

MaREI Policy Briefing – June 9th, 2020

Emissions and energy system implications of increasing the ambition on the 70% RES-E target

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Context

Government formation talks are centred on increasing the greenhouse-gas (GHG) abatement ambition in the period to 2030. Achieving a 7% annual average reduction in GHGs requires roughly a halving of Ireland's current emissions of ~60 million tonnes of carbon dioxide-equivalent (Mt CO₂e)³, a reduction of ~30 Mt relative to today's levels in 2030. The Climate Action Plan (CAP) sets forth actions which amount to 15-18 Mt in reductions across all GHGs. If the 7% annual reduction target is confined to energy-related emissions alone, which currently account for ~40 Mt CO₂, reductions of around 20 Mt would be required in 2030 relative to current emissions, of which the CAP would deliver 13-16 Mt. Therefore, to increase ambition as planned, additional measures for energy-related emissions in heat, transport and electricity need to deliver reductions of 4-7 Mt in 2030, in addition to full achievement of targets in the CAP.

The electricity sector has to date been at the forefront of decarbonisation in Ireland, and now the sector currently accounts for around one-quarter of energy-related emissions in Ireland. Since 2000, emissions fell by around 35%, more than 5 Mt. Over the same period, emissions in the transport sector rose by 1.5 Mt, emissions from industrial processes reduced by the same amount, and emissions from manufacturing and the built environment collectively fell by around 1.5 Mt.

Of the 13-16 Mt reductions in energy-related emissions set forth in the Climate Action Plan, around half are expected from the electricity sector. This would be achieved by phasing out coal fired plants and by increasing the share of renewables in electricity generation (RES-E) to 70%, around a doubling of today's share. This policy brief discusses the feasibility of increasing the RES-E share beyond 70%, and other options for reducing electricity sector emissions further than the CAP.

Going beyond the Climate Action Plan RES-E target

According to the CAP, reducing today's electricity sector emissions by 7-8 Mt CO₂ by 2030 would require the share of electricity generated from renewable electricity to grow to 70%, including at least 3.5 GW of offshore wind, 0.4 GW of grid-scale solar electricity and 8.2 GW total of increased wind capacity.



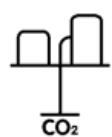

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³ The CO₂-equivalent (CO₂e) metric makes an equivalence between long-lived and short-lived GHGs according to their global warming potential (GWP) over 100 years, the metric which is used to set Ireland's EU target for 2030.

We have modelled what the implications of additional variable renewable capacity would have on power system curtailment, which is the amount of wind energy that is available but cannot be used by the system, and emissions, in the absence of further planned interconnection, and if interconnection was increased by 0.5 GW.

Additional Measures to Climate Action Plan and Associated Potential Emissions Reductions*

 Extra Offshore Wind and Interconnection	 750,000 Homes with Solar PV	 One Carbon Capture Plant	 Datacentre Demand 24*7 Renewable
0.5 Million Tonnes	0.3 Million Tonnes	0.7 Million Tonnes	0.7 Million Tonnes

*Savings are not additive

- *Adding an additional 1.5 GW of offshore wind coupled with additional Interconnection*

Adding an additional 1.5 GW of offshore wind on top of 12.2 GW renewable capacities already envisaged in the Climate Action Plan as well as *increasing the All Island interconnection capacity to 2.7 GW [1 GW today] – 0.5 GW greater than currently planned –* would lead to a RES-E share in excess of 80%. Headline results indicate that emissions savings would amount to 0.5 Mt in 2030, wind curtailment would stabilise at 7% and the emissions intensity of electricity would fall to 109 gCO₂/kWh.

This would require a remarkably flexible power system and strong market signals for storage and smart loads.

Adding the additional offshore wind capacity without simultaneously increasing the planned interconnection would lead to excessive curtailment.

- *Electricity emissions savings from other options*

Increased electricity demand from data centers will be a significant source of future system-wide emissions (up to 0.7 Mt in 2030). Limiting the growth in data centers or requiring new connections to be 24*7 renewable (for example, by mandating on-site battery storage of renewable electricity) would limit emissions growth in the area.

Fitting Carbon Capture to one gas fired power plant would reduce emissions by 0.7 Mt. The capital costs of carbon capture could be up to €1 bn but would deliver the same emissions reduction as an additional 1.5 GW of offshore wind with a cost of up to €2 bn.

Rooftop solar PV has also been discussed. An initial estimate of the emissions savings from installing 750,000 rooftop solar PV systems to provide for 5% of electricity needs in 2030⁴ would lead to a emissions reduction of approximately 0.3 Mt in 2030. The emissions reductions are relatively low as solar PV mainly replaces existing wind generation (rather than natural gas), and the additional renewable energy is exported rather than used domestically. The potential for emissions savings from solar PV could increase should installations be coupled with battery storage.

Conclusion

Previous MaREI analyses⁵ have looked at what measures on top of those in the CAP could deliver reductions to meet a 7% annual reduction in energy-related emissions across the whole energy system. It is clear that measures on which there is as yet little discussion need to be deliberated, including biofuels in transport and heat, and the potential development of carbon capture and storage (CCS) in the power sector. As the country looks beyond 2030 to the goal of fully decarbonising the energy system, no option should be off the table.

⁴ <https://www.irishtimes.com/news/politics/solar-panel-limit-lifting-key-part-of-government-formation-talks-1.4259654>

⁵ <https://www.marei.ie/7-percent/>