Saving Money

IWEA Webinar
Tuesday 23rd of June
4.00 pm – 5.30 pm

This webinar will begin shortly

Please use the Q&A box at the bottom of the screen to submit your questions

Presented by
David Connolly,
CEO IWEA

Chaired by
Paul Blount,
Portfolio Director Coillte

Delivering the 70by30 target with IWEA's 70by30 Implementation Plan (Four Reports)

1. 70by30 Implementation Plan: Building Onshore Wind
   - Complete – Launching Next
2. 70by30 Implementation Plan: Building Offshore Wind
   - Modelling Underway
3. 70by30 Implementation Plan: Saving Money
   - Launched 15th June
4. 70by30 Implementation Plan: Saving Power
   - Complete

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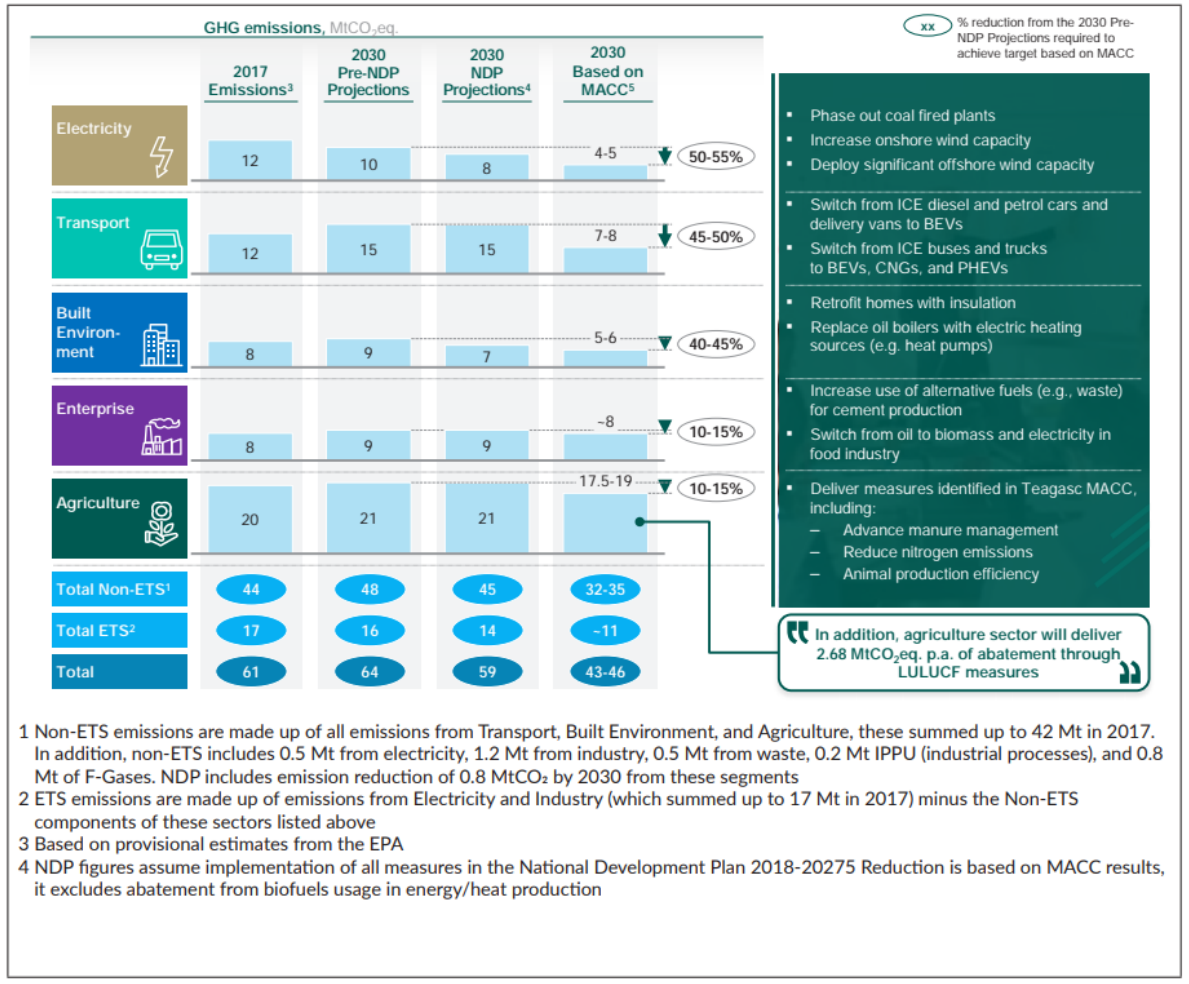
70by30 Energy will Save the Most Carbon in the Climate Action Plan

- Climate Action Plan aiming to save ~16 Mt by 2030
- 70by30 will save ~8 Mt of carbon by 2030

i.e. 50% of all

- INDUSTRY IS DEVELOPING ENOUGH PROJECTS TO MEET 2030 TARGETS

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

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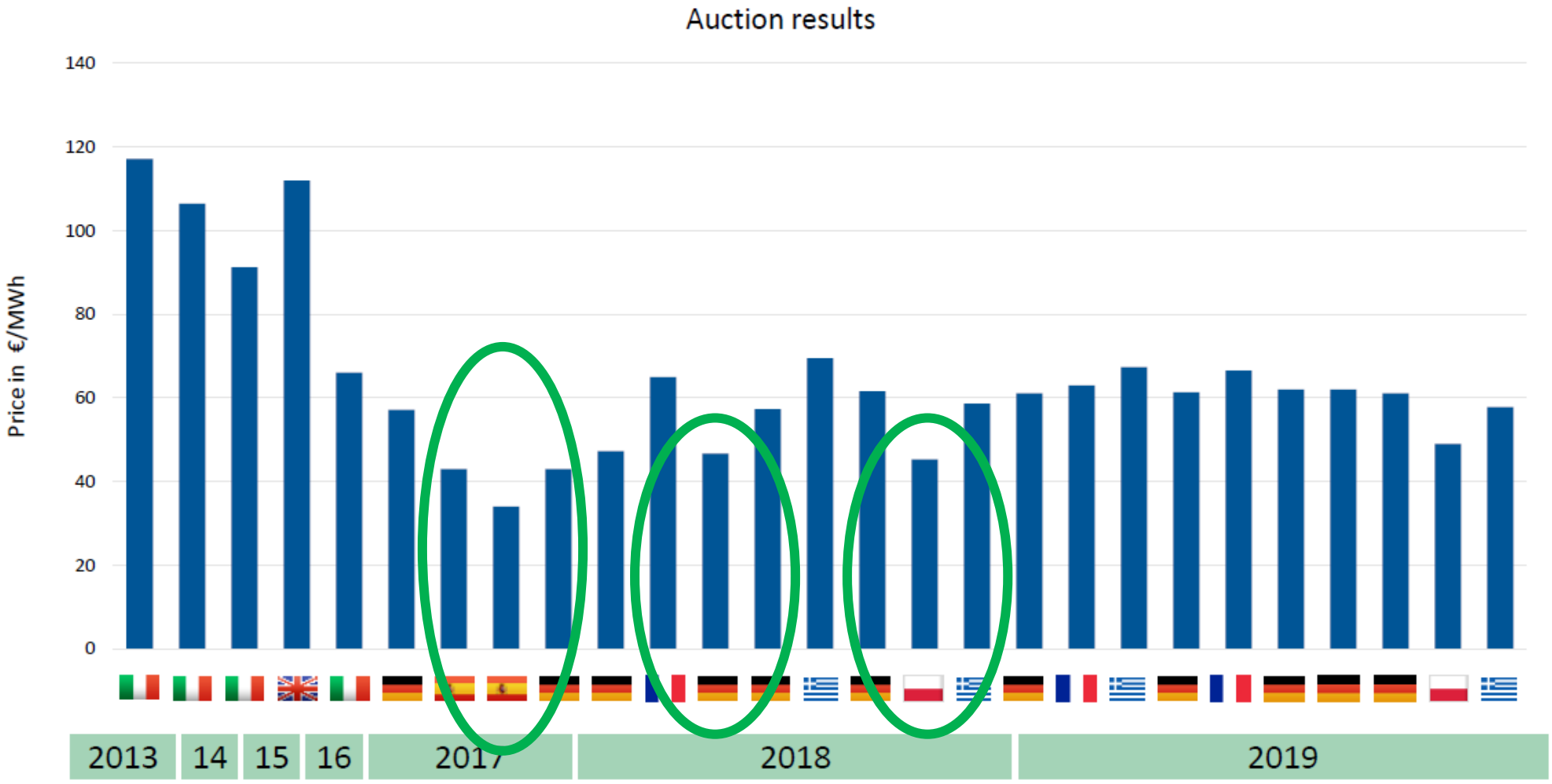
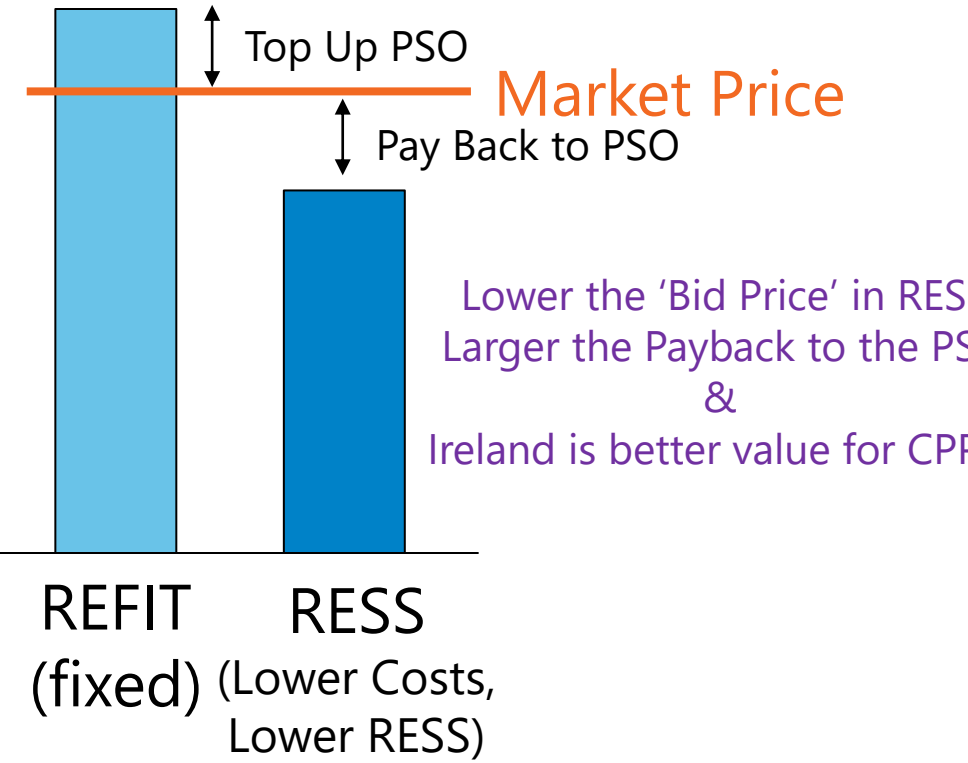
Cost of onshore wind is decreasing



