



DPC: 19/30375191 DC

BSI Group Headquarters

389 Chiswick High Road London W4 4AL

Tel: +44 (0)20 8996 9000

Fax: +44 (0)20 8996 7400

www.bsigroup.com

Date: 16 July 2019

Origin: International

Latest date for receipt of comments: 06 August 2019

Project No. 2018/00852

Responsible committee: GEL/8 Systems Aspects for Electrical Energy Supply

Interested committees:

Title: Draft BS EN IEC 63189-1 Virtual Power Plants. Part 1: Architecture and Functional Requirements.

Please notify the secretary if you are aware of any keywords that might assist in classifying or identifying the standard or if the content of this standard

- i) has any issues related to 3rd party IPR, patent or copyright
- ii) affects other national standard(s)
- iii) requires additional national guidance or information

WARNING: THIS IS A DRAFT AND MUST NOT BE REGARDED OR USED AS A BRITISH STANDARD. THIS DRAFT IS NOT CURRENT BEYOND 06 August 2019This draft is issued to allow comments from interested parties; all comments will be given consideration prior to publication. No acknowledgement will normally be sent. **See overleaf for information on the submission of comments.**

No copying is allowed, in any form, without prior written permission from BSI except as permitted under the Copyright, Designs and Patent Act 1988 or for circulation within a nominating organization for briefing purposes. Electronic circulation is limited to dissemination by e-mail within such an organization by committee members.

Further copies of this draft may be purchased from BSI Shop <http://shop.bsigroup.com> or from BSI Customer Services, Tel: +44(0) 20 8996 9001 or email cservices@bsigroup.com. British, International and foreign standards are also available from BSI Customer Services.Information on the co-operating organizations represented on the committees referenced above may be obtained from <https://standardsdevelopment.bsigroup.com/>.

Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

For national standards, comments will be reviewed by the relevant UK national committee and the resulting standards published as a British Standard.

UK Vote

Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

Submission of Comments

- **Annotated drafts are not acceptable and will be rejected.**
- All comments should be submitted online at <https://standardsdevelopment.bsigroup.com/>. You will need to register in order to comment.

Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
------------------	------------------------

1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/Figure/ Table/Note	Type of comment	Commend (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



8B/41/CD

COMMITTEE DRAFT (CD)

PROJECT NUMBER:

IEC 63189-1 ED1

DATE OF CIRCULATION:

2019-07-12

CLOSING DATE FOR COMMENTS:

2019-09-06

SUPERSEDES DOCUMENTS:

8B/10/NP, 8B/20/RVN

IEC SC 8B : DECENTRALIZED ELECTRICAL ENERGY SYSTEMS

SECRETARIAT:

China

SECRETARY:

Mr Wenpeng LUAN

OF INTEREST TO THE FOLLOWING COMMITTEES:

PROPOSED HORIZONTAL STANDARD:



Other TC/SCs are requested to indicate their interest, if any, in this CD to the secretary.

FUNCTIONS CONCERNED:

☐ EMC

☐ ENVIRONMENT

☐ QUALITY ASSURANCE

☐ SAFETY

This document is still under study and subject to change. It should not be used for reference purposes.

Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

TITLE:

Virtual Power Plants- Part 1: Architecture and Functional Requirements

NOTE FROM TC/SC OFFICERS:

As agreed at the latest WG 4 meeting hold on May 21st 2019, in Fehraltorf, Switzerland, WG 4 prepared a new draft for CD circulation based on the meeting discussion. This draft has been reviewed by WG 4 members before this circulation. The next WG 4 meeting will be held on October 16th, in Shanghai, China. To ensure the WG 4 receive the comments before the next meeting and prepare the draft response for discussion, the circulation time is set for 8 weeks.

Copyright © 2019 International Electrotechnical Commission, IEC. All rights reserved. It is permitted to download this electronic file, to make a copy and to print out the content for the sole purpose of preparing National Committee positions. You may not copy or "mirror" the file or printed version of the document, or any part of it, for any other purpose without permission in writing from IEC.

