

Laura Crawford

From: Lonan McLaughlin [REDACTED]
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To: Planning
Subject: Rigged Hill Windfarm
Attachments: Current electricity supply in Northern Ireland in relation to wind energy.docx

Hello

This is in reference to planning application LA01/2019/0890/F

I hope for this to be viewed by the Planning Committee Members before the Planning Meeting on Wednesday.

Many Thanks
Lonan Thomas McLaughlin

Current electricity supply in Northern Ireland in relation to wind energy

(In writing this, I aim to be as impartial as possible. I have gathered, the most recent information I could find in relation to Northern Ireland's Renewable Energy Supply).

There has been a lot news lately in the national press of the importance of reducing our carbon emissions. Clearly, it is important that we need to reduce our dependence on fossil fuels and increase our use of renewable energy. The following evidence I have gathered explores Northern Ireland's current standing on this. Furthermore, I hope it will allow the reader to relate this information to the Roe Valley, which currently produces a lot of wind energy and hopefully form a decision to whether we should continue to increase our wind energy production in our local area.

BBC News 'Green Energy – How Powering Northern Ireland has changed'. (12/11/2021) by Louise Cullen. <https://www.bbc.co.uk/news/uk-northern-ireland-59258325>

In this article, Cullen positively describes how Northern Ireland currently "gets almost half (46.4%) of our electricity from renewable sources - mostly generated from wind."

The article says that "while we have plenty of wind, thanks to where we are on the planet, it has its drawbacks." The article quotes Terry Waugh, chief executive of Action Renewables. He says, "Wind is unpredictable," "It fluctuates and that presents difficulties for the network. The network is a static system - it's trying to become dynamic." "It hasn't got there yet but it will get there."

He continues saying that "Once it's become dynamic the fluctuation of the wind won't be as important but for now, we need to focus on increasing the other sources of renewables which don't fluctuate."

The article explores the issue of the network further by quoting Colin Broomfield, of the Utility Regulator, "when demand is low, some of our renewable power-generating wind turbines get switched off - that's because the grid can't absorb the electricity, and it can't be stored."

In review of this article, it is positive to hear that renewable energy makes up almost 50% of our electricity production in Northern Ireland. However, it lists the problems of wind energy as it is unpredictable. It states that when demand is low, wind turbines are turned off as the grid can't absorb the electricity and it can't be stored. So, is there such a thing as too much electricity production by wind turbines? The following article explores this further:

BBC News – ‘Green Energy – Options for doubling renewable energy on Northern Ireland’s Power Grid’ (08/03/2021) by Connor McCauley.

<https://www.bbc.co.uk/news/uk-northern-ireland-56316250>

This article quotes SONI – The operator of NI’s electricity network.

This article again states that “About half our power already comes from renewables”. However, “One of the biggest problems is that much renewable energy - mainly wind farms - is in the north and west, while most of the power is consumed in the east of Northern Ireland.”

SONI says the network “needs investment in the hundreds of millions to cope with increased demand for green energy as NI tries to hit carbon targets.” There is no set carbon targets in Northern Ireland as yet, however the article reports “there is a stated ambition to get that to 70% by 2030.”

The article says there is “major challenges for the electricity network due to the nature of renewable power and the capacity of the grid to deliver it.”

The four approaches suggested include, “using policy to concentrate renewable generation in areas where the grid is strong,” i.e., in the East of the country instead of the North West. “Other options include continuing to offer grid connections where generators choose to site renewable projects and using technology to transfer power from west to east.” Which raises the questions of the cost and ability of transporting electricity over long distances.

The final suggestion is that “the executive incentivises power-hungry data centres and other big industry to locate close to renewable sources.” This would be advantageous but other issues are heavily considered when a company decides this, i.e., road infrastructure, skilled employment, etc.

SONI says “only two of the options - concentrating renewable connections at grid strong-points and encouraging big business to locate near renewable sources - will guarantee Northern Ireland meets a 70% target.”

In review of this article and the interview with SONI it is clear that although Northern Ireland has done pretty well in updating our grid for renewable energy, there is challenges ahead if NI wants to meet a 70% target of renewable power. The two main issues are:

- Nature of renewable power – Unreliability of wind.
- The capacity of the grid to deliver – Infrastructure and storage

SONI offers a range of solutions as described above. It is important for us to relate these solutions to the Roe Valley. Infrastructure is an issue that can be seen with the two most recent windfarms built outside Drumsurn. The turbines have been stationary for a significant period of time so one would assume there is problems with connecting the windfarms to the grid and transporting the electricity to where it’s needed. If the new windfarm at Rigged Hill gets passed, is the infrastructure in place to support it?

