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FEBRUARY 2022

FRANCE

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# Risk preparedness plan in the electricity sector

**pursuant to article 10 of Regulation (EU) 2019/941 of the  
European Parliament and of the Council of 5 June 2019 on  
risk-preparedness in the electricity sector**



## General information

### Competent authority responsible for the preparation of this plan

Ministry of Ecological Transition

*(i.e., the Ministry of Energy at the time of the publication)*

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Note: Useful contacts for exchanges - in normal situation and in crisis management - between Member States of the European Union are not public. They are accessible through the list shared within the Electricity Coordination Group (ECG).



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## Introduction

Pursuant to Regulation (EU) 2019/941 on risk preparedness in the electricity sector, in particular Articles 10 and 11, France is developing this plan.

The plan presents the overall structure of the French organisation in terms of risk management in the electricity sector. By providing consolidated information on crisis prevention and management in the French electricity sector, this plan aims to strengthen the preparedness of all entities and consequently the resilience of the system.

*"Resilience is defined as the willingness and ability of a country, society and public authorities to withstand the consequences of a major aggression or disaster, and then to rapidly restore their ability to function normally, or at least in a socially acceptable way. It concerns not only the public authorities, but also the economic entities and the entire civil society<sup>1</sup>. »*

*"This collective ownership of the defence and national security strategy is the pre-requisite for the resilience of the Nation. In addition to the role of the relevant ministries in implementing the strategy, the State must also involve other entities, without whom crisis management cannot be envisaged<sup>2</sup>. »*

Within this document, the terms "the Regulation" or "of the Regulation" refer to Regulation (EU) 2019/941 on risk preparedness in the electricity sector.

France is made up of different geographical entities, each with its own specific characteristics relating to electricity networks. French laws and regulations distinguish between the following entities, which are included in this document:

- Mainland France
- Metropolitan France (= mainland France + Corsica)
- Areas not interconnected to mainland France (= Corsica + Guadeloupe + French Guiana + Martinique + New Caledonia + French Polynesia + Reunion + Saint-Martin and Saint Barthélemy + Saint-Pierre et Miquelon)

The following logos are used to facilitate the reading of this plan by distinguishing :

- This is part of the general prevention or crisis management system,
- This is part of the prevention or crisis management system specific to the electricity sector.



Several documents complete the reading of this plan in order to understand the resilience issues of the electric system. These are:

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<sup>1</sup> Extract from the White Paper on Defence and National Security, 2008.

<sup>2</sup> From the White Paper on Defence and National Security, 2013.

Those drafted by the state services:

- The electric continuity national plan (NOT PUBLIC)
- ORSEC planification (Organization of the Civil Security Response) (NOT PUBLIC)
- The French strategy for the defence and security of information systems

<https://www.ssi.gouv.fr/publication/la-strategie-de-la-france-en-matiere-de-cyberdefense-et-cybersecurite-2/>

Those drafted by the power system operators:

- The defense plan and the recovery plan, designed by RTE and approved by CRE under the conditions defined by Regulation (EU) 2017/2196 establishing a network code on the state of emergency and the reconstitution of the electricity network
- Grid development decennial scheme elaborated by RTE (Network of Transmission System Operators for Electricity)

<https://www.rte-france.com/en/analyses-trends-and-perspectives/ten-year-network-development-plan>

- Adequacy assessment

For Mainland France:

<https://www.rte-france.com/analyses-tendances-et-prospectives/les-bilans-previsionnels>

For Corsica:

<https://corse.edf.fr/edf-en-corse/bilan-previsionnel-par-territoire/bilan-previsionnel-par-territoire>

For Guadeloupe, Saint-Barthélemy and Saint-Martin :

<https://www.edf.gp/edf-en-guadeloupe/les-engagements-edf-dans-l-archipel-guadeloupe/bilan-previsionnel-par-territoire>  
<https://www.edf.gp/edf-en-guadeloupe/les-engagements-edf-dans-l-archipel-guadeloupe/bilan-previsionnel-par-territoire>

For Guyana:

<https://www.edf.gf/edf-en-guyane/bilan-previsionnel-par-territoire/bilan-previsionnel-par-territoire#les-bilans-previsionnels-de-l-equilibre-offre-demande>

For Reunion Island:

<https://reunion.edf.fr/edf-a-la-reunion/bilan-previsionnel-par-territoire/bilan-previsionnel-par-territoire>

For Martinique:

<https://www.edf.mq/edf-en-martinique/les-engagements-edf-en-martinique/bilan-previsionnel-par-territoire>

For Mayotte:

<https://www.electricitedemayotte.com/publications-2/>

For New Caledonia:

<https://www.enercal.nc/publications>

For Saint-Pierre and Miquelon:

<https://www.edf.pm/edf-a-saint-pierre-et-miquelon/bilan-previsionnel-par-territoire/bilan-previsionnel-par-territoire>

- Seasonal analyses of RTE:

<https://www.rte-france.com/analyses-tendances-et-prospectives/les-analyses-saisonnieres>

- RTE's safety report published each year:

<https://www.rte-france.com/analyses-tendances-et-prospectives/bilans-surete>  
<https://www.rte-france.com/analyses-tendances-et-prospectives/bilans-surete>

In addition to these documents, crisis preparation and management are the subject of detailed operational procedures within each operator or within the State services. Therefore, this plan may not mention some documents.



# 1. Summary of electrical crisis scenarios

## 1.1. Profiles of crises affecting the electricity sector

From the occasional building shutdown due to a technical incident on the public grid to the shutdown of several million customers, the range of current or imminent situations<sup>3</sup> in which there is an electricity shortage or in which it is impossible to supply electricity to customers<sup>4</sup> is wide.

For the same hazard, disruptions may have different magnitude depending on the situation - both in the nature of the consequences and in their duration - and require responses at different levels.

Whether or not the characterization in "crisis" applies to a situation depends on the analysis of the actors at the time. For example, it is possible that a crisis for an operator is not a crisis for the State services. It is also possible that this characterisation changes over time.

The characterisation in "crisis" or the absence of this qualification by the actors defines the perimeter of action and the application of certain procedures to face the situation. For the same hazard, the involvement of state services is therefore not systematic.

This plan focuses on the possible consequences on the electricity system. The prevention of some risks and the management of some crisis are part of a broader framework. The actors involved and relevant procedures may not all be referenced in this document; the reading of sectoral documents may therefore complete this plan.

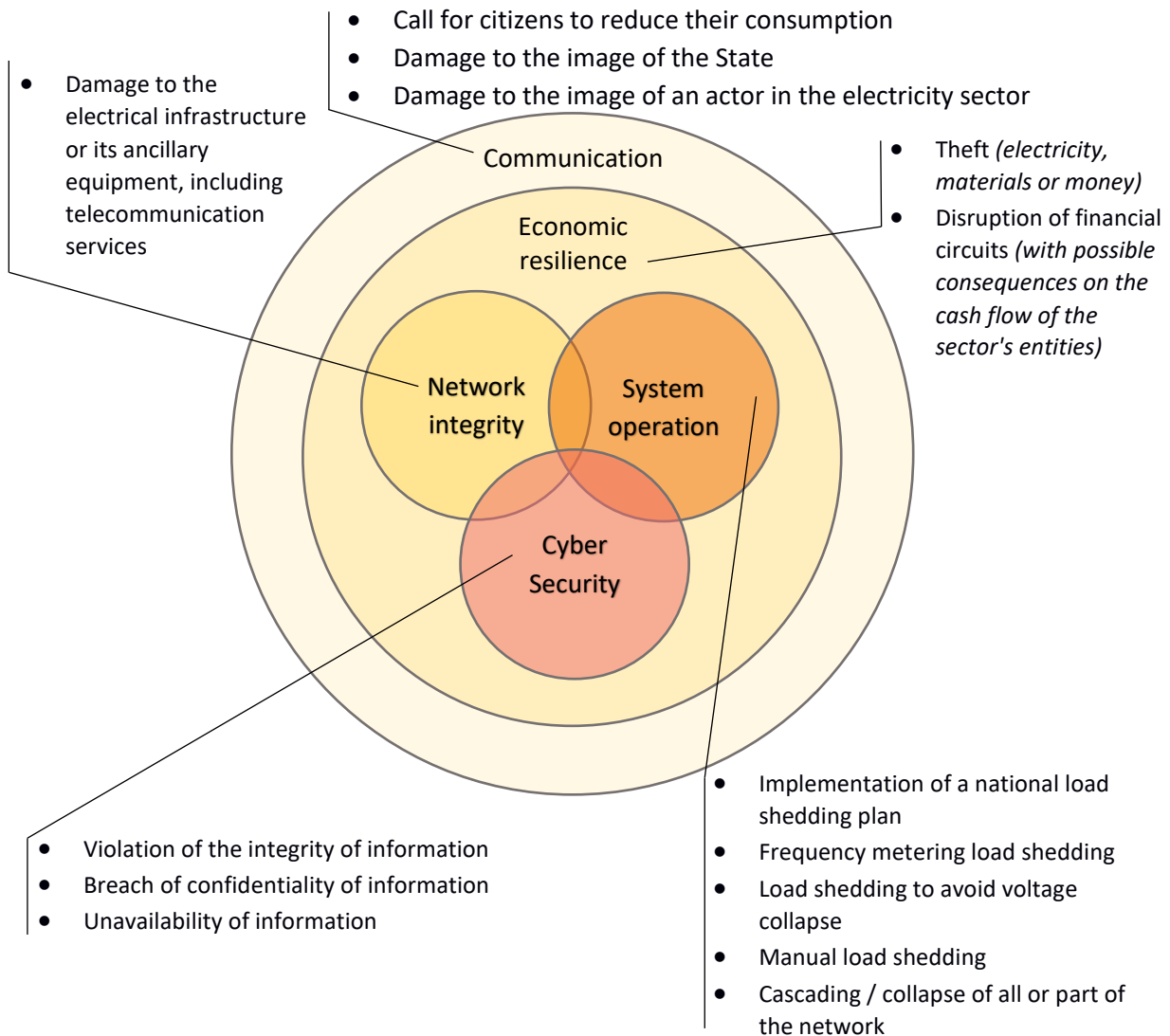
In the operation of the electricity system, load shedding<sup>5</sup> is a particular measure: it is a crisis prevention measure as it allows to avoid a higher number of outages and to avoid the disconnection of priority customers. It is also a crisis management measure since it aims to deal in real time with an exceptional situation. As this measure leads to customer disconnections, it also requires additional crisis management measures, in particular in the field of civil security. Despite the diversity of these situations, the following diagram summarizes the dimensions of a crisis affecting the electricity sector. **With the exception of image damage, each of these dimensions leads or may lead to the disconnection of one or more customers connected to the public electricity network.**

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<sup>3</sup> Examples of imminent situations: storms announced, imbalance between supply and demand anticipated by network managers, knowledge of a planned terrorist attack.

<sup>4</sup> Article 2 of the Regulation : “9) ‘electricity crisis’ means a present or imminent situation in which there is a significant electricity shortage, as determined by the Member States and described in their risk-preparedness plans, or in which it is impossible to supply electricity to customers”

<sup>5</sup> See paragraph 4.3.2. for more details



**Different dimensions of a crisis in the electricity sector**

## 1.2. National scenarios

In application of Article 7 of the Regulation, the Ministry in charge of energy identifies the following 29 national scenarios for which the State or the electricity system entities take preventive or crisis management measures:

- **Cyber-attacks**
  - Cyber-attack of an entity connected to the electrical grid
  - Cyber-attack of an entity not connected to the electrical grid
- **Physical attack**
  - Physical attack - critical assets
  - Physical attack - control center
  - Threat to key employees
  - Insider attack
- **Extreme weather**
  - Solar storm
  - Storm
  - Winter incident
  - Multiple failures caused by extreme weather
  - Cold spell
  - Precipitation and flooding
  - Heatwave
  - Dry period
- **Natural disaster**
  - Forest fires
  - Pandemic
  - Earthquake
- **Technical failure**
  - Local technical failure
  - Simultaneous multiple failures
  - Loss of ICT tools for real-time operation
  - Serial equipment failure
- **Fuel shortage**
  - Fossil fuel shortage
  - Nuclear fuel shortage
- **Unanticipated interaction of electricity market rules**
- **Human-related events**
  - Human error
  - Strike, riots, industrial action
- **Other**
  - Industrial or nuclear accident
  - Power system control mechanism complexity
  - Unusually big RES forecast errors

These scenarios match those identified pursuant to Article 6 of the Regulation in the non-public report of the ENTSO-E association (European Network of Transmission System Operators for Electricity) of 7 September 2020.

### 1.3. Regional scenarios

Some national scenarios may have consequences beyond the French borders and, depending on the initial conditions that apply, have consequences overall European synchronous area.

Some incidents underline the interdependence of all the countries in the European synchronous zone, especially three losses of synchronism:

- The incident of 4 November 2006, which triggering event was in Germany and led in France to 6,3GW load shedding.
- The incident of 8 January 2021, which triggering event was in Croatia and which led in France to the instantaneous interruption of 1,3 GW of industrial consumption,
- The incident of 24 July 2021 which triggering event was in France and led to 3,6GW load shedding in Spain, 0,7GW load shedding in Portugal and 0,07GW load shedding in France.

The Regulation defines a region as a group of Member States whose transmission system operators share the same regional coordination centre as referred to in Article 36 of Regulation (EU) 2019/943.

In accordance with the decision 10/2020 of 6 April of the Agency for the Cooperation of Energy Regulators (**ACER**), France belongs to Central Europe System Operation Region (SOR)

This region includes Belgium, the Netherlands, Germany, Luxembourg, Poland, Austria, Hungary, the Czech Republic, Slovakia, Portugal, Spain, Italy, Romania, Slovenia, Croatia and France.

Within each region, coordination between the transmission system operators is based on:

- Bidding zones (one zone for mainland France);
- Capacity calculation regions (CCR) (mainland France belongs to three capacity calculation regions: Central Europe (Core), Italy North and South-Western Europe (SWE);
- Outage Coordination Region (OCR) which are based on the capacity calculation regions for France.

RTE, the electricity Transmission System Operator (TSO) in mainland France, is a member of Coreso, which currently the mission of a regional coordination centre.



CORESO members as of  
31December 2020

In the coming days, TSOs will submit the status of Coreso to the regulators for approval. Therefore, those status may change soon.

In the electricity sector, France is also a member of three cooperation groups:

- The Penta Lateral Energy Forum, which is a coordination between Germany, Austria, Belgium, Luxembourg, the Netherlands, Switzerland and France on all subjects related to the functioning of the electricity system,
- The North Sea Energy Cooperation involving Belgium, Denmark, Germany, Ireland, Luxembourg, the Netherlands, Norway, Sweden and France, which is a coordination on the development of wind energy in the North Sea and on possible developments in interconnection and the functioning of the electricity market.,
- The High Level Group on Interconnections for South West Europe involving the European Commission, Spain, Portugal and France.

## 2. Competent authority for the implementation of the Regulation

The competent authority for the implementation of the Regulation is the French Ministry in charge of energy, the Ministry of Ecological Transition<sup>6</sup>,

Pursuant to Decree No. 2020-869 of 15 July 2020 on the powers of the Minister of Ecological Transition, the Minister of Ecological Transition prepares and implements the Government's policy in the areas of sustainable development, the environment, including energy transition and energy, climate, prevention of natural and technological risks, industrial safety, transport and its infrastructure.

Within the Ministry of Ecological Transition, four branches are working to strengthen the resilience of the electricity system.

Two general directorates work specifically on risk preparedness in the electricity sector: the General Secretariat (SG), which includes the Senior Defence and Security Official (SHFDS), and the General Directorate for Energy and Climate (DGEC).

These directorates work in coordination with the General Directorate for Risks Prevention (DGPR) and the General Directorate of Planning, Housing and Nature (DGALN). The DGPR is responsible for natural and industrial risk prevention policy. The DGALN is responsible for land use planning and water resource management policies. It defines the regulations relating to the construction of buildings.

These directorates coordinate with other ministries, particularly the Prime Minister's departments and the Ministry of Interior, which are responsible for crisis management.

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<sup>6</sup> Notification to the European Commission by Memo from the French Authorities on 23 December 2019.

### 3. Crisis coordinator



**In the event of a major crisis, the Prime Minister is responsible for directing the political and strategic aspects of the crisis**, relying on the General Secretariat for Defence and National Security (SGDSN), the Government Information Service (SIG), and, if necessary, the General Secretariat for European Affairs (SGAE) or the Secretariat General for the sea (SG Mer). It also relies on an Interministerial crisis cell (CIC) to ensure the first level of coordination of the State's response. To this end, he may entrust the operational management to a minister whom he designates according to the nature of the events, the type of crisis or the political direction he intends to give to his action.

However, in accordance with the provisions of the Defence Code, the Prime Minister in principle entrusts the operational management of the crisis:

- To the Minister of Interior when the crisis takes place on the national territory;
- To the Minister of Foreign Affairs for external crises.

Government responsibilities for major crisis preparedness and management are detailed in Prime Minister's Circular No. 6095-SG dated 1 July 2019<sup>7</sup> and are based on the following principles:

- For the management of major crises, the responsibilities devolved to the Prime Minister, in liaison with the President of the Republic, imply the implementation of a specific organization;
- Each minister is responsible for the preparation and execution of national defence and security measures within his or her ministry.

The objectives are to ensure the protection of the population and the territory, to maintain the functioning of public authorities and to ensure the continuity of the life of the Nation.



#### 3.1. Distribution of responsibilities

**The President of the Republic** "ensures, through his arbitration, the regular functioning of the public powers as well as the continuity of the State" (Article 5 of the Constitution of 4 October 1958). He has a national defence and security council which makes decisions on the political and strategic direction of responses to major crises (article L. 1111-3 of the Defence Code).

