Energy for generations

ESB Response:

Greenlink Electricity Interconnector Consultation Paper (CRU/18/119)

13th August 2018

Contents

1. INTRODUCTION

ESB GWM welcomes the opportunity to respond to the Greenlink Electricity Interconnector Consultation Paper (CRU/18/119).

ESB GWM's response is broken into four sections; the first is an executive summary of ESB GWM's response to the Consultation Paper, the second section describes ESB GWM's main concerns in relation to security of supply and derating factors that need to be considered in assessing the value of an interconnector to Ireland, the third section articulates ESB GWM's response to the specific questions in the Consultation Paper and conclusions are summarised in the final section.

2. EXECUTIVE SUMMARY

Interconnection in general has the ability to contribute towards the three principal objectives of energy policy; energy security, affordability and sustainability. Thus, ESB GWM supports a CRU led economic and technical assessment of future interconnectors, along the lines proposed in CRU consultation document CRU/18/131, to ensure tangible and quantifiable benefits and costs[1] to electricity and gas consumers are identified, particularly if the Irish consumer is underwriting some of the risk[2] in a regulated funding model.

While increased interconnection with other markets may help reduce wholesale prices, where arbitrage opportunities present themselves, the economic benefits of the Greenlink Interconnector need to be evaluated against the total cost of supporting the new interconnector including EU supports, cap-and-floor pay-outs, procurement of additional ancillary services , onshore reinforcement costs required to connect the interconnector to the transmission system and wider works costs, where they are identified as directly attributable to the Greenlink Interconnector, for frequency control and voltage support.

The energy system is rapidly evolving, both here and in the rest of Europe, in particular, increased reliance on renewables exacerbates the impact of a low-wind period across Europe. As such, credible future scenarios involving faster-than-anticipated renewables build-out and higher interconnection between countries could compromise security of supply in Ireland due to the consequences for power demand over interconnectors during periods when low renewable output (e.g. on a calm, very cold, dark winter evenings) and high system demand coincide in interconnected systems. In terms of a technical assessment, the CRU needs to carefully consider how interconnectors, and in this case, the Greenlink Electricity Interconnector, can be relied upon to deliver security of supply during future stress events (in energy systems with significant renewable generation penetration) and, accordingly, adopt an approach to de-rating that accounts for some of the risks identified in this response.

ESB GWM's view is that the regulatory approach selected by the CRU should be that which protect the interests of existing and future Irish consumers and retains a level playing field for all investors in the generation and ancillary services markets. In order to provide relevant feedback to this consultation, ESB GWM have structured this response to comment on the economic assessment, technical assessment and regulatory treatment of the Greenlink Electricity interconnector, as per the consultation paper format.

Furthermore, the DCCAE Consultation Paper signalled that CRU may consider security of supply alternatives to interconnection when considering new interconnection proposals. ESB GWM agrees with this and further suggests that it is included as part of the Greenlink Interconnector assessment.

[1] The energy consumer is ultimately funding the deep reinforcement costs associated with the interconnector from which the investor and interconnector users derive economic benefit.
[2] One of the risks is that of buying ahead and regretting the procurement if there is a chance the asset will be stranded.

3. SECURITY OF SUPPLY AND DERATING FACTORS

3.1 Security of supply

One of the most contentious debates around interconnectors is how they contribute to security of supply. It is highlighted as one of the key benefits of interconnection but it is challenging to quantify. While interconnectors can serve as an additional source of supply for the Irish Market, the impact on system security of high levels of interconnection is uncertain. Under the current capacity market in I-SEM, capacity contracts secured by interconnectors displace alternative domestic capacity sources, thereby replacing one form of security of supply insurance with another, rather than adding another layer of security. [6.1] It is arguable that the derated capacity of interconnection is less secure than the derated capacity of domestic generation given the possible correlation of stress events in the systems on both sides of the interconnector, e.g., cold, dark, calm days when system demand is high and both solar and wind sources of generation are very low.