The two options that SONI gives to meet the 70% target need special consideration. The first option, ‘concentrating renewable connections at grid strong-points’, means locating renewable energy in the more heavily populated east which would exclude the Roe Valley.

The second option 'encouraging big business to locate near renewable sources' would be great for the Roe Valley, however many other factors need to be considered.

The next news article concerns the current news of increased electricity prices in NI:

Belfast Live "**Power NI becomes the latest energy provider to announce major price hike**" (19/11/2021) by David Young.

<https://www.belfastlive.co.uk/news/belfast-news/power-ni-becomes-latest-energy-22209392>

In the past few days, Northern Ireland residents received the news that their electricity costs are due to be increased once again. Belfast Live reports that "Power NI is to increase electricity prices by 21.4%," coming into effect on Jan 1st, 2022.

This raises the obvious question, if almost half our electricity is coming from renewable sources, why the increase? The article explains this and the circumstances leading to the decision. They interview John French the chief executive of the Utility Regulator NI. He says:

"The drivers behind this increase are that we have had one of the least windy summers since 1961, meaning generation from cheaper wind power has been very low." Furthermore, "This low output from wind has meant that there has been an increased use of conventional gas, coal, and oil-fired power stations."

This latest announcement demonstrates the unreliability of wind energy in providing electricity to households in NI. It highlights the previous article and the statement of the SONI back in March, in that there is "major challenges for the electricity network, due to the nature of renewable power".

As the previous articles have demonstrated, NI is benefitting from the production of electricity through wind energy. However, the normal resident does not seem to benefit financially. If one summer is not as windy and prices go up, does this mean electricity prices will go down when a season is particularly windy?

If the wind is going to be unpredictable is there any way, we can store energy and use it when we need it? The following article explores this in detail:

The Spectator **'Why the UK can't rely on renewables... yet'** (13/11/2021) by Ross Clark.
<https://www.spectator.co.uk/article/why-the-uk-cant-rely-on-renewablesyet>

This article is from a national news outlet and focuses on the UK as a whole. The article opens in saying "we have little means of storing energy when the wind is blowing; so that we can use it on dull, windless days." It uses an example to back this statement. According to the Renewable Energy Foundation, "3.7 TWh of wind energy in 2020 — enough to power every home in Wales for the whole year — was wasted because the national grid could not accept it."

The article continues by explaining the UK governments current 'constraint payment' system in which windfarm companies are compensated for turning off their turbines when they are generating too much electricity for the grid to absorb. It gives an example of 'Griffin Windfarm in Perthshire which was given £500,000 to turn off.' The author develops this further by describing that the problem of constraint payments "is exacerbated because over-generous constraint payments have given wind-farm operators a perverse incentive to build in places where there is little demand for electricity: they get paid more when they are not generating electricity than when they are."

This is a claim by the author and something which requires more research. However, it makes me consider the current situation of the Roe Valley in which there is not as many people in relation to the large number of windfarms in the area. Essentially, if the demand is not there, then electricity needs transported to other areas. If this is not possible then the grid becomes too full, which results in the government paying constraint payments.

The article goes on to explain the lack of energy storage in the UK. The article describes that the UK has not yet solved the problem of storing large quantities of power, describing that, "our national enthusiasm for wind and solar power has run ahead of solving the storage problem." He supports this by referencing the National Grid ESO, "Britain currently has 25.4 GWh of energy storage." "Given that we consumed 346,000 GWh of electricity in 2019, this amounts to just 38 minutes' worth of supply."

Large storage batteries are seemingly the only technology that is growing, with the author saying, "the battery boom has attracted investors after green assets" However he points to the current lack of storage these batteries can contain. He uses the state of South Australia as an example, "The state's massive 129 MWh Hornsdale battery will store just 24 minutes' worth of energy when the adjoining wind farm is working at full pelt."

