



Navigating to 2050

A safe and sustainable maritime future

#NavigatingTo2050



Dr John O'Sullivan

COO and Co-founder
dCarbonX, Ireland



Commissioners of
IRISH LIGHTS

Navigation
and Maritime
Services

dCarbonX

Delivering GeoEnergy

*Offshore large-scale subsurface energy storage:
a key component in Ireland's transition to Net Zero*

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Navigating to 2050 - A Safe and Sustainable Maritime Future

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dCarbonX

- dCarbonX was founded in 2020 and is an asset-focused GeoEnergy company established to deliver Energy Transition baseload subsurface assets
- Securing offshore subsurface assets in partnerships
 - Hydrogen, Hydrogen carrier storage & CO₂ sequestration
- Smoothing the Energy Transition:
 - E&P companies – repurposing assets
 - Industrial clusters – solving decarbonisation
 - Energy system operators – balancing intermittency
- Responsible & reliable future-proof GeoEnergy portfolio
 - Screened with capital discipline for the evolving Energy Transition



Reliable & resilient subsurface energy management systems

Snam

- In November 2021, dCarbonX established strategic energy transition alliance with Snam
- Snam has a 28.89% equity stake in dCarbonX with a pathway to a future controlling interest
- Initial projects focus on green hydrogen storage & carbon sequestration in Ireland & UK

**Energy networks
multi-molecule**
(CH₄, bioCH₄, H₂, CO₂)

**Energy storage
multi-molecule**
(CH₄, bioCH₄, H₂, CO₂)

**Green Energy
Projects**

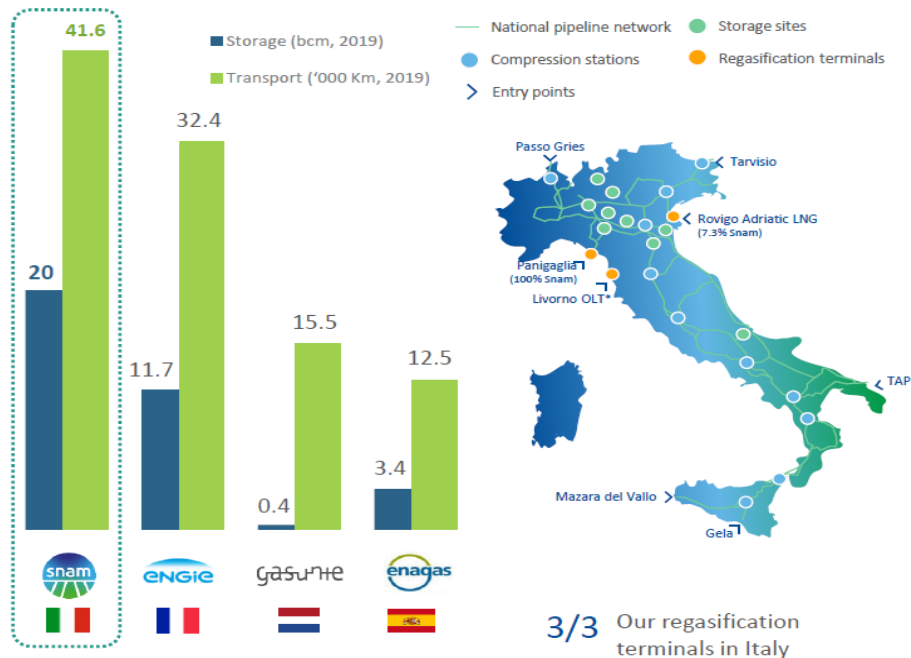


Market cap: € 17.91 B
Net Profit: € 1.21 B
Capex: € 1.3 B
Employees: 3,468

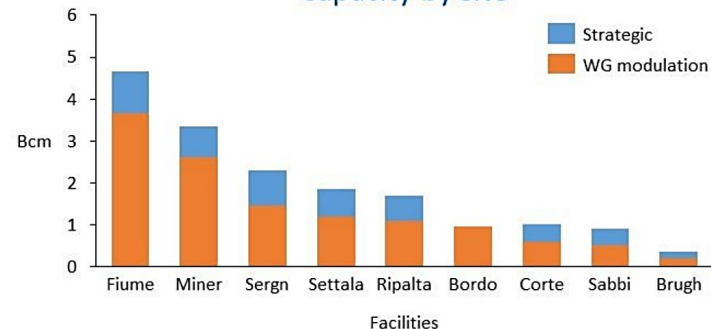
Global leader in H₂-ready transport network, energy storage & green energy projects