Documents
AVA Document Sharing Hub

CONTENTS

1		
2		
3	1. Scope	1
4	2. Normative references.....	1
5	3. Terms and definitions.....	2
6	3.1 virtual power plant (VPP)	2
7	3.2 Distributed energy resource (DER).....	2
8	3.3 Distributed generation (DG).....	2
9	3.4 Electrical energy storage (EES)	2
10	3.5 Energy Storage System	2
11	3.6 Controllable loads.....	3
12	3.7 Demand side management (DSM)	3
13	3.8 Demand Response	3
14	4. System components and functions	3
15	4.1 Power generation unit.....	4
16	4.2 Power utilization unit	4
17	4.3 Power storage unit	5
18	4.4 Microgrid	5
19	4.5 Management and control system	5
20	5. Control mode.....	6
21	5.1 Centralized control mode	6
22	5.1.1 Dispatch and control architecture.....	6
23	5.1.2 Communication system	7
24	5.1.3 Application scenario	7
25	5.2 Decentralized control mode.....	7
26	5.2.1 Decentralized Control-Centralized Assessment	8
27	5.2.2 Decentralized Control-Local Assessment	9
28	6. Functional requirements	10
29	6.1 Status monitoring and communication.....	10
30	6.1.1 Status monitoring.....	11

31	6.1.2 Communication and interface specification.....	12
32	6.1.3 Data analysis functional requirements.....	12
33	6.2 Predict and optimize operation function	13
34	6.2.1 Power generation forecast.....	13
35	6.2.2 Load forecast	14
36	6.2.3 Portfolio optimization and coordination.....	17
37	6.2.4 Generation and load schedule development.....	20
38	6.3 Electricity market transaction function.....	23
39	6.3.1 Participate in the electricity market or aggregate ancillary services	23
40	6.3.2 Establish a bidding mechanism for VPP units in the region	24
41	6.3.3 Submit bids to the electricity trade center	24
42	6.3.4 Sign contracts with the power trade center to sell electricity to the market after	
43	obtaining the market authorization through the bidding.....	25
44		
45		
46		

Virtual Power Plants- Part 1: Architecture and Functional Requirements

1. Scope

This standard covers the terms and definitions, system composition, control modes of virtual power plants (VPPs). This document defines the functional requirements for VPPs, including for example: 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, market transaction.

This standard applies to VPPs consisting of distributed energy resources and loads. It specifies the design and development of VPPs.

2. Normative references

IEC TS 62898-2 ED1: Microgrids - Guidelines for Microgrid Operation

IEC/TS 62786: 2017 Distributed Energy Resources Connection with the Grid

IEC 61970 Ed. 3.0 Energy Management System Application Program Interface

IEC 61131-3 Programmable controllers - Part 3: Programming languages

IEC 61850 Communication networks and systems for power utility automation

IEC 60780-5-101 Telecontrol equipment and systems - Part 5-101: Transmission protocols – Companion standard for basic telecontrol tasks

IEC 60780-5-104 Telecontrol equipment and systems - Part 5-104: Transmission protocols – Network access for IEC 60780-5-101 using standard transport profiles

69 **3. Terms and definitions**

70 **3.1 virtual power plant (VPP)**

71 group of distributed energy resources which combine to function as a dispatchable unit

72 note 1 to entry: A virtual power plant can be used for the purpose of participating in the
73 electricity market or aggregating ancillary services

74 note 2 to entry: A virtual power plant constituted of distributed energy resources and
75 controllable loads, which are not necessarily within the same geographical area

76 [SOURCE: IEC 617-04-20]

77 **3.2 Distributed energy resource (DER)**

78 generators, including loads having a generating mode (such as electrical energy
79 storage systems), connected to the low or medium voltage network, with their
80 auxiliaries, protection and connection equipment

81 [SOURCE: IEC 617-04-20]

82 **3.3 Distributed generation (DG)**

83 generation of electric energy by multiple sources which are connected to the low or
84 medium voltage network

85 [SOURCE: IEC 617-04-09]

86 **3.4 Electrical energy storage (EES)**

87 installation that is able to absorb electrical energy, store it and release it for a certain
88 amount of time during which energy conversion processes may be included

89 [SOURCE: IEC TS 62898-2 ED1]