**The Prime Minister** "directs the action of the Government" (Article 20 of the Constitution). As such, he "prepares and coordinates the action of the public authorities in the event of a major crisis" (article L. 1131-1 of the Defence Code).

**Each minister is responsible**, under the authority of the Prime Minister, for the preparation and execution of national defence and security measures within his or her area of competence (article L. 1141-1 of the Defence Code). This responsibility is global and requires that the ministers organize

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<sup>7</sup> Circular No. 6095-SG of 1 July 2019, on government organization for major crisis management.

themselves, within their field of competence, to contribute to the government's action, both in crisis management and in the implementation of prevention policies. To this end, they mobilize not only their departments but also the operators in their sectors of activity for the analysis and resolution of crises.



### 3.2. Specific areas of responsibility of certain ministers

**The Ministers in charge of the Environment, Transport, Energy and Industry, i.e. the Ministers of Ecological Transition and of Economy, Finance and Recovery at the date of this plan,** are each responsible, in their respective areas of responsibility, for controlling natural and technological risks, transport, energy production and supply, and infrastructure, and for meeting the needs of national defence and security and, in all circumstances, for ensuring the continuity of services (Article L. 1142-9 of the Defence Code).

**The Minister of Interior** is responsible for anticipating and monitoring crises that may affect internal security and civil protection. He is responsible for the operational management of crises on the territory of the Republic (Article L. 1142-2 of the Defence Code). It must also, as part of crisis management preparation, ensure the transposition and application of government plans at the deconcentrated level.

**The Minister of Foreign Affairs** coordinates the management of external crises as well as the associated civilian planning with the assistance of all the ministries and State services concerned (Article L. 1142-6 of the Defence Code).

**The Minister of Defence** is responsible for anticipating and monitoring crises involving defence, on land and at sea (articles L. 1142-1 and R. 3121-1 of the Defence Code).

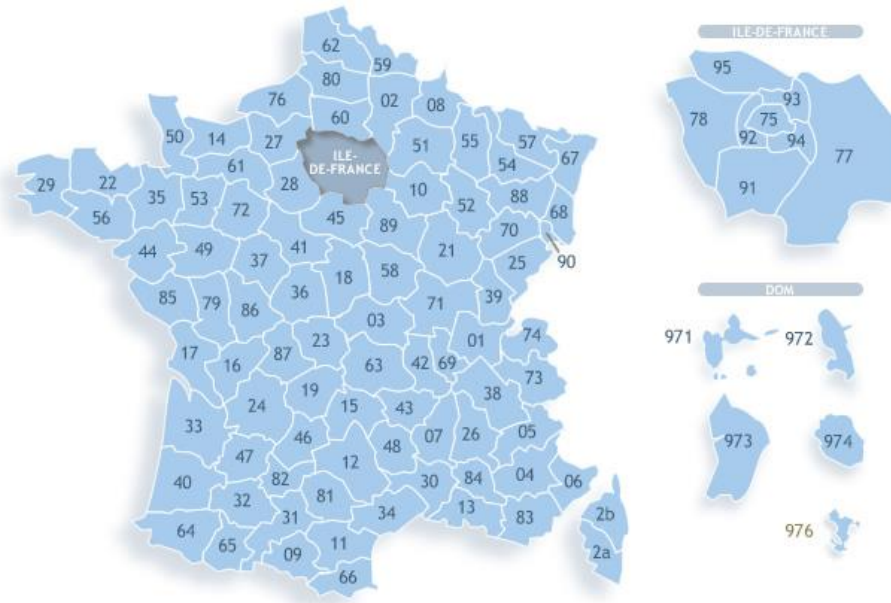
### 3.3. Decentralized state services

The French government services are composed of different levels, including two levels that are competent for crisis management:



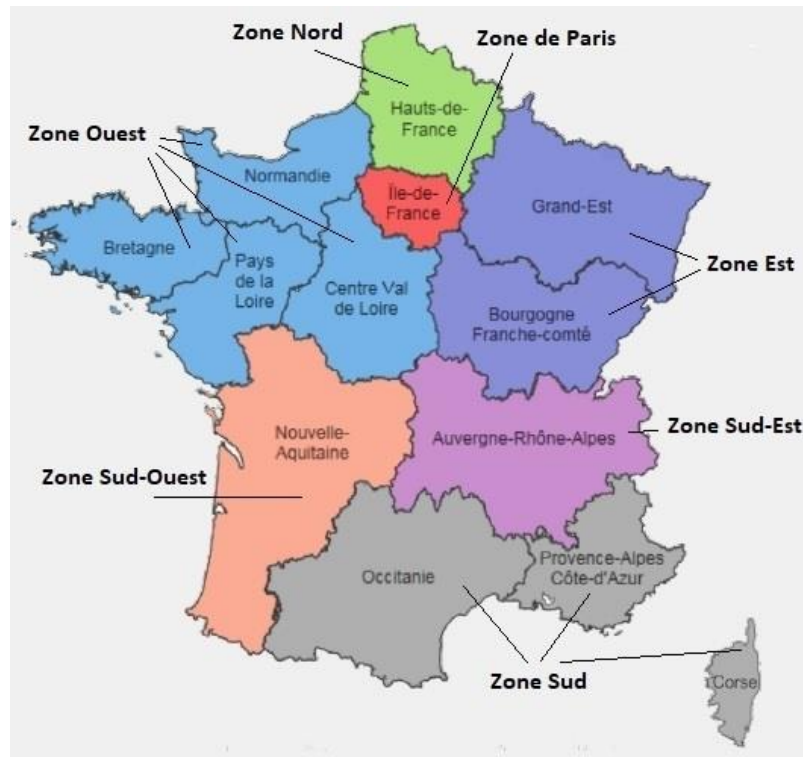


- The department



Map of French departments

- The defence and security zone (includes one or more regions, which in turn include several departments).



Map of defence and security zones in metropolitan France

In this administrative context, the territorial management of crisis response responds to the concern of efficiency and subsidiarity.

The number of territorial services involved in the management of a crisis depends on the geographical extent of the crisis. As soon as any part of the territory of a defence zone is affected, all the territorial levels immediately above this territory become part of the national crisis response organization and activate their operational center.

**The defence and security zone prefect** is the first competent territorial level. Via the Zone operational center (COZ), he informs the Interministerial crisis cell (CIC) and the ministerial crisis cells of the seriousness of the situation in his geographical area and the actions undertaken. He coordinates the actions of the competent regional or departmental services and is the privileged correspondent of the operators' regional management. He sets the priorities for action in his area and provide support to the departments.

**The departmental prefects** are responsible for leading operations and crisis management at the territorial level. They mobilize and coordinate all the necessary public and private actors.

The Departmental operational center (COD) is the center for decision-making, information gathering and measures coordination among the entities mobilized by the Prefect.



In the event of a crisis with consequences on the electricity sector, the deconcentrated services competent to support the Prefect(s) involved in the security of the electricity supply are, through the "security and defence" mission or through the service in charge of energy:

- In metropolitan France, with the exception of the Île-de-France region, the Regional Directorate of the Environment, Land-Use Planning, and Housing (DREAL),
- In Île-de-France, the Regional and Interdepartmental Directorate for the Environment, Planning and Transport (DRIEAT),
- In Guadeloupe, Martinique, Mayotte, and La Réunion, the Department of the Environment, Planning and Housing (DEAL)
- In Guyana, the General Directorate for Territories and Sea (DGTM)
- In Saint-Pierre-et-Miquelon, the Directorate for Territories, Food and Sea (DTAM).

The Government's instruction of 22 August 2014 "on the role of the DIRMs, DMs, DREALs, DRIEA, DRIEE, DRIHL, DEALs, DIRs in crisis prevention and the management of emergency and post-crisis situations in the areas of competence of the Ministry of Ecology, Sustainable Development and Energy and the Ministry of Housing and Equality" sets the role of these departments. This instruction stipulates in particular that "in the context of crisis prevention and preparation and emergency management, [these services] intervene with direct responsibility for the energy sector.

In mainland France, with the exception of the four departments of Paris (75), Hauts-de-Seine (92), Seine-Saint-Denis (93) and Val-de-Marne (94), the DREAL and DRIEAT intervene in coordination with the departmental directorates of territories (DDT).

Pursuant to the instruction of the General Secretariat of the Government (SGG) of 7 October 2014 relating to the role of the interministerial departmental directorates<sup>8</sup> (DDI) in prevention, crisis and post-crisis management, the contribution of the DDT(M) consists of knowledge of the issues at stake and their vulnerability to the various hazards exposing the territory and the identification of the means and methods of intervention. The DDT(M) have a role of integration, synthesis and coordination at departmental level for information gathering and for other public or private services' actions.



### 3.4. The municipality, a local territorial authority

Among French local authorities, the commune is the local territorial level. As of 1 January 2021, France has 34,965 communes.

**In the event of a crisis, the mayors are responsible for managing the crisis on the territory of their municipality. They implement the municipal safeguard plans (PCS) for the municipalities that have such plan.** Public establishments for inter-municipal cooperation with their own tax system also have inter-municipal safeguard plans.

The Mayors set up the "living areas" and are the correspondents of the operators and the State services. They implement, with the municipal services, the first measures of local response to the crisis (proximity actions and support to the population) and take all necessary measures for the continuity of activities until the return to normal, with the support of Public establishments for inter-municipal cooperation.

The Communal command post (PCC) centralizes information, coordinates and directs the operations of local entities. Set up at the initiative of the mayor, it is in contact with the operational center of the departmental Prefect.

In the event of a crisis in the electricity sector and when a municipality does not exercise its own competence for the concession of the public electricity distribution network, when necessary, this municipality relies on the expertise of the electricity distribution concession authority (AODE) competent on its territory.

In application of articles L. 2212-1 and L. 2212-2 of the general code of local authorities, the Mayor is responsible, under the administrative control of the departmental Prefect, for the municipal police. The purpose of this police mission is to ensure good order, safety, security and public health. This includes, in particular, matters relating to the safety and convenience of passage in the streets, platform, squares and public places, including lighting.

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<sup>8</sup> The DDIs include the DDTs, the DDTMs, the departmental directorates for social cohesion (DDCS), the departmental directorates for population protection (DDPP) and the departmental directorates for social cohesion and population protection (DDCSPP).

## 4. National procedures and measures in the event of an electrical crisis

### 4.1. Procedures to follow in case of an electrical crisis

Crisis management is mainly based on:

- A permanent watch,
- The arming of crisis cells to deal with certain situations,
- The implementation of a planning process,
- The implementation of information flow mechanisms.



#### 4.1.1. A permanent watch

The State services rely on the network of watch and alert centers and ministerial operational centers composed of twelve permanent centers and eleven operational centers activated according to the crisis profile.

At the deconcentrated level, the defence and security zones as well as the departmental prefectures have their own teams responsible for monitoring their territory.



#### 4.1.2. Arming of crisis cells and crisis management

The arming of a crisis unit is a decision made by each authority within its area of competence (government department, local authority, operators).

As soon as a crisis unit is activated, it informs the other authorities that may contribute to the crisis management. The activated crisis units coordinate with each other in accordance with the responsibilities detailed in part 3 and taking into account the subsidiarity of the organizations.

The composition of a crisis unit is determined according to the event and under the conditions defined by the internal procedures of each authority. The State services can thus ask for the representation of none, one or several operators within their crisis cells.

The state's response is proportionate to the situation.

***Extract from the departmental and zonal ORSEC guide relating to the restoration and emergency supply of electricity grids, electronic communications, water, gas and hydrocarbons networks.***

*"The operational response in network management can be schematically divided into several levels. (Cf. diagram below)*

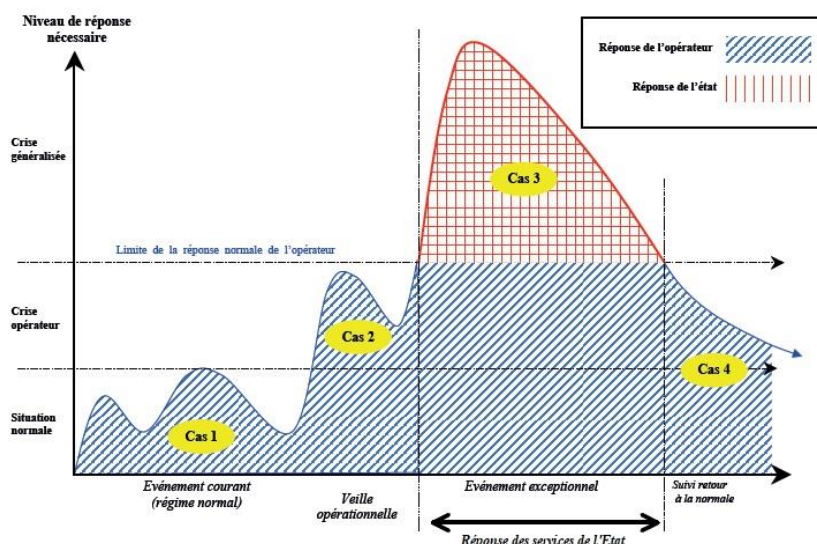
*Case 1: This level corresponds to the normal operation of the network. The operator is called upon to provide the planned services and power the network. This level of response also corresponds to the treatment of current incidents.*

*Case 2: This level corresponds to situations where the operator is confronted with an event that affects the normal functioning of its network. These are "crisis" situations for the operator and the latter decides to use internal crisis management procedures. In principle, these procedures call for a different organization and different resources than those used in normal operations. In some cases, these crises managed by the operator are not perceptible to network users.*

Case 3: There are situations where the disruptions are such that, faced with the needs of the population, the response that must be provided exceeds the operator's own capacities. The State then decides to intervene in support of the impacted operators, whose own maximum operational response is maintained. These are exceptional events.

Case 4: As the situation improves, the State's response is progressively reduced until the operator can manage the situation alone. When it ends], the operator's actions should continue until the affected network is fully restored to normal operation.

It should be noted that depending on the abruptness and suddenness of the event, it is possible to go directly from normal operation to an exceptional event; this is the case of strong storms, for example. In this case, if the event is foreseeable, it is preceded by a vigilance and/or an alert a few hours before the arrival of the phenomenon. This period is used by the operators and the public authorities to take all preparatory measures. These provisions can at best be foreseen in the respective planning of the entities. »



The operator's response completed by the State's response

Traduction du diagramme:

Level of response required, Operator respons, Response of the state, Generalized crisis, Operator crisis, Normal situation, Case 1, Case 2, Case 3, Case 4, Limit of normal operator response, Current event (normal regime), Operational watch, Exceptional event, Follow-up return to normal, Response of the State services.

4.1.3. Operational planning for crisis management



The national operational plan for crisis management with consequences on the electricity sector in force is the national electricity continuity plan n°600/SGDN/PSE/PPS of 18 September 2009.



At the local level, the ORSEC is the program for organizing emergency assistance in the event of a crisis. It allows for the rapid and efficient implementation of all necessary means under the authority of the prefect.

This framework provides:

- general provisions applicable in all circumstances,
- provisions specific to certain risks or linked to the operation of certain facilities (in particular, specific intervention plans).

The French strategy for the defence and security of information systems<sup>9</sup> complements these operational plans and drives a national approach to cyber security.

#### 4.1.4. Information flow mechanisms

The information flow mechanisms are adapted to the event, while respecting the following conditions:

- The entities of the sector inform the State services:
  - In compliance with their regulatory obligations<sup>10</sup>, in particular Article R. 323-38 of the Energy Code,
  - Within the framework of agreements concluded between the State on the one hand and RTE or Enedis on the other hand
  - By internal decision.
- Each armed crisis unit informs of its activation under the conditions defined internally. This information is important because it can change the contact details of the people involved in the normal operation and the watch, on-call or duty arrangements.
- The entities of the sector share in priority the useful information with the State crisis unit corresponding to their level of responsibility (national, zonal or departmental).
- In order to take into account the principle of subsidiarity structuring the organization of State services:
  - The situation reports are distributed to all the government departments concerned,
  - Each crisis cell coordinates, as needed and at its level of competence, with the representatives of the entities.



Depending on the nature of the event, specific information loops are set up to support decision-making in the crisis unit (e.g. between technical services or between the administration's communication services and the sector's entities).



In the event of a cybersecurity crisis, a specific information exchange loop is set up between the French national agency for information systems security (ANSSI) and the operator(s) concerned, with the support of the Ministry of Energy if necessary.

The main information exchanges<sup>11</sup> can be illustrated as follows.

