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1. Introduction

Invis Energy welcomes the opportunity to provide feedback to the joint Regulatory Authorities (RAs) in relation to the consultation on the Capacity Remuneration Mechanism (CRM). We believe that the design of the CRM has many fundamental challenges and questions hanging over it. Resolving these will be a complex task with far-reaching implications for the entire I-SEM. We note the RA's three phase consultation approach designed to enable stakeholders to assess and provide feedback on the CRM design as it develops. We believe this consultation approach is superior to the single consultation plus decision approach being employed in the Energy Trading Arrangements (ETA) work stream (which is as important, if not more important than the design of the CRM). Therefore we strongly encourage the RAs to follow a similar approach to the CRM for the ETA consultation by publishing a "proposed decision" ETA paper enabling additional stakeholder input in advance of making final decisions for one of the most crucial components of the I-SEM.

Invis Energy was established in 2011 as a joint venture between Invis Energy's Renewable Energy Fund and the Craydel Group, an Irish engineering company for the development, construction and operation of onshore windfarms in Ireland. Invis Energy currently has 87MW across two wind farms in operation, 65MW under construction and a substantial project pipeline of over 500MW representing around a quarter of the windfarms expected to be built in Ireland through to 2020.

We believe that the four key issues to be addressed in the design of the CRM are as follows:

1.1 **Modelling and Analytical Validation:** that confirms the need for the CRM and that the ROs will efficiently deliver capacity availability.

1.2 **Eligibility:** strict criteria that governs eligibility, but open to all participants (including supported generation and reflecting their capacity contribution) to promote efficient competition and encourage participation of new technologies.

1.3 **Evolution:** dynamic rules that allow the CRM to be capable of evolving with new technologies and other market signals.

1.4 **REFIT**: fundamental principal of supporting renewable generators up to the REFIT level to be maintained as part of design and implementation of the CRM.

2. Need for Analysis to Support CRM Design

Across Europe there has been a push towards CRMs in recent years (the SEM is unusual in having had a capacity mechanism for some time). This is in spite of the fact that capacity margins are much wider now than in previous decades where margins were tight and CRMs did not exist. Ireland offers a prime example of this, with significantly large capacity margins to the order of gigawatts and older generators with unproven reliability receiving extremely lucrative capacity payments. We note however that the appetite for CRMs has increased as thermal assets earnings have decreased, a period of falling power prices and low coal prices leaving gas plant struggling to compete with coal generators.

EU and Irish objectives to reduce pollution by the power generation sector, particularly carbon dioxide emissions, fundamentally require a gradual transition away from the most polluting thermal plant to newer and low carbon forms of generation. They specifically require the exit of many thermal units, particularly the most polluting ones (coal and oil, especially older units), a feature anticipated and planned for over the past decand although disrupted by falling coal prices. They require not only greater interconnection and cross-border trading – amongst the key motivators for I-SEM – but also the ready ability to integrate new technologies into the power system, such as demand response and storage, allowing consumers to benefit from the greater efficiency they will offer. They require acceptance that modern equipment has been designed to use ever less power and that as a result the traditional relationship between GDP growth and power demand has changed. We believe it is vital that the CRM does not undermine these requirements.

Invis Energy would like to see modelling and analysis carried out to justify the emerging design of the CRM, specifically addressing questions such as:

- Have the existing levels of capacity margin and the associated cost been justifiable, and will they be justifiable if maintained into the I-SEM?
- Will a reliability option – essentially a financial instrument – actually guarantee capacity availability during stress scenarios?
- Fundamentally what do the RA's define as capacity and what do they define as ancillary services?
- Will DS3 and CRM be acquiring the same services and double-paying participants in the process?
- How will ROs impact on market liquidity and price volatility in the reference market and other markets?

3. Eligibility

3.1. Supported Generation

Invis Energy believes that all participants, regardless of fuel source or technology, should be eligible to compete in the CRM if they so choose. Eligibility must be based on their capacity contribution reflected in their de-rated capacity. As discussed in Section 4.2 of SEM-15-044, complete eligibility should lead to the most economically efficient provision of capacity.

Regarding wind generators specifically, we believe that the capacity they provide should be remunerated on an aggregate probabilistic basis, as is the case in the French CRM (which has been approved for state aid). We encourage the RAs to consider the French CRM when designing rules around wind's participation in the I-SEM CRM. In the French CRM wind capacity is de-rated on an aggregated basis and appropriately remunerated for that capacity provision unless the plant is unavailable, thus removing the risk of incurring penalties due to variations in wind speed that cannot be offset by difference payments (whereas other types of generators are able to benefit from this offset). Wind's incentives are therefore based on its technical availability (like all other generator types) rather than the randomness of whether wind blows or not.

