RENEWABLES : A TRANSFORMATIONAL OPPORTUNITY

September 2019

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Introduction

- UvdL – '***I want Europe to become the first climate-neutral continent in the world by 2050.*** *To make this happen, we must take bold steps together. Our current goal of reducing our emissions by 40% by 2030 is not enough.'*
- Electricity can and will be the vector for decarbonising our economies.
- In addition to existing demand: Transport + Heating/Cooling + Industrial Feedstock will drive increased demand.
- Power to X is a delivery mechanism and not a substitute for Renewable Energy.
- Efficiency, Self-Production, Demand Side Management and Storage will all help.
- We need a lot more Renewables!

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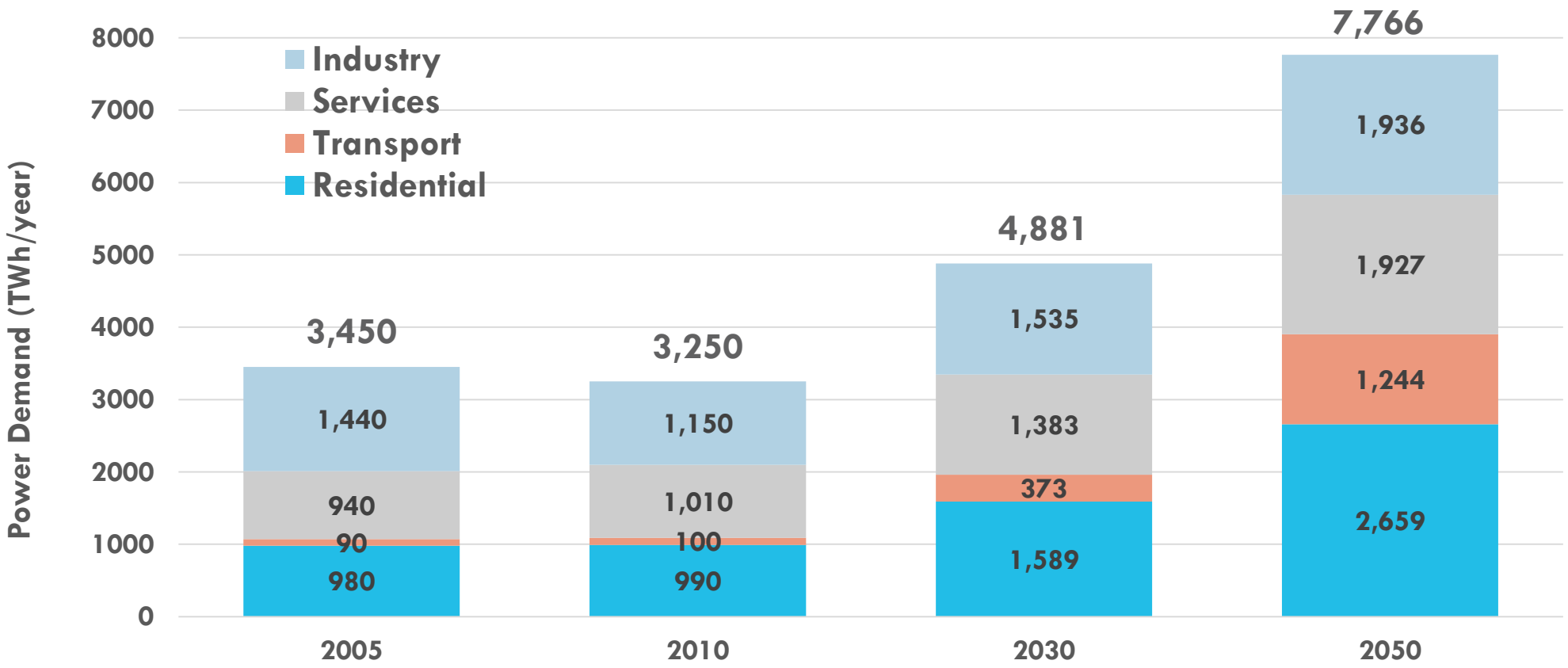
2050 European Energy Demand



