Largest Single Infeed

At present, the largest generation unit on the all-island power system is the 445MW Whitegate Combined-Cycle Gas Turbine (CCGT) unit in Cork. However, the ***Largest Single Infeed*** to the all-island power system is the Moyle Interconnector, when importing 450MW. Largest Single Infeed can be defined as a block of generation consisting of a single large unit, a group of units, or an interconnector importing, connected to the all-island power system via a single transmission circuit, the loss of which would result in the loss of the entire block of generation. Once the East-West Interconnector is commissioned, the Largest Single Infeed will rise to 500MW. The next generation of CCGTs is set to be 550MW and upwards, and there may be further, higher capacity, interconnection built in the future.

EirGrid and SONI have completed a preliminary analysis on the effect of increasing the Largest Single Infeed on the operation of the system given the challenges associated with integrating a very large unit onto a relatively small island system. This analysis indicated that there may be technical and economic implications for System Operators, market participants, and transmission system users.

This analysis has indicated that, under the current system assumptions:

- The size of the maximum Largest Single Infeed is proportional to demand, i.e. as system demand *increases,* and the amount of generation on-load increases, hence the size of technically-feasible conventional, dispatchable Largest Single Infeed can increase.
- The size of the technically-feasible conventional, dispatchable Largest Single Infeed decreases as the percentage wind generation increases relative to system demand. This is because the 'space' for conventional, dispatchable generation decreases as the level of wind generation increases.
- The cost of reserve provision increases sharply as the size of the Largest Single Infeed increases. This is because the required dynamic reserve can no longer be provided by in-merit generation and more expensive, out-of-merit, generation must be brought on-load to provide reserve.
- The capacity factor of the Largest Single Infeed decreases as the size increases since it is often more economic to turn down, or turn off, the unit rather than schedule more costly reserve. This effect is particularly pronounced at times of low demand, when levels of conventional, dispatchable generation with reserve are low.
- Developments in demand-side response, advancements in interconnector control technologies and smart grids will increase the TSOs capability to manage the system under the above scenarios.

This analysis is based on the current and predicted composition of the power system. As the network develops, the plant portfolio changes and market structures evolve, the operation of the power system will also change.

As a result of the analysis, further work is progressing in a number of broad areas. As part of the System Services review under the DS3 programme, Operating Reserve provision and procurement is being investigated. This will determine if the current/predicted portfolio of generators can provide more reserve and if it would be possible to operate the system with increased levels of static reserve. Static reserve can be provided by interconnectors or by a variety of demand side measures. Additionally, wind generation in Northern Ireland is currently being tested to provide a form of reserve.

Other work is underway in the area of Smart Grids & Demand-Side Management. The objective of this is to investigate the potential of both demand-side participation and new smart grid technologies to assist in the provision of system services. EirGrid and SONI have recently launched a demonstration project initiative to support the development in this area.