IWEA response to the Consultation on the DS3 System Services Review

3rd August, 2012

IWEA welcomes the opportunity to respond to the second consultation on the DS3 System Services Review. IWEA notes the importance of this workstream to identify the system services that will be required to operate an electricity system with increasing levels of renewable generation. This poses a significant challenge to the system operators and IWEA recognises the importance of the DS3 workstream in enabling Ireland to meet its policy objectives in relation to renewable energy.

The ongoing SEM Committee consultation on Tie-Breaks in Dispatch has brought particular attention to the issue of curtailment in the Single Electricity Market (SEM). As we have worked to assess the impact of the issues under consultation over the last years, it has become clear that there is significant benefit to the wind industry and the electricity consumer, in reducing or eliminating wind curtailment.

One of the key factors contributing to curtailment is the min_gen level, and we see that many of these new services could result in a plant mix that has a much lower min_gen. Another key factor is the level of instantaneous non-synchronous penetration allowable which is currently limited to 50%. Rapid implementation of the types of services proposed in this consultation, in conjunction with implementing a revised ROCOF in the Grid Code, will be necessary if we are to start moving towards increasing the non synchronous penetration level from 50% to the 75% level. This level is necessary to achieve the curtailment mitigation assumed in EirGrid's modelling of curtailment in relation to the 2020 targets. Achieving rapid and significant progress on both these factors, and other curtailment mitigants, are vital to the wind industry and therefore we strongly support the introduction of these new services.

IWEA notes that this paper provides further information on the system needs, and presents proposals for new products, remuneration principles and the contractual arrangements for the services, and that there will be further consultation on the financial details, including funding and remuneration levels in Q3.

IWEA also notes the importance of other workstreams in parallel with this, in particular the important work being carried out to implement a revised ROCOF in the grid code. These workstreams are essential in ensuring that the instantaneous penetration levels of wind energy can be increased in the electricity system while maintaining safe and secure operation of the system.

The products identified in this consultation are a positive step in the right direction, signalling that fast acting flexible plant with low minimum generation, high inertia and fast ramping is beneficial. These products and their impact to the system need to be appropriately remunerated to underpin bankable investments to deliver the necessary services. The next consultation will be key to ensure real

engagement from potential service providers. IWEA suggests that it is possible to put a value on these services by looking at the reduction in SMP as a result of increased wind penetration and the avoided curtailment and/or constraint costs resulting from running with fewer units or units with lower minimum generation levels, while still providing all the reserve and other system services needed to maintain a safe stable power system.

IWEA suggests that there should be a particular focus on ensuring that any potential revenue is directed towards technologies which can have a real impact on reducing curtailment.

Consultation Proposals

In June 2012 EirGrid and SONI released a joint consultation entitled "DS3: System Services Consultation – New Products and Contractual Arrangements". This document proposes establishing bi-lateral contracts between generators and utilities on a medium to long term basis.

All providers who can provide the necessary services will be eligible for payment. This includes all distribution connected users and is irrespective of plant type.

In addition to existing system services, new services are needed in three specific areas to meet 2020 targets:

1. Frequency Response
2. Ramping
3. Voltage Control

The following system services have been proposed by the system operators:

1. Synchronous Inertial Response
2. Fast Frequency Response
3. Fast Post-Fault Active Power Recovery
4. Existing product: Operating Reserve
5. Existing product: Replacement Reserve
6. Ramping Margin
7. Voltage Control
8. Dynamic Reactive Power Capability

IWEA notes that details on the value associated with each service will be consulted on in Q3 2012. IWEA also believes that the volume and timing of when the products are required is crucial to allow for a full review of this consultation.

<u>The ability of wind generators to provide system services</u>

There is recognition that with higher levels of wind generation connecting to the electricity system in Ireland, wind generators will have more of a role to play in the provision of system services. In recognition of this need the following paragraphs outline the current ability of wind generators to deliver on the system services proposed. It should be noted that development is ongoing with wind

turbine technology and some services that can be provided by the current range of wind turbines may not be available from older wind turbines.

The following is a summary of each of the services proposed and the ability of wind farms to provide such services:

1. Synchronous Inertial Response (kinetic energy of a synchronous unit)

   Potential providers of this service include all synchronous generators and synchronous compensators. Wind farms in general cannot provide this service, however some form of synthetic inertia may be available on newer turbine models. IWEA notes that the characteristics of synthetic inertia can be different to synchronous inertia and that this may not satisfy the current needs of the system operator.