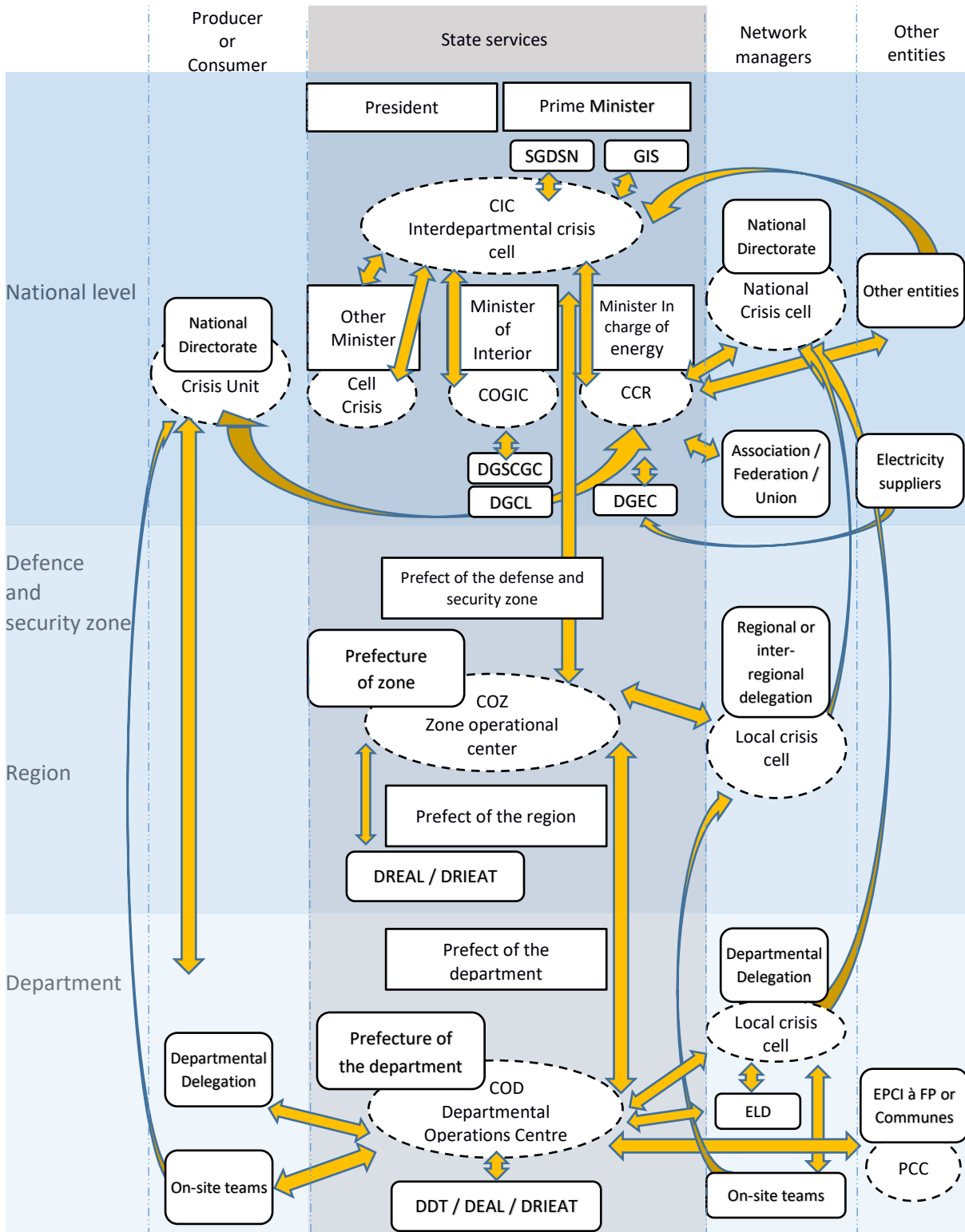


<sup>9</sup> [https://www.ssi.gouv.fr/uploads/IMG/pdf/2011-02-15\\_Defense\\_et\\_securite\\_des\\_systemes\\_d\\_information\\_strategie\\_de\\_la\\_France.pdf](https://www.ssi.gouv.fr/uploads/IMG/pdf/2011-02-15_Defense_et_securite_des_systemes_d_information_strategie_de_la_France.pdf)

<sup>10</sup> Pursuant to Article R. 323-38 of the Energy Code, "the operator of a public electricity system or the holder of a direct line authorization shall inform the prefect without delay [...] of any accident occurring on a facility that it operates, as well as any other event affecting the safety of operation or continuity of service." Pursuant to Article 3 of the Order of 26 September 2014 specifying the procedures for reporting accidents and major incidents in the operation of public electricity networks and other electricity networks, network operators shall inform the prefectures in the event of:

" - power interruptions to more than 100,000 consumers for more than half an hour  
- Injection impossibilities for producers connected to HTA for more than twelve hours".

<sup>11</sup> Indicative and not exhaustive



*Note: Abbreviations are detailed on the next page.*

**Caption:**



CCR: Roquelaure crisis center  
 CIC: Cellule Interministérielle de Crise, Interministerial crisis cell  
 COGIC : operational center for interministerial crisis management  
 DDT: Departmental Directorate for Territories  
 DEAL: Department of the Environment, Planning and Housing  
 DGCL: General Directorate of Local Authorities  
 DGEC: General Directorate for Energy and Climate  
 DGSCGC: General Directorate for Civil Protection and Crisis Management  
 DREAL: Regional Directorate of the Environment, Land-Use Planning, and Housing  
 DRIEAT: Interdepartmental Directorate for the Environment, Planning and Transport  
 ELD: Local distribution company  
 EPCI à FP: Public Establishment for Intercommunal Co-operation  
 PCC: Communal command post  
 SIG: Government Information Service  
 SGDSN: General Secretariat for Defence and National Security

#### 4.2. Preventive and preparatory measures

For the entities of the electricity sector, especially for the network operators, the preventive and preparatory measures are based on:



- Internal risk management for operators and internal audit policy,
- Prevention crisis and crisis management policies
- Internal monitoring and warning system for each company,
- Control of the construction and of operation in application of article R. 323-30 of the Energy Code
- Preventive maintenance of infrastructures,
- Investment choices,
- Training, mentoring and coaching of personnel.

For the State services, the preventive and preparatory measures are based on:

- Land use policy,
- The policy of prevention of natural risks,
- Industrial risk prevention policy,
- Building construction rules,
- The rules of dimensioning of the electricity networks on the national territory,
- The control of operators obligation for control of the construction and of operation in application of article R. 323-31 of the Energy Code
- The obligation to have self-sufficient rescue means for certain sites,
- Crisis management planning.



On these various points, the entities in the electricity sector and the State services are structuring their approaches in coordination and according to a common plan which consists of:



1. Anticipate from known events; list and model,
2. To adapt the programmed evolutions of the network accordingly,
3. Define the sizing criteria for electrical networks,
4. To ensure a permanent watch in the electricity sector,
5. Plan and anticipate crisis management as much as possible.



The sheets annexed to this plan give more details on the preventive and preparatory measures specific to certain scenarios.

#### 4.2.1. Anticipate from known events, list and model

The French government and operators have a lot of technical data and data related to past events. These data allow to document the exposure of the territories and are used to model the potential consequences of regular or exceptional events.



For the French government, these data are the basis of the natural risk prevention policy<sup>12</sup>, the technological risk prevention policy and the specific nuclear risk prevention policy, all three of which are managed by the Ministry of Ecological Transition.

These policies are part of national and European regulations and strategies, adapted to a local scale according to the risk considered. They influence either the construction rules applicable to all buildings, or the technical regulations of the electricity sector, or the choices of land use, or all three.

Operators have their own data, which is analyzed and processed through their internal risk management system.



This system can be linked to budgetary control. Cost optimization serves to strengthen the resilience of the territory by reducing :

- The costs of the operators and consequently the expenses to be incurred for each repair,
- The number of incidents through the early replacement of equipment likely to fail.

With one exception, these data are not published. RTE, the electricity transmission system operator, publishes its annual safety report<sup>13</sup>, which provides "*the main elements relating to the operating safety of the electricity system for the past year*".

#### 4.2.2. Adapting the programmed evolutions of the electrical network



Pursuant to Articles L. 141-8 and L. 141-9 of the Energy Code, the electricity transmission system operator in mainland France and the public electricity distribution system operators in areas not interconnected to the mainland metropolitan network shall draw up a forecast balance sheet for electricity supply and demand in their respective service

areas.

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<sup>12</sup> <https://www.ecologie.gouv.fr/prevention-des-risques-naturels>

<sup>13</sup> <https://www.services-rte.com/fr/decouvrez-nos-offres-de-service/le-bilan-surete-de-rte.html>



In mainland France, pursuant to Article 51 of Directive (EU) 2019/944 for the electricity transmission system operator, pursuant to Article 32 for the distribution system operator designated by the French State, RTE, Enedis and the local distribution companies (ELD) with more than 100,000 customers<sup>14</sup> each draw up a network development plan for the network under its management.

The choice of input data for the various models determines the capacity of the network to be resilient in certain situations. In mainland France, RTE carries out simulations based on exceptional weather scenarios in order to validate its security of supply projections.

Development plans are also tools that can be used to strengthen the resilience of certain areas, either by creating new structures or by adapting existing ones. In terms of the creation of structures, a major example is the "safety net" in the region Provence-Alpes-Côte d'Azur. The safety net is a set of new transmission lines designed to cope with forest fires and possible de-energization of the 225kV lines that historically supplied the eastern part of the region. In terms of adaptation, the relocation of transformers to be renewed and initially located in flood-prone areas in substations outside flood-prone areas or the €2.4 billion (2007) mechanical security plan invested over fifteen years following the 1999 storm are two examples.

Investment decisions on the distribution network are made in conjunction with the distribution authorities (AODE) that own the distribution networks; this dialogue makes it possible to adapt decisions to the specific characteristics of each region.

#### 4.2.3. Define the technical criteria for sizing electrical networks

In France, the technical dimensioning of power system facilities is defined by regulations:



- The technical decree of 17 May 2001 *setting the technical conditions to be met by electrical energy distribution*, in particular article 13 relating to the expected mechanical resistance.
- The Order of 9 June 2020 *on technical design and operating requirements for connection to electricity networks*, which determines in particular the conditions under which generation facilities must continue to inject into the electricity network and those under which a distribution network is connected to the electricity transmission network.

The network operators adapt these criteria, within the limits of the regulatory provisions, according to the characteristics of the territories in which they operate and according to their industrial strategy. The rules for sizing the facilities are included in the technical reference documentation (DTR) of each operator.

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<sup>14</sup> Pour RTE : <https://assets.rte-france.com/prod/public/2020-07/Sch%C3%A9ma%20d%C3%A9veloppement%20de%20r%C3%A9seau%202019%20-%20Synth%C3%A8se%20E2%80%93%20English%20version.pdf>

#### 4.2.4. A permanent watch in the electricity sector



Among the permanent monitoring centers mentioned in section 3.1.1, two are particularly likely to collect information on an actual or imminent crisis in the electricity sector:

- The Ministerial Center for Operational Watch and Alert (CMVOA), a watch center of the Ministry of Ecological Transition, in permanent contact with the main operators in the electricity sector, including network managers and the main producer,
- The watch center of the Ministry of Interior.

Once a day, the CMVOA relays a bulletin listing all the significant events of which it has knowledge. This bulletin is sent to the Ministry's central administrations, to other ministries, in particular the Ministry of Interior, to the prefectures and to the competent decentralized services within the Ministry's scope of action.

Depending on the events, it can issue specific bulletins and update the situation more than once a day.

#### 4.2.5. Plan and anticipate crisis management

At all levels - national, zonal, departmental or site level - public and private entities in the electricity sector are preparing to deal with various hazards. The plans and procedures in force are detailed in Annex I.

For government departments, the framework arrangements for preparing for a crisis in the electricity sector are those specified in section 4.1.3.



Anticipation is the possibility for government services, network operators and other players in the electricity sector to increase their vigilance and pre-position human resources or equipment to deal with certain situations.

For example, in the event of a meteorological event leading to multiple damages to the network, the distribution network operators EDF SEI and Enedis mobilise their teams within their jurisdiction, in particular the Electricity Rapid Intervention Force (FIRE) in the case of Enedis. Those events

### 4.3. Measures to mitigate or resolve electrical crises

As indicated in the diagram "*The operator's response supplemented by the State's response*" in section 4.1.2, the entities of the sector are the first to take measures relating to crisis management. These measures are described as either based on the electricity market or as "non-market" based.

Depending on the situation, the State services complete these measures with those under their jurisdiction.

#### 4.3.1. Market-based measures activated by system operators

In the first instance, managers use the following market-based measures to adapt system operation to the inherent hazards of power system operation and to mitigate the consequences of any event.

In mainland France, these measures are:

- Redispatching<sup>15</sup> or countertrading<sup>16</sup> as defined in Article 2 of Regulation (EU) 2019/943 on the internal electricity market and under the conditions defined by the European regulation,
- The use of primary, secondary and tertiary reserves.

The primary and secondary reserves (known as "frequency system services") are activated automatically to contain the frequency deviation, restore the frequency to 50 Hz and bring the energy exchanges at the borders back to their planned value.

The primary reserve, activated in a decentralized manner at the level of each generation unit, each demand facility or each storage device. Its activation starts 2 seconds after the frequency deviation and its full activation has to take less than 30 seconds, pursuant article 154 of the regulation (EU) 2017/1485 establishing a guideline on electricity transmission system operation.

The primary reserve must be able to respond to the simultaneous loss of the two largest generating units, i.e. a capacity of 3,000 MW at the European level. The French system contributes approximately 489 MW in 2022. Since July 2020, the primary reserve is set in France through a daily tender conducted jointly by RTE and German, Austrian, Belgian, Dutch, Danish, Slovenian and Swiss TSOs.

RTE automatically activates the secondary reserve in France in 300 seconds. This reserve brings between 500 MW and 1,300 MW. All producers operating generating units of more than 120 MW in France are required to participate.

Unlike the primary and secondary reserves, the tertiary reserve is activated manually by a RTE dispatcher through the balancing mechanism or through European balancing stock exchange. It is used for rebalancing the electrical system following a hazard, in addition to the secondary reserve, for replacing the secondary reserve, in order to reconstitute it, or for anticipating a future imbalance.

The tertiary reserve can also be used to resolve constraints on the transmission system resulting from a local excess or shortage of generation.

French producers and consumers, as well as foreign entities, can participate in the balancing mechanism. The applying conditions are defined in the rules relating to the planning, the balancing mechanism and the load recovery, proposed by RTE and then approved by CRE.

Under the provisions of Article L. 321-13 of the Energy Code, all producers connected to the transmission system are required to offer their available generation power to RTE. In addition, French

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<sup>15</sup>Redispatching means a measure, including curtailment, that is activated by one or more transmission system operators or distribution system operators and consists of a change in the pattern of generation, load, or both, so as to alter the physical flows on the power system and thereby relieve physical congestion or otherwise ensure system security

<sup>16</sup>Countertrading means a cross-zonal exchange initiated by system operators between two bidding zones to relieve physical congestion

consumers and foreign entities can, on a voluntary basis, make offers on the French balancing mechanism.

In addition, RTE ensures that it has sufficient tertiary reserves by concluding contracts with entities responsible for balancing, prior to real time, to ensure the availability of reserve resources. These entities must submit bids on the balancing mechanism, in exchange for the payment of a fixed premium. A distinction is then made between the fast reserve (which can be mobilized in less than 13 minutes) and the complementary reserve (which can be mobilized in less than 30 minutes).

In non-interconnected areas, these measures correspond to normal operation of the electricity system and are not part of the European electricity market.

#### 4.3.2. Non-market-based measures activated by system operators

Non-market-based measures that can be activated in a crisis situation are, in order of activation:

- The call for citizen action (*depending on the event and if the event management timeframe allows it*),
- The activation of Mutual Emergency Assistant Service (MEAS) between TSOs.
- Reduction of the voltage level on the distribution network (- 5 % Un) (*depending on the event and if the event management time allows it*),
- In mainland France: curative, ultimate and automatic actions included in the RTE defence plan,
- In non-interconnected areas: automatic load shedding,
- Manual offloading.

##### *The call for citizen's gestures*

In the event of an anticipated shortfall in generation, system operators and state departments may invite consumers to reduce their consumption and defer all non-essential consumption on the day(s) when a shortfall is anticipated.

This measure is to be distinguished from the energy saving messages that can be broadcast all year round and correspond to an objective of the energy transition.

The measure is considered active when the communication refers to a specific day corresponding to an alert from the network managers.

The communication system is adapted to the anticipated deficit. At its peak, it involves all the entities in the electricity sector, government departments and local authorities so that the messages are relayed to a maximum number of consumers within a limited timeframe.

##### *Activation of mutual assistance offers between TSOs (MEAS)*

These offers are bilateral agreements concluded between RTE and the neighboring TSOs in order to have access to emergency energy volumes in the event of a lack of supply on the traditional balancing markets. They are a last resort on the balancing mechanism, but before the outside-market balancing measures.

### *Reduction of the voltage level on the distribution network (- 5 % Un)*

In the event of insufficient generation to meet a daily consumption peak and in application of article 142 of the Decree of 9 June 2020 on technical design and operating requirements for connection to electricity networks, the network operators can reduce the voltage on the distribution network by 5%. This measure, which has not been implemented in recent decades, could save 3 to 4% of the power demand in winter during daily consumption peaks, i.e. an estimated potential of up to 4 GW. The measure is considered relevant for a few hours; it is likely that after this time, a "consumption catch-up" effect, particularly linked to thermostats, will be observed.

### *Curative, ultimate and automatic actions*

In mainland France, in application of Regulation (EU) 2017/2196 establishing a network code on the state of emergency and the reconstitution of the electricity network, the "Defence Plan" is drafted by RTE and is approved by deliberation n°2019-164<sup>17</sup> and n°2021-335<sup>18</sup> of the Energy Regulatory Commission.

This "Defence Plan" includes "all curative, ultimate and automatic actions, intended to counter phenomena whose rapidity of appearance and evolution excludes any possibility of human intervention". These actions are of 5 types:

1. Defence service of active reduction of the demand on low frequency
2. Automatic load shedding on low frequency,
3. Automatic separation of the network areas that have lost synchronism,
4. Automatic islanding of nuclear and fossil-fired power plants,
5. Automatic blocking of HV/HVB and HV/HTA transformer on-load regulators on voltage drop.