Security of supply is challenging to quantify and the extent to which Greenlink can be relied upon in a stress event on the Irish system is statistically far more complex to calculate than for domestic generators for which historic data gives a relatively reliable indication of availability[3]. Increasing reliance on renewables could increase uncertainty surrounding interconnector behaviour during tight periods. Correlation of both demand and wind output across countries already makes interconnector flows difficult to rely on during periods of peak demand. The greater the reliance on wind, the more severe the impact of correlated wind output if Ireland is over-reliant on interconnectors. The inherent difficulty of forecasting interconnector flows during system stress events—which, unlike domestic generation, rely on the policies and economics of two neighbouring markets—exacerbates the risk of rapid growth in Ireland's dependence on interconnection for security of supply. *[6.2]*

Interconnectors can also make a negative contribution to security of supply since they can export as well as import. During a system stress event, not only is there a risk of non-delivery, there is a risk of worsening the situation by exporting when the system is already tight.

3.1.1 ***Lessons from GB*** *[6.2]*

GB has found that historic interconnector performance is more variable than domestic thermal generation during peak hours. National Grid assessed the top 50% of peak demand periods during the winter quarter, 7am to 7pm on business days from 2015–2018 and found that EWIC was importing less than its derated capacity from Ireland to UK almost all of the time[4]. The historic performance of a dispatchable thermal asset like Pembroke CCGT —among the most efficient CCGT plants on the system—has been largely commensurate with its de-rating factor during peak demand periods. Similar results apply for other CCGT plants. Moreover, those times when its production falls short, it never falls to zero—and unlike an interconnector, cannot add to peak demand by exporting.

Uncertainty about how interconnectors will perform when it matters most has implications for capacity procurement. Based on National Grid's de-rating, existing interconnectors should provide 2.39GW of equivalent firm (i.e., de-rated) capacity. In 2017, however, while BritNED and East-West made a positive contribution to security of supply during the top 10 half-hours of peak demand, both IFA and Moyle were net exporters. The result is that existing interconnectors provided only 0.41GW (net) during these top few hours

[3] Foreign supplies of power are dependent on the arbitrage opportunity presented to them in the market
[4] This may be due to market rules and capacity payments- the price has to be high enough to offset the refund of a capacity payment

of peak demand, implying a shortfall of 1.98GW. By contrast, the CCGT fleet provided more capacity than required by its de-rating during the same period

3.2 **De-rating factors** *[6.2]*

The expected contribution of the Greenlink Interconnector to Ireland's energy security will be determined by its derating factor. Calculation of an appropriate de-rating factor for the Greenlink interconnector will be very challenging. Severe system stress events occur only infrequently – perhaps once every few years – hence rendering it problematic to accurately predict future interconnector reliability. Furthermore, while there is some data on performance of interconnectors in Europe during critical system events, there is no data on the historical performance of interconnectors between Ireland and UK during genuine system stress events. The challenges of forecasting, combined with a lack of historical data on which to base de-rating factors, provides ample cause for a cautious approach, especially given the speed at which both technology and policy is changing in Europe.

While stress events impacting Ireland, GB and western Europe, such as cold weather and low wind speed, cannot be predicted with certainty, the mere possibility of their existence makes the estimation of interconnector derating factors very difficult with an associated level of risk that is not the case for domestic generation.

Policy developments in systems directly and indirectly interconnected to the Irish electricity system can potentially undermine the economic assumptions on which interconnector derating factors are based. Participation of interconnectors in Capacity Markets may result in interconnectors "over-committed" in two different markets. For instance, consider a scenario where the Greenlink interconnector is de-rated at 40% in the GB market and 35% in the Irish capacity market. If Greenlink, whose total capacity is 500MW, is exactly meeting its obligations in GB by delivering 40% of total capacity (200 MW), its contribution to Irish supply will be negative - an outflow of 40% of total capacity, which is a substantial 375 MW in deficit on its obligations to Ireland. Furthermore, differences in capacity market penalty regimes have the potential to distort interconnector behaviour during correlated stress events.

