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Photovoltaic power systems (PVPS) – Information model for availability

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Technical Specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC TS 63019, which is a Technical Specification, has been prepared by IEC technical committee 82: Solar photovoltaic energy systems.

The text of this International Standard is based on the following documents:

DTS	Report on voting
82/1447/DTS	82/1505A/RVDTS

Full information on the voting for the approval of this Technical Specification can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

Information model categories are written in capital letters.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

- transformed into an International standard,
- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

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INTRODUCTION

This technical specification (TS) defines a common basis for the exchange of information on photovoltaic power system (PVPS) availability metrics among owners, utilities, lenders, operators, manufacturers, engineer/procure/construction firms, specifiers/designers, consultants, regulatory bodies, certification bodies, insurance companies, and other stakeholders. From this diverse group of stakeholders, external and internal interfaces arise in the operation and delivery of power. Although these are mostly power- and energy-related, some are informational or for power system control. The intention is for information exchange on capability- and energy-related data to form a nucleus for separate information needed by stakeholders, as illustrated in Figure 1.

It identifies external and internal elements related to the capability, health, and condition of components, subsystems, and the system itself, as well as energy production, plant operation, and asset management, which also benefit from a defined set of terms. This is achieved by providing an information model specifying how (PVPS) time designations shall be assigned by information categories. An information model facilitates how the unavailability of time of components, subsystems, and systems, as well as the lost power and other capabilities affect the PVPS. The ability to estimate the resulting lost energy and/or loss of PVPS capability forms the basis for how to allocate time for reporting availability metrics or, more directly, unavailability.

