Western Development Commission

Renewable Energy: An Opportunity for a Just Transition to Net Zero on the Atlantic Coast

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Executive Summary

The Western Development Commission (WDC) is a statutory body established in 1997. Its remit includes advising the Government on matters that may impact the region and promoting Government Policy that will contribute to or directly improve social and economic standards in the region. This remit now allows the WDC to ensure that the West of Ireland is positioned to capitalise on the renewable energy opportunity presented by a succession of European Union (EU) climate action and decarbonisation targets from now out to 2050. The WDC commissioned this report with the West, North-West, and Mid-West Regional Enterprise Plans to respond to the Eirgrid Consultation "Shaping Our Electricity Future" and identify cross-regional objectives to foster the renewable energy sector in the west of Ireland. The geographical scope of this report is the Atlantic Economic Corridor region stretching from Donegal to Kerry.

As part of the European Green Deal, the Commission proposed in September 2020 to raise the 2030 greenhouse gas emission reduction target, including emissions and removals, to at least 55% compared to 1990. The 2030 targets should not be seen as the finish line but merely the first of many milestones that must be met to transition to "Net Zero". This is only the first in a series of targets as Ireland and the other European Union countries move towards a net-zero carbon or climate neutral economy by 2050. This move will require a monumental change to the way we live and operate.

This change will bring important opportunities to our region, but at the same time, it will bring challenges that need to be addressed for the West of Ireland to make a just and fair transition to a carbon-neutral future. We need to understand the scale and scope of the actions required to increase the production and use of renewable energy in rural, coastal and offshore areas in the West of Ireland. We need to ensure that the impacts on rural communities of the transition to green energy are properly assessed.

A multi-faceted approach will be required to achieve net-zero carbon, of which a move away from fossil fuels in electricity production is an integral part. The west coast of Ireland has been reported as having the highest average offshore wind speeds in Europe, which can create a wealth of opportunity in terms of clean energy resources and has the potential to become a global leader in terms of climate action. Our unique geographical features and extensive natural resources place us in an optimal position for producing green energy in abundance that will decarbonise our electricity supply and place Ireland at the forefront of new industries such as green hydrogen and energy to X. The Western Development Commission sees this as an opportunity to increase investment in the region, grow existing industries, and develop new ones, resulting in improved outcomes for the region's population.

For the first time in its history, the west of Ireland has a strategic natural resource that can transform the region with over 30GW of verified offshore energy resources[1]. To put this in context, an analysis of the east coast opportunity has calculated the total employment from the development of 3.5GW of fixed offshore wind as 21,380 full-time equivalent jobs. However, because the supply chain is already well established, most of these are internationally based and lie in manufacturing (over

[1] Some commentators argue that the total figure is double this, but we are using the verified figure in this report

16000). Floating offshore wind is a burgeoning industry, and Ireland has the opportunity to get involved from the outset. The opportunity for the west cast in terms of employment is many multiples of the above figures with recognised potential for over 30GW in the Atlantic. This resource can guarantee energy independence for Ireland, significantly reduce our carbon footprint, reshape communities through billions of euros from community benefit funds and boost jobs and exports. Indeed, the west coast has many strengths to allow it to seize this opportunity.

There is significant port and research infrastructure in place across the region. There is a commitment to work together through a multi-port solution. This approach would allow each location to use its distinctive assets to contribute to the development of the industry. This is evidenced by the stakeholders who contributed to this study.

However, none of this will happen without the political will to drive the necessary changes forward. A *Whole of Government* approach is now needed to realise the renewable energy potential for the West of Ireland. Government policies must align across several critical areas, including planning policy (location of new data centres and other heavy energy users), telecommunication interconnection (west to east and beyond), renewable energy development and in particular floating offshore wind and also other supporting policies such as housing and supporting infrastructure (ports, rail and road links). Given the long lead-in times for these changes and the need to provide clarity to all the players involved, we must act now to ensure that this opportunity is not lost. Furthermore, we need a whole coast approach that recognises that each location has particular strengths, which, if used holistically, will allow the whole region to prosper.

The following are the next steps:

1. Establish a group to examine how Ireland can capitalise on the Atlantic resource of at least 30GW of floating offshore wind by 2050.
2. Increase investment in research & development in the floating wind supply chain to reduce floating wind technology costs.
3. Undertake a mapping exercise for the ports on the west coast to identify each port's strengths in the context of floating offshore wind and identify what upgrades and investments are needed to capitalise on the Atlantic resource.
4. Increase telecommunications interconnection on both an international and national scale (east to west).
5. Plan to ensure that the necessary interconnection is developed in the West of Ireland to facilitate a demand-led electricity generation approach.
6. Create additional electricity interconnection between Ireland and Europe to export early excess electricity from floating offshore wind in the Atlantic.
7. Examine the establishment of floating wind technology, logistics and research hubs in the West of Ireland.
8. Develop a start-up accelerator for floating offshore wind development and renewable energy-related activities, such as the development of green hydrogen.
9. Establish a ports working group to develop a "whole coast" approach that highlights regional opportunities and identifies policy and investment needs

The WDC would like to thank our colleagues in the Regional Enterprise Plans, ports, local authorities, other agencies, and industry, who generously gave their time to this study.

While the focus of this report is on the West of Ireland, it must be acknowledged that this is a national issue, and all the regions must work together to achieve national objectives. Furthermore, the report should not be seen as pitching east versus west, rather demonstrating how the development of renewables in the West can improve economic outcomes in the west and alleviate many of the problems on the East coast. Furthermore, this report should not be seen as an end in itself, rather a call for collective action. While we have attempted to consult widely, the actions recommended must involve all the regional and national stakeholders.

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Acronyms

Acronym	Meaning
AEC	Atlantic Economic Corridor
ADGB	Atlantic Green Digital Basin
AI	Artificial Intelligence
AIRe	Atlantic Innovation Region
AMETS	Atlantic Marine Energy Test Site
CCPC	The Competition and Consumer Protection Commission
CEO	Chief Executive Officer
CHP	Combined Heat and Power
CiSET	Centre for the integration of Sustainable Energy Technologies
CRIS	Centre for Robotics and Intelligence Systems
CSO	Central Statistics Office
CTV	Crew Transfer Vessels
DECC	Department of Environment, Climate and Communications
DHPLG	Department of Housing, Planning and Local Government, now the Department of Housing, Local Government and Heritage
DoT	Department of Transport
DRCD	Department of Rural and Community Development
ECP	Enduring Connection Policy
EEZ	Exclusive Economic Zone
EU	European Union
EV	Fully Electric Cars
FOW	Floating Offshore Wind
GCS	Generating Capacity Statement
GMIT	Galway Mayo Institute of Technology
GW	Giga Watt
IDA	Industrial Development Authority
IDEAM	Irish Digital Engineering and Advanced Manufacturing
IFSC	Irish Financial Services Centre
IT Sligo	Institute of Technology Sligo
ITLG	Irish Technology Leadership Group
JCCA	Joint Committee on Environment and Climate Action Report
kV	Kilo Volt
kW	Kilo Watt
LIT	Limerick Institute of Technology
MaREI	SFI Research Centre for Energy, Climate and Marine research
MTU	Munster Technological University
MW	Mega Watts
MWh	Mega Watt hour
NDP	National Development Plan
NM	Nautical Mile
NPF	National Planning Framework
NUIG	National University of Ireland Galway

NWRA	Northern and Western Regional Assembly
M	Million
O&M	Operations and Maintenance
OECD	The Organisation for Economic Co-operation and Development
OREDP	Offshore Renewable Energy Development Plan
OWF	Offshore Wind Farm
PfG	Programme for Government 2020
PHEV	Plug in Electric Vehicle Hybrid
PI2040	Project Ireland 2040
PPA	Power Purchase Agreement
RES-E	Renewable Electricity Targets
RESS	Renewable Energy Support Scheme
RSES	Regional Spatial and Economic Strategy 2020-2032
SEAI	Sustainable Energy Authority of Ireland
Sqm	Square meters
SRA	Southern Regional Assembly
TER	Total Energy Requirement
TWh	Terra watt hours
UL	University of Limerick
WDC	Western Development Commission
WEI	Wind Energy Ireland
UK	United Kingdom
USA	United States of America

2 Introduction

2.1 Overview of the Energy Dilemma

Increasing renewable energy production in Ireland is driven by the need to meet a series of EU emissions reduction targets. As part of the European Green Deal, the Commission proposed in September 2020 to raise the 2030 greenhouse gas emission reduction target, including emissions and removals, to at least 55% compared to 1990 (EU Commission, 2020)[2]. However, this is only the first in a series of targets as Ireland and the other European Union countries move towards a net-zero carbon or climate neutral economy by 2050. This will require a monumental change to the way we live and operate. A multi-faceted approach will be required to meet these targets, of which a move away from fossil fuels in electricity production is an integral part.

In anticipation of expected EU decarbonisation targets, and in response to concerns about climate change, the then Minister for Communications, Climate Action and Environment, Richard Bruton, published the Climate Action Plan in June 2019, which included highly ambitious targets to achieve 70% of electricity production from renewables by 2030.

The plan states that "to meet the required level of emissions reduction, by 2030 we will:

- Reduce CO2 eq. emissions from the sector by 50–55% relative to 2030 Pre-NDP projections
- Deliver an early and complete phase-out of coal and peat-fired electricity generation
- Increase electricity generated from renewable sources to 70%, indicatively comprised of
    - at least 3.5 GW of offshore renewable energy
    - up to 1.5 GW of grid-scale solar energy
    - up to 8.2 GW total of increased onshore wind capacity
- Meet 15% of electricity demand by renewable sources contracted under Corporate PPAs

The 3.5GW of offshore wind set out in the Climate Action Plan increased to 5GW by the Programme for Government published in June 2020 and should be considered a minimum threshold figure. The 2030 targets should not be seen as the finish line but merely the first of many milestones that must be met to transition to "Net Zero". A steady stream of offshore wind development is needed between now and 2050 to ensure that Ireland can transition to Net-Zero. Considering the long lead-in times for offshore wind development and other supporting infrastructure, including port and grid development and implementing policies needed to ensure co-location of complementary industries (e.g. green hydrogen production and heavy energy users), we cannot ignore the post-2030 opportunity at this time. We should move away from the pre and post 2030 idea as placing too much emphasis on 2030 targets while failing to act now for what comes afterwards jeopardises Ireland's opportunity to be a world leader in new industries such as floating offshore wind and green hydrogen.

[2] EU Commission, 2020 https://ec.europa.eu/clima/policies/strategies/2030_en

The Atlantic Ocean off the west coast of Ireland has the highest average wind speeds in Europe[3]. This places the west coast at the centre of this energy revolution. Emerging technological advancements in renewable energy combined with the Atlantic resource will lead to many multiples of 5GW offshore wind by 2050.

Many Government departments have responsibility for different policy areas that will feed into achieving not only 2030 targets but also the more ambitious targets set for 2050 of climate neutrality or net-zero carbon economies. Of particular relevance to the West of Ireland are policies related to rural development and the transition to green energy in the region. The Department of Rural and Community Development has outlined the importance of producing and promoting green energy in the West of Ireland in their Rural Development Policy 2021-2025. Within this policy, entitled 'Our Rural Future', the DRCD has committed in its key deliverables to expanding the Sustainable Energy Communities Network from 500 to 1,500 by 2030, prioritising the development of microgeneration of renewable energy, and maximising resources and strengths in rural areas to support a green economy. These deliverables will create employment and opportunity for those living in the West of Ireland. The DRCD is also committed to enacting and implementing the requirements likely to come out of the Low Carbon Development (Amendment) Bill[4]. The Bill, intended to support Ireland's transition to Net Zero and achieve a climate-neutral economy by 2050,[5] will set five-year carbon budgets for Ireland with successive carbon budgets moving us closer to the 2050 target.

The provision of grid infrastructure is critical to realise these ambitious targets concerning onshore and offshore renewable energy generation. Ireland's grid infrastructure is already coming under pressure, with renewable energy providers being asked to power down generation for 11.5% of the time in Ireland during the first six months of 2020 (WEI, August 2020). This means that 11.5% of renewable electricity generation was lost during that time and according to Wind Energy Ireland was enough electricity to power Galway for a year. In 2019, Wind Energy Ireland gave a conservative estimate of 250,000 tonnes of additional CO_2 being released into the atmosphere due to lost wind energy due to weak grid infrastructure[6] resulting in renewable energy generators being asked to power down 6.9% of the time across the whole island.[7]

The enormity of the task facing Eirgrid to integrate the capacity required to meet the 2030 targets should not be underestimated. Constantly generating infrastructure, such as coal and peat burning facilities, will be replaced by variable generating infrastructure. Difficulties are compounded by high energy usage in the east of the country and the greater Dublin area. There is limited additional generation capacity in the east of the country (including offshore wind). While it may serve short term needs, given the long lead-in times for renewable energy generation and supporting infrastructure such as port development Ireland needs to now plan for the long-term scenario. In contrast, the West of Ireland (including offshore) can supply electricity far beyond the needs of Ireland and can be the

[3] https://electrek.co/2021/04/12/egeb-ireland-to-build-the-atlantics-first-floating-offshore-wind-farm/#:~:text=The%20Atlantic%20has%20the%20highest,%2C%20called%20Green%20Atlantic%20%40%20Moneypoint.
[4] Department of Rural and Community Development *Our Rural Future- Rural Development Policy 2021-2025* p80.
[5] https://www.gov.ie/en/publication/984d2-climate-action-and-low-carbon-development-amendment-bill-2020/
[6] Justin Moran (2019) *Blog: 'Dispatch Down' and the fight against climate change',* Wind Energy Ireland
[7] https://www.eirgridgroup.com/site-files/library/EirGrid/2019-Qtrly-Wind-Dispatch-Down-Report.pdf

catalyst for new industries such as green hydrogen or other value-added and novel products and services. Ireland must implement policies to ensure that the country is a world leader in this space.

2.2 About the Western Development Commission

The Western Development Commission (WDC) is a statutory body established in 1997. It holds responsibility for promoting social and economic development in the Western Region (counties Donegal, Leitrim, Sligo, Mayo, Roscommon, Galway and Clare). Its remit includes advising the Government on matters that may impact the region and promoting Government Policy that will contribute to or directly improve social and economic standards in the region.

In doing so, it adopts a multi-faceted approach outlined in the WDC "Work Smarter, Live Better" strategy document, published in 2019. The strategy is built on the three pillars of regional promotion, regional leadership and sustainable enterprise and reflects the organisation's strategic goals in the short, medium and long term. The WDC program manages the Atlantic Economic Corridor, a non-administrative or "linear" region along the Western seaboard, stretching from Kerry to Donegal. The aim is to build and increase collaboration within the AEC that maximises its assets, attracts investment and creates jobs and prosperity in the region. It is this AEC region that forms the geographical scope of this report.

The West of Ireland of Ireland contains 1.17 million people, representing 25% of Ireland's population. The region is characterised by a vibrant network of regional centres, small towns, coastal communities and open countryside. Therefore, the WDC aims for balanced development within the region, focusing on the needs of and opportunities for rural and peripheral areas and harnessing the potential of industry, research, enterprise, and development clusters located within the region. The WDC sees the West of Ireland and its resources, including its people, as a powerful competitor to urban enterprise centres in Ireland. We look to regional business clusters such as the Dulles Technology Corridor in Virginia in the USA as a powerful example of regional innovation and enterprise. Table 2-1 provides a high-level overview of critical aspects of the region.