Onshore Wind as low as €35-45/MWh in Other EU Member States

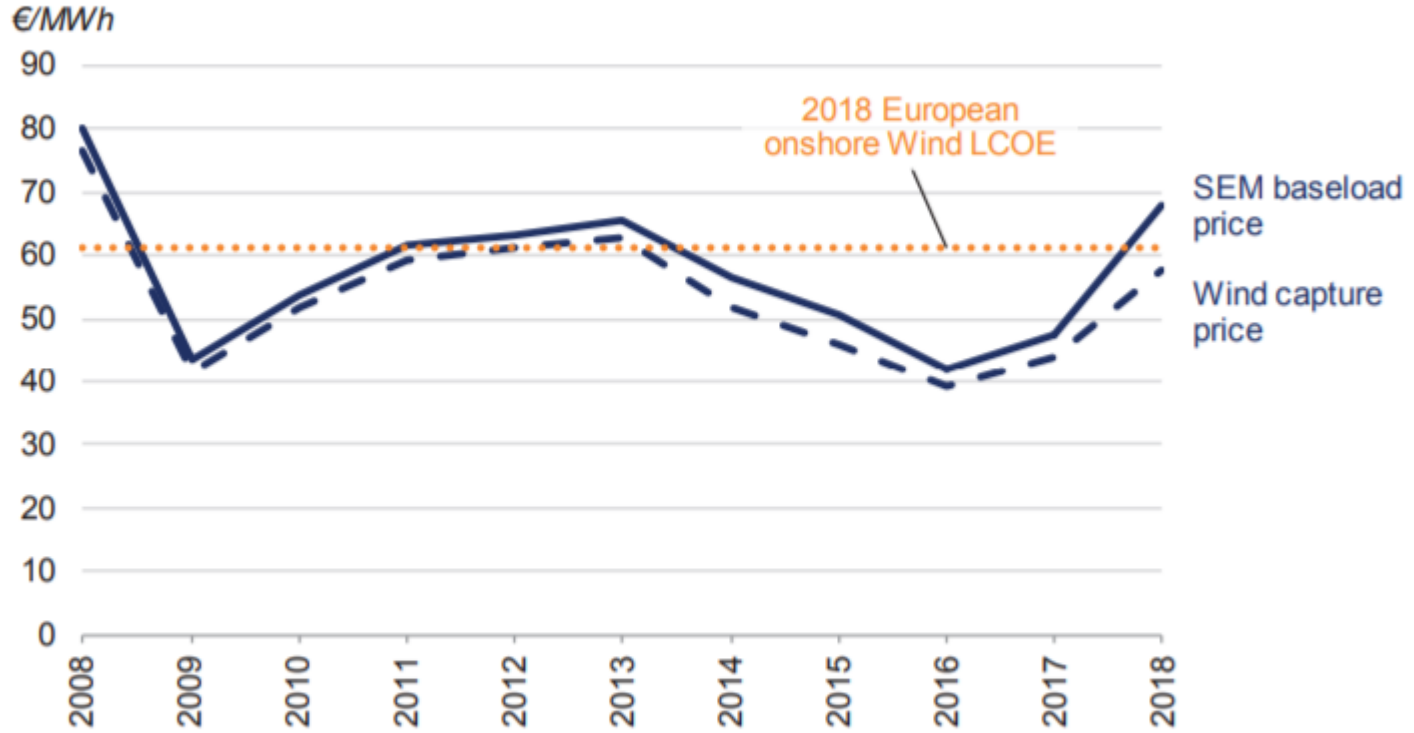
Wind EUROPE

Historical Market Prices in Ireland



Lower the 'Bid Price' in RESS
Larger the Payback to the PSO
&
Ireland is better value for CPPAs

Figure 1 – Historical average wholesale electricity prices in the SEM
(€/MWh, nominal money)



Note: The baseload price gives equal weight to all hours in a year and reflects the System Marginal Price in 2008 to September 2018 and the Day Ahead price from October 2018 onwards; the wind capture price weights each hour by the amount of wind generation available that hour.

Source: Wholesale prices – SEMO; wind capture prices – SEMO and EirGrid; onshore wind LCOE – IRENA.

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€10/MWh Saving in LCOE is ~€1.5 billion Extra Saving for Consumers

Savings identified here (i.e. €35/MWh) are therefore >€5 billion in savings for Irish Consumers

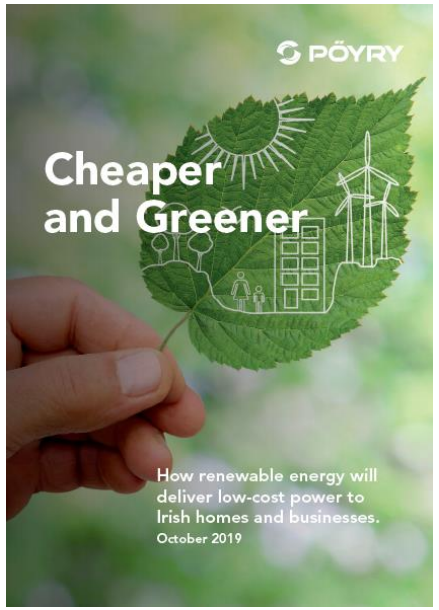
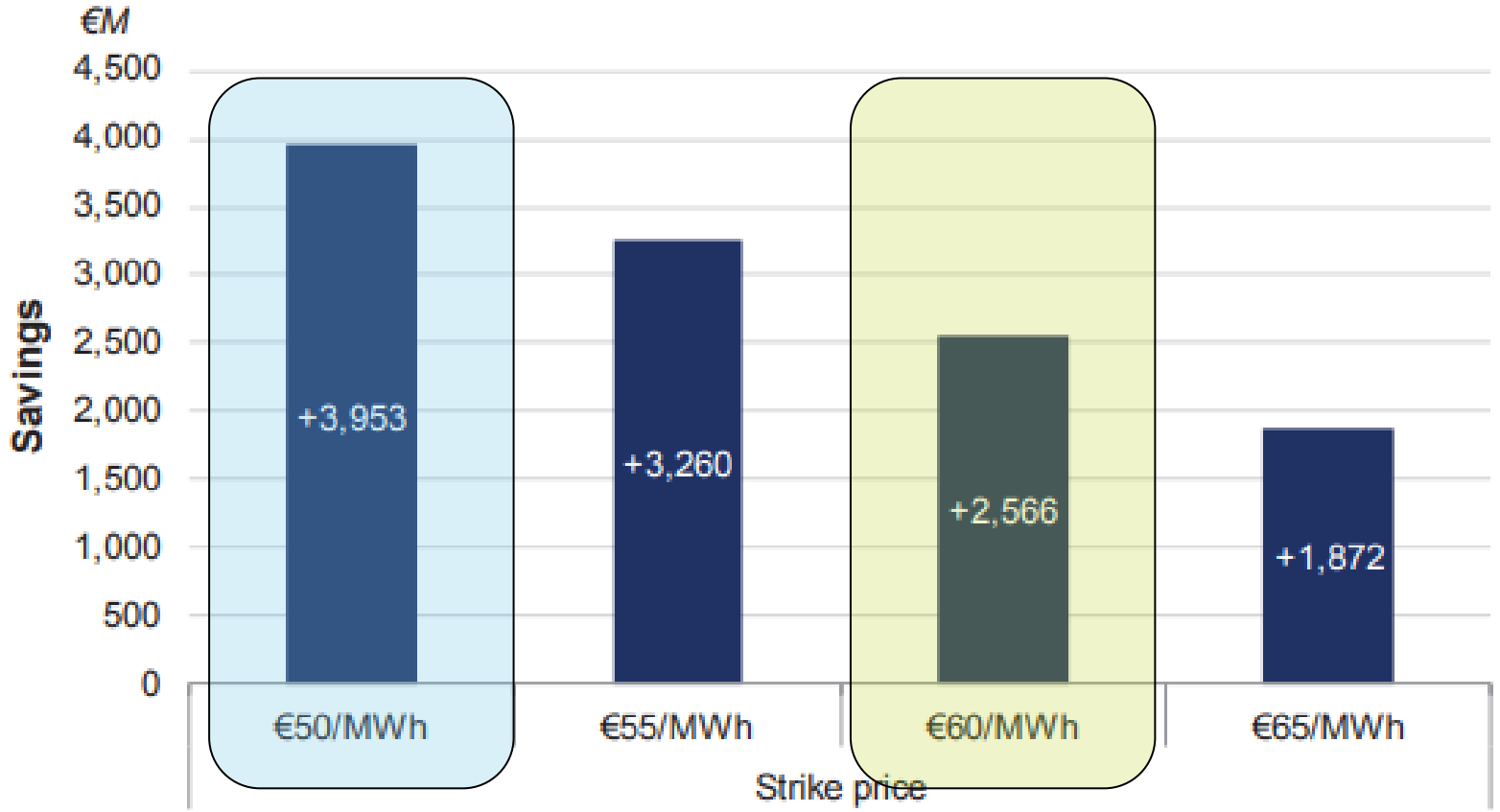


Figure 3 – Sensitivity of Net Consumer Value to different auction strike prices (€M, real 2017 money)



Note: A discount rate of 6% was used to calculate the net present value.