Snam is Europe's largest gas storage operator

Snam



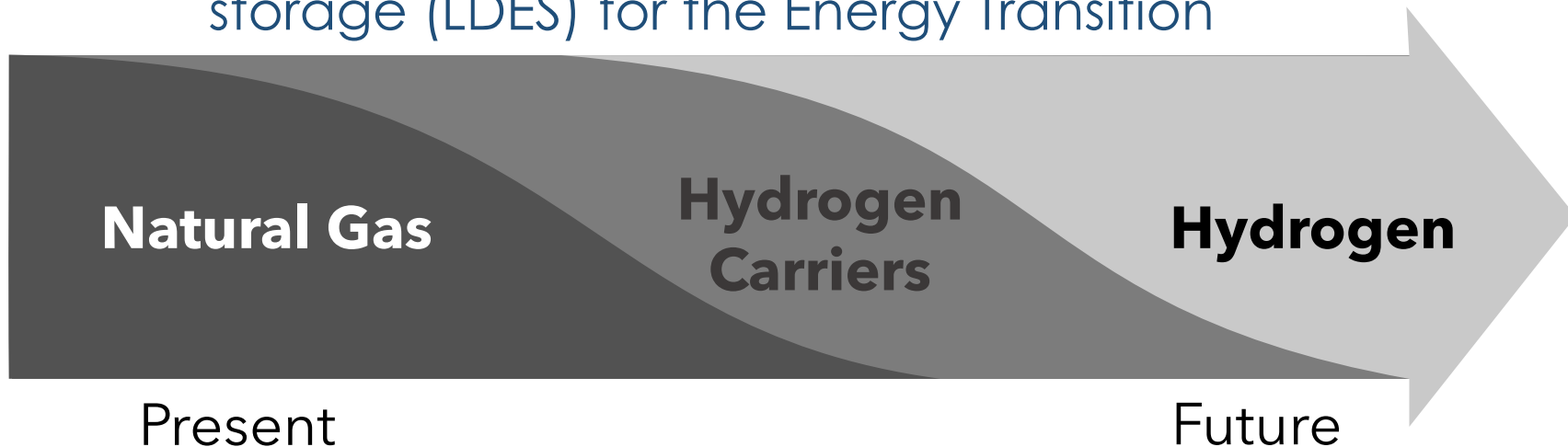
Capacity by site



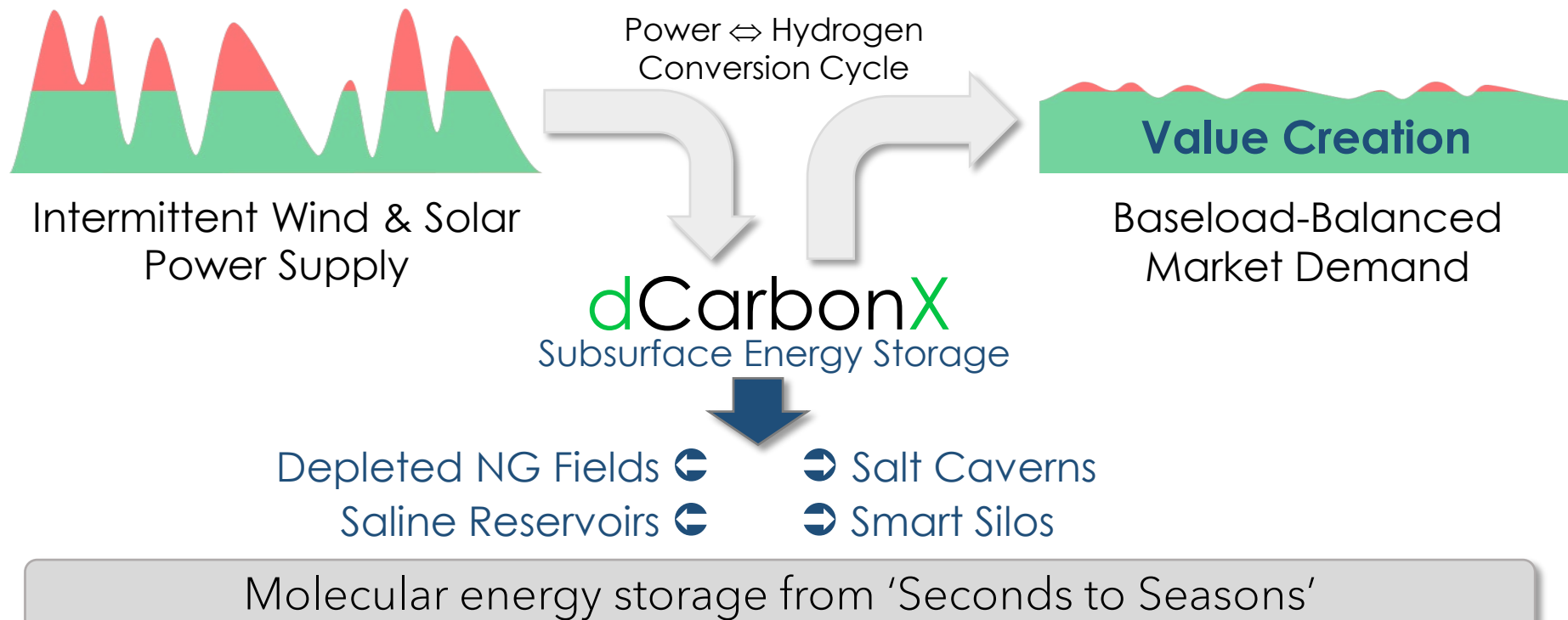
- 11 UGSs (9 depleted fields in Italy, 2 aquifer in France)
- 493 wells (out of which 160 monitoring wells)
- Working Gas capacity : 19.6 Bcm
- Max Withdrawal rate : 300 Mcmd
- Max Injection rate : 200 Mcmd

