Email to:
WMReform@ofgem.gov.uk

23 June 2022

Dear Phoebe,

Locational Pricing Assessment – Call for Input

Scottish Renewables is the voice of Scotland's renewable energy industry. The sectors we represent deliver investment, jobs, social benefits and reduce the carbon emissions which cause climate change. Our 300 members work across all renewable energy technologies, in Scotland, the UK, Europe and around the world. In representing them, we aim to lead and inform the debate on how the growth of renewable energy can help sustainably heat and power Scotland's homes and businesses.

Scottish Renewables welcomes the opportunity to provide our view on the proposals outlined in this call for input. We **have responded to your individual consultation questions further below, but in summary, we would like to draw your attention to the following points:**

- Although Ofgem may see benefits with introducing more granular locational pricing, relying on wholesale market signals alone would favour operational decisions and smaller capital investment, over large capital projects. This would not necessarily lead to cost optimal outcomes for GB consumers.

- The implementation of Locational Marginal Pricing (LMP) would tend to disadvantage northern generators and southern consumers. This means that value of a diverse mix for security – both by technology and geography – is not reflected in the locational pricing model, which is a potential shortfall in the assessment of LMP and needs to be addressed as a priority.

- LMP will also mean that generation in Scotland will face increased risk compared to generation located in the rest of the UK, unless price signals move demand from southern to northern areas effectively, which we believe is unlikely. Developing renewable potential in Scotland is essential for achieving net-zero and is reliant on GB policy/regulatory frameworks, thus new market arrangements that could potentially harm government ambitions should be assessed carefully.

- To meet the level of renewable deployment required by 2050, we will need technologies to be located across the whole of the UK, where the renewable resource is available. The location of renewable generation is decided early in the development process. Therefore, it is questionable whether a system that offers a volatile locational dispatch signal provides a useful signal at the point of choosing a location.

- We believe that the impact of LMP on the cost of capital of projects cannot be ignored. LMP is more complex and more volatile than the system currently in place, therefore if the impact on cost of capital is not assessed carefully, this could hinder investment in low carbon generation.

- Although the current proposal states that Financial Transmission Rights (FTRs) could help to hedge geographical variations in prices, we believe that a combination of LMP with effective FTRs will be challenging to deliver, and stakeholders will have to pay significant costs to adapt to that system. It is also unclear that the combination of LMP and FTRs delivers significant benefits above and beyond reforming TNUoS to reduce volatility.

6th Floor, Tara House, 46 Bath Street,
Glasgow, G2 1HG
0141 353 4980 @ScotRenew
www.scottishrenewables.com

- We believe that LMP must be assessed against the current planning system that exists across the UK and Scotland. Otherwise, the reform will result in distortions that ultimately will fall on to energy consumers to pay. In theory, LMP only works perfectly in the simplified economic conditions of "perfect competition", in a centralised energy system where planning decisions are taken by one entity in a coordinated way, none of which applies in practice.

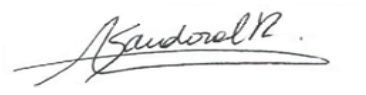
- The modelling should not assume any benefit from reducing constraint costs due to transmission capacity that has not kept up with generation deployment. Otherwise, it would confer a benefit that is unjustified.

- We recommend that the model should include:

