

19th of July 2023

CIGRE NGN Webinar series - Bord na Móna

Green Hydrogen in Ireland – Why & When?



Bord na Móna Overview



BORD^{NA}MÓNA



Bord na Móna



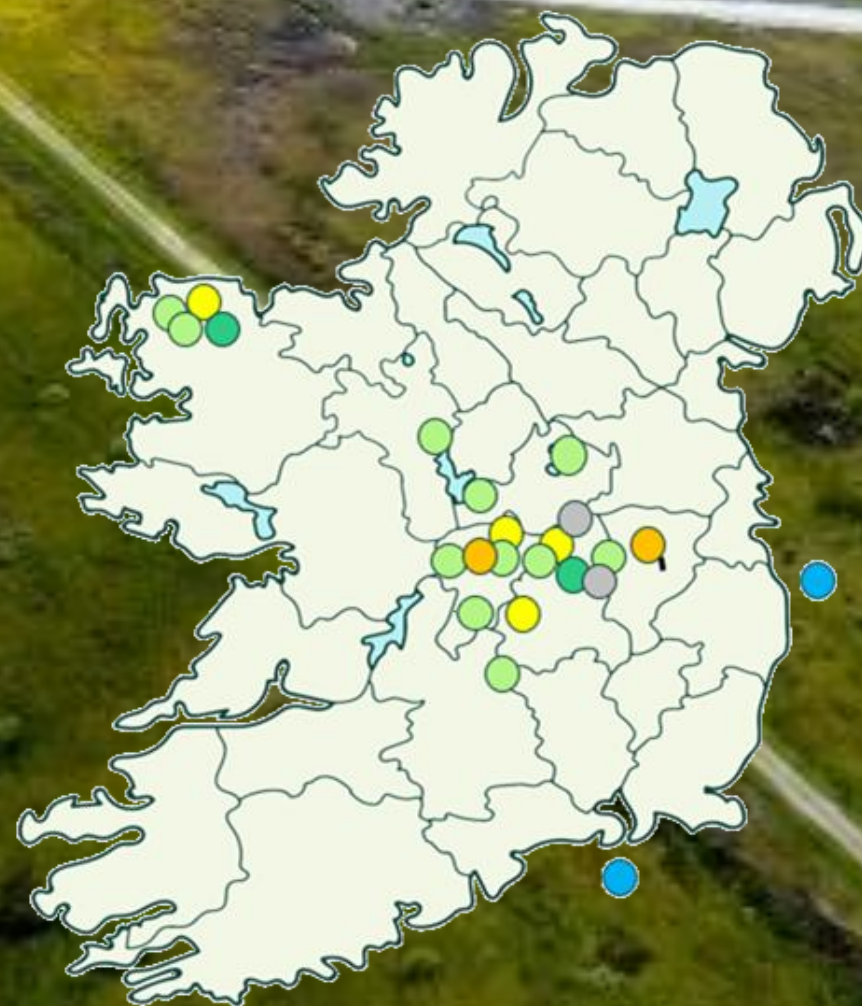


80,000 HA

Landbank

15+

Onshore Wind Projects
under development



Two Projects under Development offshore



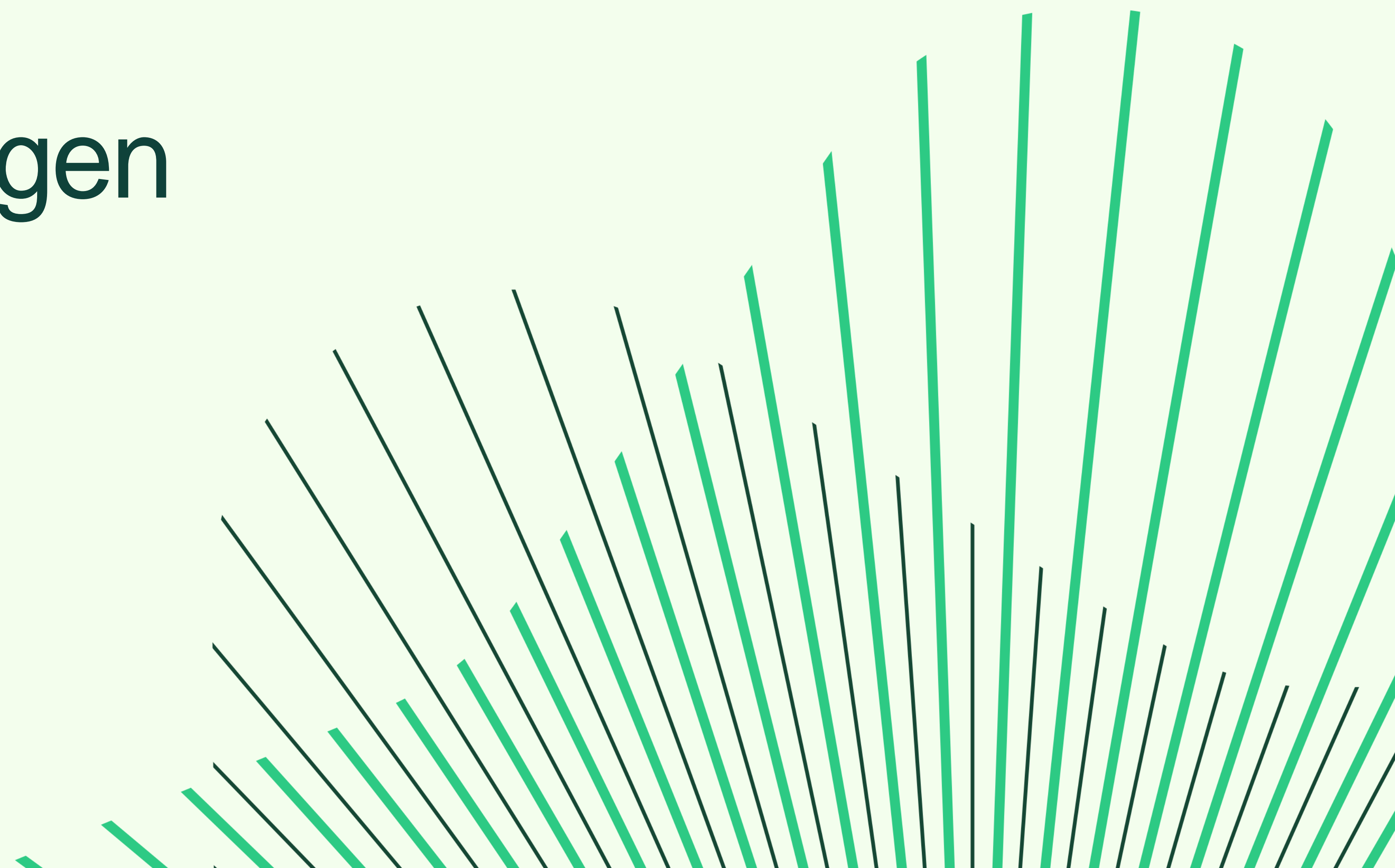
Realt na Mara Offshore Wind Farm
1,500 MW