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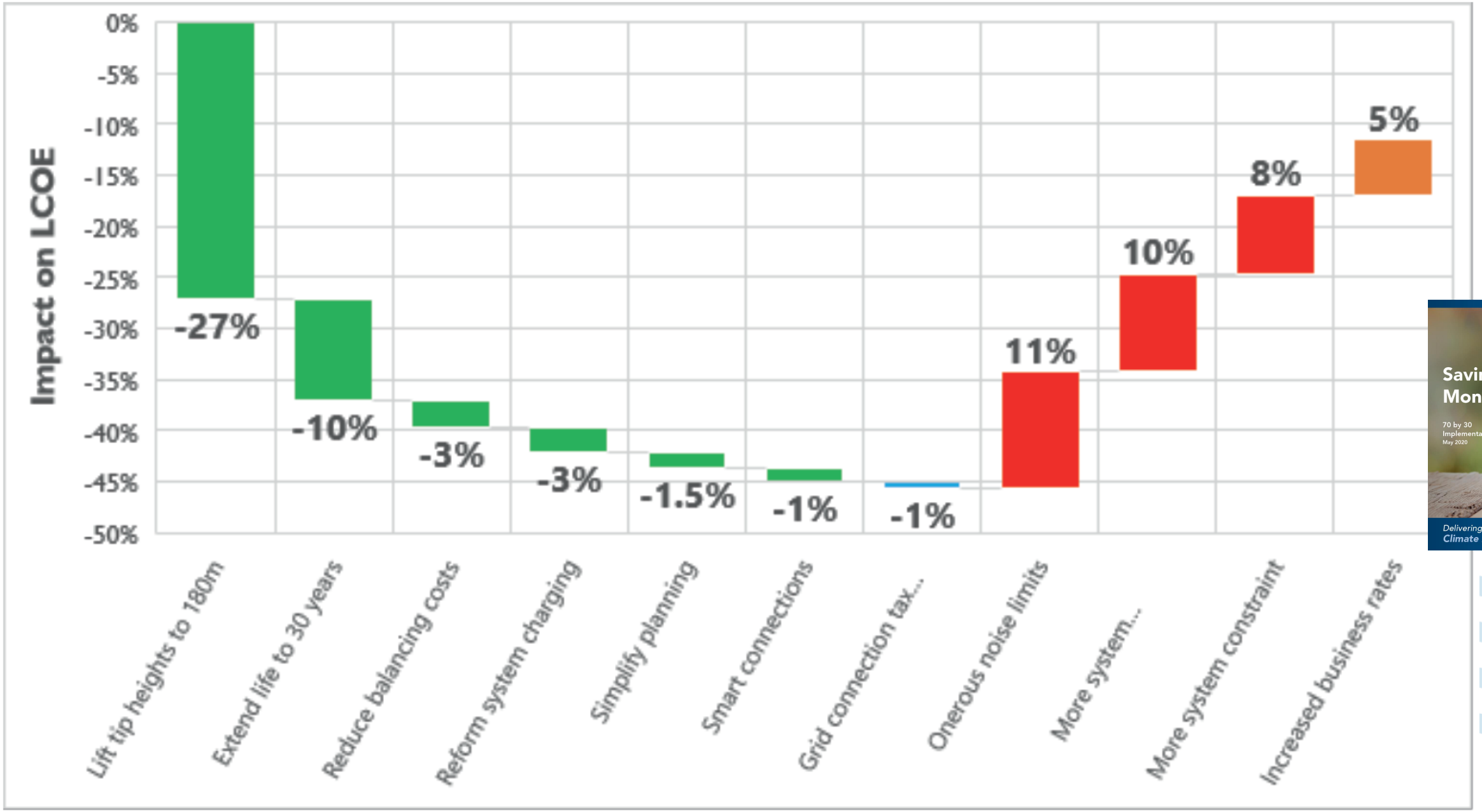
Cost reducer – direct consumer saving
Cost reducer – savings transferred
Cost raiser – direct consumer cost
Cost raiser – costs transferred
Impact on LCOE
0%
-5%
-10%
-15%
-20%
-25%
-30%
-35%
-40%
-45%
-50%
-27%
-10%
-3%
-3%
-1.5%
-1%
-1%
11%
10%
8%
5%
Lift tip heights to 180m
Extend life to 30 years
Reduce balancing costs
Reform system charging
Simplify planning
Smart connections
Grid connection tax...
Onerous noise limits
More system...
More system constraint
Increased business rates


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Saving Money
70 by 30 Implementation Plan
May 2020
Delivering the Climate Action Plan

Policy Choices to Reduce the Cost of Onshore Wind in Ireland

Name	Description	Lead Stakeholders	Most Affected	Others Impacted^	Cost Impact
1. Tip Heights	Ensure that taller wind turbines can be accommodated in the revised Wind Energy Development Guidelines	DHPLG, DCCAE, Communities, Local Authorities, An Bord Pleanála	All Consumers receive savings via the PSO due to lower RESS bid prices.		-27 per cent -€20.3/MWh
2. Noise Limits	Ensure the revised Wind Energy Development Guidelines do not include extreme noise limits	DHPLG, DCCAE, Communities, Local Authorities, An Bord Pleanála	All Consumers pay additional costs via the PSO due to higher RESS bid prices.		+11.4 per cent +€8.6/MWh
3. Life Extension	Grant planning for wind farms for 30 years	Local Authorities, An Bord Pleanála, DHPLG	All Consumers.	Offshore Wind; Solar	-10 per cent -€7.5/MWh
4. Simplified Planning	a) Enhanced community engagement; b) Implement regional planning for wind energy; c) Improve SID engagement and decision timelines in An Bord Pleanála; d) Facilitate grid consenting in parallel to wind farm consenting.	a) Wind farm developers; b) DHPLG & Regional Authorities (via REPDF); c) An Bord Pleanála & DHPLG; d) DHPLG & CRU to facilitate grid installations on public roads	All Consumers. Some savings should be allocated to additional resources in Regional Authorities & ABP.	Offshore Wind	-1.5 per cent -€1.1/MWh
5a. Curtailment	Continuation of the DS3 program to ensure enough system services (reserve, inertia, reactive power, and ramping) can be provided, ideally by zero-carbon services, to increase SNSP to 95 per cent and eliminate 'Min Gen'. Create more flexibility on the Irish grid via interconnection and Demand Side Management/storage.	CRU to provide enough resources via PR5 and EirGrid/ESBN to implement, particularly via continuation of DS3, more interconnection and flexible technologies.	All Consumers. Some savings should be allocated to EirGrid, ESBN & industry to invest in new solutions required.	Offshore Wind; Solar	+10 per cent +€7.5/MWh
5b. Constraints	Progress grid reinforcements based on future development along with alternative network solutions using best-in-class community engagement. Streamline EirGrid's 'six-step' process and create a Grid Capacity Advisory Council.	CRU to provide enough resources via Price Review 5 and EirGrid to design/consent based on future outlook. ESBN to build the grid once a clear need is demonstrated.		Offshore Wind; Solar	+8 per cent +€6/MWh
6. Grid Charges	Provide fixed grid charges (DLAF, TLAF, DuOS and TuOS) before financial close of a wind farm and allocate future cost changes to new connections and/or to be socialised.	CRU to review grid charges methodology.	All Consumers will benefit from lower capital costs. Reform of grid charges should otherwise be cost neutral.	Offshore Wind; Solar	-3 per cent -€2.3/MWh

7. Grid Connections*	More contestability for grid connections, sufficient grid offers and alignment of grid offer process with RESS auctions, facilitate hybrid connections by allowing separate legal entities and dynamic sharing of capacity at a single connection point.	CRU via review of Hybrid policy, ECP policy and PR5. EirGrid and ESBN to implement Hybrid and ECP policy with resources/incentives from PR5.	All Consumers. Some savings should be allocated to EirGrid & ESBN for additional resources to deliver.	Offshore Wind; Solar	-1 per cent -€0.8/MWh
8. Balancing Costs	Create more flexibility on the Irish grid via interconnection and DSM/storage; couple I-SEM to Europe via SIDC (formerly XBID); improve liquidity in the continuous markets by allowing new products and GB access to all intraday markets; avoid excessive system margins.	EirGrid via SEMO and CRU to update the I-SEM design. EirGrid to facilitate more interconnection and flexible technologies.	All Consumers with some savings offset by investment in new solutions.	Offshore Wind; Solar	-3 per cent -€2.3/MWh
9. Commercial Rates	Reverse recent increase in commercial rates for wind farms so they are maintained at similar levels to those payable by fossil fuel generators. For example, Ireland could decrease the rates payable by wind farms by updating the Valuations Act to exclude the moving parts of a wind turbine which is the case in Northern Ireland.	DHPLG to update the Valuation Act. Valuation Office to implement based on a more transparent and robust valuation scheme for wind farms.	All Consumers. Reduced commercial rates liability will enable wind farms to sell power more cheaply.	Solar	**+5 per cent +€3.8/MWh**
10. Grid Capital Allowances	Allow the capital costs associated with grid connections to be included as capital expenditure like roads, turbines and electricity systems when reducing the amount of tax payable, as allowed in the UK.	Department of Finance and the Revenue Commissioners	Lower costs for wind, but tax reductions will need to be collected elsewhere or offset by future growth in wind.	Offshore Wind; Solar	-1 per cent -€0.8/MWh
Total Savings					**-46.5** per cent **-€35/MWh**
Total Costs					**+34.4 per cent +€26/MWh**

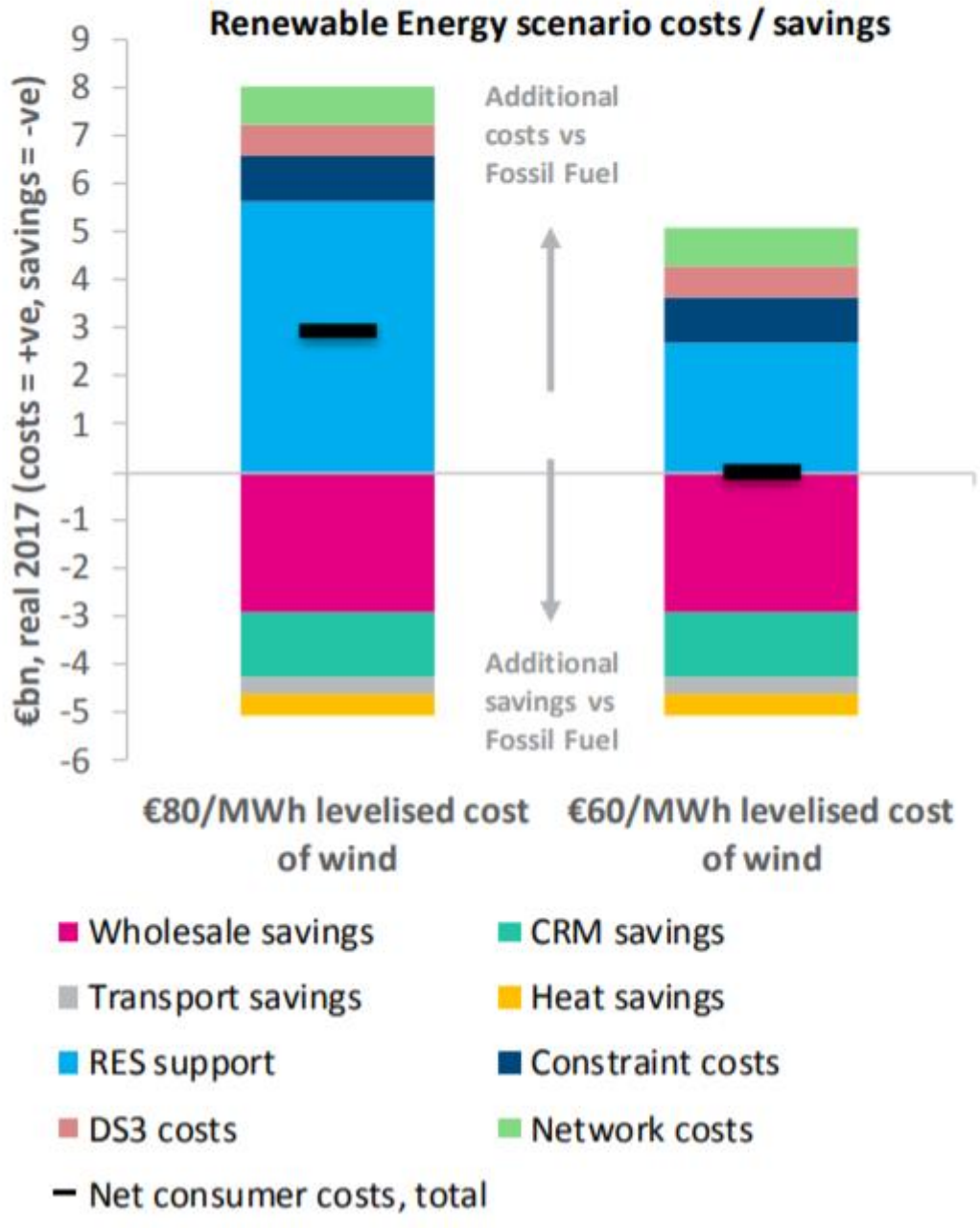
^The analysis was originally based on onshore wind, but there are a number of policies that will potentially benefit offshore wind and solar also, which are also central to the Irish government's plans for 2030.

