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TECHNICAL SPECIFICATION

colour inside

Virtual power plants –
Part 1: Architecture and functional requirements



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IEC Secretariat
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

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VIRTUAL POWER PLANTS –

Part 1: Architecture and functional requirements

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IEC TS 63189-1 has been prepared by subcommittee SC 8B: Decentralized electrical energy systems, of IEC technical committee TC 8: System aspects of electrical energy supply. It is a Technical Specification.

The text of this Technical Specification is based on the following documents:

Draft	Report on voting
8B/124/DTS	8B/197/RVDTS

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this Technical Specification is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts in the IEC 63189 series, published under the general title *Virtual power plants*, can be found on the IEC website.

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- withdrawn,
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VIRTUAL POWER PLANTS –

Part 1: Architecture and functional requirements

1 Scope

This part of IEC 63189 covers the terms and definitions, system composition and control modes of virtual power plant (VPP). It defines the functional requirements for VPPs, including power generation forecasting, load forecasting, generation and consumption scheduling, control and management of energy storage devices and loads, coordinated optimization of distributed energy resources, status monitoring and communication, data collection and analysis, and market transactions.

Since a virtual power plant is a cluster of dispersed energy converting installations, which are aggregated, it uses additional systems to achieve its objectives (e.g. regional energy meteorology forecasting, site specific energy management systems, SCADA and other communication systems).

Local regulations, the electricity market model and the corresponding manner of organising the market related to the utilisation of controllable DER affect the management, control and operation of VPPs.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60870-5-101, *Telecontrol equipment and systems – Part 5-101: Transmission protocols – Companion standard for basic telecontrol tasks*

IEC 60870-5-104, *Telecontrol equipment and systems – Part 5-104: Transmission protocols – Network access for IEC 60870-5-101 using standard transport profiles*

IEC 61000 (all parts): *Electromagnetic compatibility EMC*

IEC 61850 (all parts), *Communication networks and systems for power utility automation*

IEC 62351-3, *Power systems management and associated information exchange – Data and communications security – Part 3: Communication network and system security – Profiles including TCP/IP*

IEC TS 62351-5, *Power systems management and associated information exchange – Data and communications security – Part 5: Security for IEC 60870-5 and derivatives*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1
controllable load
load of particular consumers which under contract must be increased or reduced, for a limited period of time, at the request of the distribution supply undertaking

Note 1 to entry: Controllable load can be increased as well as reduced, according to the request of the distribution supply undertaking.

[SOURCE: IEC 60050-603:1986, 603-04-42, modified – "increased or" has been added to the definition.]

3.2
distributed energy resources
DER
generating units (with their auxiliaries, protection and connection equipment), as well as load units and those units having both characteristics (such as electrical energy storage systems), connected to a low-voltage or a medium-voltage network

[SOURCE: IEC 60050-617: 2009, 617-04-20, modified: adopted for the inclusion of controllable loads]

3.3
distributed generation
DG
generation of electric energy by multiple sources which are connected to the power distribution system

[SOURCE: IEC 60050-617:2009, 617-04-09]

3.4
demand response
DR
action resulting from management of the electricity demand in response to supply conditions

[SOURCE: IEC 60050-617:2009, 617-04-16]

3.5
demand side management
DSM
process that is intended to influence the quantity or patterns of use of electric energy consumed by end-use customers

[SOURCE: IEC 60050-617:2009, 617-04-15]