SUBMISSION TO THE JOINT OIREACTAS COMMITTEE ON CLIMATE ACTION

ELECTRICITY ASSOCIATION OF IRELAND

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A decarbonised future powered by electricity

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INTRODUCTION

EAI welcomes the opportunity to meet with the Joint Oireachtas Committee on Climate Action to discuss the ambition to achieve 51% reduction GHG emission reduction by 2030 compared to 2018 levels and to pursue and achieve by no later than the end of the year 2050, the transition to a climate neutral economy defined as the Draft Climate Bill. Ireland is facing significant environmental challenges, such as decarbonising the economy, preserving and restoring biodiversity, and providing clean air and water to its citizens. Climate change mitigation is crucial to preserve and improve the natural and physical environment in Ireland and increase the standard of living, not only for its current citizens, but also for future generations.

While it is positive that GHG emissions in Ireland have fallen in recent years, e.g., by 4% and 6% in 2019 and 2020 respectively, it is notable that this level of reduction falls short of the level needed to meet the commitments for 2030. The 2021 Climate Action Plan provides an opportunity for Ireland to take a leadership position in the protection of the environment and the decarbonisation of society. There is now an urgent need to address the current policy gaps and outline a clear trajectory for energy and environmental policy in the coming decade, with a stronger emphasis on climate action across the economy, to reduce the burden of decarbonisation post-2030.

The 51% reduction target implies that overall emissions in 2030 will be 31mtCo2e down from 61mtC02e in 2018, or a 30 mtC02e reduction across the 5 sectors of the Irish economy, including electricity power generation. In 2018, emissions from the power sector stood at 10.35mtCO2e and carbon intensity was approx. 377g/kWh, down from over 800g/kWh in 2001, when coal supplied 20% of electricity and wind less than 1%. In 2019 the carbon intensity of electricity had fallen to 324gCO2/kWh, the lowest recorded level in over 70 years. The carbon

intensity number is important as it will impact the ability of electricity to decarbonise other parts of the economy.

Electricity Association of Ireland

The EAI is the trade association for the electricity industry on the island of Ireland. We represent over 90% of electricity generation and retail supply activities, and both distribution system operators. Our members have a significant presence across the sector value chain, and we represent the interests of the all-island Electricity market in relevant jurisdictions, including the EU through our membership of the European electricity Sector representative body Eurelectric.

Our vision is for a decarbonised future powered by electricity and our sector supports the Government's ambition for a carbon neutral economy. As stated by the Climate Change Advisory Council, the continued decarbonisation of Ireland's Electricity sector is of fundamental importance for achieving climate action targets as this is the foundation of decarbonisation in many sectors[1].

There is no other energy carrier that can curb GHG emissions in transport and heating sectors to the same extent and scale as electricity. Switching to electricity in those sectors means significantly reducing their GHG emissions due to 1) the Decarbonisation of electricity generation and 2) the higher efficiency of electricity-based technologies.

1 CCAC Annual Review 2020

Our Zero e-Mission Future

As part of our commitment to achieving our vision, the EAI commissioned the Centre for Marine Research and Innovation (MaREI)[2] to model the electricity system in 2030 under the base assumption that 70% of the 50TWh of electricity consumed on the island will be generated from renewable energy sources. The resultant report '*Our Zero e-Mission Future*', circulated previously to this committee, demonstrates unequivocally that a 70 per cent ambition for renewables in 2030 is achievable on an all-island basis but will require significant investment in the all-island grid and an accelerated electrification of heating and transport to place Ireland firmly on a path to net zero emissions.

The MaREI researchers used publicly available data, stated government ambition and independent modelling to project into the future. Uniquely, they examined a quarter of a million hours of historical weather data. This allowed them to determine the extremes that the future weather dependent electricity generation system on the island of Ireland will have to flex to. They found that by the end of the decade the island's electricity system will be 40 per cent larger in capacity but will emit half the emissions of today. This will require all planned electricity interconnectors (north-south, ROI–UK, ROI–France) to be in place by 2030. However, back-up generation fuelled by natural gas will be used less. The findings will have implications for the economics of existing and new investments.

The analysis of the weather data shows the importance of being able to export and import energy through the interconnectors during high and low wind periods. During conditions where electricity demand is high but weather-dependent generation is low we will need all storage and system flexibility to be maximized and all back-up generation, including natural gas, to be available.