*This does not account for the cost of uncertainty due to grid delivery. For example, if renewable electricity auctions include 'cliff edge' deadlines then this will create additional risk for a project, particularly in relation to the timelines for grid delivery. This will be an additional cost to consider and was beyond the scope of the analysis here.

Need Cross-Department 'Cost Task Force' to Ensure we realise these Savings

70by30 for Electricity: Cost Neutral @€60/MWh

Figure 1 **Summary of total Renewable Energy scenario costs and benefits relative to the Fossil Fuel scenario (2020-2030)**



Need to Spend Money to Save Money!

SPEND MILLIONS

- Resources (DPER?):
  - DCCAE
  - DHPLG
  - An Bord Pleanála
  - Regional Assemblies
- Price Review 5 (CRU)
  - Infrastructure & Resources
  - EirGrid/ESB Networks
  - Grid Capacity
  - DS3
  - Grid Charges
  - Market Design (SEMO)

TO SAVE BILLIONS!

- Lower Wind Prices
- Lower Bid Prices in RESS
- Lower PSO Costs
- More Corporate PPAs

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70by30 Implementation Plan
Saving Money

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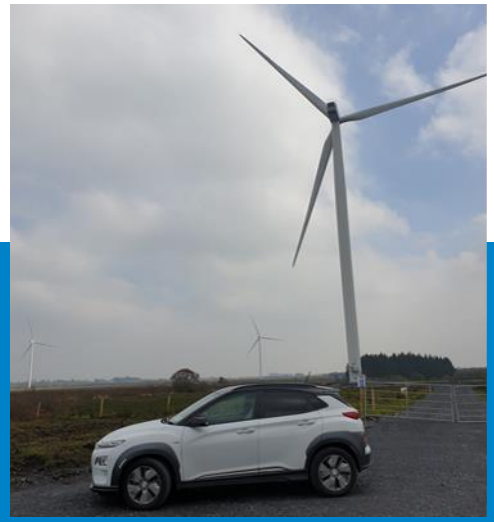

WIND ENERGY IN IRELAND
ANNUAL REPORT – 2019

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32.5%

In 2019 wind energy provided 32.5% of our electricity.

4,130 MW

The Republic of Ireland now has 4,130 MW of installed wind capacity.

24
New wind farms built in 2019.

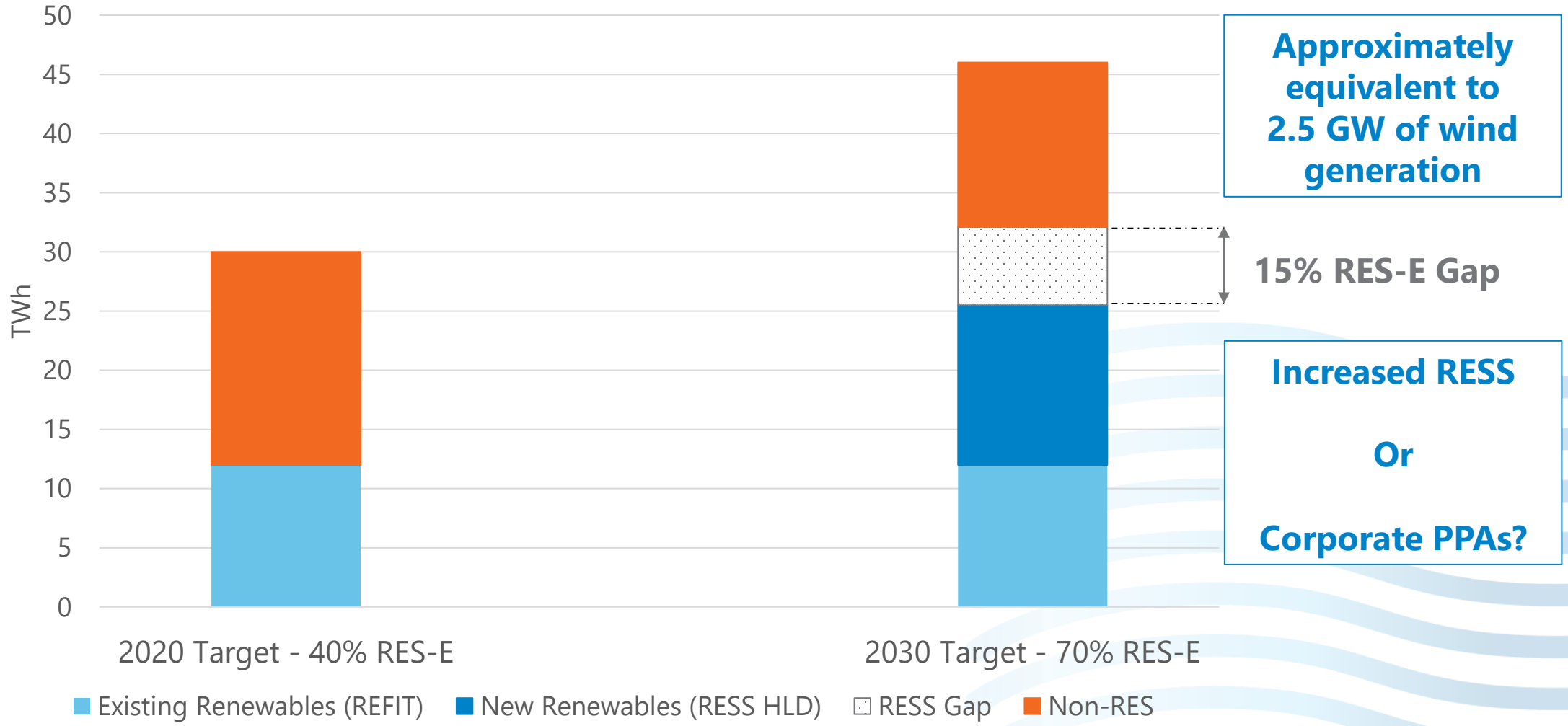
An extra
463 MW
of new wind capacity installed.

Wind **outperformed gas** in February and December.

New record set with **4,039 MW of wind** on the all-island system.

Some figures are still provisional and the majority have been compiled by IWEA databases and EirGrid data.

70% RES-E - Increased RESS Volumes or Corporate PPAs?



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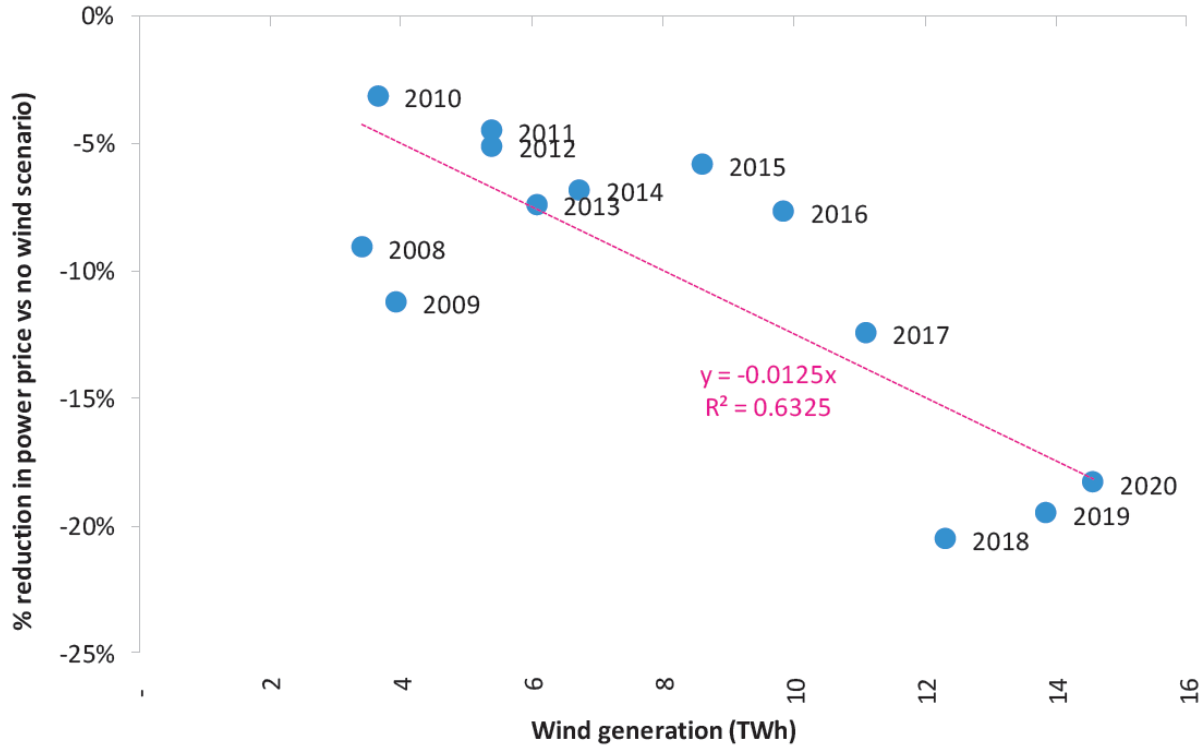
Wind Energy Drives Down Prices in the Electricity Market

Figure 6 Wind generation and wholesale price reduction vs 'no wind' scenario



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Planning and Environment – Tip height