Getting de-rating factors right is critical to ensuring interconnectors make a positive contribution to security of supply. Given the limited data available, combined with the nature of system stress events—which tend to arise from unexpected events—and the complexity of the variables involved, it is difficult to accurately quantify how an interconnector will behave in a future system stress event. When uncertainty is high, a prudent approach, given the likelihood of error, would suggest a level of reliance slightly below expectation.. A simple, but powerful, enhancement on the current de-rating methodology would be to better account for the fact that interconnectors have the potential to make a negative contribution to security of supply during a stress event. Aurora Energy Research [6.2] have suggested that the maximum range of possible de-rating is from -100% to 100%, compared to dispatchable assets which can only have a de-rating of 0% or more.

The cost of prudence is not necessarily high. An approach to de-rating that accounts for known and unknown risks is inexpensive relative to some of the potential costly, ad hoc options which policymakers may have to resort to rapidly respond to public concerns over energy security. The cost of procuring additional capacity in the Capacity Market may be relatively inexpensive compared to the cost of loss of load arising from a system event or the cost of commitment to a long term contract for an interconnector.

Increasing interconnector capacity from the present level will tend to reduce all interconnector de-rating factors (as interconnection capacity increases and the saturation effect begins to manifest resulting in each GW of incremental capacity being worth less than the previous GW). Thus, there will be a growing need to consider the interactions between derating factors among interconnectors. *[6.3]*)…

4. RESPONSE TO CONSULTATION QUESTIONS

4.1 Specific factors that the CRU should consider in assessing the Greenlink CBA

ESB GWM welcomes CRU proposal to conduct its own CBA of Greenlink using independent advisors. As with the uptake in wind and new electricity storage, increased interconnection can be viewed as an important change to the Irish electricity market and one CRU needs to assess rigorously if it believes Irish customers value security of supply. There needs to be a robust cost benefit analysis about the trade-off between paying for interconnection, and the benefits of importing cheaper electricity, albeit cheaper due to lower costs or subsidies in its national market, and the associated changes needed to also maintain domestic energy sources and maintain voltage and frequency standards. The submission for Greenlink[5] does not suggest the project is viable for GB and the possible consequences of this for Ofgem's support for funding of 50% the project need to be clarified by CRU before agreeing to a 'cap and floor' regime in Ireland for Greenlink.

CBA needs to look at several categories and we agree with the objective function of welfare maximisation as per the ENTSO-E economic assessment framework, in particular:

- Irish consumer cost savings
- Irish generators' profit reductions
- Existing interconnector profit cannibalisation
- Greenlink interconnector profits
- TUoS charges exemption- what charges would the i/c pay if it were a generator
- Security of Supply impact
- Cap-and-floor expenditure

The task of the CRU is to assess the impact of Greenlink Interconnector on the Irish Market, not the GB market, specifically Irish consumers, Irish generators, owner of proposed interconnectors and owners of existing interconnectors.

The impact of interconnection is often looked at in terms of the benefits it provides in:

- Lower wholesale prices for consumers
- Improved security of supply
- Lower carbon emissions

However, these factors do not cover the full impact of increasing interconnection. It is necessary to consider the "whole system impact" of interconnection, quantifying the overall impact to the Irish energy market. The overall welfare benefit must be considered by capturing all the costs and benefits of the proposed interconnector. This requires understanding how the operation and manageability of the entire electricity and gas system changes as we add further interconnector capacity. For example, interconnection generally displaces domestic thermal generation, which provides important benefits for managing system stability.

It is worth noting that the negative net social welfare outcome for GB in all scenarios, as summarised in Figure 4.3 of the consultation document, may be of concern to Ofgem. This is in contrast with the

[5] See Figure 4.3 in CRU/18/119.