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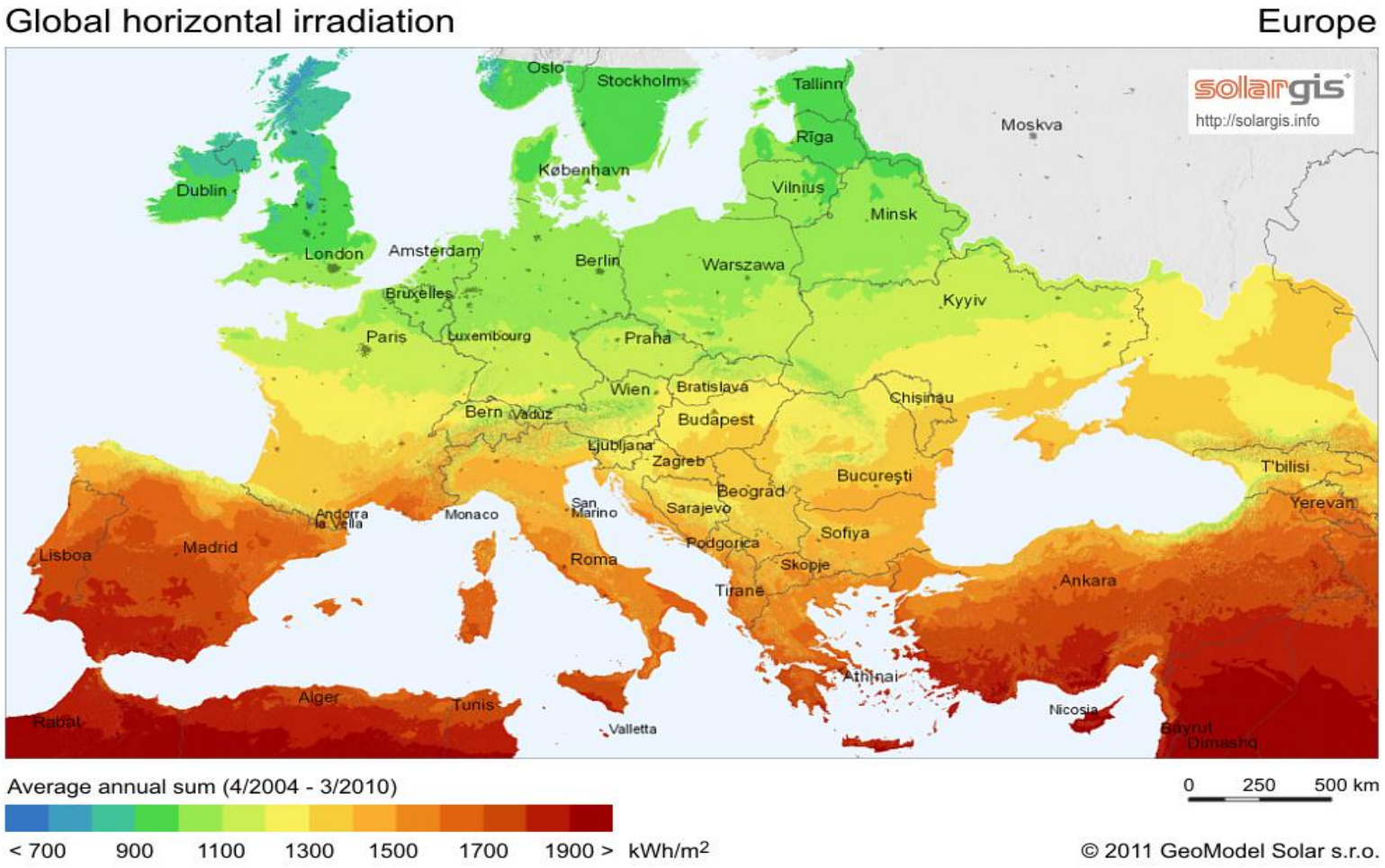
Europe's Solar Resource



