives on 90-day oil storage (NORA), it has no in-country natural gas storage capacity
  - SW Kinsale 0.23 BCM offshore storage facility closed 2017
  - 60% of electrical power generation in Ireland is gas-fired
  - 2GW of new gas fired CCGT planned
  - Irish Government CAP committed to increase electrification
- Reliance on UK gas storage capacity means Ireland's energy security is open to overseas system outages
- ESRI study showed Ireland's financial exposure to 90-day natural gas outage would be c. €80B
- Lack of large-scale energy storage will inhibit significant offshore wind/hydrogen projects & Net Zero

KESTREL – Utilising Ireland's proven storage facility

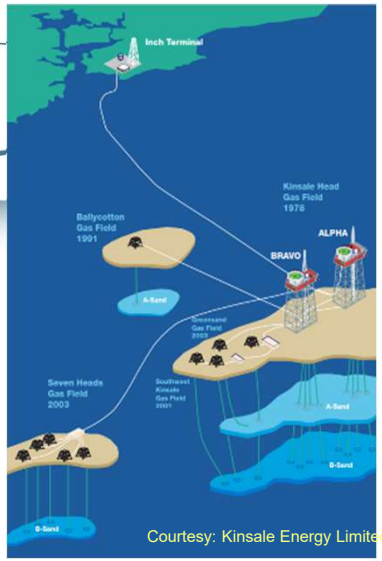
KESTREL provides strategic gas storage today & green hydrogen storage tomorrow



Decarbonisation Blend

Natural Gas → Green H2

Present → Future



Courtesy: Kinsale Energy Limited

Energy Storage in 2020: Fossil based, diverse, and large scale

Many weeks of energy stored for electricity generation: Coal, Gas, and Oil

Turlough Hill Pumped Hydro

1.6% of an average daily demand

1,000 MW batteries

< 2% of average daily demand

Irish Gas Fields

De-facto stores of natural gas

Kinsale closed, Corrib almost depleted by 2030

Gas supplied from GB

Coal Yard at 900 MW Moneypoint

Can store enough coal for full output for three months.

Closure end 2025

Diesel at Combined Cycle Gas Turbines (CCGTs)

CCGTs store enough diesel for 5-days operation

Oil: Tarbert 650MW

14 weeks full output

IED 2023

Peat:

360 MW

1+ year peat

250 MW

Closed 2020

The security & resilience of Ireland's energy system is being increasingly challenged as legacy large scale fossil fuel storage projects are decommissioned

An alternative to large scale fossil fuel energy storage is needed to back up renewables in a net zero system. Diversity and Scale are still required.

Energy for generations

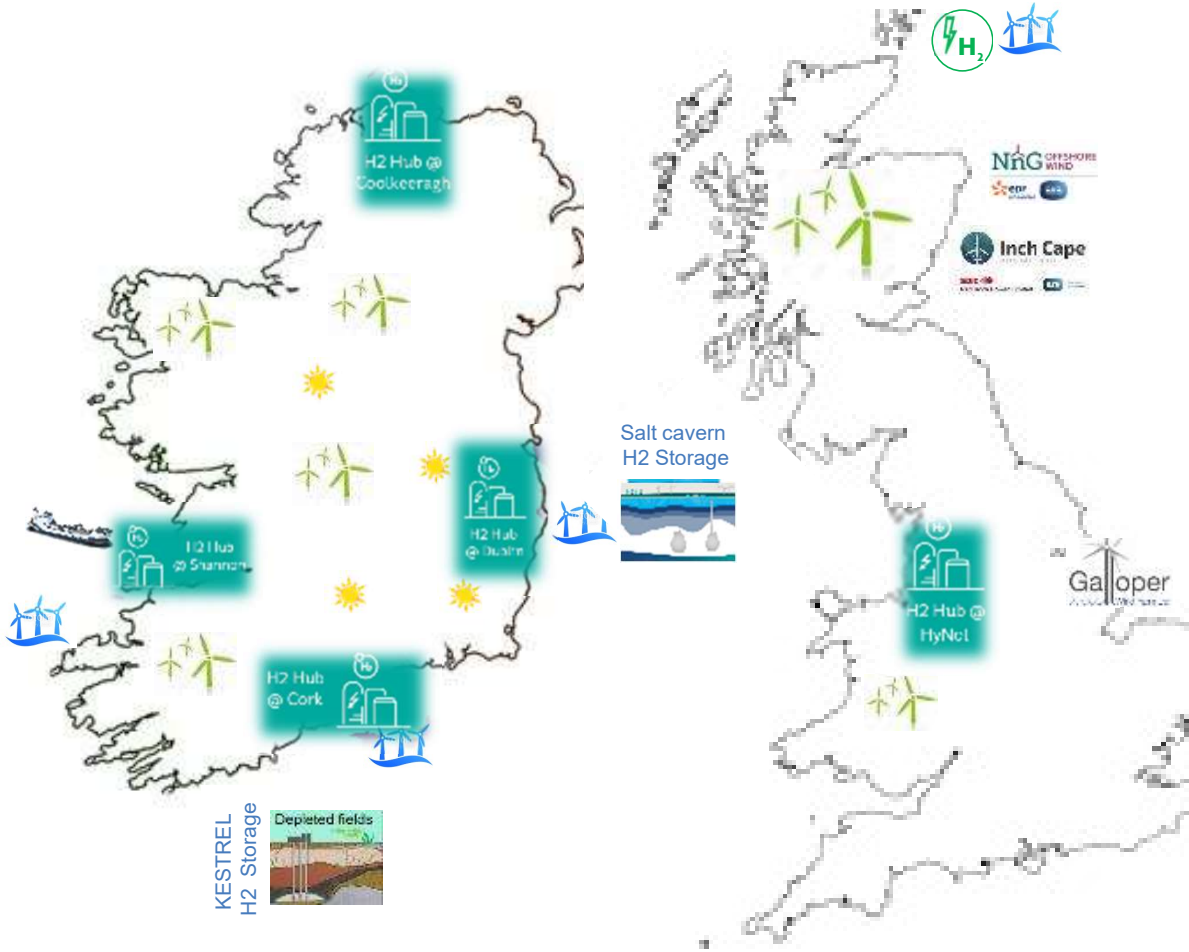
HYDROGEN CLUSTERS KEY TO NET ZERO BY 2040

Delivering a Resilient, Reliable Net-Zero Integrated Energy System

1. ESB's vision for a secure net zero energy system is firmly based on **offshore wind, green hydrogen, storage** and **backup power** fuelled by green hydrogen.

2. ESB , with **partners**, will develop **energy clusters** of **H2 production** and use. To achieve required scale, co-location with offshore wind is vital.

3. ESB's early hydrogen **partnerships** will focus on **lighthouse projects** decarbonising transport, aviation and replacing fossil fuel use in industry.



In summary

1. *Hydrogen will be required to reach net zero*
2. *Energy Clusters fed by Renewable Power producing Green H2 and Ammonia provide an opportunity to decarbonize local industry.*
3. *Opportunities exist in Ireland for Green H2 Clusters*