

# Saving Power:

# **70by30 Implementation Plan**

IWEA & Green Tech Skillnet Workshop Presentation followed by Panel Session and Q&A Thursday 27<sup>th</sup> of August 3.30 pm – 5.30 pm

#### Presented by



Noel Cunniffe Head of Policy IWEA



Panellist

Rory Mullan Director MullanGrid Consulting

#### Welcome!

This webinar will begin shortly - you can submit your questions on Slido:



Panellist

Sheila Nolan Senior Lead Engineer EirGrid

#### Moderated by

Green Tech

Skillnet



Sam Harden Chairperson Energy Storage Ireland

Join at slido.com #savingpower







#### Saving Power - 70by30 Implementation Plan Noel Cunniffe, Head of Policy

27 August 2020 IWEA, ESI and GreenTech Skillnet Webinar



Delivering the Climate Action Plan

### IWEA represents over 90% of the wind industry in Ireland

#### • Members across existing assets, development & supply chain for onshore & offshore:

- Wind farm developers
- Asset owners
- Supply Chain:
- Turbine manufacturers
- Construction companies 🐲 Baringa
- Supply companies
- Accountants
- Insurance
- Consultancy
- Legal firms
- Banks







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

- 1. 70by30 Implementation Plan: Building Onshore Wind
  - Complete Launching September
- 2. 70by30 Implementation Plan: Building Offshore Wind
  - Modelling Underway
- 3. 70by30 Implementation Plan: Saving Money
  - Launched on June 15th
- 4. 70by30 Implementation Plan: Saving Power
  - Launched on August 24th





### 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

<u>i.e. 50% of all</u>

INDUSTRY IS DEVELOPING
 ENOUGH PROJECTS TO MEET
 2030 TARGETS

Irish Wind Energy Association

Figure 4.3 Indicative Sectoral Targets for Ireland to 2030<sup>14</sup>



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<sub>2</sub> 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



#### We've come a long way to where we are today...



Source: EirGrid Renewable Data

#### ...and generally maintained levels of dispatch down till recently



#### There are three types of 'Dispatch Down' in the All-Island System



EI



Electricity Demand & Exports

Wind Power Production

SNSP Limit (e.g. 65% of demand and exports) Curtailment





#### **Constraints**







# **Energy Balancing / Oversupply / Market Curtailment**



#### **Saving Power:**

Irish Wind Energy Association

#### **Minimising Dispatch Down – Curtailment and Constraints**

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

# Saving Power:

#### Major Long-Term Changes to Consider to Minimise Dispatch Down

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

#### **Excellent additional sources of information**







## Ireland is a world leader in wind energy integration



0% 5% 10% 15% 20% 25% 30% 35% 40% 45% 50% share of wind, solar PV in power generation, 2016

© OECD/IEA 2018





## So what's Synchronous and Non-Synchronous?



## Critical for DS3+ to deliver on increased SNSP and lower Min Gen



- The success of DS3+ in achieving 95% SNSP and reducing minimum generation levels down to 300 MW is the single most important measure required to integrate 70% RES-E on the Irish system
- Maintaining a Business As Usual of 75% SNSP and approximately 1,400 MW of minimum generation would lead to enormous levels of curtailment and require huge volumes of renewable generation to be installed to hit 70% (in excess of 20 GW)
- Ensuring support for EirGrid and ESB Networks through Price Review 5 to deliver this is essential





### DS3 System Services were created to help the power system



#### Managing Frequency

Managing Voltage



DS3 introduced 14 different System Services to help to manage the system at high renewables and increase the SNSP limit



#### **Important to transition towards Zero Carbon System Services**

#### Zero Carbon Technologies to provide System Services

| Reserve        | <ul> <li>Batteries, Demand Side Response, Renewable Generation<br/>(Wind, Solar, Hydro)</li> </ul>   |
|----------------|--|
| Inertia        | • Synchronous Condensers   |
| Reactive power | <ul> <li>STATCOMS, SVCs, Synchronous Condensers, Renewable<br/>Generation (Wind, Solar, Hydro)</li> </ul>                                      |
| Ramping        | <ul> <li>Long-duration batteries (4-8 hours), Pumped Hydro Generation,<br/>Demand Side Response, Flexible Hydrogen Gas Power Plants</li> </ul> |
|                |  |





### Store, Respond & Save – How to save two million tonnes of CO2



- The results are entirely technology

   agnostic, but zero-carbon providers such as demand side response units, battery storage, synchronous condensers, flywheels and renewable generation are already available today
- The analysis has **not examined the market design and commercial framework** under which zero-carbon service providers could be remunerated
- However, it demonstrates that long-term
  frameworks which provide investment
  certainty for zero-carbon providers to
  deliver would be beneficial in achieving
  power sector decarbonisation goals





### **Additional Interconnection is vital to enable 70% RES-E**



- Analysis demonstrates that delivering on the Greenlink Interconnector and Celtic Interconnector can dramatically reduce curtailment levels
- It also highlights the benefits which could be seen if further interconnectors beyond these could be delivered
- However, to maximise their benefit we need to ensure they can export when needed most during curtailment events...





### **Improvements in Interconnector Operation will be needed**

Interconnector flows and GB-ISEM Price spread during curtailment events between 01/10/2018 and 19/05/2020.



Day-ahead market on left. Balancing market on right.

#### The interconnector flow was in the opposite direction to the price signal in the balancing market 34% of the time

Improvements to interconnector trading through counter-trading by the System Operators or closer coupling of the SEM with the Great Britain market will be vital - **Brexit is a complication to this!** 





## Grid reinforcements will be needed to combat constraints

- Constraints have been steadily rising over recent years and this will continue without further grid reinforcements and smart strategies to "sweat the assets"
- EirGrid's TES 2019 System Needs
   Assessment highlighted six regions in
   particular in Ireland which will need
   substantial reinforcements to facilitate
   their two 70% RES-E scenarios
- These results consider IWEA's pipeline survey which shows over 8 GW of onshore wind and 12 GW of offshore wind in active development





#### **Key recommendations for reducing constraints**

#1: Early development of
the transmission system
based on the strength of
renewable pipeline

#2: Sufficient budget andresources must beprovided to EirGrid andESBN in Price Review 5and Price Review 6

#3: A new grid development strategy which builds upon the 'Your Grid, Your Tomorrow' and that can facilitate 70% RES-E

#4: Establish a GridCapacity Advisory Forumto take feedback fromindustry

#5: Build public support for new grid infrastructure #6: Maximise the capacity of the existing grid via alternative network solutions such as Smart Wires, energy storage, demand side response





### PR5 Consultation is ongoing - very important one to get right

#### CRU Allowances – Draft Determination (TSO and TAO spend):

| Сарех                              | Request        | CRU Proposed<br>Allowance | Positive that it is proposed to allow nearly                     |
|------------------------------------|----------------|---------------------------|--|
| TAO Network CapexTSO Network Capex | €1126m<br>€81m | <b>€1076m</b><br>€68m     | all TAO Network Capex<br>and TSO Non-<br>Controllable Opex (i.e. |
| TSO Non-Network<br>Capex           | €69m           | €36m                      | System Services)   |
| Орех                               | Request        | CRU Proposed<br>Allowance | Concern that new TSO<br>strategic initiatives to                 |
| TSO Controllable Opex              | €318.6m        | €300.9m                   | subject to cost  |
| TSO Non-Controllable<br>Opex       | €957m          | €957m                     | challenges and required<br>revenue not fully allowed             |





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

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



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