Table 2-1 Demographic and Economic Characteristics of the West Coast Region (Western Development Commission 2021) [8]

Regional Economic Factors	
Population	1.17 million, 25% of Ireland's population
Urban Centres	Two major Centres: Galway City (80k+), Limerick City (100k+)
Regional Towns	12 strong regional towns: Letterkenny, Sligo, Ballina, Castlebar, Westport, Tuam, Ballinasloe, Loughrea, Ennis, Shannon, Tralee and Killarney
Transport Hubs	1 Major Airport: (Shannon) 1 Port of National Significance (Tier 1): Foynes Multiple Ports of Regional significance: Galway, Rossaveal, Killybegs 3 Regional Airports with international links: Kerry, Knock, Donegal
Education & Research	3 Universities: UL, NUIG, MTU 4 Institutes of Technology: LyIT, IT Sligo, GMIT, LIT Multiple research centres (from biomedical to data/analytics to marine to food etc.)
Industry Clusters	2 Major Industry Clusters & Specialisms: Life Sciences & AI/BigData/Analytics 4 Emerging Specialisms: Cleantech, Agtech, Fintech and Advanced Manufacturing & Robotics Multiple EI funded Clusters emerging: Circular Bioeconomy @MTU, Agtech @ MTU/, IDEAM@LIT etc.
Innovation Hubs	100+ Hubs and co-working spaces
Regional & Local Development Bodies	1 Western Development Commission 2 Regional Assemblies (NWRA, SRA) 3 Regional Enterprise Plans – North-West, West and Mid-West 10 Local Authorities: Donegal, Leitrim, Sligo, Roscommon, Mayo, Galway City, Galway County, Clare, Limerick & Kerry

[8] Creating an Atlantic Innovation Ecosystem by Leveraging and Integrating Regional Assets, Dr Brendan O'Brien, April 2021

2.2.1 Supporting partners

The Western Development Commission recognises the need for cross-regional support and support from other areas on the west coast to ensure that the region and adjoining counties are positioned to take advantage of the renewable energy opportunity over the medium to long term. The following partners were consulted while researching this paper:

- The Western Development Commission
- The West Regional Enterprise Plan
- The Mid West Regional Enterprise Plan
- The North West Regional Enterprise Plan
- Mayo County Council
- Port of Galway
- Killybegs Port
- The Atlantic Economic Corridor
- The Northern and Western Regional Assembly
- Údurás na Gaeltachta
- Connected Hubs

2.3 Objectives of this paper

Energy and climate action will bring important opportunities to our region. Still, at the same time, it will bring challenges that need to be addressed for the Region to make the transition to a carbon-neutral future. We need to understand the scale and scope of the actions required to increase the production and use of renewable energy in rural, coastal and offshore areas in the region. We need to ensure that the impacts on rural communities of the transition to green energy are properly assessed.

The West Coast of Ireland has been reported as having the highest average offshore wind speeds in Europe[9],[10] which can create a wealth of opportunity in terms of clean energy resources and has the potential to become a global leader in terms of climate action. Our unique geographical features and extensive resources place us in a prime position to produce green energy in abundance. However, these opportunities will not materialise without political will and require extensive infrastructure upgrades, specifically concerning electrical grid access.

With these considerations in mind, the Western Development Commission and its supporting partners submit that the West of Ireland needs access to a grid system that can facilitate the massive renewable energy potential in the region. Public and political will must reflect this. If we can achieve these key tasks, the region will benefit exponentially in terms of enterprise, employment and community development. The West of Ireland could become a global player in the export of clean energy and other green energy initiatives such as the production of green hydrogen.

[9] https://www.irishexaminer.com/business/arid-30902042.html
[10] https://www.irishexaminer.com/farming/arid-40292453.html

2.4 Western Region

The WDC has a remit for Donegal, Sligo, Galway, Mayo, Roscommon, Leitrim and Clare. However, the WDC acknowledges that a whole western Ireland approach must be adopted to ensure that the West of Ireland maximises the renewable energy potential. Specifically, three regions: Western, North-Western and Mid-Western, must work together to realise the enormous potential and maximise the benefits for western Ireland. Each of these regions produces a regional enterprise plan. Furthermore, the regions are encouraged by the Department of Enterprise Trade and Employment to develop cross-regional objectives. The WDC is working with the three Regional Enterprise Plans to develop objectives for the renewable energy sector.

The Western Development Commission already adopts this approach in other areas, such as developing and promoting the Atlantic Economic Corridor (AEC). The AEC is a non-administrative or "linear" region along the Western seaboard, stretching from Kerry to Donegal. The aim is to build and increase collaboration within the AEC that maximises its assets, attracts investment and creates jobs and prosperity in the region.[11]

Within and adjacent to the WDC region are three sub-regions. These sub-regions are the West (Galway, Mayo and Roscommon), the North-west (Sligo, Leitrim and Donegal) and the Mid-west (Clare, Limerick, and Tipperary).

2.5 Overview of the Region

Because the AEC region is a "non-administrative region", we draw on statistics for the WDC region and supplement them with county by county data where appropriate.

2.5.1 Demographic

Over the last 50 years, the population of Ireland has increased from under 3m in 1960 to just under 5m in 2020. Over that time, the country as a whole has seen increasing urbanisation of our population. In 1960 the percentage of our population living in an urban setting was 45.7%, and in 2020 it was 63%[12]. Unlike the east of the country, the population of the West of Ireland remains more dispersed across a network of regional centres, small towns and villages and coastal and rural communities. The percentage of the population living in rural areas in the WDC region is illustrated in Figure 2-1. Mayo and Donegal were the only two counties in Ireland to see a population decrease between Census 2011 and Census 2016.

[11] https://www.atlanticeconomiccorridor.ie/about/
[12] https://www.worldometers.info/world-population/ireland-population/

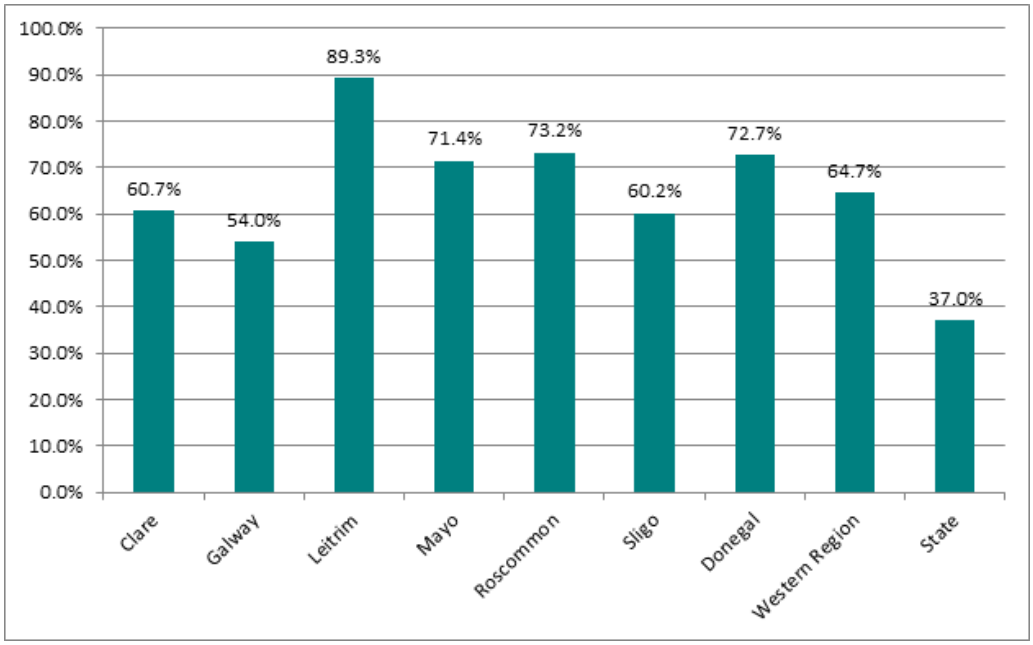

Figure 2-1 Percentage of Population living in rural areas in the Western Region and State.

The population distribution by age is as expected for less urban areas. The population is peaking at mid-childhood (c.8-9) and then again from the mid-30s and older, reflecting family-oriented living. The drop off in the late 20s to early 30s reflects the movement of young people to large towns and cities for third level education and employment. While the population age distribution reflects the region's strength in providing for a work-life balance conducive to family-oriented living, the age gap in the demographic of the region has financial consequences. The WDC estimates that retaining a greater percentage of graduate talent in the region could add almost €500million per annum to the local economy.[13]

The WDC region also contains several Gaeltacht regions in the west and south of County Galway, Donegal, the northwest of Mayo, and the Achill Island area of Mayo. There are also Gaeltacht areas in Kerry.

2.5.2 Geographic

The region is geographically diverse, characterised by mountains (Twelve Bens, Maum Turk), blanket bogland, lakes (Lough Corrib, Lough Derg), and a large, mostly rugged coastline with numerous cliff areas, bays and offshore islands.

The region has a large rural element. The West of Ireland accounts for approximately 36% of our landmass but only 25% of our population. It contains Galway City with a population of c. 80,000 and Limerick with a population of c. 100,000. Economically important regional growth centres in the West of Ireland include Athlone on the Roscommon-Westmeath border and Sligo and Letterkenny in the neighbouring north-western region. Major towns include Letterkenny, Sligo, Ballina, Castlebar,

[13] Creating an Atlantic Innovation Ecosystem by Leveraging and Integrating Regional Assets, Dr Brendan O'Brien, April 2021

Westport, Tuam, Ballinasloe, Roscommon, Ennis, Killarney, Tralee, and Carrick-on-Shannon. The total number of large towns in Ireland is 41 based on Census 2016 figures.[14]

The area off the west coast has some of the best wind and wave renewable energy resources globally. The Programme for Government 2020[15] includes a commitment to produce a longer-term plan setting out how Ireland can take advantage of the wind resource on the Atlantic coast with a figure of at least 30GW included in the PfG.

2.6 Future Plans

2.6.1 Project Ireland 2040 (PI2040)

Project Ireland 2040 aims to ensure that Ireland is a better country for all its people by changing how investment is made in public infrastructure in Ireland, ensuring that investment is based on well-defined strategies. It comprises the National Development Plan (NDP) and the National Planning Framework (NPF). The NPF sets the vision and strategy for developing our country to 2040, and the National Development Plan (NDP) provides enabling investment to implement the strategy (PI2040, Government of Ireland 2018).

The plan, which aims to facilitate Ireland's growing population, includes regional objectives based around growing our regional cities and regional growth centres.

It includes some high-level objectives, and the following are particularly relevant to the West of Ireland:

- Guide the future development of Ireland, taking into account a projected 1 million increase in our population, the need to create 660,000 additional jobs to achieve full employment and a need for 550,000 more homes by 2040;
- 25% across the other four cities combined (Cork, Limerick, Galway and Waterford), enabling all four to grow their population and jobs by 50-60%, and become cities of greater scale, i.e. growing by twice as much as they did over the previous 25 years to 2016,
- With the remaining 50% of growth to occur in key regional centres, towns, villages and rural areas, to be determined in the regional plans – Regional Spatial and Economic Strategies (RSESs)
- Enable people to live closer to where they work, moving away from the current unsustainable trends of increased commuting;
- Regenerate rural Ireland by promoting environmentally sustainable growth patterns;
- Plan for and implement better distribution of regional growth in terms of jobs and prosperity;

[14] CSO 2016
[15] https://www.gov.ie/en/publication/7e05d-programme-for-government-our-shared-future/

2.6.2 Regional Spatial and Economic Strategy 2020-2032

Most of the Western Development Commission area counties form part of the wider area that falls under the remit of the Northern and Western Regional Assembly. The NWRA recently published its development strategy for the region "Regional Spatial and Economic Strategy 2020-2032" (RSES). This forms part of Project Ireland 2040 and is aligned with the National Development Plan. County plans are due to follow the regional plan.

Socio-economic outcomes for the region lag behind their eastern and southern counterparts. The plan addresses this worrying trend, leading to an ever-widening divide and worsening outcomes for the population across various factors, including health, education, and employment. The region has seen years of underinvestment in infrastructure, including roads, rail and energy.

If Government policies relating to the west, including investment in people and infrastructure, continue, as is, the worsening socio-economic divide will quickly grow to an uncrossable chasm.

The NWRA RSES aims to address this through a growth framework focusing on an overarching principle of People and Places and five growth ambitions. The Principle of People and Places aims for more compact growth and a move away from the region's sprawling urban and rural style of development. It aims to ensure more sustainable growth of compact urban and rural settlements supported by jobs, houses, services and amenities.

The five growth ambitions in the NWRA RSES are:

1. Vibrant Ambition – aims to focus policy on creating scale, investing in connectivity and people whilst aggressively pursuing a low carbon approach to differentiate the region. Strong economic growth, which creates permanent, sustainable jobs, is best achieved by building a competitive and productive economy.
2. Natural Ambition – strategic actions are required to prepare the region for what is to come, including creating a combined long-term vision for the future of both energy supply and our ability to use renewable energy. The RSES emphasises the need for coordination, new thinking, investment and skills to implement change. All considerations need to be cognisant of our natural resources, landscape and heritage (natural, social and cultural).
3. Connected Ambition - accessibility and mobility within the region directly affect the region's economic competitiveness. It also has an effect on the attractiveness of the region as a favourable living and visiting environment. The RSES will support further investment in sustainable transport measures. In addition, to achieve our Vision for the region, we need to strengthen our digital network and enable new technologies to work by ensuring that policies and systems are in place that can help people transition to a world much more digitally connected.
4. Inclusive Ambition - one of the strongest foundations and emerging propositions this region has to build on is its 'liveability'. The region aspires to be one of the most attractive places to live in Europe with a commitment to sustainable and inclusive growth.
5. Infrastructure Ambition – aims to ensure that the plans for the provision and maintenance of economic infrastructure, such as energy, water, and wastewater. This

infrastructure is key to delivering compact growth and implementing a connected, vibrant, inclusive, resilient, and smart region.

Of particular relevance to this submission is energy infrastructure, which falls under Growth Ambition number five – Infrastructure Ambition.

The West of Ireland has a particularly high potential for renewable energy development, focusing on onshore wind in the short term and offshore mainly floating wind in the longer term with wave also a possibility. The RSES includes several grid infrastructure projects in the pipeline, which must be developed as key enablers of the region's economic growth and strategic development. These include:

Table 2-2 Grid Infrastructure Projects under Project Ireland 2040

PROJECT NAME	LOCATION
North Connacht Project	Roscommon, Sligo, Mayo
Regional Solution Project (series compensation on 400 kV network)	Galway
North South 400 kV Interconnector	Meath, Cavan, Monaghan, Armagh, Tyrone
Bellacorick – Castlebar 110 kV Line update	Mayo
North West Project (study area)	Donegal, Leitrim, Sligo
Bellacorick – Moy 110 kV Line update	Mayo
Cashla – Salthill 110 kV Line update	Galway
Galway 110 kV Station Redevelopment	Galway

These projects are what is needed to service the existing region and expected growth out to 2032. It does not take into account the potential growth of the offshore wind industry in the region. Given the long lead-in times for offshore wind and associated supporting infrastructure such as port development, a clear roadmap for developing additional grid infrastructure is needed. This roadmap must include early-stage planning activities to ensure that the West of Ireland can capitalise on the huge economic potential of offshore wind.

In addition to the planned projects, the RSES supports the following:

- The development of a safe, secure and reliable electricity network and the transition towards a low carbon economy centred on energy efficiency and the growth projects outlined and described in the strategy.
- The reinforcement and strengthening of the electricity transmission network with particular reference to the regionally important projects contained within Table 2-2.
- The necessary integration of the transmission network requirements to allow linkages with renewable energy proposals at all levels to the electricity transmission grid in a sustainable and timely manner.
- The reinforcement and development of new electricity transmission infrastructure to ensure that the energy needs of the future population and economic expansion within designated growth areas and across the region may be delivered in a sustainable and timely manner and that capacity is available at a local and regional scale to meet future needs.

Of specific relevance to this report, the NWRA RSES identifies the need for investment in ports infrastructure. Specifically, sections 4.4 and 6.3 of the RSES supports the further examination of the feasibility for pursuing the designation of Galway Port and Killybegs Port as EU TEN-T Ports.

The Southern Regional Assembly has also prepared their Regional Spatial & Economic Strategy (RSES) for the Southern Region. The RSES provides a long-term, strategic development framework for the future physical, economic and social development of the Southern Region and includes Metropolitan Area Strategic Plans (MASPs) to guide the future development of the Region's three main cities and metropolitan areas – Cork, Limerick-Shannon and Waterford.

