

The price of electricity can vary between seasons and throughout the day, depending on amongst other things demand and supply. For this reason the Demand Response concept has gained traction in utility circles – it involves providing incentives to users to reduce consumption when the cost of providing power is high or when there is a short-term shortage of generation.

Interviewer: What is a DSU?

EirGrid: A Demand Side Unit or DSU is a single demand site or group of demand sites that can reduce their electricity consumption when instructed by the National Control Centre (NCC). Demand Side Units allow parties to bid demand reductions into the all-island wholesale Single Electricity Market (SEM) (akin to a generator bidding to be run). They provide flexible demand side reduction as the system operator has real-time visibility of their availability and can call on the units directly to provide the demand reduction that they have successfully bid for. A request to reduce electricity demand is called a Dispatch Instruction. A Dispatch Instruction can occur any time of day or night provided a DSU has declared that they are available for reduction. The DSU must be capable of delivering the demand reduction for a minimum of two hours. It can utilise plant shutdown and/or on-site generation to deliver the demand reduction. A party can either set-up their own Demand Side Unit or contract with a Demand Side Unit who will bid on their behalf. At present, DSUs typically comprise of commercial and industrial electricity consumers, however, the proposed roll-out of smart meters at a residential-level over the next five years will facilitate a larger potential market.

Interviewer: Why DSU?

EirGrid: There has been provision for DSUs in the SEM since 2007. However, up until summer 2012 there had not been any significant take up. In May 2011 the regulators in both Ireland and Northern Ireland published their “Demand Side Vision for 2020” in which they stated that they “recognise the potential which demand side management has to deliver significant economic and environmental benefits to the All-Island market”. DSUs are seen as one of the key vehicles to enable a market based approach to demand side management. Since the publication of the “Demand Side Vision for 2020” many but not all of the barriers to market entry have been removed and demand side participation has been promoted throughout the country. There are two DSUs currently (information correct at time of interview) operational in Ireland providing up to 70 MW of demand reduction and there are a further four at various stages of the application process. All are DSU Aggregators who contract with individual demand sites and aggregate their demand response together to operate as a single DSU. The DSU Aggregators are third party companies specialising in demand side participation. The concept of demand sites reducing their electricity consumption at certain times for payment is not a new one in Ireland. For over ten years up to last winter, a demand side scheme called the Winter Peak Demand Reduction Scheme (WPDRS) was operational in Ireland. Under the scheme, demand sites received payments for reducing their demand between 17.00 and 19.00 on winter weekday evenings. Average reductions were between 80 MW and 120 MW. The main advantage of DSUs over WPDRS is the flexibility they provide inefficient power system operation in an increasingly dynamic supply/demand balance. For example, it may not always be advantageous to the system to have the demand reduce during the winter evening peak, in particular if it is a windy day and there is a lot of wind power available. A DSU can be called on to provide demand reduction when it is required and economic to do so. Another advantage of DSUs over WPDRS is that there is real-time visibility of the amount of demand reduction available at any time and its response to a Dispatch Instruction can be tracked in real-time. The volume of demand reduction provided by WPDRS was only determined during settlement after the event.

Demand Response Schemes currently in operation:

Short Term Active Response (STAR)

In this scheme electricity consumers are contracted to make their load available for short-term interruptions. This service provides ‘reserves’ to the system that are utilised in the event of the loss of a large generating unit. The STAR scheme, which was previously known as the ‘Interruptible Load’ scheme, has been operating for over 20 years. Interruptions are initiated by an under-frequency relay installed at the consumer’s premises and each interruption would typically be of the order of 5 minutes duration. No notice is given of interruptions. The cost of installing metering, communications

and control equipment is paid for by customers participating in the scheme. In return for providing this service, payments are made to customers based on the energy that they make available for interruption. Customers who participate in this scheme can also participate in Powersave or comprise part of a DSU but not both.

Powersave

The objective of the Powersave scheme is to encourage large and medium-sized customers to reduce their electricity demand on days when total system demand is close to available supply. In return, participating customers are paid on the basis of kWh reductions achieved during a Powersave Event. A Powersave Event may be called any business day of the year and for any time of day. Customers are notified using email and text messaging when a Powersave Event is being called. Customers who participate in this scheme can also participate in STAR but cannot comprise part of a DSU.

Interviewer: How does it work?

EirGrid: DSUs are registered as parties and units in the SEM. The DSUs bid quantities of demand reduction into the SEM pool with associated prices for each half-hour trading period of the next trading day in exactly the same way that a generator bids in quantities and associated prices for its generation (the bid price must comply with the Bidding Code of Practice). Put simply, insofar as possible, the least expensive generation and demand reduction will be dispatched to meet the overall system demand at a particular instance. So if it is economical or required for system security reasons, a DSU will be issued a Dispatch Instruction and the DSU then coordinates the demand reduction from the individual site(s) that make(s) up the DSU.

