

# **METHODOLOGY FOR IDENTIFYING REGIONAL ELECTRICITY CRISIS SCENARIOS**

**in accordance with Article 5 of Regulation (EU) 2019/941 of the  
European Parliament and of the Council on risk-preparedness in  
the electricity sector and repealing Directive 2005/89/EC**

12 December 2023

From: Working Group Risk Preparedness

---

# Methodology for identifying regional electricity crisis scenarios

12 December 2023

## TABLE OF CONTENTS

<b>Table of Contents</b>	<b>2</b>
<b>Whereas</b>	<b>4</b>
<b>TITLE 1 General provisions</b>	<b>7</b>
Article 1 Scope and document structure	7
Article 2 Definitions and interpretation	7
Article 3 Requirements for initiating events	9
Article 4 Requirements for cross-border dependencies	9
Article 5 Requirements for regional electricity crisis scenario candidates and regional electricity crisis scenarios	9
Article 6 Obligation to provide information to ENTSO-E and relevant RCCs to support the identification of electricity crisis scenarios and candidate scenarios	11
<b>TITLE 2 Methods for the evaluation and ranking of regional electricity crisis scenarios</b>	<b>12</b>
Article 7 Overview of methods	12
Article 8 Evaluation of the likelihood and impact of an electricity crisis scenario	12
Article 9 Evaluation of cross-border dependencies of an electricity crisis scenario	13
Article 10 Evaluation of the risk rating and ranking of an electricity crisis scenario	13
<b>TITLE 3 Process for the identification of regional electricity crisis scenarios</b>	<b>14</b>
Article 11 Establishing a list of regional electricity crisis scenario candidates	14
Article 12 Compiling a list of regional electricity crisis scenarios for evaluation	15
Article 13 Evaluation of regional electricity crisis scenarios	15
Article 14 Ranking of regional electricity crisis scenarios	17
Article 15 Reporting on the most relevant regional electricity crisis scenarios	17
<b>TITLE 4 Final provisions</b>	<b>18</b>
Article 16 Update of the electricity crisis scenarios	18
Article 17 Handling of sensitive information	18
Article 18 Publication of the methodology	19
Article 19 Language	19
<b>Appendix I: Electricity crisis scenario rating scales</b>	<b>20</b>
I.1 Electricity crisis scenario likelihood scale	20
I.2 Electricity crisis scenario impact scale	21
I.3 Electricity crisis scenario risk rating	21

<b>Deleted: Whereas</b> 4¶	
<b>TITLE 1 General provisions</b> 7¶	
Article 1 Subject matter and scope 7¶	
Article 2 Definitions and interpretation 7¶	
Article 3 Cross-border dependencies 9¶	
Article 4 Initiating events 9¶	
Article 5 Requirements for an electricity crisis scenario 9¶	
Article 6 TSOs' obligation to provide information to ENTSO-E to support scenario identification and evaluation 11¶	...
<b>Deleted:</b> ¶	...
<b>Deleted:</b> ¶	...
<b>Deleted:</b> ¶	...
<b>Deleted:</b> ¶	...
<b>Deleted:</b> ¶	...
<b>Deleted:</b> ¶	...
<b>Deleted:</b> ¶	...
<b>Deleted:</b> ¶	...
<b>Deleted:</b> ¶	...
<b>Deleted:</b> ¶	...
<b>Deleted:</b> ¶	...
<b>Deleted:</b> ¶	...
<b>Deleted:</b> ¶	...
<b>Deleted:</b> ¶	...
<b>Deleted:</b> ¶	...
<b>Deleted:</b> ¶	...
<b>Deleted:</b> ¶	...
<b>Deleted:</b> ¶	...
<b>Deleted:</b> ¶	...
<b>Deleted:</b> ¶	...
<b>Deleted:</b> ¶	...
<b>Deleted:</b> ¶	...
<b>Deleted:</b> ¶	...
<b>Deleted:</b> ¶	...
<b>Deleted:</b> ¶	...
<b>Deleted:</b> ¶	...
<b>Deleted:</b> ¶	...
<b>Deleted:</b> ¶	...
<b>Deleted:</b> ¶	...
<b>Deleted:</b> ¶	...
<b>Deleted:</b> ¶	...
<b>Deleted:</b> ¶	...
<b>Deleted:</b> ¶	...
<b>Deleted:</b> ¶	...
<b>Deleted:</b> ¶	...
<b>Deleted:</b> ¶	...
<b>Deleted:</b> ¶	...
<b>Deleted:</b> ¶	...

# Methodology for identifying regional electricity crisis scenarios

12 December 2023

<a href="#">I.4 Cross-border dependency rating</a>	24
<a href="#">I.5 Regional electricity crisis scenario risk rating</a>	25
<b><a href="#">Appendix II: Hazards that could initiate an electricity crisis scenario (initiating events)</a></b>	<b>26</b>
<b><a href="#">Appendix III: Roles and Responsibilities</a></b>	<b>28</b>
<b><a href="#">Appendix IV: Electricity crisis scenario description templates</a></b>	<b>29</b>
<a href="#">IV.1 Description of electricity crisis scenario candidate</a>	29
<a href="#">Checklist to use for a comprehensive description of the electricity crisis scenario candidate</a>	31
<a href="#">IV.2 Description of regional electricity crisis scenarios by ENTSO-E</a>	32
<a href="#">IV.3 Evaluation of national impact of the regional electricity crisis scenarios</a>	33
<a href="#">Checklist to consider for a comprehensive impact evaluation of a regional electricity crisis scenario</a>	35

# Methodology for identifying regional electricity crisis scenarios

12 December 2023

## Whereas

- (1) This methodology is established for identifying regional electricity crisis scenarios (the 'methodology') in accordance with Article 5 of Regulation (EU) 2019/941 of the European Parliament and of the Council of 5 June 2019 on risk-preparedness in the electricity sector and repealing Directive 2005/89/EC ('RP Regulation').
- (2) The methodology has been developed by the European Network of Transmission System Operators for Electricity (hereafter referred to as 'ENTSO-E'), in cooperation with TSOs and Regional Coordination Centres (RCCs) and incorporating input by stakeholders as part of the public consultation required in terms of Article 5(5) of the RP Regulation. It takes into account the general principles and goals set in the RP Regulation as well as the relevant EU legal framework, in particular:
- Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 on common rules for the internal market for electricity and amending Directive 2012/27/EU, (OJ L 158, 14.6.2019, p. 125–199). ('Electricity Directive');
  - Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity, (OJ L 158, 14.6.2019, p. 54–124). ('Electricity Regulation');
  - Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation, (OJ L 220, 25.8.2017, p. 1–120). ('SOGL');
  - Regulation (EU) 2019/942 of the European Parliament and of the Council of 5 June 2019 establishing a European Union Agency for the Cooperation of Energy Regulators, (OJ L 158, 14.6.2019, p. 22–53). ('ACER Regulation')
  - Directive (EU) 2022/2555 of the European Parliament and of the Council of 14 December 2022 on measures for a high common level of cybersecurity across the Union, amending Regulation (EU) No 910/2014 and Directive (EU) 2018/1972, and repealing Directive (EU) 2016/1148, (OJ L 333, 27.12.2022, p. 80–152). ('NIS2 Directive');
  - Commission Regulation (EU) 2017/2196 of 24 November 2017 establishing a network code on electricity emergency and restoration, (OJ L 312, 28.11.2017, p. 54–85). ('Network code on emergency and restoration') ('NC ER Regulation');
  - Regulation (EU) 2017/1938 on measures to safeguard security of gas supply to ensure consistency with the gas disruption scenarios, (OJ L 280, 28.10.2017, p. 1–56);
  - Commission Recommendation (EU) 2017/1584 of 13 September 2017 on coordinated response to large-scale cybersecurity incidents and crises, (OJ L 239, 19.9.2017, p. 36–58);

Deleted: ¶  
Page Break

Deleted: ¶  
This document is a methodology

Deleted: ) for identifying regional electricity crisis scenarios in accordance with Article 5 of the REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on risk-preparedness in the electricity sector and repealing Directive 2005/89/EC ('RP Regulation') establishing appropriate tools to prevent, prepare for and manage electricity crisis situations. It is hereafter referred to as the 'methodology'.¶  
The methodology has been developed by ENTSO-E,

Deleted: the

Deleted: the

Deleted: Security Coordinators (RSCs).

