DRAI Response to Review of The Security Of Energy Supply Of Ireland's Electricity And Natural Gas Systems

About the DRAI

Demand Response Association of Ireland (DRAI) members are committed to shaping the future of the power system through advancing demand side flexibility on the island of Ireland. As Ireland strives to achieve up to 80% renewable generation by 2030, our promise as an industry-led organisation is to champion the development of innovative demand side solutions that are designed to address the system-wide requirement for flexibility.

The DRAI represents approximately 700 MW of demand and embedded generation response across hundreds of industrial and commercial customer sites throughout the island of Ireland. These sites are managed by our members each of whom actively participate in the capacity, DS3 system services, and energy markets.

The association was formed to give a single voice to companies operating in this space, in order to help facilitate market participation for demand, and provide perspectives on how to design market and system rules to allow greater volumes of active participation by flexible sources of demand.

https://thedrai.ie/

BACKGROUND

What is Demand Response?

Demand response asks power users to change their electricity demand during times of grid stress or congestion, and pays participants for providing this service. Whereas energy efficiency reduces energy use overall, and seeks to make permanent changes to usage, demand response is a temporary action.

It rewards customers who can provide flexibility in terms of "when" and "where" they use electricity, providing a valuable service to the power system in balancing and ensuring adequate capacity margin.

Demand Response effectively turns energy users into "virtual power plants" who are instructed to adjust energy consumption during specific times to relieve stress on the grid. Instead of turning another traditional supply source on or up (such as a power plant), a grid operator can use demand response to predictably adjust electricity demand and maintain a balanced system.

Through the use of enabling technologies, demand response unlocks flexibility in how, when and where customers use electricity, to turn consumption into a tool in operating the power system. Afterall, when balancing the grid, reducing electricity consumption has the same effect as increasing generation, but uses the underlying capability of existing resources without the need for additional infrastructure.

Demand response leverages the latent capability of existing assets to minimise the considerable costs, resource depletion, and carbon emissions associated with building new infrastructure, and retains value in Ireland's economy.

Benefits of Demand Response

Some key benefits of demand-side flexibility include:

Contribution to meeting electricity system peak demand

- *Meeting Peak Demand*

Ireland's electricity system requires the top 200 MW of peak demand for approximately 8 hours in a typical year[1]. Building an open cycle gas turbine peaking plant to meet this final 200 MW of annual demand would cost in excess of €120M and, with no such generator manufacturer in Ireland, the majority of this value will leave the Irish economy. This is before we consider the availability of fossil fuels to run the plant when needed to provide generation adequacy on the power system.

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Resilience to external fuel and equipment dependencies

- *Retention of value in the economy*

A lack of generator and battery manufacturers, and indigenous fossil fuel sources on the island of Ireland results in the majority of energy and services payments leaving the economy in the form of capital expenditure and fuel purchases. Conversely, payments to providers of demand-side flexibility result in a much greater share of electricity market expenditure remaining in the economy; returned to indigenous consumers that actively support the operation of the electricity system.

- *Reduced life-cycle carbon emissions and supply chain dependency for energy assets*

The provision of demand-side flexibility is supplementary to the primary activities of the individual demand sites that provide it. It is provided using equipment and processes that already exist and, as such, the build phase of their life-cycle carbon emissions will have been amortised and are not related to their availability to provide flexibility services.

[1] SEM-18-156 https://www.semcommittee.com/publications/sem-18-156-publication-crm-t-4-cy202223-best-new-entrant-decision-paper

- *Positive promotion of consumer engagement*

Engagement in providing demand-side flexibility services fosters awareness of the power system and provides participating consumers with a source of revenue that can be further invested in energy efficiency measures. The evolution of the demand response / aggregation business model will enable aggregators to engage increasingly smaller customers, broadening consumer engagement in 'good energy citizenship'.

Avoided fossil fuel consumption:

- *Delivery of services from no-load state*

Demand-side flexibility delivers valuable energy and system services from a "no-load" state. This avoids the considerable cost, fuel usage and carbon emissions associated with scheduling conventional fossil-fuelled plant to operate at their minimum stable generation thresholds, where they perform at their lowest thermal efficiency, in order to provide the reserve services needed to support zero carbon generation on the system.

