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Jim McManus
Clerk to the ETI Committee
Committee for Enterprise, Trade and Investment
Room 424
Parliament Buildings
Belfast
BT4 3XX

Dear Jim,

The Ulster Farmers' Union is the principal and largest representative of the farming community in Northern Ireland with a base of over 12,000 members.

Electricity Policy Review (Grid Connections)

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1. Background

Grid Connection is the largest barrier and most insurmountable difficulty facing small scale renewable electricity developers in Northern Ireland, with frustration and anger amongst our membership.

Initially, the UFU were inundated with calls from members who had received very expensive grid connection quotes. The situation has since worsened, with an even larger number of our members now in a position of limbo as their applications are subject to “conditional offers”. This means they are unable to connect to the grid because of a lack of available capacity. Despite having applied for and been granted planning permission, paid significant money up front, and gone through the long application process, yet they get to this stage of the application process and they do not know whether they will be able to connect at all, in many instances, they are waiting for other applicants to pull out and free up more capacity.

As of 31 December 2013, there were 686 single wind turbines awaiting planning permission. This is not the direct result of a problem in planning policy, rather the result of a failing grid connection process. This does not account for the large number of Anaerobic Digestion units (and other small scale generation projects waiting to connect to the grid.

In October 2013, NIE published a “Heat Map”, illustrating the increasing levels of capacity congestion on the grid and this is a live illustration of the problems being faced on the ground.

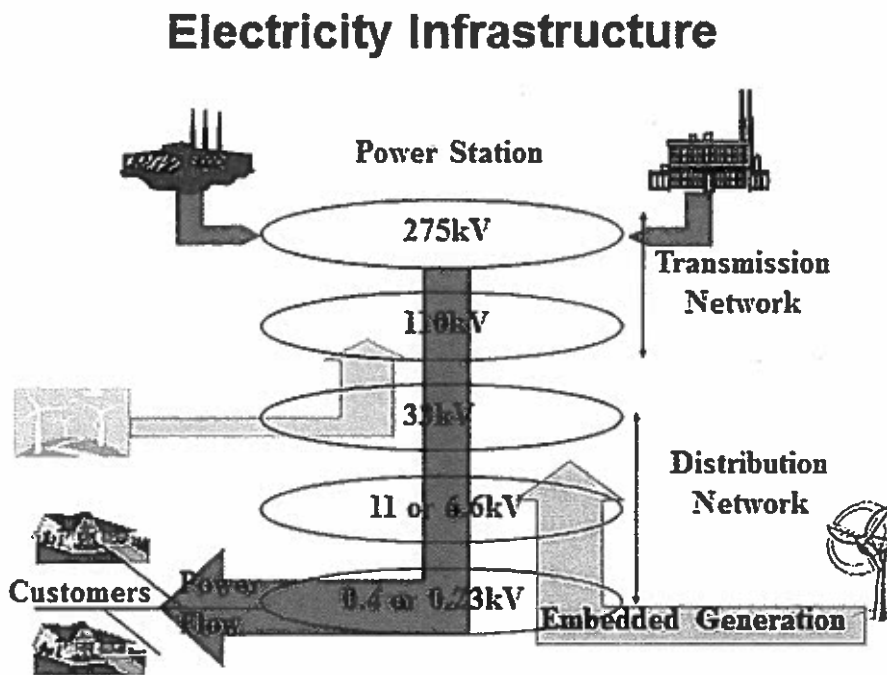
However, as the UFU submission will show, this is now outdated and the picture has deteriorated further since then with no sign of any improvement or easing of capacity congestion.

In the following representation, the UFU will detail why Grid Connection is failing in Northern Ireland and what we perceive to be the solutions to relieve the current log jam.

2. Structure of the Grid

The following illustration (figure One) shows the electricity infrastructure in Northern Ireland. The lower voltage distribution network is where our members are connecting (33kV and below).

Figure One - Northern Ireland Electricity Infrastructure



3. RP5 and UFU Submission to Competition Commission – Reliance Upon 11kV Network

Back in 2013, the Utility Regulator (Northern Ireland Authority for Utility Regulation) referred the disputed price determination with Northern Ireland Electricity Limited (NIE) to the Competition Commission (CC) now known as the Competition and Market Authority (CMA). This followed NIE's decision to reject the Utility Regulator's price control determination for the period January 2013 to September 2017 (also known as RP5). The price control covers charges made for the transmission and distribution of electricity by NIE.