The RSES sets out a vision for the Southern Region to:

- Nurture all our places to realise their full potential
- Protect, and enhance our environment
- Successfully combat climate change
- Achieve economic prosperity and improved quality of life for all our citizens
- Accommodate expanded growth and development in suitable locations
- Make the Southern Region one of Europe's most creative, innovative, greenest and liveable regions

It is an objective to support the implementation of the National Renewable Energy Action Plan (NREAP), the Offshore Renewable Energy Plan, and the implementation of mitigation measures outlined in their respective actions. The RSES seeks to leverage the region as a leader and innovator in sustainable renewable energy generation. Another objective is to support the sustainable development, maintenance and upgrading of electricity and gas network grid infrastructure. This upgrade will help integrate renewable energy sources and ensure our national and regional energy system remains safe, secure and ready to meet increased demand as the regional economy grows. Specific Initiatives referenced in the RSES include:

- Promoting the conversion of Moneypoint electricity station by 2025 from burning fossil fuels
- The Shannon Integrated Framework Plan (SIFP) provides significant opportunities to grow the Blue Economy through offshore wave and renewable wind energy in the Shannon Estuary
- The Clare MEZ (Maritime Economic Zone) project for Cahiracon is a wave and offshore renewable energy test-site initiative by Clare County Council to provide specialist infrastructure, accommodation and development space for various maritime-related niche businesses.

2.6.3 "Our Rural Future" Rural Development Policy 2021-2025

Ireland's rural development plan "Our Rural Future"[16] aims to "transform people's quality of life and opportunities living in rural areas." With a rural population of 70%, this policy is particularly relevant to the West of Ireland. The transformative results of effective rural development policy and supportive renewable energy policies would impact virtually every community in the region. These two policies must be considered in tandem to maximise the quality of life in rural areas truly. The OECD, in its study

[16] https://www.gov.ie/en/publication/4c236-our-rural-future-vision-and-policy-context/

'Linking Renewable Energy to Rural Development', identified the following key policy elements to be considered:

- Embed energy strategies in the local economic development strategy so that they reflect local potential and needs.
- Integrate renewable energy within larger supply chains in rural economies, such as agriculture, forestry, traditional manufacturing and green tourism.
- Limit subsidies in both scope and duration and only use them to encourage renewable energy projects close to being viable on the market.
- Avoid imposing types of renewable energy on areas that are not suited to them.
- Focus on relatively mature technologies such as heat from biomass, small scale hydro and wind.
- Create an integrated energy system based on small grids able to support manufacturing activities.

2.6.4 Other Relevant Policy Initiatives

Some other important policy initiatives must be acknowledged as relevant to this document. The Marine Area Planning Bill 2021[17] is the State's leading response to the much-needed marine governance reform. The Bill provides the legal underpinning to an entirely new marine planning system, which will balance harnessing our huge offshore wind potential with protecting our rich and unique marine environment. The Bill is a key enabler of Ireland's decarbonisation goals

Ireland's Marine Spatial Plan[18] is known as the National Marine Planning Framework. Marine Spatial Planning (MSP) is a new way of looking at how we use the marine area and planning how best to use it in the future. MSP will try to balance the different demands for using the sea, including protecting the marine environment. It's about planning when and where human activities take place at sea. It's about ensuring these activities are as efficient and sustainable as possible. Marine spatial planning transparently involves stakeholders in the planning of maritime activities. The Maritime Jurisdiction Act establishes boundaries and zones in the territorial sea, and in May 2021, the Government published a Policy Statement on the Framework for Ireland's Offshore Electricity Transmission System, introducing a phased transition to a centralised offshore transmission system model[19]

Any working group looking at the development of offshore energy must engage with these developments before proceeding.

[17] https://www.gov.ie/en/publication/91aab-maritime-area-planning-bill/
[18] https://www.gov.ie/en/publication/a4a9a-national-marine-planning-framework/?referrer=http://www.housing.gov.ie/planning/maritime-spatial-planning/maritime-spatial-planning-directive/maritime-spatial-planning
[19] https://www.mccannfitzgerald.com/knowledge/environmental-and-planning/maritime-area-planning-bill-and-national-marine-planning-framework-hot-off-the-press

3 Energy Demand

3.1 Overview of national energy demand

The latest full figures available for Ireland can be found in the SEAI Energy in Ireland Report 2018.[20] This shows that the final consumption of electricity for the year was 26TWh. However, electricity is only one part of the picture and accounts for only 21% of our total energy demand in Ireland. Heat accounts for 37% of energy usage, with the remaining 42% being attributed to transport. In 2018 renewable energy accounted for 30.1% of all electricity generated in Ireland. However, renewable energy shares for heating and transport were much lower at 6.8% and 7.4%, respectively. 90% of all energy consumed came from fossil fuels.

Additional wind capacity was added to the grid in 2019 and 2020. According to Wind Energy Ireland's Irish Spring Wind 2021 Report[21], SEAI indicative figures show that Ireland achieved 40% electricity generation from renewable sources, of which wind was a major factor in 2020. This is the only part of the 2020 renewable energy targets that Ireland achieved.

3.2 Future demand trends

Energy demand is projected to grow by between 19% and 50% in Ireland over the next decade.[22] Eirgrid must produce a Generation Capacity Statement (GCS) every year for expected growth in demand over the following ten years. Figure 3-1 below shows Ireland's total energy requirement (TER) based on different growth scenarios for successive Generation Capacity Statements (GCS). In this case, it is the 2019 GCS versus the 2020 GCS (Eirgrid, 2020)[23]. Each scenario has two growth lines representing the most up to date low, median and high growth scenario and the growth scenario reported the previous year. The slightly lower prediction in 2020 represents the effects of Covid 19 on national demand in 2020.

Replacement of fossil fuel-based electricity generation and fossil fuel energy usage is not a like for like situation in terms of energy capacity as some methods of generation or consumption are more efficient than others. For example, the efficiency of a petrol engine is around 33%, and diesel car engines are typically 40%. In contrast, the efficiency of fully electric battery-based vehicles is as high as 98% (Martins et al., 2013)[24]. The efficiency of the method of consumption and also the generation method must be considered. As part of the decarbonisation of Ireland's energy consumption, we must also consider the rate at which we electrify our energy usage versus the rate at which additional renewable energy resources are added to the grid.

[20] SEAI, 2019
[21] Wind Energy Ireland (2021) *Irish Spring Wind Report*
[22] https://www.eirgridgroup.com/newsroom/gcs-2020-2029/
[23] https://www.eirgridgroup.com/site-files/library/EirGrid/All-Island-Generation-Capacity-Statement-2020-2029.pdf
[24] Martins et al, 2013 J. Martins, F. P. Brito, D. Pedrosa, V. Monteiro, João L. Afonso Real-Life Comparison Between Diesel and Electric Car Energy Consumption https://core.ac.uk/download/pdf/55627041.pdf

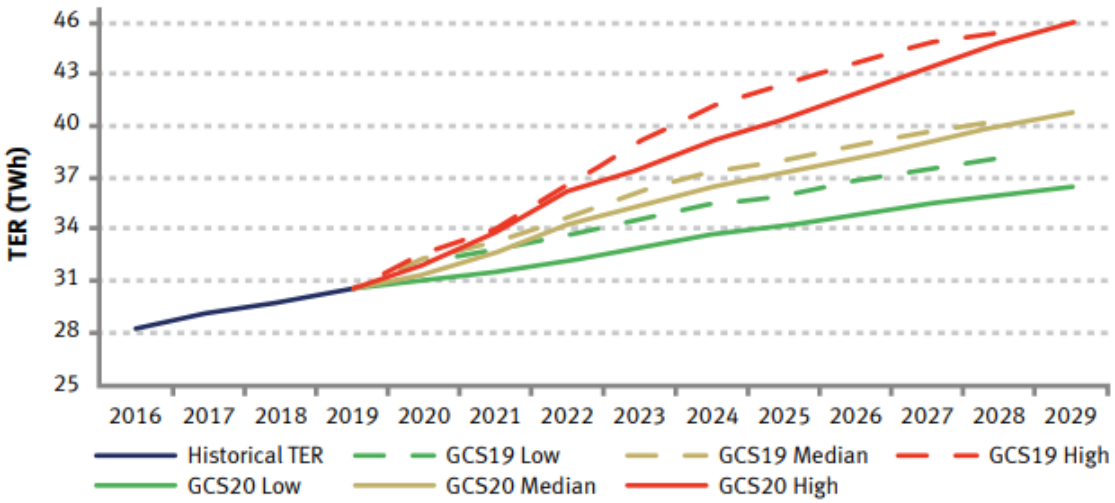

Figure 3-1 Ireland's total energy forecast GCS 2020-2029

Figure 3-1 shows the range of predicted increases in electricity consumption to 2028 only. Sufficient renewables must be accommodated within the grid infrastructure to service the increasing demand for renewable energy as we electrify our transport and heating supply. Given the long lead-in time for renewables and associated supporting infrastructure such as port development for offshore wind, we must now look to 2030 and beyond to ensure that we do not miss an opportunity to become energy-independent and a global leader in clean energy production.

3.3 Increased electrification of Ireland's energy usage

3.3.1 Programme for Government 2020

The Programme for Government 2020 between Fianna Fáil, Fine Gael and Green Party included a range of measures designed to ensure that we met our existing 2030 targets and move our country towards being carbon neutral by 2050.

It included the following measures either directly related to or which may influence our requirement for and how and where we need renewable electricity:

1. Produce a Whole-of-Government plan setting out how it will deliver at least 70% renewable electricity by 2030 and develop the necessary skills base, supply chains, legislation and infrastructure. This new plan will recommend measures to accelerate the deployment of renewable electricity, such as providing and granting permissions for grid connections.
2. To achieve a 7% per annum reduction in overall greenhouse gas emissions from 2021 to 2030 (a 51% reduction over the decade).
3. Achieve net-zero emissions by 2050, with the 2050 target set in law by the Climate Action Bill, introduced in the Dáil within the first 100 days of Government, alongside a newly established Climate Action Council. The Climate Action Bill will define how five-year carbon

budgets will be set. The special economic and social role of agriculture and the distinct characteristics of biogenic methane must be fully recognised in plans to achieve these targets.

4. Hold the first Renewable Electricity Support Scheme ("RESS") auction by the end of 2020, with auctions held each year after that, including the first RESS auction for offshore wind in 2021.
5. Produce a longer-term plan setting out how, as a country, we will take advantage of the massive potential of offshore energy on the Atlantic Coast. This plan will set out how Ireland can become a major contributor to a pan-European renewable energy generation and transmission system, taking advantage of the potential of at least 30GW of offshore floating wind power in our deeper waters in the Atlantic. The plan will also set a path to achieving 5GW capacity in offshore wind by 2030 off Ireland's Eastern and Southern coasts.
6. To give cross-Government priority to the drafting of the Marine Planning and Development Bill so that it is published as soon as possible and enacted within nine months.
7. To support work on the Celtic Interconnector, which will link Ireland to Europe's energy grid, increase competition in electricity prices, and help Ireland to switch to at least 70% renewable electricity.
8. To commence planning for future interconnection with our neighbours.
9. To strengthen the policy framework to incentivise electricity storage and interconnection.
10. Develop a solar energy strategy for rooftop and ground-based photovoltaics to ensure that a greater share of our electricity needs is met through solar power.
11. To invest in research and development in 'green' hydrogen (generated using excess renewable energy) as a fuel for power generation, manufacturing, energy storage and transport.
12. Accelerating the electrification of the transport system, including electric bikes, electric vehicles, and electric public transport, alongside a ban on new registrations of petrol and diesel cars from 2030.
13. Develop a strategy for remote working and remote service delivery, taking advantage of the opportunity for a rapid roll-out of the National Broadband Plan.

(Programme for Government, 2020)[25]

3.3.2 Transport

The idea of a move to electrify Ireland's fleet was proposed over ten years ago, and in 2011 the SEAI published The Electric Vehicles Roadmap, setting out a plan for the transition of Ireland's fleet from traditional diesel and petrol-powered vehicles to alternatives including electricity.[26] That roadmap included an assumption that electric vehicles would account for 10% of passenger vehicles by 2020 and 60% by 2050. While Ireland has fallen far short of the 2020 target, recent Government

[25] https://www.gov.ie/en/publication/7e05d-programme-for-government-our-shared-future/
[26] http://www.seai.ie/publications/Electric-Vehicle-Roadmap.pdf

announcements such as a ban on the sale of new diesel or petrol cars by 2030 aim to push the fleet towards complete electrification or other green fuel alternatives such as green hydrogen.

Electric cars require a larger upfront outlay, and grants to date have treated both plug-in electric hybrids (PHEV) (which run on a combination of electricity and fossil fuels) and fully electric cars (EV) as equal. However, from July 2021, grants for fully electric cars will be double the grant for PHEV, further strengthening the Government's longer-term intention of decarbonising the fleet.

This will require a significant increase in electricity generation. According to the Competition and Consumer Protection Commission, the average kilometres per year for a privately owned car in Ireland is 17,000km. (CCPC September 2020)[27]. According to the Central Statistics Office Transport Omnibus, Irish licenced vehicles travelled a total of 47.1 billion kilometres in 2019 (CSO, 2020)[28]. Wind Energy Ireland estimates that the power required by 2030 to power 1 million electric vehicles is in the region of 3TWh. To enable the full electrification of the fleet, the additional energy usage is in the region of 9TWh based on the current fleet size and total travelled kilometres. This is approximately one-third of current total electricity consumption.

It should be noted that promoting compact development and remote working could reduce the stated demands for Electric Vehicles. However, in the West, there is more dependency on car transport. Corresponding electric Infrastructure for refuelling will be needed, which has to be facilitated by grid distribution infrastructure.

Ireland's transport emissions increased by 136% between 1990 and 2019 compared to the EU average of 20% (33-JCCA-02)[29]. Public transport is of insufficient quality outside the major cities to entice people away from private vehicle usage. Electrification of this sector is crucial to Ireland achieving decarbonisation targets for 2030 and onwards.

3.3.3 Heating

Heating our homes and other buildings account for approximately 20% of Ireland's overall greenhouse gas emissions (ESB, 2021)[30]. In 2018 it accounted for 37% of our total energy usage. Oil is the predominant fuel used to heat homes in Ireland, reflecting our large rural population distribution. Today, space and water heating of our homes account for half of Ireland's heat demand, our industry for one third and our commercial and public buildings for the remaining one fifth (Ireland 2050). Due to both our low-density urban housing and the rural nature of much of Ireland's population, district heating schemes will not be suitable in many cases. Therefore, measures to address the electrification of domestic heating will be on an individual house basis.

Heat pumps that take heat from outside and transfer it inside are being proposed with strong support in the Programme for Government. It states that the Government will commence a targeted

[27] CCPC September 2020, https://www.ccpc.ie/consumers/cars/car-clocking/
[28] CSO,2020 https://www.cso.ie/en/releasesandpublications/ep/p-tranom/transportomnibus2019/roadtrafficvolumes/
[29] [33-JCCA-02] Joint Committee on Environment and Climate Action Report on reducing emissions in the transport sector by 51% by 2030 June 2021
[30] ESB 2021, https://www.esb.ie/tns/education-hub/future-energy/electrification-of-heat

programme to install heat pumps in homes already suitable for the technology, as part of the plan to install 600,000 heat pumps by 2030. A heat pump to heat the average home will require around 4000kw of electricity a year.

3.4 Location of Energy Intensive Industries

Data centres are a commonly cited example of an energy-intensive industry. Most centres are concentrated around Dublin, which has become the largest data centre hub in Europe[31]. However, Ireland has several energy-intensive industries, including agriculture, pharmaceuticals, food processing and construction-related manufacturing (e.g. cement) located all over the country and function at a highly productive level. Heavy energy users require large amounts of energy which can be provided by renewable energy. Moving high demand industries, such as data centres, to where generation is projected to be the highest is one of the options being considered in the Eirgrid consultation paper. It is discussed later in this paper.

[31] https://yala.ie/news/dublin-data-centre/

4 Wind Energy

4.1 Onshore Wind

4.1.1 National Ambition

Onshore wind power refers to turbines located on land that use the wind to generate electricity. Ireland's first commercial wind farm was commissioned at Bellacorrick, Co Mayo in 1992. There are now over 300 wind farms currently in operation, with a total installed capacity of 3,700 Mega Watts (MW)[32]. The largest wind farm in the country (SSE Renewables Galway Wind Park) has an installed capacity of 169 MW. If we are to reach our 2030 renewable electricity target, the build rate of onshore wind farms must accelerate from a historical average of 180 MW per year to at least 250 MW per year.