    - The impact of LMP on net-zero,
    - Data input corrected to include government targets and sensitivities that reflect the reality of deployment by location - including how geographic diversity of generation will be altered by the introduction of LMP.
    - Transmission networks that reflect the 25GW of ScotWind offshore wind.
    - A key measure of benefit focused on economic total system welfare, consistent with achieving net-zero targets and ensuring security of supply.
    - Consideration of how locational pricing volatility may affect the forecast of prices when bidding into CfD contracts, and how this could increase cost for consumers.
    - The relative timing of siting decisions for new CfD projects. CfD contracts run for 15 years, so it is the pattern of charging across this period that will form the basis of the investment and siting decisions for a CfD project.
    - Explicit assumptions around the reforms of relevant policy regimes such as the CfD and Capacity Market (CM), and the cost impact for end consumers.
    - Impacts on consumers not only as a total value but looking at the impacts on different consumer archetypes. Ofgem should also provide more detail on how it proposes to model the elasticity of demand for different categories of consumers.
    - The impact on generators. For this is important the model provides the disaggregation of generators by categories to understand the impact on different types of generators by different zones/nodes, different technologies, and different support schemes/business models.
    - The assessment of benefits of LMP against ongoing reforms. The counterfactual should be an improved market, including improved TNUoS, not the market as it stands today.
    - The modelling of the potential increase of negative pricing periods in certain areas.
    - Wholesale price impacts of the government's decision to reduce/remove final consumption levies from domestic and non-domestic electricity bills.

Scottish Renewables would be keen to engage further with this agenda and would be happy to discuss our response in more detail.

Yours sincerely,



Angeles Sandoval
Policy Manager | Grid & Systems
Scottish Renewables

Question 1. The key opportunities associated with introducing more granular locational pricing in GB;

Although Ofgem may see benefits with introducing more granular locational pricing, relying on wholesale market signals alone would inefficiently favour operational decisions and smaller, shorter-life capital investment over long-life large capital projects such as electricity transmission capacity. This would not lead to cost optimal outcomes for GB consumers and would underutilise the strategic wind resource the UK has at its disposal.

According to the ESO Net Zero Market Reform, a locational margin pricing (LMP) system may alleviate the cost to the ESO of managing grid congestion and provide more efficient utilisation of flexible assets. However, LMP is more complex and more volatile than the system currently in place. This price volatility reflects the state of the power system, but it also increases the price risk for market participants. This component is significant, as price risk could increase cost of capital and hinder investment in low carbon generation.

We believe that grid congestion may be manged with less disruption via flexibility markets and network investment rather than changes to the wholesale market at a point when significant investment is required to decarbonise the economy and reduce our dependence on fossil fuel imports. Attempting to deliver this via sharper wholesale market signals will not deliver the required infrastructure at lowest cost.

Overall, there are more opportunities to deliver efficient use of the system at the least cost for the consumer via alternatives to LMP, but unfortunately, alternatives to LMP are out of the scope of Ofgem' assessment.

Finally, we would like to note that the objective of a new market design is to deliver net-zero and energy security at the best value to the GB system. Therefore, future market arrangements must consider:

- Investments in a diverse mix of low generation to deliver a net-zero energy system by 2045 in Scotland and by 2050 in the UK.
- A decentralised, diverse mix of low carbon generation across different locations, aligned with the ambitions of the latest Energy White Paper and the planning system of the UK Government and Scottish Government (1).
- The right solutions to ensure the operation of a system with a high level of variable generation, through a wide range of flexibility options.

We believe that it is questionable how more granular locational pricing would help to achieve these objectives and we would welcome further discussion on this.

Question 2. The key implementation challenges, risks and mitigations

We have identified the following challenges and risks:

- **Impact on the cost of capital**

We strongly assert that the impact on risk investment in renewable generation is an important component to be analysed. As mentioned previously, LMP is more complex, more volatile and more unpredictable than the system currently in place, which could hinder the level of investment in low carbon generation.

A recent report from UKERC quantified the impact that uncertainty could have on the cost of building out offshore wind in the UK under different policy and market regimes. The results show that a moderate impact in the cost of capital for delivering 80GW of offshore wind by 2040 adds £15bn to the cost of delivering the full fleet of offshore wind needed, and every increase point in the cost of capital implies an additional £1bn per year. This suggests that the cost of delivering offshore wind could vary from £1-5bn per year depending

upon the policy framework decided for the future of the electricity market (2). This provides strong evidence to illustrate the threat of underestimating the risk exposure of renewable generators under different market designs.

