Building Offshore Wind: 70by30 Implementation Plan
Presentation followed by Panel Session and Q&A

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Thanks for joining! The webinar will begin shortly. You can submit your questions for the panel through Slido.com now:

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Building Offshore Wind - 70by30 Implementation Plan

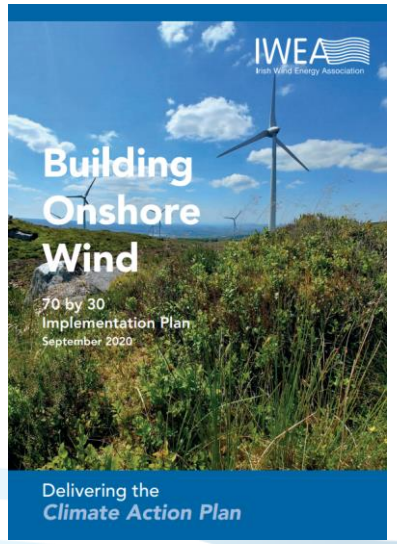
10 December 2020

70by30 Implementation Plan

(Four Reports)

- Saving Money
  - Press Release
  - Report
  - Webinar

- Building Onshore Wind
  - Press Release
  - Report
  - Webinar



- Saving Power
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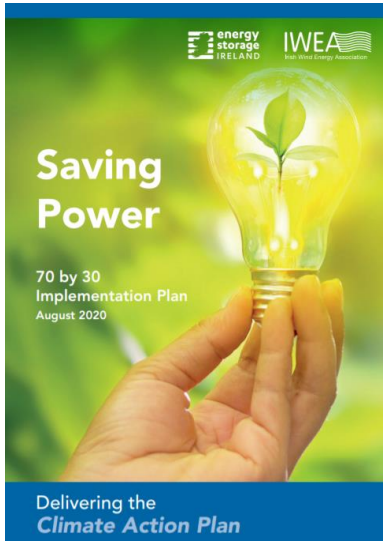

- Building Offshore Wind
  - Press Release
  - Report
  - Webinar

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70by30 Energy will Save the Most Carbon in the Climate Action Plan

2030 Electricity Key Statistics

- 70% RES-E
- 5 GW Offshore — Was 3.5GW updated to 5GW in June 2020
- 8.2 GW Onshore (vs 4.2 GW in 2020)
- 0.4 – 1.5 GW Solar
- 600,000 Heat Pumps
- 1 million Electric Vehicles
- Industry is developing enough projects to hit targets - the supporting systems need to be there

Carbon Emission Savings

- Climate Action Plan aiming to save ~16 Mt by 2030
- 70by30 will save ~8 Mt of carbon by 2030 i.e. 50% of all!
- Wind will save the most CO2 in the Climate Action Plan

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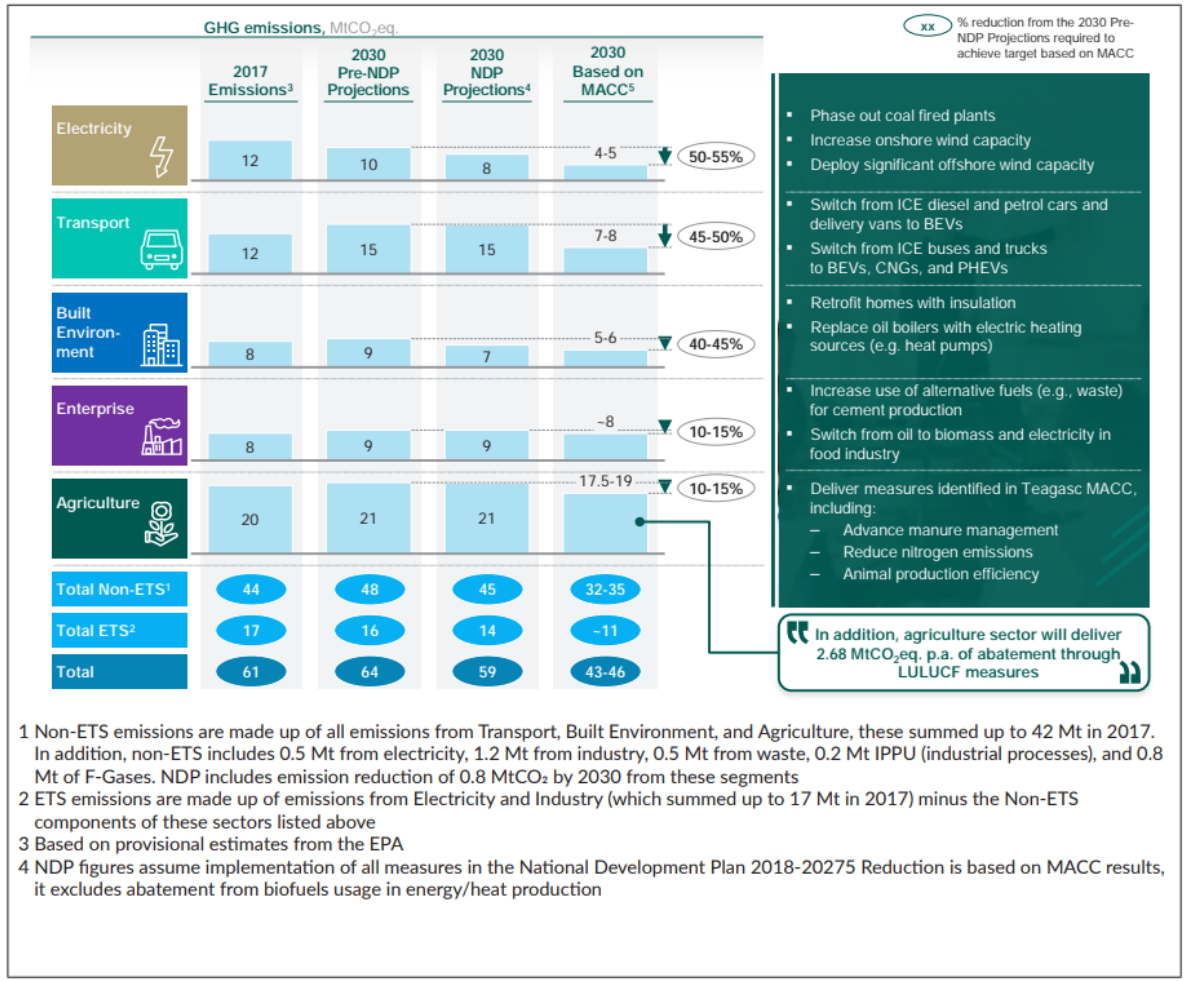
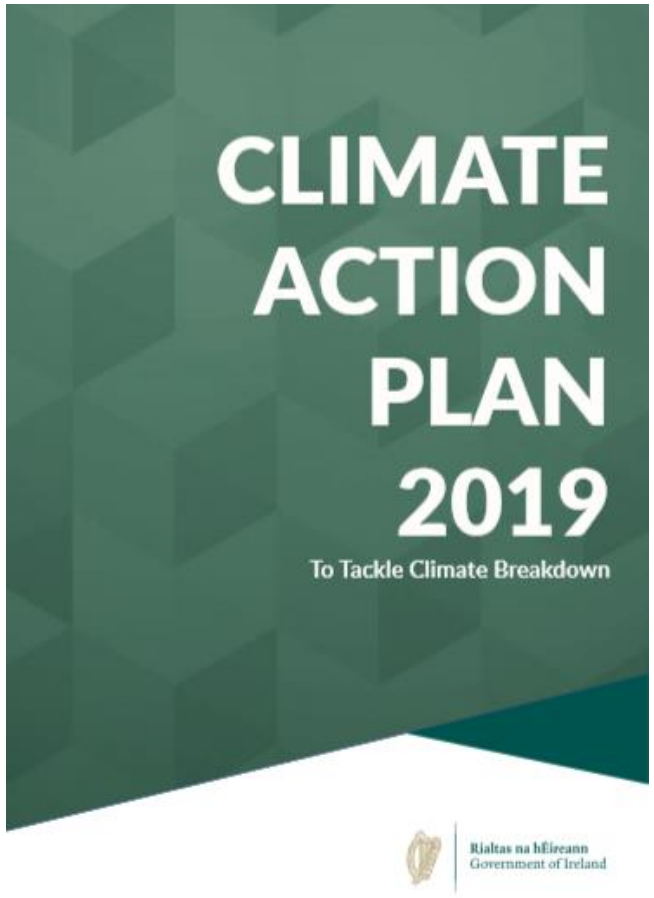
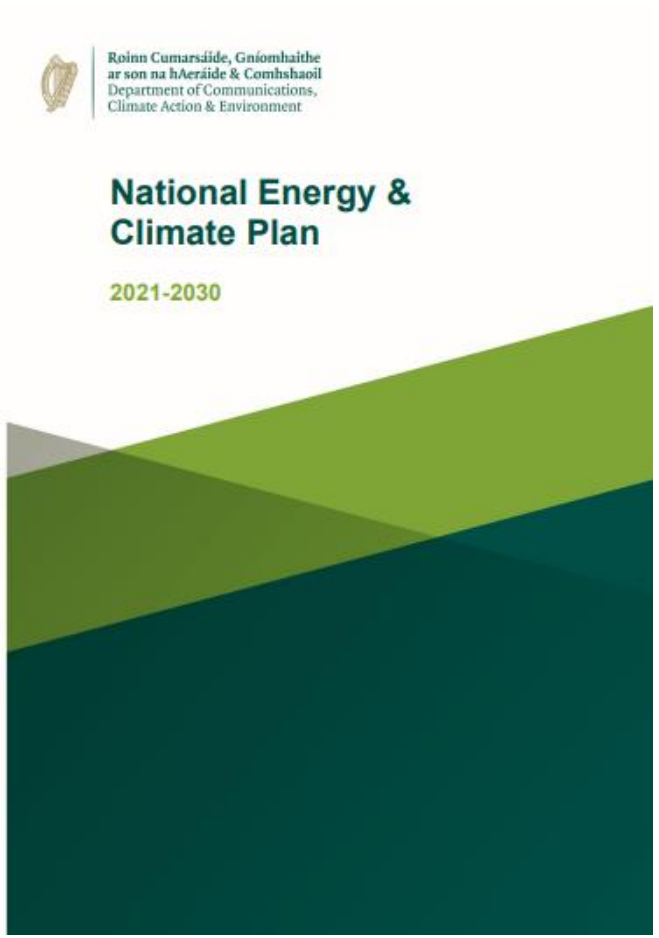
Figure 4.3 Indicative Sectoral Targets for Ireland to 2030[14]



1 Non-ETS emissions are made up of all emissions from Transport, Built Environment, and Agriculture, these summed up to 42 Mt in 2017. In addition, non-ETS includes 0.5 Mt from electricity, 1.2 Mt from industry, 0.5 Mt from waste, 0.2 Mt IPPU (industrial processes), and 0.8 Mt of F-Gases. NDP includes emission reduction of 0.8 $MtCO_2$ by 2030 from these segments
2 ETS emissions are made up of emissions from Electricity and Industry (which summed up to 17 Mt in 2017) minus the Non-ETS components of these sectors listed above
3 Based on provisional estimates from the EPA
4 NDP figures assume implementation of all measures in the National Development Plan 2018-20275 Reduction is based on MACC results, it excludes abatement from biofuels usage in energy/heat production

Policy Landscape





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Climate Action and Low Carbon Development (Amendment) Bill 2020

IWEA Offshore Wind Pipeline Survey Overview

August 2020

Irish Wind Energy Association

23 projects in the Irish offshore wind pipeline

Over 16 GW of capacity

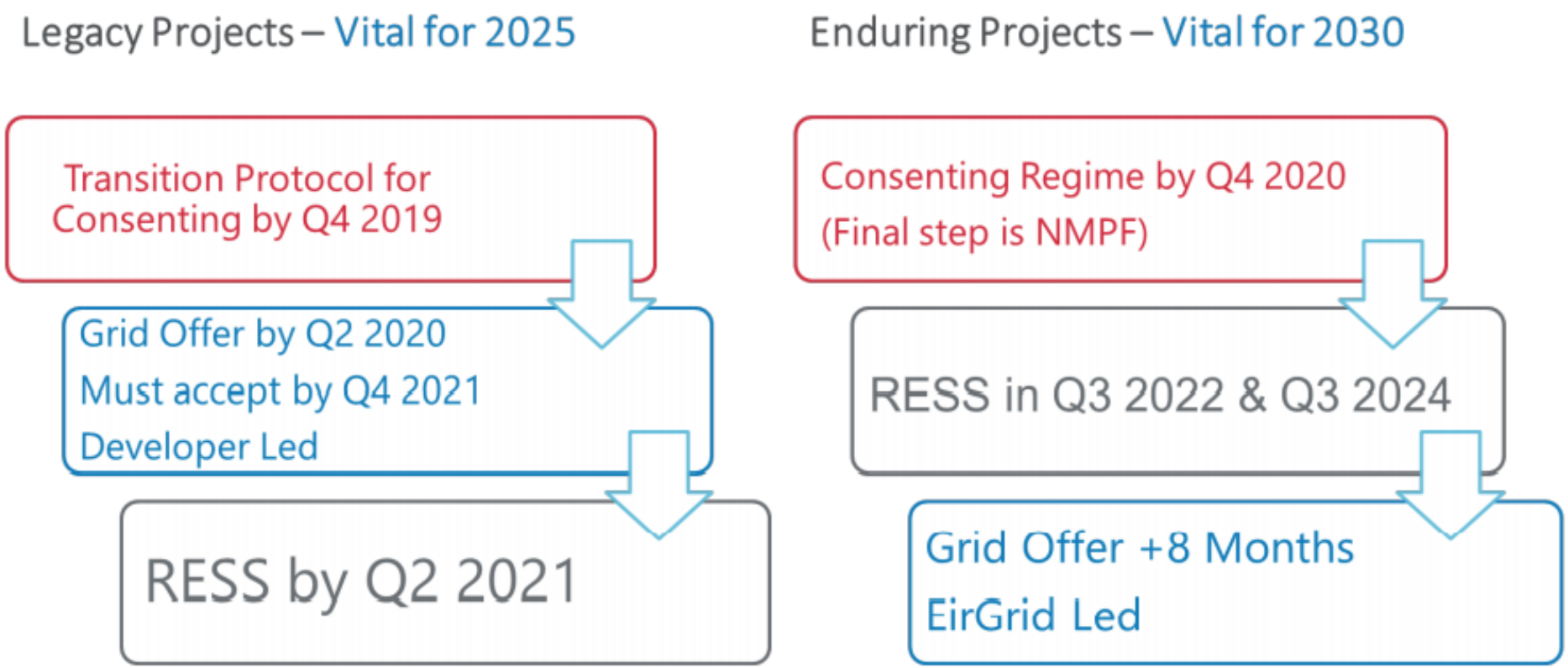
An expected average project capacity of over 700 MW

