SLOVENSKI STANDARD
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Ocena storitev električne prilagodljivosti z vidika elektroenergetskega omrežja

Assessment of electrical flexibility services from power network perspective

Bewertung der Stromflexibilitätsdiensten aus Sicht der Stromnetzbetreiber

Évaluation des services de flexibilité électrique pour la gestion des réseaux électriques

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03.080.99	Druge storitve	Other services
29.240.01	Omrežja za prenos in distribucijo električne energije na splošno	Power transmission and distribution networks in general

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EUROPEAN STANDARD

NORME EUROPÉENNE

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Assessment of electrical flexibility services from power network perspective

Evaluation des services de flexibilité électrique pour la gestion des réseaux électriques

Bewertung der Stromflexibilitätsdiensten aus Sicht der Stromnetzbetreiber

This draft European Standard is submitted to CENELEC members for enquiry.
Deadline for CENELEC: 2026-12-18.

It has been drawn up by CLC/TC 8X.

If this draft becomes a European Standard, CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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Europäisches Komitee für Elektrotechnische Normung

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European foreword

This document (prEN 50763:2026) has been prepared by Technical Committee CLC/TC 8X "System aspects of electrical energy supply".

This document is currently submitted to the CENELEC Enquiry.

The following dates are proposed:

—	latest date by which the existence of this document has to be announced at national level	(doa)	dav + 6 months
—	latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	dav + 12 months
—	latest date by which the national standards conflicting with this document have to be withdrawn	(dow)	dav + 36 months (to be confirmed or modified when voting)

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Introduction

Due to the energy transition, European power systems are facing several new challenges: increasing levels of renewable generation on the transmission and on distribution networks, acceleration of electrification of industry, heat and transportation, emergence of new electricity usages such as electric vehicles and battery energy storage systems, phase-out of fossil-fuel generation, increase in power electronics equipments, constraint national network development and needs for new interconnections.

System operators must ensure the reliability and quality of the electricity supply while addressing several challenges such as :

— the increasing volatility of power flows (both generation and consumption),

— the increasing constraints on grid availability,

— and the growing complexity of the system.

The transformation of European power system involves the transformation of system operation and the evolution of European energy markets: system operators can be required to be able to request and procure electrical flexibility services in order to balance demand and supply or to solve their congestion or voltage control issues, provided that these services offer reliability and competitiveness.

The definition and characterization of flexibility services is a cornerstone for the design of future European flexibility markets, flexibility schemes or flexibility market products.

The present standard is intended to cover all of these aspects and to describe the main use cases for flexibility services from the perspective of system operators.

It is intended to be used by the many stakeholders of electrical flexibility services: TSOs, DSOs, flexibility service operators, market operators, manufacturers, system engineers.

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1 Scope

This document aims at standardizing concepts, terms and definitions relating to electrical flexibility as well as methodology to assess electrical flexibility services.

The purpose of this document is to define a standardized characterization of electrical flexible services, so that data collected by transmission system operators or distribution system operators can be used and compared in an interoperable manner.

In addition to the development of relevant use cases, the project will focus on the following normative aspects:

— definition and characterization of the different types of electrical flexibilities depending, in particular, on the flexibility needs and the response time;

— activation or control mode of the flexibility services;

— measurement provisions: e.g. consistency with the data of the electricity smart meters and the metrology requirements and the use of dedicated measurement devices;

— information exchanges between concerned parties;

— verification of delivery of service.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

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3.1
flexibility service
capability to set the level of injection and/or consumption of an individual asset or a set of aggregated assets belonging to grid users at a chosen value, in response to the flexibility needs of a system operator

3.1.1
explicit flexibility service
flexibility service provided as a reaction to a request or a signal

Note 1 to entry: A explicit flexibility service can be market-based services (local services, balancing services), rule-based services, or flexibility connection agreements.