When submitting evidence to the Competition Commission, the UFU stated that NIE should be granted the level of investment they had originally submitted in order to improve and enhance resilience on the 11kV network and thereby enable rural dwellers to access services they so heavily rely upon.

With 25,000 farms throughout Northern Ireland, our members are dependent upon the 11kV network and lines. If you consider the fact that in NI there is approximately 3.5 times more overhead line per customer than the average Distribution Network Operator on the UK mainland, this illustrates the importance of a resilient, reliable electricity network being available. It was only by sheer luck that the ice storm in Spring 2010 did not result in large and wide spread outages on the 11kV network. The

aged lines (c.40-50 years old in many cases) on the network are highly susceptible to what is known as ice accretion.

This was turned down and the 11kV network remains at the mercy of the elements and the UFU are concerned about the impact of prolonged outages and any health and safety compromises which may arise as a result.

We will return to the Competition Commission ruling shortly as it also impacts upon reinstatement work on the 33kV lines.

4. Grid Connection Capacity Problems

As well as the UFU concerns about inadequate investment on the 11kV network, we have grave concerns about the decreasing levels of spare capacity on the 11 and 33kV networks.

Connecting individual small scale renewable energy generation units to the electricity network is proving to be a major problem for our members, on both the 11 and 33kV lines. Please refer to Figure One above.

- **11kV lines** - On electricity grids there is the necessity for generated capacity to match the load. Traditionally this would have been achieved by adjusting the throttle control in the central power station (i.e through generation). However, the nature of small scale renewable generators (embedded and intermittent) joining the grid means that this equilibrium between demand and supply has to met through the control of loads as well as a generation. Initially, the UFU were inundated with calls from landowners complaining about very expensive grid connection quotes. It transpired that this was attributed to lack of capacity on the 11kV network. This congestion has been brought about by “circuit level” activity. In other words, embedded capacity of small scale generation currently connected to the 11kV network.
- **33kV lines** - The situation worsened last year, with NIE identifying that capacity limitations are now arising on parts of the 33kV network. The Aggregated Volume of generators building up created problems at 33kv level and led to what is known as reverse power activity. The “conventional” power flow is from high to low. Yet, when connecting small scale renewables to the grid, this is done through embedded generation. Embedded generation alters the characteristics of the distribution network as it changes this network from a passive network with power flows in one direction to an active network with reverse power activity. The main problem is that AD plants create Permanent reverse power and this is unprecedented in network systems. In light of these problems with the 33kV lines, NIE have issued conditional offers for those landowners applying to connect to the grid. The conditionality means that the project will not proceed until a decision is made from the Competition Commission and then the Utility Regulator. This means that there will be a delay to many projects and a significant number will not be completed due to the significant upgrade/infrastructure costs likely to be borne by the landowner.
- **Conditional Offers** - Capacity problems have led to the issuing of “Conditional offers” to grid applicants. Would-be generators are issued with a conditional offer at the 11th hour. They have already applied for planning permission (see below), sometimes they have secured capital funding to buy the turbine/AD etc, carried out other related works, paid for a NIE feasibility study and then when they apply for grid connection, they are informed by NIE that the offer they are issued with, will be conditional upon upgrade/reinforcement work taking place on the 33kV sub station. Such infrastructure work is outside of the £2.3m agreed by the Utility Regulator (see below) and is unlikely to be carried out. These are showing as red on the NIE Heat Map and the problem is that the map is now outdated and many amber areas have turned red since the time of publication. Capacity is only freed up when applicants further up the queue withdraw their applications.

Hence the frustration being expressed by our membership.

5. Competition Commission Findings – April 2014

NIE initially called for an ex ante allowance of £30m for distribution load-related expenditure. NIE proposed that they could allow case-by-case approval with different approaches for low and high cost reinforcement work. The Utility Regulator rejected this immediately in their provisional determination and emphasised that it had no desire to change the connection policy.

In their response to the CC, DETI confirmed that they were looking into funding through European Regional Development Fund 2014-2020 to part-fund investment in the 33kV network. NIE responded by saying that such funding would be 2 years away and as a result, many projects (c. 130 Conditional Offers) will never actually materialise. This would be partly due to the fact that part-funding means that the generators would have to pay the full cost of the 33kV reinforcement work upfront and such is the level of money involved, they would render the project unaffordable for so many.