The New Green Deal is outlined in Programme for Government 2020 and commits to "Produce a whole-of-government plan setting out how we will deliver at least 70% renewable electricity by 2030". The programme for government also covers how we will develop the necessary skills base, supply chains, legislation, and infrastructure to enable it. The main challenges involved in developing renewable energy are also outlined, and commitments are undertaken to "make recommendations for how the deployment of renewable electricity can be speeded up, for example, by providing and permitting grid connections".

The Programme also set out a route to market for the first new onshore wind farms of the 2020s. An additional 4,000 MW of onshore wind capacity in Ireland is required to meet our 2020 goals, and time is of the essence. Onshore wind remains the cheapest renewable energy source, and increased connection means more economical clean energy sources for the consumer[33]. The Programme also commits to finalising Wind Energy Guidelines, which may mean re-examining noise limits associated with onshore wind turbines. Revised guidelines have been in development for a number of years and the existing guidelines are no longer considered fit for purpose by some observers.

4.1.2 Regional Potential

There is a substantially higher capacity of both renewable and conventional generation compared to demand in the region. Renewable generation currently connected (1,343MW) produces approximately 3,750GWh of renewable electricity. Considering total peak demand of 651MW and assuming the nation-wide demand capacity factor of 65%, the total demand in the region is approximately 3,700GWh. It can be concluded that the western region is currently producing enough renewable generation to meet 100% of its own demand annually.

[32] https://windenergyireland.com/about-wind/facts-stats

[33] https://www.irena.org/newsroom/pressreleases/2021/Jun/Majority-of-New-Renewables-Undercut-Cheapest-Fossil-Fuel-on-Cost

Figure 4-1 shows the levels of connected renewable generation in the region (1,343MW) and conventional generation (1,371MW), as discussed above. Mullan Grid estimated maximum demand (at peak) as 651 MW with minimum demand at 164MW.

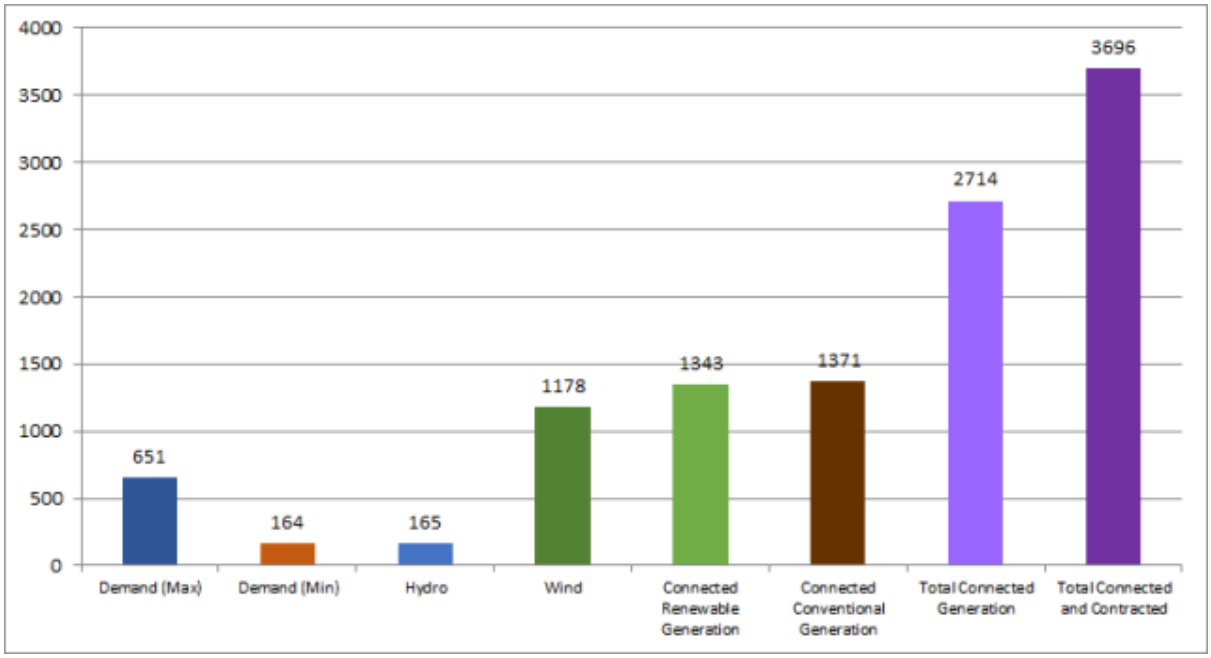

Figure 4-1 2018 Generation and Demand in the Western Region (Source: www.esb.ie, www.eirgrid.com and MullanGrid Consulting) [34]

By 2020, it was estimated that 1,760MW of renewable generation would be connected in the western region, 1,595MW of wind generation and 165MW of hydro generation. There is a further 1,000MW of renewable generation in the region that was contracted or offered connections by mid-2019 (as shown in Figure 4-1 above) and 173MW of further potential onshore wind connections in the short term (as allocated under the Enduring Connection Policy Phase 1 (ECP-1)). Clearly, the potential for renewable generation and the opportunities the region provides are significant.

4.1.3 Generation and Demand at County level

It is interesting to look briefly at the generation and demand patterns at the county level in the wider WDC region (Figure 4-2). Donegal, which has the third-largest connected capacity of onshore wind generation in Ireland, is a significant force in the Region's transition to renewable electricity.

It currently has 480 MW of connected renewable generation with significant hydro generation (75MW) and 405MW wind generation capacity with a further 254MW of contracted generation. Galway and Clare and the next most important counties for renewable generation, with Ardnacrusha making a significant contribution (86MW) in Clare, while most of Galway's renewable

[34] WDC Insights (2018) *Electricity Transmission for Renewable Generation- What's needed in the Western Region* http://www.wdc.ie/publications/reports-papers/

generation (286MW) is from onshore wind. These counties have high levels of contracted wind generation, which will be connected in the short term. Mayo currently has 83MW of connected wind capacity but has 406MW of contracted generation to be connected.

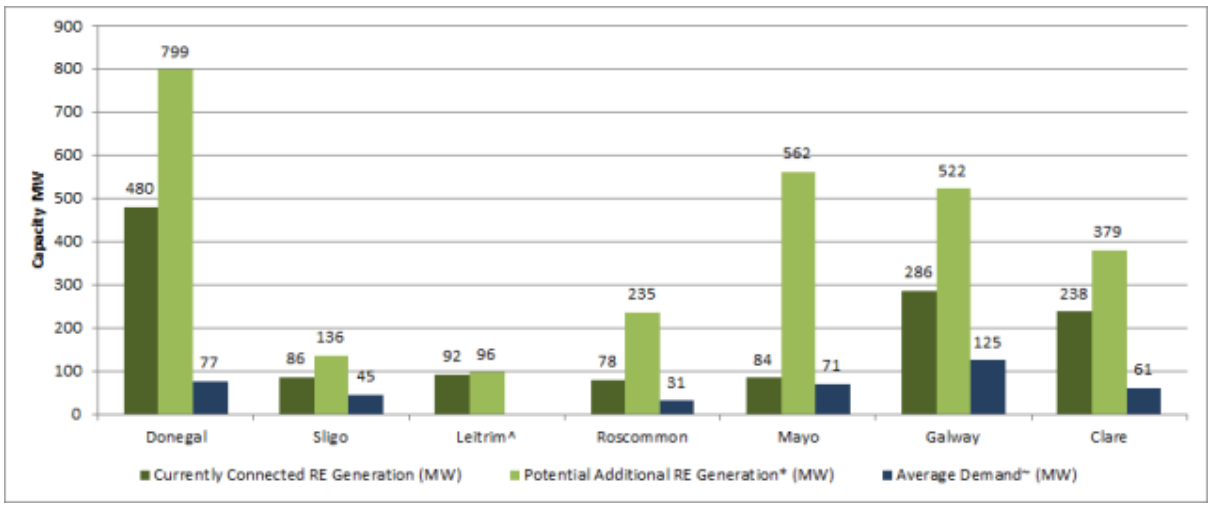

Figure 4-2 Generation and Demand in Western Region counties (Source: www.esb.ie, www.eirgrid.com and Mullan Grid Consulting)35

In all Western Region counties, currently connected renewable generation is well above the average county demand. Table 4-1 below gives the detail of the connected, contracted and ECP-1 capacity in each county in the Western Region alongside the estimated demand in each county (although Sligo and Leitrim are considered together). Limerick and Tipperary are not included in this figure.

Table 4-1 Connected, Contracted and future renewable generation and Demand in Western Region counties (Source: www.esb.ie, www.eirgrid.com and MullanGrid Consulting)[36]

County	Connected Wind (MW)	Connected Hydro/ other RE (MW)	Total Connected (MW)	Contracted (MW)	Total Connected and Contracted (MW)	New & ECP-1 Capacity (MW)	Total Connected, Contracted and ECP-1 (MW)	Demand Max	Demand Min
Donegal	405	75	480	254	734	65	799	127	27
Sligo	83	3	86	50	136	-	136	65	24
Leitrim^	92	-	92	4	96	-	96		
Roscommon	78	0	78	14	92	143	235	50	12
Mayo	83	1	84	418	502	60	562	115	26
Galway	286	1	286	152	438	84	522	197	52
Clare	151	86	238	107	344	35	379	98	24
Western Region	**1,178**	**166**	**1,344**	**999**	**2,342**	**387**	**2,728**	**652**	**165**

35 WDC Insights (2018) Electricity Transmission for Renewable Generation- What's needed in the Western Region http://www.wdc.ie/publications/reports-papers/

36 WDC Insights (2018) Electricity Transmission for Renewable Generation- What's needed in the Western Region http://www.wdc.ie/publications/reports-papers/

4.2 Offshore Wind

4.2.1 National Ambition

There are only seven turbines installed in Irish Waters off the coast of Arklow. In 2004 when those seven turbines on the Arklow Bank project were erected, Ireland emerged as a leading player in the early days of offshore wind energy. The 25MW wind farm constructed off the Wicklow coast marked an exciting time for the Irish Renewable Sector, placing Ireland in pole position at the dawn of a new global industry. Unfortunately, our aspirations did not match the market realities. Without some key supporting conditions such as sufficient grid infrastructure and a clear and timely route to market, no other offshore wind has been developed in the subsequent 15 years. Despite this early move offshore with Arklow Bank Phase 1, the offshore wind industry is still in its infancy in Ireland.

A new opportunity for offshore wind in Ireland now presents itself. The rapidly evolving market conditions, the Climate Action Plan, and the Programme for Government provide a clear mandate for establishing an Offshore Wind Industry. This is a fantastic opportunity for Ireland, which is set to have a new beginning in this area. The various changes being implemented across the Government in support of offshore wind development and developments within the industry, including larger turbines and increases in efficiency in the supply chain, have driven down offshore wind's cost, improving its competitive position compared with other renewable technologies. The first new offshore wind farms aim to be fully operational by 2025/2026, with a steady pipeline following in the years afterwards.

Beyond 2030, the technical resource available to both fixed and floating offshore wind off the coast of Ireland is immense, with the SEAI and OREDP referencing 12.5GW for fixed and up to 27GW for floating' (Carbon Trust, Harnessing our Potential, March 2020)[37]. As stated previously, this is a view supported by the Government. The PfG 2020 includes several commitments concerning offshore wind development, including one promise to develop a long-term programme to realise the potential of at least 30GW of floating wind in the Atlantic.

4.2.2 Regional potential

As the offshore wind industry delves into deeper waters at greater distances from shore, floating wind concepts are increasingly being developed and tested. Floating Offshore Wind (FOW) is the key to an inexhaustible resource potential in Ireland and Europe. Floating foundations offer the offshore wind industry the following key opportunities:

- They allow access to deep-water sites with higher wind resources;
- The floating offshore wind projects can be developed faster with lower foundation requirements and higher energy yield. Upon achieving commercial development and economies of scale, floating wind projects can achieve cost parity with traditional offshore wind projects;

[37] Carbon Trust, Harnessing our Potential, March 2020 https://prod-drupal-files.storage.googleapis.com/documents/resource/public/final-harnessing-our-potential-report-may-2020.pdf

Under the right conditions, FOW can be a significant driver supporting the energy transition. There are currently four dominant substructure designs for floating offshore wind: barge, semi-submersible, spar buoy and tension leg platform shown in Figure 4-3. The first three are loosely moored to the seabed, allowing for easier installation, while the tension leg platform is more firmly connected to the seabed. This allows for a more stable structure.

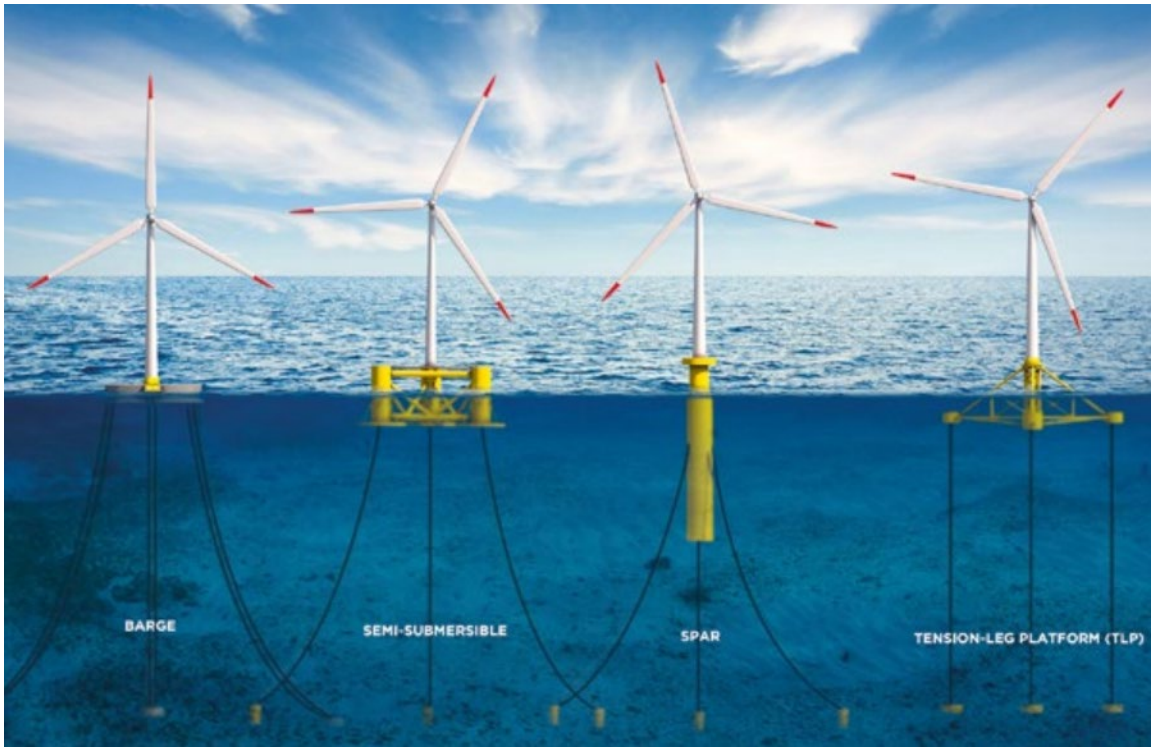

Figure 4-3 Substructure designs for floating offshore wind (Ref: WindEurope)

Floating wind presents an opportunity for Ireland to become a world leader in renewable energy production. Ultimately the biggest constraint will be the ability of Ireland to connect this resource to the grid and either export the excess to other markets knowing the electricity demand in Ireland or use the excess to create green hydrogen or convert to other value-added products and services.

To facilitate taking the lead in the global market, Ireland needs to apply significant investment in research & development to solve this market barrier and reduce floating wind technology costs. In doing so, capacity building through research activities in Ireland will place it at the forefront of the industry. This will allow a supply chain to develop well before project construction, opening a domestic and international market to Irish companies that have established themselves in the floating wind supply chain. Consideration should be given to establishing floating wind technology hubs along the west coast. A centre of excellence for floating offshore wind is currently being created at the University of Limerick, in conjunction with Limerick Institute of Technology.