Deleted: -

Deleted: -

Deleted: ) hereafter 'Electricity Regulation';

Deleted: -

Deleted: ),[...] ('SO GL');

Deleted: -

Deleted: ),('

Deleted: -

Deleted: 2016/1148

Deleted: 6 July 2016 concerning

Deleted: security of network and information systems

Deleted: 194, 19.07.2016

Deleted: 1-30. ('NIS

Deleted:

Deleted: -

Deleted: );

Deleted: -

Deleted:

Deleted: -

Deleted: ;

# Methodology for identifying regional electricity crisis scenarios

12 December 2023

- ~~Commission Recommendation (EU) 2019/553 of 3 April 2019 on cybersecurity in the energy sector, (notified under document C(2019) 2400) (OJ L 96, 5.4.2019, p. 50–54);~~
  - ~~Commission Recommendation (EU) 2019/554 of 26 March 2019 Cybersecurity of 5G networks, (OJ L 88, 29.3.2019, p. 42–47);~~
  - ~~Directive (EU) 2022/2557 of the European Parliament and of the Council of 14 December 2022 on the resilience of critical entities and repealing Council Directive 2008/114/EC ('CER Directive'), considering the transposition period until October 2024;~~
  - ~~Decision No 1313/2013/EU of the European Parliament and of the Council of 17 December 2013 on a Union Civil Protection Mechanism (OJ L 347, 20.12.2013, p 924-947).~~
- (3) The goal of the RP Regulation is to ensure the most effective and efficient risk preparedness within the Union. To this end, the RP Regulation aims at building trust between Member States by ensuring coherence of risk evaluations in a crisis situation. A common approach in identifying risk scenarios is needed at regional and national levels to achieve coherence. The first step toward common approach is the identification of electricity crisis scenarios at regional level, which shall be achieved by applying this methodology.
- (4) ENTSO-E shall use the methodology to identify the most relevant electricity crisis scenarios at regional level (including cross-border dependencies) and update the regional electricity crisis scenarios at least every four years as required by Article 6 of the RP Regulation. The national electricity crisis scenarios shall be identified on the basis of at least the risks referred to in Article 5(2) of the RP Regulation and shall be consistent with the regional electricity crisis scenarios identified in accordance with Article 6(1) RP Regulation, as required by Article 7 of the RP Regulation. Consequently, national competent authorities will use the regional crisis scenarios for establishing risk preparedness plans as required by Article 10 of the RP Regulation. For the sake of clarity, it is stated that ultimately Articles 7 and 11 of the RP Regulation lays down the legal requirements for the national scenarios that the competent authorities shall adopt, and that this methodology does not intend to go beyond or contradict those requirements.
- (5) Mitigation of the cross-border impacts of electricity crises is outside the scope of this methodology. This mitigation falls into the scope of the risk preparedness plans to be established by competent authorities in accordance with Article 10 of the RP Regulation. Mitigation measures already in place are included in the evaluation of the regional electricity crisis scenarios by Members States, as outlined in this methodology.
- (6) The identification of electricity crisis scenarios at a regional level requires close cooperation between ENTSO-E and stakeholders as defined in Article 6 of the RP Regulation. Consultation with the ECG, RCCs, competent authorities and regulatory authorities is therefore included at various stages in the process of identifying regional electricity crisis scenarios. TSOs and RCCs play an

**Deleted:** -

**Deleted:** ;

**Deleted:** -

**Deleted:** ;

**Deleted:** - Council Directive 2008/114/EC of 8 December 2008 on the identification and designation of European critical infrastructures and the assessment of the need to improve their protection (OJ L345, 23.12.2008, P.75-82) ('European Critical Infrastructure Directive'); and¶  
-

**Deleted:**

**Deleted:** prepared by ENTSO-E

**Deleted:** Once adopted,

**Deleted:** 5

**Deleted:** Article

# Methodology for identifying regional electricity crisis scenarios

12 December 2023

important role in supporting ENTSO-E in the implementation of the methodology. ENTSO-E shall consult with TSOs and RCCs in the identification and evaluation of regional crisis scenarios. TSOs may seek support from the competent authorities and regulatory authorities in evaluating the likelihood and impact at a national level.

- (7) The Members States' competent authorities and TSOs should also establish effective cooperation with other relevant authorities in the Member State to support evaluation of electricity crisis scenarios. With a view of obtaining all the relevant information for regional electricity crisis scenarios developed by ENTSO-E, the methodology assumes adequate information sharing at national level. This is understood to include among others, the competent authorities consulting with other authorities, at least, the national authorities implementing Council Directive 2008/114/EC (European Critical Infrastructure Directive), the national authorities in charge of the networks and information system security under the Directive (EU) 2022/2555 ('NIS2 Directive'), and where appropriate, the national defence authorities.
- (8) In accordance with Article 6(1) of the RP Regulation, ENTSO-E may delegate tasks relating to the identification of regional electricity crisis scenarios to the RCCs. Specifically, according to the methodology RCCs may be delegated in the assessment of cross-border dependencies and impact on the system operation region(s) in which they are performing their tasks.
- (9) Article 5(3)(c) of the RP Regulation requires the simulation of simultaneous electricity crisis scenarios. In this respect, model-based simulations support a consistent impact assessment, which is particularly relevant in evaluating simultaneous regional crisis scenarios with cascading effects. However, due to the diverse nature of both known and potential future electricity crisis scenarios, not all electricity crisis scenarios can be fully evaluated utilising model-based simulations. In such cases, expert judgement may be required to determine how simulations would be used in the evaluation.
- (10) Pursuant to Article 21 of the RP Regulation, Cyprus is not obliged to participate in the identification of regional electricity crisis scenarios described in this methodology until they are directly connected with another Member State.
- (11) For the purposes of the methodology as in Malta there is no TSO, the DSO is the entity responsible for providing information to ENTSO-E.

**Deleted:** <#>In particular, the TSOs play an important role to support ENTSO-E in the identification of crisis scenarios at a regional level. In this task, TSOs may seek support from the Member States' competent authorities in the identification of all candidate risks to the electricity system at a national level, following the bottom-up approach of the methodology. ¶

**Deleted:** <#>ensure an integrated approach to the risks

**Deleted:** <#>the

**Deleted:** <#>system.

**Deleted:** <#>

**Deleted:** <#>2016/1148 ( NIS Directive

**Deleted:**

**Deleted:** to the regional coordination centres (RCCs).

**Deleted:** <#>In accordance with Article 3 (3) of the RP Regulation, Member States may allow the competent authority to delegate the operational tasks regarding risk-preparedness planning and risk management to other bodies. ¶

## TITLE 1 General provisions

### Article 1

#### Scope and document structure

1. The methodology is developed to enable the identification of the electricity crisis scenarios at a regional level, pursuant to the requirements of Articles 5 and 6 of the RP Regulation. The methodology is split into four sections:

- (a) requirements for regional electricity crisis scenarios, scenario candidates, initiating events, and cross-border dependencies, are defined in Title 1 (Articles 3 to 5);
- (b) methods for the evaluation and ranking of electricity crisis scenarios are defined in Title 2 (Articles 7 to 10);
- (c) a process for the identification of the most relevant regional electricity crisis scenarios is defined in Title 3 (Articles 11 to 15), including stakeholder engagements required in terms of Article 6;
- (d) the appendices (Appendix I, II, III and IV) constitute an integral part of the methodology and shall be read together with its provisions.

- Deleted: ¶
- Deleted: Subject matter
- Deleted: scope
- Deleted: This
- Deleted: has been
- Deleted: in accordance with Article 5
- Deleted: The Appendices

2. The roles and responsibilities of all concerned entities are assigned as part of the process description in Title 3 (Articles 11 to 15), including:

- (a) the role of ENTSO-E, working closely with TSOs, RCCs, subgroups, and competent authorities in identifying the most relevant electricity crisis scenarios for each region, including the possible delegation of tasks to the RCCs in accordance with Article 6(1) of the RP Regulation;
- (b) the requirement for close cooperation with the ECG, RCCs, competent authorities and regulatory authorities in the process, pursuant to Article 6(1) of the RP Regulation;
- (c) the role of the ECG in potentially recommending amendments to the regional electricity crisis submitted by ENTSO-E, pursuant to Article 6(2) of the RP Regulation.

- Deleted: this
- Deleted: This methodology shall establish
- Deleted: for identification of

- Deleted: scenarios.

### Article 2 Definitions and interpretation

1. For the purpose of the methodology, the definitions in Article 2 of the RP Regulation shall apply,

- Deleted:
- Deleted: this document
- Deleted:

# Methodology for identifying regional electricity crisis scenarios

12 December 2023

2. The following additional definitions also apply:

- (a) 'likelihood' means a chance of something happening;
- (b) 'impact' means an evaluated consequence of a particular electricity crisis scenario;
- (c) 'risk rating' means the combination of the likelihood and impact ratings of an electricity crisis scenario;
- (d) 'expected energy not-serveds' (EENSs) means the volume of energy which is expected not to be supplied to the end users due to insufficient supply-side, demand-side and grid resources, in the affected area (i.e. control area, system operation region or a combination of those), as a direct consequence and for the duration of a specific electricity crisis scenario "s".
- (e) 'expected energy not-served percentage' (or EENSs%) is calculated by dividing the expected energy not-serveds by the estimated total annual energy consumption of the affected area;
- (f) 'energy consumption of a Member State' means the annual sum of electricity consumption over the control areas of all TSOs operating in that Member State;
- (g) 'loss of load expectation' (or LOLEs) means the expected number of hours, in an affected area, during which resources are insufficient to supply the demand due to a specific electricity crisis scenario "s".
- (h) 'electricity crisis scenario' means a description of an event, a sequence of events, or a combination of events, together with their evolution that will (or is expected to) lead to a deterioration of security of supply of electricity, affecting community or whole society. An electricity crisis scenario may be relevant to more than one region or subgroup or may include parts of two or more regions or subgroups;
- (i) 'regional electricity crisis' means a present or imminent situation in which there is an electricity crisis, as defined in Article 2(9) of the RP Regulation, in more than one Member State at the same time;
- (j) 'regional electricity crisis scenario candidate' means an electricity crisis scenario identified by any stakeholder to have an impact on at least one Member State and a potential to impact other Member States, and may therefore, after its evaluation, be included in the list of relevant regional electricity crisis scenarios;
- (k) 'event' means an occurrence or change of a particular set of circumstances;
- (l) 'initiating event' means an event which has the potential to cause an electricity crisis; the initiating event may be momentary or may evolve over time and can be significant enough to