- *Providing power system services in high RES-E scenarios*

Increasing the volume of non-synchronous renewable generation results in a corresponding reduction in the availability of essential grid services (e.g. operating reserve, ramping) on the power system. This is due to the corresponding reduction in volume of conventional generation, which includes inherent characteristics that have traditionally provided these services.

In contrast, the availability of demand-side flexibility remains broadly proportional to the total energy consumption on the power system, matching availability with the time-of-need on the system. It also minimises instances where power system operators would be required to constrain RES-E off or down in order to schedule essential system services from conventional generators.

- *High confidence of delivery of declared availability*

Since demand side units typically contain multiple sites in an aggregated demand-side portfolio, they have an inherent resilience and are not subject to a single point of failure, in comparison to a large generation set. For instance, in the case where one or more individual consumers fail to respond to an event, this will have a comparatively small impact on the delivery of a required volume. In contrast, a failure to synchronise or a forced outage of conventional generation results in a binary outcome, whereby required volumes are either delivered in their entirety or not at all.

Recognising the reliable delivery characteristics of demand units can therefore reduce the system requirement for contingency, in the form of replacement reserve and ramping margin from conventional fossil-fuelled generation.

Current Status of Demand Response in Ireland

Currently approximately 800MW[2] of demand side flexibility operates in wholesale markets on the island of Ireland, with an average of 200MW of response available for dispatch across the year, in line with customer usage profiles. There is considerable opportunity to increase levels of participation among existing electricity customers, as well as through the electrification of heat and transport over the coming decade.

Historically, demand response was an emergency resource designed to prevent blackouts, for instance during winter evening peak, when usage is traditionally highest on the power system. However, demand response is increasingly sophisticated and can be used to correct short-term imbalances on the grid, adjust output to relieve network congestion or provide power to balance supply and demand from customers. These services are primarily provided by fossil fuel conventional generation and so increasing utilisation of demand response will help to diversity sources of essential grid services, and lessen the dependence on imported fossil fuels.

[2] See appendix B of DRAI submission to Joint Oireachtas Committee on Environment and Climate Action March 2022

Unlike other technology types, with characteristics that remain static over their lifetimes, demand response is flexible and responsive. Through technology enablement and portfolio management Fully utilising demand response capability on customer sites all around the country, means customer actions can yield system-wide benefits

Commercial and industrial electricity customers are the richest source of demand response in Ireland, but greater incentives are required to stimulate increased participation by this evermore Environmental, Social, and Governance focused sector, including carbon credits to recognise the positive impact their local actions have on our national energy objectives.

The electrification of transport and heat will present new opportunities for demand response in the residential sector in the coming decade; opportunities to not only mitigate their impact on the local distribution systems on which they reside, but to support the broader operation of Ireland's electricity system.

Utility of Demand Response on the Power System

European Policy supporting Demand Response and Flexibility

Recent studies and publications at a European level highlight the need for demand response to meet decarbonisation targets to 2030 and beyond.

The EUSysFlex Project 2017-2022[3]

This project sought to identify issues and solutions associated with integrating large-scale renewable energy and create a plan to provide practical assistance to power system operators across Europe. This aim was to facilitate the large-scale integration of renewable energy across Europe. Their outcomes were published in February 2022 and in relation to demand response and flexibility the view was that;

> *"With the right mix of technologies in generation and storage in addition to new flexibilities in the demand side and networks, we will tackle the challenges arising in the European Power System as we transition towards 2030 energy targets and beyond to net-zero."*

ACER Decision[4] *on ENTSO-E European Resource Adequacy Assessment*

In November 2021, the EU Agency for the Cooperation of Energy Regulators (ACER) received a proposal from the European Network of Transmission System Operators for Electricity (ENTSO-E) for the first pan-European resource adequacy assessment (ERAA 2021).