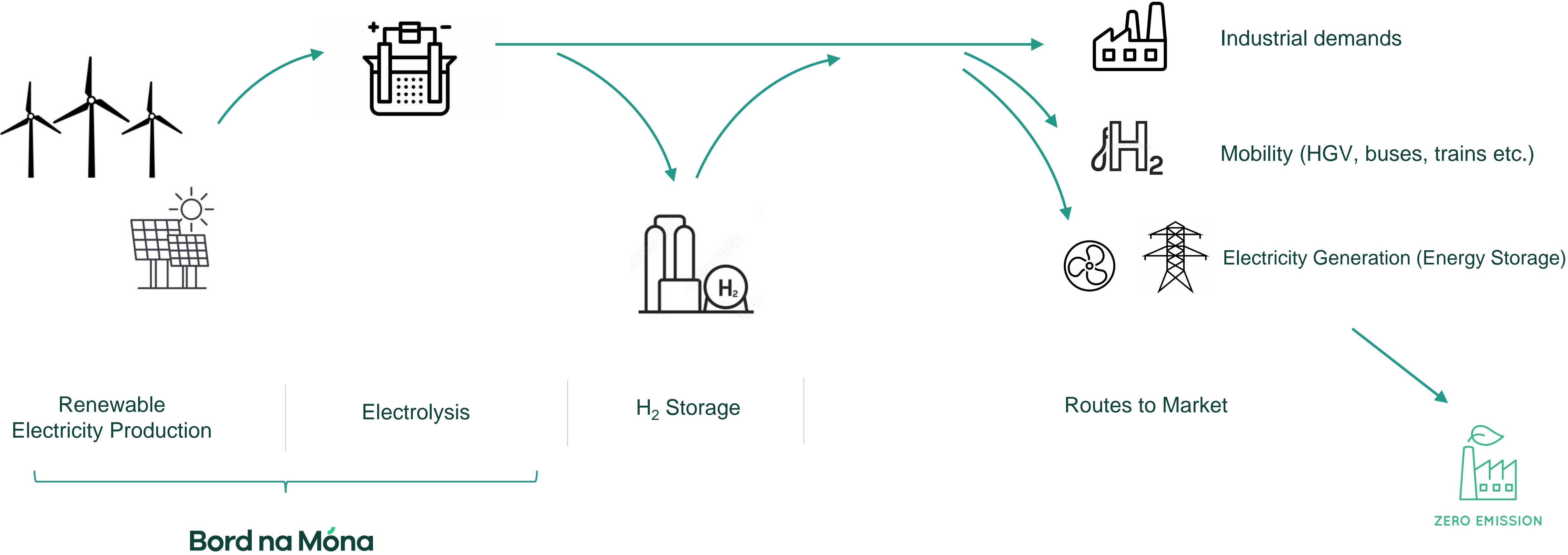
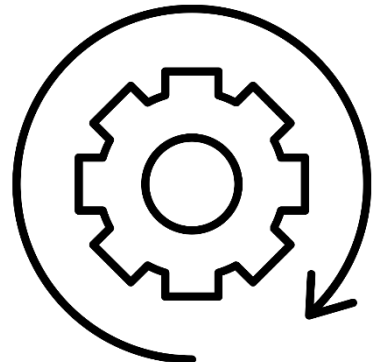
Celtic Horizon Offshore Wind Farm
800 MW