Base case assumptions

- 90m rotor, 80m hub
- Shear = 0.2
- Industry best practice losses
- 125m tip height
- 9 turbine on 6D x 4D spacing

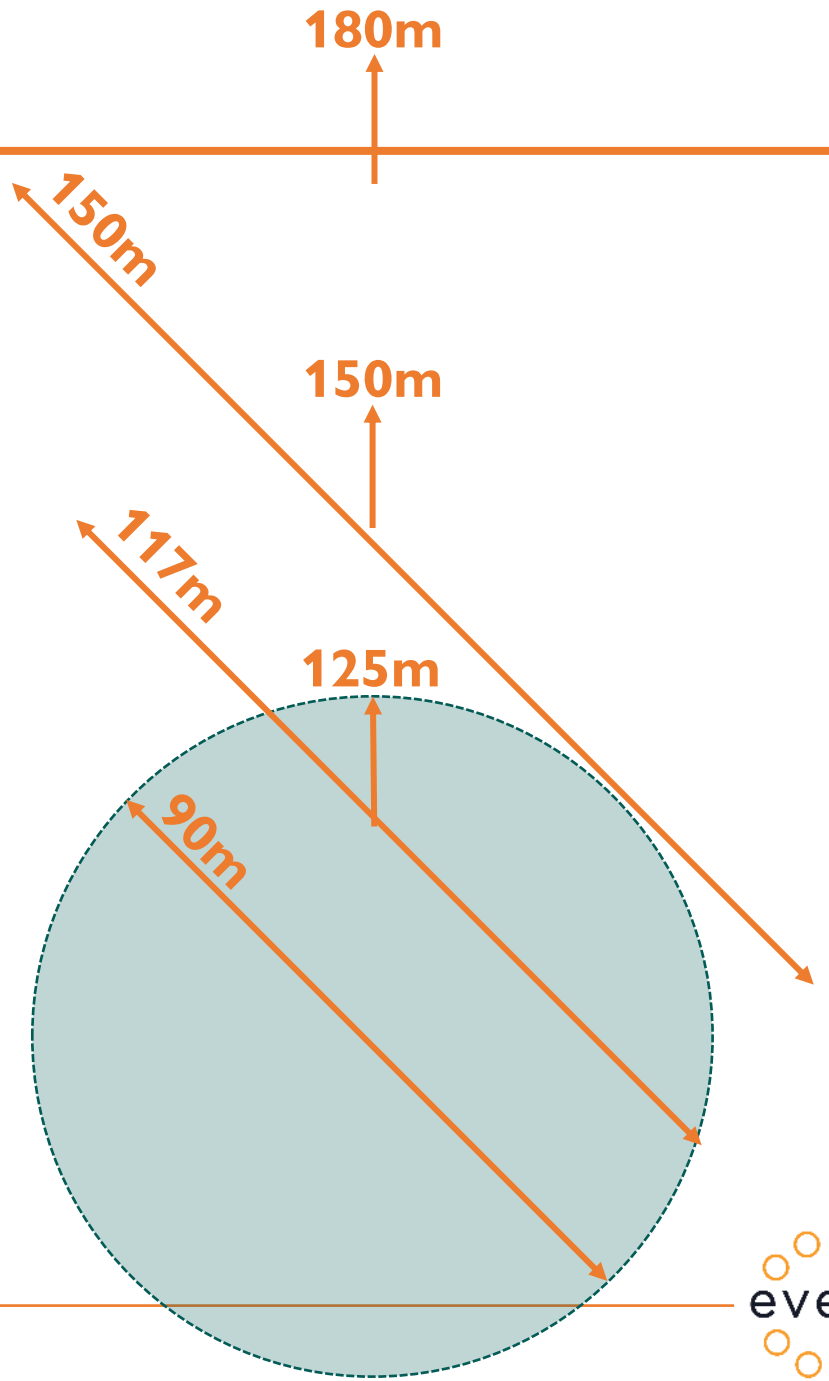
Benefits of increased tip height

- Latest turbine tech with improved wind conditions
- Reduced turbine and civils CAPEX per MW
- Reduced turbine OPEX per MW

LCoE impact on base case

150m -12%

180m -27%



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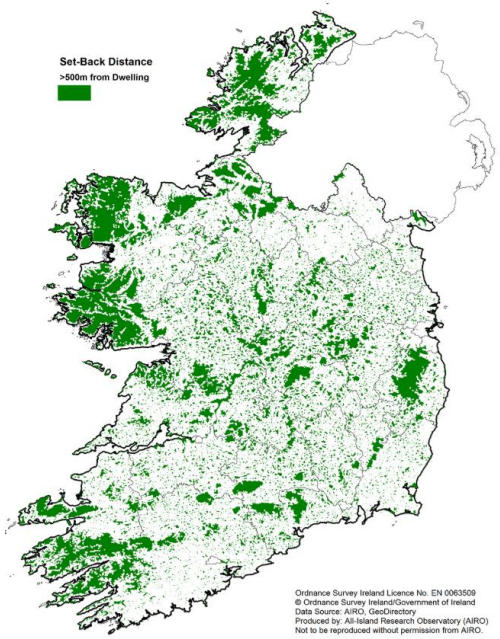
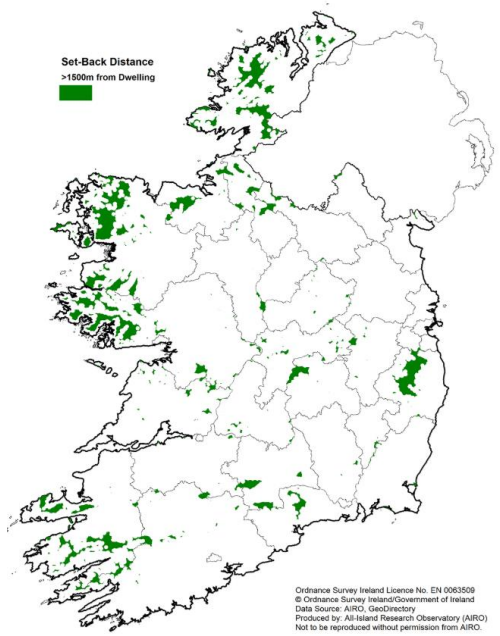
An excessive setback distance could prevent future onshore wind development

500 METRES SETBACK = 23% LAND (CURRENT GUIDELINES)



1500 METRES SETBACK = 5% LAND (10 X MIN TIP OF 150 M)



Source: https://irelandafternama.wordpress.com/2012/11/26/wind-turbines-bill/

20% Increase in Height = 180% Increase in Power

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Bellacorrick:
New turbines are 3.2 MW vs. the original 0.3 MW, so x10 times the Power for x3.6 times the height (~180 m high).

22 Original turbines will be replaced by 2 new turbines (~50 m high).

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Larger Turbines Can be Quieter Turbines: https://www.youtube.com/watch?v=BjO7aS6WZ5g

No	Type	Power	Rotor	Tip height	Noise
		(MW)	(m)	(m)	(dBa)
1	V117-4.2MW	4.2MW	117	150m+	106 dBa
2	V126-3.6MW	3.6MW	126	150m+	104.4 dBa
3	V136-3.6MW	3.6MW	136	150m+	105.5 dBa
4	V136-4.2MW	4.2MW	136	150m+	103.9 dBa
5	V150-4.2MW	4.2MW	150	180+	104.9 dBa
6	V150-5.6MW	5.6MW	150	180+	104.9 dBa
7	V162-5.6MW	5.6MW	162	200+	104 dBa

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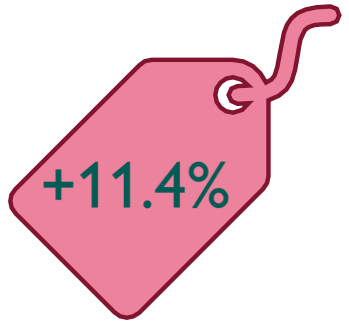
Vestas®

Planning and Environment – Other scenarios

Noise

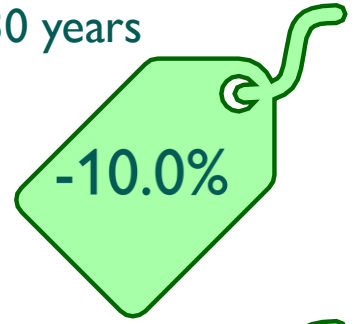
- Implementing proposed WEG guidelines will increase need to restrict wind turbine performance
- IWEA 10% reduction in AEP based on models of members sites



Life extension – extending permitted operating life from 20 years

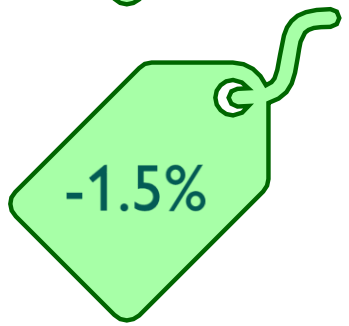
…to 25 years

…to 30 years



Simplified planning

- Less uncertainty in development = smaller risk premiums
- Reduced time in development phase
- 28% reduction in DEVEX



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WEGs: IWEA Main Concerns & Proposed Compromise

Noise: a) limits and b) method:

- Independent experts say method "contains a number of technical errors, ambiguities and inconsistencies" – IWEA acousticians have identified 309 issues

- Wind Europe "The proposed noise limit of 35-43 dB would be, by some distance, one of the lowest and harshest limits in the whole EU"

- Compromise: keep 35-43 dBA limits, but use Northern Ireland/UK method

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Northern Ireland Noise Data

- Northern Ireland: A recent study from Northern Ireland concluded that only 20 out of ~11,700 noise complaints over a 12-month period in 2017/2018 were related to wind farms i.e. 0.1% of all noise complaints.
  - Page 12: https://www.daera-ni.gov.uk/sites/default/files/publications/daera/DAERA%20Noise%20Complaint%20Statistics%20NI%202017-18.pdf

Table 1 Total noise complaints received by district council 2017-18

	Category of Source															
	Industrial				Commercial & Leisure							Domestic				
COUNCIL	Industry Manufacturing Workshops	Agricultural	Wind Turbine (Individual)	Wind Farm	Entertainment Premises	Sports & Leisure	Petrol Stations/Car Wash	Hot Food Bars Restaurants	Other Shops & Offices	Security Alarms	Other	DIY	Music Televisions Parties	Animal Noise	House Alarms	Other Neighbour Noise
Antrim & Newtownabbey	22	2	6	2	3	10	0	0	3	4	34	8	119	289	7	87
Armagh, Banbridge & Craigavon	9	11	12	0	1	25	1	2	0	2	4	7	143	409	6	52
Belfast	2	0	0	0	366	49	4	3	68	163	51	49	3,648	813	147	899
Causeway Coast & Glens	12	5	6	4	5	0	0	1	0	8	11	1	62	313	10	17
Derry & Strabane	18	2	2	2	26	3	0	6	1	3	5	4	77	239	11	52
Fermanagh & Omagh	8	7	7	2	5	1	2	0	3	4	3	1	41	120	0	51
Lisburn & Castlereagh	9	9	2	0	4	8	2	1	0	4	0	3	80	283	2	58
Mid & East Antrim	10	4	4	1	5	6	0	0	4	4	1	8	60	216	5	49
Mid Ulster	26	11	3	7	2	3	1	0	1	4	1	2	54	196	1	34
Newry, Mourne & Down	22	4	13	0	4	2	0	1	0	1	0	0	19	242	4	43
Ards & North Down	6	6	2	2	3	8	0	2	3	9	6	2	62	319	5	38
TOTAL	144	61	57	20	424	115	10	16	83	206	116	85	4,365	3,439	198	1,380
				282							970					9467