On 15 April 2014, the CMA published their findings and the local press hailed it as a success for domestic electricity users as in their eyes it meant no increase in their bills. But closer inspection reveal it to be another set-back for the small scale renewables sector, with the CC concluding that it was not in the public interest to make an allowance for further network reinforcement on the 33kV network, since the risks of NIEs proposals outweigh the potential benefits.

6. Distribution Grid Connection and Planning Permission

In Northern Ireland, grid connection offers can only be made by NIE after planning permission has been granted for a site. The problem is that with many cases, by the time planning permission is granted, the grid is full to capacity and either the applicant is unable to connect (it issued with a conditional offer) or facing very expensive grid connection costs meaning it is not worthwhile proceeding and upfront costs are written off as lost.

This is in contrast to GB where the two applications can be made simultaneously.

Had this been the case the above log jam could have been eased. We will clarify this point by say that it would not have been avoided, rather it formed part of the structural barriers we have described above. Parallel planning and grid connection applicants would mean that less farmers would not be left in a state of limbo.

The muddled planning policy stated above, together with an electricity grid with is not able to accommodate those applying to connect means that we have a toxic mixture where many small scale renewables projects will not materialise and many applicants will be out of pocket.

7. Security of Supply Concerns

In July 2013, DETI and the Utility Regulator issued a joint press release airing their concerns on the security of supply on the Northern Ireland grid. Generation capacity is under pressure currently due to a fault on the Moyle Interconnector and it is only running at ¼ capacity. Also, in order to comply with the EU Emissions Directive from 2016, there will need to be the withdrawal of 510MW of generation capacity at Ballylumford power station and place restrictions on generation at the Kilroot plant. The severity of the situation is clearly identified by DETI/Utility Regulator, there is a risk that there could be prolonged outages on the system if no action is taken and deficit of supply occurs.

To remedy the situation, SONI has assessed that securing an additional 250MW of generation capacity from January 2016 would be adequate to manage the risk of a prolonged outage of a large conventional generation plant. However, at what cost is currently unclear.

This coupled with the current capacity problems on the 11/33kV means that the grid is under severe strain.

8. NIE Proposed Solution

In October, the Utility Regulator approved investment of up to £2.3m to facilitate additional small scale generation at 40 primary sub stations. However, congestion continues at least 30 others and according to NIE, connections will only materialise if there is significant grid strengthening, but this will only come at significant capital expenditure. NIE have said that the CMA might make the position clearer although this is still not clear despite the findings being published on 15 April.

Automated Network Management (ANM) has been identified by NIE as a means to get more people connected onto the grid at less cost. Control arrangements are needed to be in place which will mean a more efficient use of extra capacity going forward. NIE presented the initial findings to the Small Scale Renewables Workshop in March and the UFU would be of the opinion that it will not go far enough to bring enough small scale renewable generators onto the grid.

Despite the two solutions pursued by NIE, the grid connection situation has not improved and if anything, it has actually deteriorated.

The Ulster Farmers Union believe that the grid cannot be upgraded in this manner, what is proposed is a large capital outlay to free up a relatively small level of capacity.

Instead we have proposed an alternative which we are actively involved in promoting as an alternative which could be open to any small scale renewable rural developer in NI;

9. UFU Proposed Solution

On 10 February, Lecale DSU was launched and it is a joint initiative involving the Down District Farmers for Renewable Energy (DDFFREE), South West College, East Down Rural Community Network, Invest NI, local residents groups and the Ulster Farmers Union.

The proposal is to development a microgrid and storage solution for the Ardglass/Ballyhoran area. They will generate and store their own energy and utilising the surplus for their own use or even selling it to local community.

A Microgrid solution is rather than connecting to the grid and distributing the electricity around NI and beyond, the electricity will not go any further than the local sub-station and will be distributed locally. Where not distributed or used, it will be stored through a storage solution.

A significant share of the grid capacity problems on the distribution network have been attributed to problems associated with "load control" or lack of. Experts believe that load control can be achieved through Storage and/or heat transformation. Storage up until now has been the "holy grail" for small scale renewables, the problem up until now has been the electricity has been generated when it was not needed and there has been no way to store it.

The former airfield at Bishopscourt airfield has been identified as the preferred location for a "centre of excellence" base for the micro-grid serving the energy and heat requirements of 300 homes in nearby Ballyhoran. The project will incorporate a broad mix of renewable technology; small scale wind, Solar PV, on-farm AD and the Seagen tidal test site at Portaferry.