2. Fast Frequency Response

   Synchronous and non-synchronous units (including wind) can provide this service. However a wind farm will be dispatched down in an over frequency event and requested to increase its output in an under frequency event (which inherently means it will not normally operate at it available active power output). Synthetic Inertia is a form of FFR which requires no prior dispatch down. However after the event there is a period of reduced power while the wind turbines' rotors are restored to normal speed. For each of these occurrences a non-firm generator will not be compensated in the market for lost revenue. In addition firm units will only be compensated to SMP during such events if they are contracted for this service and as such would not be in receipt of the REFIT/ROC price as this is only paid for metered generation. Much consideration would be needed when choosing whether or not to contract for this service, and to properly incentivise this, the value would have to be such that the generator would be kept whole in terms of revenue (i.e. the REFIT/ROC price).

3. Fast Post-Fault Active Power Recovery

   Direct drive wind turbines and turbines using CD link dump resistors are likely to be able to contract for this service which requires units to recover active power to at least 90% of its pre fault value within 250ms of voltage recovering to at least 85% of its pre fault value. Setting an attractive rate for this system service will incentivise wind farm developers to select wind turbines which can deliver this service.

4. Operating Reserve

   As per current definitions this is not provided by wind farms, however given the correct incentivisation wind farms would be able to provide operating reserve. Reserve payments to the support level (REFIT floor or ROCs) would need to be provided for a wind farm to consider offering this service. There may be a possibility that a wind farm that is being curtailed/constrained for system reasons could provide this service during this time.

5. Replacement Reserve

Timings associated with operating reserve are to be redefined as "*the additional MW output (and/or reduction in demand) provided compared to the pre-incident output (or demand) which is fully available and sustainable over the period from 20 minutes to 1 hour following an Event*". Currently this service is not provided by wind farms. Reserve payments to support level (REFIT floor or ROCs) would need to be provided for a wind farm to consider offering this service. There may be a possibility that a wind farm that is being curtailed for system reasons could provide this service during this time.

6. Ramping Margin

Two options are proposed in this consultation paper. Both options 1 and 2 are challenging in different ways for wind farms. For both options the 1 hour product in each case is the most likely to be deliverable by wind. There may be merit in examining products with shorter timeframes if these are of benefit to the system.

Under Option 1 this is defined as the ramp-up capability of a unit in the horizon time limited by the lowest availability during the horizon window, less the maximum increase in MW output during the horizon window. Potential providers of these services include conventional generators that are not dispatched to their maximum output, storage devices, demand side providers and windfarms that have been dispatched (curtailed) down, however a suitably attractive rate would be required to incentivize wind farm operators to offer this service. The value of Option 1 is only determined ex post and is vulnerable to availability reductions. This added risk may not make it attractive to wind generators.

Option 2 requires sustained output for the ramping product. Wind farm operators may have difficulties in sustaining wind farm output for the entire duration of the product however the value is not vulnerable to availability reductions and plant is paid for on the basis of what is delivered.

Further assessment with more detailed information would need to be carried out on these options for a preference for wind generators to be determined.

7. Voltage Control

Steady state reactive power - Both synchronous and non-synchronous generators (wind) can contribute to this existing service. Payment for Reactive Power Capability will be based on a rate that is scaled by the ratio of the active power output range (Maximum Generation – Minimum Generation) to the Registered Capacity of the generator.

It is proposed that payment is based on the reactive capability, irrespective of the dispatched output of the generator. However the capabilities of a wind farm vary dependant on active power output, consideration of this should be taken into account in final design of the products. Further description of the proposed testing to determine the reactive power capability is required.

Dynamic Reactive Power Capability - The Reactive Power response shall be supplied with a Rise Time no greater than 70ms, a percentage Overshoot of no greater than 20%, and a Settling Time no greater than 500ms.

The proposed service should acknowledge that

1. wind farm dynamic reactive capability is typically provided by distributed control at the wind turbine level; and
2. overshoot of reactive power from DFIG turbines is a function of the generator parameters and cannot be controlled in real time.

The measurement of this product will require high quality phasor measurement units to be installed at the provider's site with appropriate communication and access arrangements agreed with the TSOs. Phasor equipment may need to be provided and paid for by the TSOs.
WTG OEM's have indicated that they may be able to provide this service but a number of studies and on-site tests would need to be carried out to demonstrate the capability of the machines.

Ramping and reserve capability

An example of a case where wind may be dispatched down to provide ramping and reserve capability follows:

If the SOs were to dispatch down 10% of a 4000MW portfolio at full output 400MWs would be available for ramping and reserve. This would have considerable impact on the associated revenue of a wind farm and the value of the service would have to be such that this is incentivised.