Molecules really matter

Evolving offshore subsurface long duration energy storage (LDES) for the Energy Transition



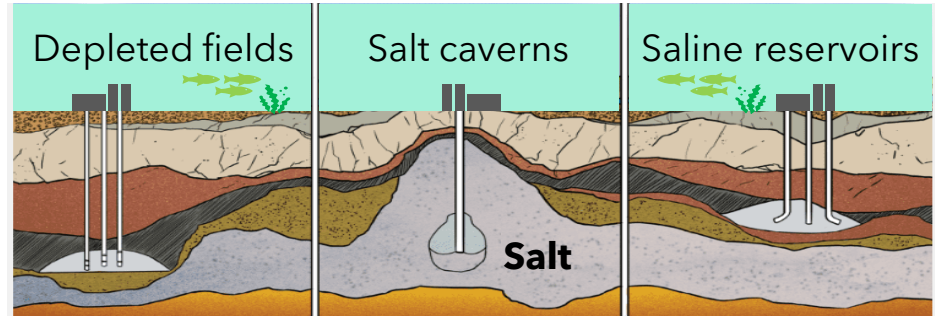
LDES delivers system resilience



Offshore LDES

- Depleted gas fields
- Salt caverns
- Saline reservoirs

Three types of subsurface gas storage Understanding geology essential to success



Potential capacity (duration of discharge)

Large (months)

Medium (weeks)

Large (months)