The first action is a first defence barrier allowing to act, before any other load shedding, on the consumption of active demand response service providers. This action makes it possible to avoid or limit the activation of low frequency load shedding and to limit degraded situations that could lead to large-scale outages. The activation of this service is automatic when the frequency drops below the threshold of 49.8 Hz in accordance with Article 18 of Regulation (EU) 2017/2196 establishing a network code on emergency and restoration of the electricity network.

The consumer facilities providing this service are selected through periodic calls for tender. The maximum aggregate capacity is 1.2 GW. Each facility must provide an interruptible power equal to or greater than 25 MW and be able to interrupt its consumption in less than 5 seconds.

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<sup>17</sup> CRE's decision - Délibération de la Commission de régulation de l'énergie du 26 juin 2019 portant approbation des propositions de RTE pour la mise en œuvre du règlement (UE) 2017/2196 en France

<sup>18</sup> CRE's decision - Délibération de la Commission de régulation de l'énergie du 28 octobre 2021 portant approbation du service de défense de participation active de la demande et du plan d'essais proposés par RTE dans le cadre de la mise en œuvre du règlement (UE) 2017/2196 en France

The system provides assurance to the French electricity system, and consequently to the European system, for its stability in critical periods. Its high level of reactivity, availability and reliability distinguish this measure.

The second action is implemented as soon as the generation-demand imbalance leads to a frequency drop below 49 Hz. Its purpose is to try to re-establish this generation/consumption balance by suddenly reducing the load, by automatically opening the MV outgoing feeders. It is the ultimate response to stop the "frequency collapse" phenomenon. It corresponds to the provisions of Article 15 of EU Regulation No. 2017/2196 on the state of emergency and restoration of the electricity network.

The third action is intended to separate the electrical zone(s) on which the generation units have lost synchronism. It is generally accompanied by automatic load shedding on the zones that are in production deficit following the separation. It is the ultimate solution to avoid the loss of synchronism spreading to all the generation units of the general network, by separating the "healthy" network from the non-synchronous network. The French network is divided into several "dynamically homogeneous" zones. This action falls under the provisions of Articles 19 and 20 of EU Regulation No. 2017/2196 on the state of emergency and restoration of the electricity network.

The fourth action is intended to protect the power plants that have remained connected to an unstable zone, by causing them to operate autonomously on their auxiliaries, so that they can be restarted more quickly when service is resumed. It is essential to ensure the effective implementation of the "Network Restoration Plan". This action falls under the provisions of Article 18 of EU Regulation No. 2017/2196 on the state of emergency and the restoration of the electricity network.

The fifth action aims to control the evolution of the voltage plan following an incident, and in particular to curb the phenomena of "voltage collapse". This action corresponds to the provisions of Article 17 of EU Regulation No. 2017/2196 on the state of emergency and restoration of the electricity network.

#### *Manual load shedding*

Activation of the defence service of active reduction of the demand on low frequency may be manual in case of power flow management in accordance with Article 20 of the Regulation (EU) 2017/2196 establishing a network code on emergency state and restoration of the electricity network.

System operators may initiate manual load shedding under the conditions set out in Article 22 of the same Regulation and within the limits of the provisions in force (see 4.3.3).

They can thus resort to manual load shedding:

- During the real-time operation of the system and when the speed of an event allows it, to avoid a large-scale incident or limit its geographical consequences,
- For the management of transits in a localized area, when operating measures could have more significant consequences than manual load shedding in the area concerned,
- For the implementation of a national load-shedding plan, i.e. when RTE has anticipated insufficient production in relation to consumption and the insufficiency of the other measures at its disposal to ensure the supply-demand balance.

### 4.3.3. The Framework for load shedding

Section R. 323-36 of the Energy Code provides in part:

*"The public electricity distribution system operators implement load shedding mechanisms to ensure the safe operation of the electrical system in degraded situations.*

*These devices are established in compliance with the safety rules drawn up by the public electricity transmission system operator mentioned in the specifications provided for in Article L. 321-2 or, where applicable, safety rules of the same nature drawn up and published by an electricity distribution system operator for public services.*

*The list of priority users is established by the [department] prefect. »*

The decree of July 5, 1990, *setting out the general instructions for load shedding on the electricity networks*, specifies the conditions under which the Prefect of the department draws up the list of users of the priority electricity service.

Article 1 of this order states that, provided that the essential needs of the nation are met, the criteria for triggering load shedding are:

- decreases in the frequency of electrical networks below 49 Hz;
- voltage drops such that at certain points of the 400 and 225 kV networks the voltage drops below the respective values of 380 and 210 kV;
- abnormal overloads on transmission or distribution facilities without the possibility of transferring them to other facilities;
- more generally, the impossibility of ensuring normal operating conditions, including the obligations resulting from agreements between interconnected systems.

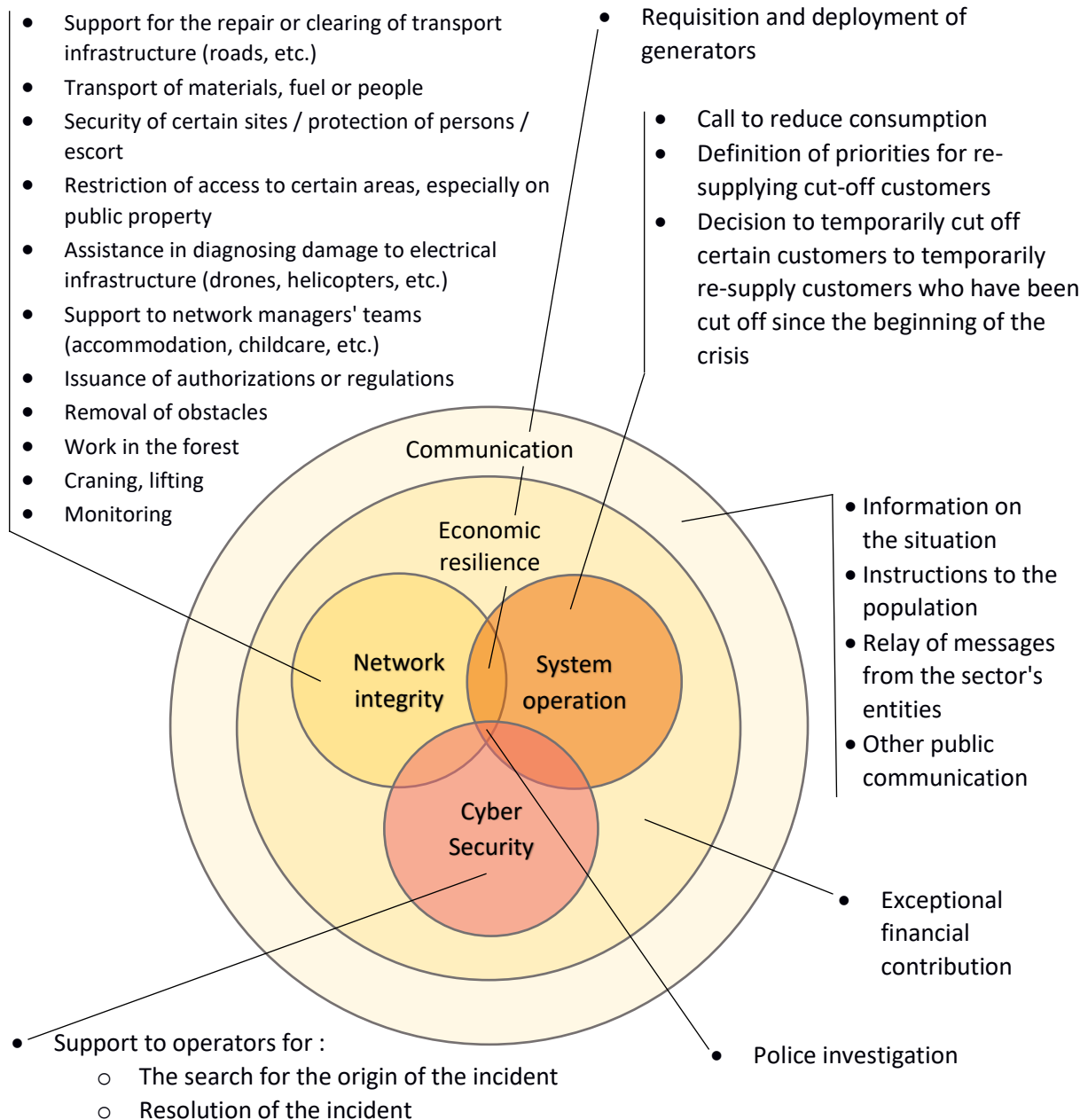
Pursuant to Article 2 of the same order, the electricity users who are entitled to special protection against service interruptions designated by the Prefect of the Department may be:

- Hospitals, clinics and laboratories that cannot be interrupted without endangering human lives, as well as establishments whose sudden cessation or reduction of activity would entail serious dangers for people;
- The installations of signalling and lighting of the public road deemed essential to safety;
- Industrial installations that cannot suffer, without suffering damage, from interruptions in their operation, especially those that are of interest to national defence.
- Other users who, because of their particular situation, may be given priority over other users, within the limits of availability, particularly in the event of an emergency.



#### 4.3.4. Measures within the competence of the State services

The measures to mitigate or resolve electrical crises under the jurisdiction of the State are summarized in the diagram below.



#### Measures within the competence of the State

Note: The decision to temporarily cut off certain customers in order to re-supply other customers does not correspond to load shedding as defined in article R. 323-36 of the Energy Code. It is a decision taken by a Prefect as the State authority in charge of public order, security and protection of the population (in application of Article 11 of the decree n°2004-374 relating to the powers of the prefects, the organization and the action of the State services in the regions and departments) and in charge of the operational management of a crisis.

#### 4.3.5. Mechanisms used to inform the public in the event of an electrical crisis.

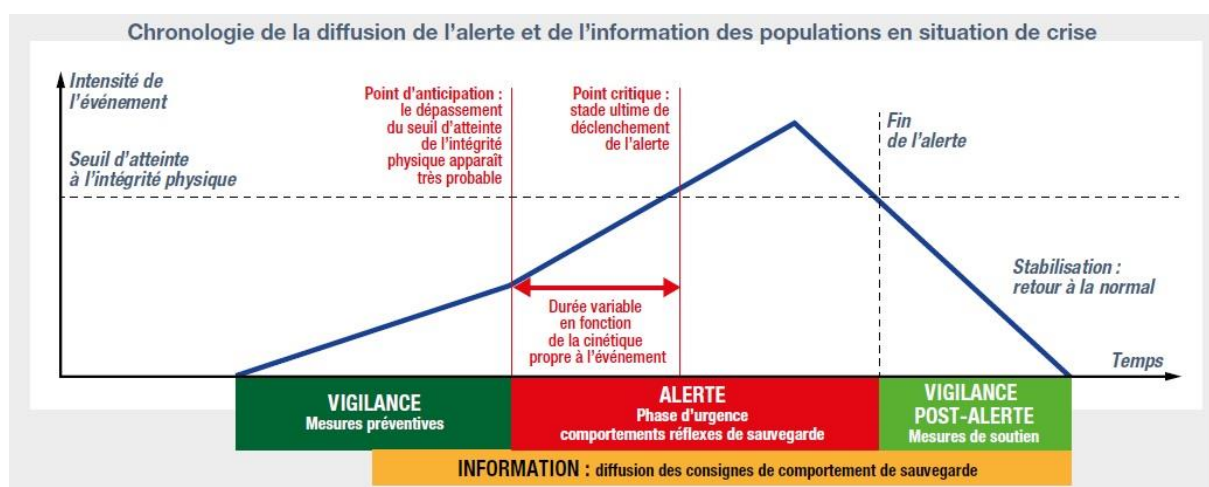
##### *The general doctrine of alert and information of the population*



Alerting and informing the population are decisions made by:

- The Prime Minister
- The Prefect of the department or, in Paris, the Prefect of Police
- The Mayors.

When a Mayor alerts or informs the population, he informs the Prefect of the department without delay.



##### Chronology of the diffusion of the alert and the information of the populations in a crisis situation

###### *Translation of the figure :*

Chronology of the alert dissemination and information to the population in a crisis situation, Point of anticipation: the exceeding of the threshold of physical integrity appears very probable, Critical point: ultimate stage of alert activation, End of the alert, Threshold of physical integrity, Intensity of the event, Stabilization: return to normal, Variable duration depending on the kinetics of the event, Time, VIGILANCE Preventive measures, ALERT Emergency phase reflexive safeguard behaviors, VIGILANCE POST-ALERT Support measures, INFORMATION: dissemination of the instructions for safeguarding behaviour.

##### *The population alert and information system (SAIP)*



The warning and information system for populations (SAIP) is a structured set of tools through different channels allowing the dissemination of a signal or a message by the competent authorities (First Minister, Prefect, Mayor) depending on the concerned area and the risk.

The broadcasting of a signal or a message consists in alerting a population exposed, or likely to be exposed, to the consequences of a serious event and which must then adopt a reflex behavior of safeguard.





Radio, television, social media, automatic phone call systems (tele-alert) are, along with sirens (for areas at risk that are equipped with), means of disseminating alerts and providing emergency information to the population.

In 2022, in response to the European directive of 11 December 2018, the administration will deploy a new system for alerting the population by mobile phone called FR ALERT. The main channels will be cell broadcasting and geolocalised text messages. It will thus be possible to inform the population in real time to indicate the posture to adopt. The Ministry of the Interior is responsible for the deployment of this system, planned in June 2022 in mainland France.

Upon hearing the alert, the population must immediately apply the safety measures, within the framework of reflex actions.

The alert broadcast by radio, television, telephone or social media detail initial information and behavior instructions.

The information of the population facing a situation of emergency quickly complete the alert. It specifies the safety instructions to follow urgently and to give indications on the evolution of the event. As an example:

-  1/ Get to safety: get to a building immediately.
-  2/ Keep yourself informed. Follow the instructions broadcast on France Bleu, France Info, other local radio stations or France Télévisions.
-  3/ Stay safe: do not go to school to pick up your children, they are taken care of by their teachers.
-  4/ Only call in a life-threatening emergency.

#### *Informing the population about the state of the network*

In mainland France, customers connected to the public network can obtain information on consumption levels, region by region, through the EcoWatt platform:

<https://monecowatt.fr/> In the event of a power cut, these customers can also contact Enedis by phone at the following number: 09 71 75 80 00.



#### 4.3.6. Measures taken according to the crisis scenario

The State services and the entities of the sector take the prevention or crisis management measures applicable to all scenarios that are detailed in sheet n°1 on Annex I.

Depending on the situation, they take specific measures detailed on the following sheets:

2. Cyber attack
3. Attacks or threats against a site, infrastructure or employee
4. Solar storm
5. High winds and extreme weather conditions
6. Cold spell
7. Heat wave drought and forest fires
8. Precipitation and flooding
9. Pandemic
10. Earthquake
11. Fossil fuel shortage
12. Shortage of nuclear fuel or saturation of spent fuel storage capacities

13. Unavailability of one or more network elements
14. Unanticipated interaction of electricity market rules
15. Human error during network operation
16. Loss of communication means used to operate the system
17. Failure of a piece of equipment that is very common on the network
18. Industrial or nuclear accident
19. Unusually big RES forecast error

The table below detail the correspondences between national scenarios, regional scenarios as defined in the non-public report of the ENTSO-E association of 7 September 2020 and the thematic sheets.