**Deleted:** shall

**Deleted:**

**Deleted:** outcome

**Deleted:** severity'

**Deleted:** served' (EENS)

**Deleted:** given zone (Member State) and in

**Deleted:** given time period (

**Deleted:** load curtailment due to the

**Deleted:** ), energy which is expected not to be supplied due to insufficient resources to supply demand;

**Deleted:** ¶

**Deleted:** EENS

**Deleted:** served

**Deleted:** a Member State

**Deleted:** 'Energy

**Deleted:** is a

**Deleted:** LOLE) represents

**Deleted:** in

**Deleted:** , in a given zone (Member State),

**Deleted:** the

**Deleted:** ;

**Deleted:**

**Deleted:** or

**Deleted:** chain

**Deleted:** a

**Deleted:** include

**Deleted:** defined by Member States

**Deleted:**

**Deleted:** has declared an electricity crisis

**Deleted:** (simultaneous crisis in two or more Member States);

**Deleted:** is

**Deleted:** TSOs

**Deleted:** State

**Deleted:** have the potential to form

**Deleted:** 'regional electricity crisis scenario'

**Deleted:** is

**Deleted:** initiates

**Deleted:** can



# Methodology for identifying regional electricity crisis scenarios

12 December 2023

cause the electricity crisis by itself or can cause an existing critical grid situation to become an electricity crisis.

## Article 3

### Requirements for initiating events

1. On the basis of Article 5(2) of the RP Regulation, the hazards listed in Appendix II need to be at least considered as initiating events when developing regional electricity crisis scenarios.

## Article 4

### Requirements for cross-border dependencies

1. A cross-border dependency shall be deemed to arise where the impact of preventive actions, remedial actions, or mitigating measures taken by one Member State have the potential to give rise to a crisis in another Member State.
2. Cross-border dependencies shall be considered for both regional electricity crisis scenarios and electricity scenario candidates.
3. When considering cross-border dependencies, at least the following shall be included:
  - (a) dependencies that propagate through the power system, such as unavailability of several (beyond N-1) interconnectors or internal lines in close electrical proximity, unavailability of generation, or lack of adequacy;
  - (b) dependencies that propagate through electricity markets; and
  - (c) dependencies that propagate through supply chains, including primary energy sources and equipment in other Member States;
4. Cross-border dependencies shall be evaluated in accordance with Article 9.

## Article 5

### Requirements for regional electricity crisis scenario candidates and regional electricity crisis scenarios

1. An electricity crisis scenario candidate must fulfil at least the following criteria in order to be included in the list of scenario candidates that will be consulted on with the stakeholders in terms of Article 11(2), or when submitted as a new scenario candidate by those stakeholders during the consultation:

**Deleted:**

Cross-border dependencies

**Deleted:** Cross-border dependencies shall be identified both in

**Deleted:** and in electricity crisis scenario candidates.

**Deleted:** In order to be identified as a

**Deleted:** dependency within the meaning of this article, the

**Deleted:** likely to initiate a crisis or aggravate the situation in other Member States.

**Deleted:** identifying

**Deleted:** ,

**Deleted:** categories

**Deleted:** assessed

**Deleted:** likely to initiate a crisis or aggravate the situation in other Member States, for reasons

**Deleted:** or

**Deleted:** Dependencies

**Deleted:** result as an indirect impact of a crisis on

**Deleted:** , either:

**Deleted:** <#>Consequences in one Member State due to actions taken by another Member State in crisis; or ¶ Actions taken in one Member State following a request by a Member State in crisis with a significant negative impact on a third Member State, such as re-planning of maintenance work or a higher level of generation in accordance with the relevant Articles of the SO GL, in particular Articles 20, 21, 22 and 23. ¶ ¶

**Deleted:** ¶

Article 4

Initiating events ¶

In accordance with

**Deleted:** (2) of the RP Regulation, potential initiating events for electricity crisis scenarios shall be based on at least the following hazards: ¶ rare and extreme natural hazards; ¶ accidental hazards going beyond the N-1 security criterion, and exceptional contingencies; ¶ consequential hazards including consequences of malicious attacks and of fuel shortages. ¶

As a basis to identify initiating events, the above list of hazards has been expanded in Appendix II. At least the hazards contained in Appendix II need to be considered as possible initiating events in developing ...

**Deleted:** .

**Deleted:** ¶

Article 5

Requirements for an electricity crisis scenario ¶

Each

**Deleted:** and regional electricity crisis scenario shall

**Deleted:** quality

# Methodology for identifying regional electricity crisis scenarios

12 December 2023

- (a) it is specific enough to individually describe the consequences in an impacted TSO's control area, as this area is defined in Article 2(67) of the Electricity Regulation;
  - (b) it needs to be clear and unambiguous;
  - (c) it must have regional relevance, potentially impacting more than one Member State.
2. Each regional electricity crisis scenario included in the list of scenarios submitted for consultation by stakeholders according to Article 12, before evaluation and ranking according to Articles 13 and 14, shall fulfil at least the following additional criteria:
- (a) It supports consistent evaluation and ranking of electricity crisis scenarios at a regional and national level;
  - (b) it supports the creation of a risk preparedness plan, including prevention and mitigation measures, as required under Article 10 of the RP Regulation.
3. Each regional electricity crisis scenario candidate shall include at least the following information:
- (a) name of the scenario;
  - (b) description of the scenario, including the potential duration;
  - (c) season(s) of the year when the scenario may be relevant;
  - (d) preconditions and initiating event(s);
  - (e) likely advance warning of an initiating event;
  - (f) evolution of the scenario;
  - (g) a description of the likely potential direct and indirect cross-border impact on Member States;
  - (h) where available, a list of possible measures to prevent or reduce the impact and its expected duration, including operational, non-market-based, and cross-border measures.
4. Each regional electricity crisis scenario shall include, in addition to the items listed in Paragraph 3, the following information:
- (a) pre-conditions and assumptions to be used in the evaluation process, including expected duration;
  - (b) input data sources needed to evaluate the scenario;

**Deleted:** for each TSO

**Deleted:** , qualitatively and quantitatively

**Deleted:** the

**Deleted:** Control Area

**Deleted:** allows for

**Deleted:** ;

**Deleted:** <#>its symptoms shall be observable, so that it is possible to execute risk preparedness plans.¶  
The

**Deleted:** <#>description shall be precise and consistent. It shall consist of...

**Deleted:** a

**Deleted:** initial condition of the electricity system relevant to the scenario

**Deleted:** <#>a list of initiating event(s) and a chain of event(s);¶

**Deleted:** <#>is

**Deleted:** <#> and type of load

**Deleted:** the

**Deleted:** crisis

**Deleted:** the most likely impacts

**Deleted:** scenario, including, if applicable, past reference crises;¶

**Deleted:** dependencies

**Deleted:** if applicable, quantitative data expressed as ranges for all ...

**Deleted:** above; and¶  
other important

**Deleted:** related to

**Deleted:** ,

# Methodology for identifying regional electricity crisis scenarios

12 December 2023

- (c) list of available assessment methods and tools and where they are available, including model-based simulation tools and other quantitative and qualitative assessment methods; and
- (d) list of relevant reference crises or incidents from the past, such as ENTSO-E Incident Classification Scale (ICS) Expert Panel reports;

## Article 6

### Obligation to provide information to ENTSO-E and relevant RCCs to support the identification of electricity crisis scenarios and candidate scenarios

1. Each TSO and RCC shall share scenario and candidate scenario information — including sensitive information — with ENTSO-E and relevant RCCs in accordance with national and EU policies and legislation concerning handling of sensitive information.
2. Information provided to ENTSO-E and relevant RCCs shall be detailed enough to enable ENTSO-E (and RCCs if applicable) to identify, and simulate where appropriate, the regional electricity crisis scenarios. ENTSO-E and RCCs are entitled to request more details where they deem that the information provided is insufficient to identify, simulate and quantify the regional electricity crisis scenarios.
3. Information which is already shared between TSOs, RCCs, ENTSO-E, regulatory authorities and other third parties to ensure operational or planning tasks in accordance with the requirements of the SO GL, NC ER and other regulations shall not be considered as sensitive information as described in Article 17.
4. Without prejudice to paragraph 1 and where information is not made available, ENTSO-E and the relevant RCC(s) shall propose assumptions based on the best information at their disposal to allow the evaluation of electricity crisis scenarios for all Member States (including simulations where appropriate).

Deleted: to managing it.

Deleted: ¶

Deleted:  
TSOs' obligation

Deleted: scenario

Deleted: and evaluation

Deleted:

Deleted: , as referred to in Article 12.