13 projects planned for the Irish Sea

6 projects planned for the Celtic Sea

4 projects planned for the Atlantic Ocean

Key Milestones Climate Action Plan June 2019



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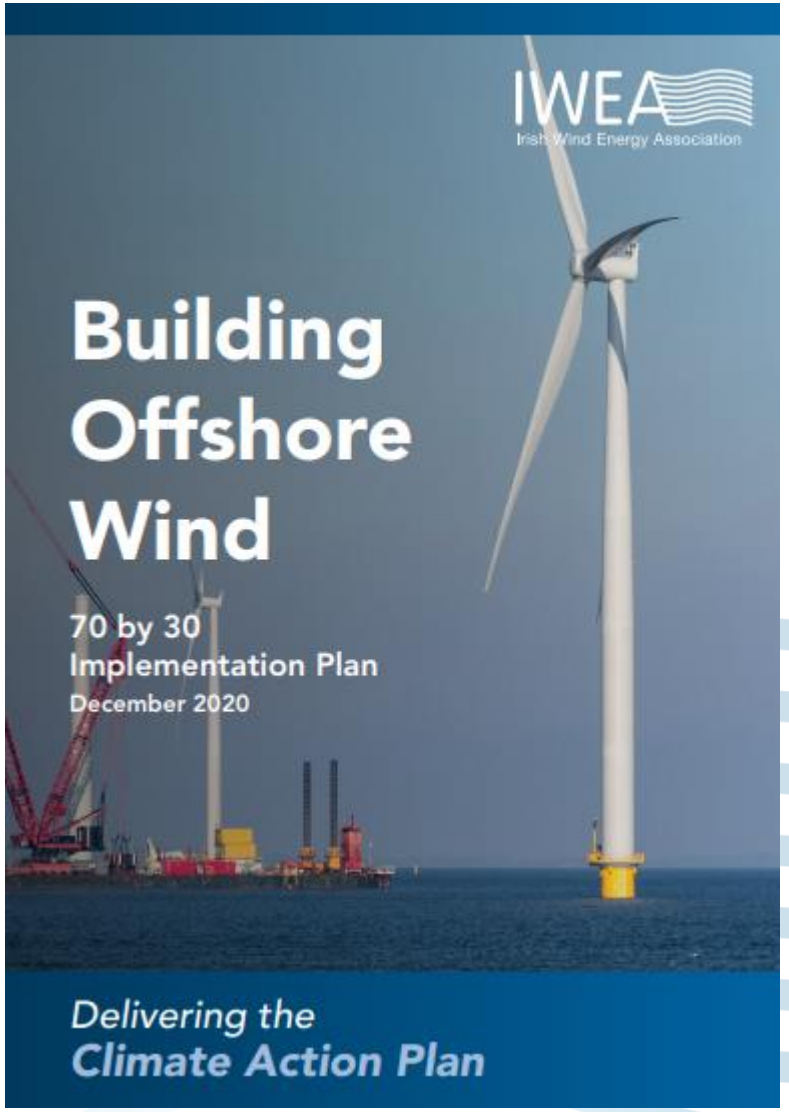
Key Messages for Building Offshore Wind

1. If a project does not have planning permission by the end of 2025 it will not be built by the end of the decade
2. We have a pipeline of 16GW but we do not have a planning regime for offshore wind
3. Parallel Grid Development is currently the single biggest challenge facing Ireland's 2030 targets
4. We need urgent, rapid and coordinated policy development for building 5GW by 2030
5. Currently we are destined to fail!



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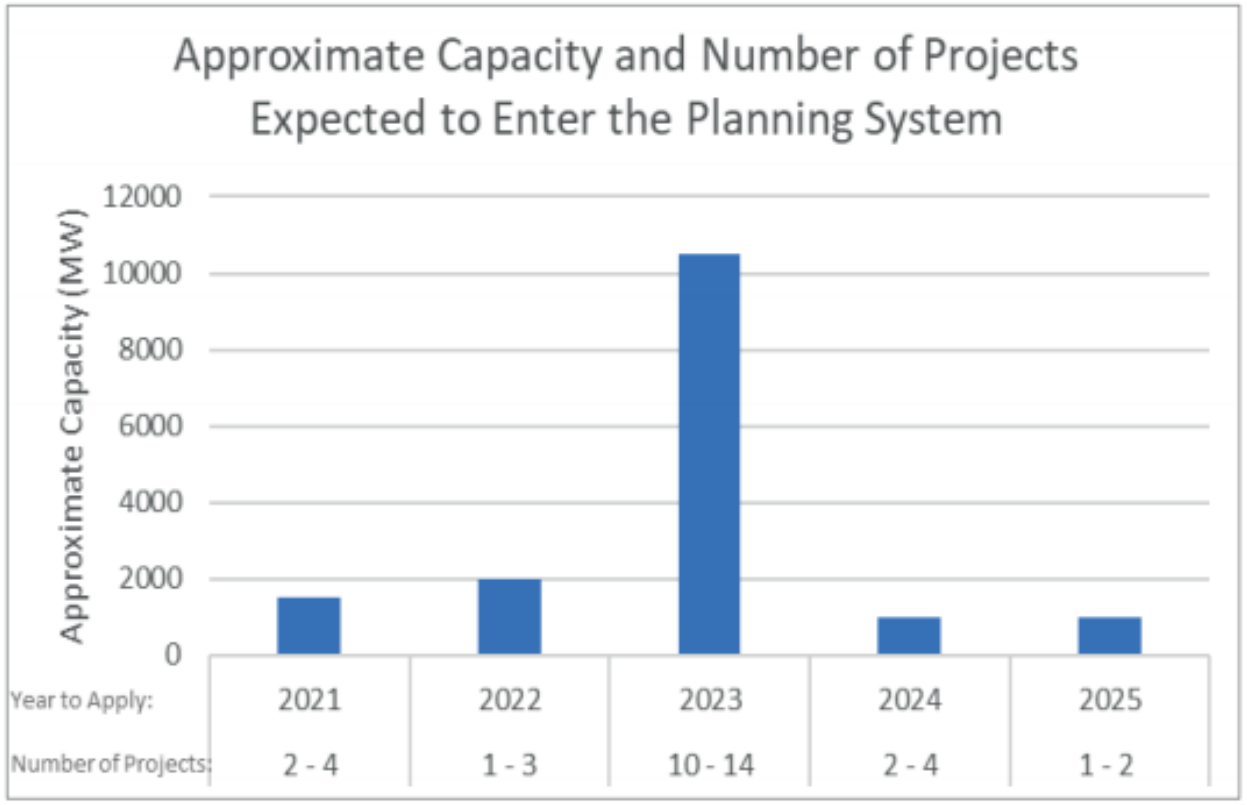
Typical High Level Development Timeline

Step	Work package	Elements	Timelines
1.	**Early-Stage Assessment**	Desktop studies and application for foreshore licence and/or Planning Interest	1 to 1.5 years.
2.	**Site Characterisation**	High resolution geophysical and geotechnical drilling campaigns, offshore met ocean and wind resource data collection and modelling.	1 to 2 years, post completion of work package 1.
3.	**Environmental Assessments**	Baseline data collection including a minimum of 2 years offshore bird and mammal surveying, seasonal onshore ecological surveys, basic design and EIA preparation and consultation.	2 to 3 years, can run in parallel to work package 2.
4.	**Grid connection**	Connection method from TSO confirming specifications and costs, cable route planning, substation design and negotiation of associated landowner agreements.	2 years, can run in parallel with work packages 2 and 3.
5.	**Consents**	Planning application, further consultation and decision process including likely oral hearing.	1 to 1.5 years, post completion of work packages 2, 3 and 4.
6.	**Auction preparation**	Front end engineering design and supply chain pricing.	1 year, can run in parallel to work package 5.
7.	**Engineering and procurement**	Detailed design for supply chain tendering and contracting.	1 to 2 years, post success in RESS auction.
8.	**Financing (Financial Investment Decision or FID)**	Debt and equity package negotiation including due diligence.	1 to 2 years, post success in RESS auction, in parallel with work package 7.
9.	**Fabrication**	Main components fabrication, turbines, foundations, HV equipment, cables.	1 to 2 years post FID, depending on supply chain availability.
10.	**Construction and commissioning**	Offshore foundation, turbine and OHVS installation, onshore cable and HVS construction.	1 to 3 years, depending on construction methodologies and complexity of grid connection.

How the model works?



	Baseline	
	Phase 1	Phase 2
Planning		
Pre-Planning Attrition	20%	30%
Planning Success Rate	60%	60%
Maximum Projects ABP can process per year	5	
Tier 1 duration[19]	2 years	
Tier 2 duration	3 years	
Route to Market		
Pre-Auction Attrition	15%	15%
Percentage of losing capacity in each RESS auction	50%	50%
RESS Auctions	2024, 2027	
Auction Capacity Limit	2 GW	
RESS Competition Ratio	1.7	
Grid Offer and Consenting		
Tier 1 duration	2 years	
Tier 2 duration	3 years	
FID, Wind Farm and Grid Delivery		
Phase 1 of construction before energisation begins	3 Years	
Phase 2 of construction (with energisation in parallel)	1 Year	

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Baseline

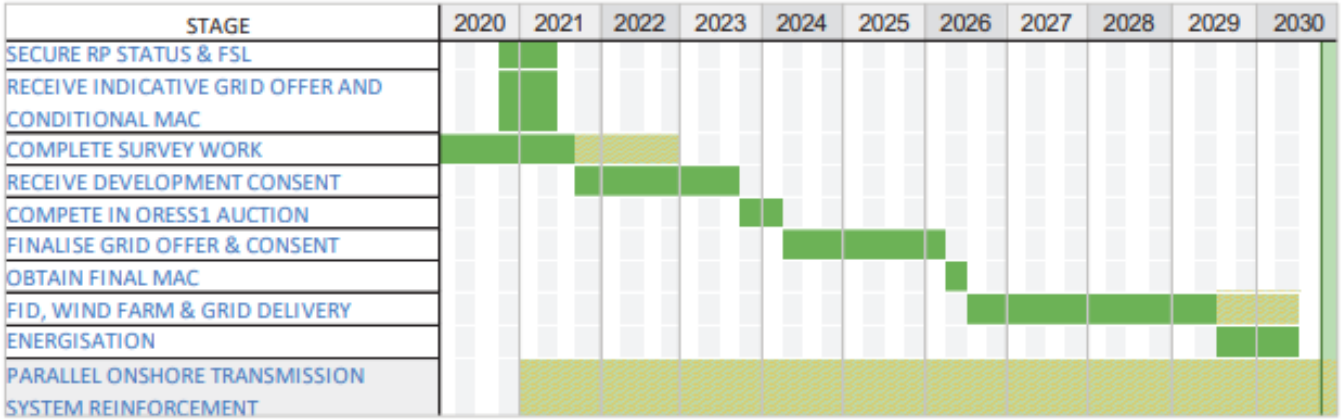

Figure 9: *Baseline* timeline assumed for Phase 1 Projects.

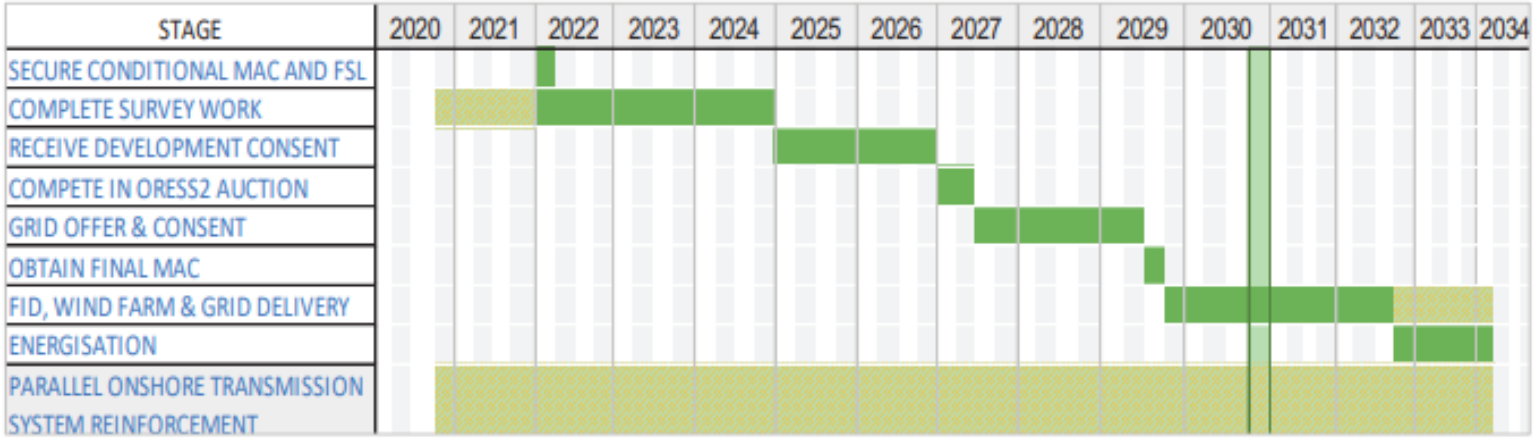

Figure 10: *Baseline* timeline assumed for Phase 2 Projects.

