Storage, FACTS & Custom Power, SSSC

Glossary of Terms

Rev. A

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1 Ancillary Services

Their definition and scope differ depending on the country, but in general terms, they are elements needed to guarantee the correct functioning of the electrical system.

They are generally divided into immediate response services (frequency reserve, ancillary services I, etc.) rapid response (spinning reserve, ancillary services II etc.), and standby reserve (non-spinning reserve, ancillary services III, etc.).

2 Ancillary Services I : Immediate Response

This is a complementary immediate response service. Storage solutions make it possible to contribute to this service.

3 Ancillary Services II : Fast Response

This is a complementary rapid response service. One of the things it consists of is the spinning reserve which consists of an energy capacity available in the generators for exclusive use for this service. Storage solutions make it possible to contribute to this service by freeing up the spinning reserve which can be used to increase the production of energy without compromising the electrical system.

4 Ancillary Services III : Standby Reserve

This is a complementary slow response service. Storage solutions make it possible to contribute to postponing or not needing this type of reserve.

5 Black Start Support

After an electrical system shutdown, storage solutions can be used to restart the generation plant's turbines, thus helping to restore the electrical system.

6 Congestion Relief

Using both serial and parallel power electronics solutions, it is possible to readdress power flows or limit the peak values to be transmitted.

7 Emergency Backup

Storage solutions can be used as backups in the event of a power cut. Plants which traditionally have battery or UPS backup systems no longer need them since this task is one of many carried out by an energy storage system.

8 Energy Quality

Power electronics solutions facilitate quality in the voltage and current wave form, thus eliminating unwanted peaks, dips, detrimental harmonics and even correcting the frequency.

9 Energy Ramping and Smoothing

This mainly refers to stabilising, damping and generating ramps in generations from highly-variable renewable sources such as photovoltaic or wind power.

Storage solutions make it possible to program energy supply by means of configurable energising ramps, "constant" energy periods and configurable de-energising ramps.

10 Flicker Compensation

Power electronics solutions make it possible to prevent grid flickers from reaching and harming the consumption point.

11 Frequency Regulation

The difference between the energy available (primary generation) and energy demanded (consumers) causes variations in the frequency.

Action must be taken to keep the frequency within permissible limits to prevent potential load shedding, instability and electrical system loss.

Using storage solutions involving the injection or consumption of active power means that there is an immediate frequency control response.

12 Grid Code Compliance

Electrical companies penalise or reward certain parameters such as the power factor, frequency, etc.

This occurs both in energy generation and consumption and in both cases solutions based on power electronics make it possible to maintain these parameters at values which are beneficial to both the generator company and the consumer.

13 Grid Connection of Renewables

The unpredictability, and temporal and variable nature of certain renewable sources hinder their use as stable types of energy.

Power electronics solutions make it possible to adapt this type of generation so that it complies with grid codes and, if storage is being used, so that it is predictable, reliable and available at the most profitable time.

14 Infrastructure Investment Deferral : Transmission & Distribution Lines

Using power electronics, it is possible to optimise the existing power and limit peak values (both active and reactive power), which if not limited may mean that transmission and distribution grids need to be modified.

15 Infrastructure Investment Deferral: Replacement of electrical equipment

Power electronics can be used to optimise existing infrastructure, limit current peak values, reduce the number of electromechanical operations (intake exchangers, capacitor banks, etc.) and thus slow down the ageing process of electrical switchgear, thus extending useful life times.

16 Infrastructure Investment Deferral: Supply Capacity

Using power electronics, it is possible to optimise the existing power and limit peak values (both active and reactive power), which if not limited will mean that new generation plants will be needed.

17 Intermittent Loads

As regards intermittent loads (e.g. trains on a section of the railway), storage solutions make it possible to load during periods of inactivity and unload when there is activity, significantly reducing contracted power.

18 Load Following

Solutions with storage make it possible to balance out the difference between available energy (primary generation) and the energy demanded (consumers).

19 Load Shifting

Load shifting alters the energy consumption pattern. Hence, energy consumption in peak hours is shifted to periods when there is less activity. To the reduce the costs of end user energy, ESM is loaded with low-cost energy and is unloaded later when energy prices are high.

20 Outage Management

Storage solutions can avoid the effects of electrical grid power cuts.

21 Peak Shaving

Storage solutions make it possible to have active energy to be used when demand is greater.

Hence, the peak power needed is limited.

In consumption, the maximum power limit consumed from the grid implies a reduction in contracted power for the company.

In transmission and distribution, the localised availability of supplementary active energy can mean not having to invest in infrastructure or improving grid stability.

22 Renewable Energy Capacity Firming

This mainly refers to stabilising, damping and generating ramps in generations from highly-variable renewable sources such as photovoltaic or wind power.

Storage solutions make it possible to program energy supply by means of configurable energising ramps, "constant" energy periods and configurable de-energising ramps.

23 Substation On-Site Power

When a storage solution is adopted in a substation, auxiliary emergency service power supplies are no longer needed since the availability of the substation control system is maintained even when there is no electrical power supply.

24 Subsynchronous Resonance Damping

The use of serial capacitors with transmission lines may make this type of resonance affect turbogenerators electro-mechanically.

Power electronics solutions using active filters may solve these problems.

25 Time Of Use (TOU) management

Storage solutions allow the consumer to charge their batteries when the energy in the grid is cheaper and supply it (back to the grid or auto-consume it) when it is more expensive.

26 Time Shifting

Load shifting alters the energy consumption pattern. Hence, energy consumption in peak hours is shifted to periods when there is less activity. To the reduce the costs of end user energy, ESM is loaded with low-cost energy and is unloaded later when energy prices are high.

27 Voltage Control

Power electronics equipment is able to inject or consume reactive energy and hence support voltage regulation.

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