Other supported generation should not be precluded from the CRM over fears of "overcompensation" that are contrary to fact: under Irish support schemes the benefit of capacity payments would accrue to the PSO not to generators, and existing renewable generators receive the current capacity payment – the new CRM will result in lower not higher payments. These fears would only be justified were the CRM to result in an increase in supported generator remuneration in practice. The goal of support mechanisms such as REFIT is to encourage investment in indigenous and renewable generation by guaranteeing cost recovery over the lifespan of the project. The goal of the CRM is to incentivise reliability of supply on the island of Ireland. These two goals are distinct and eligibility for the former should not result in ineligibility for the latter.

3.2. Traditional thinking with regard to generation and capacity issues

We note in the consultation documentation very traditional, backward-looking thinking with regard to the understanding of generation and capacity sources. We believe that future power systems will look significantly different to those of the past and that modelling and capacity adequacy assumptions should be updated from their traditional thermal plant focus to reflect this. An area where this is most marked is in the assumptions around demand side participation.

Demand Side Participation

It is likely that demand response could at least partially replace traditional peaking units as a more cost effective and efficient means of providing capacity during stress situations. We believe that in future it is likely that the marginal source of capacity (i.e. 8 hours per year) will be demand side capacity. The fact that the paper makes exclusive reference to a gas or oil peaking plant (and its costs) as marginal capacity indicates the traditional thinking that may be prevalent throughout this design process. Demand side units are playing an increasingly significant role in power system operation, a role which will become more important as demand side response, smart grids and other technologies continue to develop. We believe that it is extremely important that demand flexibility is taken into account in capacity adequacy assessments and in particular that demand side participants are effectively incentivised to participate in the CRM and recover all costs of providing capacity when called upon.

Invis Energy would like to highlight the importance for joined up thinking between demand side response, the CRM and the smart meter programme about to be rolled out in Ireland. There is huge opportunity for smart participation of wide-spread, small-scale, flexible demand to provide valuable services to the system including capacity provision.

3.3. De-rating

We believe participation in the CRM should be on a de-rated capacity basis. It it is imperative that the methodology used to de-rate participants is appropriately dynamic, that it takes detailed consideration of the characteristics and performance each technology in question and is updated regularly in line with developments in those technologies. For wind and other intermittent generation, participation should be on a probabilistic or normative basis following the approach recently adopted in the French CRM. We note that this will require stochastic modelling; we believe this modelling will be unavoidable in the future given the large and increasing role of intermittent generation in Ireland's (and indeed Europe's) power systems.

4. Product Design

4.1. Strike Price

Invis Energy believes gas is better than oil in reflecting current reality of the marginal plant on the system. However referencing the RO Strike Price to oil or gas prices is backward looking as it does not reflect the fact that in the future these may not be the marginal units. It seems unnecessary to index to the spot price of that commodity as this would result in volatility in the CRM that in any case may not be reflective of costs. Instead, a Strike Price value should be set per year for short term RO contracts. We recognise that for longer term contracts or for contracts starting some years into the future, indexation will be necessary. In this case the Strike Price should be indexed to some type of CPI benchmark (or other reflection of broader operating costs) as well as or instead of just the commodity price.

The choice of reference unit for an RO contract should be on a per-contract basis, as it will depend on the:

- Conditions of the market at the time (to retain existing generators).
- Conditions during the period to be covered by the RO being auctioned (to or incentivise new capacity).
- Length of contract being auctioned (contract start time and duration).

We believe that the 'reference unit' used for a contract must be grandfathered for holders of that contract. A changing Strike Price in the RO contract would undermine the stability incentive being offered in the first place. Concerns about this should be addressed by auctioning shorter term contracts and save longer term ones for periods when it is clear new capacity is required to be built.

4.2. Market Reference Price

Invis Energy believes that a single market will not suffice for the Market Reference Price. The MRP must incorporate the Balancing Market in order to properly capture stress scenarios, properly incentivise RO holders to be available when ROs are called and to deliver the 'price smoothing' benefits cited as a primary objective of the CRM. However, we do recognise issues that may arise with using the Balancing Market alone as the Reference Market. We believe the decision of Reference Market has the potential to influence liquidity in that market and that it is important that

all three market timeframes may be used as reference in order to avoid making any one of them redundant, excessively volatile or with so few participants as to be open to manipulation. This would undermine one of the key goals of implementing the EU Target Model - coupling the I-SEM with European markets via the Day Ahead and Intraday Markets. We note that the ETA work stream remains open and under consultation; we believe its design must be harmonised with that of the CRM to ensure that referencing of ROs in all market timeframes would not result in excessive calls of the RO for example due to price volatility linked to illiquidity or complex imbalance price formation.