2 Our Zero e-Mission Future Report

The study looks at potential pathways to net zero. It includes the 5GW of additional wind energy to the CAP that is in the Programme for Government. It assumes that this will be able to be dispatched, with much of it exported, and that 'dispatch down' will be in single figures. The report highlights the need for increased interconnection post-2030 and looks to understand the potential resource available from curtailed renewables for hydrogen production.

Post 2030, there is an implicit uncertainty about the most appropriate low carbon technologies and energy sources. Large storage projects, Carbon Capture and Storage, or Power to Hydrogen all share a requirement for early investment decisions, significant capital commitment and long lead times for construction.

With one year gone and nine to go to 2030, it is imperative that the Dáil turns its attention to ensuring that the correct policy signals stimulate appropriate market incentives and the right investments for a cost-effective and just transition. Ireland has already achieved world-leading rates of renewable penetration for weather dependent energy on an isolated island system. There is now a significant opportunity to crystallize a leadership role in the energy transition. However, this will require a much faster rate of switching from high carbon fossil fuel to electric heat pumps and vehicles and a much more flexible and agile electricity grid to absorb the projected level of weather dependent generation. An all-island approach to market development and infrastructural investment will be required too.

NEXT STEPS

Investment

Significant investment in renewable deployment, system services and electrification will be required.

- MaREI estimate an 'overnight' capital investment of ~33€ billion for the All-Island power system, which excludes investment on the demand side.
- Appropriate market arrangements or incentives will be required to encourage investments in these technologies. A well-functioning power market and efficient carbon pricing are key tools to deliver the necessary investment signals in a technology-neutral way.
- To meet our 70% RES-E target **wind capacity will need to more than double and solar will need to increase more than 11 times**. Batteries will also have to considerably scale up. **Investors need clear and reliable long-term signals to allocate funds to such capital-intensive projects**.
- A key component to delivering new renewable generation is for developers to have **certainty on the permitting and environmental consents needed to develop infrastructure** that will enable delivery of 2021 CAP Actions.
- If we are to meet our 70% renewable electricity target, offshore wind development needs to commence early in the 2020s. Projects capable of delivering by the middle of this decade need to be facilitated in Ireland's first Offshore RESS auction. Getting the first commercial project in the water is critical to help build the supply chain in Ireland. We welcome the progress to date and hope the Marine Area Planning (MAP) Bill will be enacted in this Dáil term. The focus must now turn to developing a robust seabed leasing regime so that Phase 2 projects can gain conditional-Maritime Area Consents, progress their projects and ensure we reach our 5 GW offshore wind target by 2030.

Eurelectric recently published a study on DSO investments needed over the next decade. For Ireland they estimate a €6.9 billion investment is needed[3]. Much of this investment is needed to electricity buildings, industry and transport, while modernisation of the grid and the rollout

3 https://www.eurelectric.org/connecting-the-dots

of smart meters also requires significant funding. The right framework conditions and smart tariff design will ensure the annual investment needs will have a moderate the long term.

Grid

The system must be able to absorb a minimum of 85% of non-synchronous renewable energy generation at any one time, grid constraints must be removed and investment in flexibility and infrastructure must continue; without this, emissions will increase.

- A system that is only able to integrate 75% at any one time, could see levels of curtailment rising to as high as 16%. High levels of variable curtailment make financing renewable projects highly challenging.
- Grid infrastructure and development must keep pace with policy ambition and renewables development. With lower levels of system flexibility, we are unable to reach a RES-E ambition of 70%. **Today's grid is not adequately flexible to deliver the decarbonisation ambition.**
- **There is a need to communicate the Government's policy on infrastructure and engage the public on the need for electricity infrastructure**.

System Operation

Ireland will need to have a remarkably flexible system because at times the system will produce more renewable generation than can be used, stored or exported, while it must also be resilient and able to deal with periods of low regional wind generation when conventional generators and interconnectors will meet the bulk of electricity demand. There will also be short periods of system stress where all available thermal generation is called upon to ensure supply is met.

- Demand side response units and batteries will help on shorter timescales, but current technologies cannot economically provide the scale of capacity to operate an electricity system on variable renewable generation alone. For example, if we consider a 2-week

window of low wind speeds, approximately 65 million Tesla Power walls would be required to provide energy for this period.