Deleted: is

Deleted: it deems

Deleted: <#>TSOs shall take into account the checklists of information contained in Appendix III when evaluating scenarios. ¶

Deleted: <#>SO GL

Deleted: <#>ER

Deleted: ¶  
¶  
TITLE 2  
Electricity crisis scenario evaluation methods¶  
Article 7  
Evaluation of

## TITLE 2

# Methods for the evaluation and ranking of regional electricity crisis scenarios

### Article 7

#### Overview of methods

1. The identification and evaluation of regional electricity crisis scenarios shall consider all relevant national and regional circumstances, including subgroups, pursuant to Article 5(3)(a) of the RP Regulation.
2. The relevance of a regional electricity crisis scenario shall be based on its risk rating.
3. The risk rating of a regional electricity crisis scenario shall be determined by an evaluation of its likelihood and impact, pursuant to Article 5(3)(d) of the RP Regulation, and cross-border dependencies, pursuant to Article 5(3)(b) of the RP Regulation.
4. The likelihood, impact and cross-border dependencies of each electricity crisis scenario shall be evaluated using appropriate information and techniques, applying quantitative or qualitative techniques or a combination of both. A quantitative technique shall typically be preferred over a purely qualitative technique. The choice of technique used shall be duly justified.
5. Unless otherwise justified, model-based simulation techniques shall be used in the simulation of simultaneous electricity crisis scenarios, as required by Article 5(3)(c) of the RP Regulation, including cross-border dependencies.
6. For the first evaluation of scenarios after the approval of this methodology, a limited number of scenarios may be simulated using model-based simulations based on adapting tools, datasets and methods that are used in provision of other ENTSO-E and/or RCC tasks. The number of simulated scenarios shall be expanded in subsequent cycles to update the identified regional electricity crisis scenarios.

Deleted: evaluation of the

Deleted: shall consider

### Article 8

#### Evaluation of the likelihood and impact of an electricity crisis scenario

1. Evaluation of the likelihood of an electricity crisis scenario shall include at least the following elements;
  - (a) consideration of the expected frequency of occurrence of an initiating event (or a combination of multiple initiating events);

Deleted:

Deleted: and

# Methodology for identifying regional electricity crisis scenarios

12 December 2023

- (b) classification of the likelihood of each crisis scenario, ranging from “extremely unlikely” to “very likely”, corresponding to the likelihood range shown in Appendix I.1; and
  - (c) documentation of how the likelihood classification has been derived, to allow retracing when the analysis is updated or verified.
2. Evaluation of the impact of an electricity crisis scenario shall include at least the following elements:
- (a) an estimation of the expected energy not served percentage (EENS%) and loss of load expectation (LOLEs);
  - (b) classification of the impact of each crisis scenario (ranging from “insignificant” to “disastrous”), as defined in Appendix I.2. EENS% and LOLEs shall be classified independently; and
  - (c) the derivation of the impact classification shall be documented allowing for retracing when the analysis is updated or verified.

- Deleted: the
- Deleted: ranges
- Deleted: very
- Deleted: a quantitative
- Deleted: , as
- Deleted: .
- Deleted: the derivation
- Deleted: shall be documented allowing for
- Deleted: The evaluation
- Deleted: direct operational
- Deleted: a given
- Deleted: the impact estimated for each defined crisis scenario in terms
- Deleted: EENS
- Deleted: LOLE);
- Deleted: the
- Deleted: EENS
- Deleted: LOLE
- Deleted:
- Deleted: <#>Electricity crisis scenarios are evaluated using the classification of likelihood and impact described in paragraphs 1 and 2. The overall crisis scenario rating is determined according to the table shown in Appendix I.3. The electricity crisis scenario rating, ranging from ‘insignificant’ to ‘disastrous’, is evaluated by combining the operational impact rating (resulting from EENS% and LOLE evaluation) and likelihood rating.¶

## Article 9

### Evaluation of cross-border dependencies of an electricity crisis scenario

1. Pursuant to Article 5(3)(b) in the RP Regulation, the interaction and correlation of risks across borders shall be assessed by evaluating cross-border dependencies for each electricity crisis scenario in accordance with the techniques in Appendix I.4.
2. Cross-border dependencies shall be considered as aggravating factors in the evaluation of the national risk ratings associated with each electricity scenario.
3. The method for the evaluation of the cross-border dependencies shall be consistent with the method used for the impact assessment. Where model-based simulations were used for the impact assessment, the cross-border dependencies shall be assessed taking into account the results of the simulation.

## Article 10

### Evaluation of the risk rating and ranking of an electricity crisis scenario

1. The risk rating of each electricity crisis scenario, classified on a scale from ‘low’ to ‘extremely high’, shall be evaluated according to the table shown in Appendix I.3, using the likelihood and impact assessment undertaken according to the methods in Article 8;
2. This crisis scenario risk rating, in combination with the cross-border dependency rating described in Article 9 and Appendix I.4, are used for the identification of the relevant regional electricity crisis scenarios.

- Deleted: , as described in Article 12
- Deleted: Article 8 Methods

### TITLE 3

## Process for the identification of regional electricity crisis scenarios

### Article 11

#### Establishing a list of regional electricity crisis scenario candidates

- ENTSO-E, working closely with the RCCs, TSOs and subgroups shall begin the process of identifying regional electricity crisis scenario candidates by reviewing and updating the existing regional electricity crisis scenarios identified by the previous cycle under Article 6 of the RP Regulation. For the initiation of this process, the subgroups shall be self-identified through a request from the ECG. Other groupings of Member States with the technical ability to provide each other assistance may be involved. Based on this review, and considering the hazards and initiating events in Appendix II, ENTSO-E shall establish a list of proposed regional electricity crisis scenario candidates which includes the following information:
  - the list of the existing regional electricity crisis scenarios;
  - proposed updates and changes to the existing regional electricity crisis scenarios, including the possible merging of some scenarios;
  - proposed new regional electricity crisis scenario candidates, where these are not addressed by the updated regional electricity crisis scenarios, or cannot be merged with them; and
  - identified groups of regional electricity crisis scenario candidates which can be reasonably expected to coincide simultaneously and could be merged in the simulation of combined scenarios.
- Pursuant to Article 6(1) of the RP Regulation, ENTSO-E shall consult on the proposed list of regional electricity crisis candidates with the ECG, regional coordination centres, competent authorities, and regulatory authorities. The consultation shall allow for stakeholders to propose additional electricity crisis scenario candidates, where those on the list cannot be expanded to address these.
- The regional electricity crisis scenario candidates which will be included in the final list shall fulfil the requirements of paragraphs 1 and 3 of Article 5.

- Deleted:** evaluation of the likelihood and impact of a crisis¶  
During electricity crisis scenario
- Deleted:** and evaluation, either a probabilistic or a deterministic method of evaluating the likelihood and impact of a crisis shall be used. A probabilistic method shall be favoured over a deterministic one where appropriate. ENTSO-E shall propose the use of a scenario-specific method (or methods) for evaluating the likelihood and impact measures relevant to the particular scenario and the nature of its uncertainty when appropriate. Such a method shall be identified by ENTSO-E not later than six months prior to the mandatory update of the
- Deleted:** in accordance with Article 5 (7) of RP Regulation.
- Deleted:** No later than 12 months following the publication of the report as described in Article 15,
- Deleted:** publish a report assessing whether there would be
- Deleted:** need for the development of necessary computational methods and tools to be used as a pan-European method for the assessment of
- Deleted:** ¶  
Following the publication of this report, ENTSO-E shall assess its results and consider whether significant new information has become available. If so, ENTSO-E shall update and improve the methodology in accordance with
- Deleted:** 5 (7)
- Deleted:** ¶  
Once the tools and methods are implemented and made available by ENTSO-E, TSOs shall use them in future evaluations of crisis scenarios, for which they were designed.¶  
Until
- Deleted:** methods and tools are developed and made available in accordance with paragraph 3, the TSOs shall evaluate the likelihood and impact of a crisis for their Member State using the best method available to them at the time of evaluation.¶
- Deleted:** , if the crisis prevents the TSO from offering support to other TSOs, either in active or reactive power, in counter trading
- Deleted:** <#>The two aspects described in paragraph 1 shall be included in the description of scenarios following Appendix III.3.
- Deleted:** scenarios in accordance with Article 16, ENTSO-E shall send a request to TSOs for the identification of electricity crisis
- Deleted:** TSO(s) in close cooperation with the national competent authority. The identification shall follow a three-step-process
- Deleted:**
- Deleted:** 1. Following the identification of electricity crisis scenario candidates in accordance with Article 10, ENTSO-E shall establish
- Deleted:** in more than one Member State and thus form a simultaneous regional electricity crisis (in accordance with Article
- Deleted:** <#>preparing a description of the final set of regional electricity crisis scenarios identified (Article 12 (8));¶
- Deleted:** template to TSOs (Article 12 (9));¶
- Deleted:** can be reasonably expected to coincide in more than one Member State and thus form a simultaneous regional

# Methodology for identifying regional electricity crisis scenarios

12 December 2023

## Article 12

### Compiling a list of regional electricity crisis scenarios for evaluation

1. After the regional electricity crisis scenario candidates have been consulted on in accordance with Article 11(2), ENTSO-E working closely with RCCs, TSOs, and subgroups, shall compile a list of regional electricity crisis scenarios out of the candidate scenarios for evaluation in accordance with the methods in Title 2 (Articles 7 to 10).
2. The list of the regional electricity crisis scenarios shall include a proposal on which scenarios shall be assessed quantitatively in accordance with paragraphs 4, 5 and 6 of Article 7, including:
  - (a) a list of scenarios that may be reasonably expected to occur simultaneously based on the groups identified in Article 11(1)(d), and where these could be merged;
  - (b) the technique(s) and possible tools, to be used for the simulation of these;
  - (c) the entity responsible for undertaking the simulation, for example, ENTSO-E or RCCs;
  - (d) the required input data for the simulation, including existing data and data that needs to be collected;
  - (e) the required assumptions and preconditions for the simulations; and
  - (f) expected outcome(s) of the simulation and how these would support the evaluation in accordance with Articles 8 and 9.
3. Considering Articles 6(1) of the RP Regulation, ENTSO-E shall seek the co-operation of the ECG by submitting the list of regional electricity crisis scenarios and modelling assumptions to the ECG before carrying-out the evaluation of the regional electricity crisis scenarios. The feedback from the ECG will be used to update the scenarios and modelling assumptions before the evaluation of regional electricity crisis scenarios.