Ofgem documentation in relation to Greenlink from 2015 where the outcome appears positive for GB in the high and reference scenarios[6].

4.1.1 *Interaction of provision of system service in two energy markets*

Consideration needs to be given to the possibility of double accounting of interconnector income from energy and system services markets in assessing cap and floor payments. The double counting is on the basis it becomes a financial insurance type of equation for the investor but it is dependent on there being zero correlation between the markets in terms of events and therefore prices, i.e., the gamble is not being needed at the same time by both systems. It is important that double counting of security across two jurisdictions is avoided. While in general, for system services, events are not correlated, if events happen to coincide in each system, the interconnector cannot physically provide reserve to both.

4.1.2 *System operation*

One of the most material costs that emerges with increasing interconnection is associated with voltage and frequency manageability. The cost of balancing and ancillary services increases steadily with increasing interconnection. The primary reason for this is that the majority of system services require thermal generation in some form to provide flexibility. This includes:

- Systems balancing actions
- Frequency response
- Headroom and footroom
- System inertia

All of these are cheaper to provide with synchronised thermal capacity. The increased interconnection capacity leads to both loss of thermal capacity and, in particular, lower levels of thermal generation. The result of this is increased system services costs that are necessary to accommodate the intermittent and non-synchronous capacity on the system, of which interconnections are a significant single point of failure.

The proposed capacity of Greenlink, at 500 MW, being equal to EWIC will not impact on the amount of reserve that needs to be carried on the Irish system. Any changes to this proposed capacity may increase system services requirements and , consequently , costs. The value that Greenlink will bring in delivery of AS needs to be established.

Interconnectors can be used to alleviate transmission network flows, resulting in displaced investment on the transmission network. Is this the case with proposed Greenlink connection point? The impact of the proposed Greenlink interconnector and power flows in various scenarios on transmission constraint costs needs to be assessed.

From the UK perspective, the system operation benefits of Greenlink connecting are minimal. The connection location on the GB network limits the potential for boundary capability increase, or reactive response benefits from the link. Limited frequency response capability is also assumed due

[6] https://www.ofgem.gov.uk/sites/default/files/docs/2015/08/greenlink_ipa_open_letter.pdf

Table 1: Impacts of Greenlink on GB with SNSP limit excluded from I-SEM scheduling (Pöyry analysis)

£m NPV, 2013 prices		Base	Low	High
Greenlink	GB consumers	183	-285	452
	GB producers	-151	160	-241
	GB interconnectors	65	-17	95
	GB total[7]	96	-143	306

to the lower inertia of the Irish network. These conclusions are based on NGET's assumptions about the Irish transmission system. We note from NGET's analysis that this is not conclusive and further discussion with the Irish TSO is required to realise potential future benefits to the UK from black start and frequency response. There is no change in boundary capability in the UK attributed to Greenlink.

4.1.3 *System security*

Element Power qualitatively rather than quantitatively assessed the benefits of the Greenlink interconnector in relation to security of supply due to the challenges with the latter. Following on from the issues raised in sections 3.1 and 3.2, ESB GWM urges a conservative approach to calculation of the de-rating factor that will apply to Greenlink to reasonably account for known and unknown risks.

The DCCAE Consultation Paper on "Draft National Policy on Electricity Interconnection in Ireland" suggested that CRU may consider security of supply and alternatives to interconnection when considering new interconnection proposals. ESB GWM agrees with this and further suggests that it's made a mandatory aspect for consideration for CRU.

Alternative security of supply options to be considered could include gas storage or LNG for example. From an initial assessment, a gas storage or LNG project would provide a far superior security of supply benefit to the entire Irish energy system than a single electricity interconnector would as it will underpin gas supplies to domestic and industrial gas customers and simultaneously underpin supply to Ireland's fleet of gas fired generators. Another potential alternative is to utilise demand side response and peak shifting of load on the electricity system.