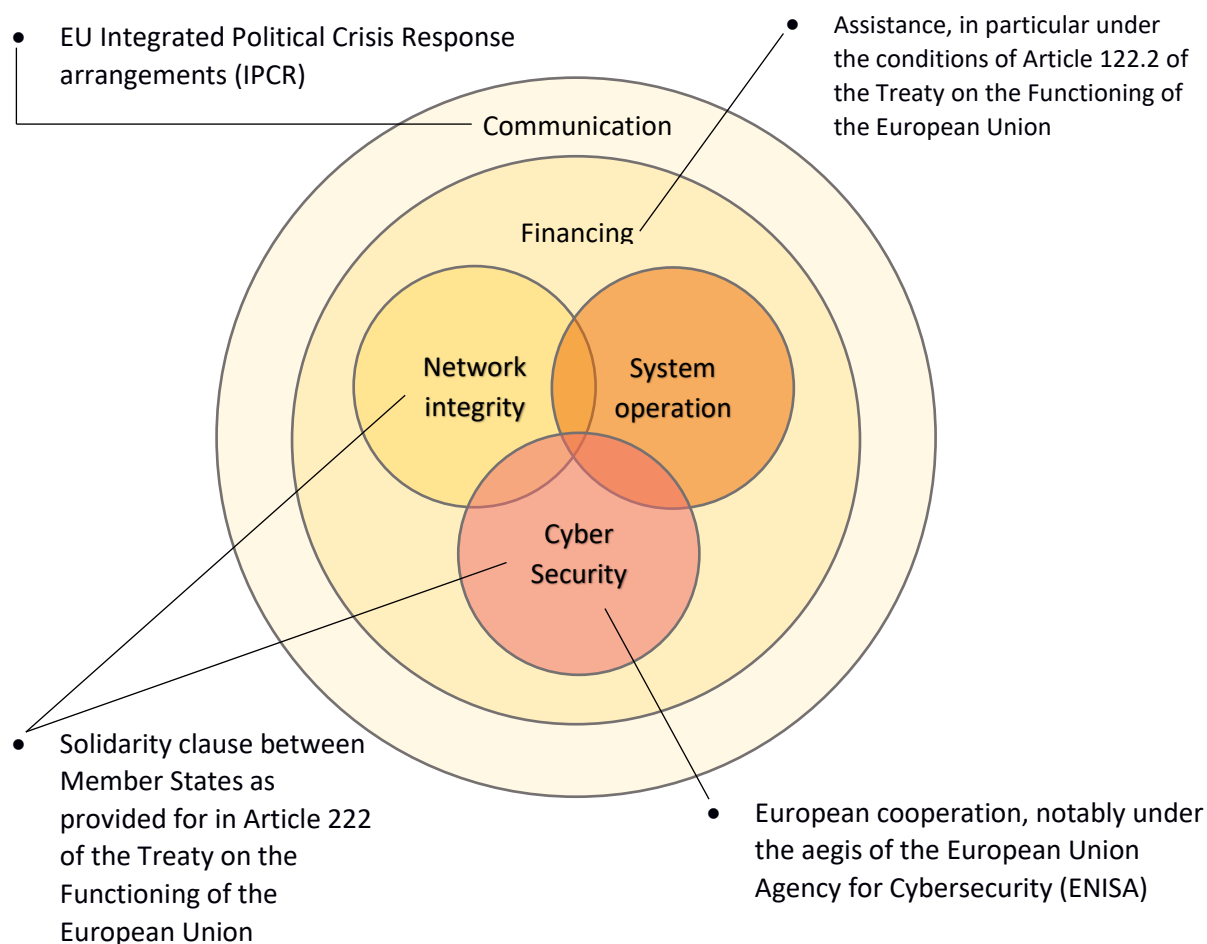
Scenarios	# ENTSO-E	# sheet
• Cyber-attacks		
○ <b>Cyber-attack of an entity connected to the electrical grid</b>	1	2
○ <b>Cyber-attack of an entity not connected to the electrical grid</b>	2	2
• Physical attack		
○ <b>Physical attack – critical assets</b>	3	3
○ <b>Physical attack – control center</b>	4	3
○ <b>Threats to key employees</b>	5	3
○ <b>Insider attack</b>	6	3
• Extreme weather		
○ <b>Solar storm</b>	7	4
○ <b>Storm</b>	9	5
○ <b>Winter incident</b>	12	5
○ <b>Multiple failures caused by extreme weather</b>	16	5
○ <b>Cold spell</b>	10	6
○ <b>Precipitation and flooding</b>	11	8
○ <b>Heatwave</b>	28	7
○ <b>Dry period</b>	29	7
• Natural disaster		
○ <b>Forest fires</b>	31	7
○ <b>Pandemic</b>	27	9
○ <b>Earthquake</b>	30	10
• Fuel shortage		
○ <b>Fossil fuel shortage</b>	13	11
○ <b>Nuclear fuel shortage</b>	14	12
• Unanticipated interaction of electricity market rules	25	14
• Human-related events		
○ Human error	20	15
○ Strike, riots and industrial action	23	3
• Technical failure		
○ <b>Local technical failure</b>	15	13
○ <b>Simultaneous multiple failures</b>	18	13
○ Loss of ICT tools for real-time operation	17	16
○ Serial equipment failure	22	17
• Other		
○ <b>Industrial or nuclear accident</b>	24	18
○ Power system control mechanism complexity	19	13
○ Unusually big RES forecast errors	26	19

## 5. Regional and bilateral procedures and measures

### 5.1. Regional and bilateral measures taken by Member States

The measures taken by several Member States in the event of an electricity crisis are in line with the provisions applicable to the whole of the European Union.

As of the date of this Plan, there are no bilateral or regional measures between Member States specific to the electricity sector.



The cooperation measures relating to the operation of the system are the responsibility of the transmission system operators and are implemented, in particular, under the impetus of the ENTSO-E association.



*Mechanism for information exchange, cooperation and coordination set up within the European Union.*

The EU Integrated Political Crisis Response arrangements (IPCR) is intended to promote political coordination and decision-making in major crises within the EU. The aim is to guarantee a perfectly coordinated political response to crises at the European level, particularly if they

are multisectoral in nature. These mechanisms do not replace national mechanisms, which remain responsible for decisions and operations on their territory.

Three assumptions for activating the IPCR system:

- on the initiative of the Presidency or after consultation with one or more of the Member States concerned
- by a crisis, at the request of one or more Member States affected by a crisis ;
- automatically in case of invocation of the Solidarity Clause (Art. 222 TFEU: dealing with man-made or technological disasters or acts of terrorism) by a Member State affected by a crisis. The modalities for the implementation of the solidarity clause are defined by a Council decision (2014/415/EU).

On the operational side, the IPCR relies, among other things, on the Emergency Response Coordination Centre (ERCC) of the European Commission's Directorate-General for European Civil Protection and Humanitarian Aid Operations (DG ECHO), which ensures 24/7 coordination of the operational response to a crisis, within or outside the Union.

At the French level, relying on the General Secretariat for European Affairs (SGAE) and the Permanent Representation of France to the European Union and on the operational mechanisms already in place at the ministerial level, the role of the CIC consists of:

- propose to the Prime Minister the integration of consolidated information on the IPCR platform in order to keep the Member States and the European Institutions informed, or even, if the situation requires it, the activation of the IPCR system in information sharing mode or in full activation mode;
- to propose to the Prime Minister, if the situation requires it, the activation of the European Union's solidarity clause (knowing that the IPCR will be automatically activated); to participate in the emergence of common European positions to deal with crises; to provide the European institutions with any useful information likely to guide their deliberations;
- to ensure liaison with the crisis management structures activated within the institutions of the European Union, if necessary; to collect the communication elements prepared at the level of the European Union.

## 5.2. Cooperation and coordination mechanisms within the region

The cooperation mechanisms at the regional level do not include decision-making procedures as there are no regional measures under the competence of the Member States.

The cooperation inside the Penta lateral Energy Forum takes the form of regular contacts, reciprocal information and joint work. The implementation of the regulation has been the subject of a series of dedicated meetings, the results of which are detailed in Annex II.

This cooperation includes a memorandum of understanding<sup>19</sup> signed on 1<sup>st</sup> December 2021 on risk preparedness in the electricity sector.

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<sup>19</sup> "Memorandum of understanding on emergency planning and crisis management for the power sector".

### 5.3. Mechanism for cooperation and coordination with third countries within the synchronous area concerned

The French state cooperates with Switzerland within the Pentalateral Energy Forum.

The French government does not have a bilateral agreement with Andorra, the United Kingdom or the islands of Jersey regarding a crisis in the electricity sector.

## 6. Stakeholder Consultations

### 6.1. Consultation carried out

In accordance with Article 7(2) of the Regulation, the Ministry of Energy consulted the following entities in December 2020 to determine the national scenarios:

- CRE (Energy Regulatory Commission) - regulator
- RTE - Network of Transmission System Operators for Electricity
- Enedis - main electricity distribution network operator in mainland France
- Greenalp - local distribution company with over 100,000 customers
- Gérédis - local distribution company with over 100,000 customers
- SRD - local distribution company with over 100,000 customers
- Strasbourg Electricité Réseaux - local distribution company with over 100,000 customers
- URM, which is now Résada - local distribution company with over 100,000 customers
- EDF - France's main electricity producer and distribution system operator in several non-interconnected areas.

### 6.2. Consultations for drafting the plan

In accordance with Article 10, paragraph 1 of the Regulation, the French ministry of energy has consulted between September and December 2021 the following entities:

- CRE
- RTE
- Local distribution companies, either through the national union of local electricity and gas companies (UNELEG), through the professional union of local electricity companies (ELE) or through the national federation of companies having collective agricultural interest for electricity (FNSICAE), or directly for the five local distribution companies mentioned in 6.1,
- EDF
- The national association of retail energy operators (Anode),
- Engie
- The national federation of local authorities (FNCCR),
- The French Union for Electricity (UFE),
- Epex Spot, designated electricity market operator (NEMO) in France,
- Nord Pool, electricity market operator (NEMO) designated in France,
- Countries of the Pentalateral Energy Forum
- Italy
- Spain



## 7. Emergency preparedness and training tests

The French authorities and operators regularly organize or participate in exercises at various levels:

- Operators train their staff and conduct internal or external exercises in coordination with other operators,
- Each departmental Prefect organizes exercises on its territory according to an annual or multi-annual program,
- Each Prefect of the defence and security zone does the same at his level in order to reinforce the coordination between the entities of different departments and to simulate scenarios with consequences beyond a single department,
- At the national level:
  - The General Secretariat for Defence and National Security (SGDSN) defines a major exercise program. This program covers all sectors, including the energy sector. Because of the importance of the latter, energy operators are regularly involved.
  - The Ministry in charge of energy or other ministries complete this program with national exercises on their perimeter of competence,
- Finally, the Member States organize exercises at the European level.

The Ministry in charge of energy has contributed - as organizer or as participant - in the last years to the following non-confidential exercises that concerned the electricity sector:

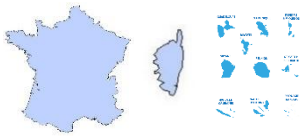
- From 7 to 18 March 2016: "Sequana" - simulation of a 100-year flood in Île-de-France,
- 28 September 2016: "Piranet" - simulating a cyber attack,
- 2 December 2016: "GEODE" - simulation of the implementation of a national load shedding plan in the electricity sector,
- 19-20 June 2018: "PENTEX2018" - the 7 countries of the pentilateral energy forum simulated an incident related to the security of electricity supply
- 5 June 2019: "Gigawatt" - simulation of a major power outage in the Paris region,
- 22 October 2020: "Extreme cold" - simulation of the implementation of a national load shedding plan in the electricity sector.



## ANNEX I – Sheets on national scenarios

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Failure of a piece of equipment that is very present on the network	17	p 81
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Territories concerned	<b>All scenarios</b>	Sheet
		n°1

Version	Date	
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The crisis management system of the State services and operators applies to all scenarios, especially when the scenarios lead to customer outages. The following measures therefore apply systematically and are not recalled in the thematic sheets.

Competence	Preventive measures	Crisis management measures
All entities	Warning and alert system	Warning and alert system  Plan for the continuity of activities (PCA) Scale: entity and site
State	Definition of the security of supply criterion  Control of compliance with the obligations of the transmission system operator or the licence holders for a direct line to control the construction and operation of the facilities	<b>National plan for electrical continuity</b> <i>scale: national level]</i>  <b>ORSEC device</b> , including: <ul style="list-style-type: none"> <li>• Diagnostic assistance in case of damage to an infrastructure</li> <li>• The clearing of communication routes</li> <li>• Support for the transport of people or materials</li> <li>• Authorization of temporary works</li> <li>• Requisition and deployment of generators</li> <li>• Securing the public domain</li> </ul>
Communities	Control of compliance with the obligations of the distribution system operator or the licence holders for a direct line to control the construction and operation of the facilities	Communal safeguard plan (PCS) or inter-communal plan
RTE	Control of the construction and operation of the facilities  Audit and risk management policy  Preparation of an annual safety report  Adaptation of the ten-year network development plan (SDDR)	Internal crisis management system: ORTEC system
Distribution System Operators	Risk and activity control policy  Control of the construction and operation of the facilities	Internal crisis management system
EDF, including EDF SEI	Risk and activity control policy	Group crisis and business continuity plan. <i>Scale: company and site</i>

### **The security of supply or failure criterion**

The minister of energy define the security of supply criterion, or failure criteria, in application of Articles L. 141-7 and D. 141-12-6 of the Energy Code. It represents the level of risk of interruption of the electricity supply, for reasons of supply-demand balance, accepted each year by the community.

It is an economic sizing criterion for the system, for which two complementary tools support its compliance: the adequacy assessment drawn up by RTE and the capacity mechanism. The definition of the criterion is thus the result of an economic trade-off between the value of lost load (VOL) and the cost of measures enabling their average duration and frequency to be reduced (e.g. the construction of generation facilities).

On the date of publication of this plan, the security of supply criterion for the electricity system is such that the average annual outage duration is less than three hours.

Pursuant to Article D. 141-12-6 of the Energy Code, at least once per period of the multiannual energy program (PPE), RTE shall carry out, for mainland France, an estimate of the VOL and of the security of supply criterion in accordance with the methodologies provided for in Article 23 of Regulation (EU) 2019/943 on the internal electricity market. Taking into account these estimates, CRE proposes a value for the security of supply criterion for mainland France. The Minister sets the criterion, taking into account the proposal made.

### **Control of the construction and operation of the facilities**

Articles L. 323-11 and R. 323-23 and following of the Energy Code define the control of the construction and operation of facilities.

Article R. 323-30 provides in particular that: *"The works of the public electricity networks and direct lines are subject to technical inspections intended to verify that they comply with the technical requirements applicable to them."*

Article R. 323-31 specifies that *"Control of compliance with the obligations placed on public electricity system operators and the holder of a direct line authorisation in respect of the construction or operation of the works is carried out :*

- 1° By the organising authority [for electricity distribution (AODE)] for the obligations of the operator of a public distribution network ;*
- 2° By the Prefect in all other cases."*

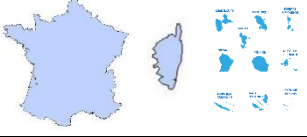
### **Plan for the continuity of activities / Business continuity plan (PCA)**

The continuity of activities approach is the means of combining risk management, crisis management, intervention, maintenance and recovery in a global and coherent manner.

A PCA describes for an entity or a site the continuity strategy adopted to deal, in order of priority, with risks identified and prioritised according to the seriousness of their effects and their plausibility. It sets out this strategy in terms of resources and documented procedures that will serve as references for responding, restoring, resuming and recovering a predefined level of operation when it has been interrupted as a result of a major disruption.

Credit institutions, investment firms, health care institutions and operators of vital importance (OIV) are legally required to draw up a PCA.

The SGDSN's 2013 "Guide to drawing up a PCA" provides State bodies, local authorities and companies with the method for drawing up such a document. All entities are thus invited to equip themselves with this preparation tool.

Territories concerned	<b>Cyber attack</b>	Sheet
		N°2

Version	Date	
1	01/02/2022	Creation

### Corresponding regional scenarios

Cyber-attack of an entity connected to the electrical grid (n°1 - ENTSO-E report)  
 Cyber-attack of an entity not connected to the grid (n°2 - ENTSO-E report)

### Script Summary:

A cyber-attack is any attempt or action that leads to:

- Alter the integrity of the data used by the electricity industry,
- Accessing information without being authorized to do so or without being a recipient of the information,
- Blocking access to data.

### Risk assessment

Cyber-attacks are now a proven risk to which all private or public entities are exposed. The risk assessment is carried out by each entity on its perimeter of activity.

At the national level, the French National Agency for the Security of Information Systems (ANSSI) defines the French cyber security strategy and disseminates information on known cyber-attacks. The ANSSI can provide assistance to an actor of the sector during the analysis of its vulnerabilities, in particular to Operators of Vital Importance (OIV).

### Crisis management threshold

Crisis management begins as soon as a threat is identified or an attack is detected that is likely to have significant or visible consequences on the entity's businesses and users. Depending on the nature of the attack, its detection may occur in a very short period of time, or it may occur when the information systems are already compromised.

Depending on the potential or observed consequences on the functioning of the entity, on the electricity supply or on any other form of service provided to the customers of the public electricity network, the entity takes emergency conservation measures and informs the administration (MTE and ANSSI). According to the elements brought up by the entity, the latter and the administration decide if it is a crisis requiring the intervention of the State services.

Competence	Specific prevention measures	Specific crisis management measures
State	French strategy for the defence and security of information systems <i>scale: national level]</i>	Piragnet Government Plan
Entity	Entity policy on information systems security	





Territories concerned	<b>Attacks or threats against a site, infrastructure or employee</b>	Sheet
		N°3

Version	Date	
1	01/02/2022	Creation

### Corresponding regional scenarios

Malicious attack of a critical infrastructure	(n°3 - ENTSO-E report)
Malicious attack on a control center	(n°4 - ENTSO-E report)
Threats to key employees	(n°5 - ENTSO-E report)
Insider attack	(n°6 - ENTSO-E report)
Strike, riots and industrial actions	(n°23 - ENTSO-E report)

### Summary of scenarios:

An attack is reported or a threat is identified.

An attack is characterized by:

- Damage to electrical system assets or to assets essential to its proper functioning.
- Taking control of a site or part of the electrical system.
- Performing unscheduled maneuvers.

### Risk assessment

The risk assessment is initially carried out by each entity in the sector within its own area of activity.

At the initiative of a Prefect of a department or a coordinating minister and in coordination with the operator concerned, an entity may be recognized as an operator of vital importance (OIV) and one or more of the sites it manages may be recognized as points of vital importance (PIV).

The security system for important activities (SAIV) provides a framework adapted to define and apply security measures for the priority protection of PIVs against the terrorist threat, and to facilitate relations between operators and public authorities, in order to allow optimal application (by public authorities and operators) of the vigilance, prevention and protection measures included in the government's VIGIPIRATE plan.

### Crisis management threshold

The crisis management threshold is:

- When launching an attack,
- To the exercise of pressure or threat to one or more persons,
- An attempted attack or threat to one or more persons,
- Depending on the analysis of the situation, to the identification of a project of attack.

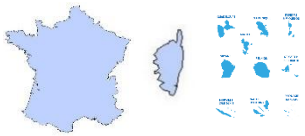
For all attacks or threats against persons:

Competence	Specific prevention measures	Specific crisis management measures
State	<p>Vigipirate plan and sectoral pirate plans [<i>scale: national level</i>].</p> <p>Security of vital activities (SAIV) [<i>scale: national level</i>] - <i>confidential defense</i></p> <p>External Protection Plan (EPP) [<i>scale: site</i>] - <i>confidential defense</i></p>	<p>Law enforcement response procedures [<i>scale: national level</i>]</p> <p>Specific intervention plan (PPI) [<i>scale: site</i>] - <i>confidential defense</i></p>
Entity	<p>Operator Safety Plan (OSP) [<i>scale: actor's area of responsibility</i>] - <i>confidential defense</i></p> <p>Specific protection plan (PPP) [<i>scale: site</i>] - <i>confidential defense</i></p> <p>Training and awareness of personnel working or intervening on sensitive sites.</p>	

Only for attacks:

Competence	Specific prevention measures	Specific crisis management measures
Entity	<p>Installation of protections against intrusions. <i>Note: Access to certain structures in the electrical system, particularly live bare structures, is restricted for safety reasons (risk of electrification or electrocution). These access restrictions contribute to the protection of the infrastructure.</i></p> <p>Guarding measures</p>	

In the event of a police investigation, all measures taken by the administrative authority take precedence. The operator concerned may therefore have a delayed access to the damaged installations. This delay may have consequences on the time needed to return to normal operations.

