Offshore Renewable Electricity Support Scheme Phase 2 (ORESS2)

Dear Minister Eamon Ryan,

As a s[redacted] at Dublin City University and professional engineer, I would like to thank the Department of the Environment, Climate and Communications (DECC) for the opportunity to provide a submission to the public consultation on the Offshore Renewable Electricity Support Scheme Phase 2 (ORESS2). Clearly this scheme will be vital for reaching the Climate Action Plan targets of 80% renewable electricity by 2030. It can also be a learning platform for further expansion of offshore wind generation, where Ireland can become a global leader. However, time is running out to reach these targets and we must act now as stated by Wind Energy Ireland CEO Noel Cunniffe [1].

I am currently studying [redacted] in Dublin City University. As part of this diploma, I was made aware of this consultation, it has given me an opportunity to expand my understanding of Irelands offshore renewable energy options and current position. Likewise, I have gained a far greater understanding of Irelands potential energy transition to a net zero country, just how important the transition is and importance of equity as we transition worldwide.

In my role as a Technical Executive in [redacted] I work directly with the Sustainable Energy Authority of Ireland (SEAI) to ensure the quality of grant work both domestically and non-domestically. The increase in energy efficiency of our homes and businesses is another vital area of the energy transition. The recent announcements from the DECC have been encouraging, such as the new grant for 500,000 homes to reach a minimum BER rating of B2, the increase in micro generation and the new Clean Export Guarantee (CEG) Tariff [2], [3]. However, I believe the disincentivizing of batteries as part of a solar photovoltaic system by removing the grants, could be limiting for both the consumers and the grid into the future.

I have commented on the specific questions 10 (a,c &e) and 11 (a &c) in the consultation document, regarding the hybrid grid connections and innovation technologies respectively [4]. I am available to be contacted if any clarification is needed or if you have any questions.

Kind Regards,

Hybrid Grid Connections (Question 10)

10. Hybrid grid connections are defined in this paper as single grid connections which facilitate the connection of both an existing or proposed thermal generation plant and a proposed offshore wind project.

Offshore wind projects will be critical for Ireland to reach its climate action targets in 2030 and into the future as we decarbonise [5]. While we transition to a net zero carbon emitter thermal generation plants will still be a key part of our energy infrastructure. They will be required as a base load generator as renewable energy will not be able produce 100% of our electricity for some time. Biofuels will also need to phased in, meaning the newer proposed plants need to consider this for future proofing [6]. It will also have to support the renewable generators as they are intermittent and there may not be any wind to generate from. Until energy storage infrastructure is installed thermal plants are still required, they will give energy security.

a. Do you support the facilitation of such connections, as defined? Why?

Yes, as discussed above, thermal plants are required until they can be phased out with energy storage of renewable energy and green bio energy. Meaning both technologies will have to work together for the foreseeable future.

As remarked by Jim Dollard an Executive Director in Electric Ireland, "essential step to delivering offshore wind of scale is to utilise the existing grid infrastructure as efficiently as possible" in a statement to the Oireachtas [7]. The hybrid grid connection can be an extremely effective way to do this. Two key advantages mentioned in the statement are that the cost to the consumer could be reduced and the speed of delivery of renewable projects could be increased. Hybrid grid connections will offer an increased grid capacity which will allow more projects to compete for in the auctions for this scheme, potential making them more competitive, reducing the cost to the consumer at the end. Furthermore, hybrid grid connections will allow for these offshore projects to output their generated electricity onto the grid faster, as it will minimise the need for new infrastructure to be constructed [7].

c. Are there potentially unintended consequences associated with permitting hybrid grid connections, such as potential impact on grid system services provided by the associated thermal plant or potential impacts on the reliability of the thermal plant?

From a paper in 2011 by Stephen J Mills with support from the United States Energy Association (USEA) it was seen that, "switching a plant originally designed for base load can have implications in a number of areas that include plant economics, operation and performance" [8].

Changing a plant designed for base load to working with intermittent sources could cause to damage to plant equipment. This is due to the plant ramping up and down its generators more to allow the intermittent energy to be used on the grid. Again, this means future thermal generators, like those planned by the government need to consider this [6]. If these types of plants aren't controlled correctly their lifespan can be significantly shortened and energy efficiency will be reduced leading to more fuel burned and more emissions released. This may in turn reduce their economic viability [8]. It may be more viable to invest in further energy storage options to support the renewables.

e. Do you support the facilitation of such connections, if the definition was adjusted to, e.g. an existing or proposed onshore battery, solar or other generator?

As per the Eirgrid definition below for hybrid projects:

- A Hybrid Project to be any project that has multiple generators which utilise multiple primary energy sources or technology types in generating power.
- A Hybrid Generator is a single generator which utilises multiple primary energy sources or technology types in generating power [9].

Similarly, a hybrid grid connection could be shared any type of generator.

Innovation Categories (Question 11)

11. Should any special allowances for innovation technologies be included in the Phase Two process?

a. What technologies should be provided with special allowances and why?