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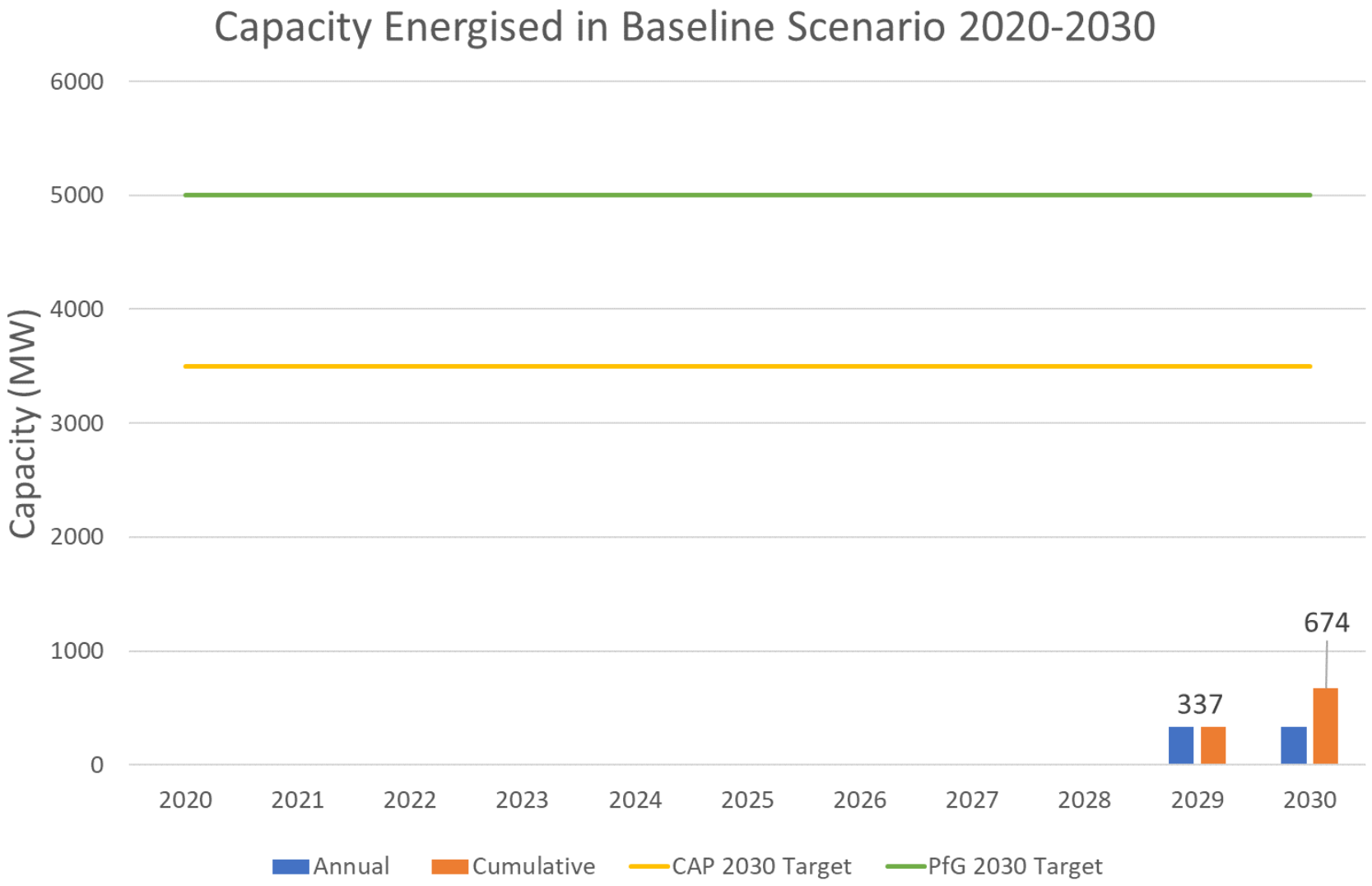
Baseline Scenario Results - We have work to do…

Baseline Scenario results show that only 674 MW of offshore capacity will deliver by 2030 unless we see Policy Improvements across:

- Planning
- Grid Connections
- Route-to-Market and
- Grid Capacity



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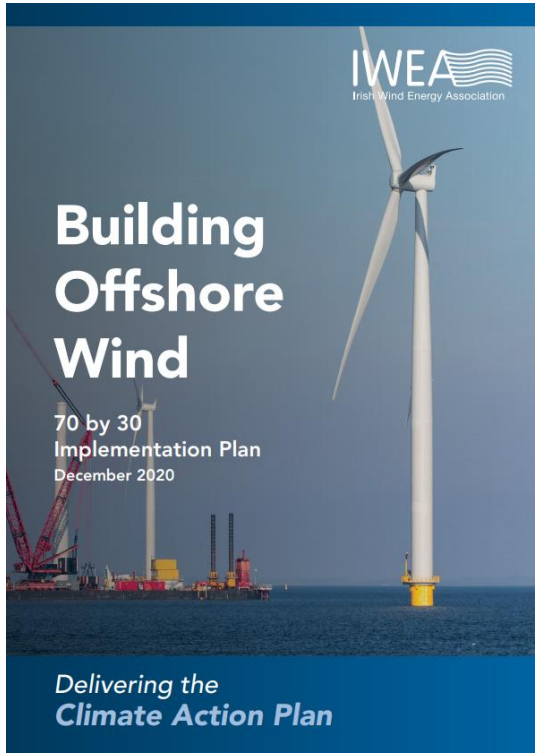
Building Offshore Wind:

Key Policy Improvements for Consenting



Policy Improvement (PI)	Brief Description of What's Needed	Lead	Supporting Role	Next Step	Target Date	Additional Capacity in 2030 vs BASE scenario of 674 MW*
PI1: Obtain Foreshore Licences by Q4 2021	A planning application typically requires at least two years of environmental surveys, but these can only be completed once a project has a foreshore licence, so any project that has to be delivered before 2030 must have a licence by 2021.	DHLGH	DECC, DPER	Ensure sufficient resources are available to issue foreshore licences for all projects that can deliver pre-2030.	Q4 2021	Not Modelled
PI2: Complete National Marine Planning Framework by Q4 2020	The National Marine Planning Framework should be finalised and in place by Q4 2020 so projects can apply for consent through the MPDM in 2021	DHLGH	DECC	Conclude National Marine Planning Framework consultation by updating based on feedback received.	Q4 2020	+330 MW
PI3: Enact MPDM Bill by Q1 2021	The MPDM and all secondary legislation must be enacted by Q1 2021 to allow Phase 1 Projects to progress and Phase 2 Projects to enter the consent process	DHLGH	DECC	Complete pre-legislative scrutiny of the General Scheme before the end of the year and prioritise the final Bill for passage in early 2021. Progress Secondary Legislation and Offshore Guidelines.	Q1 2021	
PI4: ABP Planning Resources and Decision Timelines	An Bord Pleanála must be sufficiently resourced to process the significant number of projects that will apply for planning consent over the next number of years in a timely manner	ABP, DHLGH	DPER	Add at least 10 new people to ABP with appropriate skillsets for offshore wind & begin engaging with offshore projects. ABP should have statutory timelines for planning decisions.	Q4 2020	+562 MW

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PI1: Foreshore Licenses & Exclusivity (e.g. via Conditional MAC) by Q4 2021

1. Issues
    a) FL requirement
    b) Survey windows
    c) 2021 at the latest

2. Solution
    a) Phase 1 and facilitating 2030
    b) Resourcing is key
    c) Exclusivity

Table 5: Foreshore Unit Prioritisation of ORE site investigation cases.

Priority Level	Type of Project
1.	Relevant Projects (Phase 1), projects with an existing ORE lease, Interconnectors
2.	National test site or other strategic infrastructure
3.	Projects on the East Coast (Louth to Wexford)
4.	Celtic Sea Inc. Cork & Kerry
5.	West Coast

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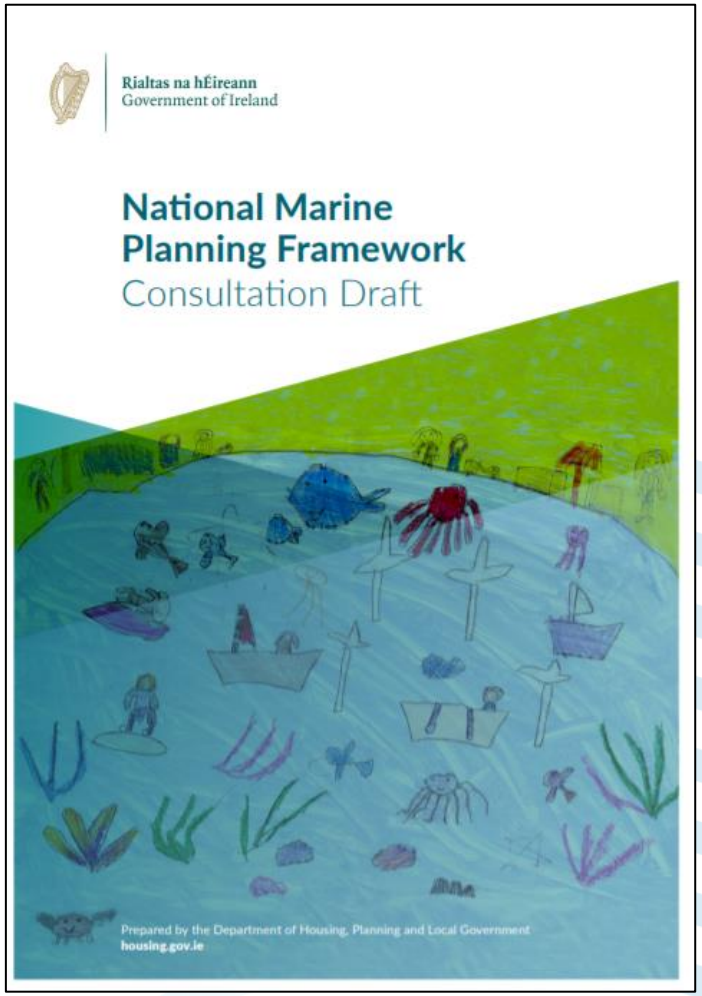
PI2: Complete NMPF by Q4 2020

1. Issues
    a) MSFD directing MSP
    b) Co-existence
    c) Sets direction for maritime development

1. Solution
    a) Final Plan by Q4 2020 as per CAP
    b) MSP in place by 31 March 2021



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PI3: Enact MPDM Bill by Q1 2021

1. Issues
    a) Challenges relating to Heads of Bill
    b) Urgency

1. Solution
    a) Enactment by Q1 2021
    b) Design envelope flexibility
    c) Streamlining to reduce the time to deliver projects
    d) Milestones for the MAC

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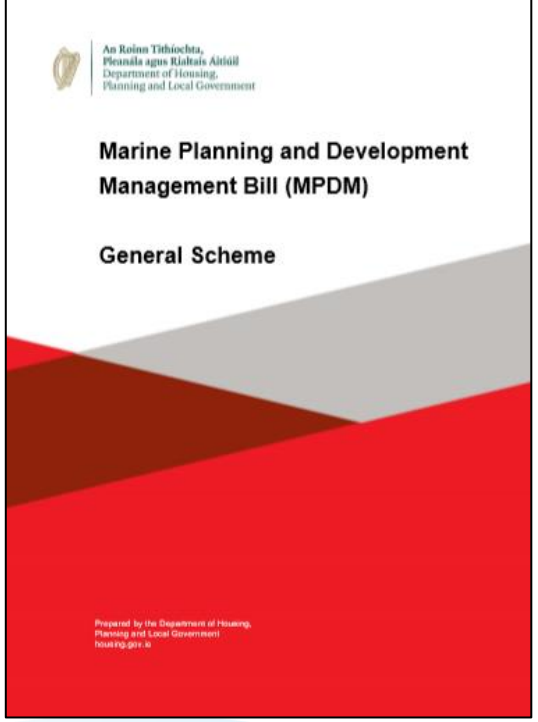
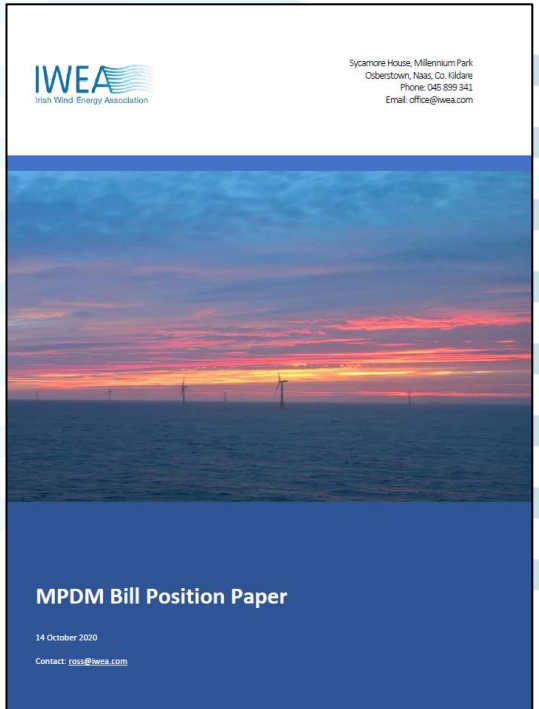
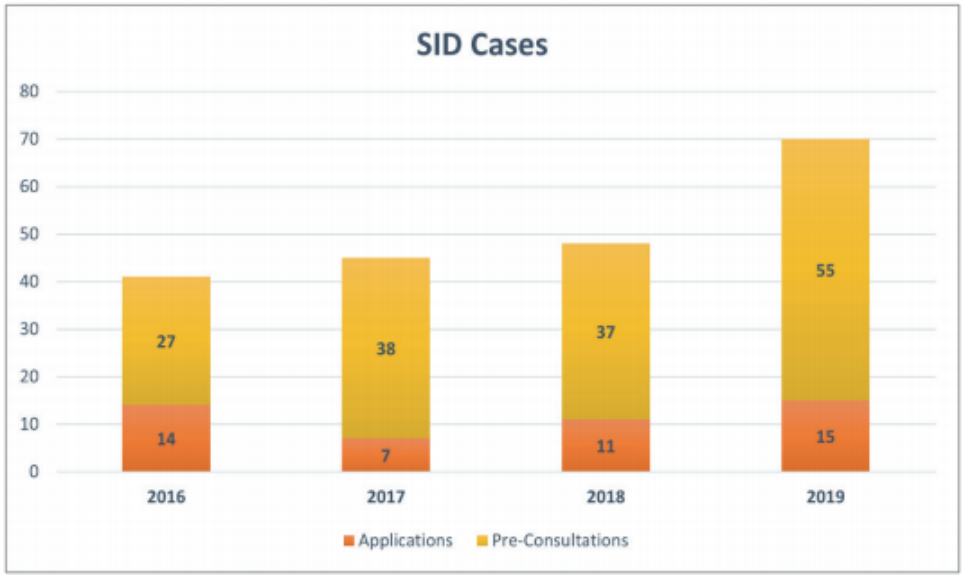