Territories concerned	<b>Solar storm</b>	Sheet
		N°4

Version	Date	
1	01/02/2022	Creation

### Corresponding regional scenario

Solar storm (n°7 - ENTSO-E report)

### Script Summary:

Solar storms or solar flares are primordial events of solar activity that occur periodically on the surface of the sun.

### Risk assessment

Solar storms occur periodically. They are classified in different categories according to the maximum intensity of their energy flow in the vicinity of the Earth.

### Known precedents:

- The solar storm of 1859 called Carrington event and which hit the Earth
- The solar storm of July 2012 which did not hit the Earth.

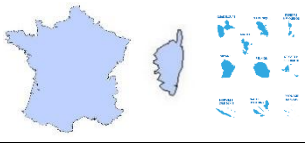
### Crisis management threshold

Depending on the information issued by the world's space agencies, system operators take safety measures.

A solar storm can only be anticipated two days in advance.

Competence	Specific prevention measures		Specific crisis management measures
System operators	Consultation of the forecast bulletins of space agencies, especially NASA.  Safety of sensitive structures		



Territories concerned	<b>High winds and extreme weather conditions</b>	Sheet
		N°5

Version	Date	
1	01/02/2022	Creation

### Corresponding regional scenarios

Storm	(n°9 - ENTSO-E report)
Winter incident	(n°12 - ENTSO-E report)
Multiple failures caused by extreme weather	(n°16 - ENTSO-E report)

### Summary of scenarios:

Extreme weather conditions cause multiple damages to the electrical system or render certain facilities temporarily unavailable.

### Risk assessment

Such events occur regularly throughout the country.  
In Overseas France, the recurrence of cyclones is such that the risk is a major risk.

With regard to the consequences on the electrical system, the most important precedents are:

Storm	Year	Territory
Storms Lothar and Martin	1999	Mainland France
Storm Klaus	2009	Regions concerned: Aquitaine, Midi-Pyrénées, Languedoc-Roussillon and Poitou-Charentes
Storm Xynthia	2010	Regions concerned: Aquitaine, Poitou-Charentes, Pays de la Loire, Bretagne and Normandie
Hurricane Irma	2017	Saint-Barthélemy, Saint-Martin, Guadeloupe
Storm Eleanor	2018	Regions concerned : Grand-Est, Hauts-de-France, Corsica and Normandy
Storm Berguita	2018	Reunion Island
Storm Alex	2020	Regions concerned : Bretagne, Alpes-Maritimes

### Crisis management threshold

Detailed analysis.

Within the limits of the conditions defined by article R. 323-38 of the Energy Code<sup>20</sup>, decision in opportunity according to the damage observed and the need or not for the network operators to benefit from the State support.

<sup>20</sup> Obligation to inform the Prefect if : " - power interruptions to more than 100,000 consumers for more than half an hour - Injection impossibilities for producers connected to HTA for more than twelve hours"

Competence	Specific prevention measures	Specific crisis management measures
State	<p>Rules for sizing structures, including:</p> <ul style="list-style-type: none"> <li>- Art 13 of the technical decree of 17 May 2001, article relating to the mechanical resistance of the structures</li> </ul> <p>Policy of burying existing networks and building new underground structures</p>	
Météo France	Forecasts and warnings	
Operators	<p>Pruning and maintenance of power lines</p> <p>Investment program of €2.4 billion <sup>(2017)</sup> between 2002 and 2017 for a secured grid</p>	Pre-mobilisation of human and material resources to reduce the time needed to come back to normal
AODE	Financing the construction of underground lines	

Territories concerned	<b>Cold spell</b>	Sheet
		N°6

Version	Date	
1	01/02/2022	Creation

### Corresponding regional scenario

Cold spell

(n°10 - ENTSO-E report)

### Script Summary:

Due to exceptional weather conditions<sup>21</sup>, electricity consumption increases and/or some generation resources are made unavailable, to the extent that system operators have to take so-called non-market measures to ensure the supply-demand balance. The last of these measures is the use of load shedding (see section 4.3.3).

### Risk assessment

In mainland France, the main risk to the security of electricity supply is winter peak demand. Demand peaks occur during cold spells, which greatly exceed average electricity consumption: power demand increases by around 2.4<sup>22</sup>GW for every 1°C drop in temperature. The maximum level of power demand to date at national level was reached on 8 February 2012, during an exceptional cold snap, at a level of 102.1 GW.

Each year, RTE publishes the forecasted balance for the following years and specifies its modelling by a seasonal analysis of the passage of the winter.

<https://www.rte-france.com/analyses-tendances-et-prospectives/les-bilans-previsionnels>

<https://www.rte-france.com/analyses-tendances-et-prospectives/les-analyses-saisonnieres#Lesanalysesaisonnieres>

### Crisis management threshold

- Identification by RTE of a possible recourse to load shedding over one or more days,
- Insufficiency of the power generation program and then of the effective power generation compared to the consumption.

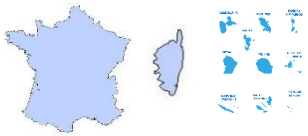
<sup>21</sup> Exceptional Weather" is defined here as temperatures below the known or likely temperatures for the day in question.

<sup>22</sup> The sensitivity of electricity consumption to temperature varies throughout the day. It is estimated to average about 2.4 GW per degree Celsius in winter.

Competence	Specific prevention measures	Specific crisis management measures
State	<p>Multiannual energy plan (PPE)</p> <p>Elaboration of lists of users of the priority electricity service.</p> <p>Informing the population + reinforcing communication on energy saving.</p>	<p>Management of the consequences on civil security and maintenance of order.</p> <p>Information for the population</p>
RTE	<p>Balance sheet forecast</p> <p>Seasonal analysis</p> <p>Adaptation of the maintenance program of the works</p> <p>Monitoring of weather forecasts and updating of DOE forecasts up to D-1</p> <p>Development of a national load shedding plan on D-1.</p> <p>Implementation of load shedding</p>	<p>Information of the population</p> <p>Implementation of load shedding</p>
Enedis and ELD	<p>Implementation of load shedding</p> <p>Adaptation of the maintenance program of the works</p>	<p>Information of the population</p> <p>Implementation of load shedding</p>
Electricity producers	<p>Adaptation of all of the power plants</p> <p>Adaptation of the power plants maintenance program</p>	<p>Adaptation of the power plants maintenance and generation program</p>
Entities in the electricity sector	<p>Information of the population</p>	<p>Information of the population</p>

Note: informing the population is a crisis prevention measure and a crisis management measure. The communication of the public and private entities can help to reduce the consumption during the tensest days and reduce or avoid the load sheddings.



Territories concerned	<b>Heat wave, drought and fires</b>	Sheet
		N°7

Version	Date	
1	01/02/2022	Creation

### Corresponding regional scenarios

Heat wave	(n°28 - ENTSO-E report)
Dry period	(n°29 - ENTSO-E report)
Forest fires	(n°31 - ENTSO-E report)

### Summary of scenarios:

Weather conditions lead to the occurrence of one or more of the following three hazards:

- Heat wave or heatwave
- Decrease in available water resources or drought
- Fires which lead to the destruction of natural areas, urban areas or both. It therefore includes forest fires.

In metropolitan France, these hazards mainly concern the period from April to November.

Known precedents:

- Forest fire of 30 July 2009 in Bouches-du-Rhône department (13), which led to a 1.2 GW load shedding in PACA region.
- Early drought in April 2011/Late drought in the fall of 2018
- A succession of two heat waves in 2019
- Forest fire in Aude department (11), which led to a loss of synchronism between Spain, Portugal and a part of France on one side and the rest of Europe on the other side.

A fire, forest fire included, can also have a human related origin. The “fire” scenario can therefore cross the “industrial accident” scenario.

Known precedents:

- Fire in a garage in Treillières (44) on 15 December 2010 during which two firemen died after an electric arc between their nacelle and a transmission line.
- Fire in a warehouse in Gagny (93) on 10 March 2012, which led to the fall of one 225 kV line and the replacement of a second one due to the damages.

### Risk assessment

A fire can cause damages to the network, lead to an electric arc and the dripping of one or more lines, limit the transit capacities due to the overheating of the cables or create insulation failure by the soot deposit.

A fire near an electrical system structure is a recurring hazard.

The incident of July 24, 2021 recently underlined that the consequences of a fire on the electrical system can be geographically widespread, despite preventive measures. The “drought” and “heat

wave” hazards are recurrent and climate change increases the frequency, intensity and duration of these events, which can occur outside of the so-called summer period. They are therefore taken into account in the design of the grid and operating rules, particularly for nuclear power plants and hydroelectric installations. However, it is possible that a drought or a heat wave disrupts the electricity supply. In mainland France, RTE publishes each year its forecasted balance for the following years and specifies its modelling by a seasonal analysis of the passage of the summer.

<https://www.rte-france.com/analyses-tendances-et-prospectives/les-bilans-previsionnels>

<https://www.rte-france.com/analyses-tendances-et-prospectives/les-analyses-saisonnieres#Lesanalysesaisonnieres>

### Crisis management threshold

Depending on the situation, the threshold corresponds to:

- An alert issued by the services of Météo France,
- The observation of damage to the electrical infrastructure,
- The shutdown of several production facilities,
- The taking of out-of-market measures by network operators.

Competence	Specific prevention measures	Specific crisis management measures
State	<p>National Climate Change Adaptation Plan (NCCAP) 2018-2022 [<i>scale: national level</i>]</p> <p>Forest fire protection plan (PPFCI) [<i>scale: departmental level</i>]</p> <p>Natural hazard prevention plan (PPRN) [<i>scale: sub-departmental level</i>]</p> <p>Prefectural orders to preserve water resources</p> <p>Definition of rules for distance from obstacles – Definition of territories subject to legal clearing obligations</p> <p>Evaluation of the volumes of water that can be withdrawn and distribution according to use (every 6 years)</p>	<p>Interministerial instruction on the health management of heat waves in metropolitan France [<i>Scale: national level</i>]</p> <p>Specific departmental ORSEC plan on the health management of heat waves [<i>scale: department</i>]</p> <p>Drought order issued by the Basin Coordinator Prefect (alert zones, severity levels and priorities)</p> <p>Order temporarily restricting the use of water issued by the department Prefect</p>
RTE	<p>Adaptation of the grid operation to the temperature of the transmission lines</p> <p>Network sizing</p> <p>Ten-year investment plan</p>	
Network managers	Pruning and maintenance of power lines	

Competence	Specific prevention measures	Specific crisis management measures
Entities in hydroelectric generation	Coordination with the State services on water resource management.	

Notes:

For all three hazards:

The redundancies of the electrical system<sup>23</sup> contribute to the resilience of the system in the event of the occurrence of these hazards.

For fires:

The policy of burying networks allows us to limit damage to infrastructure.

State services and operators strive to limit the consequences of a fire on the electricity system as much as possible and adapt their procedures and/or the sizing of the network following each event.

The procedures in force are developed around two priorities: the first is the safety of people, in particular that of personnel working near the electricity network, and the second is to prevent or limit damage to the electricity transmission network, in order to facilitate the return to normal. System operation is adapted accordingly; load shedding can help to limit power flow on some lines.

These operating margins do not exist on the distribution network. The resilience of the system then depends on the speed of deployment of emergency resources and the speed of repairs.

Inaugurated in 2015, the safety net of the Provence-Alpes-Côte-D'azur (PACA) region is the latest RTE project to strengthen the resilience of a territory in the event of a forest fire. The three underground 225 kV connections Briançon-La Bocca, Briançon-Fréjus and Boutre-Trans thus provide the necessary redundancy to the system to deal with the hazard and prevent consequences that go beyond the sector of the fires.

For drought:

To deal with a shortage of water resources during low water periods, the Prefects can take exceptional measures to limit or suspend the use of water in application of II-1° of Article L. 211-3 of the environment code. The thresholds resulting in restrictive measures are defined at local level by the department Prefects.

“Drought” orders can only apply for a limited period, within a determined perimeter. They must ensure the exercise of priority uses, more particularly for health, civil security, the supply of drinking water and the preservation of aquatic ecosystems. They must also respect the equality between users of the different departments and the necessary upstream-downstream solidarity of the watersheds.

The “drought” order is part of the more general framework of water policy. In France, the latter is based on four major laws (1964, 1992, transposition in 2004, 2006) and is governed by the European

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<sup>23</sup> In particular, the (N-1) criterion on the electricity transmission system

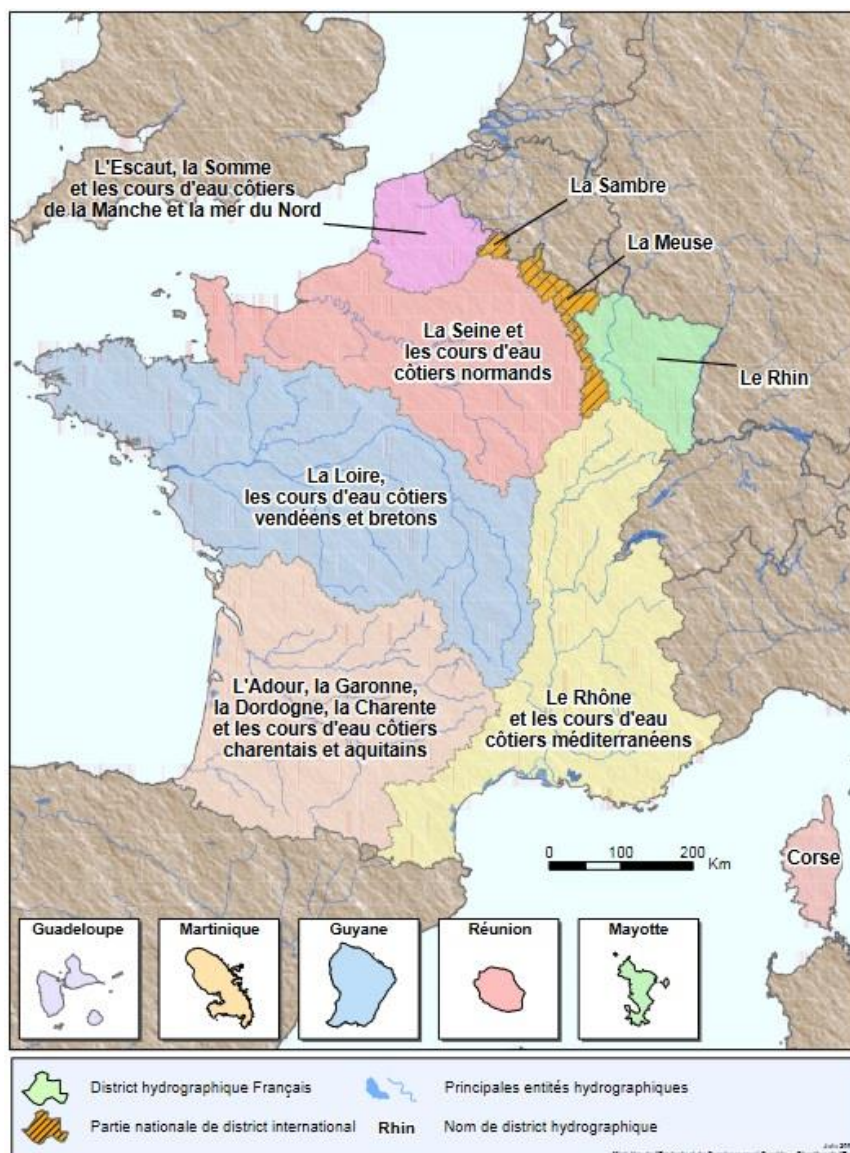
directive 2000/60/CE establishing a framework for Community action in the field of water policy. This text defines the concept of “good water status”, towards which all Member States must strive.

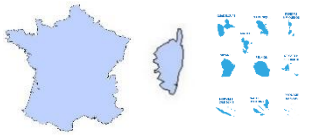
River basins are the reference for water management; surface watershed lines delimit them. The territorial animation of this policy is thus done around 12 basins:

- The seven metropolitan basins: Adour-Garonne, Artois-Picardie, Loire-Bretagne, Rhine-Meuse, Rhône-Mediterranean, Corsica, Seine-Normandy,
- The five overseas basins: Guadeloupe, Guyana, Martinique, Reunion and Mayotte.

The management of these basins is based on the governance of a basin committee and financial solidarity organized by a water agency in mainland France and by a water office overseas (excluding Mayotte).

Pursuant to Article L. 213-7 of the Environment Code, the Prefect of the region where the Basin Committee has its headquarters leads and coordinates State policy in terms of police and resource management in water in order to achieve the unity and coherence of the decentralized actions of the State in this field in the regions and departments concerned.