Scottish Renewables has gathered evidence that illustrates how the volatility and unpredictability of TNUoS charges were sending an inefficient signal for developers and investors, increasing the capital cost of projects that ultimately cost energy consumers more. According to a report conducted by NERA Consulting, consumers could face costs between £122 million and £391 million per year by 2030 if financial risk for future wind projects, resulting from TNUoS, is not addressed. The LMP assessment should recognise that this cost to customers from TNUoS uncertainty could be avoided by making improvements to TNUoS, while the cost of uncertainty arising from LMP would likely be substantially more expensive.

Recently, Ofgem agreed with reforming TNUoS, proposing to address the volatility and unpredictability of TNUoS charges in the short term, with fundamental questions regarding the function of TNUoS in a net-zero, flexible and decentralised energy system expected to be covered in a long-term review (3). In light of this announcement, it is difficult to agree with the implementation of a new system that will make the electricity market more volatile and complex. Appropriate and accurate 'cost-reflective' signals need to be given to network users and they need to have an opportunity to respond to them. LMP is still a long way from providing this to network users.

The market design proposed is so complex that it is hard even for long-term experts in electricity markets to understand how it would practically be implemented and impact them. This severely threatens the ability of developers to build and communicate robust business cases for investment. It would be even more difficult for citizens as end-users to understand the basis of their bills.

Although some markets such as the US use FTRs to hedge geographical variations in prices, we believe that a combination of LMP with FTRs will require challenging and significant changes to industry and procedures, and stakeholders will have to pay significant costs to adapt to a system of this kind. According to Bell, et al. in the *Project Transmit: Academic Review of Transmission Charging Arrangements*, the value of the hedge provided by the purchase of FTRs may be difficult to predict and it would tend to favour larger market players with greater resources and with greater experience in the GB market. It will be challenging to design FTRs with a duration long enough to provide a meaningful hedge over the project life of low-carbon generators. Additionally, large market participants may be able to manipulate prices in a system with LMP. The *Project Transmit* recommended that LMP with FTRs was inconsistent with the encouragement of economic efficiency, sensitive to small changes in the transmission and its users, highly complex, and it needed considerable further work to develop implementation (4).

- **The impact on in-flight projects and new generation in Scotland**

It's important to highlight that the implementation of LMP would tend to disadvantage northern generators and southern consumers. The methodology will signal generators to locate near to demand, in locations where renewables resource is not necessarily available – encouraging more gas generation close to demand centres. This means that the need and value of a diverse mix for security – both by technology and geography – is not reflected in the locational pricing model, which is a major shortfall in the assessment of LMP and needs to be addressed as a priority.

The implementation of LMP will mean that generation in Scotland will face increased risk compared to generation located in the rest of the UK, unless price signals move demand from southern to northern areas effectively, which we believe is unlikely and difficult to rely on as a business case. Developing renewable potential in Scotland is reliant on GB policy/regulatory frameworks, thus new market arrangements that could potentially harm government ambitions should be assessed carefully.

To meet the level of renewable deployment required by 2050, we will need technologies to be located across the whole of the UK, where the renewable resource is available based on geography and meteorology. The location of renewable generation is decided early in the development process. Therefore, it is questionable whether a system that offers a bottom-up site signal to generation developers provides a useful signal at the point of choosing a location.

Importantly, the case for LMP ignores the negative impact on financing costs. Advocates argue that there would be no investment hiatus, but LMP will make it increasingly difficult to forecast future wholesale prices, increasing the risk and thus cost to upcoming projects – particularly those in Scotland. This is before considering the uncertainty of a change process that would likely take more than 5 years and would involve changes to market dispatch, existing CfDs, LCCC reference prices, as well as implications for upcoming transmission build-out, the interaction between transmission and distribution networks, and supplier processes.