Source: Solar GIS

Europe's Offshore Wind Resource

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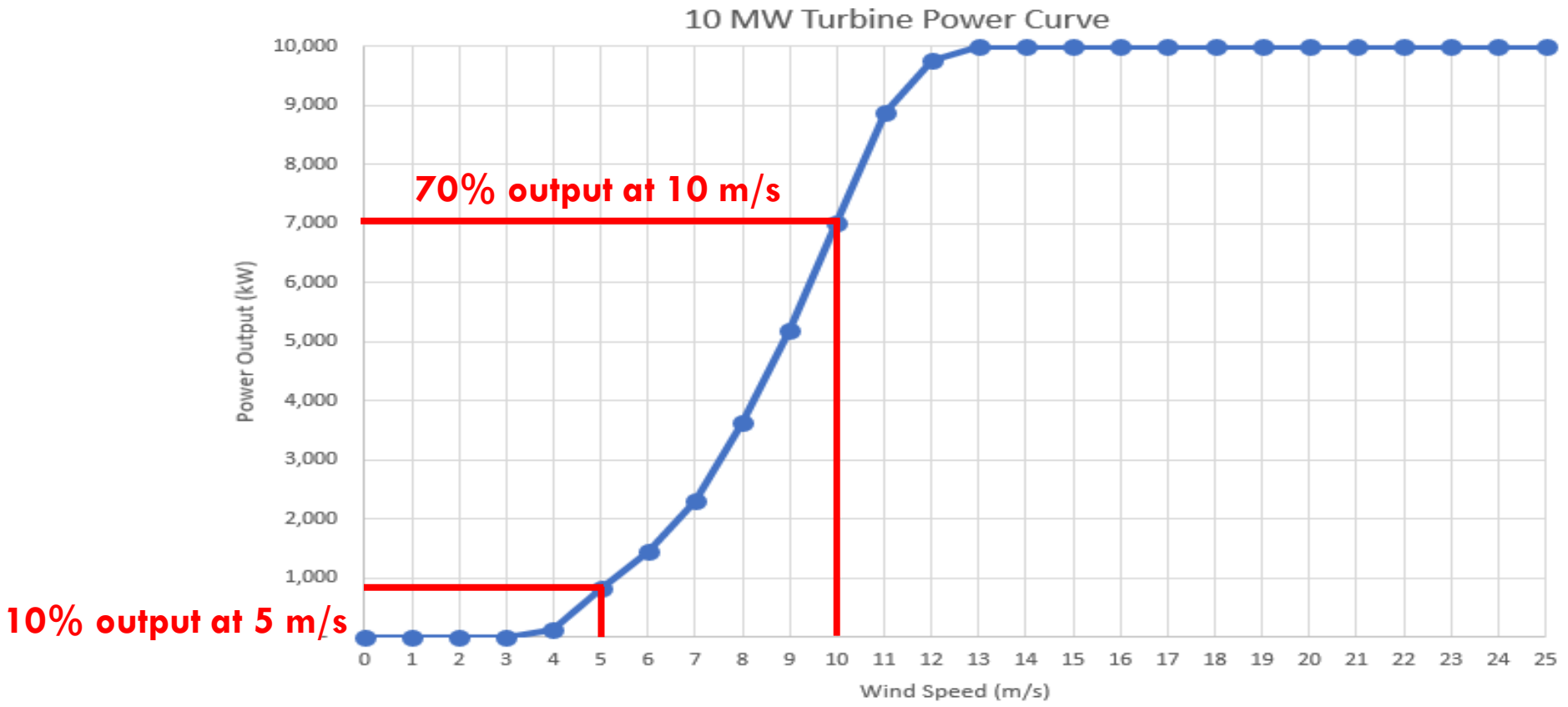
Translation to Output



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Why not Onshore?

Technology	Country	Capacity Factor	
		Existing	New
Onshore Wind	England	26.9%	30.9%
	Wales	31.1%	0.9%
	Scotland	26.7%	35.2%
	N. Ireland	24.2%	32.4%
Offshore Wind	UK	38.8%	47.3%
	Germany	39.8%	51.2%
	Denmark	40.9%	53.0%
	France	NA	50 +%

- Latest German Onshore wind auction in October 2018 saw prices climb to 6.26 c/kWh.
- Latest French Offshore wind auction in 2017 saw prices drop to 4.4 c/kWh.

