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16 May 2022

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## **NIE Networks RP7 Price Control : Our Proposed Approach Consultation**

The Ulster Farmers Union (UFU) is the largest landowner representative organisation in Northern Ireland with over 12,000 members and we welcome the opportunity to reply to this Consultation.

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### **1. Introduction**

Northern Ireland agriculture plays a three-part role in energy; landowner, local demand customer and renewable generator.

- a) **Landowner** - The electricity infrastructure covers thousands of kilometres of cables, poles and transformers crossing our members land and there are thousands of wayleave agreements as well as formal and informal land access agreements.
- b) **Local Demand Customer** - Farm businesses are direct customers, consuming large and significant volumes of electricity. Farmers and landowners rely upon these lines which cross their land are reliant upon the electricity transmitted and distributed to run their farms.
- c) **Renewable Energy Generators** - As well as being major load customers, over the last decade our members have become significant generators of renewable electricity; Small Scale Wind, Hydro, Anaerobic Digestion and Solar PV. This has shown the commitment of the land-based sector in Northern Ireland to embrace renewable energy.

### **2. Northern Ireland Legislation**

#### **i. Northern Ireland Strategic Energy Framework Directive 2010-2020**

Over the last decade, our members experienced in many cases insurmountable problems in accessing grid connection for their renewable projects. Lack of spare capacity, specifically problems relating to reverse power flow, as well as astronomic quotes to connect meant that many projects never materialised, incurring an average loss for unfinished projects of £8,000 per applications, including planning, consultancy and grid application costs.

Despite this, the land-based sector played an important role in Northern Ireland meeting the 40% renewable energy target set out within the Strategic Energy Framework Directive. Small scale renewable generation from our members now provides enough renewable electricity for 150,000 homes such is the importance of our role.

## **ii. Northern Ireland Energy Strategy 2020 onwards**

Launched in late 2021, the new Energy Strategy for Northern Ireland; 'Path to Net Zero' and the 22-point action plan which followed set an ambitious target of renewable electricity of 70% of electricity from renewable sources. Our sector will be once again called upon to play a role in meeting objectives.

However, we are currently looking at 'a groundhog-day' scenario, with many potholes remaining in the road, namely the barriers we have faced in the last 12 years; Planning, Incentives and Grid.

The political landscape has vastly changed since RP6.

## **iii. Climate Change Legislation**

In the intervening period, we have had two competing pieces of climate change legislation in the NI Assembly. Our industry is under pressure, especially in terms of public scrutiny to reduce GHG emissions.

A Private Members Bill which if introduced in its purest form could have seen NI agriculture being decimated with livestock numbers being reduced to levels not seen since the end of the Second World War. As is the case when a Private Members Bill progresses from the floor of the Assembly, it is accompanied by a series of amendments. One such amendment was the increase in the renewable target for electricity generation from 70% to 80%. Essentially making an already daunting target even more unachievable.

Northern Ireland agriculture has undertaken considerable work to protect the environment and we have adapted our farming practices to further reduce emissions going forward. In terms of carbon savings accounting, the considerable push to towards on-farm renewable generation has not been recognised and we are calling for this to change.

## **3. NIE Networks RP7 Price Control**

With specific reference to this Consultation, the land-based sector focus is on;

- Delivering the Energy Strategy – the path to net zero energy
- Network Resilience