ESB GWM suggests that before a security of supply benefit is monetised, credited to an interconnector project and underwritten by electricity customers, it is imperative alternative options be equally considered. This would establish whether these alternative solutions may provide a more preferable outcome for Irish customers.

4.1.4 *Interaction with gas market*

Additional costs arise related to the interaction with the gas market. The addition of EWIC has directly resulted in a reduction in gas transmission capacity bookings. Gas Networks Ireland's (GNI) fixed costs were then spread across fewer gas transmission capacity bookings with resultant higher transmission tariffs for all customer categories (power generation, industrial and commercial and domestics). Gas transmission tariffs in the Republic of Ireland feed directly into the wholesale electricity price since they represent a marginal cost. Therefore, the addition of EWIC may have had an upward impact on the wholesale electricity price at times; this would need to be considered in the context of the wider wholesale price reductions assumed within the Greenlink business case.

4.1.5 *Reinforcement costs*

It is essential to assess the overall efficiency of the proposed connection location as part of the assessment of the proposed project. Onshore reinforcement costs reflect the investment that is required for upgrading of the existing transmission system/ infrastructure to connect the interconnector. The costs are recovered through Transmission Use of System (TUoS) charges, which are paid by users of the transmission network. As well as assessing the system operation impacts of each interconnector connecting and associated benefits to Irish consumers, it is essential to consider any deep reinforcement costs associated with connecting Greenlink to the Irish Transmission System as ultimately, costs will be passed on to the consumers.

Consideration should also be given to wider works costs identified as directly attributable to the Greenlink project, e.g. for installation of static VAR compensators (for fast frequency response) and mechanical switch capacitors (for voltage support) near the point of connection.

4.1.6 *Subsidies*

Subsidies for interconnectors via PCI financial support and 'cap and floor' regimes are at a cost to the consumers and need to be weighed against expected benefits. In particular, addition of further interconnection at a future date will cannibalise profits of existing interconnectors and , therefore, may increase the cost of the cap and floor regime agreed for Greenlink to the end consumer, i.e. subsidies beget further subsidies.

4.2 Specific factors that the CRU should consider in assessing the Greenlink technical overview report

The CRU has already highlighted the lack of detail in Element Power's submission regarding the technical detail. Apart from specific issues raised by the CRU including risk associated with proposed layout, voltage rating, consideration of protected areas, subsea cable-route assessments, the following also need consideration:

4.2.1 *Ancillary Services*

HVDC interconnectors based on VSC technology (which is proposed for Greenlink) are capable of providing Black Start. The benefit to Irish system will be location dependent and this should be evaluated in relation to the proposed interconnector.

Interconnectors using the right technology could contribute to providing reactive power services to the Irish transmission system. The location and technology of the Greenlink interconnector connection should be assessed in relation to the potential to utilise its reactive power capability to reduce the need to procure reactive services from other sources. 'Tomorrow's Energy Scenarios' can be employed to form a view of the future changes in reactive power generation and demand and a quantitative analysis should be done to compare provision of the service by Greenlink versus conventional means.

Element Power has suggested Greenlink could provide Fast Frequency Response (FFR) to UK. Any impact on the stability of the Irish system given its low inertia compared to the GB system merits detailed investigation.

4.2.2 *Sub-synchronous Response*

The possible issues arising for generators, near the proposed connection point, in relation to sub-synchronous resonance (SSR) must be given due attention. Turbine-generator shaft failure and electrical instability at oscillation frequencies lower than the normal system frequency can result from SSR.