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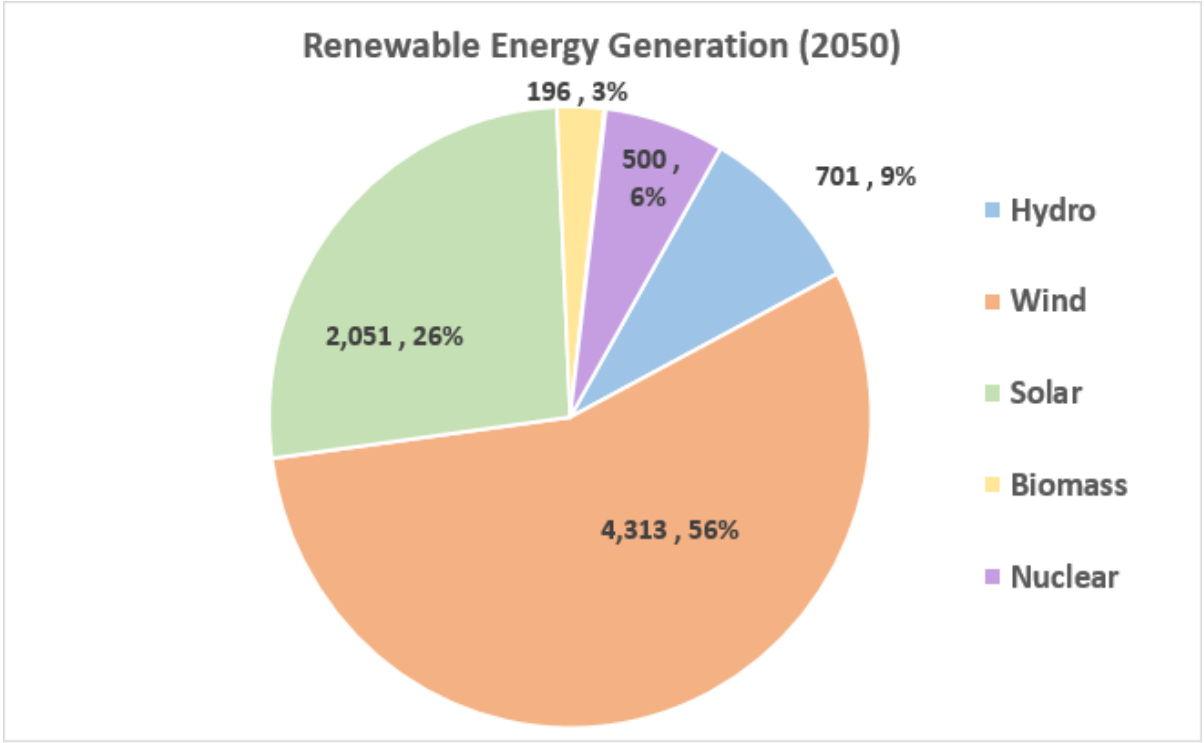
Underlying Challenge / Opportunity

- Best Renewable resources are at the periphery.
- Dispersing renewable sources geographically obviates the variability of production.
- 500GW of wind + 450GW of solar in addition to what is in the system today.



2050 Renewable Total: *7,768* TWh

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Underlying Challenge / Opportunity

- Existing Grid was designed for carbon Gen/Demand and is inadequate.
- Though the cost of RES is falling the cost of connecting RES is increasing and there is not enough grid capacity available.
- Public Acceptance of infrastructure is an issue.
- New technology/ infrastructure is required.

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- SuperNode is a tech company working with OEMs and research institutes to develop more cost-effective transmission solutions.
- We are developing a connection system for (offshore) renewables that will route RES power back to customers/existing grid efficiently.
- This system will incorporate superconductors and is a key piece of technology that:
  1. Collects the energy from mainly offshore sources
  2. Converts to DC to extend range
  3. Routes the energy to where demand is highest

The system will reduce the cost and footprint of connections by 40 - 50% and open up new opportunities for Renewable development.