Interviewer: What are the prerequisites for successful participation of prospective customers?

EirGrid: To become a DSU or sign up with a DSU Aggregator the customer will need a predictable demand reduction capability which can be enabled within one hour of request and can be maintained for two hours. Quarter-hourly or half-hourly metering is also required.

Interviewer: Who is eligible to become a DSU?

EirGrid: There are a number of prerequisites to becoming operational as a DSU:

- A Supply License is required from the Commission of Energy Regulation
- It must be registered as a Party to and a Unit in the SEM
- It must apply to EirGrid, undergo Grid Code testing and obtain an Operational Certificate

A DSU must comply with the following:

- Grid Code – technical document that establishes the rules governing the operation, maintenance and development of the transmission system and sets out the procedures for governing the actions of all transmission system users.
- Trading and Settlement Code – sets out the trading and settlement rules and procedures for participation in the SEM Pool.
- Bidding Code of Practice – defines the components of costs that can be included as part of commercial bids into the SEM. Note: For demand sites that sign up with a DSU Aggregator, these requirements are on the DSU Aggregator and not on the individual site.

Interviewer: Are there size restrictions to becoming a DSU?

EirGrid: DSUs must have a minimum demand reduction capability of 4 MW. There is no lower limit to the demand reduction capability of individual sites comprising a DSU, provided that the combined demand reduction capability is 4 MW or greater. Sites with a demand reduction capability of 10 MW or greater must be a DSU on their own and cannot sign-up with a DSU Aggregator.

Interviewer: What is the role of the DSU/DSU Aggregator? What are the Key Functions?

EirGrid: The key functions of a DSU/DSU Aggregator are:

- Install and maintain a control system and real-time communications between the sites that comprise the DSU, its control centre and the TSO communications interface
- Provide a 24/7 manned control centre

- Submit daily a demand reduction capability profile for each half-hour trading period for the next trading day including bid prices.
- Submit daily a projected aggregate demand profile of all the sites comprising the DSU for each half-hour trading period for the next trading day.
- Declare in real-time changes to the DSU's demand reduction availability
- React to Dispatch Instructions by coordinating demand reduction from the individual demand sites comprising the DSU.

Interviewer: How often is the DSU likely to be called upon?

EirGrid: This very much depends on its bid price(s) into the SEM for its demand reduction capability. Where it is more economic to request a demand reduction than to schedule additional generation then the DSU is likely to be called upon. Constraints Payments in the SEM will ensure that the DSU is never disadvantaged by being dispatched.

Interviewer: How does a DSU earn payment?

EirGrid: At present, DSUs primarily earn their revenues through Capacity Payments in the SEM. The Capacity Payments Mechanism attaches a value to the provision of generation or demand reduction capacity within the electricity market. The Capacity Payments Mechanism is intended to strike a balance between providing the highest capacity prices at periods of highest loss-of-load probability or tightest margin in order to value the provision of capacity appropriately, and provide a stable set of investment signals. In 2012, the Annual Capacity Payment Sum (ACPS) was in excess of €528m and was paid to generators and DSUs for providing capacity. In 2012, for each MW of demand reduction made available for the full year the DSU would have earned approximately €62k. So DSUs primarily earn their revenues by being available to provide demand reduction and not necessarily for providing the reduction.

Interviewer: How are the DSU demand reductions verified?

EirGrid: DSUs on a daily basis submit the following day's projected aggregate demand of all the sites comprising the DSU in half-hour intervals and this is used as a baseline. This is compared to actual site meter readings and must be accurate to within 5% when the DSU is not dispatched. When the DSU is dispatched the dispatch quantity is compared against the baseline less the meter readings and must be accurate to within 5%.

Interviewer: What are the Communications requirements?

EirGrid: The communication requirements are clearly defined in the Grid Code. In simple terms, signals need to be accurate to within 1 MW within 15 seconds of a change occurring to that signal.

Interviewer: What are the benefits of DSUs?

EirGrid: DSUs can provide a valuable tool in accommodating increased renewable electricity generation. Customers who have elected to make their electrical supply more flexible in response to the needs of the system can access an additional revenue stream by offering a useful service which can help in the facilitation of renewables. It makes better use of existing small-scale generation resources and provides more capacity to the system.

Interviewer: What is next on the development path for DSUs?

EirGrid: At present we are working on removing the barriers to DSUs providing Ancillary Services. Ancillary Services are those services apart from energy that are required for the secure operation of the power system. Conventional generators have traditionally provided those services but increasing renewable generation is displacing conventional generation on the system. DSUs are ideally placed to provide many of these services such as fast-acting reserves. As mentioned previously, the proposed roll-out of smart meters at a residential level over the next five years will facilitate a larger potential market which opens up huge opportunities for DSUs and for innovation in the area.