90 **3.5 Energy Storage System**

91 an energy storage system can store and release electric energy within limited period of
92 time. The electric energy can be stored in the form of mechanical, chemical,
93 electromagnetic energy and phase transition

94 **3.6 Controllable loads**

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

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

99 [Source: IEC 603-04-42, MOD] (1986)

100 **3.7 Demand side management (DSM)**

101 process that is intended to influence the quantity or patterns of use of electric energy
102 consumed by end-use customers

103 [Source: IEC 617-04-15]

104 **3.8 Demand Response**

105 action resulting from management of the electricity demand in response to supply
106 conditions

107 [Source: IEC 617-04-16] (2011)

108 **4. System components and functions**

109 VPP is composed of solid units such as power generation units, power utilization units,
110 and power storage units, and together with the VPP management and control system
111 constituting a VPP system. The power generation unit, power utilization unit and power
112 storage unit in the VPP system adopt interface protocols such as OPC and IEC. By the
113 communication medium such as optical fibre, cable and wireless, the VPP
114 management and control system can interact with different units to realize the unified
115 scheduling management and control. The VPP management and control system
116 provides a real-time communication interface to interact with the TSO for grid services
117 and interact with the DSO for grid automation systems. The VPP control system
118 provides external interfaces and can interact with TSO and Energy
119 Management/Trading platform to implement external information access release,

scheduling management and market trading. Figure 4-1 shows the VPP system components.

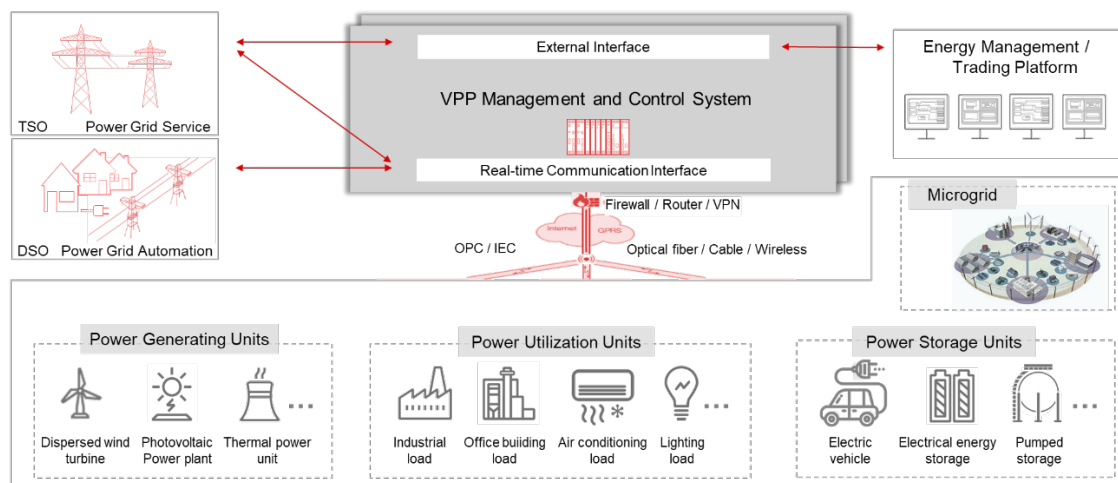


Fig. 4-1 VPP system composition diagram

4.1 Power generation unit

The power generation unit of VPP system includes dispersed wind turbines, photovoltaic power plants, thermal power units, solar thermal generator sets and other units, which can generate active power. The power generation unit interacts with VPP management and control system to upload the information status of the power generation unit and respond to the power generation control command of the VPP management and control system. The power generation unit itself may have a power generation prediction function, or a power generation prediction function service provided by upper layer VPP management and control system. The power generation unit should have the ability to participate in the market trading of the Energy Management/Trading platform.

4.2 Power utilization unit

The power utilization unit of VPP system includes industrial load, office building load, air conditioning load, lighting load, and other interruptible loads, etc., mainly consuming active power. The load unit exchanges information with the VPP management and control system, uploads the information status of the power unit, and responds to the power demand command of the VPP management and control system.