Invis Energy has a strong preference for Option 4b, **including** the Intraday Market in the multiple reference market calculation (see footnote 33 in the consultation paper). By including all market timeframes as a reference, you avoid draining liquidity from any particular timeframe. IDM liquidity is vital to a wind generator's ability to effectively participate in I-SEM – it is wind's tool for adjustment to updated wind forecasts without incurring the penalties associated with imbalance in the Balancing Market.

For us as a wind generator, this would also efficiently tie back into the REFIT support and reconciliation mechanisms (as currently used and as applied to I-SEM's additional market timeframes) and should ensure the energy markets properly reflects energy costs, rather than the PSO, which will reduce unnecessary political risk.

Invis Energy expects that REFIT will continue to net CRM payments off the top-up payment made to supported projects, as is the case in the current SEM. This may result in little incentive for such projects to participate in the CRM, as it would only introduce additional option liability risk without any upside benefit. Nonetheless, technology and support mechanisms will undoubtedly evolve over time and therefore it is possible that supported generation may want to participate in the CRM in the future. In the spirit of promoting economically efficient provision of capacity, the CRM design should allow for such generators to do so.

On the topic of REFIT, Invis Energy would like to express the standpoint that in line with REFIT's cover of CRM payments, the support scheme should similarly cover participant's balancing costs. Any decision otherwise would amount to a retroactive change to the terms of the REFIT support mechanism by the DCENR, which would be to the detriment of the Irish renewable energy industry and wider economy.

4.3. Scarcity

We are uncertain as to the requirement for administrative scarcity pricing but acknowledge it may be required to address market inefficiencies. We believe that the CRM should be designed in such a way that the mechanism itself effectively incentivises participants to provide capacity, as is the goal of a CRM. Invis Energy has concerns that adding an administrative price dynamic could lead to price volatility and uncertainty, similar to that introduced by uplift in the SEM.

Invis Energy would also like to make the point that it is not accurate to make numerical comparisons between incidents of scarcity in SEM and GB (Section 3.4.5) due to various differences in market designs, for example the design of GB's balancing market (dual imbalance pricing with PAR 500MW price calculation) and the smaller, constrained system on the island of Ireland. One of the issues that has arisen in GB, and one of the reasons for the recently adopted cash out mechanism, is the design of STOR. It is difficult to comment on the need for administrative scarcity pricing without any detail on the design and operation of DS3 in Ireland. However we do note the benefit of adopting a similar approach to GB in terms of enhancing market coupling and avoiding distorting interconnector flows.

5. DS3 and CRM overlap/over-compensation

Invis Energy believes the CRM and DS3 programs must be carefully designed in parallel to avoid contracting for the same services and double paying participants. It is clear that there is a grey area where some system services appear to have the same goal as the CRM of providing power during times of system stress. The Ramping Margin 8 Hour (RM8) DS3 product is a prime example of this.

6. Responses to RAs' Consultation Questions

Section 2: Capacity Requirement

A) Minded to position of 8hr LOLE

Invis Energy agrees this is sensible, however Invis Energy notes the need for the capacity assessment to be realistic – or adjusted – so that money is not taken out of the energy markets. For example, an 8 hours LOLE calculation based on very conservative assumptions is in reality fewer than 8 hours LOLE.

B) How to account for unreliability of capacity

Invis Energy suggests the use of de-rated volumes as calculated over recent years by the TSO.

Generators with non-firm grid connections should receive full capacity credit and not be discriminated or unduly de-rated for the following reasons:

- Transmission lines can generally carry extra load under stress for short periods anyway so in periods of stress non-firm capacity is almost always available.
- It is not "non-firm generators" but the grid operator who should be held financially accountable for insufficient grid capacity.
- The delays associated with non-firm capacity often for reasons beyond a generator's control and therefore the costs socialised should be socialised – there is no discount to TUoS payments for non-firm generators after all.

Invis Energy also believes that it is important that stochastic modelling is implemented in calculating capacity requirements and could help with quantifying unreliability. Stochastic modelling will be increasingly used in due course as it will be required in a market with an increasing proportion of intermittent generation.

C) Demand forecast

Invis Energy suggests that the RAs consider use of a demand curve methodology similar to that in GB to set an elasticity price function.