3.1.2
implicit flexibility service
flexibility service provided as a reaction to market price signals, or incentive signals (e.g. grid warning signal, CO_2 footprint signal)

3.2
network flexibility need
flexibility needed to adjust for grid availability, by means of preventing or solving congestion or voltage issues, across relevant timeframe

3.3
system flexibility need
flexibility needed by the electricity system to adjust to the variability of generation and consumption patterns, across relevant market timeframe

3.4
disturbance
unplanned event that can cause the transmission or distribution system to divert from the normal state

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3.5
congestion issue
situation when the electric current flow through a physical asset exceeds operational limits applied by systems operators in line with their national framework

[SOURCE: Flexibility Needs Assessment Methodology [1] - Article 2(c)]

3.6
voltage issue
situation when voltage is above or below operational limits or when steady state voltage levels are not within operational security limits

[SOURCE: Flexibility Needs Assessment Methodology [1] - Article 2(ll) and Network Code on Demand Response [2] - Article 2(4)]

3.7
residual load
total demand minus non-dispatchable generation (as individual units or as aggregated units) such as from wind or solar as well as generation, subject to must-run conditions per market time unit.

[SOURCE: Flexibility Needs Assessment Methodology [1] - Article 2(dd)]

3.8
voltage control
manual or automatic control actions at the generation node, at the end nodes of the AC lines or HVDC systems, on transformers, or other means, designed to maintain the set voltage level or the set value of reactive power

[SOURCE: Regulation (EU) 2017/1485[3] - Article 3(21)]

3.9
normal state
situation in which the system is within operational security limits in the N-situation and after the occurrence of any contingency from the contingency list, taking into account the effect of the available remedial actions

[SOURCE: Regulation (EU) 2017/1485 [3] - Article 3(5)]

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3.10
emergency state
system state in which one or more operational security limits are violated

[SOURCE: Regulation (EU) 2017/1485 [3] - Article 3(37)]

3.11
restoration state
system state in which the objective of all activities in the transmission system is to re-establish the system operation and maintain operational security after the blackout state or the emergency state

[SOURCE: Regulation (EU) 2017/1485 [3] - Article 3(38)]

3.12
controllable unit
CU
power-generating module and/or demand unit

Note 1 to entry: A controllable unit for the purposes of this document can be in accordance with Article 2(5) of Network Code on requirements for grid connection of generators[4] and Article 2(4) of Network Code on demand connection[5].

[SOURCE: Network Code on Demand Response [2] - Article 2(18)]

3.13
service providing unit
SPU
controllable unit or an ensemble of controllable units connected to a single connection point

Note 1 to entry: SPU is defined by the service provider to provide balancing or local services.

[SOURCE: Network Code on Demand Response[2] - Article 2(22)]

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3.14
service providing group
SPG
aggregation of controllable units or service providing units connected to more than one connection point within the same scheduling area

Note 1 to entry: SPG is defined by the service provider to provide balancing or local services.

[SOURCE: Network Code on Demand Response[2]- Article 2(23)]

3.15
distributed energy resource
DER
generators (with their auxiliaries, protection and connection equipment), including loads having a generating mode (such as electrical energy storage systems), connected to a low-voltage or a medium-voltage network

[SOURCE: IEC 60050-617:2009 [6] - [617-04-20]]

3.16
service provider
SP
market participant with service providing units or service providing groups able to provide system operator services in a balancing or local market

[SOURCE: Network Code on Demand Response[2] - Article 2 (20)]

3.17
balancing service provider
BSP
party with reserve-providing units or reserve-providing groups able to provide balancing services to TSOs

Note 1 to entry: A balancing service provider is a type of service provider.

Note 2 to entry: Balancing services can be balancing energy and/or balancing capacity.

[SOURCE: Regulation (EU) 2017/2195 [7] - Article 2(6)]

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3.18
balance responsible party
BRP
party financially accountable for its imbalances

Note 1 to entry: A balance responsibility requires a contract proving financial security with the imbalance settlement responsible of the scheduling area entitling the party to operate in the market. Imbalance means an energy volume calculated for a balance responsible party and representing the difference between the allocated volume attributed to that balance responsible party and the final position of that balance responsible party, including any imbalance adjustment applied to that balance responsible party, within a given imbalance settlement period.

