

Identifying the Best Technologies to Secure Ready Dispatchability to Renewable Energy

Different customer requirements impacting
on technology and system design

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Storage customer base

- Grid operator
- Generator support
- End user support



Grid operator requirements

Storage drivers:

- decarbonisation
- intermittent renewable generation roll out
- network upgrade investment deferral
- changing demand profile e.g. electric vehicles

Storage technology drivers:

- response systems
 - rapid or instantaneous power for short periods of time
- reserve systems
 - power over an extended period and potentially at a larger scale

Examples of grid operator requirements

National Grid UK

— Multiple contracts

- frequency stability – 1 to 30 second response with 30 minute discharge
- fast reserve to deal with sudden demand increase or generation loss – 2 minute response with 5 to 15 minute discharge
- short term operating reserve – 20 minute response with 2 hour discharge
- capacity market to secure existing and new capacity – 4 hours response with 2 – 4 hours discharge

— Enhanced Frequency Response Tender

- 100% active power output at 1 second or less of registering frequency deviation - up to 30 minutes dispatch
- 8 bids successful, 10 to 49 MW, £7/MW/hr to £12/MW/hr – all lithium-ion batteries

Examples of grid operator requirements

Jordan 12 MWH lithium-ion

- PPA with IDECO and colocation with PV
- peak shaving capabilities to increase stability of local grid and enhance PV output

Ireland

- EirGrid - grid stability to cater for higher levels of renewable energy

Grid operator requirements

Large scale storage

- traditional space for pumped hydro
- potential for batteries to provide large scale
- potential for Compressed Air Energy Storage
 - 330MW Northern Ireland salt caverns

Renewable generator support

Colocation with wind and PV

- storage used to store energy during peak generation and deliver energy during periods of user demand
- grid curtailment
 - energy storage to store energy which otherwise be lost due to grid curtailment
 - especially relevant where there are constraints on distribution networks, especially in high renewable energy regions/remote locations/islands
 - high upgrade costs for grid reinforcement

Technology type driven by interfacing with onsite generation, offtaker and/or grid requirements

End User Support

Energy supply stability

Colocation with renewables:

- match customer profile
- self-sufficiency/off grid

Variable import tariffs:

- avoid importing at peak prices
- exporting at peak prices

Technology type driven by interfacing with onsite generation, customer demand characteristics and/or grid requirements

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