If the wind curtailed is firm currently the plant would be compensated for curtailed volumes at SMP. Depending on the annual average SMP level and support scheme this can have very different impacts. REFIT payments are only paid for metered generation, so in the case where the market revenue falls below the REFIT floor price for a given year, the generators revenue will be reduced by the full REFIT floor price for the curtailed energy. If SMP prices are high the impact is likely to be less significant. For generators in NI, the ROC payments are also paid for metered generation, irrespective of the SMP and this would have to be taken into consideration.

Currently reserve is compensated at €2.2MWh. If this payment is available to curtailed volumes it could be equivalent to between approx 3% of lost revenue recovered at full REFIT price or 20% if REFIT balancing only is lost. This is clearly not sufficient to promote participation.

IWEA notes that the provision of ramping and reserve capability by wind generators could have the impact of reducing curtailment required as other generators may not need to be run at minimum generation to be able to provide these services. More information would be required on the feasibility of this. If the AS payments are sufficient to overcome the revenue loss associated with the initial curtailment, then this is something that could be considered, however the arrangements would have to take the financial models of a wind farm into consideration. This may be covered in more detail in the consultation paper in Q3.

Reactive Power

Wind farms are currently paid for reactive power based on their ability to meet the grid code requirements only. Turbines with greater reactive power capability than grid code could be incentivised, however the current payment is not sufficient to influence turbine choice or to promote investment in additional reactive power devices such as a Statcom. It is estimated that the rate required to incentivise investment in Statcom installation would need to be double the current rate and a long term contract would be required.

Remuneration Approach and Contractual Arrangements

The consultation paper notes that in order for a generator to be entitled to system services they must be fully compliant with the relevant distribution code or grid code requirements related to specific services before they are eligible to be contracted for such service. IWEA supports that the TSO should be obliged to contract for services where the provider meets the minimum grid code requirements. IWEA also supports TSO contracting for services with capabilities beyond the grid code minimum.

IWEA supports the proposal that payment will be based on capability and not on utilisation of a service in order to provide certainty to service providers. Clarification is required as to how the capability is defined.

It is proposed that payment rates will be reduced where performance reliability is shown to be below a defined level (e.g. 90%) and reach zero at 50%. IWEA recognizes the need for the system operator to be able to rely on the provision of services and notes that some measure of performance reliability should be identified. A balance needs to be found between the need to incentivise the provision of the service with the need to ensure reliability. There are concerns regarding this proposal noting that in any case where a service is provided there should be payment for that service (even at levels below 50%). The risk of reducing payment rates to zero, along with the use of penalty payments could result in a more onerous penalty regime than payment, thereby removing the incentive for generators to provide services. An incentive payment could be included where reliability is demonstrated, not just a penalty. Further work is required to determine the levels of performance and the associated payment rates, and to take into consideration the process where a unit is commissioning or is unavailable for long periods of time. If work has been carried out to improve the performance of plant this would also need to be taken into consideration in the assessment of performance reliability.

Clarity will be required on how the system services will be monitored, who installs the monitoring devices and who pays for the equipment.

IWEA recognises that regulated bilateral contracts are the most pragmatic way forward at this stage and notes that these contracts need to be sufficiently long if new investment is required and to be incentivised in the required technologies. The questionnaire looks for views on contractual arrangements from 3 to 7 years. IWEA is of the view that a contract with a longer duration of at least 7 years would be required to provide more certainty to the service provider, particularly in the case where

investments are required. Bankability of investments would often require a 10 year contract as a minimum. The RAs have expressed concerns about contracts being longer than 3-5 years. However there is no point implementing a medium term approach if that fails to deliver investments, which need to be underpinned by bankable contracts. In general, the longer the financing term, the lower the annual cost required to underpin the investment.

Reactive power provided by DSO connected generators should be included in these contracts. We note there may be some difficulty here but perhaps the contract should be with the DSO in this case.

Revenue Considerations

As noted above, there will be further consultation in Q3 relating to the value of the system services and the financial aspects. However it is important to highlight some of our concerns in relation to the revenue considerations in this response.

- It will be important for the timing, volume and the value of each service to be identified. The volume and price will need to be sufficient to motivate and incentivise development of the optimal plant mix to enable increased integration of renewable energy.

- It will be important for the TSO's to include in the next consultation the modelling results that underpin the values and volumes that will be proposed for the products. In the interests of transparency the modelling results of DS3's impact on SMP prices, constraints costs and potentially on capacity payment revenues should be included.