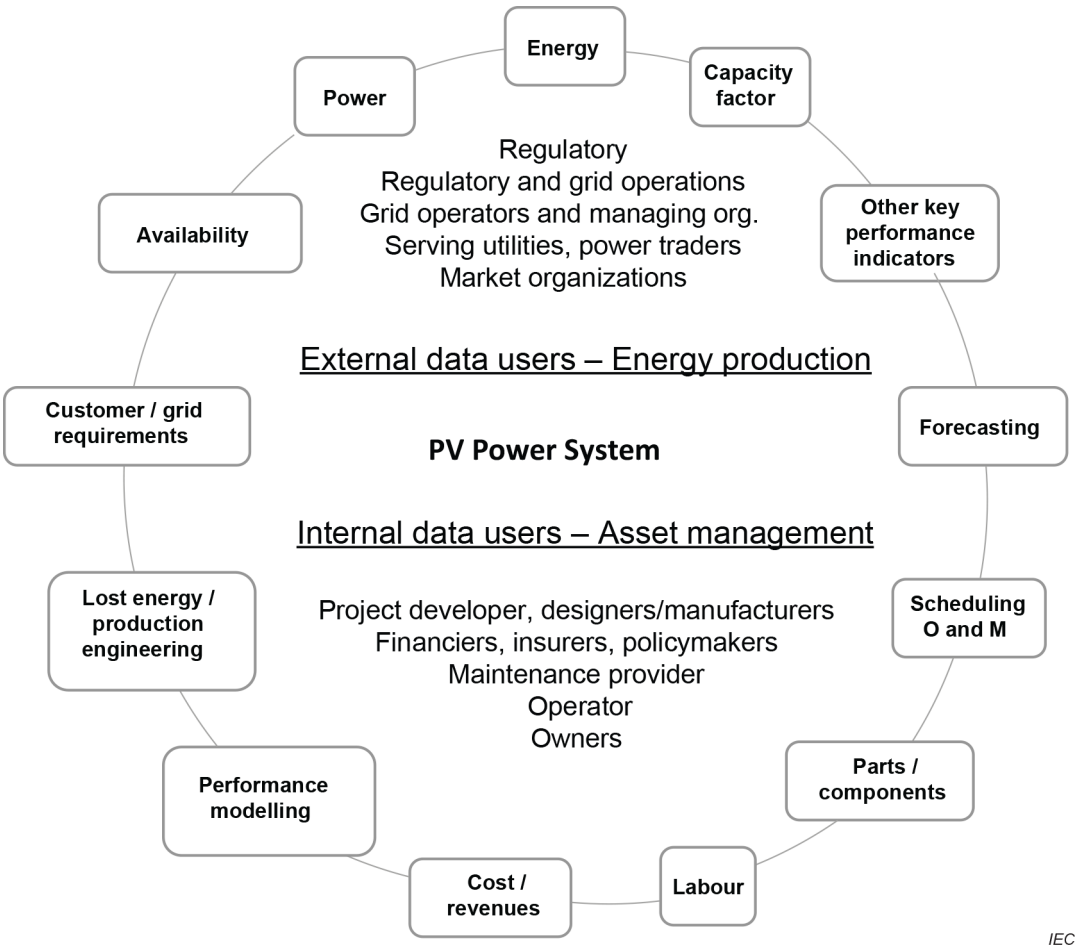

Figure 1 – Data stakeholders for a PVPS

PHOTOVOLTAIC POWER SYSTEMS (PVPS) – INFORMATION MODEL FOR AVAILABILITY

1 Scope

A common basis of understanding results from defined metrics that can be useful to the stakeholders, populated by data collected in the operation of the PVPS:

a) To provide a standarized approach to characterize availablity and unavailablity for a PVPS.

b) To provide standard methodologies for determining the appropriate forms of availability of the PVPS during varying time periods, including real-time capability assessment or longer, for reporting availablity metrics to stakeholders.

Table 1 – Stakeholder roles and objectives for reliability and maintenance data

Roles	Objective
Owner	Decision support for investments
Operator	Reporting performance indicators
	Determining availability and weaknesses
	Identifying maintenance strategies
Service provider	Maintenance optimization
	Optimizing keeping stock of spare parts
Original equipment manufacturers/ supplier	Design optimization
Financier/insurer	Risk assessment
Grid operator	Highly reliable and stable bulk power system
Source: International Energy Agency (IEA)	

This document provides a framework from which the availability metrics of a PVPS can be derived and reported. It describes how data are categorized and defines generic information categories to which time can be assigned for a PVPS considering internal and external conditions based on fraction of time, system health, and condition by specifying the following:

- generic information categories of a PVPS considering availability and production.
- information category priority to discriminate between concurrent categories.
- entry and exit point for each information category to allocate designation of time.

The PVPS comprises all photovoltaic (PV) modules, inverters, DC and AC collection systems, grid interconnection equipment, the site, its infrastructure, and all functional service elements. This is further explained in 6.3 and 6.4.

Formulas in this document provide normative guidance for standardization. Beyond that, it is not the intention of this document to specify exactly how other undefined, time-based availability metrics shall be calculated. The annexes are examples and guiding principles for developing methods for calculation and estimation of availability metrics, subject to the knowledge and concurrence for use by the involved stakeholders. Estimates and calculations also have recommendations on how they are to be used as part of the informative function.

It is not within the scope of this document to determine the method of information acquisition. Relevant IEC documents on data collection and information acquisition are included in the following normative references. IEC 61724-1 has requirements and IEC TS 61724-3:2016, 6.2.5, specifically identifies measured data on this topic.

Data generated during the operation of a PVPS are valuable, establishing who owns the monitoring data and who will have access to the data and for what purpose should be established. Different stakeholders will have different needs, as summarized in Table 1 (IEA). In Annex E, the monitoring systems are addressed in greater detail.

Availability metrics cannot be derived without important outage information. Questions can require the PVPS operation to properly collect the requisite data, such as what equipment or portion of the plant is failing, how long, how often, and how much energy is being lost and categorized by the information model. Asset management questions include the source of the outage (i.e., Whose clock is it on? Was the outage due to internal or external forces? What power and energy was generated? And, what was expected?).

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 TS 61724-3:2016, *Photovoltaic system performance – Part 3: Energy evaluation method*

IEEE Std 762™-2006, *IEEE Standard definitions for use in reporting electric generating unit reliability, availability, and productivity*