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GROUP REF. : C5
PREF. SUBJECT :PS3
QUESTION N° : 3

PS3-3. What are the biggest challenges faced with the changing mix of generation, new responses to the providing ancillary services and innovative generation connection proposals?

Response:

Ireland and Northern Ireland have one of the highest levels of variable renewable generation on a synchronous power system in the world. It is now operational policy for the power system on the island to accommodate up to 75% System Non-Synchronous Penetration (SNSP). SNSP is a metric which measures the non-synchronous generation on the island systems at an instant in time and therefore quantifies the level of demand that is met by generation resources other than synchronous units (i.e. wind and PV renewables and HVDC imports). It is the ratio of the real-time MW contribution from non-synchronous generation and net HVDC interconnector imports to demand plus net HVDC interconnector exports – the ratio of non-synchronous generation and net interconnector imports to demand and net interconnector exports. Operation of a small power system with high levels of SNSP introduces many technical challenges and operational risks, including rate-of-change-of-frequency (RoCoF), ramping capability, reactive power control, rotor-angle stability, voltage dip-induced frequency event (VDIF), power quality and power oscillations.

In order to meet our 2030 renewables targets and to accommodate further significant increases in renewable capacity, the level of non-synchronous generation with which the power system can operate in real-time must further increase. One aspect of facilitating this increase is the procurement of system (ancillary) services from new low carbon technologies. A new framework for system services was established in Ireland and Northern Ireland in 2018, whereby twelve system services, providing frequency and voltage support, were procured from both existing and new technologies. Ultimately the power system of 2030 will primarily comprise low carbon technologies and therefore those technologies will need to provide the volumes of system services traditionally provided by thermal units. One of the significant challenges in moving towards this scenario is in setting the correct investment incentives so that technologies such as, for example, battery storage which can provide a range of services has sufficient incentive to invest, while also ensuring that the services provided are of the type and quality required by the power system. It is important also that investment incentives are balanced so that thermal plant is not given an inefficient exit signal during the transition. The current arrangements for system services are tariff-based and were designed to achieve 2020 targets. As part of the arrangements, contracts for a fixed volume for a bundle of reserve services were awarded, won by three battery storage units. Consultation on a similar future competition for providers of low carbon inertia is currently in progress.

Figure 1 illustrates the change in the profile of the technologies contracted to provide the Fast Frequency Response (FFR) service, since the current arrangements were implemented in 2018 to the end of 2021; in 2021, approximately 330 MW of FFR was procured from batteries thereby significantly increasing the percentage of the service provided by low carbon technologies.