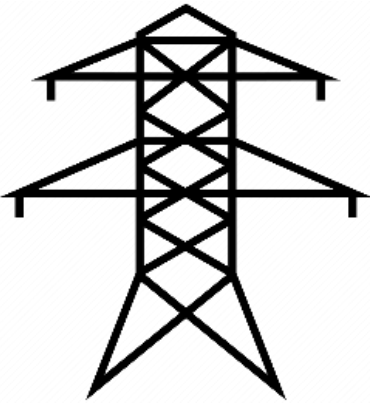
Green Hydrogen



Green Hydrogen Process



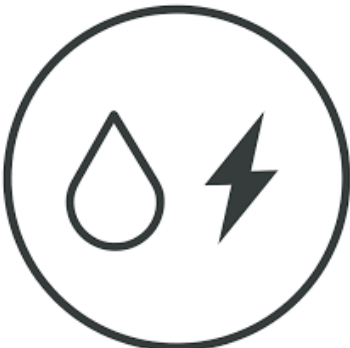
Benefits of Green Hydrogen



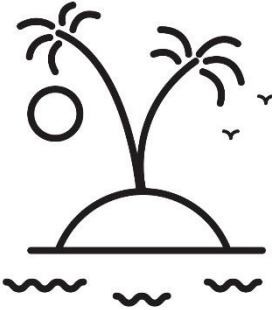
Reduce Pressure on Electricity Grid



Green Gas required for Net Zero



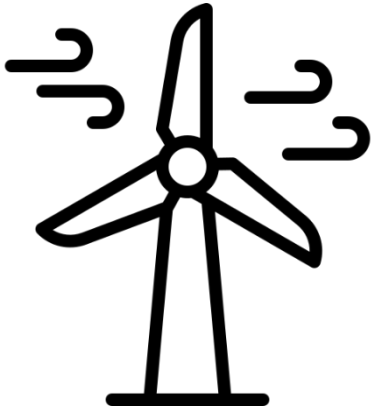
H2 Value Added Products



Export



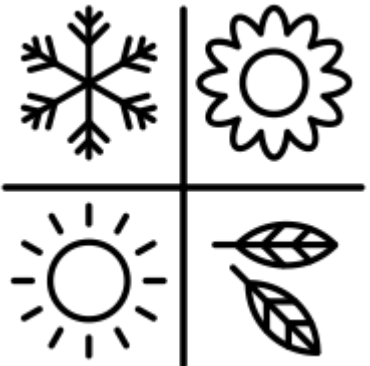
“Dunkelflaute” Events



Better Use of Curtailed Energy



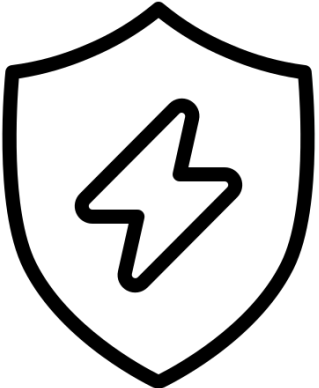
New Jobs



Seasonal Energy Storage



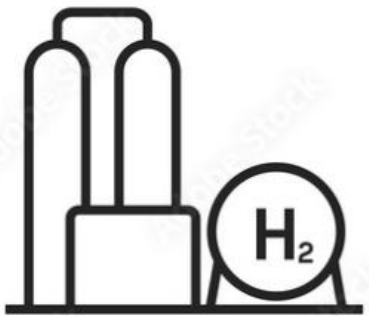
Grid Stability



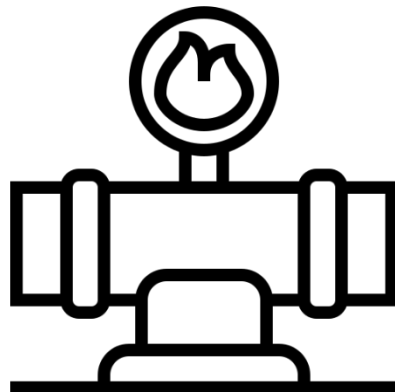
Energy Security



Align with EU Legislation

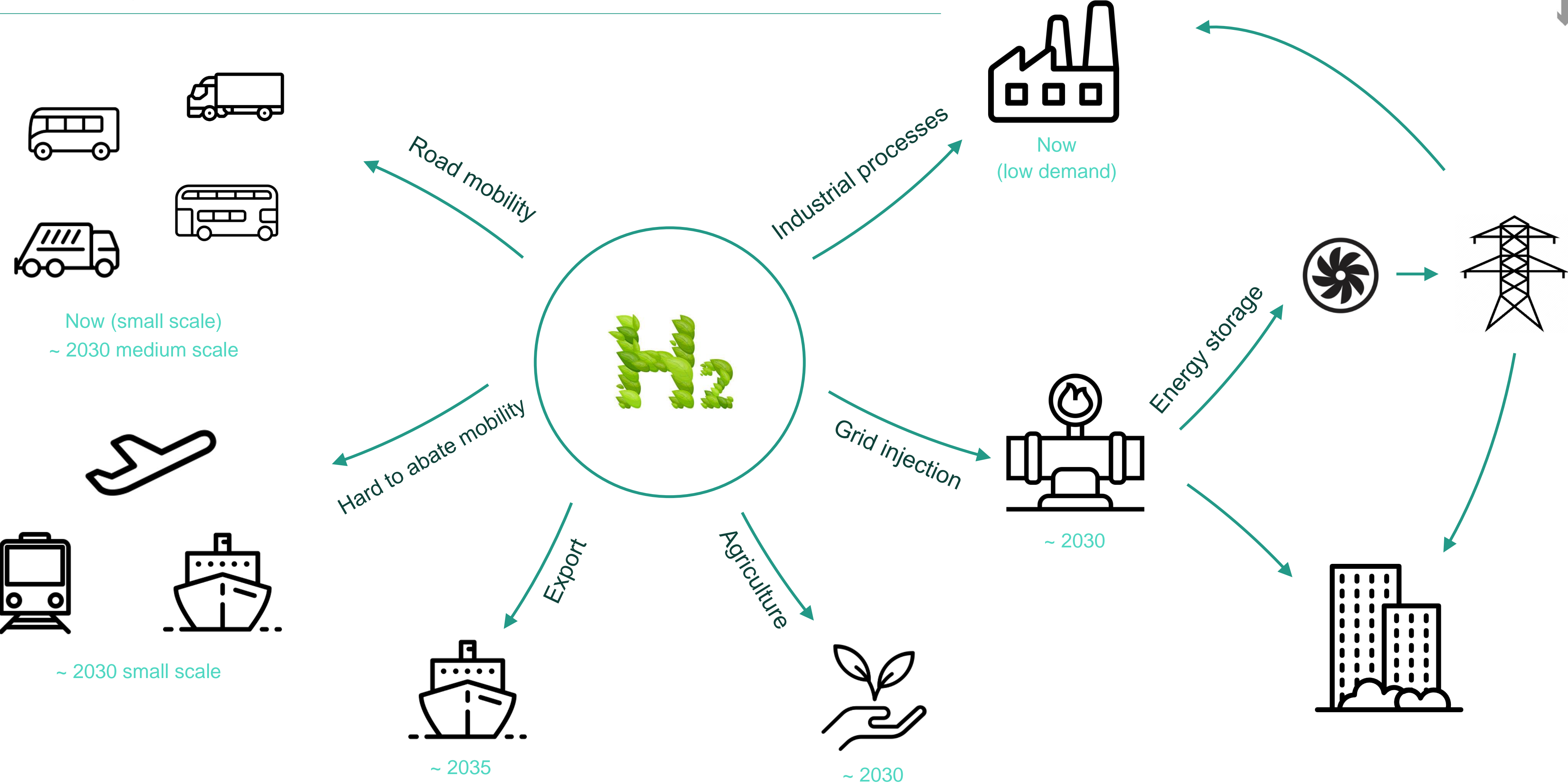
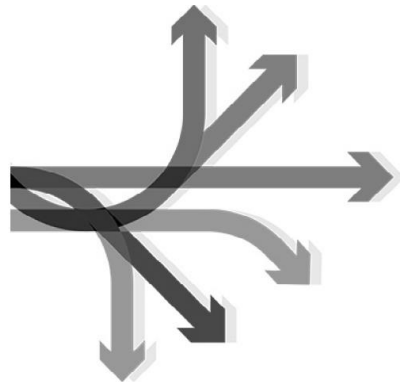