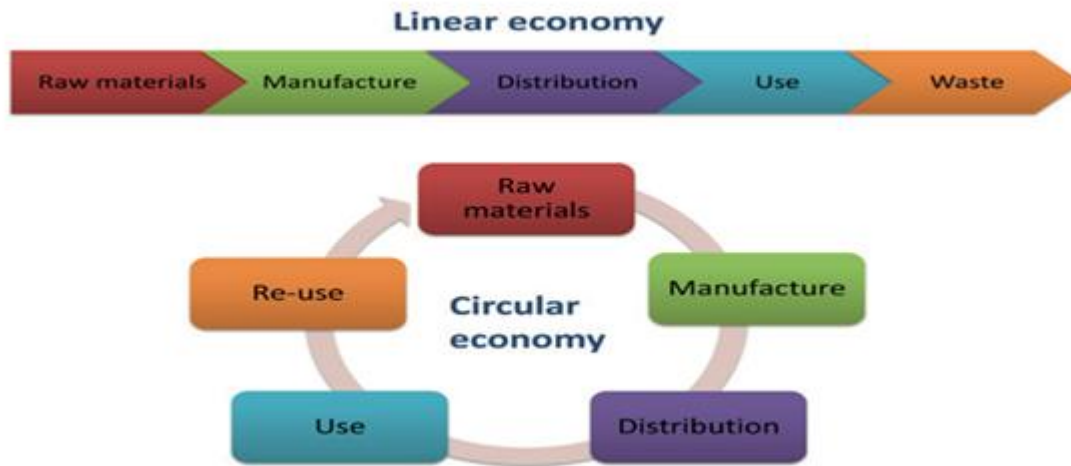
The UFU believe that these two headings are inter-linked and the UFU wish to stress that the delivery of the energy strategy set out by the NI Executive in December 2021 is reliant upon a resilient electricity network.

The push to further energy transition, i.e. the roll out of electric vehicles (and the capacity required) and electrification of heating, will mean an increased demand on the network.

Accounting for potential benefits of energy efficiency and the opportunities offered by the range of new technologies, the UFU wish to flag up that distributed energy resources and changes in consumption patterns which might reduce peak demand on the network. But what the Utility Regulator fails to recognise is the need for much needed investment in the low voltage lines which our members rely upon.

## i. Circular Economy and RP7

Encompassing the concept of the circular economy, with our role in food/energy crop production, as well as the generation of renewable energy both now and in the future, we are of the opinion that we are part of the solution and not the problem when it comes to climate change. In the linear economy, raw natural resources are taken, transformed into products and get disposed of. The Circular Economy Model on the other hand, aims to close the gap between the production and the natural ecosystems' cycles.



The circular economy model dovetails into our vision as how energy generation and its end use could look in the countryside going forward, and this should be recognised in the forthcoming price control.

Adopting the circular economy into energy transition will allow us to move towards meeting our climate change goals. The central concept of a circular economy will open 'circular branches' within parts of economy and in the context of our consultation response, we feel that this will include the electricity network.

One way to look at this image of the circular economy is the elimination of waste. In the case of transformed and non-biodegradable waste, reusing, remanufacturing and finally recycling.

Designing circular systems is an integral part of the circular economy and creating a truly sustainable energy transition means factoring the circular economy in at the design stage.

Consideration should be given to the European Commission's Circular Economy Plan.

### o European Commission's Circular Economy Plan

In 2020, the European Commission adopted a Circular Economy plan. The initial focus of the eco-design regulation on transformers was on energy efficiency, but from 2023 focus in the EU will extend to material efficiency when the next revision of the eco design regulation for transformers is implemented.

As it currently stands, the impact of materials is not negligible, with high quantities of steel and copper used in the transformers. But at the end of life of the transformer, the recycling of all these metallic materials should be ensured.

Power transformers are one of the most expensive and strategic components of an electric Transmission and Distribution system. Their failure may result in a long-term power outage; therefore, it is essential that power transformers work efficiently for many years. The normal life expectancy of a power transformer is 30-40 years.

Now many of these transformers are reaching the end of their lives, which raises the question of their recycling potential. 95% of a power transformer's materials can potentially be recycled. Some materials of high economic value such as copper, can be recycled and resold as secondary raw materials.

- **Material efficiency/'Green Transformers'**

Material efficiency relates to the efficient use of materials over a product's lifetime, including its fabrication, distribution, use and eventual disposal. The benefits of recycling and reusing the materials used in power transformers was evaluated by GE. They evaluated the possibility of replacing conventional oils with renewable/re-refined oils and illustrated an important improvement in the circularity design of power transformers.

One example that supports the concept of material efficiency is around the use of biodegradable vegetable oil. Biodegradable vegetable oil can be used as an insulating medium and refrigerant instead of mineral oil. This is known as "green transformers".

- **Lifetime extension through oil monitoring**

Most if not all, organic materials used within the transformer age leading to the gradual degradation of their physical, chemical and electrical properties. Whilst the end-of-life failure is inevitable, oil monitoring is an efficient way to improve the lifetime extension of power transformer and thus their circularity.