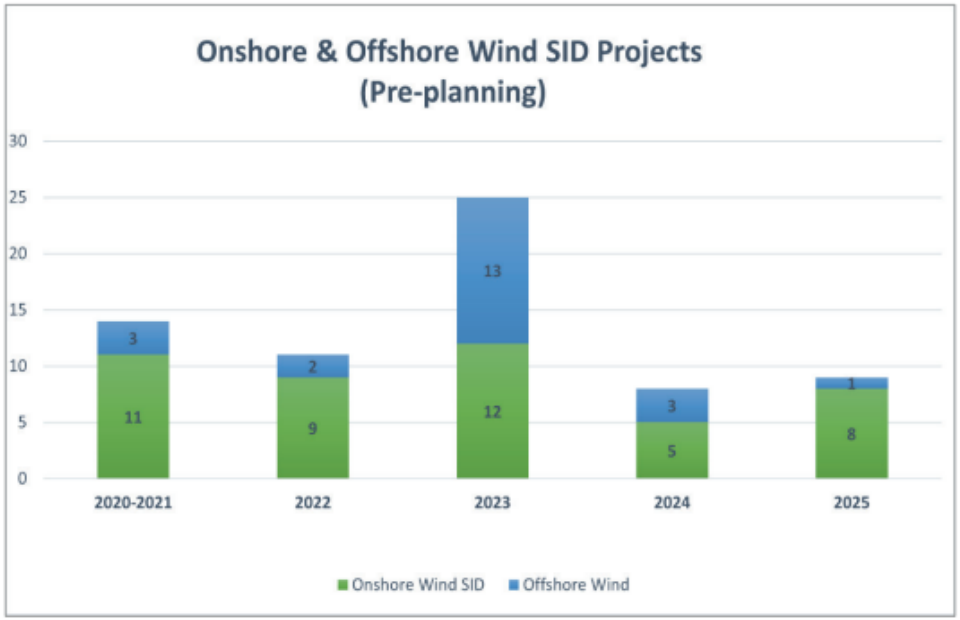


PI4: ABP Resources for Average Decisions in 1.5 Years

1. Issues
   a) Increased volume
   b) Project scale
   c) Project complexity

2. Solution
   a) Resource Roadmap
   b) ABP planning decisions in 1.5 years





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Policy Improvements - Offshore Consenting

PI1 Issue Foreshore Licences and exclusivity for the seabed to all 2030 projects by Q4 2021

PI2 Complete the National Marine Planning Framework (NMPF) by Q4 2020

PI3 Enact the Marine Planning and Development Management (MPDM) Bill by Q1 2021

PI4 An Bord Pleanála will need sufficient resources so they can make decisions on planning applications in 1.5 years on average

Result: Offshore Consenting Policy Improvements **deliver an additional 890 MW by 2030** compared to Baseline Scenario

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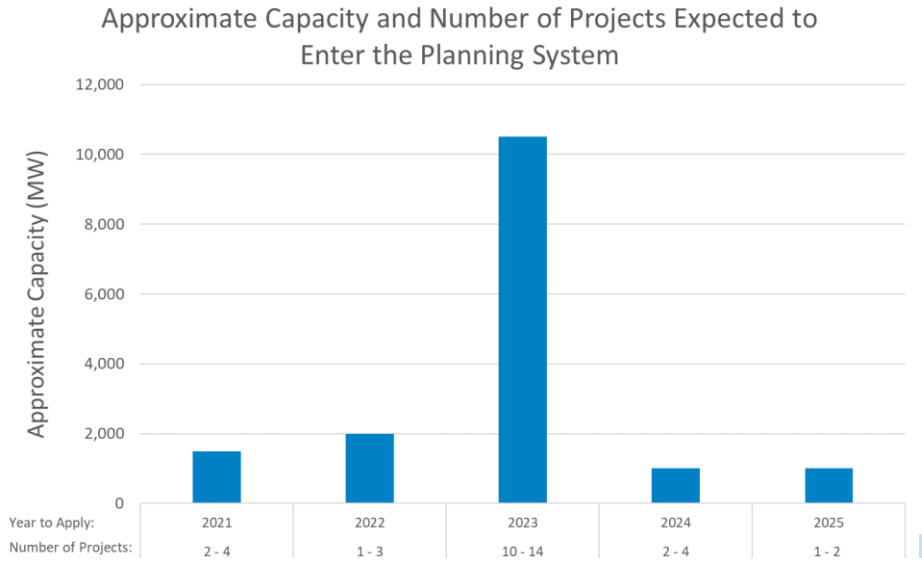
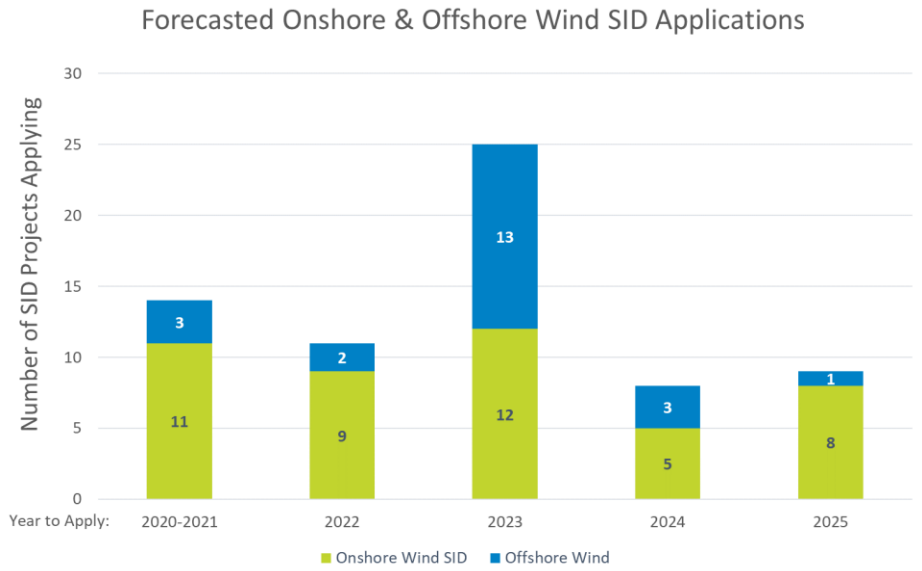
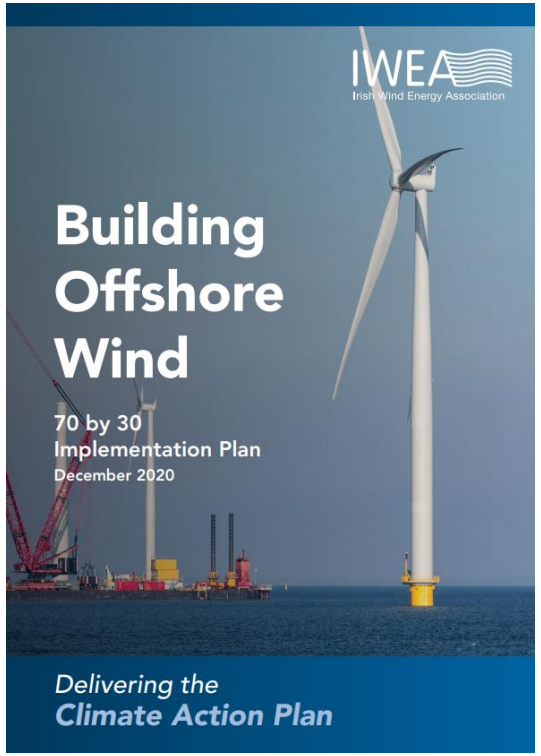




Building Offshore Wind:

Key Policy Improvements for Grid Connections, RESS, and Grid Capacity



Policy Improvement (PI)	Brief Description of What's Needed	Lead	Supporting Role	Next Step	Target Date	Additional Capacity in 2030 vs BASE scenario of 674 MW*
PI5: Grid Offers & Consenting	A decentralised, developer-led grid delivery model involving early engagement with An Bord Pleanála and EirGrid must be put in place to facilitate parallel wind farm and grid consenting. Phase 1 & 2 Projects need clarity on how their offers will be progressed.	Decentralise Grid: DECC Offers: CRU/ EirGrid	ABP	DECC to use a developer-Led Option 1/2 Offshore Grid Delivery Model. CRU to put in place grid offer process for Phase 1 & 2 Projects. EirGrid to process offers.	Q4 2020	+906 MW
PI6: Grid Delivery	Sufficient resourcing must be in place so that non-contestable grid delivery does not delay projects from commissioning. Appropriate cable functional specifications are also vital.	CRU	ESBN, EirGrid	Sufficient resources and incentives in PR5 to deliver project grid connections in a timely and cost-effective manner.	Q1 2021	+500 MW
PI7: RESS	An efficient RESS scheme must be put in place for offshore wind to maximise the capacity that can be achieved by 2030.	DECC	CRU, EirGrid	First Offshore RESS (O-RESS) auction as soon as possible with sufficient volumes auctioned by 2025 to meet the 2030 targets.	Q4 2021	+2,112 MW
PI8: Grid Capacity (note: IWEA's *Saving Power* report is dedicated to this issue)	The design, consent and construction of the appropriate network reinforcement for the east coast must be carried out as quickly as possible and on the south and west coasts to facilitate post-2030 projects.	EirGrid, CRU	ESBN	EirGrid to publish Power Systems Vision 2030 indicating what is required for 2030. CRU to ensure EirGrid and ESBN have the resources necessary in PR5 to deliver the grid required. EirGrid & industry to engage on the development of an 'All-Island Grid Capacity Forum'	Q4 2020	Modelled in *Saving Power* report and not this study. Offshore wind limited to ~2000 MW without this PI.

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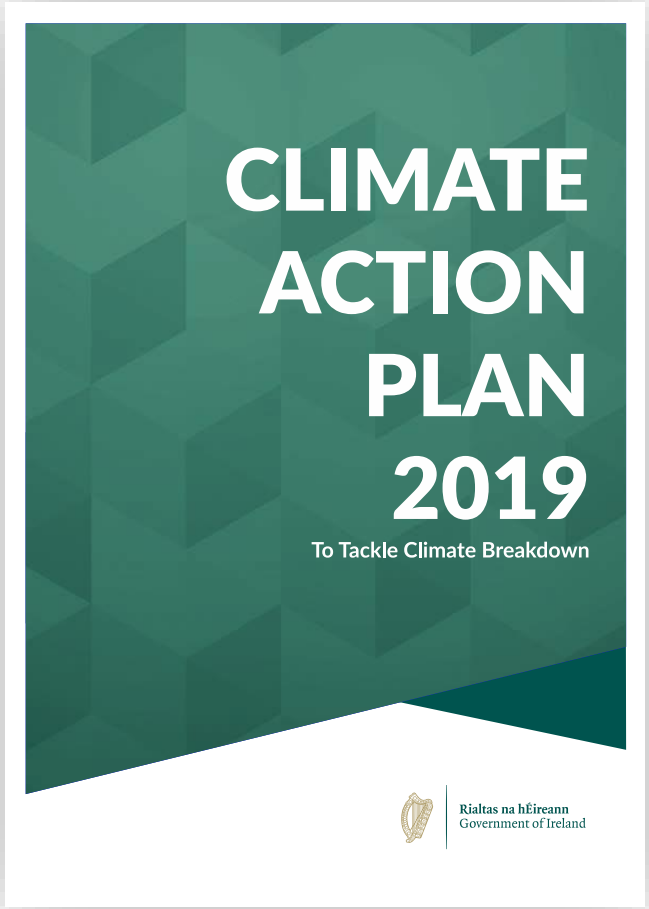
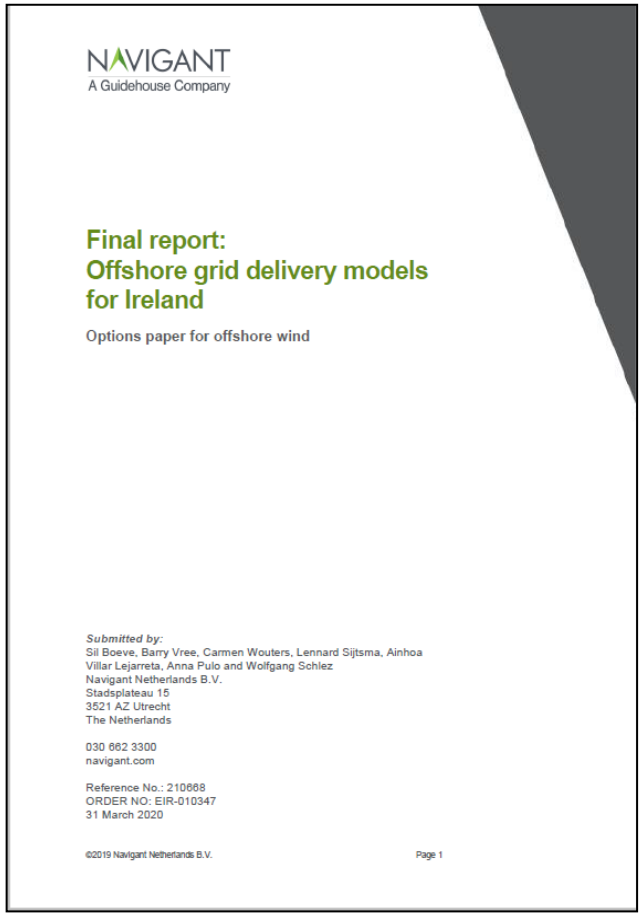
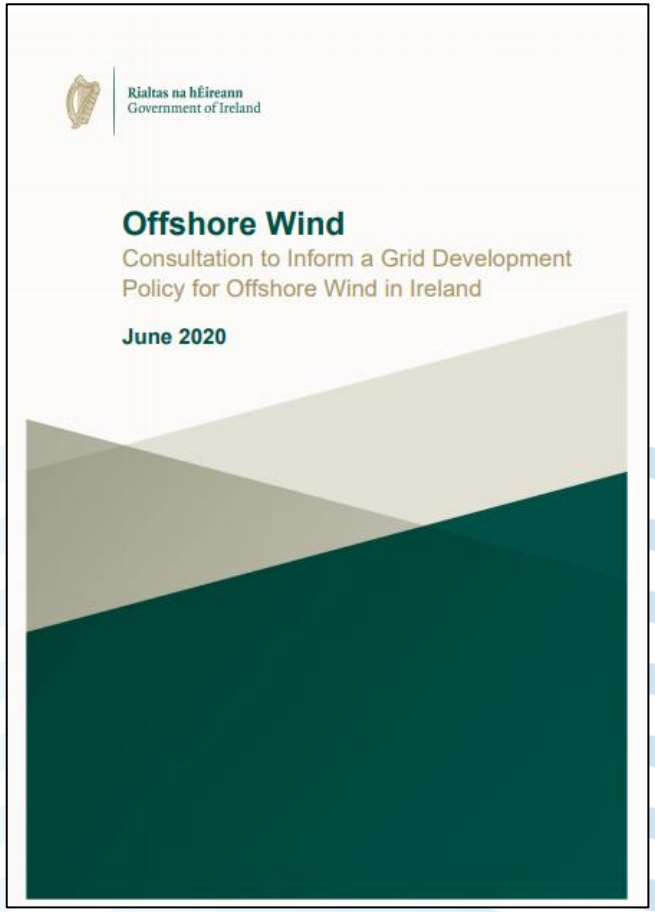
Offshore Grid Options Considerations