Large Storage Volumes



Utilise Existing Infrastructure

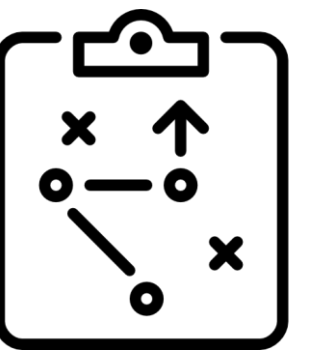
Hydrogen Routes to Market



National Hydrogen Strategy



National Hydrogen Strategy

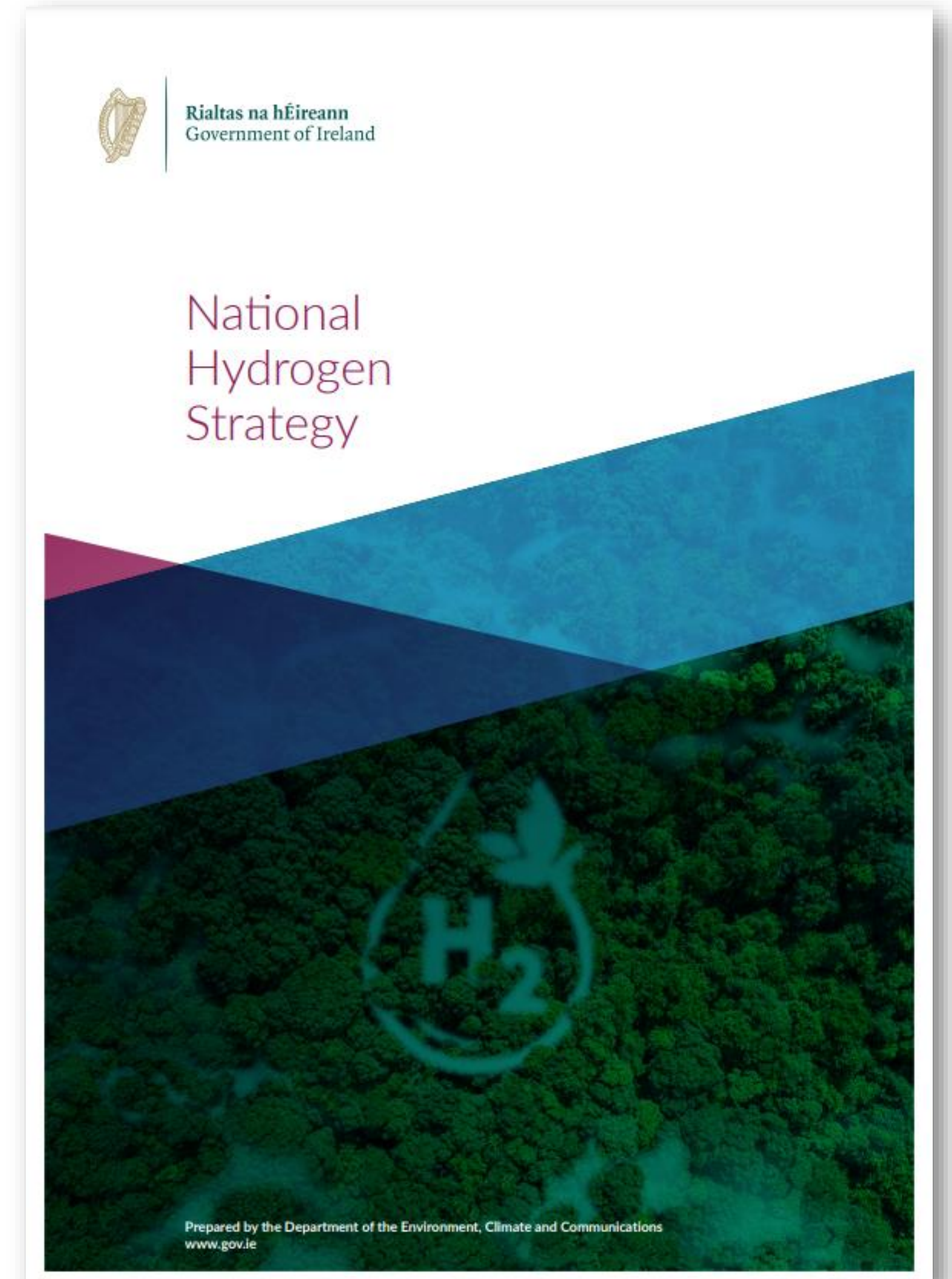


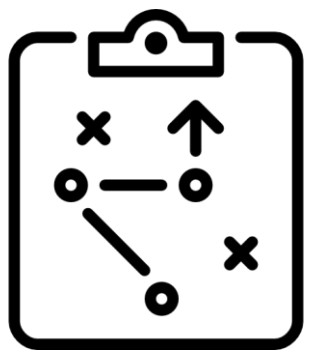
- Published on the 12th of July 2023
- The strategy states **three primary reasons**:
 1. **Decarbonising the Irish Economy**

By providing a solution to hard to decarbonise sectors where electrification is not feasible or cost effective.
 2. **Enhancing Ireland's energy security**

Through the development of indigenous zero carbon renewable fuel, which can act as an alternative to the 77% of the Irish energy system generated by imported fossil fuels
 3. **Creating industrial opportunities**






Through potential development of export markets for renewable hydrogen and hydrogen derivatives such as Sustainable Aviation Fuels
- The strategy considers the needs of the entire hydrogen value chain including production, end-uses, transportation and storage, safety & regulation, research & cooperation





National Hydrogen Strategy (cont.)

