Limiting Factors to further Development of Bulk Energy Storage

The stoRE project has identified six main challenges to the further development of bulk energy storage in Ireland, as listed below. We ask that you refer to these when answering the questionnaire.

1. Lack of definitive storage needs

A first key question is if and at what level grid-scale energy storage is needed. Definitive determination of this need in the Irish electricity system is a great challenge but necessary for any further step.

Estimates vary depending on the particular grid and future electricity plans. Currently, the Irish grid has sufficient traditional and new methods and mechanisms available to cope with grid flexibility needs at present levels of variable renewable energy source (RES) integration (e.g diesel or OCGT, frequency control by wind turbines, demand response and management, etc.). However, the study published by stoRE on "The Needs for Energy Storage in Ireland" clearly shows benefits for additional energy storage capacity by 2020, including increased overall RES-E share and a reduction in curtailment of wind energy. On the other hand the report published by stoRE "Recommendations for furthering the sustainable development of bulk Energy Storage Facilities" states that without a clear indication of storage needs, relevant policy cannot be prepared, which creates a void in the planning system resulting in an inefficient developer led project development process.

Storage power and storage capacity are the two main parameters that need to be determined in order to conclude to what extent energy storage can contribute in addressing the needs of the Irish grid system, including high RES integration. Their optimum values may be partially independent, ranging from high power – short term storage to lower power – long term storage.

2. Strong interdependence between energy storage and system development

The optimal market regulatory framework for energy storage depends on the future development plans and targets of the entire electricity system, and can greatly affect both the size and capacity, and also the type of future energy storage systems (ESS) (e.g. stand alone storage units or hybrid schemes), which in turn contribute decisively to the realization of future plans for high RES integration.

Consequently, it is not possible to schedule the future ESS deployment in the same independent way as other parts of the electricity system (wind and solar deployment, decarbonization, nuclear removal etc.). Decisions to invest in energy storage are closely linked to developments such as (a) electricity super-highways with large-scale RES in North Sea and North Africa, combined with distributer/regional RES solutions; (b) penetration of electric vehicles; (c) improvements in demand response/demand side management/smart grids.

3. Lack of investments motivations and incentives

The uncertainties surrounding energy storage regulation do not provide any motivation for future investments.

Most renewable portfolio standards or government investment or production incentives are written for renewable generation only and exclude energy storage. The capacity credit mechanism is designed for peak generation units but does not recognize the contribution of

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other flexible means, like energy storage. Moreover, no incentives are given to energy storage in recognition of its important contribution to enable higher penetration of variable RES production in the grid. In contrast, such incentives are for the same reason provided to both RES power plants and transmission infrastructure (e.g. feed-in-tariffs, subsidies etc.).

4. **Double or uncertain grid access fees**

Pumped hydro energy storage (PHES) is seen as an electricity consumer and electricity generator. Therefore, in most EU countries, PHES pays double fees (tariffs) for access to the network; some TSOs charge nothing for the pumped hydro storage's role as electricity consumer; other TSOs charge nothing for the little net consumption of PHES (withdrawal injection) or recognize it as a renewable based generator. There is no EU legislation or common rules to regulate this issue and TSOs treat pumped hydro storage as they see it fit to their local market circumstances.

5. **Competition with other technologies for grid flexibility**

Energy storage is one of many technologies proposed to increase grid flexibility and enable greater use of intermittent RES production. Utilities can have many "flexibility" options for incorporating greater amounts of RES into the grid, many of which may cost less than using energy storage (e.g. supply & reserve sharing, flexible generation or demand, RE curtailment, new loads like hydrogen, vehicle electrification, etc.). The cost of energy storage needs to be compared to the alternatives, considering also the efficiency losses in the storage cycle that may be avoided by using other enabling technologies.

6. **Siting & Planning constraints**

Energy storage technologies may face siting and planning challenges that may delay the projects and increase expense.

The less expensive and most mature PHES systems require particular topological features and possible commitment of large land areas for reservoirs, hence limiting the number of appropriate sites. An estimate made by Malachy Walsh and Partners indicates that there are approximately 20 physically viable sites in Ireland.

Once an appropriate site has been selected the developer may proceed to project development stage during which the project is designed in the context of the site constraints. Once the design is finalised, a planning application may be lodged together with an Environmental Impact Statement and often a Natura Impact Statement to the competent authority for consideration. The competent authority overseeing the planning approval process is usually the local authority or in the case of SID projects, An Bord Pleanála. The planning approval process can be lengthy, expensive and result in delays.

Furthermore, large ESS units typically require new high-voltage transmission, which adds additional siting challenges. Transmission planning today considers the location of generation units and centres of demand, but not of remote ESS facilities, which may have limited access to the grid.

To access the questionnaire please go to link. Thank-you for your time and feedback.

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