The Carbon Trust Report, *Harnessing our Potential March 2020* report recommends that 'The Irish Government or the investment community should consider a strategic investment at a port(s) on the west coast to take advantage of the commercial opportunity of delivering floating offshore wind

where the majority is likely to be on the west, north/south-west coast.'[38] The same report also states that offshore wind could create 2,500 jobs over the next ten years and attract €42bn in lifetime investment, but that this may be lost because no Irish port currently meets all of the requirements to serve the project construction.

The case for investing in port infrastructure to support offshore wind growth and create a local supply chain cannot be underestimated. Ports act as focal points during offshore wind farms' manufacturing, installation, operation, and decommissioning. Floating offshore wind presents a range of possibilities for ports, and an exercise should be carried out to establish wherein each ports' strengths lie concerning the floating offshore wind opportunity. Each port should then be supported in successfully realising that opportunity, leveraging those strengths, existing relationships with educational institutions and industry and other resources to maximise the overall value of the floating wind opportunity across the region. The IMDO has already reviewed the Irish Ports Offshore Renewable Energy Services[39].

As the floating wind sector is currently in its infancy, there is no well-established supply chain. This represents an opportunity for Ireland to be a leader in the floating wind sector. For the West of Ireland, there is the opportunity to service the domestic market in the Atlantic and become an exporter of floating wind technology globally. Commencing the process now to ensure that the development of the infrastructure is facilitated will lead to a myriad of other opportunities, which are discussed later in this report (Section 4)

4.2.3 Floating Wind Industry Requirements

Floating offshore wind has several specific requirements at different life stages. These include:

1. Access to deep ports as the technology will most likely be assembled quayside and transported fully assembled into position.
2. Access to significant landbank to support a floating offshore industry. Potentially this could result in the following:
    a. Offshore wind and floating foundation manufacturing facility
    b. Wind-blade manufacturing facilities
    c. Wind turbine assembly and inspection facilities
    d. Development of associated industries
3. Access to sufficient operations and maintenance port facilities
4. Access to the grid or some other suitable alternative (e.g. green hydrogen manufacturing)

The challenges and opportunities for floating wind are discussed in Section 4.

[38] https://www.carbontrust.com/resources/harnessing-our-potential-investment-and-jobs-in-irelands-offshore-wind-industry

[39] https://www.imdo.ie/Home/sites/default/files/IMDOFiles/13390%20IMDO%20IPORES%20Report%202018%20FA.PDF

4.2.4 Transmission Capacity

The transmission system has been essential in enabling the West of Ireland to achieve these relatively high levels of renewable generation. There has been substantial investment in the transmission network in the region, recently the majority of which has been in upgrading the existing electricity transmission network to provide additional capacity. However, further investment in new transmission infrastructure is required to allow for the region's continued growth of renewable generation. There is capacity in the current transmission system for more renewable generation in parts of the West of Ireland, including large parts of Co. Roscommon, Co. Clare and Co. Galway. However, there is concern about the pace and scale of development of new transmission circuits elsewhere in the Region. The areas of particular concern in the medium term are Co. Donegal and North Mayo. In Donegal, by 2022, it is expected that the connected renewable generation will have exceeded the capacity of the existing transmission system. The planned North Connacht project will provide critical infrastructure for connected and some planned renewable generation in North Mayo/West Sligo development. However, it will not provide for further renewable generation in the area. There could also be a need for new transmission circuits to Co in the medium to long term. Sligo/Co. Leitrim. It is essential to take a long-term view of the generation needs and potential in these areas considering the extended timelines (at least ten years) to deliver new transmission infrastructure.

There must be a three-pronged approach to developing the transmission grid in the Region:

- Upgrading existing transmission infrastructure;
- New transmission infrastructure;
- Implementing smart grid solutions.

New transmission infrastructure is most challenging to deliver. However, it is critical for the development of more renewable electricity generation in the Region. Other factors that will impact the growth of renewable generation are the planning process and public acceptance of onshore wind generation. Recent new transmission projects have faced strong local opposition and a lack of local political support.

Further investment in the transmission grid with sufficient capacity for new generation connections is crucial to achieving 2030 targets under the climate action plan.

5 Regional Opportunities

Renewable energy represents a huge opportunity to act as a catalyst for the development of supporting industries and the co-location of complementary industries. Having such facilities close to wind farms will encourage development and drive down the costs of renewable energy and further reduce Irish carbon emissions through more efficient and accelerated delivery of Irish offshore wind.

With its central location on Ireland's Atlantic coastline, the Western region can offer the most favourable wind conditions in Europe and sheltered deep-sea port facilities along the Shannon Estuary and over 1.5GW of existing grid connection infrastructure at Moneypoint and Tarbert Power stations. Delivery of large energy projects from the region brings the potential to drive significant economic activity. It can create many high-quality, sustainable jobs, both direct and indirect, to benefit all those living in the region. The Mid-West region is supportive of a Demand-led energy strategy by locating energy consumers such as data centres closer to the Atlantic Energy resource to add national resilience and capacity while simultaneously stimulating long-term regional growth.

Activities directly related to offshore wind such as marine surveying, ecological/geotechnical sample processing, port activities (staging, marshalling, O&M) are obvious business opportunities. The training and upskilling of the local workforce operations can deliver real benefits to local communities. In addition, complementary industries are ideal for co-location near clean, renewable energy sources such as the aforementioned heavy energy users like data centres, industrial manufacturing processes, and pharma. There are also possibilities for novel industries such as green hydrogen. The co-location of research and innovation hubs can at least contribute to, if not lead out, the development of novel industries related to the immense renewable energy Atlantic resource.

We are seeing some cluster like activity on a local scale, such as in Cork Harbour, where an industry is developing in support of the Celtic Sea offshore wind opportunity. Given the scale of the Atlantic Resource, the long-term potential for the West of Ireland, and commitments in the Programme for Government around realising this potential, a more strategic approach is now required.

5.1 Green Energy input to datacentres

Renewable energy at the scale of what is possible with floating offshore wind technology off Ireland's west coast lends itself to creating complementary industries. There are 70 operational data centres in Ireland, almost exclusively in the greater Dublin area, except for some small data centres dotted elsewhere in Ireland. There is significant additional datacentre capacity progressing through the planning system, adding additional pressures in this area. However, the move to renewable energy and the long term scale at which it is required presents an opportunity to develop and implement policies that encourage new high energy users closer to where renewable energy is being developed at scale. While datacentres are front and foremost in heavy energy users, other industries are also significant users of energy that are well suited to co-location with renewable electricity generation. They are highlighted in Section 4.2.2. Existing data centres in the Dublin area are shown in Figure 5-1 and Figure 5-2 below. This figure highlights the additional pressure on the grid in that area over the next few years. It strengthens the argument for moving high energy industry close to renewable

generation at scale over the medium to long term. Further investigation into the cost of moving industry towards energy generation and the economic benefits associated with these industries is required.

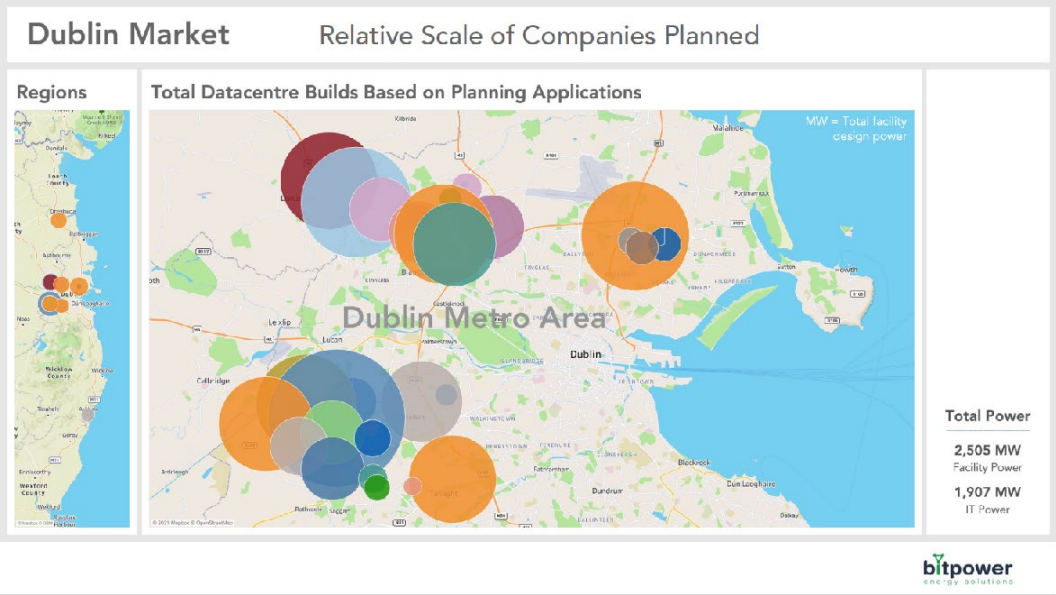

Figure 5-1 Existing Operational Data Centres in the Greater Dublin Area[40]

The industry is beginning to develop in the west with some proposed and planned projects underway, including the Ennis Planning Application Cluster. Clare County Council has rezoned land to develop a €400m data centre. Also in train is the Nautilus Floating Data Centre in Limerick[41], a novel approach to data centres that reduces the amount of area and energy required to operate it. Also proposed is the Atlantic Green Digital Basin, a project to build on the existing Moneypoint operation. This project is part of the Mid-west Regional Enterprise Plan to 2020[42]. It will take advantage of the existing electrical infrastructure and the impending floating offshore wind industry in Ireland's Mid-West region. Stakeholders recognise the "once in a generation" opportunity that offshore renewable energy provides to transform the region and the economic opportunities for its residents. A coordinated regional approach is being undertaken to maximise the regional benefits gained by leveraging this opportunity to attract digital industries. Creating the Atlantic Green Digital Basin vision aims to develop a long-term strategy and support green digital initiatives and projects. This strategy will ensure that maximum value-add is achieved for the region when our vast energy resources truly are inevitably harnessed.

Figure 5-2 shows the data centres in operation outside the greater Dublin area in 2017.

[40] Bitpower 2021, www.bitpower.ie
[41] https://www.datacenterdynamics.com/en/news/floating-data-center-approved-launch-ireland/
[42] https://enterprise.gov.ie/en/Publications/Publication-files/Mid-West-Regional-Enterprise-Plan-Final-Progress-Report.pdf

Figure 5-2 Existing Operational Data Centres in the south and south-west (Bitpower 2017)[43]

Developing the data sector in the West of Ireland is already under consideration by the tech industry. In November 2021, the University of Limerick will host the Irish Technology Leadership Group (ITLG) 'Silicon Valley Comes to Ireland' event in conjunction with its Alliance partner, NUI Galway and Shannon Development. This event brings prominent figures from the innovation, business and venture capital communities in Silicon Valley to the region to review potential investment opportunities under the chairmanship of former Intel CEO and Chairman Dr Craig Barrett.[44]

5.1.1 Development of Specialists Industry Hubs

Other heavy energy users include the medical device, pharmaceuticals, the agri-processing industry and some types of manufacturing. Existing heavy energy users in the region include:

- Medtronic, Galway
- Boston Scientific, Galway
- VistaMed, Galway
- Allergen, Mayo
- Baxter Healthcare, Mayo
- TopChem, Sligo
- Abbot Diagnostics, Sligo
- Vention Medical, Roscommon
- Valeo Vision Systems, Tuam
- Mirror Controls International, Manor Hamilton
- McHale Engineering, Mayo
- Lufthansa Technik Turbine, Clare
- Agrispread, Mayo

[43] Bitpower 2017, www.bitpower.ie
[44] https://www.ul.ie/about-ul/strategic-alliances

- Aughinish Alumina
- Irish Cement Limerick
- CRH Ennis
- Shannon Airport (through aviation fuel)
- Shannon Foynes Port (through marine fuel)
- Moneypoint Power station (fossil fuel (coal) to electricity)
- Tarbert Power Station
- Irish Water

The long-term provision of renewable energy at scale in the region combined with supportive government policies to increase economic development and leverage the region's reputation within these existing industries can develop specialist MedTech, Agri and manufacturing hubs increasing employment in the region.

5.1.2 Opportunities for Ports in the Region

The development of offshore renewable energy is critically dependent on enabling infrastructure such as suitable port infrastructure. This development represents a huge opportunity for Irish ports to contribute to the Irish offshore wind market development.

Port infrastructure will need to be upgraded to take full advantage of this opportunity. While there is only one Tier 1 port on the west coast of Ireland, there are 22 tier 1 ports in Denmark. However, there are ports in the region that are either already in a position or are suitable for an upgrade to support certain aspects of the floating offshore wind industry. If we do not move on this now, there is a risk that parts of the offshore wind industry in Ireland will likely be served by UK & European ports, representing a lost opportunity for Ireland.

The likely nature of Offshore Wind Farm projects along the west coast, including those already undertaking early-stage site investigations and feasibility studies, the ports in Ireland will have opportunities to support the OWF industry acting as either a staging port, construction base, or O&M base. In this case, the OWF related main activities will be:

- Loading / offloading of OWF components and auxiliary equipment;
- Lay-down/storage of OWF components and auxiliary equipment;
- Final assembly works or inspections of floating wind turbines and mooring equipment;
- Deployment of floating wind turbines;
- Crew Transfer Vessel (CTV) operations;
- Marine coordination and project management base;
- General vessel logistics (e.g., bunkers, food stores, etc.); and
- Vessel lay-down / shelter.

Furthermore, OWF could collocate with digital services, including the operation of unmanned repair, inspection and maintenance vehicles, sensor survey and monitoring, data-driven services etc.

According to the Irish Maritime Development Office (IMDO) estimations[45], "*if an Irish port was chosen for staging during the installation phase, the financial opportunity for Irish ports could be as much as €70,000,0000 for the provision of staging during construction for 18 months to deliver 3.5GW by 2030*". Furthermore, when the port can additionally serve as a construction base, the financial potential increases by €21,000,000.

During the O&M phase, the OWF ports generally sign long-term lease agreements with OWF developers, owners or operators. Considering the traditional operational lifetime of an OWF (25 years), this can represent an opportunity of €350,000,000, looking only at the 3.5GW installed in Irish waters before 2030.

Beyond 2030, the forecasts indicate that the opportunity for Irish ports will continue to exist, with predictions of the commercial potential of more than €1,000,000,000.

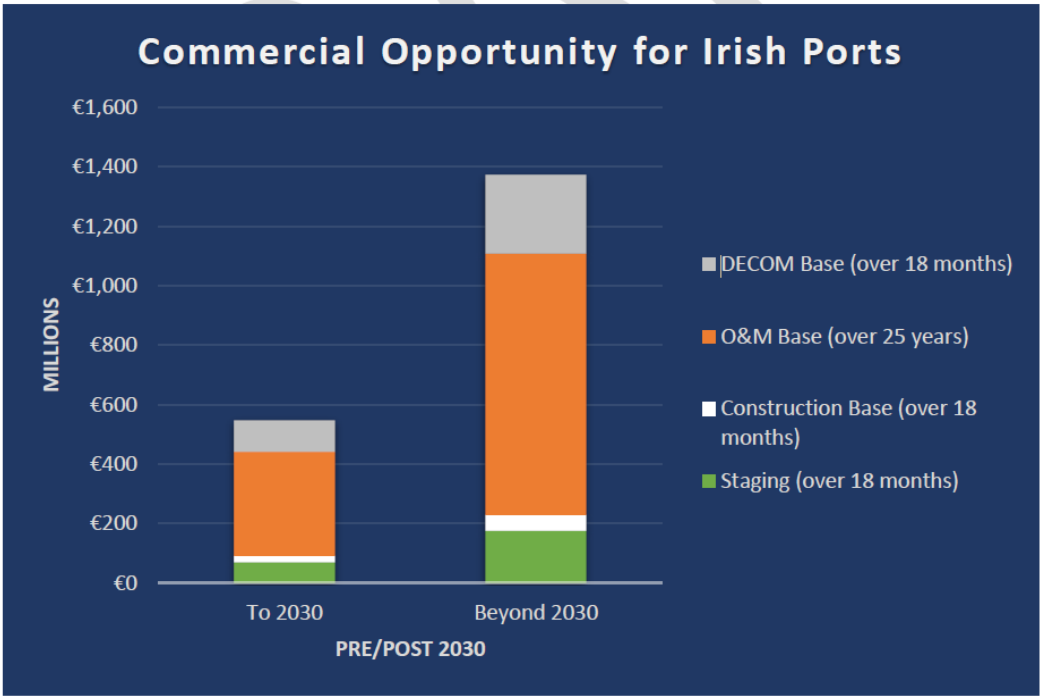

Figure 5-3 Commercial Opportunity for Irish Ports (IPORES 2018)[46]

Traditionally, the OWF market tends to enhance and take advantage of the local capacity, manpower and know-how. This facilitates projects in meeting their program deadlines. It also makes the projects more competitive and contributes to the industry's positive image within the local communities.