Table 1: Ireland's strategic hydrogen development timeline roadmap

Production		2023-28	2028-33	2033-38	2038-50
	Renewable hydrogen produced from curtailed grid electricity or onshore renewables where available	Green	Green	Green	Green
	Hydrogen blends across the interconnectors	Yellow	Yellow	Yellow	Red
	Renewable hydrogen from Offshore Wind	Red	Yellow	Green	Green
Transportation		2023-28	2028-33	2033-38	2038-50
	Trucked (non-pipeline) or onsite use	Green	Green	Yellow	Yellow
	Network blending	Yellow	Yellow	Red	Red
	Local networks/clusters	Red	Green	Green	Yellow
	National hydrogen network	Red	Red	Yellow	Green
	Import/Export Routes established	Red	Red	Yellow	Green
Storage		2023-28	2028-33	2033-38	2038-50
	Network blending	Yellow	Yellow	Red	Red
	Small scale storage applications	Green	Green	Yellow	Yellow
	Large scale storage solutions of geological scale	Red	Yellow	Green	Green
End Uses		2023-28	2028-33	2033-38	2038-50
	Existing Large Energy Users on gas network using GOs	Yellow	Yellow	Red	Red
	Heavy Land Transport	Yellow	Green	Green	Yellow
	Power Generation	Red	Yellow	Green	Green
	Industrial Heating	Red	Yellow	Green	Green
	Aviation and Shipping	Red	Red	Yellow	Green
	Exports	Red	Red	Yellow	Green

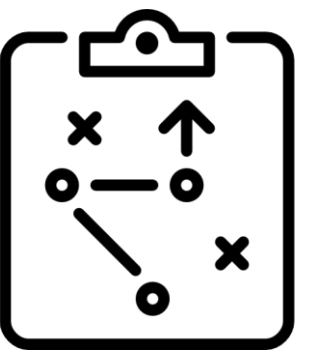
■ Unlikely to exist
 ■ Small number of niche applications
 ■ Large scale deployment envisioned

Production

- Focus on “renewable hydrogen” (green)
- Prior to 2030, hydrogen will be produced from grid connected electrolysis from surplus renewables
- 2GW of offshore wind dedicated to green hydrogen production in 2030

Transport

- Initial hydrogen applications likely to utilise compressed tankering solutions
- As production expands, hydrogen pipelines (100% hydrogen) are envisaged to become the dominant transport option
- Hydrogen infrastructure is expected to be rolled out across clusters where production, demand uses and large-scale storage are co-located.



National Hydrogen Strategy (cont.)

Table 1: Ireland's strategic hydrogen development timeline roadmap

	2023-28	2028-33	2033-38	2038-50
Production				
Renewable hydrogen produced from curtailed grid electricity or onshore renewables where available	Green	Green	Green	Green
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Transportation				
Trucked (non-pipeline) or onsite use	Green	Green	Yellow	Yellow
Network blending	Yellow	Yellow	Red	Red
Local networks/clusters	Red	Green	Green	Yellow
National hydrogen network	Red	Red	Yellow	Green
Import/Export Routes established	Red	Red	Yellow	Green
Storage				
Network blending	Yellow	Yellow	Red	Red
Small scale storage applications	Green	Green	Yellow	Yellow
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End Uses				
Existing Large Energy Users on gas network using GOs	Yellow	Yellow	Red	Red
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Power Generation	Red	Yellow	Green	Green
Industrial Heating	Red	Yellow	Green	Green
Aviation and Shipping	Red	Red	Yellow	Green
Exports	Red	Red	Yellow	Green

Legend: ■ Unlikely to exist ■ Small number of niche applications ■ Large scale deployment envisioned