Territories concerned	<b>Precipitation and flooding</b>	Sheet
		N°8

Version	Date	
1	01/02/2022	Creation

### Corresponding regional scenario

Precipitation and flooding

(n°11 - ENTSO-E report)

### Script Summary:

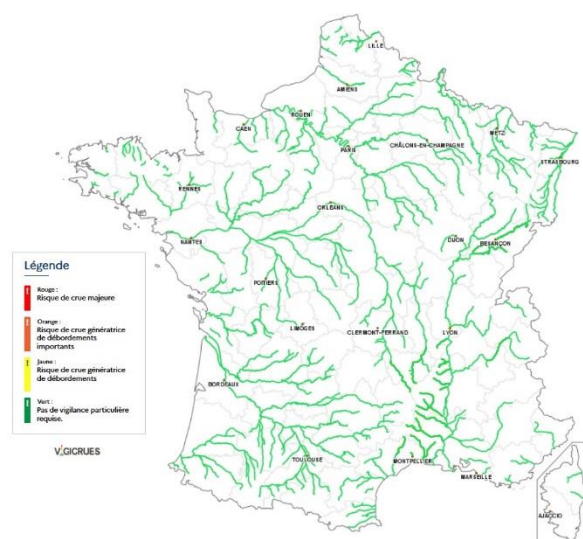
The flood risk covers different situations, especially:

- Flooding due to slow or low-lying floods, sometimes associated with rising water tables
- Flooding due to rapid and torrential floods
- Flooding due to runoff (urban and/or agricultural)
- Floods involving maritime phenomena: marine submersion and estuarine floods
- The failure of hydraulic protection works (partial or total rupture)<sup>24</sup>.

### Risk assessment

Precipitation is evaluated daily by the public institution Météo-France. The latter accompanies its forecasts with a level of vigilance by territory. In particular, it has developed a warning network for intense rainfall at the local level (APIC).

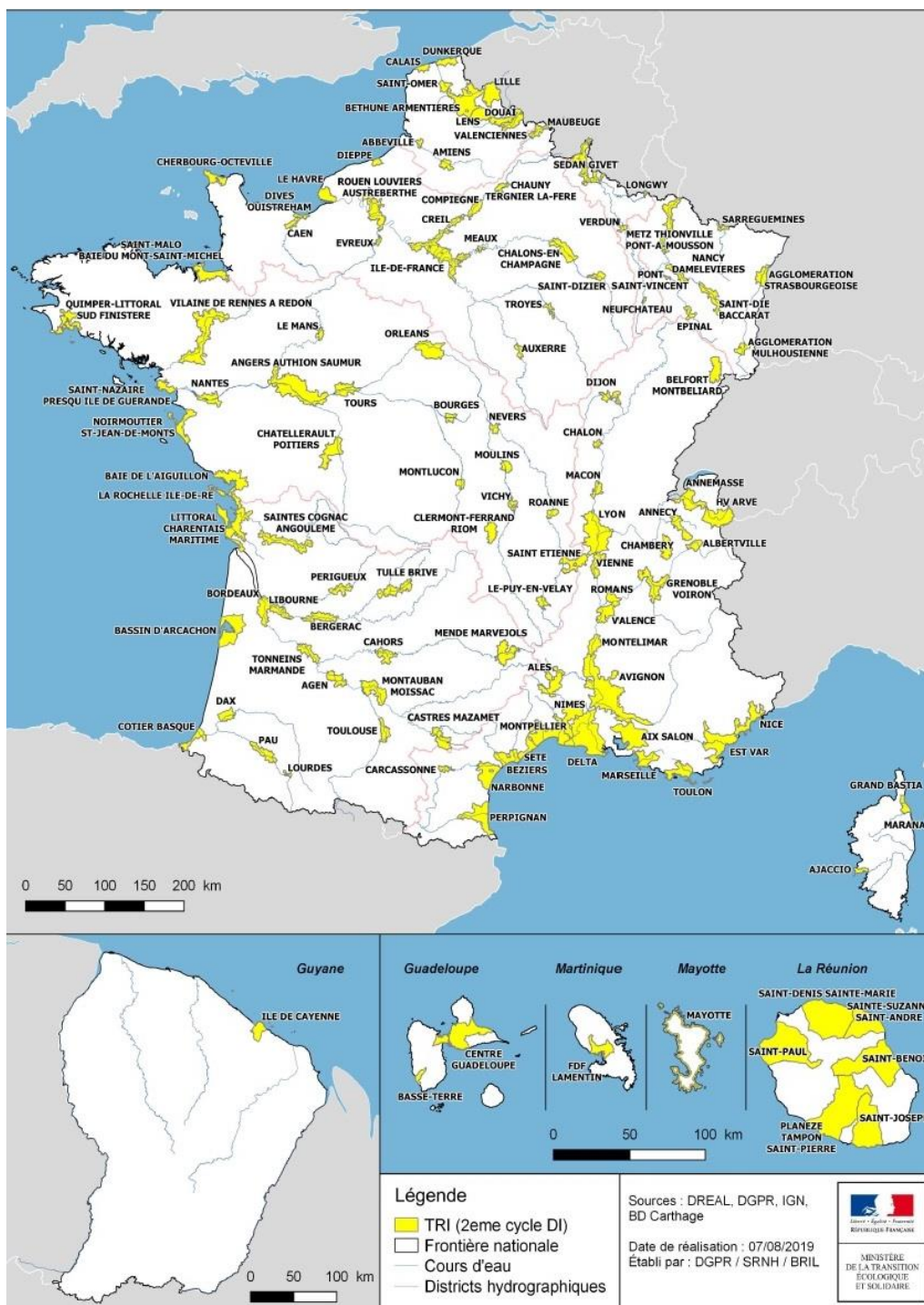
The Ministry of Ecological Transition provides flood forecasting on the monitored network of more than 20,000 km of rivers. To do this, the Vigicrues network, composed of the central hydrometeorological and flood forecasting support service (SCHAPI, created in 2005), 19 flood forecasting services and 27 hydrometric units in the regional directorates (DREAL), relies on several hundred hydrometric stations that measure water levels in real time. The appropriate level of vigilance per river section, as well as the water level and flow observations are available on the website <https://www.vigicrues.gouv.fr>. Since a few years, quantitative forecasts are also provided during floods. This service is operated 24 hours a day.



[Information map of the Vigicrues website](#)  
- Metropolitan France

<sup>24</sup> Can be considered as a technological risk

Flood risk prevention is proportionate to the "probability of occurrence \* vulnerability of the territory". In mainland France, priority is given to the 124 territories at significant risk of flooding (TRI) identified on the basis of national risk characterization criteria.



Map of territories at significant risk of flooding (TRI) - 2<sup>nd</sup> cycle of the Flood Directive

While the cost of some floods, particularly in the Seine basin, is in the billions of euros of damage to all sectors, a major flood would not lead to a large-scale incident (LSI) for the power system in the absence of another hazard. The consequences on the power supply are estimated to be localized on the flooded areas and the non-flooded areas in the immediate vicinity.

For assessing the risk related to marine flooding, France has developed vigilance and alert systems since 2011, in coordination with Météo France and the hydrographic and oceanographic service of the navy (SHOM)<sup>25</sup> to have "waves" vigilance -submergence". This modeling and forecasting system is constantly optimized.

#### Crisis management threshold

- Warning issued by Météo France
- Alert issued by an SPC (DREAL)
- Activation of the ORSEC plan
- Alerts issued by APIC-Vigicrues Flash

Competence	Specific prevention measures	Specific crisis management measures
State	<p>National Flood Risk Management Strategy</p> <p>Sector plans :</p> <ul style="list-style-type: none"> <li>• Flood risk management plans (PGRI), drawn up in application of the Flood Directive on a basin scale.</li> <li>• Flood risk prevention plans (PPRI), which have the value of a public utility easement and include specific building construction rules.</li> </ul> <p>Planning/Land Use :</p> <ul style="list-style-type: none"> <li>• regional plans <sup>26</sup></li> </ul>	<p>Departmental and zone ORSEC flooding plan</p> <p>Departmental flood referent mission (DDT)</p>
Local authorities	<p>Consideration of flood and coastal risks in planning/land use documents, including</p> <ul style="list-style-type: none"> <li>• Territorial coherence schemes (SCoT)</li> <li>• Local urban plans (PLU)</li> </ul> <p>In articulation with the exercise of the GEMAPI competence (EPCI-FP)</p> <p>Flood prevention action programs (PAPI)</p>	

<sup>25</sup> Directorate of the ministry of Defense

<sup>26</sup> Regional scheme =For 11 regions in mainland France: the regional plan for land use, sustainable development and equality (SRADDET) For Guadeloupe, Guyana, Martinique, Mayotte and Reunion: the regional development plan (SAR) For the Île-de-France region: the master plan of the Île-de-France region (SDRIF) For Corsica: the plan for sustainable development of Corsica (PADDuC)

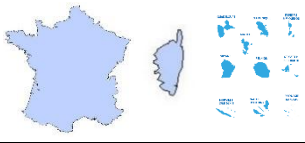
Competence	Specific prevention measures	Specific crisis management measures
Network managers	<p>Rules of construction for new works</p> <p>Investment plans and policy for securing existing substations (on the PTS and on the PDS)</p> <p>Modification of the public network structure to limit the number of customers cut off outside the flood zone.</p> <p>Following an alert, securing of structures located in flood-prone areas</p>	<p>De-energizing certain structures in flooded areas</p> <p>Deployment of generators to restore power to customers cut off and located outside of flooded areas</p> <p>Anticipation of flooding, cleaning and repair operations.</p>
AODE	Investment choices	

Note: The national flood risk management strategy has 3 priority objectives:

- Increase the safety of exposed populations
- Stabilize in the short term, and reduce in the medium term, the cost of flood-related damages
- To shorten the time it takes the affected areas to return to normal.

Pursuant to Article L. 213-7 of the Environment Code, the Basin Coordinator Prefect leads and coordinates State policy in terms of flood risk assessment and management.



Territories concerned	<b>Pandemic</b>	Sheet
		N°9

Version	Date	
1	01/02/2022	Creation

### Corresponding regional scenario

Pandemic (n°27 - ENTSO-E report)

### Summary of the scenario

Spreading in France and/or in the world of a disease affecting the capacity of the sector's personnel to carry out their missions.

### Risk assessment

Last precedent: Covid-19 pandemic

### Crisis management threshold

Decision made by the Government in view of the health situation in France and in the world.

Competence	Preventive measures	Crisis management measures
State		ORSAN device (organization of the health system) <i>scale: national level]</i>  Influenza pandemic plan <i>scale: national level]</i>  Ebola Plan <i>scale: national level]</i>



Territories concerned	<b>Earthquake</b>	Sheet
		N°10

Version	Date	
1	01/02/2022	Creation

### Corresponding regional scenario

Earthquake

(n°30 - ENTSO-E report)

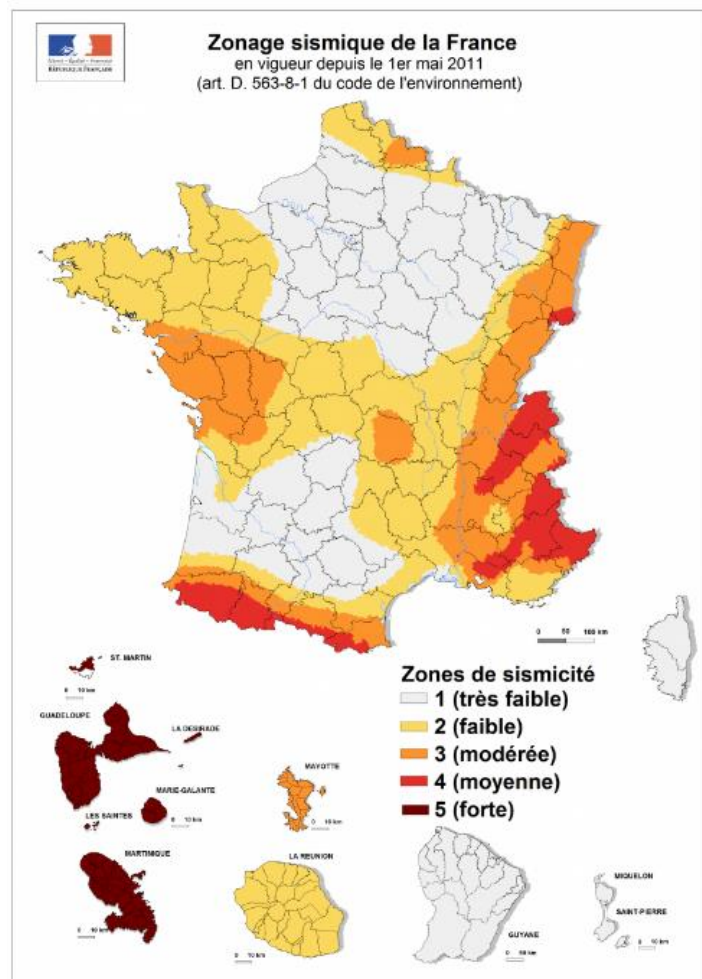
### Summary of the scenario

Occurrence of an earthquake whose location and magnitude are such that it has consequences on the electricity supply of French customers.

### Risk assessment

French municipalities are divided into the five seismicity zones defined in Article R. 563-4 of the Environmental Code (very low, low, moderate, medium, high) according to the list defined in Article D. 563-8-1 of the Environmental Code.

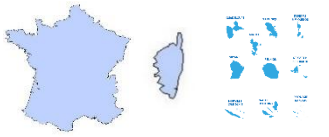
Throughout France, apart from the West Indies (Guadeloupe, Martinique, Saint-Martin, Saint-Barthélemy), few areas are exposed to major shocks: earthquakes of magnitude equal to or greater than 5 remain exceptional. However, because of the stakes (population, built-up areas, etc.), the increase in this exposure (increasingly urbanized areas) and the variable quality of construction, major earthquakes could cause several hundred victims in mainland France and several thousand in the Antilles.



Crisis management threshold

Alert issued by an earthquake monitoring agency or occurrence of an earthquake.

Competence	Specific prevention measures	Specific crisis management measures
State	<p>Framework of actions for seismic risk prevention <i>scale: national level]</i></p> <p>Antilles earthquake plan <i>[scope: Martinique, Guadeloupe, Saint-Martin and Saint-Barthélemy]</i></p> <p>Plan for the prevention of natural seismic risks (PPRS) <i>scale: department or sub-departmental level</i></p> <p>6. The PPRS have the value of a public utility easement. They include specific rules for the construction of buildings.</p>	
Facility manager	Facility sizing	

Territories concerned	<b>Fossil fuel shortage</b>	Sheet
		N°11

Version	Date	
1	01/02/2022	Creation

### Corresponding regional scenarios

Fossil fuel shortage

(n°13 - ENTSO-E report)

### Script Summary:

Due to disruptions in the supply of petroleum products or gas, the low availability of fossil fuels leads, firstly, to a reduction in the production of electricity from production facilities using these fuels as primary energy and, secondly, to their shutdown.

### Risk assessment

In mainland France, electricity production from fossil fuels represents 7.5% of the annual production in 2020, or 37.6 TWh<sup>27</sup>.

The majority of fossil fuel generation is from gas (34.5 TWh). The consequences of a disruption in the supply of fuel oil or coal will therefore be limited.

On the other hand, the electricity and gas systems are interdependent, particularly during periods of extreme cold and during winter peak consumption. The electricity and gas systems are subject to different balancing issues, with the electricity system being much faster than the gas system. Consideration has been given to how best to exploit these differences in the event of a crisis situation common to both the electricity and gas systems, for example by targeting interruptibility and natural gas load shedding measures for power plants during night-time periods when the electricity system is less busy.


### Crisis management threshold

At a time when the disruption of fossil fuel supply has consequences on electricity production, the crisis management system is already active with regard to this disruption of supply and its impacts on other sectors of the economy

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<sup>27</sup> For the record, annual production in mainland France in 2020: 500.1 TWh

Competence	Specific prevention measures	Specific crisis management measures
State	<p>Multiannual energy planning (PPE)</p> <p>Approval of the lists of customers connected to the public gas network providing a mission of general interest</p> <p>Management of strategic petroleum stocks</p>	<p>Relocation of strategic oil stocks</p> <p>Use of strategic petroleum stocks</p>
Gas industry entities	Natural gas supply obligation	Interruptibility and load shedding systems for natural gas consumption integrating the problem of balancing the electrical system
Petrol industry entities	Obligation to establish strategic stocks	

Territories concerned	<b>Shortage of nuclear fuel or saturation of spent fuel storage capacities</b>	Sheet
		N°12

Version	Date	
1	01/02/2022	Creation

### Corresponding regional scenarios

Nuclear fuel shortage

(n°14 - ENTSO-E report)

### Script Summary:

Following a prolonged disruption in<sup>28</sup> the supply of nuclear fuels, their use is limited and leads, firstly, to a generation reduction in some power plants and, secondly, to the shutdown of certain nuclear power plants.

Saturation of a reactor's storage pool (the pool in which spent fuel is stored for about two to three years before being sent to the La Hague plant) could also lead to a forced shutdown of the reactor in question. This shutdown could be generalized to several reactors, depending on the cause of the interruption in fuel disposal (e.g., a national transportation problem).

### Risk assessment

In mainland France, nuclear generation in 2020 was 335.4 TWh, or 67.1% of total generation<sup>29</sup>.

EDF's consumption of natural uranium for the French power plants represents about 8,000 metric tons per year, or 13% of the world's average consumption of 62,000 metric tons.

Reasonably accessible world reserves are estimated at 4.6 million tons of uranium (MtU), which corresponds to 74 years of world consumption. These reserves are globally well distributed geographically, with Australia (1.7 MtU), Africa (0.9 MtU), Central Asia (0.8 MtU) and North America (0.5 MtU) being the main regions.