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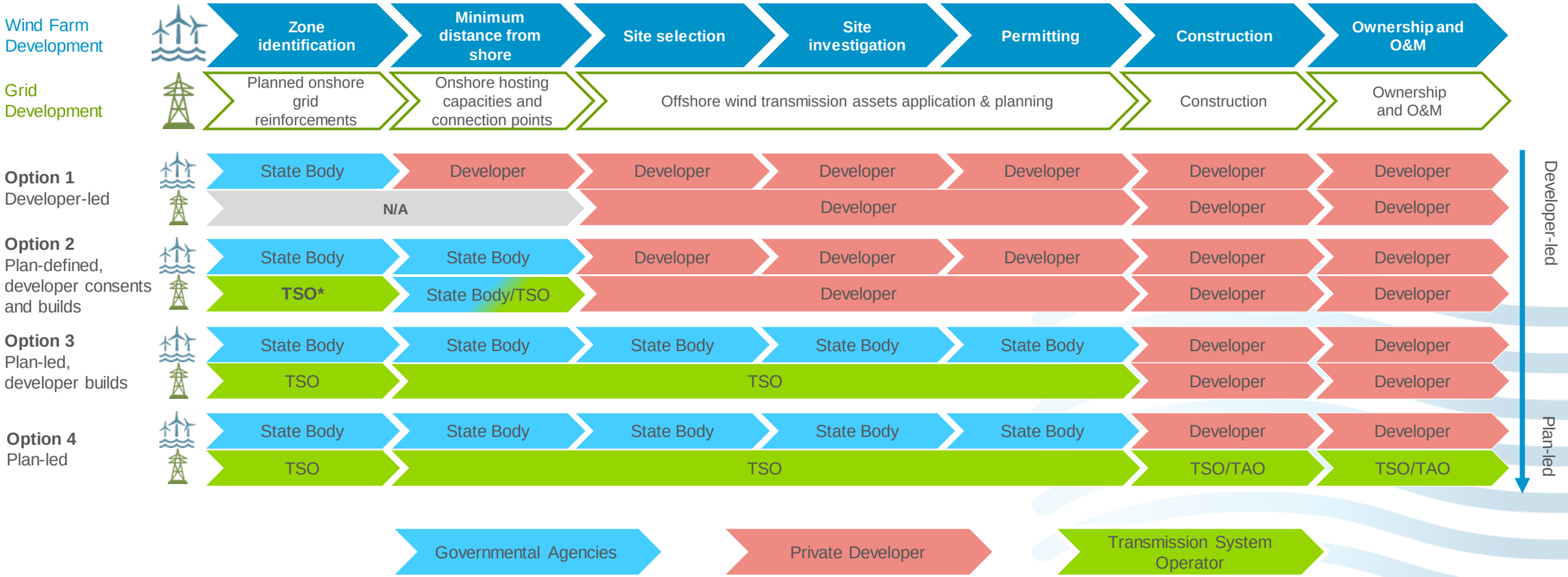
Navigant report set out four options for grid models in Ireland

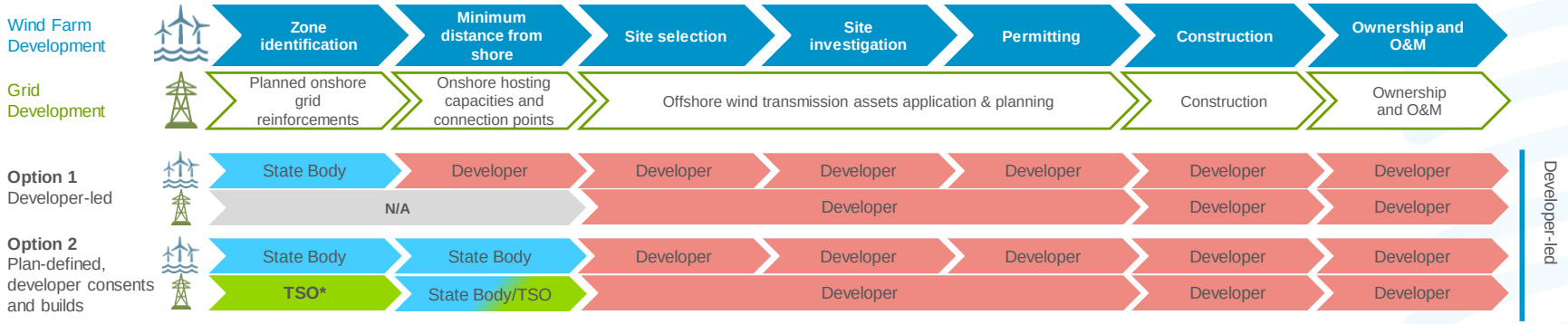


Source: Navigant - Offshore Grid Delivery Models for Ireland report

Offshore Grid Options Consultation - Pre-2030 Proposal (5GW)

- IWEA supported a base of Option 1 (developer-led model) with components of Option 2 - the proactive development of the transmission system - to be progressed as a hybrid solution

- This should be applied to the Phase 1 and Phase 2 Projects which can deliver pre-2030



Key Assumption - Phase 1 & Phase 2 Projects progress under 'developer led' offshore grid model to 2030

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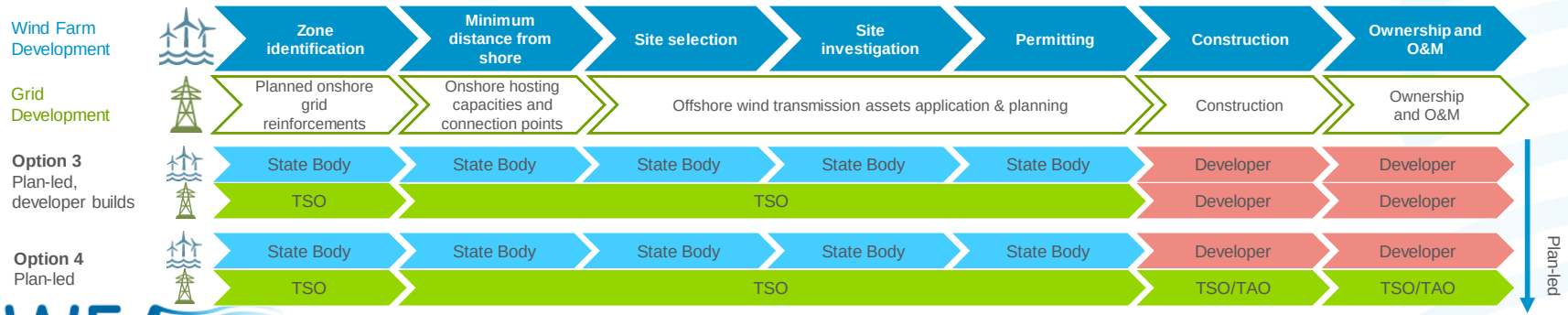
Offshore Grid Options Consultation - Post-2030 (30GW Potential)

- IWEA believes a plan-led approach that is zoned appropriately is likely to be needed post-2030 to unlock investment beyond 5GW and to tap into the 30GW of potential for export in the PfG

- Planning for the transition from the pre-2030 model to the post-2030 more plan-led approach must begin as soon as a pre-2030 model is defined to provide a clear, transparent roadmap

- IWEA recommend this model and roadmap are consulted upon once policy decisions to support the PfG export ambitions have been developed



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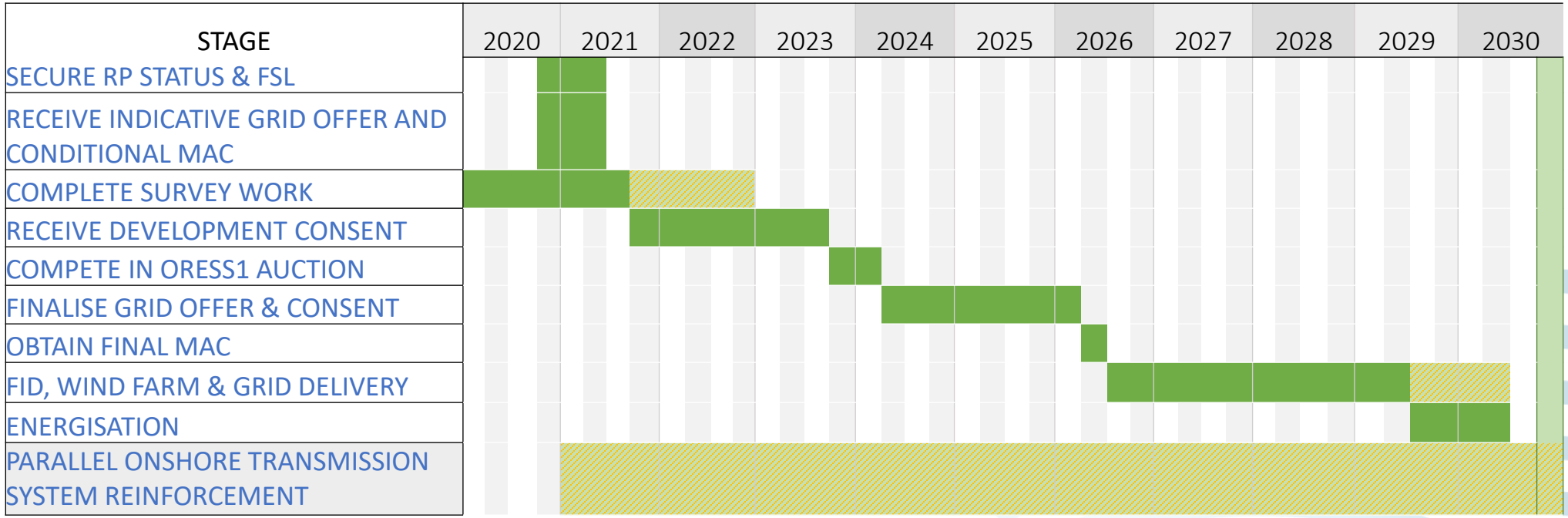
Steps to receive a grid connection and energise project

Phase 1 Business-As-Usual Baseline project example (timelines for grid connection onwards the same for Phase 2 Projects just later)



7 years from final consent achieved to energisation

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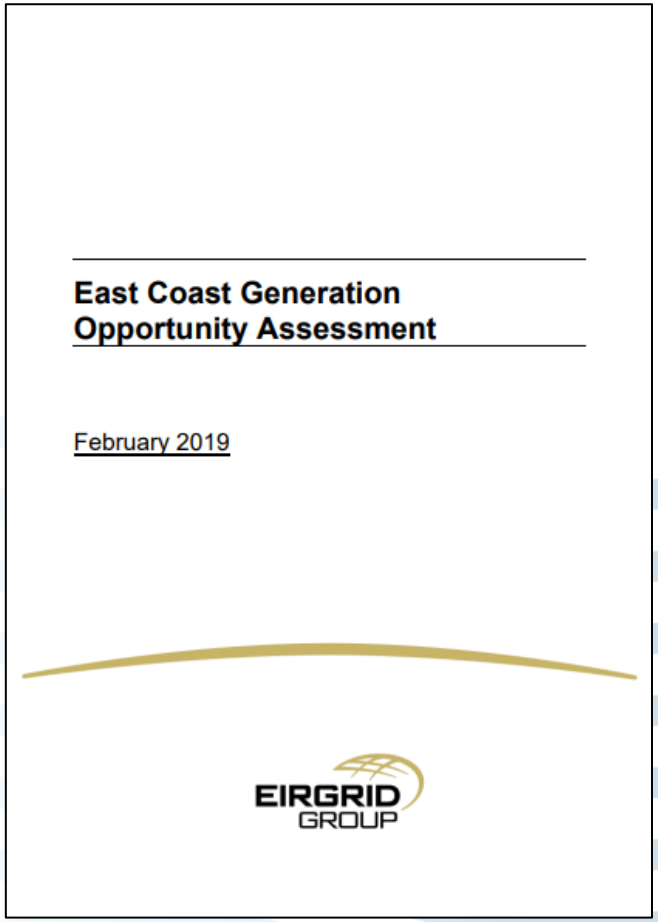
Policy Improvements 5 & 6 for Grid Connection and Delivery

- Collaboration is key on connection policy design and grid connection delivery - CRU, EirGrid, ESB Networks, Industry
- Obtaining consent for the grid connection at the same time as obtaining consent for the wind farm - An Bord Pleanála and EirGrid must be resourced sufficiently to allow early engagement
- The connection offer process and agreements need to strike a balance between:
  a) the need to have legal certainty on the grid connection method, costs and timelines when bidding and securing a RESS contract;
  b) the need to ensure grid capacity for offshore renewable projects is used efficiently; and
  c) the need for commitments to execute connection offers including first-stage payment and bonds
- Strongly recommend that EirGrid update analyses from East Coast Generation Assessment study for entire coastline for pre-2030 projects to best optimise grid capacity