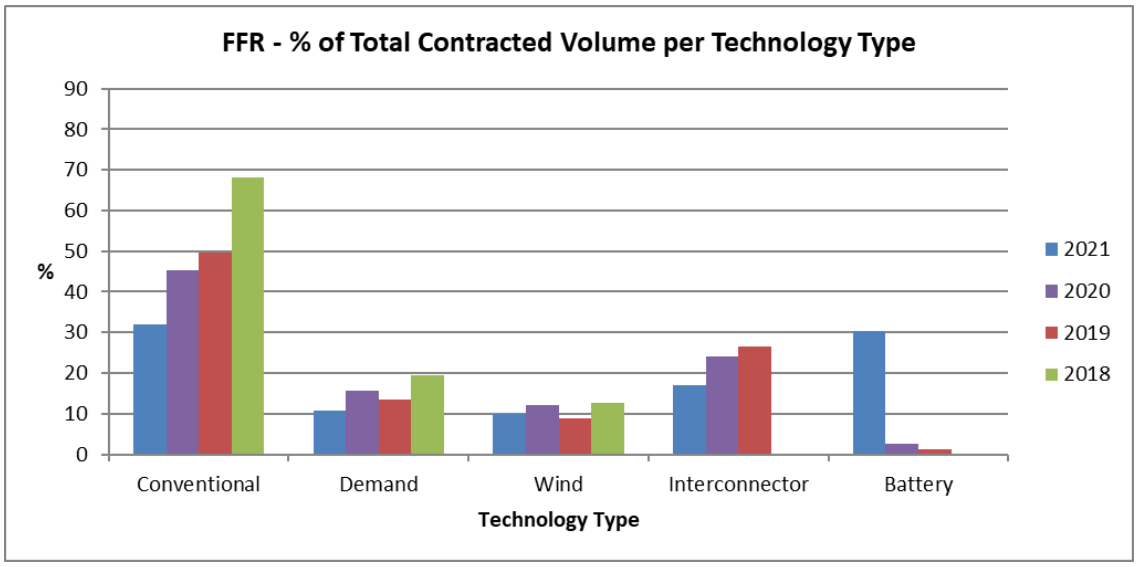

Figure 1: Percentage of Contracted Volume of FFR Service by Technology Type 2018 - 2021

Figure 2 illustrates the change in the profile of the technologies contracted to provide the Steady State Reactive Power (SSRP) service, for the same time period. It is evident that the transformation of the profile of the technologies providing the reactive power system service has been less than that of frequency response, indicative of the future challenge in procuring reactive power from low carbon sources.

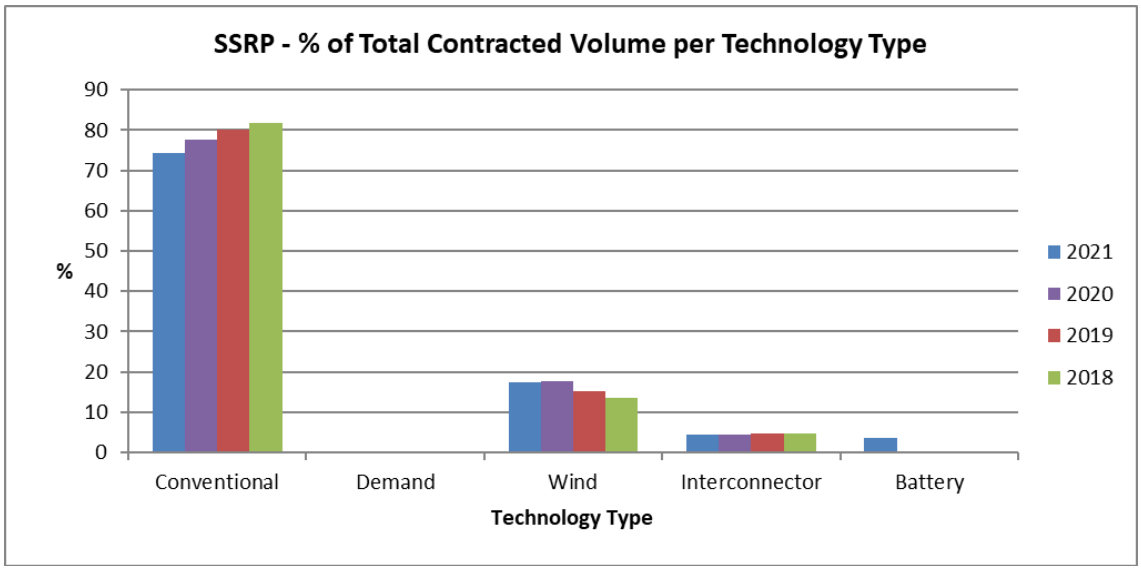

Figure 2: Percentage of Contracted Volume of SSRP Service by Technology Type 2018 - 2021

The current focus for Ireland and Northern Ireland is to develop a set of future arrangements for system services which procure system services primarily through short term auctions, albeit underpinned by a level of longer term contracting which provides sufficient investor confidence. There are challenges in developing such a framework in a way that facilitates the greatest level of access for all technologies. For example, technologies such as wind and demand side would prefer an auction mechanism with a closer to real-time gate closure for such an auction. A key aspect of getting system services from new technologies is also performance monitoring the delivery of those services. It is also a challenging aspect as it requires the development of new procedures and systems and it takes time for the system operator to trust the delivery of services coming from new technologies.