The purpose of the assessment is to monitor the risks to Europe's security of electricity supply and identify adequacy concerns. In their February 2022 decision they noted the following in relation to Demand Side Response (DSR):

> *"DSR, currently largely untapped, is widely recognised as a significant resource to meet future system needs, including for securing supplies."*
>
> *"promoting DSR lies within the key objectives of the Electricity Regulation and market rules must promote its development"*

Security of Supply Policy

In relation to Security of Supply, both the Security of Supply Programme of Actions (CRU 21115) and the National Energy Security Framework emphasize that demand response will play a key role in ensuring a secure, low carbon electricity system as well as providing much-needed capacity to meet security of supply needs. In particular, the need to enable and incentivise demand side flexibility is highlighted.

[3] https://eu-sysflex.com/the-outcomes-of-the-eu-sysflex-project/
[4] https://www.acer.europa.eu/events-and-engagement/news/acer-decides-not-approve-entso-es-first-pan-european-resource-adequacy

National Policy support for Demand Response

To date, Ireland had taken a least effort approach to integrating customer flexibility through demand response into our energy markets and how we operate the power system. Despite this we have achieved up to 800MW of operating demand response in markets, with an average of 200MW available across the year.

Ireland has not had a demand side strategy since the Demand Side Vision for 2020[5] was published in 2011.

Demand Response in the Climate Action Plan

The Climate Action Plan 2021[6] sets an overall target to have "20-30% of system demand … flexible by 2030" and recognises that "unlocking the flexibility of large electricity demand users will be a key challenge as the electricity system is decarbonised."

Delivery of both the Security of Supply Programme of Actions and actions relating to demand response in the Climate Action Plan Annex of Actions 2021 has been slow.

- The Security of Supply Programme of Actions has focused almost exclusively on the running of diesel generation as part of the Mandatory Demand Curtailment (MDC) process. This is an out of market emergency activation of on-site generation, with little progress being made on market and regulatory barriers to demand side participation. The recent update[7] on the programme has highlighted that the only areas focusing on demand side participation is the System Operations & Emergency Planning pillar.
- Ireland's Climate Change Advisory Council (CCAC) Chair, Marie Donnelly, wrote a letter[8] to Government urging action on climate action related matters including – "Accelerated implementation of a Demand Side Management Strategy including demand response by large energy users and demand side flexibility services are crucial to meet future system needs as Ireland progresses to 80% renewable electricity." To date, there has been little progress on actions of high importance to demand response, such as those outlined in this paper.

Actions to Better Facilitate Demand Response

The key reforms needed to better facilitate demand response centre on national energy policy, reform of regulatory frameworks which are designed around conventional fossil fuel generation, addressing market rules which do not adequately facilitate demand side resources and improving system operation practices.

In the short term, Ireland needs to remove barriers participation in current markets and system operation. We need regulatory authorities and system and market operators to:

- Deliver market rules and code modifications for the current markets and system operation to lift barriers to demand response participation
- Address market deficiencies acknowledged in the SEMC Forward Work Programme, including;
    - Project 23 - Energy Payments for DSUs
    - Project 34 - Review of applicability of RO difference charges to available units
- Deliver improved messaging and communications to electricity users to reinforce the benefits of providing services to the power system via aggregation

[5] https://www.semcommittee.com/news-centre/demand-side-vision-2020
[6] https://www.gov.ie/en/publication/6223e-climate-action-plan-2021/
[7] https://www.cru.ie/wp-content/uploads/2022/06/CRU202264-Electricity-Security-of-Supply-Programme-of-Work-Update.pdf
[8] https://www.climatecouncil.ie/media/climatechangeadvisorycouncil/contentassets/documents/news/CCAC%20Letter%20to%20Government.pdf

In the medium term, Ireland must fully utilise demand response capability to meet energy needs. This should include activity to:

- Publish Ireland's Demand Side Strategy, under Action 100 of the Climate Action Plan.
- Introduce a form of carbon credit for Large Energy Users (LEUs) and ultimately homes and communities that provide demand response and flexibility.
- Ensure technology inclusive future market design – for system services, flexibility markets, energy and capacity.
- Incentivise demand participation via effective network tariff design and network connection agreement conditions.