The consideration and possible transition to LMP is likely to take at least 5 to 10 years, during which time investors will be expected to participate in CfD auctions and take CfD Strike Prices in the face of a high degree of uncertainty. It will not be clear how, when, or if the change to LMP will happen, how FTR may be designed, and how the CfD may accommodate such a change. This transition would impose a high degree of risk and cost on investors, threatening investments at a time when it is more important than ever to secure new low carbon generation at as low a cost of capital as possible.

- **Compatibility of LMP with the current planning system in the UK**

In a liberalised electricity market such as the UK, infrastructure and generation assets are granted planning consent by different authorities, which leads to multilevel decision-making. An example is the case of onshore wind. Today, the planning and consenting system for onshore wind developers are more favourable in Scotland than in England and Wales (5). The planning regime in England was changed in 2015 with the express intention of preventing the deployment of onshore wind. Therefore, it is expected that most of the onshore wind needed to meet our climate targets will be located in Scotland.

Similarly, the recent results of the ScotWind leasing round will result in up to 25GW of capacity being built out in Scottish waters in the 2030s, and this will be a substantial part of the UK offshore wind deployment needed to reach net-zero.

We believe that LMP must be assessed against the current planning system that exists across the UK. Otherwise, the reform will result in distortions that ultimately will fall onto energy consumers to pay. In theory, LMP only works perfectly in the simplified economic conditions of “perfect competition”, in a centralised energy system where planning decisions are taken by one entity in a coordinated way, none of which applies in practice.

Research has already shown that ignoring risk in planning transmission for renewables has quantifiable economic consequences (6). There is a need for transmission planners to anticipate generation investment, and we can see increased uncertainty for renewables in an LMP system. This is mainly because generators would have different signals to consider before deciding on a site. These signals will include the market signal of the LMP system, availability of resources, local planning restrictions, etc.

Due to the geography of the UK, demand centres and availability of renewable resource are located at opposite ends of the country - renewable resource is greater further north, and demand centres are greater further south. This means that renewable developers and consumers are unable to respond effectively to the market signal from an LMP system. The signal is rather redistributing costs and benefits in a manner that does not achieve any aim. If a market signal cannot be responded to, then it is not a useful signal and does not achieve its purpose.

- **The limits of demand-side flexibility**

NGESO states that a case for nodal pricing is its ability to unlock accurate dynamic flexibility in operational timescales on the demand side. Although it is true that some future demand could be flexible (e.g. vehicle to grid technologies), we believe that a large part of end consumers' basic needs for electricity will not be. Furthermore, these end consumers may be limited in their ability to respond to short-term price movements, and unable to predict mid to long-term price signals due to the dynamic nature of the LMP system.

Question 3. The proposed approach to modelling zonal and nodal market designs.

Below we have detailed our current thinking about the modelling.

3.1 The impact of LMP on Net Zero

We believe that given the uncertainty that LMP will introduce on low carbon generation in the short and long term, it is important that Ofgem evaluate if this new market design will affect the achievement of net-zero targets. We believe this point is very relevant, particularly if the new market design will favour generation in areas of low renewable resource, where there are also planning restrictions to build out new renewable generation.

3.2 Data input and sensitivities

The industry requests that Ofgem explains how ScotWind has been factored into the analysis, and whether any risk margin for the uncertainty resulting from a move to LMP been factored into the investment decisions.

Additionally, given that ScotWind will bring around 25GW of capacity by the 2030s, the industry would like to know how the transmission network needed for this capacity will be included. In the workshop, the consultants mentioned that they will use the latest NOA and ETYS available. However, those latest documents do not include the 25GW of ScotWind. We believe this point is very relevant as the amount of capacity expected to be built in Scotland is significant. If the model is not considering including the transmission needed for this amount of capacity, then the cost of benefits resulting from this would be very questionable.