**Deleted:** identifying groups

**Deleted:** can

**Deleted:** coincide and thus form a simultaneous regional electricity crisis

**Deleted:** <#>combining the relevant electricity crisis scenario candidates into regional electricity crisis scenarios; and ¶ evaluating such

**Deleted:** according

**Deleted:** Articles 13 and 14. ¶ Upon concluding on

**Deleted:** results of

**Deleted:** gap analysis and creation of simultaneous

**Deleted:** , ENTSO-E shall prepare a description of the final set

**Deleted:** identified in compliance with the template in Appendix III.2

**Deleted:** <#>ENTSO-E shall submit the regional electricity crisis scenario template in Appendix III.2 to TSOs four weeks after the receipt of the completed electricity crisis scenario candidate descriptions to enable assessment in accordance with Article 13. ¶ Article 13

**Deleted:** <#>at national level

**Deleted:** Each relevant

**Deleted:** scenario,

**Deleted:** Article 12, shall be assessed at a national level by TSOs, in close cooperation with the national competent authority.

## Article 13

### Evaluation of regional electricity crisis scenarios

1. Pursuant to Article 5(3)(a) of the RP Regulation, ENTSO-E shall work closely with the TSOs, RCCs, and subgroups to evaluate the regional electricity crisis scenarios identified in accordance with the assumptions and methods provided in Article 12.
2. ENTSO-E, and the RCC(s) where delegated, shall undertake simulations for the regional electricity crisis scenarios determined in Article 12, using the decided pre-conditions, assumptions, and techniques.

# Methodology for identifying regional electricity crisis scenarios

12 December 2023

3. Each regional electricity crisis scenario identified in accordance with Article 12, shall be evaluated at a national level by the TSOs, including verification of the results of the model-based simulations, adding the necessary information to have a complete view and analysis of each regional crisis scenario at national level. TSOs shall collaborate with their competent authority and provide a single and complete evaluation for each electricity crisis scenario. TSOs who belong to the same Member State shall coordinate with other TSOs within the Member State. Where model-based simulations have been undertaken in accordance with paragraph (2), the results of these shall be taken into consideration in the evaluation.
4. For each Member State, the TSO(s) shall specify the likelihood and the impact on the electricity system of each regional electricity scenario in accordance with the methods defined in Article 8, and consistent with the rating scales provided in Appendix I.
5. For each Member State, regarding each regional electricity crisis scenario, the TSO(s) shall assess their severity and cross-border dependencies in accordance with Articles 7, 8 and 9.
6. This evaluation shall include:
  - (a) For each Member State and region, the TSO(s) and RCC(s) shall specify the likelihood and the impact on the electricity system of each scenario consistent with the rating scales provided (Appendix I), in accordance with paragraphs (3) and (4) of Article 7.
  - (b) For each Member State and region, ENTSO-E, the TSO(s) and RCC(s) shall evaluate the risk and cross-border dependencies in accordance with Articles 8 and 9.
7. ENTSO-E shall use the template in Appendix IV.2 to provide the regional electricity crisis scenarios and the necessary information for TSOs to make their national impact evaluations.
8. Within 6 weeks from the receipt of the regional electricity crisis scenarios for a national impact evaluation, for each Member State, the TSO(s) shall provide to ENTSO-E the completed national impact evaluation template in accordance with Appendix IV.3 on the evaluation of national impact to the regional electricity crisis scenarios.
9. ENTSO-E shall review the evaluations for completeness and consistency pursuant to Articles 7, 8, 9 and 10. ENTSO-E may delegate the review of cross-border dependencies to the RCC(s). In cases of detected inconsistencies or incompleteness, ENTSO-E shall engage with the relevant parties to correct or complete them.

**Deleted:** relevant

**Deleted:**

**Deleted:** regional

**Deleted:** 1

**Deleted:** 2

**Deleted:** . TSOs shall collaborate with their competent authority and provide a single evaluation for each

**Deleted:** scenario. TSOs who belong to the same Member State shall coordinate with other TSOs within the Member State.

**Deleted:** six

**Deleted:** receiving

**Deleted:** III

**Deleted:** 1



# Methodology for identifying regional electricity crisis scenarios

12 December 2023

## Article 14

### Ranking of regional electricity crisis scenarios

- Following the evaluation of the regional electricity crisis scenarios in accordance with Article 13 by TSOs and Member States, ENTSO-E, with the support of TSOs and RCCs, shall determine the relevance of the regional electricity crisis scenarios by:
  - gathering the evaluations of likelihood, impact, scenario risk rating and cross-border dependencies for each regional electricity crisis scenario and Member State;
  - calculating the national risk ratings from the scenario risk ratings and cross-border dependency ratings in accordance with Appendix I;
  - calculating the regional risk rating for each regional crisis scenario as a sum of national risk ratings over the considered Member States in accordance with Appendix I; and
  - ranking the regional electricity crisis scenarios according to their regional risk rating.
- The relevance of a regional electricity crisis scenario is determined by its ranking based on the regional risk rating calculated in accordance with paragraph 1. The higher the rating, the more relevant the regional electricity crisis scenario is for a particular region, including any subgroups.

## Article 15

### Reporting on the most relevant regional electricity crisis scenarios

- Pursuant to Article 6(2) of the RP Regulation, ENTSO-E shall submit the most relevant regional electricity crisis scenarios to the TSOs, RCCs, competent authorities, regulatory authorities and the ECG.
- This submission shall be in the form of a single report prepared by ENTSO-E, which provides the ranked list of scenarios for each region as required by Article 2(16) of the RP Regulation and may contain available information relating to subgroups.
- The ranked list of regional electricity crisis scenario shall be based on the rating calculated in accordance with Appendix I. The most relevant scenarios shall be the highest scoring scenarios.
- Each scenario shall be reported in terms of the requirements described in Article 5.

- Deleted:** electricity crisis scenarios ¶  
ENTSO-E shall rank the
- Deleted:** evaluated at national level in accordance with the following process:
- Deleted:** national impact
- Deleted:** per Member State (paragraph 2); ¶  
checking the consistency of
- Deleted:** (paragraph 2) and addressing any deficiencies (paragraph 3);...
- Deleted:** <#> evaluating regional impacts (paragraphs 4 and 5); and¶  
final
- Deleted:** of
- Deleted:** relevance (paragraph 6). ¶  
ENTSO-E shall first collect the evaluations of national impact to the regional electricity crisis scenarios according to Article 13, completed by the TSOs. ENTSO-E shall check the evaluations for completeness and consistency with the impacted power systems. ENTSO-E may delegate this task to the RCC(s). In cases of detected inconsistencies or missing submissions, ENTSO-E shall notify the concerned TSOs. Missing or non-compliant submissions: ¶  
may be treated as rating a particular crisis scenario as irrelevant to the Member State (national impact rating "insignificant"); or ¶  
may be treated as not having a cross-border dependency (cross-border dependency
- Deleted:** "none";) or
- Deleted:** <#>may be brought to compliance by ENTSO-E in cooperation with the relevant TSOs, RCCs at ENTSO-E's discretion. ¶  
In case of any doubts regarding any content of the submitted national evaluations, ENTSO-E shall ask the concerned TSOs (...)
- Deleted:** <#>clarification shall be provided to ENTSO-E (...)
- Deleted:** <#>the cross-border dependencies shall be collected (...)
- Deleted:** <#>as a sum over all Member States of national (...)
- Deleted:** <#>3, a single number is assigned to each scenario.
- Deleted:** <#>number
- Deleted:** <#>scenario is.
- Deleted:** ¶
- Deleted:** of
- Deleted:** The reporting of
- Deleted:** shall be done in accordance with Article 6 of the RP (...)
- Deleted:** The reporting mentioned
- Deleted:** paragraph 1 shall consist
- Deleted:** comprising the
- Deleted:** scenarios, which shall be prepared by ENTSO-E. The (...)
- Deleted:** indicated by
- Deleted:** score according to
- Deleted:** following minimal information collected:

## TITLE 4 Final provisions

### Article 16 Update of the electricity crisis scenarios

1. ENTSO-E shall update the regional electricity crisis scenarios every four (4) years unless circumstances warrant more frequent updates, pursuant to Article 6(3) of the RP Regulation. Without limiting the generality of the foregoing, such updates may be triggered by ENTSO-E as a result of a significant change in regional risk evaluations, or the detection of a major risk previously not integrated in the regional electricity crisis scenarios (for instance, new studies on climate change highlighting a significant increase in the frequency or severity of various hydro-meteorological hazards could trigger an update). For this purpose, following a request by ENTSO-E, the process described in the methodology shall be applied.
2. The ECG may also recommend amendments of the regional electricity crisis scenarios before the end of the four-year period referred to in paragraph 1, as provided for in Article 6(2) of the RP Regulation.
3. The methods, process, and timelines described in Articles 7 to 15 of the methodology shall apply for updates to the regional electricity crisis scenarios.