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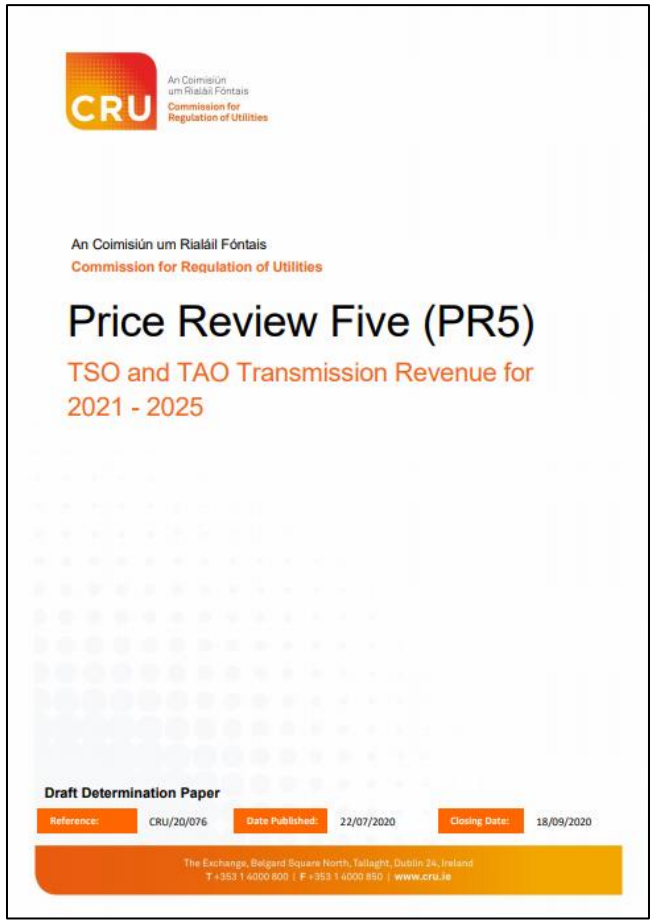
Policy Improvements 5 & 6 for Grid Connection and Delivery

Resourcing for EirGrid and ESB Networks is vital!



CRU
An Coimisiún um Rialáil Fóntais
Commission for Regulation of Utilities

An Coimisiún um Rialáil Fóntais
Commission for Regulation of Utilities

Price Review Five (PR5)

TSO and TAO Transmission Revenue for 2021 - 2025

Draft Determination Paper

Reference: CRU/20/076 Date Published: 22/07/2020 Closing Date: 18/09/2020

The Exchange, Belgard Square North, Tallaght, Dublin 24, Ireland
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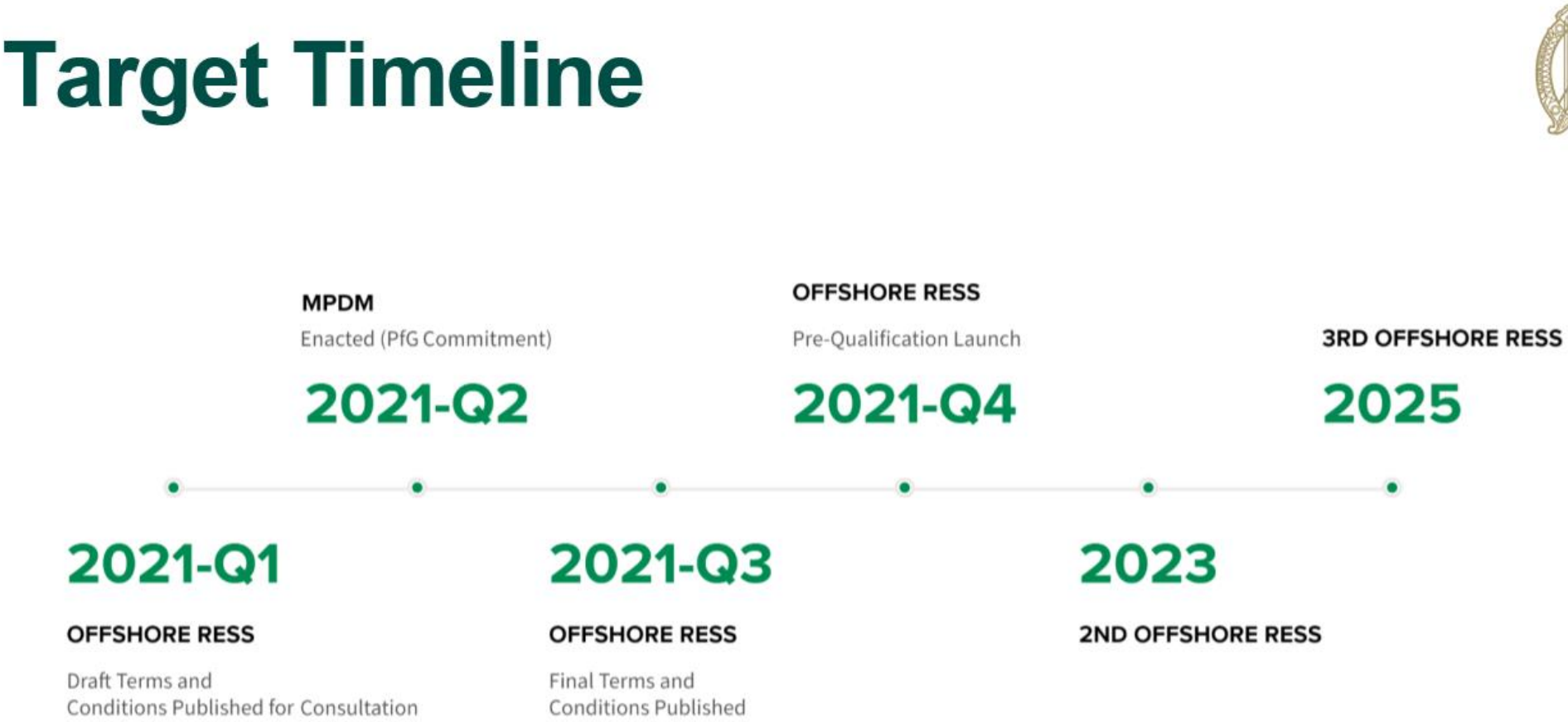
Policy Improvement 7 - Three RESS Auctions by 2025



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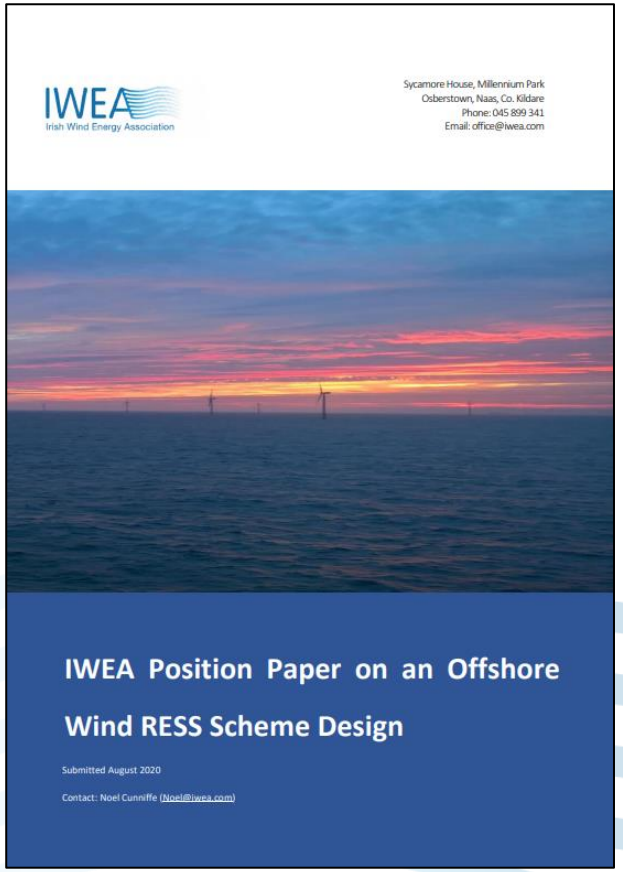
Source: DECC presentation - November 2020

Considerations for RESS Auction Design

- Indexation
- Late delivery penalties should be limited to erosion of support
- Move constraint and curtailment from being an uncontrollable risk on the developer to a centrally managed risk
- Pay-as-Clear (uniform price) auction mechanism
- High level of interaction should take place between DECC and industry
- Timing of the auctions will be a critical factor to ensure competition



The results in this study indicate that if Policy Improvements 1-6 are implemented, then the timing and volume of the RESS auctions along with the grid capacity put in place (Policy Improvement 8) will determine if it is 3.5 GW or 5 GW of offshore wind that is successful by 2030.

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Policy Improvements - Grid Connection, Grid Delivery & RESS

Grid Connections & Grid Delivery

PI5 EirGrid and ABP to engage with projects from project initiation so the project can receive a final grid offer and get consent for its grid connection within 1.5 years on average after RESS

PI6 Financial close and construction of the wind farm and grid connection should take 3 years or less (including energisation)

Result: Policy Improvements in Offshore Grid Connections and Grid Delivery lead to an additional 1,400 MW delivered by 2030 compared to Baseline Scenario

Key Assumption - Phase 1 & Phase 2 Projects progress under 'developer led' offshore grid model to 2030

Result: Policy Improvements in Offshore RESS auction design, combined with previous Policy Improvements to improve pipeline, lead to an additional 2,100 MW delivered by 2030 compared to Baseline Scenario

Offshore Route-to-Market

PI7 Three RESS auctions need to occur by 2025 with sufficient volumes and competition and first auction as soon as possible

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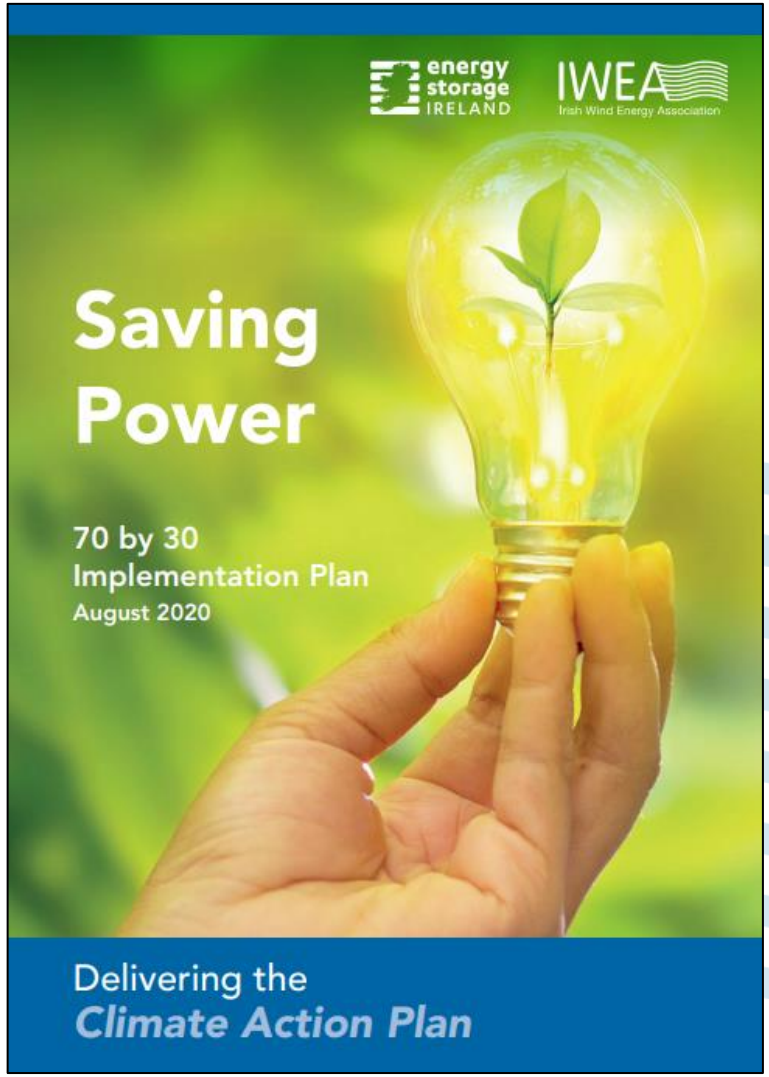
Importance of Grid Capacity & Integration

PI8

Work must **commence immediately** on **strengthening the capacity and flexibility of the grid** to accommodate 5 GW of offshore wind by 2030.