Special allowances and future proofing must be considered now as the energy transition is implemented. If Ireland is to transform into a global renewable energy hub we must start planning now. Again, in his statement to the Oireachtas, Jim Dollard made this clear. He stated that Electric Ireland have four key items which they believe will position Ireland to deliver their 2030 targets and beyond. These were the points below [7]:

1. Enable Floating Offshore Wind Projects Now
2. Utilise the Existing Grid Network as Efficiently as Possible using Hybrid Connections
3. Build Early Supply Chain Confidence
4. Set up Ireland for Hydrogen Power Generation

Electric Ireland note that the future is in floating offshore wind projects as the seabed is to deep in most areas around Ireland for the current approach. As mentioned in the statement above regarding hybrid connections, they will be vital for energy security and using existing infrastructure will hasten the transition. It is also noted that developing an early supply chain will be important with larger emerging markets by neighbouring countries, it will be important to maintain momentum in delivering our renewable projects. The final point is regarding hydrogen, it is expected to be a vital component of the energy transition to net-zero [7]. Special allowances and considerations must be given for these technologies going forward.

Hydrogen will play a role in energy storage, along with the likes of batteries and pumped hydro. In a paper about levelized cost of energy storage the graph in figure 1 was developed. It shows these technologies as the most viable going forward into 2040. Hydrogen is the only option for seasonal storage, it can compensate for long term supply disruption or seasonal variation in supply and demand [10].

The other technologies for energy storage which will be important are pumped hydro, compressed air energy storage (CAES) and batteries. Ireland already has one pumped hydro station, Turlough Hill with plans for a new one, Silvermines. These are extremely stable with a long life cycles and are critical for balancing the demand on the grid [11], [12]. CAES is a newer form of mechanical energy storage, similar to pumped hydro. Location will be an issue however as salt caverns are ideal, with Northern Ireland having the most viable location [13], [14]. Finally, batteries will play a huge role in energy storage. With continues technological improvements in batteries there are a number of different options but lithium ion batteries remain the most mature and value for money [15]. Some projects have begun in Ireland, with grid connection offers being release for larger battery storage [16]. However, batteries currently require rare earth minerals such as cobalt. The mining of these has terrible environmental and human impacts. Developing countries are continually exploited for their resources for renewable technology, just like they have been for fossil fuels [17]. Equity for all must be part of our energy transition.

5.

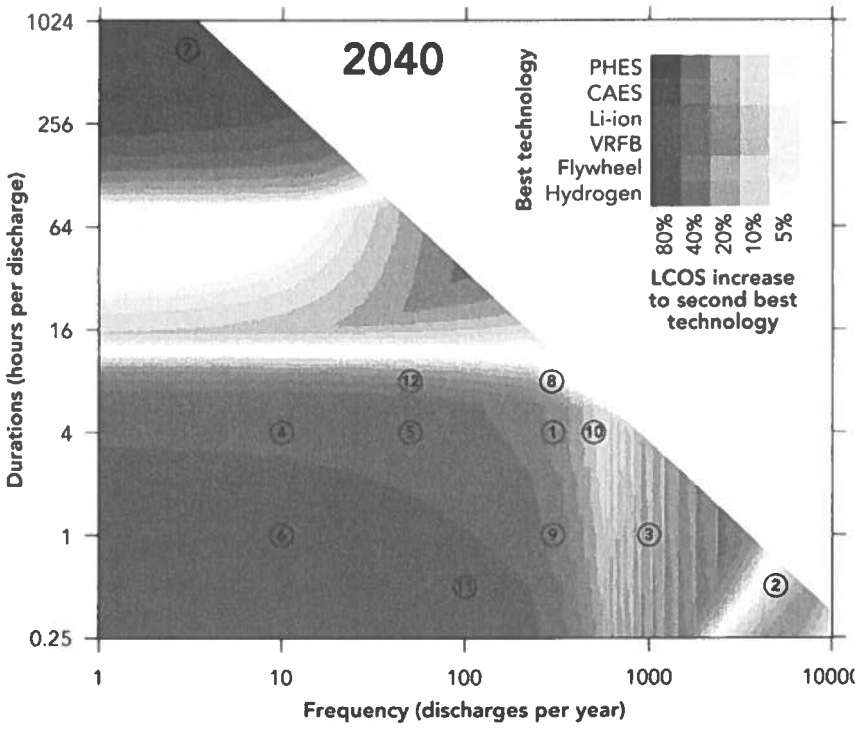

Figure 1: Most Cost-Efficient Technologies for 2040, showing the applications and comparing Discharge Duration and Annual Cycle Requirements [10].

Green hydrogen will be a vital solution for Ireland to reach its climate targets, as it can store energy. It is generated from renewable sources; with offshore wind being Irelands best solution. As wind is an intermittent energy source, we will need to store energy for when there is no wind. When wind is high and excess electricity is generated, it can be used to preform electrolysis, producing green hydrogen, and storing the energy for use later. This can be ramped up and down to limit curtailment. Green hydrogen has many other applications too. It can be used in fuel cells for heavy goods vehicles, a plant in Mayo is doing just this [18]. It can also be used where electrification can not be used, such as applications that require high heat like cement and fertiliser production [7]. Green hydrogen can also use existing gas pipelines cutting the initial investment needed.

The idea of a European Supergrid has also become noteworthy and should be considered for this and future schemes. The Celtic Interconnector and similar connections will be important as we transition to an intermittent dominated energy market, we will need to import electricity from Europe/UK when wind is low and export when it is high. This is something we can take advantage of and become a market leader in renewable energy exportation. It is expected that Europe's fossil fuel based grids will not be fit for purpose beyond 2030 as renewables dominate. This has led to the idea of a Supergrid, which will connect directly to the best electricity generators i.e. Offshore wind farms, and create a meshed interconnection across the continent [19].

c. Should these types of projects also be required to deliver by 2030?

Yes, these projects will help boost our decarbonisation by generation electricity with offshore wind, storing it through the likes of hydrogen and exporting it to Europe when it's not needed in Ireland.

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