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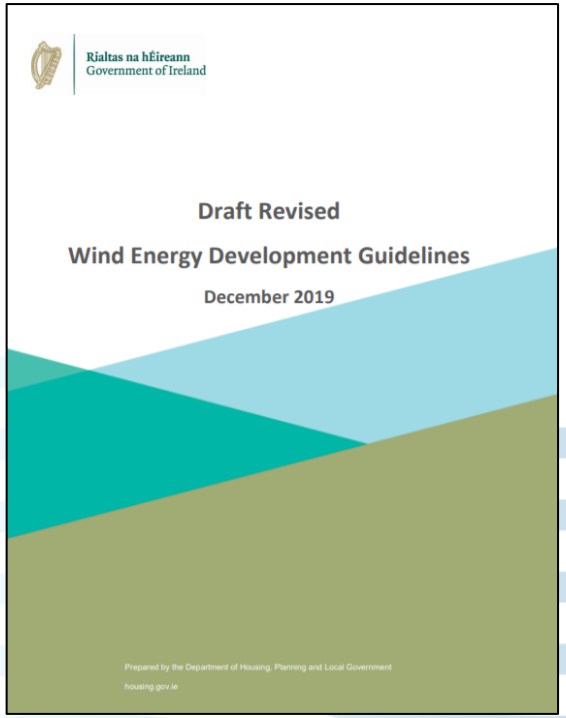
Draft Wind Energy Guidelines a Huge Concern

- No assessment of reduction in capacity from existing wind farms (IWEA estimate 36% at risk)
- No assessment of reduction in future onshore wind development (e.g. setback means 40% less land. Overall, 2030 onshore wind target = high risk)
- No assessment of additional costs to consumer i.e. higher bid prices in RESS (IWEA estimate of limits only = €2.7 billion)
- No assessment of the scale of concerns e.g. number of noise complaints (IWEA estimate = ~20 per year)



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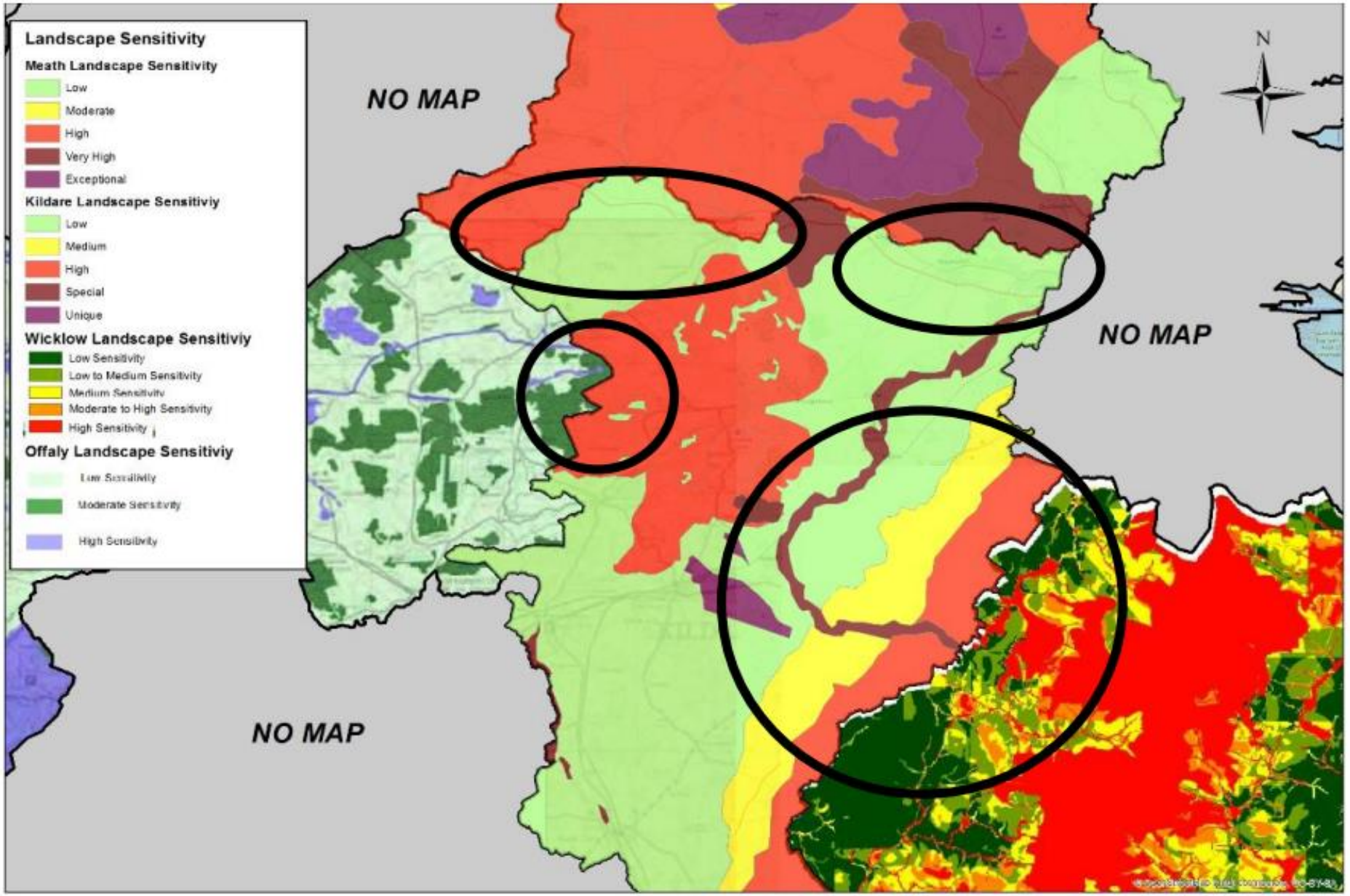
Simplified Planning

Example of Simplified Planning: Regional Approach



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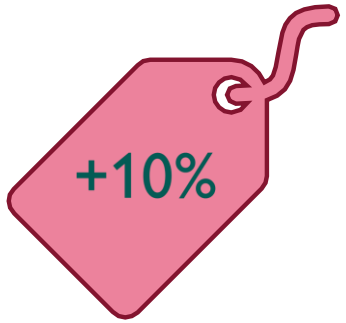
Curtailment/ Constraints

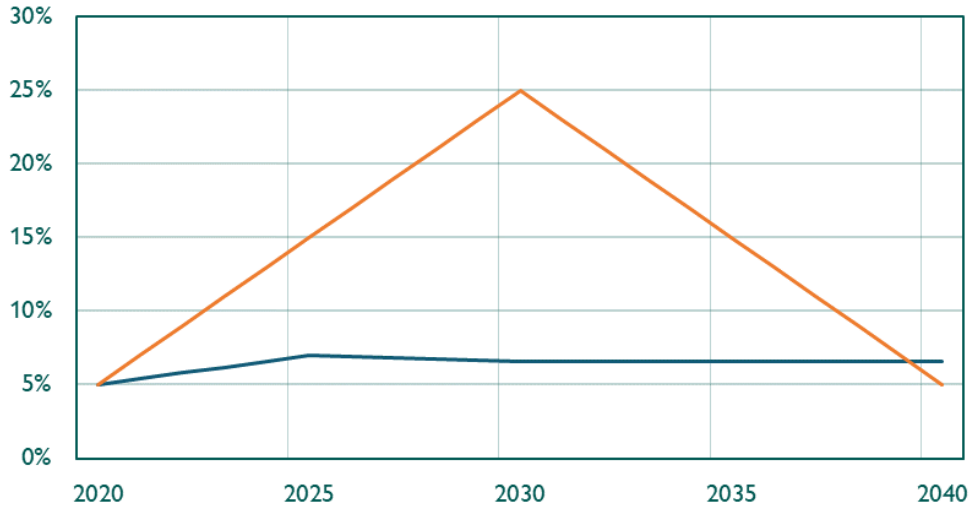
Grid – Constraint and curtailment

Curtailment

Base case: per 70by30 study

Downside scenario:
- 5% in 2020 (operations year 1)
- rising to 25% in 2030
- falling back to 5% by 2040

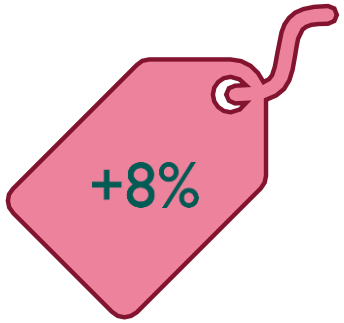




Constraint

Base case: 1% flat

Downside scenario:
- 1% in 2020 (operations year 1)
- rising to 15% in 2030
- falling back to 2% by 2040