[SOURCE: Regulation (EU) 2017/2195 [7] - Article 2(7)]

3.19
prosumer
entity or party which can be both a producer and a consumer of electrical energy

[SOURCE: IEC 60050-617:2009 [6] - [617-02-16]]

3.20
final customer
customer who purchases electricity for own use

[SOURCE: Directive (EU) 2019/944 [8] - Article 2(3)]

3.21
market-based
mechanism or a procurement process for a service provision where either the selection of the service providers or the activation of the service is based on a bidding process

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3.22
flexibility market product
set of technical and commercial characteristics defined a flexibility service that can be traded or procured by a procuring system operator through market-based procedures

3.23
flexible connection agreement
FCA
set of agreed conditions for connecting electrical capacity to the grid that includes conditions to limit and control the electricity injection to and withdrawal from the transmission network or distribution network

[SOURCE: Directive (EU) 2019/944 [8] - Article 2(24c)]

3.24
ancillary services
service necessary for the operation of an electric power system provided by the system operator or by power system users

Note 1 to entry: System ancillary services may include the participation in frequency regulation, reactive power regulation, active power reserve, etc.

[SOURCE: IEC 60050-617:2009 [6] - [617-03-09]]

3.25
non-frequency ancillary services
service used by a system operator or distribution system operator for steady state voltage control, fast reactive current injections, inertia for local grid stability, short-circuit current, black start capability and island operation capability

3.26
flexible information system
FIS
system to record at least the qualification of service providers, the product prequalification, product verification and grid prequalification of SPUs and SPGs and the switch of controllable units for the provision of balancing and local services and to exchange data for such processes

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[SOURCE: Network Code on Demand Response [2] - Article 2 (15)]

3.27
energy management system
EMS
solution for monitoring, operating, controlling and optimizing energy resources and loads at premises level (home, commercial, industrial building or industrial plant)

Note 1 to entry: An energy management system is a local system for monitoring and control of energy resources and loads belonging to the same grid use.

Note 2 to entry: An energy management system acts as the execution layer for flexibility services by receiving activation or incentive signals, executing control actions, and providing measurement and forecasting data.

Note 3 to entry: An energy management system can also be called a home energy management system (HEMS), a building energy management system (BEMS), a customer energy management system (CEMS), or an electrical energy management system (EEMS).

Note 4 to entry: The EMS is the primary interface for explicit and implicit flexibility services as specified in EN IEC 62746-4 [9] andEN IEC 63402-1 [10].

[SOURCE: IEC 60050-617:2009 [6] [826-19-04] and ISO 17800:2017 [11].]

3.28
connection point
interface at which the power-generating module, demand facility, distribution system or MVDC or HVDC system is connected to a transmission system, offshore network, distribution system, including closed distribution systems, or HVDC system, as identified in the connection agreement

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3.29
dynamic electricity price contract
electricity supply contract between a supplier and a final customer that reflects the price variation in the spot markets, including in the day-ahead and intra-day markets, at intervals at least equal to the market settlement frequency

[SOURCE: Directive (EU) 2019/944 [8] - Article 2(15)]

4 Defining electrical flexibility services

4.1 General

The European power system is undergoing significant changes motivated by the European Union's ambition to achieve climate neutrality and to accelerate the transition to a fully carbon-neutral system. These ambitions are driving the rapid integration of large amounts of variable renewable resources into the transmission and distribution networks and the phase-out of fossil-fuel generation.

Furthermore, the European power system must face the increasing electrification of end uses such as transportation, heating, cooling and industrial processes, the ongoing significant growth in electricity demand induced by artificial intelligence and datacenters but also the proliferation of distributed energy resources.

Amid this rapid energy transition and the ever-growing complexity of the power system where system operators must safeguard balance between supply and demand, flexibility has become a key factor to ensure the reliability, resilience and stability of the grid.

Flexibility refers to the ability of an electricity system to adapt to variability and uncertainty in generation and consumption patterns, and to adjust to network availability over relevant market timeframes.

Flexibility services shall be proposed in order to fulfill, prevent or solve the flexibility needs identified by system operators.

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4.2 Identification of flexibility needs

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4.2.1 General

From a system operator's perspective, flexibility needs arise from the power flows variability and the availability of the grid. They are caused by the volatility / growth of demand and injection flows, involving increased peak loads and changing electrical flows patterns. Flexibility needs are amplified by the growing adoption of renewable generation which is inherently intermittent and weather-dependent.

