OUTLINE SPECIFICATIONS FOR SCOTLAND / NE ENGLAND SITES FOR GRID-SCALE VANADIUM REDOX FLOW BATTERIES

IESR develops grid-scale battery energy storage systems, BESS, in Scotland and N. England for use with flow batteries and other battery technologies (not lithium ion). We are looking for suitable plots of 8-10 hectares / 20-25 acres to develop utility scale battery arrays, either on a lease- or freehold basis, with leases to run 25+15 years. IESR has retained planning & technical consultants to deal with local authority planning application and commercial & technical contractual agreements/arrangements with grid operator.

1. General principles

- Front of meter, FTM, rather than behind the meter, BTM
- Designed to serve several applications/revenue streams: Trading, Frequency & Capacity Management
- Maximise project power rating to defray fixed project costs; we avoid projects under 49.9MWp power rating
- Possible co-location near generating assets, (e.g. windfarms, solar, hydro), which may benefit from storage and have spare/overflow land area and substation access, but not obligatory

2. Substation access and proximity – MUST HAVES

- Access to substation within 2 kilometres/1.2 miles; closer=better (lower cable costs & transmission losses & faster reaction time for frequency management)
- Suitable substations have rating of min.132kV (EHVs) & spare capacity; we can pay for capacity upgrades, but not rating upgrades (typically wooden electricity poles to/from substation indicate <66kV, i.e. insufficient)
- Larger development supports higher fixed development/project costs and vice versa
- Way-rights must be attainable for laying connector cable to substation

3. Area required

- Area of 8-10 hectares or 20-25 acres for sites allowing up to c.350MWp battery arrays
- We will consider 50-350MWp power ratings with up to 6h duration (300-2100 MWh capacity)

4. Visual & noise impact

- Containers for stacks & electrolyte tanks (for redox flow batteries) can be double-stacked, i.e. height of two standard sea-containers, lithium technologies are single-stacked to c. 260cm height
- Equipment will have chillers and pumps running, but located within containers; sound-damping is possible
- Other technologies will also require cooling and will produce some noise

5. Placement & access issues

- Hard standing (platform) not required; but strip foundations and load-bearing access paths must be possible
- Need to have or construct access path/road to deliver & unload containers and auxiliary equipment

6. Main differences of redox flow batteries to lithium-ion technology to note

- Flow batteries have a larger footprint than lithium-ion batteries (factor c.3x) and thus require larger sites
- Lower fire hazard profile, allowing closer proximity to inhabited/urban settings
- Higher visibility given double stacking of containers
- Cooling required but to lesser extent than lithium-ion
- Pumps & chillers required for charge-discharge process
- Flow batteries remain in place for 25+ years; li-ion are ‘repowered’ every 6-8 years, (hardware replacement)

7. Commercial considerations

- Lease paid on a per MWp power rating basis (not on area): at competitive market rates, index-linked
- Counterparty will be international energy traders, specialised investment funds or utilities with excellent financial standing
- IESR carry costs of development and connection and have retained planning specialists
- Development process lasts c.12 months from ‘go’ for 49.9MWp projects, longer for >50MWp
- Initially, 36m lease option is sought for commitment; once permits are in place & construction starts, pre-agreed lease to be executed

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