Storage will initially be in the form of 2nd life traction battery charging (from Electric cars). Longer term, the storage solution will be met by ICAES (Isothermal Compressed Air Energy Storage) will be central to a Northern Ireland Energy Storage Demonstration Park located in the local area. This will be the first of its kind outside USA. As well as being stored, excess wind can be put to other uses;

namely Ammonia Production. An Ammonia production plant is proposed for Ardglass. Ammonia can be used to power tractors, fishing trawlers and in charging Electric Vehicle. However, this project will take it to another level. Excess wind can be converted to hydrogen, via electrolysis, reacted with scrubbed nitrogen to produce ammonia. It will be then then liquefied for storage and burnt in gen-sets. These gen sets will be operating a “peak-topping” service between 4 and 8pm daily.

Curtailment of renewable energy has been mooted by some as a means of getting more small scale generation capacity on to an already stretching grid. This would be the line of thought for the ANM project being considered by NIE. However, storage such as this will provide the load and therefore avoid the need for curtailment. The System Marginal Price is very low during curtailment. Yet storage helps maximise the opportunity for arbitrage to the benefit of generator and customer alike. This will need to be packed up by Regulatory backing with specific consideration being paid to Competition Law.

Increasing the export capacity is likely to require expensive grid re-enforcement, as we have already stated, yet the Lecale proposal allows existing grid to be used and avoid the significant cost to the industry and wider consumer. Going forward, there is much work to be done (including interaction with the Utility Regulator and NIE) but if this “intelligent” solution does get off the ground it could be rolled out to other areas in NI and ease the grid connection problems, with the roll out of reactive power management as described above with the future possibility of voltage regulation (something not currently available).

10. Support for Storage Solutions

Renewables support in Northern Ireland has traditionally taken the form of ROCs (Renewable Obligation Certificates), where a renewable generator is rewarded for every unit of electricity they generate and export to the grid. This policy has meant that no support has been considered for storage. Producing electricity in this way is very inefficient with a considerable amount wasted. If a storage solution was available, the farmer could store the electricity generated and use it when it is needed most. This would improve on-farm energy efficiency and reduce greenhouse emissions generated by using traditional fossil fuels. The UFU are calling for storage technology to be supported in line with a microgrid solution.

The two solutions proposed are interlinked but will involve a change in thinking in relation to renewables. Up until now the drive has been to build large renewable generators to reap the rewards of ROCs, but this has led to much waste and perhaps led to many of the barriers experienced so far. Instead now, we should consider small units and utilise renewables to improve on-farm energy efficiency and provide energy to the local community rather than exporting it out of the area.

11. Terms of Reference Questions

The following questions were proposed in the terms of reference;

i. Explore the strategic approach to electricity grid investment;

The UFU would make the case that, as far as small scale renewables connecting to the grid is concerned, there has been no clear and defined strategy, with patch-work solutions to on-going and so far unresolved grid highlighted above.

ii. Explore the relationship between grid strength and connection costs for developers;

There is no direct correlation. A developer might have an endless pot of money, but this does get back the capacity problems at the 33kV substations.

- iii. **Review processes in place for developers applying for planning permission and grid connection;**

Grid connection and planning permission should be considered in parallel and not the way it current operates in Northern Ireland.

- iv. **Review any requirements there are for renewable electricity developers to connect to the grid;**

These requirements need to be overhauled. NIE have admitted that they do not have the resources to deal with the number of grid connection applications. When we meet with NIE they say that they are working to improve interaction with applicants, but we are hearing otherwise. When the situation is as critical as it is, transparent and regular interaction is crucial and it is not always forthcoming from NIE.

- v. **Consider the feasibility of introducing competition into grid connections;**

The UFU would welcome this, however, is the Grid in its current state, able to cope with Competition? It is doubtful as it currently stands, however, microgrid solutions should be encouraged.

- vi. **To bring forward recommendations on how these problems can be resolved in the interests of consumers, renewable energy developers and the local economy.**

Please refer to detail on micro-grid development and storage.

- vii. **Summary**

The UFU believe that it is time to consider micro-grid solutions (with its associated benefits) by way of a way forward. By relieving the obligation to connect to the grid for wider distribution, you are removing a significant cause of this unyielding problem. In addition, NIE and the Utility Regulator should commit to reviewing the existing connections charging policy and consider how reinforcement work should be paid for in the future.

If you have any queries do not hesitate to contact me on 90 370222 or via email, christopher@ufuhq.com

Yours sincerely,



Chris Osborne
UFU Senior Policy Officer