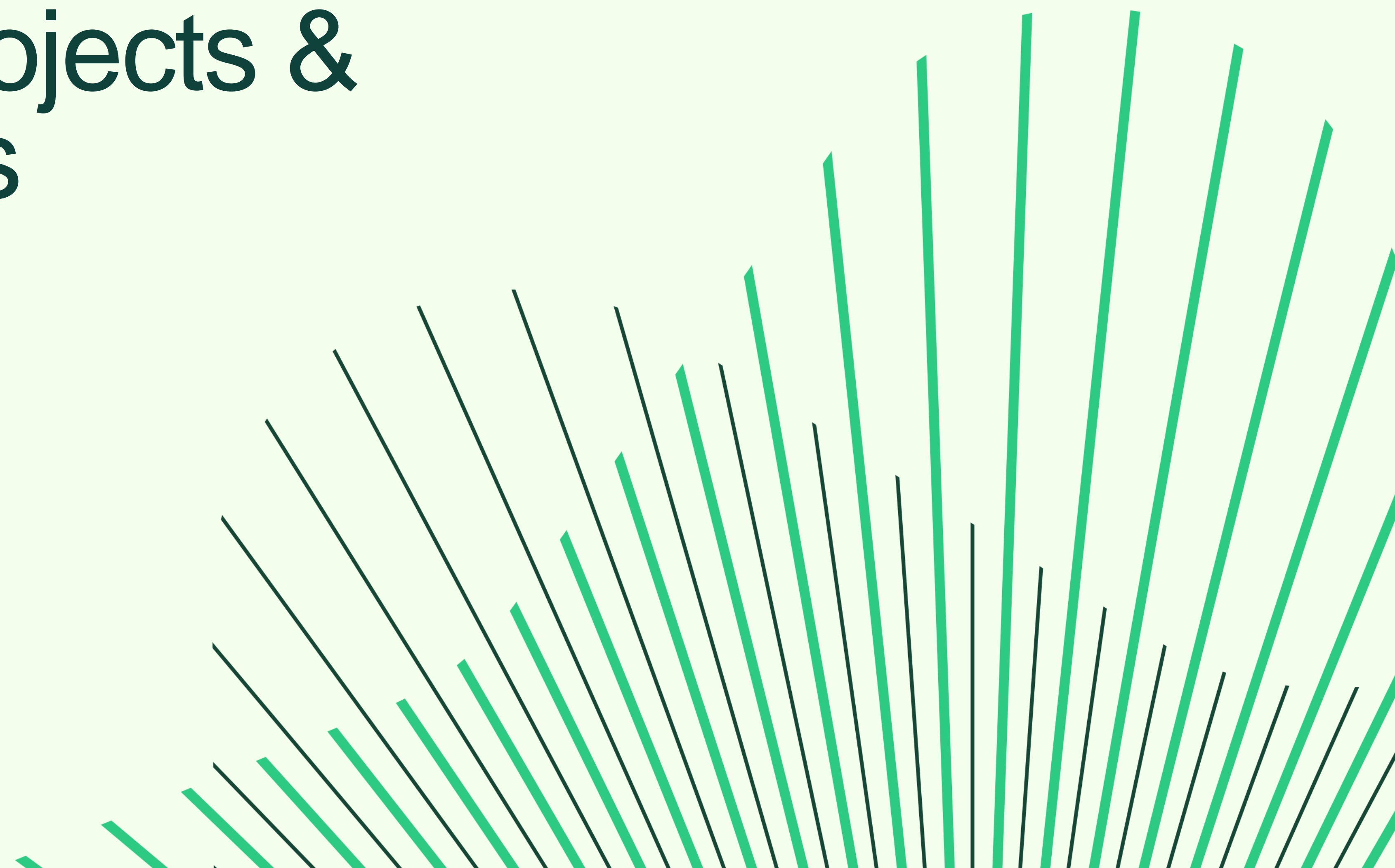
Storage

- Storage critical part for future energy system to balance fluctuations in supply from renewables (5-15% of electricity generation will be provided by zero carbon dispatchable generation in a net zero power system)
- Network blending can offer a way of kick-starting the hydrogen production but in the longer term a 100% hydrogen network will be favourable
- Small scale storage in the short-term, geological storage and e-fuels in the long-term

End Uses

- Direct electrification where possible is priority
- Four key end-uses:
 1. Heavy goods transport
 2. Dispatchable flexible electricity & long duration energy storage (inter-seasonal)
 3. Decarbonising industrial processes
 4. E-fuels for maritime and aviation

Hydrogen Projects & Energy Parks

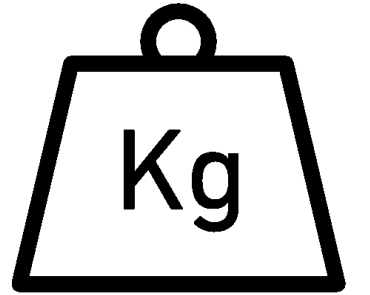


Phase I: Mt Lucas Hydrogen Project



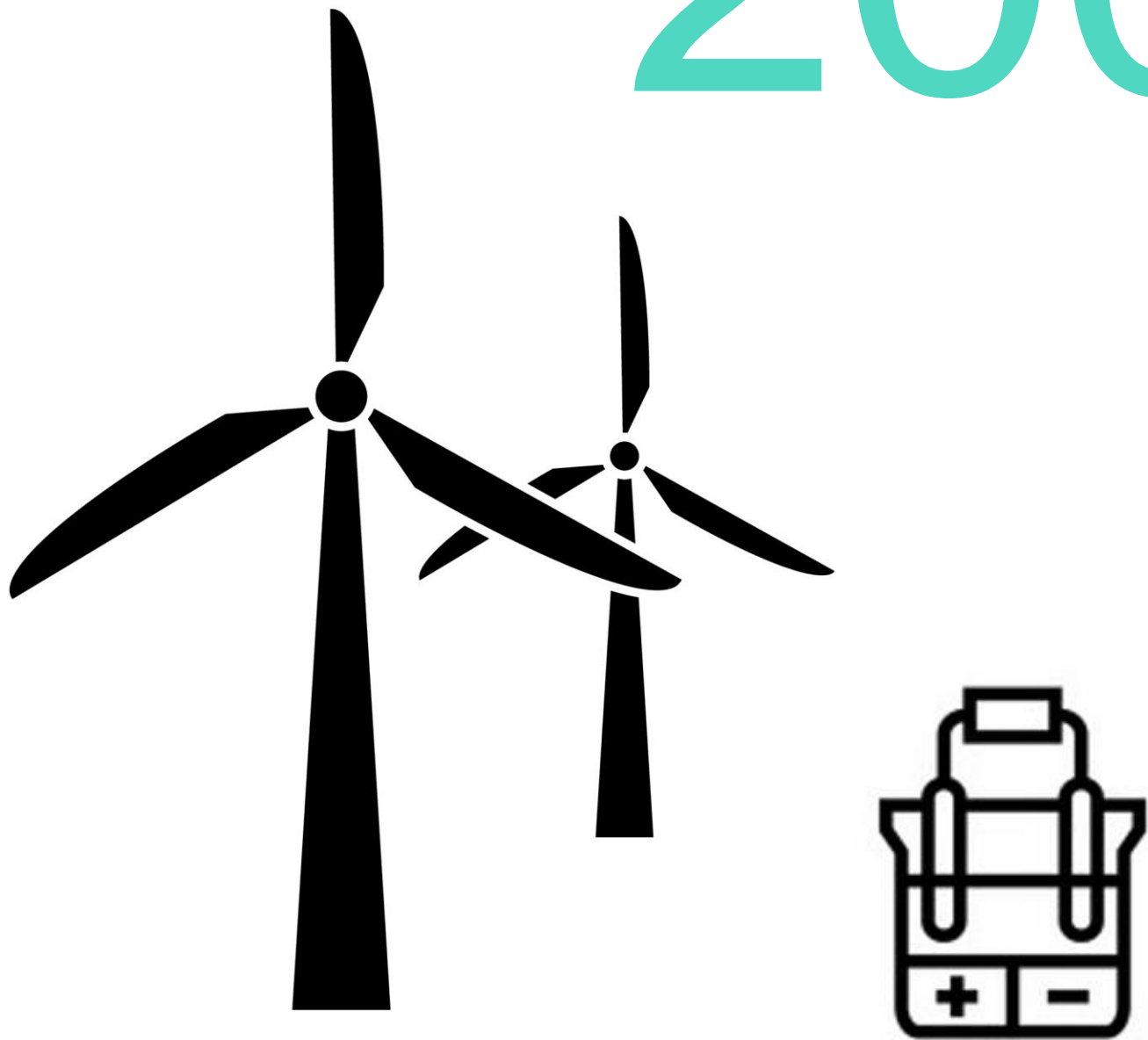
- The pilot project is a 2MW electrolyser at our existing Mt Lucas windfarm.
- The planning stage design phase has been completed; some preparation works have started.
- Planning Consent received in May 2023.
- Procurement of electrolyser to start shortly due to long lead times for electrolysers.
- Bord na Móna is currently aiming for production of green hydrogen in 2025.
- The hydrogen produced will be used in the mobility sector.