We note that the model is also using the out-of-date FES as data input, thus we would recommend that a sensitivity analysis is used to include the 2030 target of 50GW of offshore wind capacity announced by the UK Government in the Energy Security Strategy, the 8-12GW onshore wind target by 2030 in the Scottish Government's Onshore Wind Policy Statement, and the 25GW of ScotWind projects by 2030s. We also think it would be important that the model use sensitivities to consider the reality of deployment by location. For example, planning restrictions for onshore wind in England are unlikely to change, therefore most of this capacity would be expected to be deployed in Scotland. Additionally, the land availability for solar deployment in southern areas must be taken into account.

3.3 Economic efficiency versus consumer bill impact

We note that the current assessment will be focusing on estimating the cost benefits to consumer bills, but we believe that it would be more appropriate to focus on economic welfare as a key measure of benefit (the sum of consumer and producer surplus), consistent with achieving net-zero targets and ensuring security of supply. Cost to customers should be considered as part of an assessment of distributional impacts.

We believe that placing the risk on renewables generators only will result in economic inefficiencies and be passed through in the form of more expensive costs to customers in the long-term.

3.4 Modelling CFD contract holders

Consideration should be given to how locational pricing volatility may affect the forecast of prices when bidding into CfD contracts.

The CfD has been successful in the delivery of projects by providing security and reducing the costs of financing projects. To the extent that locational pricing increases uncertainty over CfD financial returns, this should be reflected in the modelling, perhaps through an increased cost of capital.

There is another fundamental issue in modelling CfD contract holders - the modelling assumptions do not consider the relative timing of siting decisions for new CfD projects. CfD contracts run for 15 years, so it is the pattern of charging across this period that will form the basis of the investment and siting decisions for a CfD project. The location of a generator must be determined more than 5 years ahead of first generation, so if there is to be an efficient locational signal, then the aggregation of 15 years of locational prices needs to be communicated to the developer 5 years in advance of first operation. This is extremely challenging for any cost signal, let alone one that is inherently volatile.

The CfD design under nodal pricing should also be taken into consideration. CfD has been critical to secure investment, yet it is unclear how the CfD process would function given the uncertainty on reference prices. For example, how would the best bids be awarded, how would tender budget be determined and how would the settlement payments take place?

Additionally, the assessment of LMP should take into account the types of market failure that move the GB energy market away from the idealised world of “perfect competition”. This includes the presence of high sunk costs for low carbon generators and subsidised entry where new entrants can receive CfD prices that are higher than incumbents at the same location, so new entrants can be protected from worsening LMP differentials while incumbents are not.

3.5 Impacts on consumers

Impacts on consumers should be modelled not only as a total value but looking at the impacts on different consumer archetypes. For example, ‘consumers’ should be subdivided into:

- Domestic consumers,
- SME,
- Industrial and commercial (I&C)
- Energy intensive industry (EII).

Ofgem should also provide more detail on how it proposes to model the elasticity of demand for different categories of consumers. This should include time-shifting of consumption and absolute increases/decreases in consumption in response to price changes. This will be an essential input to modelling of consumer surplus and the extent to which locational pricing can lead to greater economic efficiency.

3.6 The impact on generators

- The assessment should further disaggregate the generator categories to understand different impacts on different types of generators by different zones/nodes, different technologies and

different support schemes/business models (also covering FiT, ROCs, fully merchant, existing CfD and future CfD generators etc).

- It should also include what different generators can do to mitigate those negative impacts and risks.
- We think that one of the risks is that AR4 CfD projects onwards are exposed to negative prices and nodal markets are likely to increase periods of negative pricing in certain areas and this should be modelled.
- We also think that generators require the following outputs from the modelling to assess the risks/opportunities from a move to a nodal market:

  - Average wholesale prices across all zones
  - Average load factors across all zones
  - Installed generation capacity across all zones
  - Periods of negative prices

3.7 Assessment of the benefits of LMP against ongoing reforms

We believe that the cost benefits of locational pricing must be assessed against the benefits that could be introduced through ongoing reforms and incremental improvements to the current market.