### Article 17 Handling of sensitive information

1. TSOs and national competent authorities are expected to communicate the open national risk information in sufficient detail to allow ENTSO-E to assess if a regional risk may exist.
2. Until 17 October 2024, Directive 2008/114/EC applies to the energy sector and certain parts of the electricity transmission system can be identified as sensitive critical infrastructure. From 18 October 2024, Directive (EU) 2022/2557 of the European Parliament and of the Council of 14 December 2022 on the resilience of critical entities and repealing Council Directive 2008/114/EC ('CER Directive'), shall apply.
3. Accordingly, the following principles are established:
  - (a) Confidentiality
    - i. Any confidential or sensitive information received, exchanged or transmitted pursuant to this methodology shall be subject to the conditions of professional secrecy laid down in ii, iii, and iv;

Deleted: ¶  
initiating event(s);¶  
area

Deleted: geographical relevance;¶  
RCCs and Member States affected by

Deleted: scenario;¶  
national impact & likelihood;¶  
ranking;¶  
presence and importance of cross-border dependencies.¶  
Additional information, including any visualisation, may be included in the report.¶  
¶  
Article 16  
Review

Deleted: according

Deleted:

Deleted: Such

Deleted: could

Deleted: events such as

Deleted: national or

Deleted: ENTSO-E shall update and improve this methodology when significant new information becomes available according

Deleted: 5(7)

Deleted: ¶  
TITLE 4  
Final provisions¶

Deleted:

Deleted: as described in Article 12

Deleted: ¶

Deleted: is applied

Deleted: ¶

Deleted: ¶

# Methodology for identifying regional electricity crisis scenarios

12 December 2023

- ii. The obligation of professional secrecy shall apply to any natural or legal person subject to the provisions of this methodology;
- iii. Confidential information received by the natural or legal person in the course of their duties may not be divulged to any other person or authority, without prejudice to cases covered by national law, the other provisions of this methodology or other relevant EU legislation;
- iv. Without prejudice to cases covered by national law, regulatory authorities, bodies or persons which receive confidential information pursuant to this methodology may use it only for the purpose of the performance of their functions under this methodology.

## (b) Publication

- i. For clarity, the owner of the disclosed information has the right to decide which, if any, disclosed information may be communicated outside of ENTSO-E and to whom and in what format.

## Article 18

### Publication of the methodology

1. Pursuant to Article 5(7) of the RP Regulation, ENTSO-E shall publish the final version of the updated methodology on its website without undue delay after ACER has approved it.
2. The updated methodology will also be published on the ACER website, as required by Article 5(7) of the RP Regulation.

## Article 19

### Language

1. The reference language for the methodology for identifying electricity crisis scenarios at a regional level shall be English.

Deleted: ¶

Deleted: the Agency

Deleted: ¶

Deleted:

Page Break

## Appendix I: Electricity crisis scenario rating scales

### I.1 Electricity crisis scenario likelihood scale

Pursuant to Article 7(4), available historical data may be used as input to the assessment of the likelihood of an electricity crisis scenario where future changes in factors impacting this data are not expected; alternatively, forecasts may be considered where available. If such data is not available, an estimate of the likelihood may be based on qualitative assessments using expert judgment. The approach taken to assess the likelihood is to be documented for future reference, pursuant to Article 8(2)(c).

For classification of the likelihood of an electricity crisis scenario, the following six-step classification scale is used:

Classification	Events per year	1 x in ... years	Description/example of initiating event
<b>Very likely</b>	≥ 0.5	2 or less	event expected practically every year, e.g. winds/storms causing multiple failures of overhead lines may be expected nearly every year in some areas
<b>Likely</b>	0.2-0.5	2-5	event expected once in a couple of years, e.g. heat wave causing limits on output of open-loop water-cooled power plants, low water levels at hydro plants, higher load, etc.
<b>Possible</b>	0.1-0.2	5-10	event expected or taken into consideration as a potential threat, e.g. cyber or malicious attack
<b>Unlikely</b>	0.01-0.1	10-100	rare event, e.g. simultaneous floods causing unavailability of generation, distribution and transmission infrastructure

Deleted: Scenario

Deleted: Crisis

Deleted: For the classification of likelihood of crisis, a five-step scale is used: 1

Deleted:

Deleted:

Deleted: very

Deleted:

Deleted:

Deleted:

# Methodology for identifying regional electricity crisis scenarios

scenarios  
12 December 2023

<b>Very unlikely</b>	<u>0.001-0.01</u>	<u>100 - 1000</u>	<u>very rare event</u> , e.g. earthquake causing a huge destruction of transmission, distribution and generation infrastructure
<b>Extremely unlikely</b>	<u>≤ 0.001</u>	<u>1000 or more</u>	<u>Not applicable, impossible, or extremely rare event, expected beyond 1 in 1000 years</u>

- Deleted: ≤
- Deleted: or more
- Deleted: irrelevant, or extremely rare

## I.2 Electricity crisis scenario impact scale

The impact of an electricity crisis scenario should be evaluated based on the present knowledge of the system and expected changes over at least the next four years.

A five-step classification scale is used in evaluating the impact. Two different dimensions of impact (EENS<sub>s</sub>% and LOLE<sub>s</sub>) are used. These are treated independently in the evaluation of risk rating, as shown in Appendix I.3.

- Deleted: Crisis
- Deleted: scales
- Deleted: consequences
- Deleted: simulated
- Deleted: For the
- Deleted: of operational impact of crisis, a five-step
- Deleted: .
- Deleted: EENS
- Deleted: LOLE
- Deleted: ¶
- Deleted: EENS
- Deleted: LOLE ¶
- Deleted: demand

Classification	<u>EENS<sub>s</sub>%</u>	<u>LOLE<sub>s</sub></u>
	(of <u>average annual consumption</u> )	[hours]
<b>Disastrous</b>	≥0,25%	≥168
<b>Critical</b>	≥0,05% and <0,25%	≥48 and <168
<b>Major</b>	≥0,01% and <0,05%	≥12 and <48
<b>Minor</b>	≥0,002% and <0,01%	≥3 and <12
<b>Insignificant</b>	<0,002%	<3

## I.3 Electricity crisis scenario risk rating

The classification of an electricity crisis scenario risk rating at a Member State level is performed by combining the likelihood rating and impact rating (both EENS<sub>s</sub>% and LOLE<sub>s</sub>), as illustrated in the Likelihood-Impact Matrix below. The risk rating scale ranges from low to extremely high, with medium, high, and very high being intermediate risk rating categories. For example, if a certain crisis

- Deleted: ¶
- Deleted: Crisis
- Deleted: the
- Deleted: ¶  
Crisis scenario rating
- Deleted: operational
- Deleted: resulting from EENS% and LOLE evaluation)
- Deleted: the likelihood rating,
- Deleted: -
- Deleted: ¶



# Methodology for identifying regional electricity crisis scenarios

12 December 2023

Minor	Insignificant	Low	Low	Low	Medium	Medium	High
Insignificant	Minor	Low	Low	Low	Medium	Medium	High
Insignificant	Insignificant	Low	Low	Low	Low	Medium	Medium

For the purpose of combining and computing consequences across multiple Member States, the above crisis scenario risk ratings are assigned values, shown in the table below:

- Deleted:** Major
- Deleted:** Minor
- Deleted:** Minor
- Deleted:** Insignificant
- Deleted:** Insignificant
- Deleted:** Major
- Deleted:** Minor
- Deleted:** Minor
- Deleted:** Insignificant
- Deleted:** Insignificant
- Deleted:** Minor
- Deleted:** Minor
- Deleted:** Insignificant
- Deleted:** Insignificant
- Deleted:** Insignificant

# Methodology for identifying regional electricity crisis scenarios

12 December 2023

	Value
<b>Electricity crisis scenario risk rating</b> (used for regional <b>electricity crisis</b> scenario rating)	
Extremely high	10
Very high	5
High	2
Medium	1
Low <sup>1</sup>	0

- Deleted:
- Deleted: Crisis
- Deleted: Disastrous
- Deleted: Critical
- Deleted: Major
- Deleted: Minor
- Deleted: Insignificant

## I.4 Cross-border dependency rating

The cross-border dependencies that must be considered are described in Article 4 and 9. For each scenario, the level of cross-border dependency shall be evaluated using the following scale:

- Deleted: 3
- Deleted: must

Cross-border dependency rating	Value	Description
None	1	The crisis has no impact on other countries, even if they are facing simultaneous crisis.
Minor	1.2	The crisis is susceptible to aggravate a simultaneous crisis in at least one other country, either through direct or indirect causes (cf. Article 3).
Major	2	The crisis is susceptible to generate a cross-border crisis in at least one other country, either through direct or indirect causes (cf. Article 3).

- Deleted: ¶
- Deleted:
- Deleted:
- Deleted: .

It is accepted that, when using qualitative evaluation methods, the impact of local events on other TSOs will be estimated using the TSOs' expertise on its own network and in coordination with RCC(s) of their respective system operation region(s). This information shall be collected to complement

<sup>1</sup> Low also includes zero or close to zero risk rating.



# Methodology for identifying regional electricity crisis scenarios

12 December 2023

the cross-border dependency rating, especially in cases where the situation of the different borders of the same Member State is not similar.