Speed of fill and discharge

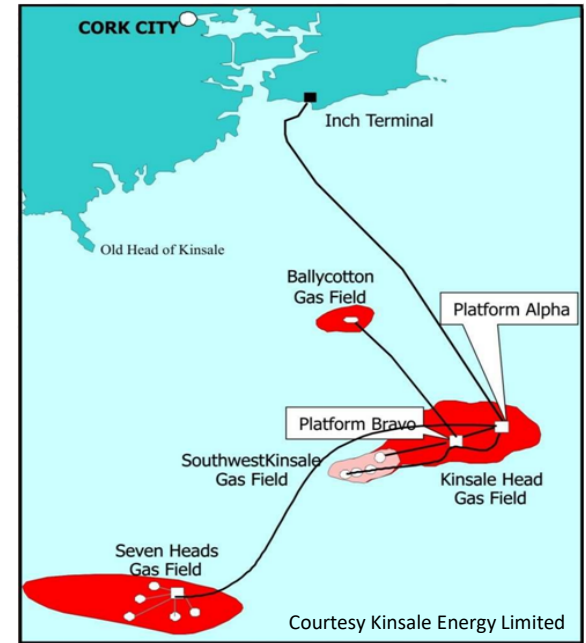
Fast

Very Fast

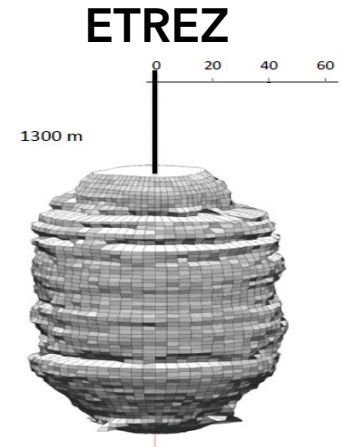
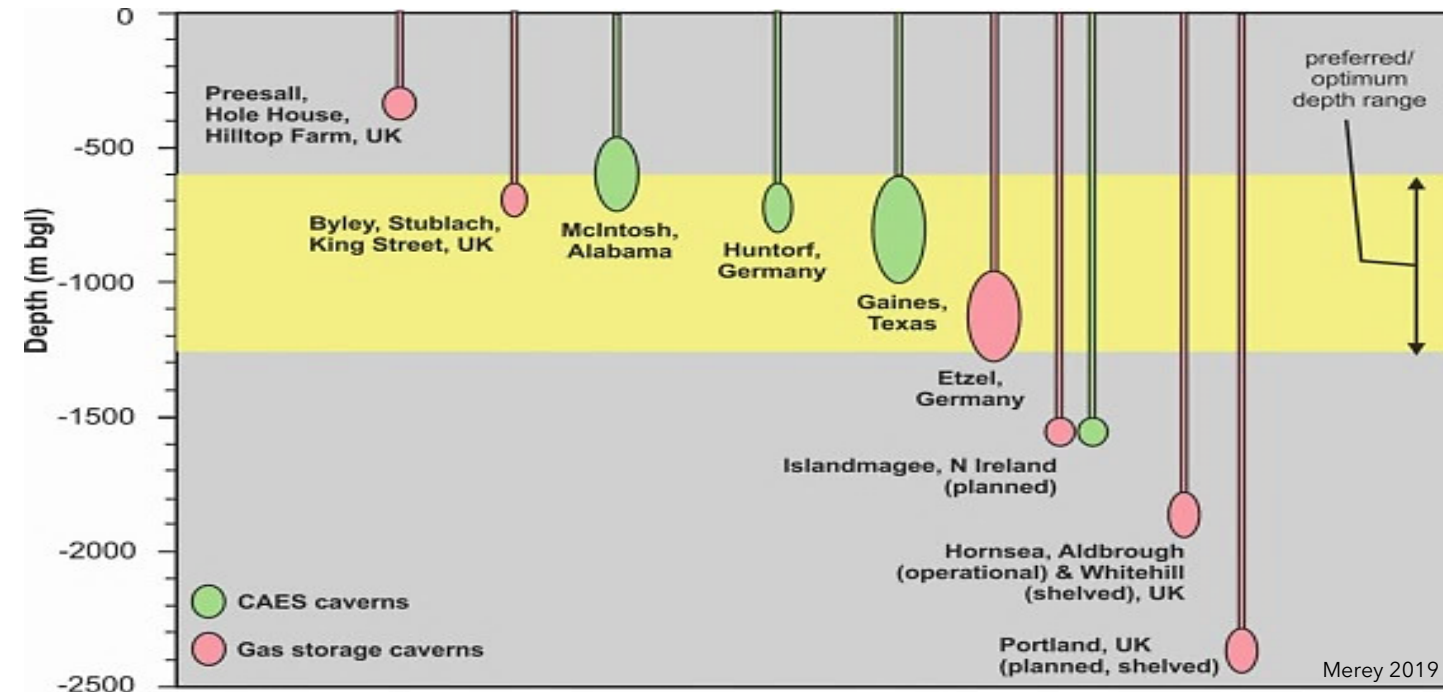
Fast

Kinsale Head energy storage

- Offshore energy storage occurred in annual cycles at Southwest Kinsale gas field, offshore Cork from 2001-2016 (Marathon/Petronas)
 - Methane gas was the hydrogen carrier for this energy storage project
 - Methane was imported & injected in the summer months and produced during the winter
- Total energy stored was c. 2.227 TWh with a 90-day draw of c. 25 GWh/day



Salt cavern storage



After Hevin 2019

Hydrogen storage challenges

- Density
- Volatility
- Chemistry
- Biology
- Metallurgy
- Calorific
- Policy



Hydrogen storage solutions

Multi-parametric reactor



Design e construction of a multi-reactor for experimental tests execution

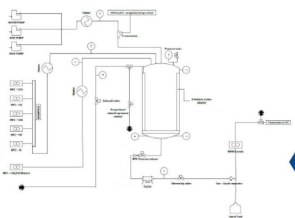


Multi-parametric reactor which allows to execute test at reservoir conditions and monitoring all the input parameters for the multidisciplinary studies.

It is a NON standard device designed on Snam specs and needs aimed at evaluating effects and ideal conditions for storage of gas blend up to 100% H₂ in depleted underground reservoirs.

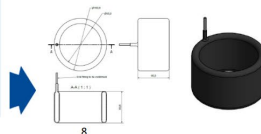
The reactor has been designed to work in **multi-sensorial mode** (both biological measurements on micro-organism and physic-chemical reaction on gaseous/liquid component) with synthetic and real samples, and with different porous structure.

A **seamless pressure and temperature control system** has been implemented for the full device (reactors and feeding lines) allowing to reproduce real reservoir condition always guaranteeing safe condition for the operator.



Specs

- Temperature Range : 20 -150°C
- Pressure range: **1 to 200 bar**
- 3 lines for pressure gas
- 3 lines for pressure fluids
- Polymeric adaptable samples lodging system suitable for flow no flow tests



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ESB-dCarbonX hydrogen storage



Summary

Critical role for hydrogen storage in decarbonising Ireland's energy

- Energy systems balancing
- Energy storage & export
- **Critical 3Ps for developing Irish offshore hydrogen storage**
 - Policy
 - Ports
 - People



Thank you...



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