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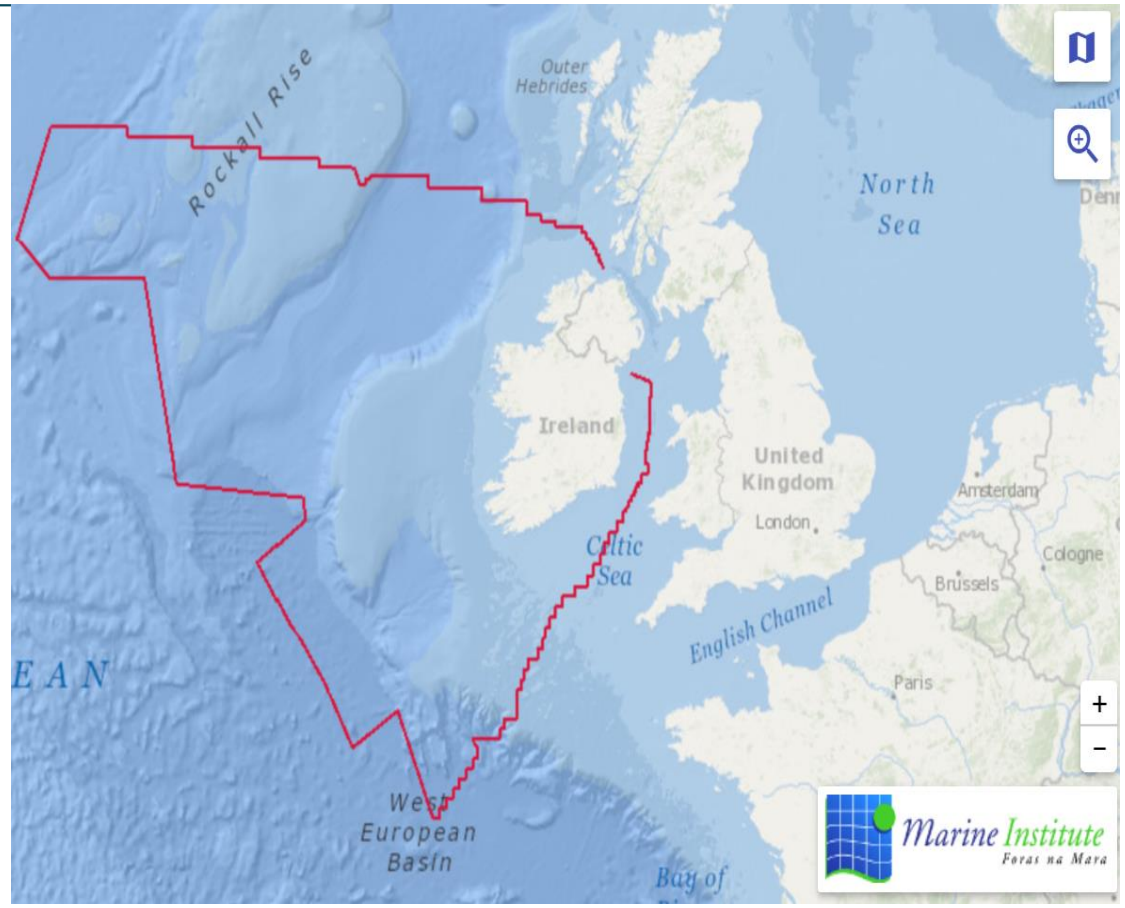
Smaller footprint

Ireland's Opportunity

- Ireland is long in quality Renewable Energy and Central Europe is short
- Ireland has a 10:1 ratio of sea to land.
- Potential for hundreds of GWs of offshore wind to be installed.
- Wind speeds in excess of 12 m/s as shown by the previous map.



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What does this offer Ireland?

1. New indigenous industries to diversify job creation and the tax base
2. Regional Development and Regeneration
3. Energy Security with an avoided annual fuel bill of €5-6bn
4. Energy Export Revenue
5. Leadership in responding to Climate Change
6. Meet responsibilities and avoid penalties

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Example - Agriculture

- 19.85 Mt CO2e are associated with agriculture in Ireland
- Coal and Gas emission factors of 0.75 tCO2e/MWh
- This is equivalent to 26 TWh of energy from coal and gas

This can be offset by ~5 GW of Offshore Wind around Ireland

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Steps to Realise

- Commit to development of our renewable assets – long term vision.
- Create an Offshore Renewable Centre of Excellence – with Industry and Govt.
- Innovation Support for new technologies – with Industry and Govt.
- Test and Deployment Centre for Offshore Renewable Energy and connection technology projects which has the following:
    1. Planning and Consents (screening),
    2. Connection Regime,
    3. Offtake Arrangements
- Spatial Planning for the optimal use of the marine environment.
- Fit for Purpose offshore consenting and asset management arrangements.

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THANK YOU