4.2.3 *Ramp rates*

In the "Interim Cross Zonal TSO Arrangements for GB-ISEM go-live", [6.5], reference is made to the ramp rate limits for the existing GB-Ireland interconnectors. The impact of Greenlink on the ramp rate functionality of these existing interconnectors and the consequential impact on the market and system efficiency are additional factors that need to be considered in assessment of Greenlink. The reliability of the proposed Greenlink interconnector during ramping periods is another key issue for consideration. [6.4]

4.3 **Specific factors that the CRU should consider in selecting the appropriate regulatory approach**

A key aspect of any interconnector proposal assessment is the total risk exposure to the Irish consumer. EWIC was 100% underwritten by the Irish consumers meaning all upside is returned to Ireland but all exposures to downsides are carried also. ESB GWM's view is that the regulatory approach selected by the CRU should be that which protect the interests of existing and future SEM consumers.

Element Power proposes a 'cap and floor' regime for the Greenlink Interconnector, mirroring what they have agreed with Ofgem. Clarification is needed whether it is proposed to set the levels of the cap and floor up front and remain fixed (in real terms) for the duration of the regime, subject to an availability incentive or whether specific re-openers can be triggered and under what circumstances.

The principles of 'cap and floor' may not be transferrable from the GB market to a much smaller market like Ireland without unintended consequences. In Ireland, the actions of a single large participant such as a CCGT or an interconnector have a disproportionate impact compared to in GB. In the interim interconnector led solution, with the economic protection of 'cap and floor', an interconnector is indifferent to the clearing price of the capacity auction and can influence a reduction in the clearing price by bidding a very low price with adverse consequences to generators in terms of capacity earnings. The possibility of consequential incorrect early exit signals[7] with reduced economic incentive for build-out of new generation in Ireland may result in suboptimal level of interconnection and undesirable outcomes for long term energy security in Ireland. The 'cap and floor' itself creates a moral hazard as this secures them "PSO type" guaranteed payments.

The duration of the 'cap and floor' regime needs to be defined. The Ofgem cap and floor regime for the Greenlink interconnector starts from the earlier of the actual connection date or 1 January 2021. This was put in place to incentivise timely delivery of projects at a time when the cap and floor regime was limited to 'near-term' projects only. In situations where projects are delivered later than 1 January 2021, the 25-year duration of the cap and floor regime will be reduced by the length of the delay. This will effectively give the regime an end-date of 31 December 2045, regardless of the operational date. Element Power expect operation of Greenlink to start 2023. This reduces the Ofgem 'cap and floor' duration by at least two years. This needs to be considered in the duration of the 'cap-and-floor' regime if it is granted by CRU. Any delay to connection date beyond the end of 2023 may result in Ofgem revisiting the IPA analysis and , possibly, lessening the benefits. The CRU 'cap-and-floor'- approval needs to be conditional on Ofgem 'cap-and-floor' ongoing approval and needs to avoid a situation where the regime duration on the Irish side is not mirrored on the GB side.

The interval for assessment of revenues against the cap and floor needs to be defined with scope for more frequent assessments if necessary. The floor should be based on the cost of debt using a sensible benchmark with reference to a range of capital structures and financing routes, and the cap based on a benchmark cost of equity applicable to a generator. Both the cap and floor should take account of CRU assessment of efficient costs and on assessment of capital costs ahead of construction based on the proposed scope of works. The comprehensive process and criteria for assessing any uncontrollable costs resulting from changes to the scope of the works needs clarification up front.

In GB, interconnector projects go through a 3 stage approach to the "cap and floor" regime which is supplemented by annual reports assessing cost variances and risk changes:

- Initial Project Assessment
- Final Project Assessment

[7] The interconnector may displace the very plant that is needed to accommodate it on the system (inefficient DS3 exit) which will then need to be procured.

- Post Completion Review

ESB GWM supports a similar framework for the Greenlink interconnector to ensure delivery of expected benefits without escalation of costs.

There is an availability incentive for the "cap and floor" regime in GB. ESB GWM supports the implementation of a similar incentive for Ireland when approving a subsidy price to ensure that the developers maintain technical availability of the cable, even in periods when they could reasonably expect revenues to exceed the cap or fall below the floor. Incentivising good technical availability will help to ensure that consumers realise the full benefits of interconnection between Ireland and GB.