- **End of life and recycling**

A transformer must be decommissioned at the end of its life; drained, prepared for transport off-site and then dismantled. However, the recommended recycling actions required for the four main materials which make up the transformer: steel, copper, cellulose and insulating liquid are the same.

**UFU Position – With high energy efficiency levels, high recyclability rates, introduction of new innovative renewable materials, as well as a lifetime that is mastered and optimised due to regular oil monitoring (see above), power transformers can be seen as a good example of a product which falls within circular economy principles. Consequently, with GE having already applied the concept of a circular economy to grid power transformers and this should be applied to a key component within RP7 thinking.**

- ii. **More intelligent use of the Northern Ireland electricity grid - Smart renewable energy systems**

The Ulster Farmers Union advocate the need for a much-needed change of thinking in the design and construction of local power systems, specifically to allow for a solution that meets the exact needs of rural consumers, specifically, a more intelligent use of the Northern Ireland electricity grid.

On the back of our experience in connecting small scale renewables to the grid in the last 15 years, the UFU advocate an alternative to traditional grid connection, embracing the merits of Distributed Generation, along with other innovative and often unconventional forms of technology.

Our long-standing call for the more intelligent use of the grid dovetails into the recognition for Distributed Generation (DG) and its contribution to climate change emission target aspirations within the wider Northern Ireland Energy Strategy. In our response to the DfE Consultation on future energy strategy for Northern Ireland last year, we called for focus on Distributed Generation, Energy Storage, Behind the Metre Technology, Peer-to-Peer Trading and improved/more efficient utilisation of existing installations.

DG describes the generation of electricity for use on-site, rather than transmitting energy over the electric grid from a large, centralised facility (such as a fossil fuel-fired power plant). Generation includes Solar PV, small wind turbines, AD, hydro technologies and is complimentary to the set-up of the vast majority of farm structures in Northern Ireland.

DG allows faster deployment of incremental capacity than a small number of very large assets, especially relevant when considering recent planning barriers encountered. DG can help support delivery of clean, reliable power to additional customers and reduce electricity losses along transmission and distribution lines. By generating electricity in smaller amounts closer to end-users, there will be improvements in energy efficiency, reductions in carbon pollution and an improvement in grid resiliency.

There needs to be a move from a supply-side infrastructure to “the other side of the metre”, in other words, a bottom-up approach and smart metering would support this. Distributed Generation will be the goal however, bringing about the integration of alternative generations sources, allowing the ability to “switch-on” controllable site-loads.

### **iii. Future for Small Scale Renewables on NI Farms**

The NIRO was designed to encourage export and the grid followed suit, but with the focus now on energy efficiency and local farms playing their role in reducing GHG emissions, the way renewables energy is generated and utilised on our farms;

- **Local Supply** – Where a local farm could produce renewable electricity via wind turbine/AD unit/solar PV and sell it to a nearby business. This is not current permitted (a practice known as wheeling) and should be considered with advantage being the value to the rural economy and energy efficiency improvements.
- **Zero-Net Energy** - This is where the renewable energy produced on a farm meets the exact needs of the business, with no spill or wastage (unlike under the ROC system).
- **Load on demand** – delivers scalable power when you need it most, whilst at the same time reducing emissions, operating costs and improving reliability of power supply. Load on demand is a fully automated energy system which uses a network of smaller generators, switch on and off to produce only as power that is needed.

**UFU Position - With the availability of further capacity severely limited in its conventional form, it is important to encourage local options for electricity transmission and this needs to be reflected in RP7 as a matter of urgency. The concepts above are collectively known as smart renewable energy systems and can, if implemented play a role in meeting net zero aspirations and give us an improved likelihood of meeting renewable electricity targets. The UFU are calling for such networks to be recognised within RP7.**

### **iv. Smart renewable energy systems – Examples in Northern Ireland**

Such systems allow for the efficient substitution of fossil fuels with renewable energy and the UFU have been supportive of this for a decade;

- **Down District Farmers for Renewable Energy (DDFFRE)**

Down District Farmers for Renewable Energy (DDFFRE) was a collaboration starting in 2013, involving South West College, East Down Rural Community Network, Invest NI, the Ulster Farmers Union along with local residents groups, with a vision for alternative way of incorporating Small Scale Renewable Energy Generation and how it can be utilised in a local area.

