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Electricity Markets and Regulation

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

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Group Discussion Meeting

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Background

All Island power system

- The island of Ireland has the highest levels of variable renewable generation on a synchronous power system in the world.
- Currently operating at 75% System Non-Synchronous Penetration (SNSP - metric which measures the non-synchronous generation on the system at an instant in time)
- Target of >80% electricity generated from renewable resources by 2030

Technical challenges & operational risks operating at a high level of SNSP

Operation of a small power system at a high level of SNSP introduces technical challenges and operational risks:

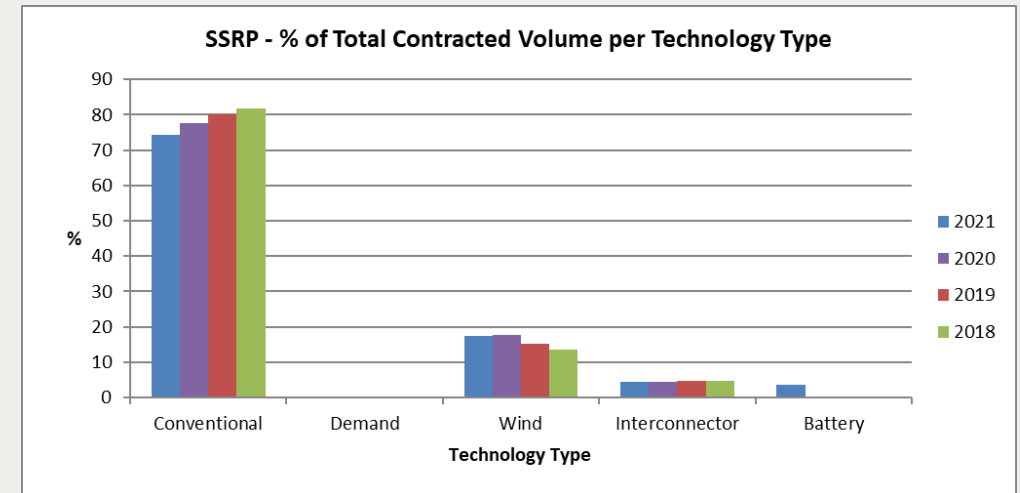
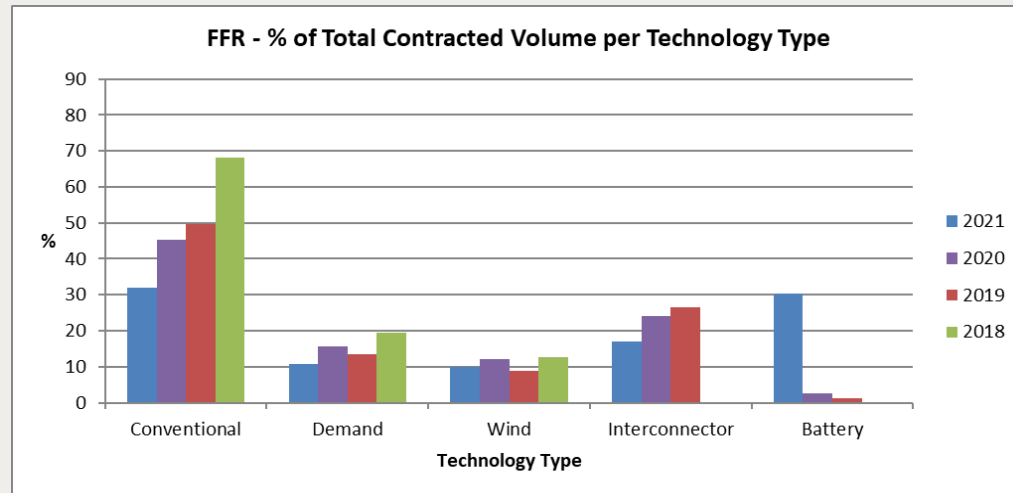
- rate-of-change-of-frequency (RoCoF),
- ramping capability,
- reactive power control,
- rotor-angle stability,
- voltage dip-induced frequency event (VDIF),
- power quality
- power oscillations.

Procurement of system services from low carbon technologies for 2030

The DS3 programme addressed the technical issues for the all island system in a holistic manner with appropriate investment in performance capability, operational policy and the development of new tools.

- Since 2018, 12 System Services, providing frequency and voltage support, have been procured from both existing and new technologies.
- The power system of 2030 will primarily comprise low carbon technologies, therefore those technologies will need to provide the volumes of system services traditionally provided by thermal units.

The figures below illustrate the change in the profile of the technologies contracted to provide 2 sample services: Fast Frequency Response (FFR) and Steady State Reactive Power (SSRP), since the current arrangements were implemented in 2018 up to the end of 2021.



Challenges moving towards changing mix of generation

Setting the correct investment incentives

- New technologies such as battery storage must have sufficient incentive to invest, while ensuring the provision of services are the type and quality required by the power system.
- Balanced investment incentives will ensure that thermal plant is not given an inefficient exit signal during the transition.

Development of a framework that facilitate the greatest level of access to all technologies

- Under the Future Arrangements for System Services, currently being developed, system services will be primarily procured 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.
- Comprehensive performance monitoring of the delivery of services will be a key challenge.
- It takes time for the system operator to integrate services from new technologies into operational policy.