- **TNUoS**

Ofgem has committed to reform TNUoS. The TNUoS Task force has been recently launched and the review of TNUoS in a decentralised net-zero energy system is expected to be done in a long-term review. Given the effort the industry has already put into TNUoS reform, it is likely that going ahead with this reform will create less disruption than implementing a new mechanism that will create more uncertainty for market participants.

- **New Market mechanism for long duration energy Storage**

We understand that one of the reasons for proposing LMP is to encourage better site signals for flexibility assets, but the industry has been exploring new ways to attract more flexible assets into the system for a while now. For the case of long-duration energy storage, Scottish Renewables has strongly advocated for the introduction of a new market mechanism for long-duration energy storage and we have also advocated to include these technologies in the Capacity Market (7) (8) (9) (10).

We have been specifically proposing the implementation of a Cap & Floor mechanism, a similar mechanism used for interconnector projects that has successfully attracted investment into several projects, delivering significant benefits to consumers. The industry is currently waiting for BEIS to respond to the consultation published last year, and if government response is positive, the deployment of these technologies could be unlocked.

- **New hydrogen business models**

In addition to the point above. Scottish Renewables has also been engaging with Government to encourage the design of new funds and business models for hydrogen (11) (12). A new mechanism that encourages hydrogen deployment will likely provide better signals for the deployment of electrolysers than a locational pricing signal.

References

1. **Energy White Paper. [Online] UK Government, 2020.**
https://www.gov.uk/government/publications/energy-white-paper-powering-our-net-zero-future ..

2. UKERC. Risk and Investment in Zero - Carbon Electricity Markets. [Online] 2021.
https://ukerc.ac.uk/publications/zero-carbon-electricity/.

3. Ofgem. TNUoS Call for Evidence - Next Steps. [Online] 2022.
https://www.ofgem.gov.uk/publications/tnuos-call-evidence-next-steps.

4. Bell, K., Green, R., Kockar, I., Ault, G., & McDonald, J. ***Project TransmiT: Academic Review of Transmission Charging Arrangements.*** **2011.**

5. Scottish Government's Onshore Wind Policy Statement. [Online] 2021.
https://www.gov.scot/publications/onshore-wind-policy-statement-refresh-2021-consultative-draft/.

6. Adriaan Hendrik Van der Weijde, Benjamin F.Hobbs. ***The economics of planning electricity transmission to accommodate renewables: Using two-stage optimisation to evaluate flexibility and the cost of disregarding uncertainty.*** **2012.**

7. Filling the flexibility gap: Realising the benefits of long-duration electricity storage. [Online] 2021. https://www.scottishrenewables.com/publications/823-filling-the-flexibility-gap-realising-the-benefits-of-long-duration-electricity-storage.

8. FINAL RESPONSE: Long duration Energy Storage -Call for evidence. [Online] 2021.
https://www.scottishrenewables.com/publications/909-final-response-long-duration-storage-call-for-evidence.

9. Letter to National Grid ESO regarding the Net Zero Market Reform. [Online]
https://www.scottishrenewables.com/publications/982-response-to-national-grid-eso-regarding-the-net-zero-market-reform.

10. FINAL RESPONSE: Capacity Market: Improving delivery assurance and early action to align with Net Zero - Call for evidence . [Online] 2021.
https://www.scottishrenewables.com/publications/927-final-response-capacity-market-improving-delivery-assurance-and-early-action-to-align-with-net-zero-call-for-evidence.

11. FINAL RESPONSE: Designing a UK low carbon hydrogen standard . [Online] 2021.
https://www.scottishrenewables.com/publications/940-final-response-designing-a-uk-low-carbon-hydrogen-standard.

12. FINAL RESPONSE: Designing the Net Zero hydrogen fund. [Online] 2021.
https://www.scottishrenewables.com/publications/941-final-response-designing-the-net-zero-hydrogen-fund.