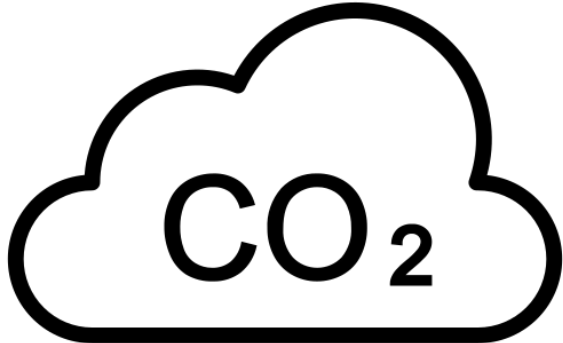


Bord na Móna's Mt Lucas pilot project will produce

200,000 kg/a of Green H₂.



And, if used to replace diesel, would result in up to **2,500** tonnes of CO₂ savings per year.



Phase II & III Hydrogen Projects



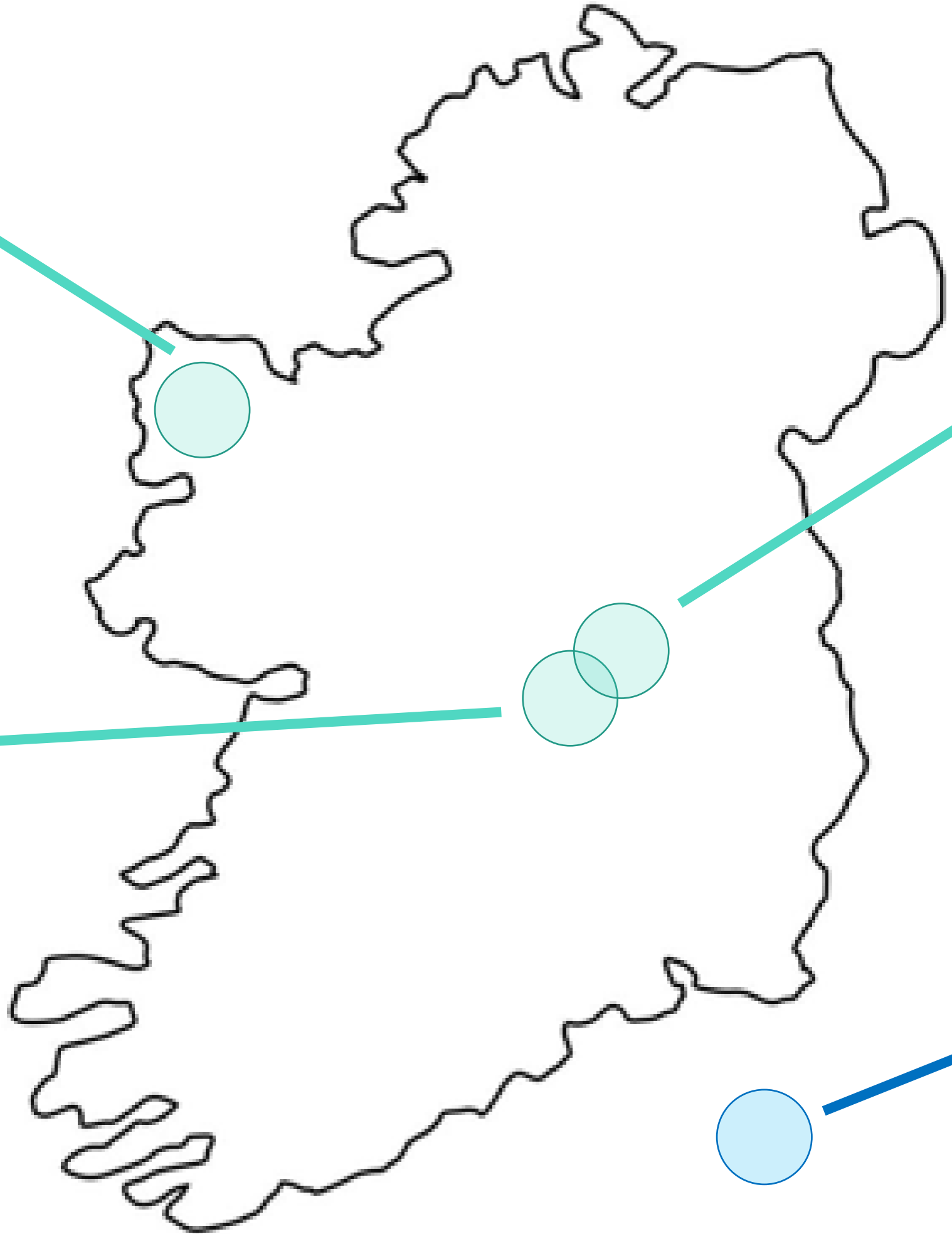
H2 integrated in Energy Park & hydrogen pipeline injection

Production of hydrogen for back-up generation and hydrogen pipeline injection



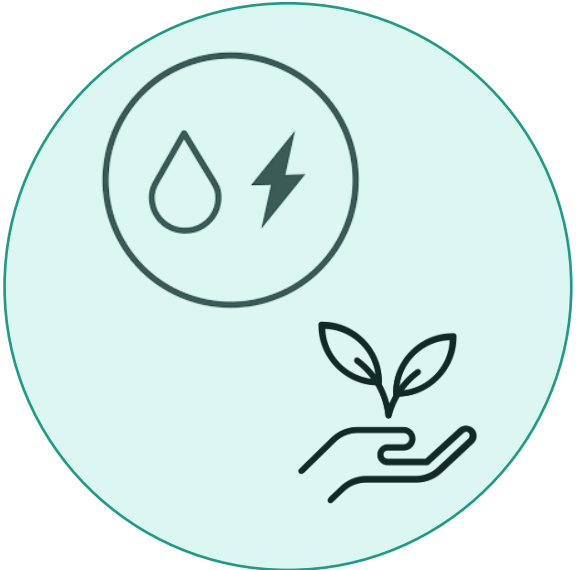
H2 integrated in Energy Park

Production of hydrogen for flexible generation, back-up generation, hard to abate industry