The article looks to the USA in terms of the expense of storing energy. This appears to be very expensive as the article describes, "When you store energy, you have to pay twice: once to generate it and again to store it. In many cases, the latter costs more than the former." The article quotes a study last December by the US Department of Energy, "They put the lifetime cost of energy from a 100 MW pumped storage system at around \$100 (£75) per MWh and that from a lithium-ion battery installation at \$300 (£225) per MWh." This is in comparison to the wholesale price of electricity which "was hovering around £60 per MWh." These figures show that in the US, storage of electricity does cost considerably more than the generation of electricity (wholesale price). Putting these figures together demonstrates the expense of storing energy.

According to the US Department of Energy, the cheapest way to store energy "is by using surplus power to fill an underground chamber with compressed air, then releasing it to drive turbines. There has been such a plant operating in the US since 1991 — although it is not an easy solution because it needs a "very particular kind of geology."

The article concludes that "Storage technology will no doubt improve, but whether it will do so at the rate and to the extent required to allow the government to close down gas plants by 2035 is an entirely different matter."

In this article we have learned that the current storage capacity of electricity in the UK is very limited. Essentially, this is due to the lack of technology. The current technology relies on large batteries; however, the article explains the potential dangers and huge costs involved. The US government has published the cheapest way of storage is large underground chambers. As this relies very much on the geology of the environment, I doubt this will work on the North Sperrin's where there is 7 current windfarms. (Evidence of the 7 windfarms is in section 8.55 of the planning committee report).

Furthermore, the article highlights the drawbacks of the UK's policy of constraint payments and relates this to windfarm companies building in areas where there is low electricity demand. This relates to Connor McCauley's article in which there is a lack of appropriate infrastructure and the inability of transporting electricity over large distances in NI. The article concludes that storage technology will improve but how far we are getting to that situation in NI is unclear.

It is very important to relate this knowledge to the current energy supply of windfarms in the Roe Valley. As I have described before, there are two windfarms built within the last year that have not been connected to the grid yet. If and when they are connected, one would assume that the electricity supply from wind energy to NI would increase substantially. However where is the electricity going to go? Is there enough demand locally for the electricity? As described before, the infrastructure is not available to transport electricity to the east of the country.

These same questions are very much relevant to the new planning application on Rigged Hill. One would assume that (depending on the weather) these new 137m high turbines will generate large quantities of electricity. Is the grid able to cope with this? If not, will the windfarm benefit from large sums of constraint payments by the UK government to the detriment of local taxpayers?

Relating to this, I have discovered another issue from the Planning Committee Report for this particular windfarm application. Section 8.38 describes:

"The bat survey results within the ES identifies that the site is used abundantly by Leisler's bats. Leisler's are considered to be at high risk of collision with turbine blades, and the development is considered to pose a high risk to them during operation. In recognition of this, a bat monitoring and mitigation strategy has been submitted as part of the ES with the primary means of mitigation being curtailment of turbine activity during peak activity periods."

The report does not detail peak activity periods but surely one would ask, are the turbines going to be turned off from dusk to dawn? Will the windfarm benefit from constraint payments for doing so? Is the electricity produced worth redeveloping the windfarm?

In terms of constraint payments in Northern Ireland, the following article explores this further:

Belfast Telegraph '**Northern Ireland wind farmers paid £1m to stop generating electricity since 2018**' (17/06/2020) by Allan Preston.

<https://www.belfasttelegraph.co.uk/news/northern-ireland/northern-ireland-wind-farmers-paid-1m-to-stop-generating-electricity-since-2018-39377481.html>

The article starts off by defining that "constraint payments are a form of compensation, paid to wind farm operators, when demand for electricity falls or winds are too strong for turbines to operate."

Quoting figures provided by the System Operator for Northern Ireland (SONI) "around £1m was paid out to wind farm owners between October 2018 and June 2020." "The money is ultimately added to household electricity bills."

The article says that "SONI has denied the payments in Northern Ireland were excessive". They talked to a SONI spokesperson Natasha Sayee who says, "it was necessary to limit wind energy on occasions for safety and security reasons, with windfarm owners compensated for the electricity they planned to sell." She further explained "that a significant amount of work has taken place to improve Northern Ireland's grid system and minimise constraints."

"At present, the grid carries up to 65% renewable energy at any one time, with a target to increase this to 95% by 2030." "There has also been investment in the Curraghmulkin project in Tyrone and the Brockaghboy 110kv line near Garvagh which connects clusters of windfarms to the transmission grid. During the first three months of this year, she added there was 21% more wind generation in Northern Ireland and 26% more available wind energy than in the same period last year."