Given the proposed change to interconnector derating methodology from the interim interconnector led solution to enduring hybrid solution (SEM-16-022), the questions to be addressed are:

- What assumption has the Greenlink project applied to the interconnector de-rating methodology i.e. interconnector led or hybrid solution?
- How is a long-term contract awarded and applied over the duration of the contract under the hybrid approach?
- What is the economic impact for Greenlink under the hybrid methodology?

4.4 Additional information the CRU should consider when determining whether the Greenlink interconnector is in the public interest or not

Ireland, as a nation has a small, finite budget to expend on energy infrastructure. It is of course crucial that the right amount of investment is made. If investment on energy infrastructure is too low, security of supply is threatened as too is investor confidence. But if too much investment is made, then costs for consumers are increased, potentially up to a point where competitiveness of "Ireland Inc." is challenged. In light of this, ESB GWM believes that decisions on investments in future interconnection support are significant for Ireland and that the Greenlink interconnector proposal should be assessed with consideration to the following issues discussed in more detail previously in the document:

- To ensure competitiveness, a whole system economic assessment of all costs and benefits should be carried out which considers the impact on the gas market, on wholesale electricity prices and the impact on the total level of electricity capacity payments and the cost for the interconnector and associated deep reinforcements
- Regarding security of supply, before a security of supply benefit is monetised, credited to a project and underwritten by energy customers, it is imperative alternative options be equally considered. This would establish whether these alternative solutions may provide a preferable outcome for Irish customers.

Other issues to be considered are expanded on below:

4.4.1 *Efficiency of interconnector behaviour* [6.4]

In the case of GB-Ireland interconnection, there has been no material improvement in the correlation of flows and price differentials between the two markets since 2011 . In 2017, GB prices were higher than prices in Ireland (SEM) for 43% of the relevant periods. However, the derating factor of GB-Ireland interconnector in GB capacity market remained low at 9% indicating "an ongoing inefficient behaviour of this interconnector". The proposal for a third interconnector with GB needs to be deliberated in the context of this observed inefficiency of existing interconnectors with GB.

4.4.2 *Equitable treatment*

The CRU needs to ensure that interconnectors, including Greenlink, compete on an equal footing with other technologies both in Ireland and in interconnected systems. An efficient market and a level playing field for all participants is essential to ensure that an interconnector brings benefits to systems at each end. Interconnectors, including that proposed by Greenlink, receives/ will receive a number of benefits and subsidies not available to domestic generators, including EU subsidies , due to its status as PCI, exemptions from TUoS and cap-and-floor payouts. The 'cap-and-floor' reduces investment risk, and consequently the cost of capital for new investors, a benefit not available to generators in Ireland who face merchant risk. If interconnector capacity leads to retirement of domestic generators, then the TUoS costs will be recovered over a smaller base resulting in higher charges for remaining generators. As referenced in 4.3, with the protection of 'cap and floor', an interconnector is indifferent to the clearing price of the capacity auction and can bid a low or even negative price with the moral hazard of leaving the consumer to make whole the asset through subsidy rather than market prices.

4.4.3 *Environmental issues*

Interconnection is seen as necessary to achieve low cost decarbonisation. Increased interconnection may lead to offsetting impacts on national renewable targets. It is expected that interconnection will reduce curtailment of wind in Ireland, although if wholesale prices fall due to interconnector flows, this may increase the renewable support payments.

Regarding facilitation of additional renewables, ESB GWM agrees that interconnection in SEM has helped facilitate increased installed capacity of wind. ESB GWM would urge future consideration of wind facilitation benefits to consider the rapidly changing technological landscape. Specifically, the combination of smart meters and immersion heaters from 2022 onwards will provide significant increased demand potential at times of high wind.