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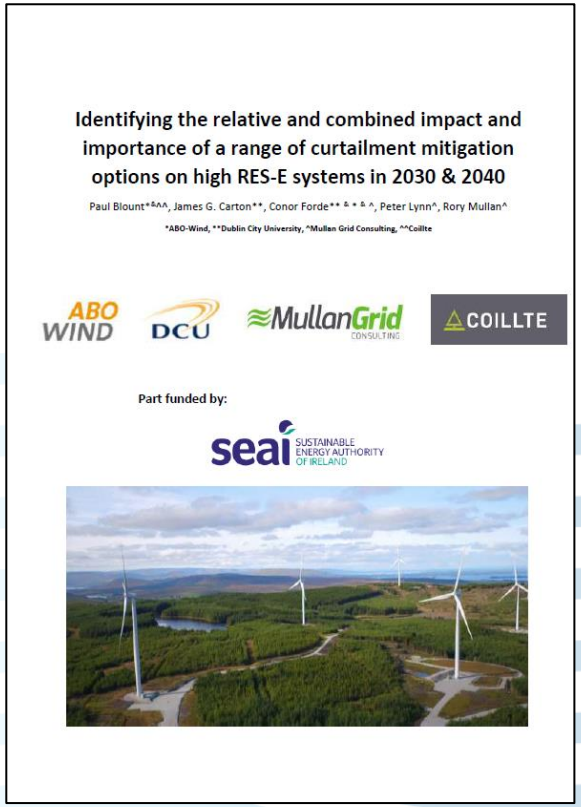
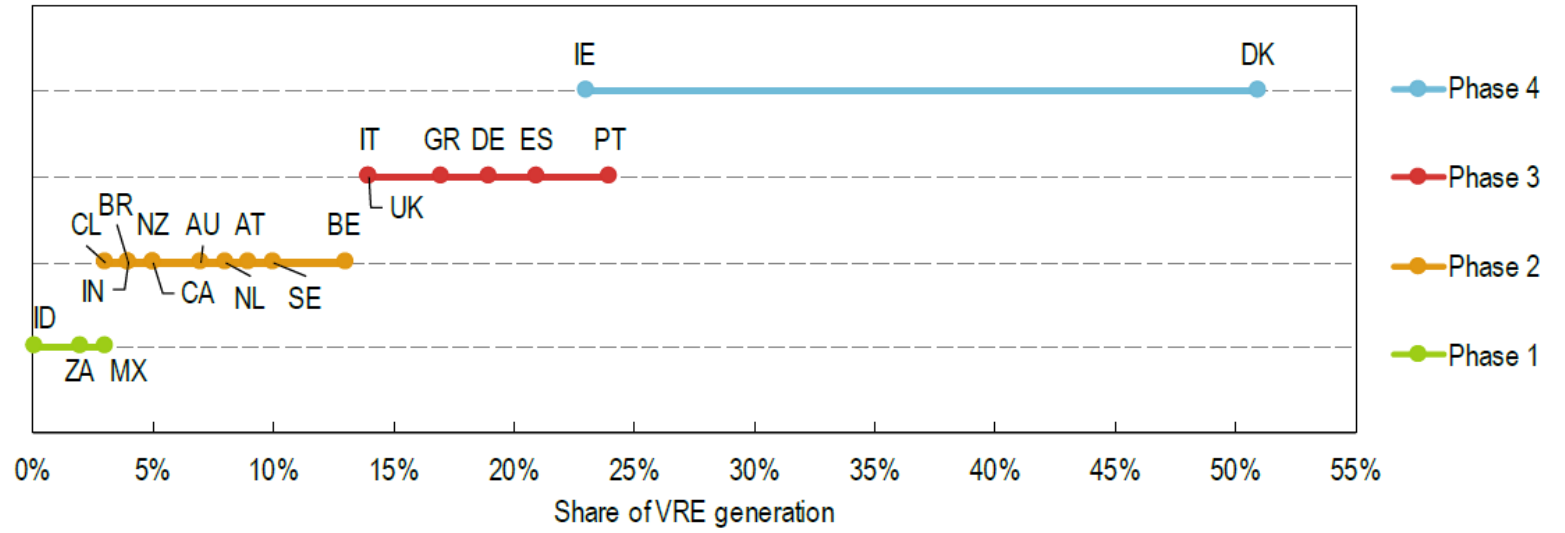
Curtailment Solutions: Coming Soon in 'Saving Power'
DS3+ & Interconnection

Scenario	SNSP	Min Gen	Interconnector Capacity	Average Interconnector Exports*	Curtailment in 2030 with 70% RES-E	Stakeholders Responsible for Individual Policies
"Climate Action Plan" Scenario i.e. All Measures Successfully Implemented	90%	700MW	2030MW	90%	5.5%	EirGrid/ ESBN /CRU
Impact of Failure for Each Policy Measure Individually						
DS3+ Failure	75%	1400MW	2030MW	90%	16.4%	EirGrid/ ESBN /CRU
Interconnection Export Capacity Failure	90%	700MW	580MW	90%	19.1%	EirGrid/ CRU
Interconnection Market Failure	90%	700MW	2030MW	50%	12.4%	SEMO/ EirGrid/ CRU
Impact of Failure for All Policy Measures Combined						
DS3+ Failure, Interconnection Capacity & Market Failure	75%	1400MW	580MW	50%	44%	EirGrid/ ESBN /CRU



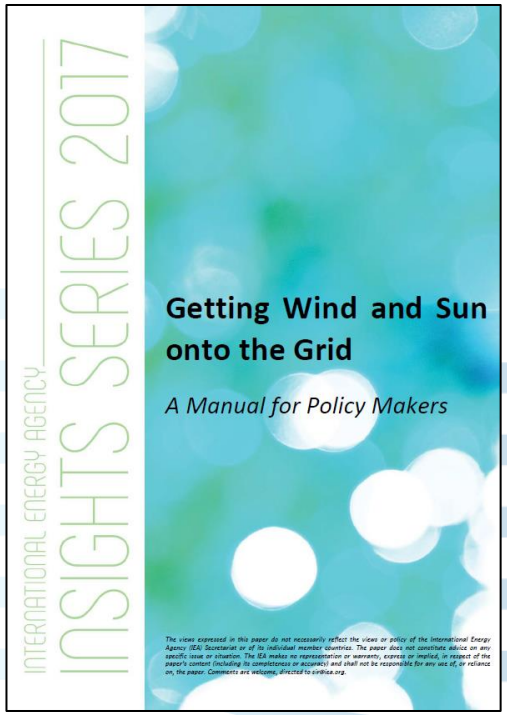
Ireland is a World Leader in Wind Power Integration

Figure 1 • Annual VRE generation shares in selected countries and correspondence to different VRE phases, 2015



Source: Adapted from IEA (2016d), *Medium-Term Renewable Energy Market Report 2016*

Key point • Each phase can span a wide range in terms of VRE share of electricity: there is no single point at which a new phase is entered.



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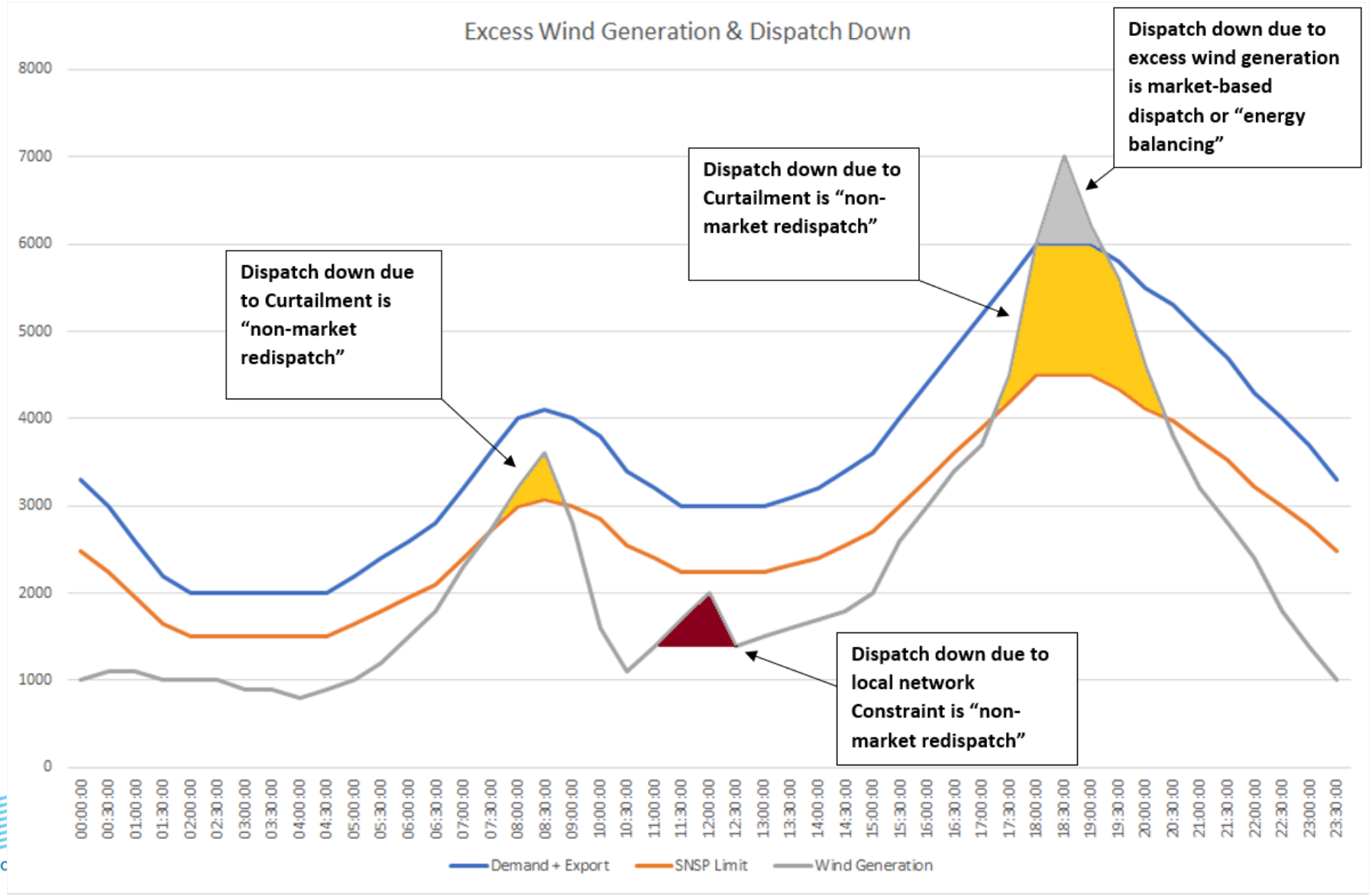
Three Types of 'Dispatch Down' in Ireland