- There will be short periods of system stress where all available conventional generation is called upon to ensure supply is met. Abated thermal with hydrogen or Carbon Capture and Storage (CCS), or both, may offer solutions for Ireland.
- The MaREI study anticipates that total gas capacity will reduce by ~20%, but the reduced running hours implied by the target will have adverse technical and financial implications for the gas fleet, failing any intervention to ensure that investment in this technology receives adequate remuneration.
- There is a need to incentivize existing and new flexible plant to remain operational so it can be available when required. EAI believes that the 'dispatchable' aspect of the power sector has been afforded inadequate consideration to date, in terms of the investment that will be required to ensure security of supply over the next decade and decarbonisation in the period between 2030-40. The role of the existing gas generation fleet needs consideration post 2030, where dispatchable generation represents 30 % or less of total power generated. The role of dispatchable generation should consider:
    - The volumes of dispatchable capacity required post 2030.
    - The ability of the required dispatchable capacity to recover its costs in a declining market.
    - The value of required volume of dispatchable generation in a role of renewable support rather than the traditional role of energy production post 2030.

Electrification

Electrification of heat and transport plays an important role in wider system decarbonisation and the rate of electrification must keep pace. **Slower uptake on technologies such as heat pumps and electric vehicles may reduce power system emissions but has a net increase on energy system emissions.**

- It is critical that we continue to swap petrol and kerosene for plugs, and that supports are put in place to enable consumers to retrofit their homes and switch to Electric Vehicles. Engagement with customers and the public's buy in will be critical to the success of the energy transition.
- Eurelectric's e-Vision study launched earlier this year looked at fleet electrification, some of the policy measures that can help electrification of transport include:
    - Incentives and discounts for bulk sales.
    - Investment in public and private charging infrastructure.
    - Low and zero-emission zones in cities.
    - In addition to CO2 standards, mandatory requirements for carmakers to sell zero-emission vehicles[4].

Barriers to electrification should be removed in the 2020s to allow swift electrification of industrial processes also. Current barriers include consumption charges on the use of electrical power. These are charges on top of the electrical wholesale price, levied on those who consume power. Charges such as PSO Levies, imperfection charges and capacity charges, add between €37 - €52 per MWh to the cost of wholesale power for large consumers [5]. The overall charging structures for electricity should be reviewed to ensure they are compatible with facilitating electrification and decarbonisation. It is important that charging structures encourage efficient consumption decisions when renewables are plentiful and wholesale prices are low. This can more efficiently utilize the available renewables while also decarbonising the

4 https://www.eurelectric.org/news/pr_evision/

5 Calculated from: http://www.eirgridgroup.com/site-files/library/EirGrid/Statement-of-Charges-2019_20-_Final.pdf

https://www.cru.ie/wp-content/uploads/2020/07/CRU20086-PSO-Decision-Paper-2020-21.pdf

https://www.sem-o.com/documents/general-publications/2019-2020-SEMO-Charging-Statement-FINAL.pdf

demand side. **Removing these regulatory barriers is vital to the economic viability of flexible electrification solutions for large energy users which can assist in increasing renewable penetration and it is important to keep Irish energy cost competitive**.

Post-2030, Towards Net Zero

In addition, the study identifies a combination of measures (note, bespoke not additive) that could remove a further 4Mt, on top of the reduction achieved by the CAP, but would require significant investment and further policy development.

- For example, delivering the 5GW of offshore capacity identified in the PfG, would remove a further 1.3Mt (on 1.5GW), and would need an additional 2.8GW of interconnection (5GW total) and 2.4GW of battery storage (3.5GW total), alongside additional offshore grid infrastructure.
- **This increase in wind capacity makes a strong contribution to the All-Island renewable energy level from 72% to approximately 97% and the associated emissions reduction is ~1.3Mt. However, this scenario results in significant levels of exported power and presents a challenge for policy makers as it highlights a divergence in outcomes between renewable energy policy and decarbonisation policy. In the absence of a cooperation mechanism which accounts for providing decarbonised electricity to other countries, e.g., carbon credits for exported renewable energy, the All-Island system will only realize marginal carbon reduction benefits of being a major exporter of power**.