## 1.5 Regional electricity crisis scenario risk rating

The values of the electricity crisis scenario risk ratings (Appendix I.3) and cross-border dependency ratings (Appendix I.4) are used to compute a national risk rating for the scenario using the following equation:

$$\text{National Risk Rating} = \text{Crisis Scenario Risk Rating} \times \text{Cross-border Dependency Rating}$$

A regional crisis scenario risk rating is then evaluated as the sum of all national risk ratings for the particular region. The resulting numbers are used only for the relative ranking of scenarios risks.

An example computation of regional crisis scenario ratings, based on three national scenario ratings, is provided in the table below (using values from Appendices I.3 and I.4). The ratings by Member State in this table represent the expected output from the national scenario evaluations in Article 13. The computation of regional risk ratings, as in the example below, shall take place in line with Article 14.

Scenario name	Member State 1			Member State 2			Member State 3			Regional risk rating
	Scenario risk rating	Cross-Border Dependency rating	National risk rating	Scenario risk rating	Cross-Border Dependency rating	National risk rating	Scenario risk rating	Cross-Border Dependency rating	National risk rating	
Fuel Shortage	1	1	1	5	1.2	6	10	2	20	27
Cyberattack	2	1.2	2.4	2	1	2	5	2	10	14.4
Heat wave	1	1.2	1.2	5	1.2	6	0	2	0	7.2
Cold spell	0	1	0	1	1	1	1	1	1	2

Deleted: Example of regional

Deleted: ¶  
National Rating = Crisis Scenario Rating × Cross Border Dependency Rating ¶

Deleted: .

Deleted: .

Deleted: of

Deleted: Note that in the table below, CBD is an abbreviation of Cross-Border Dependency rating.

Deleted: values

Deleted: ¶

Deleted Cells

Deleted: CBD

Deleted: CBD

Deleted: CBD

Deleted: Rating

Deleted: Rating

Deleted: Rating

Deleted: Rating

Deleted: Name

## Appendix II: Hazards that could initiate an electricity crisis scenario (initiating events)

At least the following hazards shall be considered in relation to system adequacy, system security and fuel security in the identification of regional electricity scenarios and scenario candidates:

Deleted: ? need to

Deleted: as possible initiating events

Deleted: developing both national

Deleted: crisis

1. Hazards defined in the latest version of the Commission Staff Working document on “cross-sectoral overview of natural and man-made disaster risks the EU may face, taking a coherent approach across different policy areas that may address or affect disaster prevention and taking due account of the likely impacts of climate change”, to ensure consistency with Decision No 1313/2013/EU of the European Parliament and of the Council of 17 December 2013 on a Union Civil Protection Mechanism, as amended by Decision No 2019/420.

2. The hazards defined in Article 5(2) of the RP Regulation, as expanded on below:

(a) rare and extreme natural hazards, including:

- i. flooding;
- ii. drought and associated water shortage;
- iii. extreme weather (incl. storms, extreme winds, ice storms, snowfall, heavy precipitation, hurricanes, cold spells, heat waves);
- iv. forest fire;
- v. seismic and volcanic activities;
- vi. infectious threats, incl. pandemic;
- vii. space weather hazards.

Deleted: ;

(b) accidental hazards going beyond the N-1 security criterion, and exceptional contingencies, including:

- i. simultaneous failure of multiple grid elements;
- ii. accidental (unintended) violation of N-1 criterion due to human error:
  - i. error during operation;
  - ii. failure or omission during the maintenance;

# Methodology for identifying regional electricity crisis scenarios

12 December 2023

iii. substandard quality of a series of manufactured grid elements.

(c) consequential hazards including consequences of malicious attacks and of fuel shortages:

i. malicious attacks:

i. terrorism / sabotage;

ii. cyberattack;

iii. manipulation of the market;

ii. disruption of fuel supply for electricity generation;

i. a disruption in natural gas supply, considering at least the scenarios developed by ENTSO-G pursuant to Article 7 of the Regulation (EU) 2017/1938 of the European Parliament and of the Council;

ii. other fuel supply-chain disruptions.

iii. not electricity-related industrial accidents (e.g. chemical spill, collapse, explosion, gas leak, radiation, transport disruption);

iv. not electricity-related critical infrastructure disruption (incl. water & food supply, garbage & sewage collection, fuel supply excl. fuels for electricity generation, telecommunications);

v. electricity market failure with significant impact in security of supply (e.g. speculation or failure of one or more stakeholders to meet its/their obligations);

vi. nuclear / radiological accident.

Deleted:

Deleted: :

Deleted: accident

Deleted:

**Deleted: Note:** It is expected that, for many Member States and TSOs, some of the above hazards will not be relevant, while, for some others, they will be relevant, but not regarding an electricity crisis scenario. The list given above is meant to help Member States and TSOs only as a checklist against which the electricity crisis scenario candidates and regional electricity crisis scenarios should be checked for completeness of coverage. It is not required (nor expected) for any TSO to produce a list of electricity crisis scenario candidates that would cover all of the above, but it should be consistent with National Risk Evaluations. ¶  
Appendix III

## Appendix III: Roles and Responsibilities

The table below summarises the roles and responsibilities defined in Title 3 (Articles 11 to 15), namely the parties responsible (R), supporting (S), consulted (C), and informed (I). This table forms an informative part of this methodology; in case of doubt, reference should be made to the corresponding articles of this methodology.

Article	Process Step	ENTSO-E	RCCs	TSOs	Sub-groups	Competent Authorities	Regulatory Authorities	ECG
11	Establishing a list of regional electricity crisis scenario candidates	R	S	S	S	(S)		
11	Consultation on scenario candidates	R	C			C	C	C
12	Compiling a list of regional electricity crisis scenarios for evaluation (incl. assumptions)	R	S	S	S	(S)		
12	Input to list of regional electricity crisis scenarios and assumptions to be evaluated	R	I		I	I	I	C
13(2)	Simulation of identified scenarios	R	S	S	I	I		
13(6)(a)	Evaluation scenarios at a national / regional level	S/R	S	R	S	(R)	I	
13(6)(b)	Evaluation scenarios at a regional level	R	S	S	S			
14	Ranking of scenarios	R	S	S	S			
15	Reporting	R	S	S	S	I	I	I

Note: ECG may recommend changes to the regional electricity crisis scenarios submitted

Deleted: ¶

## Appendix IV: Electricity crisis scenario description templates

The electricity crisis scenario description templates below shall be used during the electricity crisis scenario identification and evaluation processes. Columns are to be interpreted as follows:

- (a) “Item” contains a definition of information needed;
- (b) “Information to provide” must be filled by the relevant data provider.

All the template fields below are required and must be completed by the provider. For each item an understandable general description is needed, without indicating exact locations, equipment, measurements etc., and a range of values is preferable to an exact number.

Check lists are provided in paragraphs IV.2 and IV.3 as a tool for building a comprehensive description of each scenario. They must be followed to ensure that an important aspect of the scenario is not omitted. Some of the questions may lead to sensitive information that will not be shared by the provider, but may be useful for the provider to do a self-evaluation of a given crisis scenario impact.

### IV.1 Description of electricity crisis scenario candidate

For each electricity crisis scenario candidate as mentioned in Articles 5 and 11, the information must follow the following template:

Item	Information to provide
Name of entity and date of submission of the scenario	
Contact information if more information is required on the scenario in the following weeks.	
<u>Description of the scenario, including the potential duration</u>	<u>A brief description summarising the scenario including the potential duration.</u>

Deleted:

Deleted: III

Deleted: III

Deleted: ,

Deleted: III

Deleted: Article 10

Deleted: description

Deleted:

## Methodology for identifying regional electricity crisis scenarios

12 December 2023

Item	Information to provide
<b>Description of initial condition of the system relevant to the scenario</b>	<p>Describe potential initial conditions for the scenario, using a range for these conditions. They do not have to be very specific. Include the range of years when scenario is relevant.</p> <p><b>Ex:</b> on the national perimeter, temperatures between 30°C and 35°C for 2 to 5 weeks, associated with low water levels in reservoir, <u>internal transmission limitations expected, load and generation, weather conditions, internal and cross-border congestions and dependencies, redispatching etc.</u></p>
<b>Initiating event(s) and chain of event(s)</b>	Brief description of the initiating event (or combination of events) generating the crisis, <u>including potential advance warnings or response times and durations.</u>
<b>Season(s) of the year and day when the scenario is relevant and type of load</b>	<p>Winter/Spring/Summer/Autumn/All</p> <p>Week, weekend, holiday, day before holidays</p> <p>Peak/Base load/Minimum load/Any</p>
<b>Evolution of the crisis scenario</b>	Description of sequence of events leading from initiating events to electricity crisis.
<b>Description of the most likely impacts of the scenario</b>	<p>Description of potential impacts of the crisis of the scenario, focusing on range/general areas instead of details.</p> <p><b>Ex:</b> describe potential impacts in the south of the country/in maritime areas; instead of naming a district or a city</p>
<b>Does the event cause a cross-border dependency?</b>	Yes/No
<b>Description of cross-border dependency</b>	All <u>dependencies</u> described in Article 4 and 9 must be considered here for relevance
<b>Broad geographical area</b>	Description of the likely geographic location or part of the system affected by the event

Deleted: etc.