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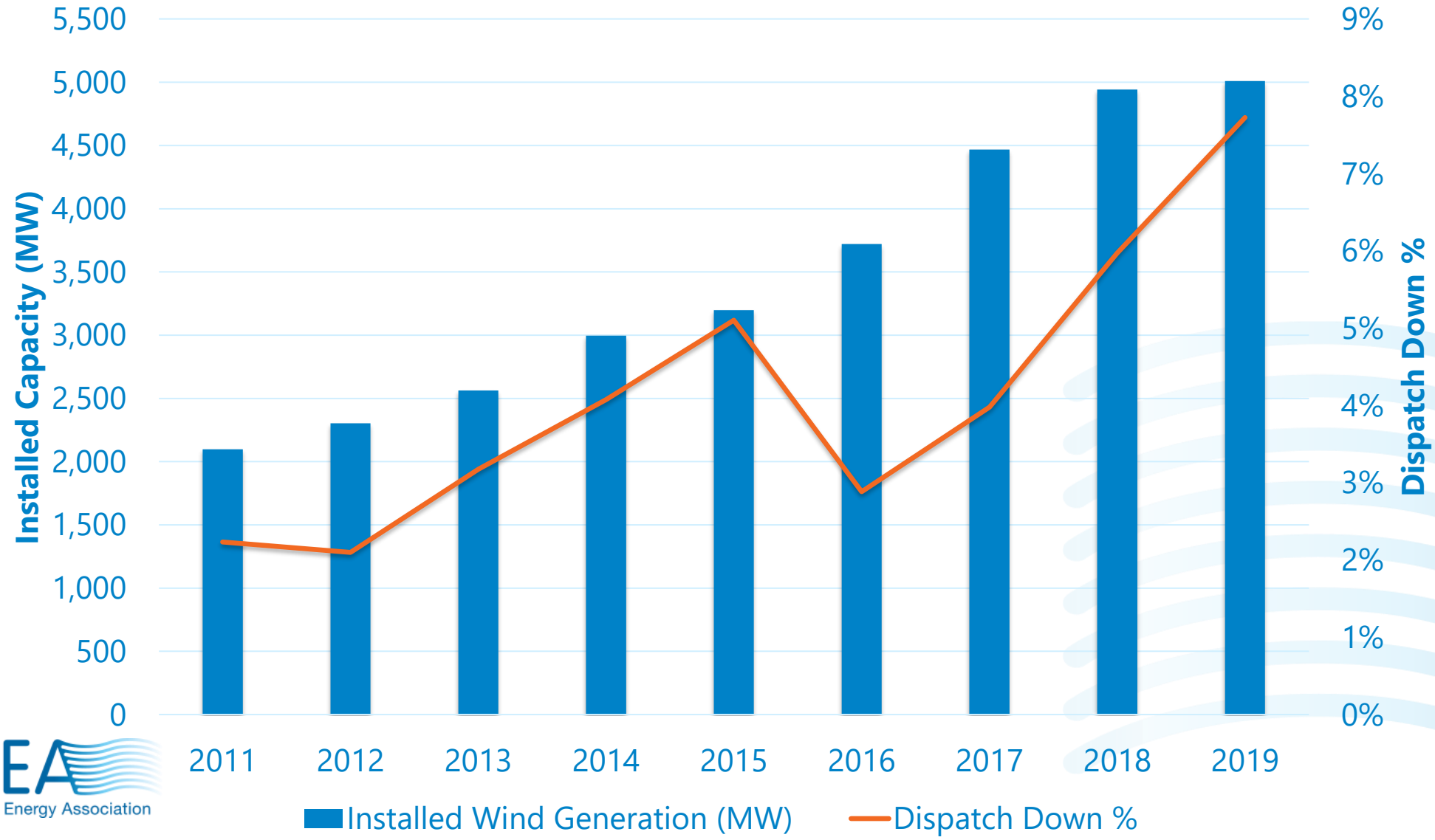
Maintained Levels of Dispatch Down



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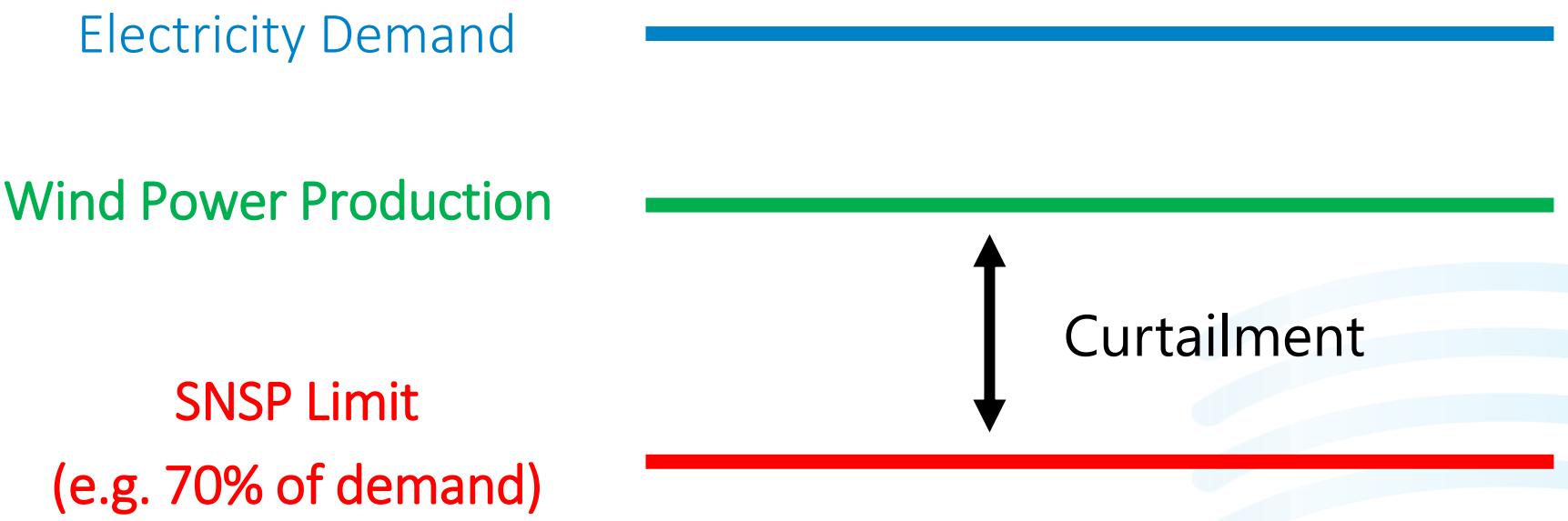
Curtailment

Curtailment



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System Services Categories & Zero Carbon Technologies

	Zero Carbon Technologies to provide System Services
Reserve	• Batteries, Demand Side Response, Renewable Generation (Wind, Solar, Hydro)
Inertia	• Synchronous Condensers
Reactive power	• STATCOMS, SVCs, Synchronous Condensers, Renewable Generation (Wind, Solar, Hydro)
Ramping	• Long-duration batteries (4-8 hours), Pumped Hydro Generation, Demand Side Response, Flexible Hydrogen Gas Power Plants

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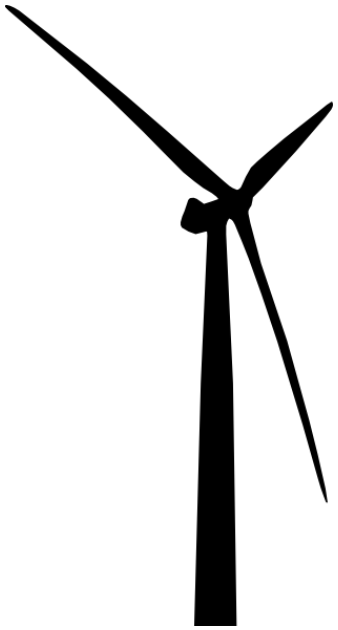
energy storage IRELAND

Constraints

Constraints



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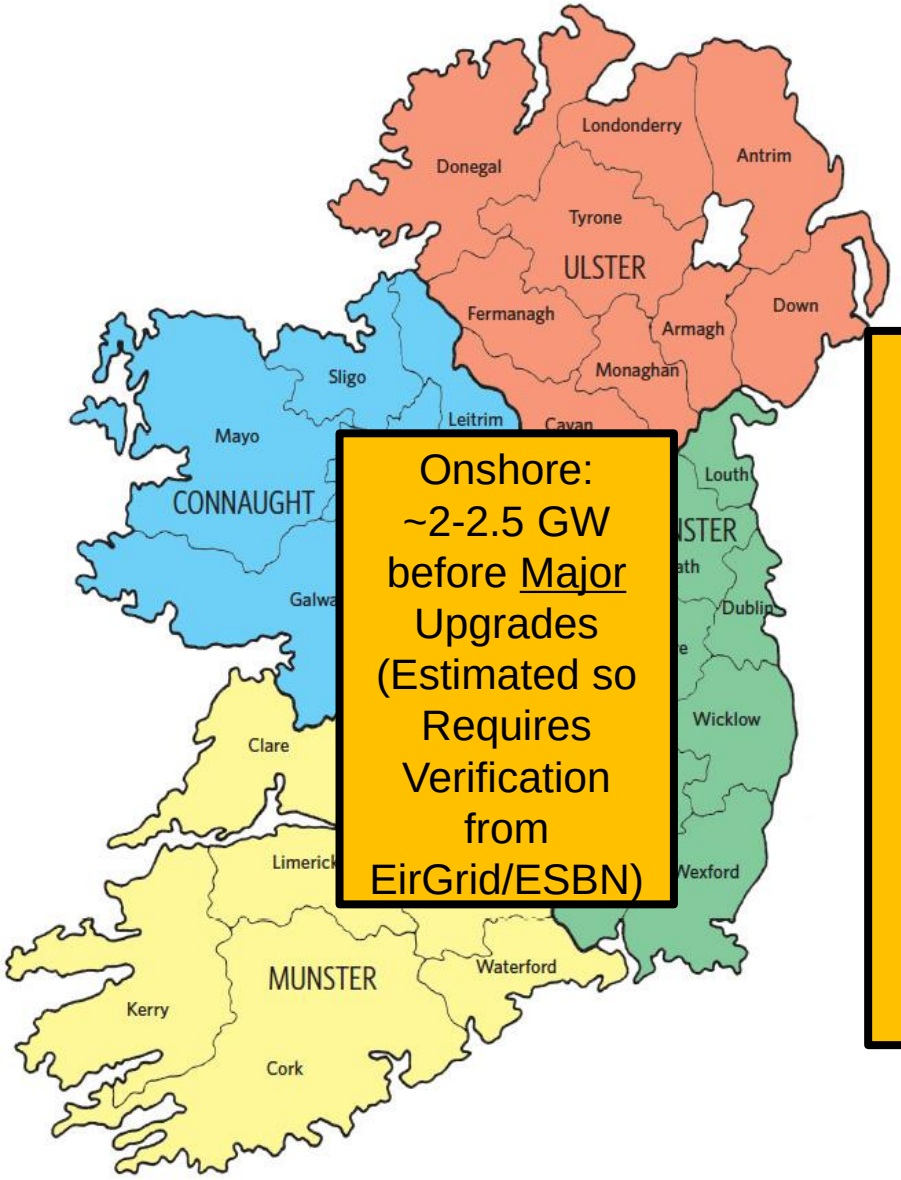
Constraints



Onshore:
~2-2.5 GW
before Major
Upgrades
(Estimated so
Requires
Verification
from
EirGrid/ESBN)

Offshore:
East Coast
~1.5-2 GW
before Major
Upgrades
(EirGrid East
Coast Study)

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Upgrading Existing Lines

Existing Technologies:

- Hybrid connections
- High-Temperature Low-Sag (HTLS) overhead line conductors
- Series Compensation
- Dynamic Line Ratings
- Reactive Power Management Devices

New Technologies:

- Power Line Guardian
- Voltage Uprating
- New HTLS Conductors
- New line structures / tower designs

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