However, developing know-how in areas where the local industry lacks experience or capabilities requires time and a significant investment. This means that the Irish OWF stakeholders will most

[45] IPORES 2018 - A review of Irish Ports Offshore Renewable Energy Services Irish Maritime Development Office, 2018
[46] IPORES 2018 - A review of Irish Ports Offshore Renewable Energy Services Irish Maritime Development Office, 2018

probably engage foreign experts to take on or assist local partners in completing the required tasks for the short term. Nonetheless, when government and regional authorities are adequately supported, these local partners can develop the required knowledge to take over from the referred foreign experts in the medium/long term.

The region contains five ports that can facilitate offshore wind at staging, construction, operations & maintenance and decommissioning stages.

Shannon Foynes Port Company

Shannon-Foynes is a Tier One port of National Significance. It has facilities already capable of(deep-water mooring facilities and natural deep-water channels), or facilities capable with a minimal upgrade, of servicing the offshore wind industry at all stages of construction operation and decommissioning. In addition, it has a significant landbank within and adjacent to port lands appropriately zoned for development suitable for a range of complementary industries, which, together with planned infrastructural upgrades to road and rail networks, places the Shannon Estuary in an excellent position to capitalise on the opportunity.

Port of Galway

The Port of Galway is of regional significance with plans to redevelop and move the port to ensure its continued contribution to Galway's economic and social development. Its position does not lend itself even with development to servicing the direct construction of floating wind farms. However, it has strong ties to the local community, including industry, industry start-ups, and research and innovation. Opportunities for the port likely lie in the provision of marshalling and O&M facilities and involvement in marine research and innovation support.

Rossaveal, Killybegs, and Broadhaven

Other major ports or harbours in the West of Ireland include the fishery harbour centres at Rossaveal and Killybegs, where significant investment in the Department of Agriculture, Food and the Marine has improved the facilities in recent years. They, too, may be suitable for O&M activities. In addition, their longstanding relationships with local mariners have resulted in the growth of marine support services such as vessel maintenance that may be suitable for diversification into offshore wind-related maintenance activities.

According to the IPORES Report (2018),[47] Killybegs Harbour Centre is well placed for servicing offshore energy relating to wind farms and wave energy along Ireland's west coast. It has evolved into a multifunctional port serving the fishing, energy, and cruise sectors, with a modern, sheltered, deep-water facility on the west coast. Furthermore, planning permission has been awarded in Rossaveal for the development of quay space that would be suitable for offshore energy projects

Broadhaven Harbour, located in Broadhaven Bay in North-Western Mayo, is known as a safe haven harbour providing shelter to vessels when they cannot dock or reach their desired port or harbour. This can contribute to operations and maintenance of floating offshore wind, given the harsh

[47] IPORES 2018 - A review of Irish Ports Offshore Renewable Energy Services Irish Maritime Development Office, 2018

conditions likely to be experienced over significant portions of the year during O&M operations. It can also provide emergency and rescue capability.

5.1.3 Long-term export potential

Considering the potential capacity of wind energy off the west coast, Ireland will be able to produce far more renewable electricity than it can use outright. This surplus creates a long-term export potential, whether direct export of electricity, conversion to green hydrogen or some other value-added product such as conversion to data or possibly combining all three. The necessary supporting policies must be developed and put in place to ensure that Ireland maximises the value of this renewable natural resource on our doorstep. Given the long lead-in time to develop such policies in combination with the long lead-in time to develop offshore wind and interconnection infrastructure, developing those policies is imperative as a matter of urgency.

While long term, the scale of energy that the Atlantic Resource can generate lends itself to value-added products such as green hydrogen, the amount of excess energy generated in the shorter term (c. 2030) will require additional interconnection with our European neighbours. What shape that interconnection should take is unknown at present. However, as stated, the time to act is now to ensure the infrastructure is delivered in line with early excess energy generation.

5.1.4 Green Hydrogen

The Green Hydrogen Industry is in its infancy however is expected to develop quickly over the coming years. With the potential renewable energy capacity off the west coast, green hydrogen can use excess electricity produced offshore, easing pressure on the electricity grid. Green Hydrogen can:

- Decarbonise heavy energy industries, including commuter and other heavy energy transportation
- Provide employment opportunities through the development of green hydrogen manufacturing facilities and other ancillary services
- Help to alleviate curtailment on renewable energy due to insufficient grid infrastructure
- Lead to innovation through the need to adapt existing industry equipment to use green hydrogen or through the development of novel products
- Develop new uses for green hydrogen through research and development

Given the early stage of the industry, the possibilities are many. Irelands immense floating offshore wind resource can place it at the forefront of this emerging industry providing long term high-value employment, particularly in the West of Ireland, close to where the resource is strongest. Green hydrogen is an attractive option, particularly for floating offshore wind, as there is a likelihood that the two industries may develop in tandem.

5.1.5 Back up storage for Irish national grid

The floating offshore wind potential is likely to result in excess electricity in the long term. While direct export is one option, it may also be used in some other ways. Offshore wind, particularly floating

offshore wind, is a far more stable energy supply than onshore wind. Generally, average wind speeds are higher, and turbines are substantially bigger with greater capacity. Given both the height of the turbines and the location of floating wind, far offshore wind is more constant.

Some of the excess electricity produced could be stored in battery storage which would help substitute onshore renewables, including onshore wind and solar, when those technologies are not producing due to unfavourable conditions. However, this requires grid-scale battery storage systems, requiring a significant landbank and resources to create the batteries themselves. There is already 2.5GW of grid-scale battery storage at various stages of planning and development in Ireland. Of that, only 100MW is operational, with a further 250MW expected to come online in 2021.[48] Most new renewable energy applications for onshore wind and solar energy include some battery storage element likely to be an attempt to protect the development from power down requests from the network operator. Any battery storage for offshore wind would likely only be a very small part of addressing excess energy generation.

5.1.6 Vertically integrated industries

Given the development stage of floating offshore wind, Ireland is perfectly placed to take advantage of the opportunity to develop a vertically integrated floating offshore wind supply chain. We must begin by building our reputation internationally by being at the forefront of floating offshore wind research, coupled with early-stage site investigations. We can then move into product design and manufacturing, all the way through to facilitating floating wind deployment in Ireland and northeast Atlantic/northwest Europe. As identified above, support industries can lead to logistics and research hubs in the region. Areas with a long history of marine research, such as Galway and Limerick, make perfect candidates. Add to that the potential to develop green hydrogen manufacturing facilities, and the West of Ireland can ensure that Ireland becomes a world leader within the floating wind industry.

5.1.7 Value-Added Opportunities

There are other options for using excess wind energy, and the sometimes variable nature of renewables needs innovative solutions. In undertaking stakeholder engagement for this paper, innovative solutions were suggested, such as variable usage operations including high-tech computation operations (i.e. super-computer) or other similar types of services. This takes the raw electricity and significantly increases its value by turning it into data. When electricity is due to be plentiful, the use of the computer is sold on the open market; when electricity is less plentiful, it lays dormant.

In addition, while not directly connected to the energy generation itself, offshore wind may be suitable for co-location with other industries such as aquaculture, which has been suggested during various consultations and research papers. However, despite extensive writings on the subject, it has not yet progressed to commercialisation on a practical level.

[48] https://www.energy-storage.news/blogs/ireland-has-more-than-2.5gw-of-grid-scale-battery-storage-in-development-st

6 Strength of the West of Ireland in Addressing this Challenge

While many countries focus development around the capital or other major cities, Ireland is particularly Dublin centric. Our major motorway network fans out from Dublin with very poor inter-regional connectivity. We have the Irish Financial Services Centre (IFSC) and silicon docks populated by major technological multinationals, including Google, Facebook and Amazon in central Dublin. This isn't necessarily a problem if it is balanced with strong regional development policies that attract similar investment to our regions. However, that isn't what we are witnessing at present.

The West of Ireland has been impacted by a decades-long west to east migration. It has suffered from underinvestment relative to Dublin for many years. This is reflected in the region's poorer outcomes on a population basis, including health and education. Ireland is already over-reliant on Dublin as a commercial centre which places significant socio-economic pressures within the greater Dublin area. Government policy now calls for a different approach as set out in the National Planning Framework and the RSES. We should take the opportunity that renewable energy at scale presents to rebalance investment distribution regionally by encouraging new investment to locate in regional centres.

6.1 Strategic Location of Major Ports

The region has some ports that can support floating offshore wind or be perfectly positioned with a minimal upgrade.

An analysis of 96 European Ports in the recent Floating Wind Joint Industry Project (Carbon Trust, 2018)[49] revealed that very few ports could accommodate draught, quayside area, onshore set-down area, wet storage and crane capacity requirements needed for floating offshore wind. However, Shannon Foynes Port already meets some requirements, particularly the set-down area, required draught and wet storage. It could, with added investment, meet all of the needs of floating wind development servicing not just Irish development off the west coast but also other north-western Europe floating wind development.

The OWF port-related operations during the Staging & Installation stage are outlined in Section 5.1.2

Operations and Maintenance ports tend to be much closer to the offshore wind development as proximity to the development is very important to the operation and maintenance cost given the long life cycle for the project of c. 25 years. Increased travelling time to the offshore wind farm from the operations and maintenance base can increase the operation costs by millions over the project's operational phase. As stated previously (Section 4.1.2), The Port of Galway, which plans to relocate and expand, leading to increased functionality and easier access, as well as the fishery harbour centres of Rossaveal and Killybegs are perfectly placed to service floating offshore wind off the coasts of Clare, Galway, Mayo and Donegal. Other smaller harbours may, with some upgrades, also be capable of

[49] https://www.carbontrust.com/our-projects/floating-wind-joint-industry-project

providing O&M facilities and services. Site investigation and operations and maintenance activities include:

- Loading / offloading of parts and auxiliary equipment to/from the OWF vessels
- Storage of parts and auxiliary equipment
- Marine Coordination Center (MCC) base
- Crew Transfer Vessel (CTV) operations
- OWF vessel logistics (such as bunkers, food stores, etc.)
- Vessel lay-down / sheltering

6.2 Land & Water Availability

The West of Ireland has greater opportunities for industrial development when compared to the east coast and, in particular, to the greater Dublin area, where land is at a premium. In addition, given that the UK already has a well-established fixed offshore wind industry, the potential for developing manufacturing facilities or other heavy industries related to fixed offshore wind development on the east coast is minimal. The value on the east coast lies in the construction and operational phases of the wind farms and tertiary activities such as the provision of engineering and scientific support services. However, the supply chain for floating wind and other renewable development in the Atlantic is yet to be established. The scale of the Atlantic resource means the value of this opportunity in the West of Ireland is multiples that of the east coast. Regarding seabed availability for fixed offshore wind, development on the east coast will be highly competitive. At least one developer undertaking early-stage feasibility studies or site investigations along most of the east and south coasts is highly likely.

In contrast, the potential for floating wind development covers a much larger area geographically extending far out into Ireland's Exclusive Economic Zone (EEZ) in the Atlantic and is a massive untapped resource. While some developers are undertaking early-stage studies on the west coast, only a small portion of the area may be suitable for offshore wind. The OREDP assessed the area off the west coast as suitable for at least 7GW of floating offshore wind. However, we now know that given developments in offshore wind technology, the total figure that can be developed is many multiples higher. The Programme for Government specifically refers to at least 30GW of floating offshore wind potential off the west coast. Figure 6-1 below shows Ireland's marine areas, including the Foreshore (12nm boundary), Exclusive Economic Zone (from 12nm boundary to outward edge) and the agreed continental shelf.

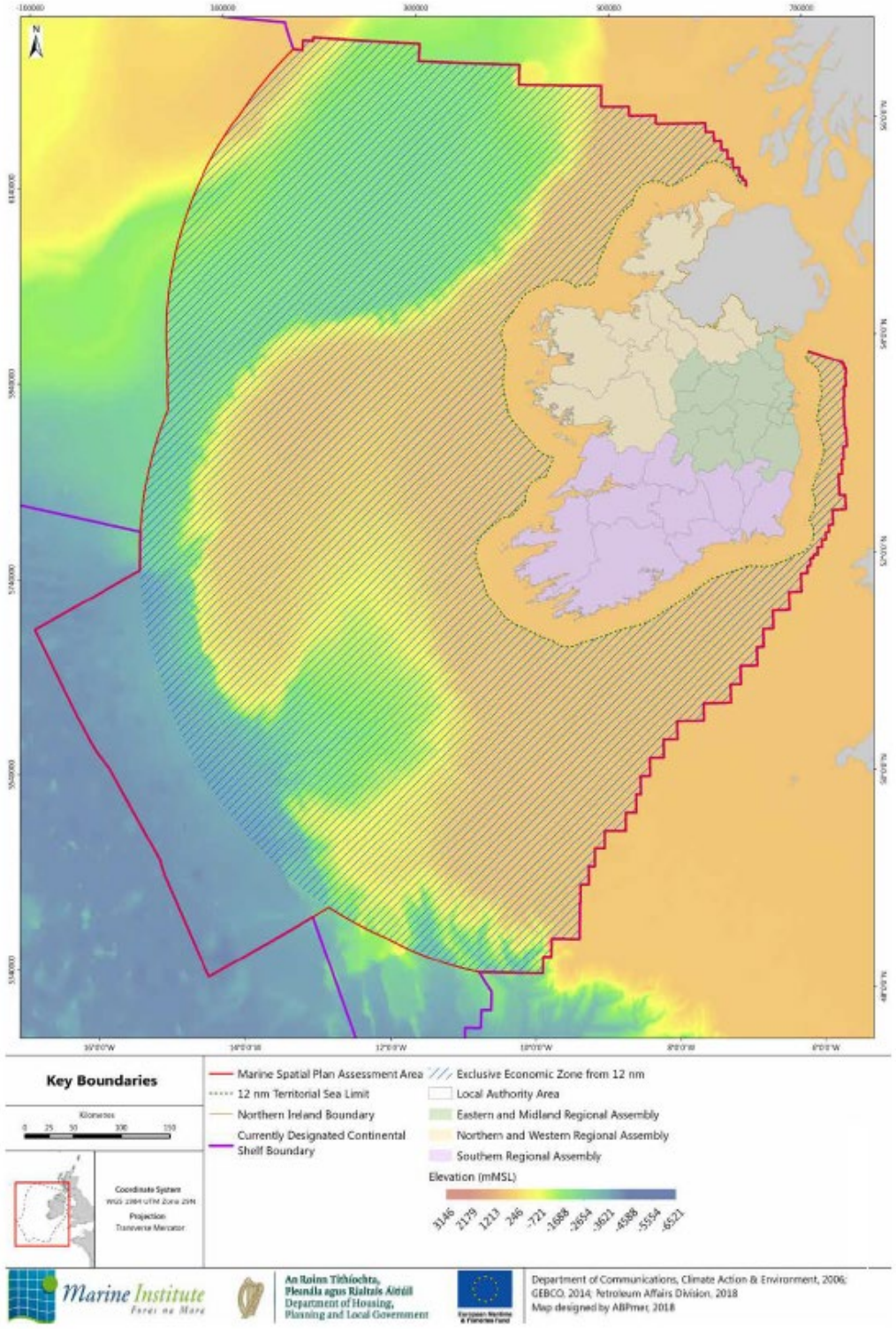

Figure 6-1 Ireland's Marine Areas (National Marine Planning Framework Baseline Report, DHPLG, 2017)[50]

6.3 Regional Appetite for Economic Growth

As specified in Section 1.6.1, a part of the West falls under the remit of the Northern and Western Regional Assembly who recently published its 12-year spatial and economic strategy for the region

(RSES 2020-2032). Supporting county plans under the regional strategy are underway, with some already published in draft form. The WDC, other regional agencies, the NWRA and the SRA are working towards improving the lives of citizens in the region. They see floating offshore wind as an opportunity that should be capitalised on, helping to balance the level of investment between the east and west of Ireland.