- Combining this measure, with a removal of the minimum generation requirement (0.8mtCO2e reduction on its own), could see a further reduction in both emissions (2.9mt total) (and curtailment)

- A CCGT plant that is enabled with Carbon Capture Storage technology could contribute a further 1.1mt

All of these options have implicit uncertainty and share a requirement for **significant capital commitment, long lead times for construction, decades-long operational lifetime and a need for investment decisions to be made well in advance of 2030**. The ongoing dialogue on the future pathways for the power system is welcomed to ensure the correct policy signals are provided to stakeholders that best position the sector to meet our decarbonisation obligations in the long term. To this end, as part of an overall energy systems integration strategy, **EAI would welcome dedicated consideration of power system decarbonisation technologies with a view to identifying an optimum pathway to net zero. Given the all-island nature of the SEM, there are significant benefits to coordinating this work with the authorities in Northern Ireland who are working through many of the same issues.**

Finally, the study also looks at the pathway to net zero beyond 2030, discussing the role of negative emissions technologies for broader energy sector decarbonisation, and the potential for hydrogen to absorb excess renewable generation and minimise curtailment.

Conclusion

The EAI is grateful for the opportunity to meet with the Committee. The following represent the key considerations to achieve a net zero emission electricity sector:

Infrastructure and grid development is key.

- Increasing offshore wind and solar PV requires significant flexibility and improvement in grid infrastructure across the system. With lower levels of system flexibility, we are unable to reach a RES-E ambition of 70%. **Today's grid is not adequately flexible to deliver the decarbonisation ambition.**

- High levels of variable curtailment make financing renewable projects highly challenging.
- Actions that increase the capability of the grid to absorb the greatest amount of renewable generation must be taken.
- **Grid infrastructure and development needs to keep pace with policy ambition and renewables development.**
- **There is a need to communicate the Government's policy on infrastructure and engage the public on the need for electricity infrastructure.**

Early investment is needed and requires the right incentives and policy signals.

- In 2030, the All-Island system will be 60% larger in capacity and to meet our 70% RES-E targets by 2030, wind capacity will need to more than double and solar will need to increase more than 11 times. Batteries and interconnection capacity will also have to considerably scale up.
- **All technologies share a requirement for significant capital commitment, long lead times for construction, decades-long operational lifetime and a need for investment decisions to be made well in advance of 2030.**
- **Investors need clear and reliable long-term signals to allocate funds to such capital-intensive projects as well as certainty on the permitting and environmental consents needed to develop infrastructure.**
- A well-functioning power market and efficient carbon pricing are key tools to deliver the necessary investment signals in a technology-neutral way.
- **Cooperation mechanisms e.g., carbon credits for exporting renewable power would enable Ireland to obtain greater reductions of carbon emissions**.

A decarbonised power system requires a diversified portfolio of technologies.

- The All-Island system will have to be remarkably flexible to deal with a wide and extreme variation in weather events.

- Dealing with prolonged periods of low weather driven generation in the All-Island system is not trivial, and while conceptual solutions involving **batteries, large scale storage, hydrogen storage and increased interconnection are appealing, the issue is not an easy one to solve.**
- Increased levels of **'smartness' in demand side loads** for residential heating and EVs, e.g. from 20% to 40% results in additional emissions reduction.
- Modelling indicates further emissions reductions arise from converting gas fired generation to **CCS**.

Electrification of heat and transport must keep pace.

- Electrification of heat and transport plays an important role in wider system decarbonisation and the rate of electrification must keep pace. **Slower uptake on technologies such as heat pumps and electric vehicles may reduce power system emissions, but has a net increase on energy system emissions**. Alternative methods of decarbonising those customers on or near the gas grid should be considered also.
- Significant investment will be needed for public and private EV charging infrastructure.
- Distribution grids will also require significant investment to support the rollout of charging infrastructure.
- Fleet electrification can be spurred by regulation, tax incentives and discounts for bulk sales.
- **Removing regulatory barriers is vital to the economic viability of flexible electrification solutions for large energy users which can assist in increasing renewable penetration and it is important to keep Irish energy cost competitive.**

The growing urgency for climate action requires that decarbonisation is central to all economic planning, regulation and environmental protection. Failure to act early creates a risk of fossil fuel lock in and future regret which will be costly to reverse. We believe a greater focus on emissions reduction, particularly in electricity, transport, heating, and agriculture is necessary

to achieve effective and economy-wide decarbonisation, which in turn will enhance our natural environment.

The Electricity Association of Ireland, May 2021

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