NOTE In accordance with Article 19e(4)(b) of Regulation (EU) 2019/943 [12], ENTSO-E and DSO Entity have set out a methodology for the analysis by TSOs and DSOs of their flexibility needs[1].

The flexibility need assessment methodology distinguishes between two types of flexibility needs: system flexibility needs and network flexibility needs.

4.2.2 System flexibility needs

"System flexibility need" refers to the flexibility needed by the electric system to adapt to the variability of generation and consumption patterns, across relevant market time frame.

System flexibility needs are classified into the following subcategories :

— **Renewable energy source (RES) integration needs**, which refer to the quantity of flexibility required to achieve annual RES integration targets or maximum acceptable level RES curtailment at the national level;

— **Ramping needs**, which refer to flexibility needs associated with variations of the residual load (defined as the difference between total demand and RES generation) assuming perfect forecast conditions;

— **Short-term needs**, which refer to flexibility needs associated with unexpected variations of the residual load or forced outage of assets during the intra-day or balancing time frame.

— **Adequacy flexibility needs**, which refer to the type of flexibility resources and the amount of flexibility required to reliably balance demand and supply at all time frames and under all expected operating conditions, especially during peak or critical hours.

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— **Restoration needs**, which refer to the type of flexibility resources and the amount of flexibility required to safely re-establish the system operation and efficiently maintain operational security after an emergency state or a blackout state.

— **Inertia needs**, which refer to the amount of inertia (rotational or synthetic inertia) required in the power system to efficiently maintain the frequency stability after a disturbance. The growth of inertia needs will be amplified by the increase in RES energy, the phase-out of fuel-based power plants (and consequently of synchronous rotating machines) and the growth of power-electronics based generation.

The flexibility needs assessment methodology addresses more specifically the RES integration needs, the ramping needs and the short-term needs, which refer to **balancing needs**.

4.2.3 Network flexibility needs

"Network flexibility need" refers to the flexibility needed to adjust for grid availability, by means of preventing or solving congestion or voltage issues, across relevant time frame.

Network flexibility needs include both upward and downward flexibility needs, and can apply to transmission or distribution network.

Network flexibility needs are classified into two subcategories:

— **Congestion management needs**, which refer to flexibility required to prevent or solve congestion issues by maintaining power flows within operational limits across the transmission or distribution network, across relevant time frame. Congestion management is critical for preventing overload or power outages, guaranteeing system security (maintaining margins for contingencies) and preserving stable system operation.

— **Voltage control needs**, which refer to flexibility required to enable system operators maintain voltage level within operational limits across the transmission or distribution network, across relevant time frame.

  Voltage control is crucial for maintaining the stability and the reliability of the grid (avoiding voltage collapse or blackout conditions) and guaranteeing the efficiency of the grid (ensuring an efficient power delivery and the protection of grid and grid users' equipments).

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4.3 Concept of flexibility services

4.3.1 General

From the perspective of system operators, flexibility services consist of solutions aimed at adapting energy flows to ensure a reliable, stable, efficient and balanced energy system.

"Flexibility service" shall refer to the capability to set the level of injection and/or consumption of an individual asset or a set of aggregated assets at a chosen value, in response to the flexibility needs (network or system flexibility needs) of a system operator.

A flexibility service can be explicit or implicit.

4.3.2 Explicit flexibility service

"Explicit flexibility service" shall refer to a flexibility service provided directly by a grid user or a service provider, as a reaction to a direct request or to an explicit signal. The user commitment depends on an obligation coming from market-based services, rule-based services or flexible connection agreements.

Grid user participating to an explicit flexibility service must comply to the received signal, according to its contracts or formal obligations (rules, laws, emergency).

Grid user participating to an explicit flexibility service may receive direct payments or financial rewards for changing its consumption or generation patterns.

4.3.3 Implicit flexibility service

"Implicit flexibility service" shall refer to a flexibility service provided as a reaction to market price signals (reflecting variations in supply, demand, grid availability or grid state) or as a reaction to incentive signals (e.g. grid emergency/warning signal, CO2 footprint signal).

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