Result: If this Policy Improvement is **not achieved** then offshore wind capacity in Ireland is **limited to ~2000 MW by 2030.**

This is currently the single biggest challenge facing Ireland's 2030 targets for both offshore and onshore wind



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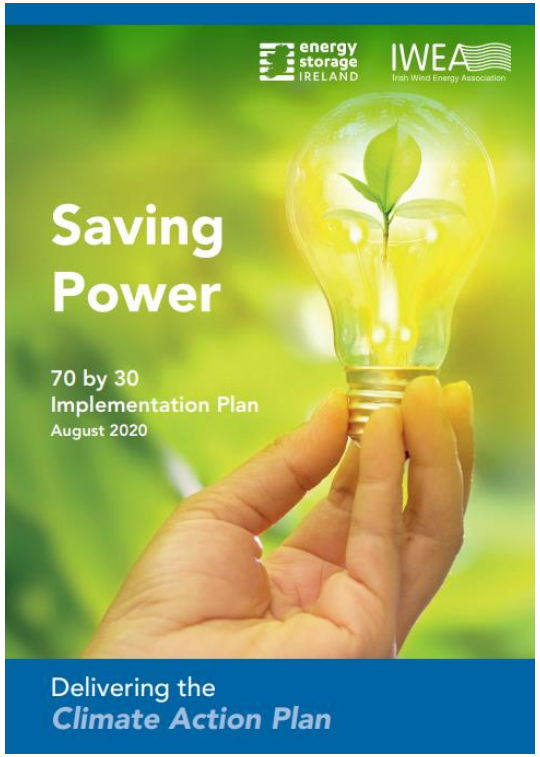
Saving Power:

Minimising Dispatch Down – Curtailment and Constraints



[Link to Saving Power Webinar here]

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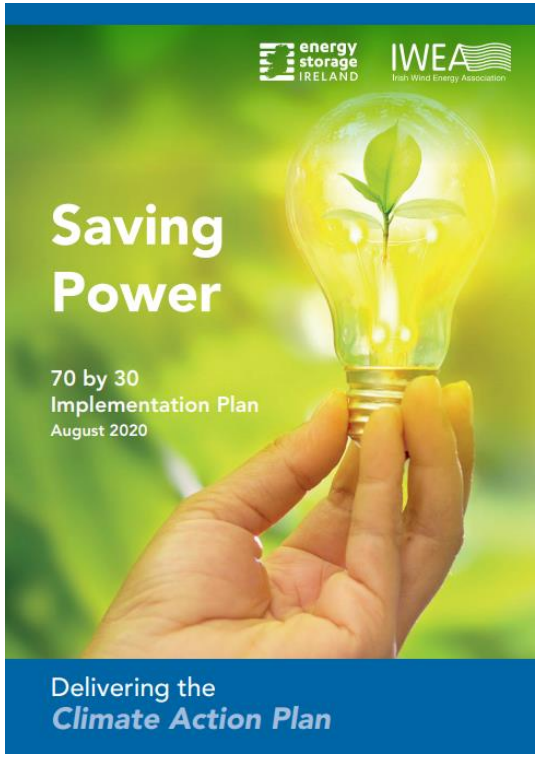
Policy Measures to Minimise Curtailment					
Policy Measure	**Description**	**Aim**	**Lead Stakeholders**	**Target Date**	**Impact in 2030 if Policy Measure not implemented**
DS3+	Enhance the DS3 programme to facilitate 2030 RES-E objectives	Develop a DS3+ programme to relieve existing operational constraints in line with EirGrid's strategic objectives to run the system with up to 95% non-synchronous generation	EirGrid, CRU, ESBN	2020	16.4% Curtailment
Interconnection Capacity	Provide additional interconnection capacity i.e. deliver Celtic and Greenlink interconnectors and put in place an enduring interconnection policy regime	Deliver Greenlink Interconnector by 2023 and Celtic Interconnector by 2026 Develop an enduring interconnection policy regime by Q4 2020	CRU, EirGrid, Greenlink Developer	Develop enduring interconnection regime - 2020 Greenlink – 2023 Celtic – 2026	19.1% Curtailment
Interconnection Operation	Introduce Single Intraday Coupling (SIDC) and maximise counter-trading as an interim measure to ensure that the market design is incentivising the right behaviour on the interconnectors on a first principles basis (least cost / least emissions).	Enhance interconnector operation so that they able to export approximately 90% of their capacity during curtailment events	EirGrid, SEMO, CRU	Maximise countertrading - 2020 Introduce SIDC - 2023	12.4% Curtailment
Policy Measures to Minimise Constraints					
Policy Measure	**Description**	**Aim**	**Lead Stakeholders**	**Target Date**	**Impact in 2030 if Policy Measure not implemented**
Increase Transmission Grid Capacity	Progress grid reinforcements based on future renewable development pipeline along with alternative network solutions using best-in-class community engagement. Streamline EirGrid's 'six-step' process and create a Grid Capacity Advisory Council. Maximise the capacity of the existing grid via alternative network solutions such as Smart Wires, energy storage, demand side response	Minimise constraints to the greatest extent possible and, where appropriate and reasonable, provide an indicative solution and timeline so renewable electricity generations can continue to develop with the certainty that constraints will be minimised in future.	EirGrid, ESBN, CRU	In 2020: Identify grid development requirements; Establish Grid Capacity Advisory Council; Initiate design & consent of required grid reinforcements. Develop PR5 grid development programme of work	1750 MW Less Onshore Wind 2000 MW Less Offshore Wind 8% Increase in cost of wind energy

Saving Power:

Major Long-Term Changes to Consider to Minimise Dispatch Down



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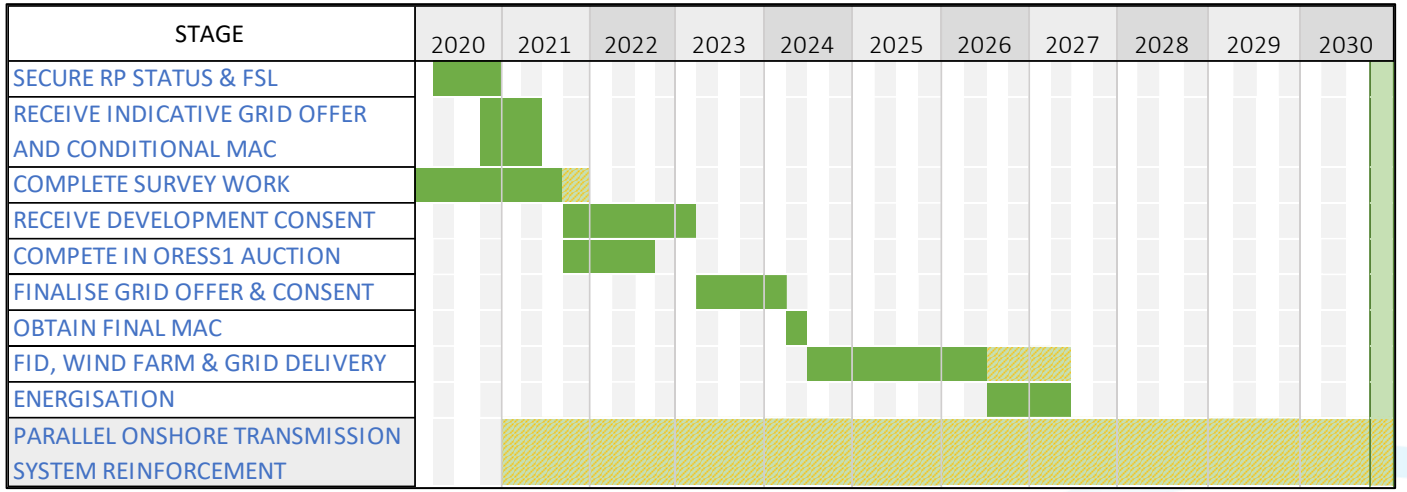
Major Long-Term Changes to Consider					
Policy Measure	**Description**	**Aim**	**Lead Stakeholders**	**Target Date**	**Impact in 2030 if Policy Measure not implemented**
Market Redesign	Today's electricity market is designed around marginal-cost energy, backup capacity and small amount of system services. In the future, renewable electricity will need long-term energy contracts, power plants will likely rely on capacity contracts and the grid will need a much larger market for system services. There is consensus change is coming, but a lot more analysis is required to establish exactly what this change is.	The market operator, SEMO via EirGrid and the CRU should put in place a dedicated team to solely focus on what the electricity market design should be in 2030 to facilitate a 70by30 power system. Ireland should also seek to engage and lead at a European level in the design of future markets appropriate for very high RES-E levels.	CRU, SEMO, EirGrid	2021	N/A
Dispatch down Certainty	CRU should implement dispatch down compensation for variable renewable generators, which is paid for by EirGrid and ESBN, who can then justify investments in solutions to reduce this compensation and thus reduce dispatch down. The compensation mechanism will need to ensure that generators are also not incentivised to build capacity in unwanted locations.	This could be implemented in the short-term while transposing Article 12 and 13 of the Electricity Regulation in the Clean Energy Package. If not, then the CRU should establish a roadmap that will explain how dispatch down will be managed over the next decade at the lower cost to the consumer, while also incentivising investment in renewable electricity to achieve 70by30. At present without dispatch down compensation, it is very likely that the 2030 targets will not be met or alternatively, they will be met at unnecessarily high costs to the consumer.	CRU, EirGrid, ESBN	2020	N/A
Grid 2050	The power system will be very different in 2050 so whatever path we take towards 2030 should bring us on the journey to full decarbonisation of the economy before 2050. This will ensure we can 1) use wind energy for renewable heat and transport and 2) minimise dispatch down due to Energy Balancing.	EirGrid and ESB Networks should begin planning for the power system needs for a fully decarbonised electricity system which can support the electrification of heat and transport with the goal of a decarbonised economy by 2050.	EirGrid, ESBN, CRU	2020	N/A

PfG/CAP Delivered Scenario Timelines

Indicative Phase 1 Timeline

with all Policy Improvements =

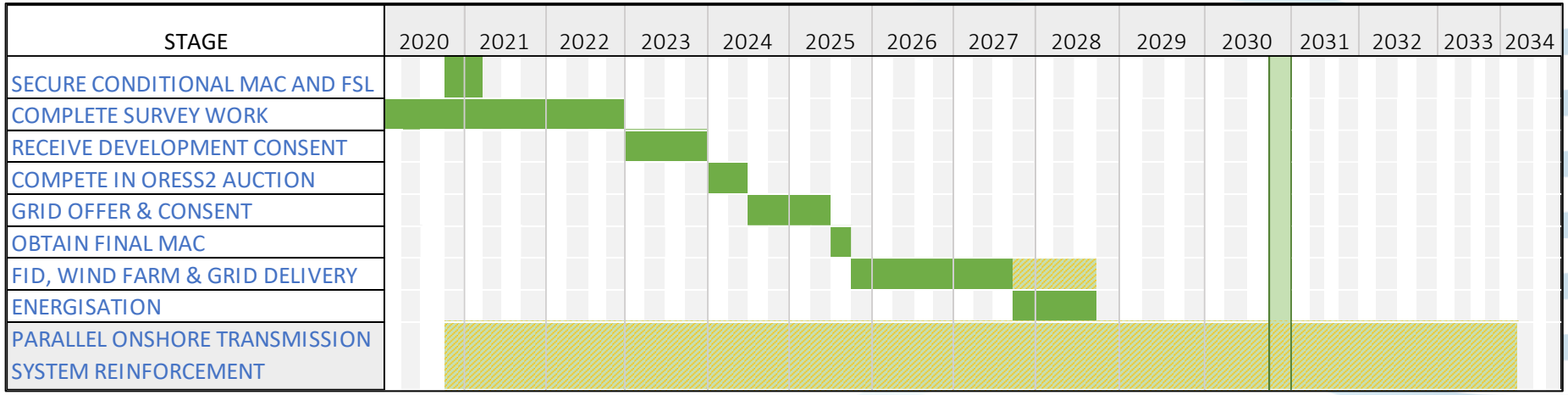
3 years saved



Indicative Phase 2 Timeline

with all Policy Improvements =

5.5 years saved



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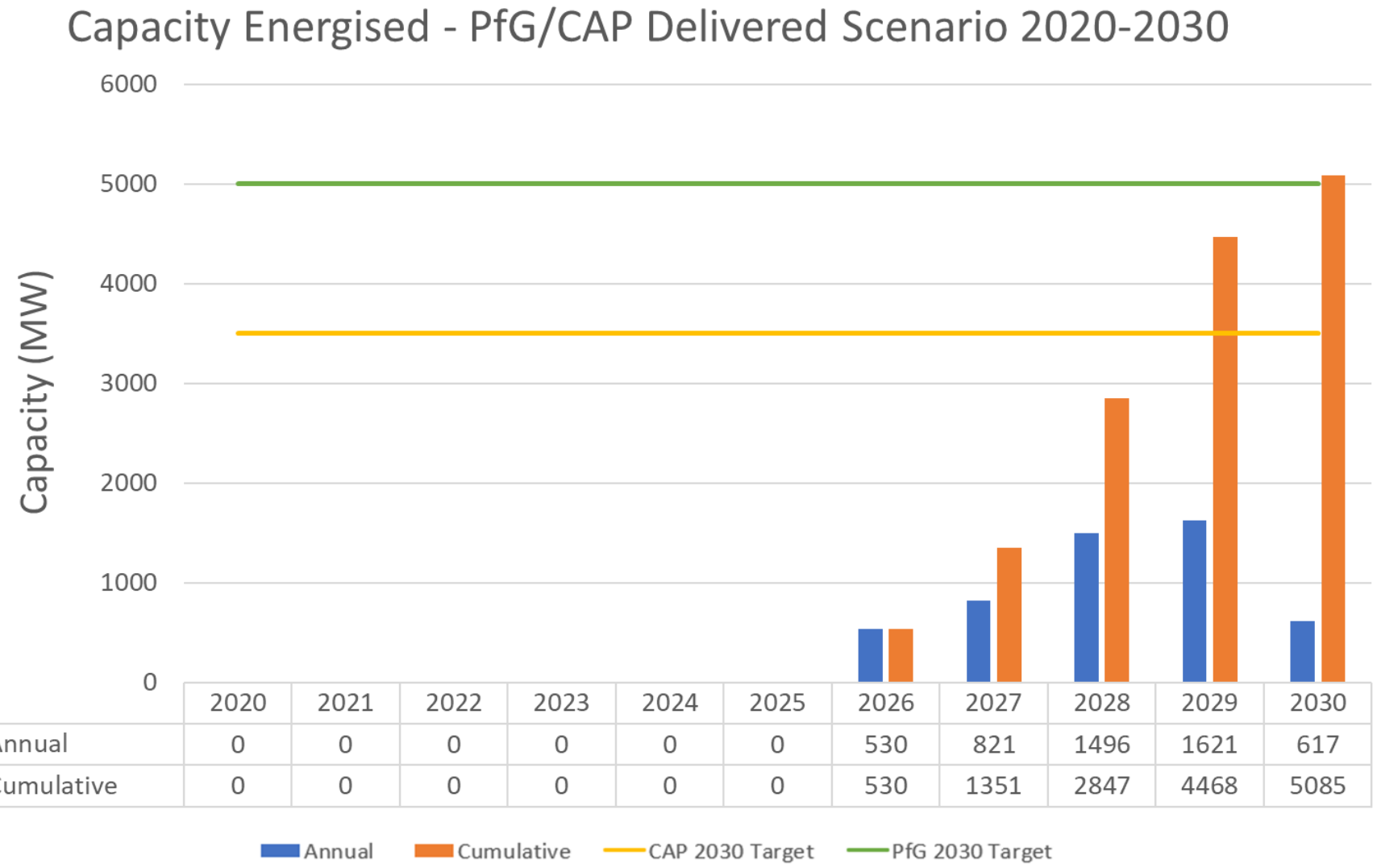
PfG/CAP Delivered Scenario Results - 5GW is possible by 2030!