A key objective is the emergence of an Atlantic Innovation Region (AIRe), which proposes a project-based approach to build on existing interactions, expand existing networks, and create a community based on innovation. The proposal builds on the global standing of sectors such as Life Sciences and AI, Big Data & Analytics, emerging sectors such as Agtech, Fintech, Cleantech and Advanced Manufacturing & Robotics. Of note is the involvement of our main educational institutions in research centres focused on these sectors showing the cohesive approach to economic development in the region.

The region is involved in innovative solutions to regional problems, such as working with local authorities and industry to provide a local biogas network in Sligo to service heavy energy users. Another major project in the region is promoting the Atlantic Economic Corridor, which includes a series of connected hubs (connectedhubs.ie) from Letterkenny down through other strategically important towns, including Sligo Carrick-on-Shannon, Castlebar, Roscommon, Galway, Ennis, Limerick and Tralee. It is driven by a task force comprising Government Departments and public bodies, universities and the IT sector, chambers groups and regional business leaders. It is chaired by the Minister of State at the Department of Rural and Community Development. It aims to build and increase collaboration within the AEC that maximises its assets, attracts investment and creates jobs and prosperity in the region.

The region is ready to seize the opportunity that is renewable energy. However, joined-up policies from the central Government and relevant state agencies are required to realise the enormous potential.

6.4 Access to Local Work Force

The West of Ireland has a well-educated workforce. The renewable energy transition can create high-level, well-paid long-term employment, which will play a vital part in keeping that young workforce in the region. This enriches the regional demographic but has the side effect of helping to reduce pressures on the eastern region and the greater Dublin area across multiple areas, including housing, schools, transport, water infrastructure, energy infrastructure, and so on. The WDC estimates that there are approximately 65,000 students and researchers in the region. However, only 16% of graduates get their first job in the region, despite 22% of the national student population studying in west-based universities.[51] Education to third-level for the region is seen in Table 6-1.

[50]https://www.gov.ie/pdf/?file=https://assets.gov.ie/100587/b28d0dc5-da56-463e-b341-e9bf444f292d.pdf#page=1

[51] Creating an Atlantic Innovation Ecosystem by Leveraging and Integrating Regional Assets, Dr Brendan O'Brien, April 2021

Table 6-1 Percentage (%) of population with Third Level Educational Status

COUNTY	THIRD LEVEL EDUCATIONAL STATUS (%)
Donegal	33.4%
Leitrim	37.7%
Sligo	40.7%
Mayo	34.8%
Roscommon	35.7%
Galway	41.3%
Clare	40.9%
Limerick	38.5%
Tipperary	34.8%

In addition to access to a well-educated workforce, renewable energy offers an opportunity to develop apprenticeship and other cross-skilling and up-skilling programmes, whether in the areas of renewable energy construction and installation, operations and maintenance, ancillary support services or research and innovation.

6.5 Alignment with Local Universities (educational cluster)

The West of Ireland has a long history of renewable energy, marine and ocean research with existing partnerships between Government Departments and Agencies, educational institutions and the commercial/industrial sectors. In recent years this is likely partly attributable to the location of two of the three national ocean energy test sites in the region, the Galway Bay Test Site and the Atlantic Marine Energy Test Site (AMETS).

The Galway Bay Marine and Renewable Energy Test Site, located off Spiddal in Galway Bay, is a quarter-scale ocean energy test site, co-located with the Science Foundation Ireland funded Galway Bay Cable, a telecommunications cable capable of transmitting real-time energy from environmental and other sensors located within the test site to a receiving station in Spiddal. The site is situated 1.5km offshore in water depths ranging from 20m-23m. Furthermore, the unique conditions of the bay allow for ocean energy devices and other scientific devices and sensors to be tested in a less hostile environment before progressing to a larger scale pre-commercial testing in the open Atlantic at AMETS (see below). The site, which was in operation from 2006 to 2017, has provided test and validation facilities for wave energy devices, components and novel marine sensors to date. At present, it is not operational due to a successful high court challenge. However, an updated assessment of the project under the Foreshore Act 1933, as amended, is underway by the Minister for Housing, Local Government and Heritage. It is understood that the test site operators, Bluewise Marine, hope to be operational before the end of the year.

The Atlantic Marine Energy Test Site (AMETS) is being developed by the Sustainable Energy Authority of Ireland (SEAI) to facilitate testing full-scale ocean energy converters, both wind and wave, in an open ocean environment. It is located off Annagh Head, west of Belmullet in Co Mayo, and connected to the national grid. AMETS is an integral component of Ireland's ocean energy strategy and test facilities and is being developed under the national Offshore Renewable Energy Plan (OREDP). AMETS

will provide full-scale test opportunities in extreme Atlantic conditions and is intended as the ultimate test site for pre-commercial-stage devices.

In addition, two of the major educational institutes in the West of Ireland (National University of Ireland Galway (NUIG) and University of Limerick (UL)) are also research partners in MaREI, the in-tank marine testing facility located at the Beaufort Building in Ringaskiddy in County Cork.

There is a proliferation of organisations and institutions, including the Marine Institute (MI), Bluewise Marine, Galway-Mayo Institute of Technology (GMIT), National University of Ireland Galway (NUIG), and Sligo IT. They have a focus on the development of the marine sector. Many of these institutions are involved in research into renewable energy from a socio-economic and technical/scientific perspective. This research includes some projects related to the test sites described above. Some of the research projects are working on finding innovative solutions to challenges faced by the West of Ireland, such as the lack of piped gas to serve the high energy users of the Sligo area (Sligo IT). Current research programmes relevant to the transition to renewable energy are set out in the following sections.

6.5.1 NUIG - Ryan Institute

Ryan Institute Economic and Social Impact Research Cluster

According to the Ryan Institute's mission statement, it aims to conduct a critical investigation of political processes, and socio-economic and cultural levers, for sustainability. This area is now a key research and policy focus both in Ireland and internationally. This special interest group brings together researchers from the social sciences who share an interest in sustainability questions. Key areas of expertise among its members include the theorisation and measurement of environmental knowledge, attitudes and behaviour, theoretical and empirical work on the socio-cultural, political and economic causes of overconsumption and its impacts on society and the environment, research on the sustainability of rural systems, studies of marine and coastal environments and conceptual and empirical work on resource conflicts and contested concepts and indicators of development and sustainability. Sub-themes include Sustainability Knowledge and Everyday Practices, Sustainable Rural Systems, Marine and Coastal Environments, Governance, Development and Contestation.

Ryan Institute Energy Research Centre (ERC)

The Energy Research Centre is focused on three main areas of energy research, namely (1) Smart Cities & Communities; (2) Low Carbon technologies; and (3) Energy Efficiency. The Smart Cities and Communication research area examine efficient, user-friendly technologies and services in energy, transport, and ICT.

The Low Carbon Technologies research area focuses on photovoltaics, concentrated solar power, wind energy, ocean energy, hydropower, geothermal energy, renewable heating and cooling, energy storage, biofuels and alternative fuels and carbon capture and storage. Finally, the energy efficiency research focuses on buildings, industry, heating and cooling, SMEs and energy-related products and services, ICT integration, and cooperation with the telecom sector.

Insight – Research Centre for Data Analytics

Insight is the Science Foundation Ireland funded research centre for data analytics with four main locations in Ireland. One of these locations is NUIG. It is driven by €150m in funding, supporting 450 researchers across areas, such as Sensing and Actuation, Scaling, Model Building, Multi-Modal Analysis, Network Data and Decision Making. It undertakes high-impact research, aiming to derive value from Big Data and provide innovative technology solutions for industry and society by enabling better decision-making. Areas of research are spread across three themes, including smart enterprise and sustainable societies. Both NUIG and UL are research partners.

6.5.2 University of Limerick (UL)

Centre for Robotics and Intelligence Systems (CRIS)

Researchers at UL's Centre for Robotics and Intelligence Systems (CRIS) have enhanced a commercially available Remotely Operated Vehicle system (Forum Energy Technology's Comanche ROV) with UL-developed advanced control software (OceanRings), precision navigation and flight control, state-of-the-art robotic imaging and sonar systems and fully automated manipulator systems.

These advanced features allow the robot to operate in the challenging environment of ocean renewable energy to support inspection, repair and maintenance operations.

https://www.marine.ie/Home/site-area/news-events/news/university-limerick-launches-robot-use-marine-renewable-energy-sector

Research Centre for Software – LERO

Hosted by the University of Limerick and funded by Science Foundation Ireland, the centre consists of ten academic partners, including three other western educational institutions, NUIG, Limerick Institute of Technology (LIT) and Galway-Mayo Institute of Technology (GMIT). The centre has a strong industry focus and researches across various sectors from AI, cybersecurity, and smart communities to Agri and health tech.

6.5.3 GMIT

The GMIT Centre for the integration of Sustainable Energy Technologies (CiSET) was established in 2007 to address concerns over rising energy costs, growing awareness of climate change, and the need for security of energy supply. It conducts applied research to design, integrate, optimise and demonstrate the potential of sustainable energy solutions to provide cost-effective and reliable energy supply in Cool-Marine climate regions. Over the past five years, CiSET has developed a unique research capability based around ten multi-disciplinary researchers from engineering and science who share a common interest and commitment to sustainable energy system development. It has €2.5 million worth of fully integrated and functioning research-grade equipment and has executed over 40 projects with a range of industrial and public-body stakeholders that support the energy sector and/or consumer. Projects span from energy auditing and monitoring to applying artificial intelligence to generate optimised, hybrid energy supply solutions for specific energy demand profiles. CiSET employs a novel climate-sensitive design methodology in conjunction with experimentally validated numerical

simulation. It has sponsored and completed 15 research Masters and PhD programmes and published over 50 conference and journal papers.[52]

6.5.4 Sligo IT

The Sligo Satellite Gas Network project proposes connecting Sligo's existing and future large energy users to enhance the Sligo region's ability to secure existing employment and attract new employment, thereby delivering balanced regional development and economic growth. Existing satellite gas networks represent international best practice and provide access to much sought after Combined Heat & Power (CHP) technology and maturing Biogas markets. This proposal results from Sligo SEC's collaborative approach. It includes IT Sligo, Sligo County Council, Plan Energy, IDA, Jennings O'Donovan, Sligo University Hospital, Abbott, Sligo Chamber of Commerce, AbbVie, Aurivo and Clayton Hotel. Using funding secured from Gas Networks Ireland and matching funded by Sligo SEC, Fingleton White was appointed to assess the project's viability. Early signs indicate sufficient thermal energy demand within the Sligo town area to support a local gas network.

IT Sligo also assists communities in developing community-owned solar and wind farm projects as part of the Renewable Electricity Support Scheme (RESS). As a trusted intermediary, IT Sligo supports communities in accessing project feasibility studies, providing technical support, applying for grid connection, and liaising with ESB Networks and the Commission for Regulation of Utilities. This exciting scheme ensures that communities can be central to Ireland's energy transition. [53]

6.5.5 Letterkenny Institute of Technology

Letterkenny Institute of Technology is involved in research partnerships in areas as diverse as renewable energy, medicine, data analytics and ocean energy. They are involved in several Interreg and Horizon 2020 funded projects, including TAOIDE, which aims to increase the performance and reliability of ocean energy devices through innovative electrical systems. Letterkenny IT coordinates the research project. They are also a research partner in SMART Renew, which aims to improve the efficiency and effectiveness of renewable energy sources and implement innovative and sustainable energy storage solutions.

[52] https://www.gmit.ie/sites/default/files/public/research-energy/docs/ciset.pdf
[53] http://www.thea.ie/impact2020/it-sligo-helps-realise-the-potential-of-renewable-energy-in-the-north-west/#:~:text=Early%20signs%20indicate%20that%20there,Electricity%20Support%20Scheme%20(RESS)

7 Socio-economic Factors

7.1 Regional Benefits

The West of Ireland has long lagged behind the east coast regarding investment in everything from infrastructure to enterprise. This gap is evidenced as previously stated by decades-long west to east migration, with many young people leaving the region for job opportunities in the east (mainly Dublin) area after school or university and not returning. This migration has resulted in a gradual depopulation of the west and has exacerbated the infrastructural pressures on the east coast and the greater Dublin area. Capitalising on renewable energy and offshore wind opportunities can help stem or partly reverse this tide.

Though the region has suffered geographical shortcomings historically, such as less-favourable farming conditions than other parts of the county, it is now in the favourable position of having access to vast amounts of natural resources in the form of renewable energy. The opportunity comes in various forms and stages. It includes early-stage research and site investigations, wind farm construction, operations and maintenance, renewable energy hubs, including logistics and research hubs. Some of these are discussed in the following sections. The resulting inward investment for offshore wind and electricity produced as a result combined with infrastructural upgrades can, in turn, lead to further investment in other industries.

The following table shows the total jobs at various supply chain stages attributable to 3.5GW of fixed offshore wind and is adapted from the Harnessing our Potential Report. Equivalent figures for floating off the west coast have not been assessed to the same level of detail. However, given the scale of the Atlantic resource, the opportunity for employment from floating wind will be multiples of this. Given the well-established supply chain for fixed offshore wind manufacturing (e.g. turbines, blades, nacelles etc.), the manufacturing jobs listed in Table 7-1 will be mainly internationally-based. However, the opportunity remains for Ireland to capture floating wind-related manufacturing jobs, particularly near the resource in the West of Ireland.

Table 7-1 Workforce to deliver 3.5GW of fixed offshore wind in Ireland (Carbon Trust, 2020)[54]

Stage of Supply Chain	Estimated workforce required to deliver 3.5GW (person-days)	Number of people working per day (FTE jobs)
Planning and Development	166,796	214
Procurement	51,093	131
Manufacturing	8,767,598	16,861
Transport and Logistics	15,113	58
Installation and Connection	1,660,743	2,129
Operation and Maintenance	4,387,775	675
Decommissioning	682,171	1,312
Total	**15,731,289**	**21,380**

7.1.1 Directly related to wind farm construction, operation and maintenance and decommissioning

The scale of offshore wind farms requires significant investment to develop a local supply chain and supporting infrastructure to at least service the windfarm and provide for the staging during the construction phase. The investment in ports and the wind farms' construction creates additional employment in those communities positioned to seize the opportunity. The size of offshore wind turbines means that they will positively impact local communities and jobs during their installation and operation. However, visibility on a steady stream of developments is required for investment to occur at the levels required. Investors need to know that there is a long-term return on their investment, given the large amounts of money involved.

Offshore wind requires more people to service it than onshore. For example, in the UK, offshore wind makes up approximately one-third of the UK's total wind capacity but accounts for more than half the wind industry jobs in the country (MHI, 2019)[55].

The "Harnessing our Potential Report" (Carbon Trust, 2020) estimated that based on the Climate Action Plan target of 3.5GW of offshore wind, 2,500 jobs would be created during construction out to 2030 and 700 long term jobs in operations and maintenance, circa 1300 jobs would be created during decommissioning. For floating wind off the west coast, figures post 2030 would be far more than this. Jobs in installation and commissioning, operation and maintenance and decommissioning are mainly based near ports close to the relevant windfarm.

7.1.2 Manufacturing related directly to offshore wind

Ireland is unlikely to benefit from manufacturing fixed offshore wind-related components. There are well-established supply chains for fixed offshore wind manufacturing elsewhere in Europe and as close as the UK. However, given the infancy of floating wind with supporting Government policies, Ireland can be an early mover in developing this industry, establishing manufacturing facilities for components in the West of Ireland. The number of jobs in manufacturing for the 3.5GW of fixed offshore wind off

[54] Carbon Trust, 2020 Harnessing our Potential, March 2020 https://prod-drupal-files.storage.googleapis.com/documents/resource/public/final-harnessing-our-potential-report-may-2020.pdf
[55] https://spectra.mhi.com/why-offshore-wind-creates-so-many-jobs

the east and south-east coasts is approximately 16,000, mostly internationally based. Similar type jobs in manufacturing for floating offshore wind would not only be many times greater than this. Still, they would also be over a longer period, given that a steady flow of floating offshore wind is expected far beyond 2030. Floating wind manufacturing-related jobs can be one of the largest employers in manufacturing in the West of Ireland.