DDFFRE envisaged a more efficient use of the existing grid system, utilising energy storage and demand side management, in what was effectively a microgrid. Microgrids are smart geographically localised networks capable of aggregating and optimising diverse small-scale renewable resources and the energy generated can then be distributed to selected customers, allowing for a greater efficient use of energy and improve power quality.

The DDFFRE proposal was to develop a microgrid with an integrated storage solution for the Lecale (including Ballyhoran, Ardglass, Killough and Bishopscourt). The former airfield at Bishopscourt was identified as the preferred location for a “Centre of Excellence” base for the microgrid serving the energy and heat requirements of 300 homes in nearby Ballyhoran and it was envisaged that the project would incorporate a broad mix of small scale renewable technology; wind, Solar PV and on-farm AD. The idea being that they will be largely independent, generating and storing their own energy and utilising the excess energy.

The Ulster Farmers Union fully supported this project and we attended meetings with Michelle O’Neill, then Agriculture Minister, Mark H Durkan, then Environment Minister and made representations (presentations/press articles/letters of support) for this initiative. UFU provided oral and written evidence to ETI Committee at Stormont. Our evidence on micro-grids was favourably received and the ETI committee were receptive to the possibility that this could be a viable alternative for those unable to connect small scale renewable generation to the electricity grid.

The project developed further into a significant body of work, led by B9 Energy and the subsequent joint project known as STORY CAES which focused on Compressed Air Energy Storage, with 18 international partners and funding was accessed through Horizon 2020, illustrating the added-value of storage in the distribution grid and highlighted the policy and regulatory changes needed to create an integrated future for energy storage. One of the significant solutions offered by CAES in this instance is that it provides local “load on demand” which countered the Reverse Power Flow constraint.

At the time, the UFU highlighted that this new concept needed to be embraced to addressing many of the barriers we have faced to date, mentioned earlier in this response. Unfortunately, it did not reach a conclusion in this time.

Now fast forward to 2022.

- **Project Girona**

Despite the DDFFRE project not reaching completion, we have seen progress with ‘Project Girona’. This project has seen solar panels installed along with a smart storage battery and software solution to 60 properties and commercial premises in the Coleraine area and represents Northern Ireland’s first smart electricity grid microgrid solution. Solutions such as this offer consumers the opportunity to generate, store and use self-generated electricity, reducing energy costs whilst contributing to net zero aspirations set out in the NI Energy Strategy; electrification of transport, heat and of significant interest, ease the pressure on the grid.

The project has installed solar panels along with a smart storage battery and software solution to 60 properties and commercial premises in the Coleraine area. It utilises an energy management platform, which in turn virtually aggregates the allocated batteries into a cluster before the system discharges the energy stored at a specific peak time. By providing flexible network support, this enables distribution network operators like NIE Networks, to meet this demand while minimising the investment that would be required to upgrade the electricity infrastructure in order to cater for this rise in demand. Battery technology managed by an energy management platform provides these services, and in return can provide additional income for households using battery technology, extending to a community energy solution. This could be rolled out to rural areas throughout Northern Ireland.

Project Girona has completed its installation phase.

#### **4. Is it time for radical new thinking?**

The grid problems in Northern Ireland have not been resolved and it means that any future renewable connections will be fraught with difficulties. This Consultation response sets out that RP7 needs to come with a ‘smart’ grid solution which can not only accommodate further embedded generation, but also improve the

efficiency of existing connected renewable generation. This smart solution will look to balance the plethora of renewable energy suppliers and growing demand emulating from the heat and transport but also improve the functionality and reliability of the LV lines.

However, perhaps more radical thinking is needed and perhaps what is happening in GB could be worth considering within the context of RP7, where a Conservative Government is actually looking at a 'Big state solution'.

### **i. Radical Shake Up in GB Energy Policy**

**National Grid ESO** - Perhaps what is happening in GB could be worth considering within the context of RP7. Here they are seeing the biggest shake up in the energy market for a generation - they are planning to part-nationalise the National Grid by 2024.

