**Battery energy storage system for generation shifting and ancillary service provision**

JSC "Latvenergo" (further Client) is planning to install a grid-connected battery energy storage system (BESS) 2MW/3.8MWh integrated with solar park (8 MWp) and possible wind park (10 MW) to provide generation shifting and grid ancillary services such as frequency response and reserve services (FCR, aFRR, mFRR). Proposed BESS solution should have its own controller with pre-set functions to ensure previous mentioned services and should accept commands from hybrid park control SCADA. It should be possible to change settings and choose pre-set functions from external SCADA. It is foreseen that BESS will be used to reduce the amount of hybrid park or whole portfolio imbalances, participate in the intraday, day-ahead market as well as ancillary services markets (MARI, PIACASO).

It is required to provide BESS in container with integrated HVAC system. Minimum output parameters of BESS system are 2MW/3.8MWh split on 2 containers, two separate connections. Preferable mismatch to output parameters is no more than 10% on MW and MWh. Each container should have integrated fire control and suppression system. As it is planned to place BESS into solar park territory and connect to solar park compact transformer station (CTS), output voltage of BESS should be 3 phase 800V AC, alternative to that is 3 phase 20kV AC system, in this case BESS provider should provide suitable power transformer/-s as well. BESS should fulfil requirements of European Commission regulation 2016/631 "Establishing a network code on requirements for grid connection of generators" requirements for type C generators and provide all required data signals and control capabilities to DSO/TSO.

Primary use of BESS is generation shifting – up to 75% of time/capacity, ancillary services (FCR, aFRR, mFRR) – up to 25% of time/capacity. It should be possible to separate BESS capacity for different function provision at the same time (e.g. reserve 1MW and 0.5MWh for FCR and rest of power and capacity is available for generation shifting). It is expected to have 2 cycles per day. Required lifetime of battery modules is 80% after 10 years, 2 cycles per day. Roundtrip efficiency ≥82%. Lifetime of inverters, HVAC, control system, wiring, container and other components, except battery modules, should be at least 15 years.

Preliminary technical requirements:

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| Manufacturer (name and country): |

| **Nr.** | **Apraksts/ Description** | **Minimāla tehniskā prasība/ Minimum technical requirement** | **Piedāvātās preces konkrētais tehniskais apraksts/ Specific technical description of the offered product** | **Piezīmes/ Remarks** |
| --- | --- | --- | --- | --- |
|  | **BESS** |  |  |  |
|  | Dimensions | Specify |  |  |
|  | Weight (kg) | Specify |  |  |
|  | CE- labelled | Issued |  |  |
|  | Battery technology | Li-ion or LFP |  |  |
|  | Protection degree | ≥IP54 |  |  |
|  | AC LV power (in range) | 2-2.2 MW |  |  |
|  | Usable AC energy capacity (in range) | 3.8-4.2 MWh |  |  |
|  | Number of BESS container | Specify |  |  |
|  | Nominal AC voltage (step-up transformer less solution) | 800 V |  |  |
|  | Nominal AC voltage (if step-up transformer is needed) | 20 kV |  |  |
|  | Maximum DC voltage | Specify |  |  |
|  | Cooling system | Specify |  |  |
|  | Battery modules lifetime to 80% capacity at 2 cycle/day | 10 years |  |  |
|  | Non-Battery components lifetime | ≥15 years |  |  |
|  | Guaranteed AC LV Roundtrip Efficiency during Battery modules lifetime | ≥82 % |  |  |
|  | Self-discharge in a day | <0.18 % |  |  |
|  | Control system communication protocol IEC 60870-5-104 | Yes |  |  |
|  | BESS availability (yearly) | 95 % |  |  |
|  | **Supplier must provide** |  |  |  |
| 17. | Battery racks or modules should be interchangeable | Yes |  |  |
|  | Battery racks or module capacity, kWh | Specify |  |  |
|  | Number of inverters in AC/DC conversion system | Specify |  |  |
|  | Maximum electricity consumption by BESS auxiliaries, kW | Specify |  |  |
|  | It should be possible to BESS auxiliaries from available BECC stored energy | Yes |  |  |
|  | Uninterruptible power supply (UPS) | Yes |  |  |
|  | Battery management system (BMS) or controller | Can be controlled by outer SCADA |  |  |
|  | Battery management system (BMS) or controller should be capable to fully operate without connection to the internet | Yes |  |  |
|  | Local Human machine interface for monitoring, settings and control (HMI) | Yes |  |  |
|  | Fire protection and suppression system | Yes |  |  |
|  | Surge protection system on AC and DC side with interchangeable elements | Yes |  |  |
|  | Short-circuit and overload protection system on AC and DC side with interchangeable elements | Yes |  |  |
|  | Power transformer thermal protection (for 20kV solution) | Yes |  |  |
|  | Transportation to the site (incl. loading, unloading) | Yes |  |  |
|  | BESS should be fully equipped to start operation after connection of external electrical and control cables | Yes |  |  |
|  | **Environment** |  |  |  |
|  | Maximum ambient air temperature | 40 °C |  |  |
|  | 24h average maximum ambient air temperature | 30 °C |  |  |
|  | Minimum system cold start ambient air temperature | -20 °C |  |  |
|  | Minimum system operation ambient air temperature | -25 °C |  |  |
|  | Maximum wind speed | 30 m/s |  |  |
|  | Exposure to direct sunlight (solar radiation) | 1000 W/m² |  |  |
|  | Altitude over sea level | 100 m |  |  |
|  | Ice coating | 20 mm |  |  |
|  | Snow load | 1750 N/m² |  |  |
|  | Humidity | 90 % |  |  |
|  | **Standards\*** |  |  |  |
|  | EN 50178 | Yes |  |  |
|  | IEC 61000-6 | Yes |  |  |
|  | EN 50110 | Yes |  |  |
|  | IEC 62477-1 | Yes |  |  |
|  | IEC 62619 | Yes |  |  |
|  | IEC 63056 | Yes |  |  |
|  | IEC 61427-2 | Yes |  |  |
|  | IEC 62933 | Yes |  |  |
|  | IEC 62485 | Yes |  |  |
|  | ISO 9001 | Yes |  |  |
|  | ISO 14001 | Yes |  |  |
|  | Compatible to Commission Regulation (EU) No. 2016/631 type C module requirements | Yes |  |  |
|  | Commission Regulation (EU) No. 2016/1388 | Yes |  |  |
|  | **Battery management system** |  |  |  |
|  | State of Charge (SOC) | Yes |  |  |
|  | State of Health (SOH) | Yes |  |  |
|  | AC Voltage and Current and power quality | Yes |  |  |
|  | DC Voltage and Current and power quality | Yes |  |  |
|  | Status | Yes |  |  |
|  | Log of operations | Yes |  |  |
|  | Device Status and Error codes | Yes |  |  |
|  | Historical data | Yes |  |  |
|  | **Documentation** |  |  |  |
|  | Original instructions | LV or EN |  |  |
|  | Labels for operating | LV or EN |  |  |
|  | Nameplates | LV or EN |  |  |
|  | Drawings | LV or EN |  |  |
|  | Test reports | LV or EN |  |  |

\* - If the system does not meet a standard, please explain the reason for not certifying the system according to this standard and explain if the system meets similar requirements as mentioned in the standard.