7.1.3 Renewable Energy Enterprise Hubs

There is the opportunity to establish floating offshore wind hubs in logistics, support services, research, and innovation. The establishment of enterprise hubs acts as a catalyst for new business, particularly small and medium enterprises. Hubs already being explored in Ireland include a logistics hub based in Rosslare Harbour. Dutch logistics company Xellz has already purchased 200,000 sqm to establish a logistics hub and Freezone to service offshore wind on the east coast. Elsewhere in Ireland, local authorities are investigating the possibility of developing research and innovation hubs in key locations (e.g. near ports and harbours) to facilitate the development of an innovation enterprise based on offshore wind. Given the scale of the floating wind opportunity off the west coast, establishing such hubs focused on offshore wind is a must in the West of Ireland. It can act as an accelerator for floating offshore wind development and renewable energy-related activities, such as the development of green hydrogen. The situation of ports in university towns, e.g. Galway, creates ideal locations for these accelerators.

7.1.4 Indirect employment

Floating offshore wind will also create jobs indirectly through the purchase of supplies and services by the developer/operator directly and possibly through increased spending in the area by employees during all phases of the development.

7.1.5 Community Benefit Funds

Under the Terms and Conditions of RESS1 the community benefit fund is €2/MWh. This is expected to remain unchanged for offshore wind. This can generate millions in funding each year for the life of the RESS (currently 15 years) for local communities. If the full 5GW of offshore wind planned for 2030 is developed under RESS it equates to over €750m in community benefit funds for local communities over the 15-year RESS period. Community benefit funds for offshore wind may be split into several different pots with a percentage reserved for fishing communities affected by the wind farm development, contribution towards sustainable development goals may also be a factor. One wind farm off the coast can result in long term improvements in the area and contribute to community facilities, programmes and developments that can make a real difference to the community and peoples' lives.

7.2 Example

7.2.1 Beatrice Offshore Wind Farm - Scotland

Wick harbour began as a small fishing community on the northeast coast of Scotland and was one of the busiest herring ports in Europe. Due to the decline of the herring industry in the second half of the twentieth century, the port's industry decreased, and many local amenities became derelict.

In 2014, SSE renewables and its project partners saw an opportunity to use Wick Harbour as operations and maintenance port for Scotland's largest offshore wind farm, Beatrice Offshore Wind Farm. They decided to purchase and restore 200-year-old derelict buildings in the harbour, retaining as much of the buildings' heritage as possible.

In hiring a local contractor, GMR Henderson, SSE facilitated four apprenticeships who helped complete the restoration. This restored base in Wick Harbour has now been described as "the long-term legacy of the Beatrice project". The harbour will serve as the O&M base for Beatrice Wind Farm for the next 25 years, supporting up to ninety full-time employees with additional support staff when required. With over £20million invested in the Wick Harbour area and almost 75% of the Beatrice workforce from the local community, local enterprises and businesses will continue to benefit from increased economic activity.

"It's so important for local companies to get a chance to play a part in projects of this scale. They bring huge opportunities that can help the social and economic development of the surrounding areas. When you choose to employ local people and local businesses, you are choosing to work with people who truly care about the end result"- Kyle Henderson- Construction Manager of GMR Henderson

8 Shaping Our Electricity Future

8.1 Eirgrid Options

Eirgrid has proposed four different options for the future shape of our electricity grid while acknowledging that the eventual outlook for the future shape of the grid may be a combination of all four with a strong focus on one or more.

The four options are outlined in Table 8-1.

Table 8-1 Future Grid Options

Option Number	Option	Description
Option 1	Generation Led	Government policy would influence where renewable energy is generated, favouring locations where the grid is already strong
Option 2	Developer-Led	In this approach, we continue to connect new sources of renewable electricity as requested in any location
Option 3	Technology-Led	This approach uses technical solutions to make the grid more resilient so it can better handle the variable nature of renewable energy
Option 4	Demand-Led	Government policy determines where large energy users located in Ireland

8.2 Implications of the four options for the West of Ireland

The Western Development Commission understands the need to decide on the most appropriate course of action to connect the renewable electricity necessary for Ireland to achieve its 2030 RES-E and decarbonisation targets. However, the WDC and its partners see the current plan as too short term. We believe that earlier engagement with developers and communities is required, and the time to look at post-2030 is now. The WDC and the Regional Enterprise Plans for the West, North West, and Mid-West do not view 2030 as the endpoint. It is merely a yield sign in the road. Plans for connecting post-2030 renewables must be assessed now to establish the most appropriate course of action to allow Ireland to seize the massive renewable opportunity sitting off our west and north-west coasts and the resulting benefits for Ireland and, in particular, the West of Ireland.

The WDC and its partners are concerned that short-term policy will compound the situation whereby the West of Ireland has fallen far behind the other regions regarding inward investment, resulting in less favourable education, employment, and health outcomes for the region's population. Also, we are concerned that grid connection policies adopted by Eirgrid will tie the hands of the WDC and other regional agencies, preventing us from achieving our objectives as set out in the Regional Spatial and Economic Strategy 2020-2032 (RSES). These policies will limit the regional development plans and other social and economic development policies such as AIRe. Objectives under RSES termed “Growth Ambitions” focus on the People and Places of the region and are described in Section 1.6.1 of this report. They were developed according to the National Development Plan and the National Planning Framework, i.e. Project Ireland 2040. The future shape of the grid should also reflect regional planning

policies as derived from national policy. The WDC and the Regional Enterprise Plans' views on the four options pertaining to the West of Ireland are detailed below.

8.2.1 Option 1 – Generation Led

The WDC and its partners consider that this approach will only work in the very short term and may even be necessary at least in part to ensure that those projects already in the system are connected, including fixed wind off the east and south-east coasts. It may also be necessary to ensure that those heavy energy users already consented to or in development have a stable electricity supply. However, it encourages a continuation of the unsustainable over-reliance of industry on the east coast and the greater Dublin Area. This will result in a greater need for infrastructure, putting additional pressure on the road network, housing, schools, public services etc., while worsening the socio-economic divide between east and west. It will result in longer journeys to work, more time commuting, which will cause short-term higher emissions and greater electricity demand in the longer term as the fleet begins to electrify, feeding into the vicious circle.

The WDC and the Regional Enterprise Plans acknowledge that this solves short term problems and is the option that Eirgrid considers the most likely to achieve 2030 RES-E targets. However, the WDC and its partners consider that it is not the optimum solution long term. The post-2030 scenario that delivers a fairer, more balanced Ireland should also be considered a matter of urgency. In addition, adopting a short-term policy jeopardises Ireland's ability to achieve 2050 climate change targets, as the infrastructural investment necessary for wholesale decarbonisation is delayed.

8.2.2 Option 2 – Developer-led

Developer led will result in significant upgrades to the grid in the West of Ireland, particularly in Mayo/north Galway and Donegal. The WDC and the Regional Enterprise Plans agree that upgrades are needed in this area. Planned upgrades for the region and the connection of existing projects, including those granted connections under ECP1, should be progressed irrespective of future generation connection policy.

However, long-term, the WDC and its partners do not support the developer-led approach as it considers only one piece of the puzzle in terms of a just and fair transition to decarbonisation. Developer led projects are coming under increasing scrutiny and subject to increasing levels of objection. The perception that the west is producing the power, but the east is reaping the benefits is, The WDC and the other bodies involved in this report, consider, a fair one.

The WDC and its partners consider that now is the time to adopt a more holistic approach. We consider that a whole of Government comprehensive plan for renewable energy development, which supports regional and local spatial and economic strategies, is required to maximise the value of renewable electricity and the floating wind opportunity in the Atlantic.

The WDC and the Regional Enterprise Plans consider that a continuation of the current policy of the developer-led approach is worrying on several levels:

1. Increasing levels of objection to local renewable energy developments leading to discord in local communities;
2. Delays in renewable electricity becoming operational leading to lost investment opportunities in the region;
3. Possible follow-on delays to post 2030 grid development necessary to realise Ireland's massive floating wind potential off the west coast resulting in one of the biggest if not the biggest lost socio-economic opportunity Ireland has ever experienced;
4. Failure to achieve 2030 RES-E targets;
5. Long-term failure to meet 2050 decarbonisation targets.

The WDC and the Regional Enterprise Plans are particularly worried that this approach would lead to loss of investment in the region and affect the ability of the region to deliver on commitments under the Regional Spatial and Economic Strategy 2020-2032. The WDC also has concerns that this will result in the region failing to maximise the floating offshore wind opportunity, completely revitalising the region. This failure would arise from follow-on delays in the grid infrastructure necessary to connect the large-scale wind farms expected to be developed off the west coast.

8.2.3 Option 3 – Technology-led

Like the generation-led option, the WDC and the Regional Enterprise Plans consider this a short-term solution that does not address the continuing socio-economic pressures in the greater Dublin area to facilitate heavy energy users. The WDC considers that additional local upgrades for planned infrastructure would still be required. The WDC and its partners also have concerns around public acceptance of such infrastructure, given the difficulties in developing the North-South Interconnector and the timeline for delivering such infrastructure. Any infrastructure installation must be cognisant of the many sensitive habitats in the region, particularly in Special Areas of Conservation and Protection.

The WDC and the Regional Enterprise Plans do not view it as directly supporting or restricting economic development in the area per se. However, they consider that inward investment and policies to encourage heavy energy users close to the energy source in the West of Ireland are a more attractive option.

8.2.4 Option 4 – Demand Led

The WDC and the Regional Enterprise Plans consider that given the massive potential for floating offshore wind in the Atlantic, a grid policy focusing on a demand-led system is the most appropriate scenario capable of realising this potential. The WDC and the Regional Enterprise Plans recognise that this cost is similar to the Generation led approach and can also deliver on 2030 targets. However, given the lead-in time for grid upgrades, it may be too late to implement it in the short term.

The demand-led approach also supports the regional enterprise plans' economic objectives, in line with national development policy (Project 2040). The WDC and its partners appreciate that policies such as those required to move to a demand-led system require a whole government approach. Government Policies must align across many policy areas, including planning policy (location of new

data centres and other heavy energy users), telecommunication interconnection (west to east and beyond), renewable energy development and in particular offshore wind post-2030 and also the other supporting policies such as housing and other supporting infrastructure. Given the long lead-in times for these changes and the need to give clarity to the industry grid post-2030, it should be examined now as a matter of urgency.

The WDC and the Regional Enterprise Plans consider that a move to a demand-led scenario long term will ease socio-economic pressures in the greater Dublin area while also increasing investment in the West of Ireland. This will help bridge the gap that has grown between the west and east and improve outcomes for the populations of the West of Ireland. It will also give a clear indication to both users and renewable electricity generators of the intention to deliver grid infrastructure in the West of Ireland and make our 2050 targets feasible.

The long term transition to a demand-led system also addresses the fact that there is limited capacity for fixed offshore wind development in the Irish Sea and the east Celtic Sea. We must look to capture the massive floating offshore wind resource off the west and northwest coast in the long term.

8.2.5 General observations

The WDC and the Regional Enterprise Plans consider that this process may be too late to allow a preferred option to be implemented. As acknowledged in this consultation paper, some combination of all four options may likely be required. This is due to existing developments already in the system, the long lead-in times for grid development and the long lead-in time required to develop and implement changes to planning and other policies. In this situation, it won't be easy to bring clarity to stakeholders, including the renewables industry or the public.

However, The WDC and its partners consider that we must act now to ensure that Ireland does not waste the Atlantic resource opportunity. Only through realising this resource can Ireland reach full energy independence and maximise the value of renewable energy for Ireland and particularly for the West of Ireland. The WDC considers that irrespective of whichever option or combination of options is chosen, the grid infrastructure should be future-proofed as much as possible, allowing for the connection of additional renewable technologies over time.

9 Summary and Recommendations

9.1 Summary of the Energy Dilemma

Ireland's electricity requirement will increase significantly to 2030 and beyond as we move to increased electrification of transport, heating and industry from renewable energy resources to meet our 2030 and 2050 renewable electricity and decarbonisation targets. Between population growth, the growth in certain heavy energy industries such as data centres and increased electrification, the amount of electricity required is expected to more than treble by 2050.

In the short term, the bulk of new onshore wind will be generated in the west and north-west, with offshore wind mainly coming from the east coast and some off the south-east coast. However, in the longer term, the existing supply will be dwarfed by the floating wind opportunity further off our coast, mostly in the Atlantic off our west and north-west coasts. The challenge presented is providing for the shorter-term requirements while ensuring that the right long-term decision is taken. Given the long lead-in times for energy infrastructure and the time needed to develop and implement new policies concerning energy usage, we must now consider our options to 2030 and the post-2030 scenario.

9.2 Role of West of Ireland in Addressing this Challenge

Focusing development predominantly on the East Coast is an example of short-term planning with long term negative consequences. The Western Development Commission and its supporting partners believe that the future of renewable energy in Ireland and its surrounding enterprise and research and development into new green technologies is located in the Western region. For Ireland to achieve its 2030 targets and then its 2050 targets, we must take a nationwide approach to grid infrastructure and development so every sector of society can benefit in a sustainable and long-term capacity.

The West of Ireland is ideally placed to capitalise on this opportunity to develop onshore wind in the short term and floating offshore wind in the post-2030 era. The WDC and the Regional Enterprise Plans see this as an opportunity to increase investment in the region, grow existing industries, and develop new ones, resulting in improved outcomes for the region's population.

9.3 Recommendations for what is needed to ensure this opportunity is captured

A whole of Government approach is needed to realise the renewable energy potential for the West of Ireland. Government policies must align across some critical areas, including planning policy (location of new data centres and other heavy energy users), telecommunication interconnection (west to east and beyond), renewable energy development and in particular floating offshore wind and also the other supporting policies such as housing and other supporting infrastructure. Given the long lead-in times for these changes and the need to give clarity to the industry grid, post-2030 should be examined now as a matter of urgency.

Buy-in is needed at all levels of decision making including the relevant Government Ministers (DECC, DHLGH, DoT, DETE), political representatives (national and local), relevant national agencies (e.g. IDA, Enterprise Ireland), regional development and enterprise agencies (WDC, Údarás), regional educational institutes and training programme operators, locally based business and the public.

Work on an integrated cross-agency policy capturing the various aspects that will ensure the West of Ireland is positioned to capitalise on the massive opportunity coming our way must be progressed as a matter of urgency.

1. The immediate establishment of a group to examine how Ireland can capitalise on the Atlantic resource of at least 30GW of floating offshore wind by 2050 as set out in the Programme for Government 2020. This group should include the relevant Government Departments and representatives of the West of Ireland, the port network on the west coast and industry.

2. Increase investment in research & development in the floating wind supply chain to reduce floating wind technology costs. In doing so, capacity building through research activities in Ireland will place it at the forefront of the industry. This capacity will allow a supply chain to develop well before project construction, opening a domestic and international market to Irish companies established in the floating wind supply chain.

3. Building on the work of the IMDO, a mapping exercise should be undertaken for the ports on the west coast to identify each port's strengths in the context of floating offshore wind and identify what upgrades and investments are needed to capitalise on the Atlantic resource.

4. Data centres and other technology-related activities require high-speed, reliable interconnection with our trading partners. To facilitate increased technological investment in the West of Ireland, including developing the Atlantic Green Digital Basin, increased telecommunications interconnection on an international and national scale (east to west) is required.

5. This industry is also developer-led, and a plan should be put in place to ensure that the necessary interconnection is developed in the West of Ireland to facilitate a demand-led electricity generation approach.

6. Additional electricity interconnection between Ireland and Europe to export early excess electricity from floating offshore wind in the Atlantic.

7. Examination of the establishment of floating wind technology, logistics and research hubs in the West of Ireland.

8. Develop a start-up accelerator for floating offshore wind development and renewable energy-related activities, such as the development of green hydrogen.

9. Establish a ports working group to develop a "whole coast" approach that highlights regional opportunities and identifies policy and investment needs.

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