Interconnector schedules have higher priority dispatch than wind. The possible curtailment of wind when there is net import of electricity on the interconnector, in light of SNSP constraints, should be assessed due to possible adverse impacts on renewable energy targets.

The EU directive allows for 'statistical transfers' of specified amount of energy from renewable sources from one Member State to another Member State. The challenge of securing public acceptance and the total societal costs of putting wind turbines and network reinforcements on the Irish landscape to serve the need in another state should be fully considered before using interconnection to enter into any agreement for exporting renewable energy in excess of national targets.

Attention needs to be given to direct local environmental effects too as part of the project assessment since all interconnector projects have a non-zero environmental footprint even when mitigated.

4.4.4 *Impact on gas network and price*

As discussed earlier, additional interconnection will have a significant impact on the gas network and will ultimately increase the price of gas and electricity (offsetting other price reducing benefits). Each time a gas plant is displaced by the electricity interconnector, the fixed costs of the gas transmission network must be recouped from a smaller user base. If the interconnector genuinely displaced the need for the gas generator then perhaps there is just an issue of revenue recovery and competitiveness for the gas network.

However given the lower capacity credit attributable to the interconnector compared to a CCGT, the gas plant may not be replaced from a security of supply point of view by the interconnector and will

instead need to remain on the system. The gas plant will likely have limited opportunity to earn inframarginal rent in the market and so will need to recover a very high proportion of its costs in the capacity market. This can only increase the costs of the capacity remuneration mechanism to customers.

The gas network operator will still have to make the gas network available for the gas plant in those days the interconnector can't provide reliability but will only get paid for the network on the days the gas plant needs it. In this sense, the per unit cost of using the gas network will rise for all users since less gas flows across the network in aggregate.

The capacity of the gas infrastructure warrants mention also. Each gas interconnector between Ireland and GB can almost meet all demand for gas in Ireland. A new 500MW electricity interconnector will meet circa 10% of Ireland peak electricity demand.

5. CONCLUSIONS

ESB GWM supports a CRU led economic and technical assessment along the lines proposed in CRU consultation document CRU18131[8] to ensure tangible and quantifiable benefits and costs to electricity and gas consumers are identified, particularly if the Irish consumer[9] is underwriting some of the risk in a regulated funding model. Weighting factors used need to be transparent and consistently used for all interconnector assessments.

Prudence is urged in selection of derating factors for interconnectors, in particular when assessing alternative options for investment for security of supply.

ESB GWM's view is that the regulatory approach selected by the CRU should be that which protects the interests of existing and future Irish consumers and ensures a high degree of certainty of security of supply. An efficient market and a level playing field for all participants is essential to ensure that an interconnector brings benefits to systems at each end. Interconnectors, including that proposed by Greenlink, receives/ will receive a number of benefits and subsidies not available to domestic generators, including EU subsidies , due to status as PCI, exemptions from TUoS and , depending on the regulatory regime, underwriting of some of the risk by the consumer. It is important to ensure that future/existing interconnection deliver significant value for money to consumers in exchange for any preferential benefits not enjoyed by other market participants.

ESB GWM welcomes the opportunity to discuss these matters in further detail should you have any queries in relation to this submission.

6. REFERENCES

6.1 'Dash for Interconnection, the impact of interconnectors on the GB market', Aurora Energy Research, 2015

6.2 "Energy Security in an interconnected Europe", Aurora Energy Research, May 2018

6.3 "Final Report on National Grid's Electricity Capacity Report", Dept. for Business, Energy and Industrial Strategy, July 2017

6.4 "An update of historical derating factors for GB Interconnectors", Poyry, April 2018

6.5 "Interim Cross Zonal TSO Arrangements for GB-ISEM go-live", SEM-GB Joint Implementation Group, September 2017

[8] CRU/18/131 "Policy for Interconnectors- Assessment Criteria for Electricity Interconnection Applications"
[9] The percentage of the risk underwritten is much higher per household in Ireland than in GB