Deleted:

Deleted:

Deleted: categories

Deleted: 3

# Methodology for identifying regional electricity crisis scenarios

12 December 2023

Item	Information to provide
If applicable, reference crisis <u>or incidents</u> in the past	
<u>Existing prevention and mitigation measures</u>	List of existing preventive and mitigating measures that could be adopted per identified risk, including their national and regional dimension, and expected contribution to cope with the impact)
Other important information related to the scenario	

Deleted:

## Checklist to use for a comprehensive description of the electricity crisis scenario candidate

Section	Item	Considered	Not relevant
Description of initial condition of the system relevant to the scenario	load, generation, frequency, available reserves, import capabilities, stability, level of system control		
	weather conditions (temperature, wind speed, rain, hail, snow, etc.)		
	internal and cross-border <u>flows (e.g., high flows approaching N-1 situations)</u>		
	re-dispatching performed before the start of the initiating event		
	internal and regional generation and transmission limitations		
Initiating event(s) and chain of event(s)	details of the initiating events (their parameters and related circumstances, if relevant)		
	the course of events (event chain)		
	<u>Advance warnings / response times</u>		
	season of the year		

Deleted:

Deleted: congestions

# Methodology for identifying regional electricity crisis scenarios

12 December 2023

Season(s) of the year when the scenario is relevant and type of load	type of day (week, weekend, holiday, day before holidays)		
	peak or base load		
Evolution of the crisis scenario	system parameters (frequency, voltage drop at critical points, etc.) at every stage of scenario		
	expected system response (automatic or manual) to the trigger and to every event in the chain		
	spontaneous propagation of the scenario vs the need for human action in the following stages of the crisis		
	potential for human error/omission/wrong decision		
	required availability of the power system elements or fuel supply		
	possible mitigation and/or corrective actions to be taken before the crisis occurs and their availability <u>and expected contribution to cope with the impact</u>		
Broad geographical area	time required for mitigation and/or corrective actions, including time before overloading of successive grid elements		
	the likely geographic location or part of the system affected by the event (type of line, substation, PST, interconnector, dispatching centre, etc.)		

Deleted: III

## IV.2 Description of regional electricity crisis scenarios by ENTSO-E

The information provided to TSOs for evaluating the regional electricity crisis scenarios as mentioned in Article 13 must follow the following template. Additional information listed in Appendix IV.1 and identified in the process described in Title 3 should be included in case it can support the TSO evaluation. The scenario must be sufficiently detailed and specific for each TSO to individually evaluate the relevance.

Deleted: description of

Deleted: 12

Deleted: its

Deleted:



# Methodology for identifying regional electricity crisis scenarios

12 December 2023

Item	Information to provide
Name of the scenario	
Description of Initial Condition of the system relevant to the scenario	
Initiating event(s) and chain of event(s)	
Time horizon for evaluation (years)	
Season(s) of the year when the scenario is relevant and type of load	
Evolution of the crisis scenario	
Broad geographical area	<u>With regions and subgroups identified, if possible</u>
Description of possible impacts	
Potential for cross-border and cross-regional dependencies	<u>All dependencies described in Article 4 and 9 must be considered here for relevance</u>
<u>Results from simulations if applicable</u>	
Other important information related to the scenario	

Deleted: III

## IV.3 Evaluation of national impact of the regional electricity crisis scenarios

Information related to the evaluation of the regional electricity crisis scenarios in accordance with Article 13 shall follow the following template. The checklist below is to be used to ensure that the evaluation is comprehensive.

Deleted:

Deleted: The national impact

Deleted: by TSOs (as mentioned in

Deleted: ) must

Item	Information provided
Name of entity and date of submission of the scenario	<u>(TSO or Competent Authority)</u>
Contact information if more information is required on the scenario in the following weeks.	

Deleted: ¶

# Methodology for identifying regional electricity crisis scenarios

12 December 2023

Item	Information provided
Name of the scenario (as described by ENTSO-E)	
<a href="#">Crisis scenario likelihood at the Member State level (as described in Appendix I.31)</a>	<a href="#">Very likely/Likely/Possible/Unlikely/Very unlikely/Extremely unlikely</a>
Crisis scenario <a href="#">EENS<sub>s</sub>% impact</a> at the Member State level (as described in Appendix I.2)	Disastrous/Critical/Major/Minor/Insignificant
<a href="#">Crisis scenario LOLE<sub>s</sub> impact at the Member State level (as described in Appendix I.2)</a>	<a href="#">Disastrous/Critical/Major/Minor/Insignificant</a>
<a href="#">Crisis scenario risk rating at the Member State level (as described in Appendix I.3)</a>	<a href="#">Extremely high/Very high/High/Medium/Low</a>
Cross-border dependency rating (as described in Appendix I.4)	Major/Minor/None
Method used for evaluation of likelihood	deterministic calculation/probabilistic calculation/ <a href="#">qualitative assessment</a> / <a href="#">quantitative assessment</a> (statistical data, number of sub-scenarios taken into account)
Method used for evaluation of impact	deterministic calculation/probabilistic calculation/ <a href="#">qualitative assessment</a> / <a href="#">quantitative assessment</a> (number of sub-scenarios taken into account)
Description of identified cross-border dependencies	
Explanation of the <a href="#">risk rating</a> of the scenario – national specificities to ENTSO-E description	National specificities relevant for the scenario: duration, length of direct impact, consequential hazards, incl. potential impact on fuel and energy markets (gas, electricity), etc.
Other important information related to the scenario	

Deleted: rating

Deleted: 3

Deleted:

Deleted:

Deleted: severity

# Methodology for identifying regional electricity crisis scenarios

## scenarios

12 December 2023

### Checklist to consider for a comprehensive impact evaluation of a regional electricity crisis scenario

**Crisis scenario rating at the Member State level, assessed by the TSO in collaboration with their competent authority in line with Article 13(3):**

Deleted: :

Section	Item	Considered	Not relevant
Severity of the scenario	duration of the scenario		
	evaluation of likelihood of scenario materialisation		
	evaluation of direct impact on security of supply ( <u>EENS<sub>s</sub>%</u> ) – the most likely and the worst case		
	overall risk evaluation (taking into account <u>EENS<sub>s</sub>%, LOLE<sub>s</sub></u> likelihood)		
	impact & likelihood evaluation – one <u>or many</u> of: deterministic <u>or</u> probabilistic calculation, <u>qualitative or quantitative assessment</u>		
	sufficient number of sub-scenarios considered for likelihood & impact evaluation (in case of a probabilistic approach).		
	the length of the direct impact		
	consequential hazards, incl. potential impact on fuel and energy markets (gas, electricity)		
	subjects of protection negatively affected by the event (persons, environment, infrastructure, etc.)		
	time required to restore the system to a normal state		
	need for remedial actions or other coordinated actions beyond TSO (national/regional)		

Deleted: EENS

Deleted: EENS%, LOLE

Deleted: calculation

# Methodology for identifying regional electricity crisis scenarios

12 December 2023

Section	Item	Considered	Not relevant
Reference crises of the past	list of comparable events that have occurred in the past (regardless of whether the crisis developed to the full extent, or not)		
	post crisis review (lessons learnt): main similarities and differences between the scenario and past crises, including the improvements/deterioration of the system condition/robustness, operational standards, maintenance practices, etc.		
Readiness of operators and/or authorities to handle the crisis	ability of TSOs and DSOs to prepare and/or react: availability of backup/support/spare components; established activation protocol; availability of clear and precise crisis procedures.		
	readiness of the local and national authorities/TSOs: existence and verification (tests, exercises) of relevant national crisis plans; existence of a clear/unambiguous chain of command; legal basis for handling crisis situations.		
	national crisis plans drafted/implemented/verified;		
	readiness/limitations of the relevant rescue/relief services;		
	ability to provide for a cross-border coordination;		
	availability of communication channels;		

Deleted:

# Methodology for identifying regional electricity crisis scenarios

12 December 2023

Section	Item	Considered	Not relevant
	findings concerning the damage susceptibility and/or robustness of the affected persons/elements, incl.:  robustness of the transmission system;  match/adequacy of the system response to events;  flexibility of reaction to the scenario;  simulation exercises.		
Other important information related to the scenario relevant to managing it.			

Deleted:

## Cross-border dependency rating:

Section	Item	Considered	Not relevant
Strength and type of cross-border dependencies	Description of cross-border dependencies as a possible aggravating input for the scenario (reliance on assistance from other TSOs);		
	Description of cross-border dependencies as a possible output of the national crisis (decreased ability to assist other TSOs).		
Interdependencies  In the described scenario, will your situation worsen if other TSOs are unable to offer the following support?;	Availability of redispatch/counter trading/cross-border exchange of ancillary services to make it possible to  inject or to withdraw power from power plants in a certain neighbouring power system;		
	Availability of reactive power (to support system stability);		

Deleted:

Deleted:

Deleted:

Deleted:

# Methodology for identifying regional electricity crisis scenarios

12 December 2023

Section	Item	Considered	Not relevant
	Availability of energy support.		
Interdependencies During the described scenario, would you be able to assist other TSOs in the following fields if they face simultaneous crisis?	Availability of redispatch/counter trading/cross-border exchange of ancillary services to make it possible to inject or to withdraw power from power plants in a certain neighbouring power system;		
	Availability of reactive power (to support system stability);		
	Availability of energy support		

Deleted:

Deleted: ¶