- If some of the services are required to be of significant large scale to have any impact on the real time operational policy of the network then these services will have to be incentivised on this basis e.g. Fast Frequency Response. If only a small portion of generators can provide this service, then there will be little or no benefit to the operation of the network.

- There needs to be a defined process whereby if the service is to be provided then the owner will have to be confident the SO will contract for the service once it is installed. Some form of offer letter should be given to the provider in advance of the provider installing the service, this offer would give a guarantee to the provider that, once the service can be provided and demonstrated in line with what the SO requests that the SO will contract for the service.

- In order to make an investment the provider will have to be guaranteed a revenue for a fixed period of years to ensure a return on investment.

It should be noted that wind is a "use it or lose it" resource. The large CAPEX cost associated with constructing a wind farm means to be viable they must harvest a proportion of wind each year which will be priced at the REFIT reference price at least (ROCs in NI). It is therefore imperative for a wind farm when providing a service to be cognisant of this. In the case of a thermal plant capable of providing reserve and fast frequency response, they can receive payment for that capability even if they are not used, with the fuel remaining available for use at a later time. Wind farms however, if providing reserve or frequency response, cannot utilise all available wind and this revenue is in effect being lost by providing these services. To make services such as reserve and frequency response attractive to

developers they would need to be priced at the support scheme reference price (REFIT/ROCs) for the difference between active power output and available active power. **This would apply to both firm and non-firm generators.**

Other technology solutions

To facilitate the penetration of wind on the island other technology solutions should also be considered. The technology most suitable to providing the flexibility required, including standalone plant such as synchronous condensers and energy storage devices should have sufficient entry signals to allow investment. At present the payments through the BNE Peaker "capacity payments" pot and existing AS do not provide sufficient entry signals to potential investors.

Consideration may also need to be given to the location where particular services are required. It may be appropriate to incentivise investment in generation or equipment such as a Statcom or a synchronous condenser in a particular area that will benefit an entire area and a number of windfarms. The TSO should give thought to how they might signal in which areas they require additional service providers and how that investment can be delivered.

Impact on Total Market Revenues

It is essential that the impact on the total market revenue of a generator is taken into consideration in the remuneration of system services. Generators need to be fully compensated to ensure the services/investment needed in the long-term are delivered, while also ensuring long term capacity adequacy. The RAs need to look at the current link between Capacity Payments and Ancillary Services and how this will be impacted by a suggested increase in AS revenues. It is not sufficient to simply reduce capacity payments to pay for new ancillary services, and an assessment should be carried out on the long-term impact on investment and revenue adequacy in the SEM. Capacity payments are there to remunerate capacity to stay in the market. This may become more important as more wind comes onto the system and conventional plant sees lower utilization. If capacity payments are reduced through increased ancillary services deductions then capacity which is needed to support the system may not be economically viable and could exit the market. Ancillary services should be remunerated separately from capacity payments.

Conclusions:

The proposed system services review is an important step to identify the needs of the electricity system to accommodate the changing system dynamics with increasing levels of interconnection and renewable generation. IWEA welcomes and supports the proposals for new system services presented in the consultation paper.

Following considerable analysis of the preferred products and the technical capabilities of different wind farm technologies, it is clear that wind farms can provide many of the ancillary service products

proposed by the system operators. However, the financial arrangements underpinning the services will be crucial to determining the attractiveness of each service and the willingness of organisations to invest in the necessary resources and capital. IWEA would welcome the opportunity to discuss the type and detail of such bi-lateral contracts with the TSOs during the next phase of the DS3 programme.

To facilitate the penetration of wind on the island other technology solutions should also be considered.

It will be important for the volume and the value of each service to be identified. The volume and price will need to be sufficient to motivate and incentivise development of the optimal plant mix to enable increased integration of renewable energy.

Consideration needs to be given to the financial model of wind farms and how the steps required for the provision of some system services may impact this. In particular of the case of reserve and ramping capabilities, dispatching down of wind generation will have an impact on the revenue from the support schemes, and this would need to be taken into consideration in the pricing of ancillary service payments.

IWEA notes the importance of other workstreams in parallel with this, in particular the important work being carried out to implement a revised ROCOF in the grid code. The impact of minimum generation levels on the curtailment of wind farms is also significant and it is expected that the work being carried out to address the system service requirements will deliver improvements in this area.

IWEA very much welcomes the opportunity to comment on this consultation and the work being carried out on the DS3 programme. The importance of this is recognized across the industry. It is expected that the forthcoming consultation on the financial aspects will provide further clarity. IWEA requests to meet with EirGrid and SONI to discuss our response in more detail.