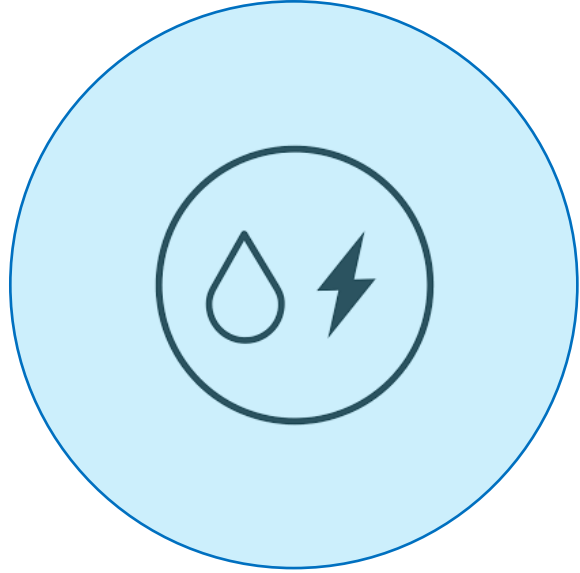
E-fuels production Project (onshore)

Production of hydrogen value added products such as e-methanol, SAF, green ammonia etc.



E-fuels production Project (offshore)

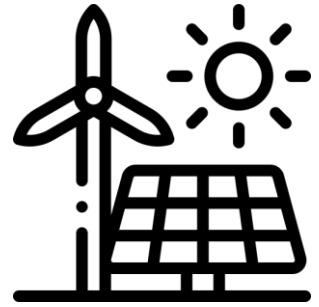
Production of hydrogen value added products such as e-methanol, SAF, green ammonia etc. (location to be determined)



 Phase II

 Phase III

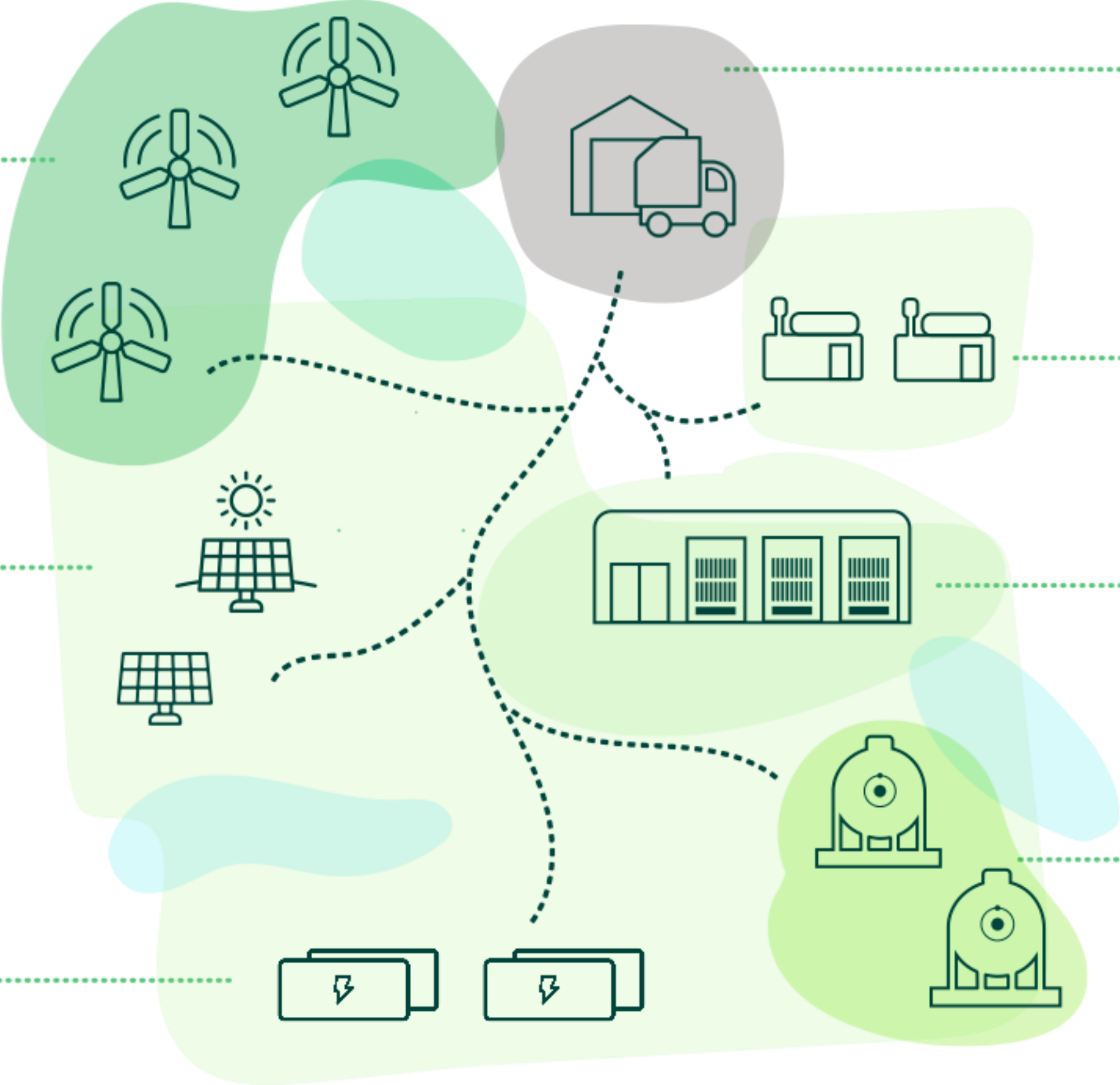
Bord na Móna Energy Park Concept



Wind Energy
Using Ireland's abundant wind resources to generate renewable energy.

Solar Energy
Solar photovoltaic panels using direct and indirect sunlight to generate electricity.

Battery Energy Storage
Excess renewable energy stored for use when required.



Distribution Centre
Large user of energy that requires energy, land and access to the national motorway network.

Flexible Technology
Provides a rapid response at times of peak energy demand.

Data Centre
Key cyber economy infrastructure that requires large amounts of energy.

Hydrogen
Electrolyzer powered by renewable energy creates clean renewable gas, a largescale energy storage solution.