She said, "the North South Interconnector would also be a "game-changer" in maximising efficiency, "In doing so it will also reduce costs to consumers across the island of approximately £20m annually, rising to £40m in savings by 2030."

She added that "investing in technologies such as battery storage to hold excess wind energy would allow more upgrades for future generations."

The article also interviews Dr John Constable, the director of a major UK charity, Renewable Energy Foundation (REF). He gives a conflicting argument by warning that "the practise of constraint payments had, in other UK regions, led to wind farms receiving more from compensation payments than producing electricity."

He pointed to a "weakness in Scotland's grid system that has already caused an excessive expansion in wind farms, resulting in large constraint payouts. Mr Constable added: "I agree these constraint payments should never have been paid at all, it's just a mistake. One thing you could say is that constraint payments are just getting going in Northern Ireland."

"Wind farms are still being built so it's only going to get worse, and the scale of the problem is very large." "The constraints so far in the GB system in 2020 has already cost £149.6m. You really don't want to head that way in Northern Ireland."

In review of this article, it has informed us that the practice of constraint payments (although not as bad as Britain), occurs in Northern Ireland, with £1m being paid out in a 20 month time period. As we know Northern Ireland has had a less than windy year in 2021, so how many and how much constraint payments have been paid to windfarm companies since this report has been published? Worryingly, Dr John Constable has said constraint payments are

“just getting going in Northern Ireland” which echoes the author of the previous article who said windfarm payments ‘is exacerbated’ and “have given wind-farm operators a perverse incentive to build in places where there is little demand for electricity”

The article tells us that at the time of publishing, (2020) The SONI has defended constraint payments and reminds us of NI’s growing capabilities of managing its renewable energy. Natasha Sayee has given examples of how the grid has been updated, such as the Brockaghboy 110kv line near Garvagh. Does this connect the Roe Valley with the rest of NI?

She advocates the growing infrastructure, such as, the North-South Interconnector. She also says investing in technologies such as battery storage to hold excess wind energy would allow more upgrades for future generations. As was explored in the previous article, this may be problematic.

Overall, the evidence I have gathered provides a better understanding of NI’s current consumption of wind energy production. As described, Northern Ireland performs well in reducing our carbon footprint as almost half of our energy is provided by renewable sources, mainly wind. The SONI has demonstrated its continued improvement of grid capacity and infrastructure, i.e., North South Interconnector.

However, recent events, such as an increase in electricity prices, has demonstrated two major challenges to the renewable electricity network of NI:

- First, the nature of renewable power is unreliable due to alternating weather.
- Second, we do not have the sufficient infrastructure in place in relation to the ability to store electricity and transporting electricity over long distances.

It is a Catch22 situation in which too little wind results on us relying on other sources of electricity and too much wind results in the grid becoming too full, thereby resulting in turbines being turned off. Unlike the current financial constraints of most homeowners in NI, the windfarm companies are seemingly the only winners out of the situation as they get paid constraint payments by the government.

It is essential that we relate this knowledge to the Roe Valley and the current proposed windfarm on Rigg Hill. There are currently 7 windfarms that are constructed or yet to be constructed in the Roe Valley, including Altahullion, the largest windfarm in NI. There is no published information on the amount of energy the Roe Valley generates. However, the evidence provided shows the dangers of locating windfarms in areas where the supply is greater than demand. The two most recently constructed windfarms have yet to be connected to the grid for a considerable length of time now which shows the lack of infrastructure we currently have.

In Northern Ireland, we have little means of storing energy. Practices elsewhere in the world have demonstrated the inability of big batteries to store energy as well as the large costs involved. Other solutions such as underground caverns depend largely on the geology of the area.

SONI (2021), have provided two solutions if NI is to meet a 70% target of renewable energy. These two solutions are concentrating renewable connections at grid strong points and encouraging big business to locate near renewable sources.” In my opinion, based on the

evidence provided, is that neither of these solutions warrant another large-scale windfarm to be developed in the Roe Valley.

The evidence shows that the present situation does not favour the newly proposed windfarm on Rigged Hill, as it is simply not viable. Key questions of demand, grid capacity, storage and turning off turbines to protect local habitats needs to be resolved before a decision on Rigged Hill Windfarm is undertaken. I believe the most viable solution is to leave the windfarm in its current state and to heed the advice of Terry Waugh, chief executive of Action Renewables, "for now, we need to focus on increasing the other sources of renewables that don't fluctuate".