Delivering all eight Policy Improvements means that Ireland can **deliver over 5,000 MW of offshore wind by 2030** when all systems work together in tandem

- ✓ Planning
- ✓ Grid Connections
- ✓ Route-to-Market and
- ✓ Grid Capacity



	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Annual	0	0	0	0	0	0	530	821	1496	1621	617
Cumulative	0	0	0	0	0	0	530	1351	2847	4468	5085

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Currently there are 10 Committees in IWEA

Health & Safety

Markets

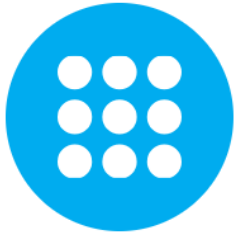
Offshore

Community Engagement

Asset Management

Planning

Energy Systems



Grid

RenewableNi

Northern Ireland

energy storage IRELAND

Storage

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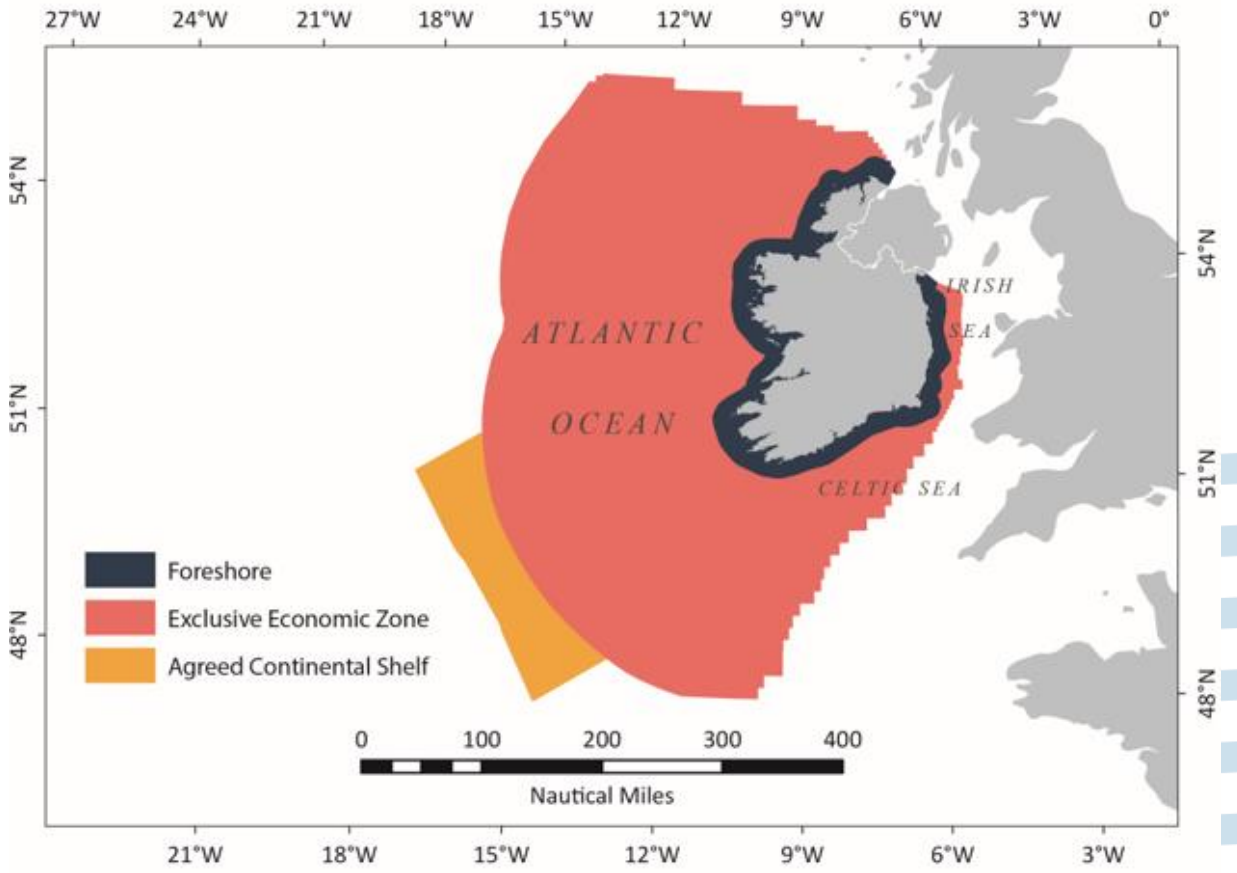
Floating Offshore Wind - 30GW Programme for Government target

Provides huge opportunities for Ireland to be a global leader in Floating Offshore Wind

- Net-zero economy by 2050 will drive unprecedented levels of change
- Direct electrification of Heat & Transport
- Indirect electrification through 'Clean Fuel Production' e.g. Hydrogen, Electrofuels
- Meeting demand of domestic Large Energy Users and contribute to wider EU decarbonisation



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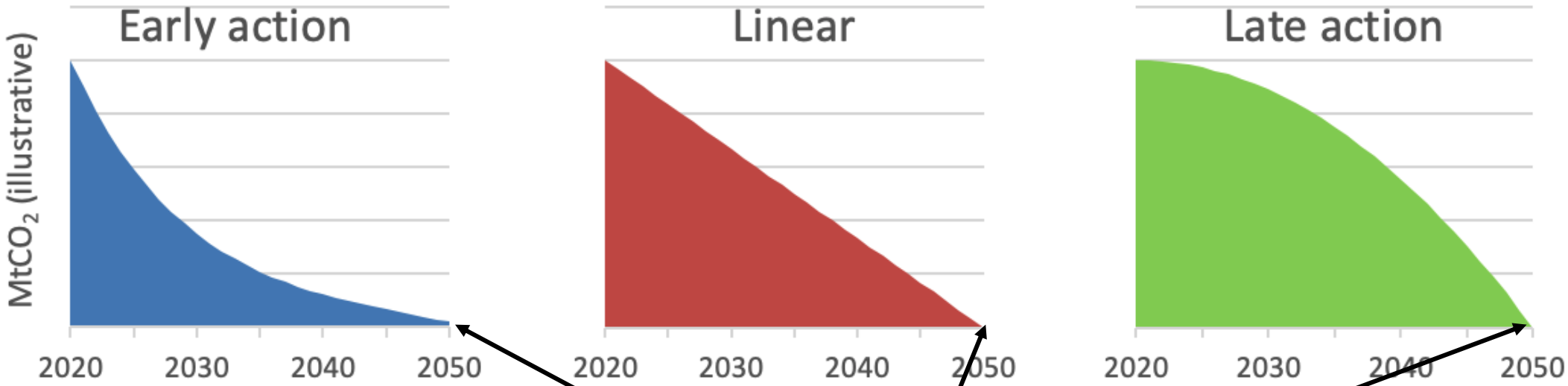
Why carbon budgets matter?

Late action cumulative emissions =
double early action cumulative emissions
therefore
double global warming impact



Very different pathways, but all achieve **net-zero emissions** in 2050

MaREI
Energy · Climate · Marine

Source: (Mc Guire et al, 2020)

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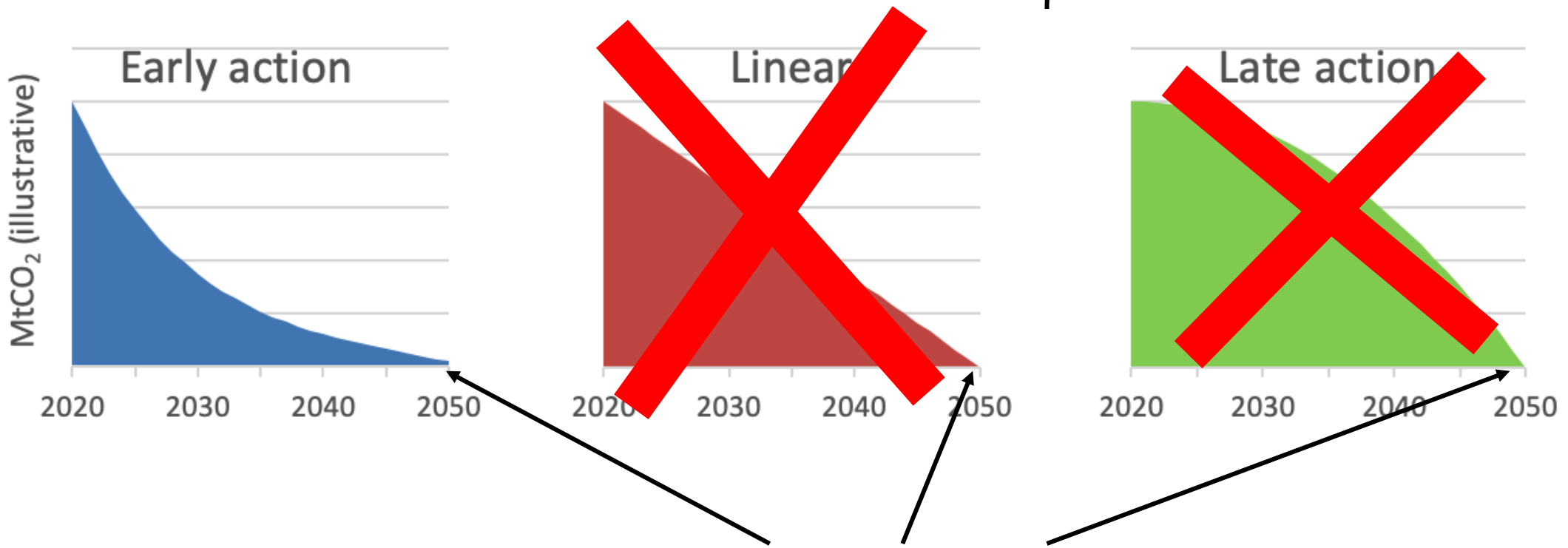

Very different pathways, but all achieve **net-zero emissions** in 2050

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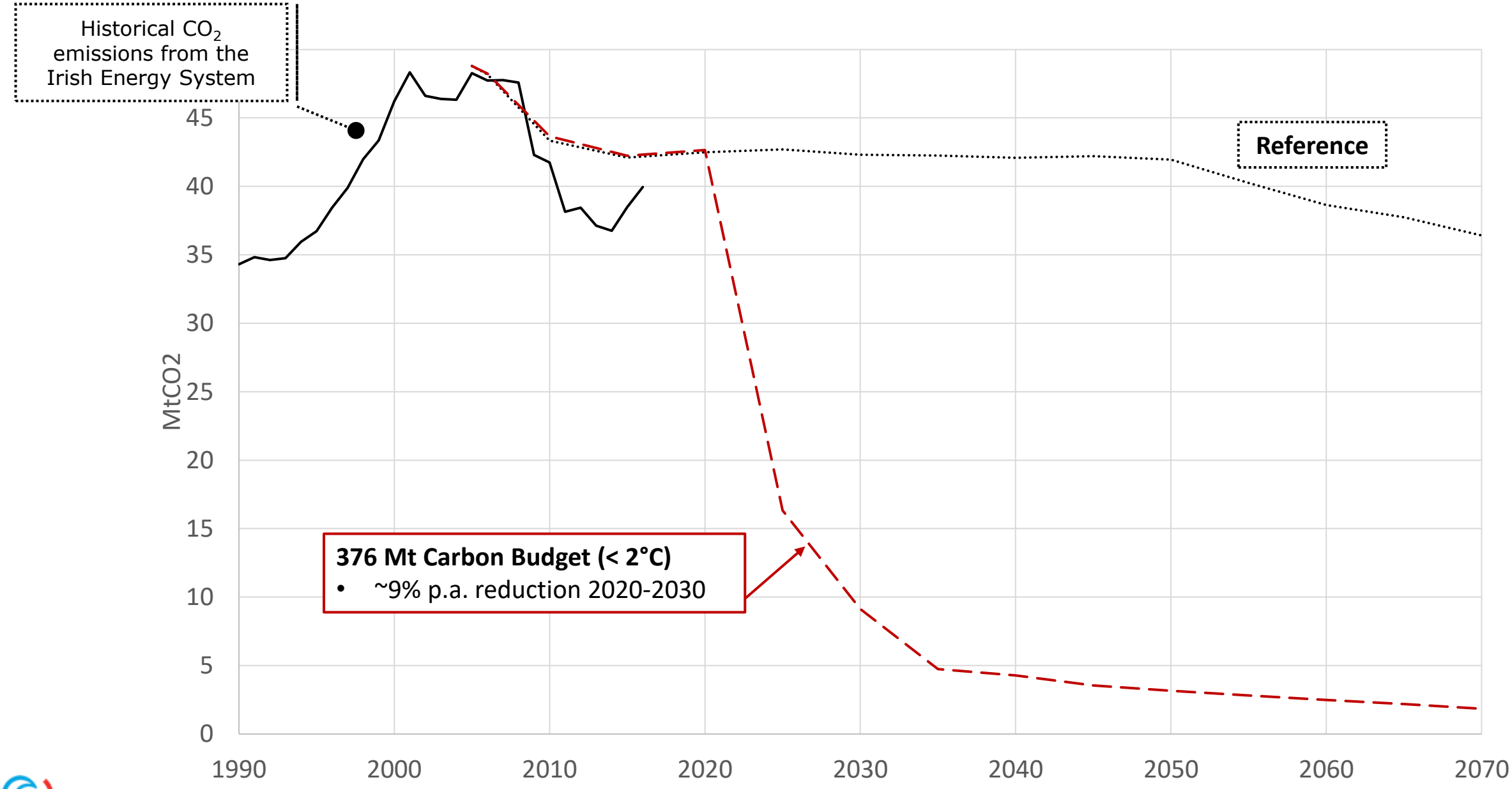

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Energy · Climate · Marine

Glynn, J., Gargiulo, M., Chiodi, A., Deane, P., Rogan F., Ó Gallachóir, B., 2019. *Zero carbon energy system pathways for Ireland consistent with the Paris Agreement.* **Climate Policy** 19:1, 30-42.

We cannot act fast enough.

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Building Offshore Wind - 70by30 Implementation Plan

10 December 2020