<https://news.sky.com/story/government-to-nationalise-key-part-of-electricity-grid-to-help-meet-climate-goals-12583678>

This is a recognition that electrification of heat and transport will create subsequent pressure on the grid (see Financial Times article below). In the move, National Grid ESO (electricity system operator) will be responsible for day-to-day management and long-term planning of the grid. Crucially the National Grid will retain ownership of the infrastructure. National Grid will sell its Electricity System Operator (ESO) arm to the government and will then become part of a new Future System Operator (FSO). The new authority will oversee Britain's electricity systems and other projects such as carbon capture and offshore wind networks.

What has led to this radical approach in GB is a similar scenario as the problems being faced in Northern Ireland and this was set out by an article published by the Financial Times on 8 May 2022, which stated that GB renewable developers are being told that they will have to wait 6-10 years to connect to the National Grid network.

In GB, construction-ready projects are being delayed by long queues and excessive charges to get access to the transmission system. Renewables provider RES, said it had several solar projects ready to connect this year but they had been given connection dates of 2028 or 2030.

RES states that projects are being delayed due to a lack of long-term planning and investment in electricity infrastructure. They go to say the current system was "not fit for purpose" and needed to change.

Whilst GB targets different to NI, the aspirations are the same and Government pledges to shift away from fossil fuels and meet net zero targets are under threat by such delays. GB are looking to more than double existing renewable generation capacity, adding 50 gigawatts of offshore wind by 2030 and 70GW of solar by 2035.

The issue of who pays for improvements to the electricity distribution network is crucial given that it is privatised, with the National Grid providing the bulk of the central transmission network across Great Britain and supplying the six regional monopolies whose pylons, poles, wires and cables carry electricity to end users and this is addressed by the radical 'big state solution' set out above.

GB is regulated via price controls set by Ofgem. The regional distributors earn their revenues from a surcharge on customer bills, with up to a fifth of the typical household energy bill (roughly £371 a year) going towards the cost of the distribution network.

National Grid are proposing to upgrade the network on a project-by-project basis, building bigger substations and more overhead lines.

However, the industry is concerned over the cost of improvements to the network, which are needed to shift from a system designed to serve large coal-powered plants close to urban centres to more dispersed renewables developments such as solar and wind farms.

According to Roadnight Taylor, the burden is being laid with smaller-scale projects, where transmission upgrade costs can be c.£12m per substation and this renders many projects unviable. They say that in GB, it has become a postcode lottery as to how much they are charged.

The UFU believe that the FT article mirrors the situation here in Northern Ireland. With grid problems not being resolved any targets which DfE set out for renewable energy are unlikely to be met, so perhaps there is a need for radical thinking here too.

**UFU Position - Looking to RP7, the scope for any radical thinking such as the big state solution seen in GB is unlikely as the UFU is conscious of the ‘all-island’ nature of the grid. Yet if we are to have any chance of meeting targets, surely there is a need to look at a new radical line of thinking regarding the Grid in Northern Ireland.**

**Role of Utility Regulator** - In our response to the DfE Energy Strategy Consultation response in June 2021, the UFU stated that the mandate of the Northern Ireland Utility Regulator needs to evolve urgently if Northern Ireland is to have any chance of meeting climate change targets.

The UFU support the view that the workings of the Utility Regulator must be broadened to consider the need for decarbonisation and economic development. There needs to be a forward-looking regulatory framework, currently the decision-making process rests upon the cheapest option, with no consideration as to value nor ahead of need, which means innovation and strategic investment is overlooked.

**UFU Position - The Energy Network Association in the FT article on 8 May made it clear that in GB, Ofgem needs to move from a reactionary process to mandating “anticipatory, strategic investment”. Similar considerations are needed on the Northern Ireland regulatory framework and hence we are asking for parallel discussions within the context of RP7.**

## **5. Conclusion**

The message is that land-based sector is ready to play our role once again in energy transition, renewable energy generation and driving energy efficiency on our farms. However, unless there is a change of thinking in how we connect to the grid, grid design and how they operate, including the mandate of the Utility Regulator we are facing a situation whereby we could fall short of the renewable energy targets we are being asked to meet by 2030.