D) Single zone

Invis Energy strongly supports the implementation of a single zone CRM. In such a small system, multiple CRM zones could cause real problems in terms of liquidity, market power etc. which are already a significant concern. It is therefore a good choice to remove the potential impact of these location-related issues from the CRM through a single-zone auction.

E) Other factors

Invis Energy believes there is a need for transparency and independent oversight of assumptions used in the CRM design. Historically, the CRM has been executed well but process must be established to continue this going forward to preserve integrity of the system.

Market power will be a particularly significant concern for the CRM considering ESB's dominant majority in the market. Invis Energy would therefore support implementing regulation on ESB's participation in the CRM auctions, which could take example from the fundamentals used in designing the Directed Contracts scheme in the current SEM.

Finally, Invis Energy believes that the CRM design must account for the contribution of the interconnectors to system capacity and stability. Invis Energy supports the careful implementation of rules which would enable GB generators who hold FTRs to bid in the CRM, rather than the interconnector owner themselves.

Section 3: Product design

A) Setting RO Strike Price

As already discussed, technological advancements will enable participants other than traditional peaking units to provide marginal capacity at times of system stress. With this in mind, Invis Energy believes that the Strike Price should not be rigidly fixed to the costs of oil or gas fired peaking units. The methodology used to calculate the Strike Price must be cognisant of evolving technology and other market signals. It is, however, important that a balance is struck and that the Strike Price is excessively volatile (i.e. indexing it to fuel prices). This would result in undue volatility in the CRM with potential for excessive RO calls being triggered. Such volatility would disincentive long-term investment in the Irish market.

B) Scarcity Pricing

Invis Energy does not believe that additional scarcity pricing is necessary. It is extremely important that the Balancing Market has stable prices and does not suffer from adverse volatility.

C) Market reference price options

As already discussed, Invis Energy have a strong preference for Option 4b, with the addition of including the Intraday Market in the multiple reference market, as the IDM is crucial for wind generators, enabling them to be balance responsible ahead of the BM. By including all market timeframes as a reference, you avoid draining liquidity from any particular timeframe.

D) Need for and design of additional performance incentives

Physical performance incentives may be needed if the CRM is not targeted enough. Invis Energy agrees that performance incentives should be "zero sum", with generators who over-deliver compensated by those who fail to deliver. There also needs to be some limit on liability as seen in other markets cited in the paper.

Invis Energy believes that incentives should be designed to apply to all participants on an equal basis, including renewables and DSUs.

Section 4: Eligibility

A) Options re plant being eligible

As already discussed, Invis Energy believes that Option 3 must be chosen (complete eligibility).

Invis Energy again highlights that it is accepted in other markets that wind is treated on a normative basis, and the RAs should implement such an aggregation mechanism in the CRM.

B) Demand side and storage

As already discussed, Invis Energy believes that demand side participation in the CRM will be hugely important going forward. Many new technologies becoming available for demand and storage would be foolish not to allow the new market to include these as and when they are ready.

I) Minimum size for participation

Invis Energy believes that the minimum size for participation in the CRM should be 100kW, as this will enable wide-spread participation of small scale demand response which will become much more prevalent as the smart metering programme is rolled out. If the minimum participation level is set too high then the CRM will exclude valuable demand side participants and will really be a generator-only CRM. Invis Energy points to the US example of PJM in this regard.

J) Pre-qualification

Existing plant: if a plant shuts down before expiry of the RO it was awarded, there should be a penalty (greater than just losing the RO).

New or refurbishing plant: there should be a bigger penalty than just losing the RO to encourage commitment and reflect cost to system and consumers involved with awarding the RO.

Section 4: Supplier arrangements

B) Credit cover

Invis Energy believes that credit cover arrangements should be simple and cheap to administer.

7. Conclusion

Invis Energy believes that detailed technical analysis and modelling is required to validate the capability of the emerging CRM design to achieve the goal of efficiently ensuring capacity availability and also the wider impacts of the mechanism on the I-SEM.

In terms of key principles of the CRM, Invis Energy believes it is important that the fundamental REFIT principle of supporting renewable generators up to the REFIT top-up level is maintained and that the CRM is capable of evolving with new technologies and market signals, particularly demand side response unique capability in capacity provision. It is also important that no participants of any kind are precluded from participating to promote efficient competition and encourage participation new technologies.

Invis Energy is supportive of the extensive three phase CRM consultation and look forward to continued collaboration through public forum and submitting responses as the design develops.

Yours sincerely,

Emma Tinker

For and on behalf of

Invis Energy