The risk of a shortage is therefore relatively low, even though the uranium market has remained depressed since the Fukushima-Daiichi accident, with a very low average price currently in the range of \$28 to \$30 per pound of uranium.

With regard to fuel storage on the reactor sites, margins are provided to anticipate any problem related to the disposal of spent fuel or to the supply of fresh fuel. In concrete terms, during operation, the pool of a reactor must have a sufficient number of cells available to accommodate the assemblies of the entire reactor core and those of the new refill of the next cycle. This operational threshold is the "operating threshold".

<sup>28</sup> Duration evaluated on the basis of French fuel stocks

<sup>29</sup> For the record, annual production in mainland France in 2020: 500.1 TWh


In addition, for the record, the majority of spent fuel is stored at the Orano site in La Hague, which is subject to specific monitoring of its storage and fuel treatment capacities. New storage capacity will be required by 2030, and EDF is currently preparing regulatory applications to provide new capacity by that date. This subject is ruled and monitored by the national plan for the management of radioactive materials and waste. A long-term contract signed between Orano and EDF has made it possible to determine the strategic orientations for the transport, storage and processing of this spent fuel; it is supplemented by periodic contracts that determine, in particular, the investments and corresponding financing that must be made by the two partners to guarantee the achievement of the strategic orientations.

**Crisis management threshold**

Alert issued by EDF, Orano, the French Nuclear Safety Authority (ASN), the French Institute for Radiological Protection and Nuclear Safety (IRSN) or the French National Radioactive Waste Management Agency (ANDRA) relating to fuel or spent fuel.

Competence	Specific prevention measures	Specific crisis management measures
State	<p>National plan for the management of radioactive materials and waste</p> <p>Verification of compliance with the obligation for EDF to build up a stockpile of uranium for operation of its nuclear power plants, as well as of optimal maintenance of fuel cycle facilities in operational conditions and the availability of appropriate storage capacities.</p>	
Entities in the nuclear sector	<p>Inventory management</p> <p>Guarantee through long-term contracts</p> <p>Geographic and commercial diversification of supply sources for each stage of the fuel cycle (mining, conversion, enrichment and assembly manufacturing)</p>	



Territories concerned	Unavailability of one or more network elements	Sheet
		N°13

Version	Date	
1	01/02/2022	Creation

### Corresponding regional scenarios

Local incident with region-wide consequences <sup>30</sup>	(n°15 - ENTSO-E report)
Multiple and simultaneous failures	(n°18 - ENTSO-E report)
Power system control mechanism complexity	(n°19 - ENTSO-E report)

### Summary of scenarios

There are two possible scenarios, and these scenarios may correspond to a single scenario:

- Occurrence of an incident qualified as "beyond design basis<sup>31</sup>" by RTE or Enedis and having consequences on the electricity transmission network and/or on a source substation.
- Simultaneous failures or successive failures within a limited time frame of several elements of the electricity transmission system.

The origin of the incident may be related to the public electricity network or be located near the network.

This initially localized incident may lead to the destruction or securing of critical network elements, to an incident within an electrical substation, in particular a fire or an explosion.

#### Note:

Pursuant to Regulation (EU) 2017/1485 establishing a guideline on the management of the electricity transmission system, in particular Article 32 (2)<sup>32</sup>, in normal conditions, each electricity transmission

<sup>30</sup> Region as defined in the regulation

<sup>31</sup> An incident is considered to be "beyond design basis" if, on the scale of the public system concerned, the cost of the measures to be taken to prevent it is greater than the cost of the repairs to be undertaken. **Broader concept than the beyond design basis hazard as defined in 2017/1485**

<sup>32</sup> Article 32 paragraph 2 of EU Regulation No. 2017/1485 establishing a guideline on the management of the electricity transmission system: "*In situation (N-1), in normal state, each TSO, having prepared the corrective actions to be applied and executed within the time allocated for the permissible transient overloads, shall maintain the power flows within the permissible transient overloads referred to in Article 25(1)(c).* »

system operator is obliged to ensure the continuity of electricity supply in the event of the loss of certain network elements.

The resilience of the system to these hazards is called the (N-1) criterion.

#### Risk assessment

The risk assessment is carried out by each network operator. This assessment contributes to the sizing of the network and guides the maintenance policy of the structures.

#### Crisis management threshold

Detailed analysis.

The decision is based on the damage observed and whether or not the network operators need to benefit from state support.

Competence	Specific prevention measures	Specific crisis management measures
All entities	Application of regulation (EU) 2017/2196 establishing a network code on electricity emergency and restoration	Application of regulation (EU) 2017/2196 establishing a network code on electricity emergency and restoration
State	Land use planning, Approval of the siting of transmission system works Preservation of the strategic network in Île-de-France	In case of fire, general framework of intervention of the fire departments
Network operators, including RTE	Securing and strengthening the medium voltage network to allow the supply of a station from the neighboring stations. Siting of transmission system facilities Structure of stations Compartmentalization and measures to reduce the propagation of a fire within the stations and galleries.	
RTE (in addition to the previous cells)	Agreements between RTE on the one hand and the departmental fire and rescue services (SDIS) or fire departments on the other hand in order to prepare the framework for the intervention of firemen. Preservation of the strategic network in Île-de-France	
AODE and communities	Undergrounding of networks (except for tunneling)	

Territories concerned	<b>Unanticipated interaction of electricity market rules</b>	Sheet
		N°14

Version	Date	
1	01/02/2022	Creation

### Corresponding regional scenario

Unanticipated interaction of electricity market rules (n°25 - rapport ENTSO-E)

Summary of scenarioThe scenario would be initiated by highly unusual and extreme behavior of some or many market participants (market panic), which itself may result from one of the following circumstances:

- change in some energy market rules or mechanisms in at least one country, which allows an undesired market effect (such as leading to gaming or arbitrage detrimental to system security);
- highly unusual weather, demand or power system conditions, which are unfamiliar to many energy market participants;
- highly unusual weather may in particular mean very low or very high temperatures for 10 or more consecutive days;
- highly unusual demand may in particular mean a disturbance of demand lasting more than 10 consecutive days, and may itself result from economic, social or political conditions.

‘Energy markets’ can refer to all types of energy markets and capacity mechanisms, emission trading mechanisms, cross-border capacity trading mechanisms, DSR services traded on the markets, scarcity pricing, etc.

### Risk assessment


Likely

### Crisis management threshold

Occurrence of the incident

Competence	Specific prevention measures	Specific crisis management measures
State	Electricity market surveillance	
CRE	Electricity market surveillance	
Entities of the electricity sector	Active participation in the energy market and analysis of its functioning	



Territories concerned	<b>Human error during network operation</b>	Sheet
		N°15

Version	Date	
1	01/02/2022	Creation

### Corresponding regional scenario

Human error during network operation

(n°20 - rapport ENTSO-E)

Summary of scenario An operator or a service staff make a mistake, leading to a cascading event.

### Risk assessment


Likely

### Crisis management threshold

Occurrence of the incident

Competence	Specific prevention measures	Specific crisis management measures
Operators	<p>Issuance of security clearance for personnel who may, in the performance of their duties, threaten their security or that of a third party and for personnel in charge of operating the system</p> <p>Training associated with the issue and maintenance of this authorization.</p> <p>Maintaining employee skills with role-playing, refresher training and awareness-raising on new crises that may be encountered</p>	



Territories concerned	<b>Loss of communication means used to operate the system</b>	Sheet
		N°16

Version	Date	
1	01/02/2022	Creation

#### Corresponding regional scenario

Loss of communication means used to operate the system (n°17 - rapport ENTSO-E)

#### Summary of scenario

The scenario is either the unavailability of a substantial part of telecommunication infrastructure used for power system or electricity market operation or the unavailability of one or more ICT systems used in real-time planning and operation of the power system or energy market operation.

#### Risk assessment

Likely


#### Crisis management threshold

Occurrence of the incident

Competence	Specific prevention measures	Specific crisis management measures
Operators	Back-up procedures among dispatching	





Territories concerned	<b>Failure of a piece of equipment that is very present on the network</b>	Sheet
		N°17

Version	Date	
1	01/02/2022	Creation

### Corresponding regional scenario

Failure of a piece of equipment that is very present on the network (n°22 - rapport ENTSO-E)

### Summary of scenario

This scenario is initiated by some elements of the transmission or distribution network exhibiting abnormal behavior that increase their risk of failure or lead directly to failure. An analysis finds that the root cause is a systematic failure in manufacturing, installation or maintenance. All elements of the same type or series are assumed to be susceptible to the same failure. All suspected elements are assumed unsafe but can't all be immediately replaced or repaired.

### Risk assessment

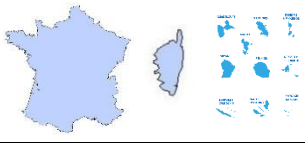
Likely

### Crisis management threshold

Occurrence of the incident

Competence	Specific prevention measures	Specific crisis management measures
Operators	Redundancy of strategic equipment Increased monitoring of equipment with a higher probability of hazard Company purchasing policy Inventory management of spare parts	



Territories concerned	<b>Industrial or nuclear accident</b>	Sheet
		N°18

Version	Date	
1	01/02/2022	Creation

### Corresponding regional scenarios

Industrial or nuclear accident (n°24 - ENTSO-E report)

### Summary of the scenario

Occurrence of an accident in an industrial or nuclear facility, the consequences of which go beyond the limits of the facility.

### Risk assessment

At the end of 2018, France identify 18,000 municipalities exposed to technological risks<sup>33</sup>. Exposure data for the entire French territory are available through the GASPARD database.


### Crisis management threshold

At the time when the accident has consequences on the electricity production, the crisis management system is already active for the management of this accident.

Competence	Specific prevention measures	Specific crisis management measures
State	Technological risk prevention plan (PPRT) <i>scale: site]</i>	National Response Plan to a Major Nuclear or Radiological Accident <i>scale: national level]</i>  Specific intervention plan (PPI) <i>[scale: site].</i>

<sup>33</sup> Sources of technological risks include, in addition to industrial and nuclear facilities, the transportation of hazardous materials, mining sites (referred to as "post-mining") and large dams.



Territories concerned	<b>Unusually big RES forecast error</b>	Sheet
		N°19

Version	Date	
1	01/02/2022	Creation

### Corresponding regional scenario

Unusually big RES forecast error

(n°26 - rapport ENTSO-E)

### Summary of scenario

This scenario may be initiated by remarkably different levels of electricity production or of electricity consumption due to unusually big forecasting errors, errors in forecast data or fast and unforeseen weather changes.

### Risk assessment

Unlikely

### Crisis management threshold

Occurrence of the incident

Competence	Specific prevention measures	Specific crisis management measures
Operators	Annual monitoring of weather forecast data in conjunction with Météo France  Monitoring of internal data to improve forecasting models	



## ANNEXE II – Risk preparedness among the countries of the Pentalateral forum (common chapter)

### Introduction and context

The Pentalateral Energy Forum (Penta) is the framework for regional cooperation in Central Western Europe, consisting of Austria, Belgium, France, Germany, Luxembourg, The Netherlands, and Switzerland. The forum aims to work towards improved electricity market integration and security of supply. Jointly, Penta countries cover more than a third of the EU population and more than 40% of EU electricity generation. The initiative aims to allow energy policy to evolve from a purely national focus to a regional approach. It allows for political backing to a process of regional integration towards a European energy market. To this end, the Ministers for Energy of the Pentalateral countries regularly meet in order to discuss energy policy matters and give guidance on this regional cooperation. The work programme is implemented by the transmission system operators (TSOs), ministries, regulatory authorities, the European Commission and the market players who regularly meet in different support groups. This collaboration is formalized through the Memorandum of Understanding of the Pentalateral Energy Forum, signed on 26 June 2007 in Luxembourg.

Security of supply in the electricity sector has always been one of the most important pillars of collaboration within the Pentalateral Energy Forum. To this end, at the beginning of 2020, the Forum received a mandate to work on a well-coordinated regional framework in light of the Regulation (EU) 2019/941 of the European Parliament and of the Council of 5 June 2019 on risk-preparedness in the electricity sector (Risk Preparedness Regulation), while at the same time building further on its Memorandum of Understanding (MoU) of 26 June 2017 on emergency planning and crisis management for the power sector. Penta therefore established a network of risk preparedness experts with representatives from ministries, regulatory authorities and TSOs from all Penta countries within the framework of Support Group II, mainly focussing on security of supply. Competent Authorities and their representatives, as depicted in the table below, actively contributed to the work.

The first two steps that were taken to work on this well-coordinated regional framework was the drafting of a common chapter that was added to the draft Risk Preparedness Plans and that was presented to the Electricity Coordination Group. This was followed by the signing of a new MoU of the Pentalateral Energy Forum on Risk Preparedness in the Electricity Sector on 1 December 2021 in Brussels by the Ministers representing the countries in the Pentalateral Energy Forum. Both documents aim to provide an answer to the requirements as regards regional and bilateral measures pursuant to article 12 and 15 of the Risk Preparedness Regulation. Furthermore, the MoU provides a basis for the work that will be done in the following years on risk preparedness in the Penta Region.

Country	Competent authority	Contact details
Belgium	Minister of Energy	<a href="https://www.belgium.be/en">https://www.belgium.be/en</a> Email: <a href="mailto:be-riskpreparedness@economie.fgov.be">be-riskpreparedness@economie.fgov.be</a>
Germany	Federal Ministry for Economic Affairs and Energy	<a href="https://www.bmwi.de/Navigation/EN/Home/home.html">https://www.bmwi.de/Navigation/EN/Home/home.html</a> Email: <a href="mailto:buer0-iiic4@bmwi.bund.de">buer0-iiic4@bmwi.bund.de</a>
France	Directorate General for Energy and Climate	Email: <a href="mailto:-solidaire.gouv.fr">-solidaire.gouv.fr</a>
Luxembourg	Minister for Energy	E-Mail: <a href="mailto:secretariat@energie.etat.lu">secretariat@energie.etat.lu</a>
Netherlands	Ministry of Economic Affairs and Climate Policy	Email: <a href="mailto:secretariaatelektriciteit@minezk.nl">secretariaatelektriciteit@minezk.nl</a>
Austria	Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology	Email: <a href="mailto:vi-8@bmk.gv.at">vi-8@bmk.gv.at</a>
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Table 1: Competent authorities in the Penta region

## Regional crisis scenarios

As highlighted in the Risk Preparedness Regulation, regional crisis scenarios are an important element to identify and elaborate the precise scope for cross-border cooperation and assistance. Article 6 of the Risk Preparedness Regulation assigned the task of identifying regional scenarios to ENTSO-E. However, the report presented by ENTSO-E did not provide sufficient detail on certain scenarios and their particular relevance for specific regions. Therefore, the Pentilateral Energy Forum saw the need to identify regional crisis scenarios pursuant to Article 5 and 6 of the Risk Preparedness Regulation, complementary to the work of ENTSO-E that had a Pan-European perspective<sup>34</sup>. Penta voluntarily performed a much more detailed analysis along the same principles and applying the same ENTSO-E methodology for the Penta perimeter, through extensive exchanges among national experts, ENTSO-E and the European Commission.

Early on in the process, national viewpoints among Penta countries were assessed in detail based on the national contributions to the ENTSO-E process. Despite a certain heterogeneity in levels of severity and ranking of scenarios, the assessment showed good correspondence and a significant cross-border dependency and/or interdependency among Member States for a large majority of scenarios.

It was agreed that the top five scenarios should receive particular attention for the elaboration of common measures.

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<sup>34</sup> Cf ENTSO-E report from September 2020 “Risk-Preparedness Regulation – Identification of Regional Electricity Crisis Scenarios”



Notably, significant cross-border dependencies arise from the fact that Penta is characterized by high levels of integration and interconnectivity<sup>35</sup>, as well as coordination and cooperation among Ministries, TSOs, regulators and market parties (in Penta and beyond), which leads to significant benefits, but also interdependencies when it comes to electricity crises. At the same time, integration and interconnectivity also allow to manage risks through appropriate measures.

During the assessment, experts also considered a more generic description of crisis scenarios, by using topical groupings, as a meaningful approach for risk preparedness. The specific scenarios may be less important for defining measures and arrangements than a more general type of scenario. For instance, whether an important line breaks down due to a storm or a heavy winter incident – both falling into the category of extreme weather conditions – is hardly decisive in identifying the most suitable prevention and mitigation measures to ensure a safe balance between supply and demand at all times and locations.

Penta members agreed to consider the top three topical groupings as particularly relevant for its geographical perimeter in terms of impact, likelihood and cross-border dependency. Meanwhile, it was also agreed upon to not completely discard the rest of the list, as different measures of assistance may be applicable to a broader set of scenarios.

While discussing these three scenario groupings, Penta paid particular attention to the triggers, the possible chain of events, and the impact those three scenario groupings would have on the electricity supply situation. While cyberattacks could lead to corruption of control of the system (including the market), extreme weather conditions and physical attacks could result in immediate physical damage to infrastructure. At the same time, all of these scenarios can lead to operational impacts, structural or systemic degradation, and/or endanger security of supply through an uncontrolled mismatch of supply and demand. This can result in an electricity crisis with load shedding and blackout states, and has to be considered during the elaboration of the regional measures.

## Regional procedures and measures

Pursuant to the requirements on solidarity and regional cooperation, the Pentilateral Energy Forum drafted and signed a MoU on Risk Preparedness in the Electricity Sector. It provides a common understanding and clear mandate to continue the collaboration concerning the identification of possible common measures.

The common measures that will be assessed in further detail within the Penta Context will build upon existing inter-TSO agreements, as well as other relevant solidarity mechanisms. Examples of such existing mechanisms are the network code on electricity emergency and restoration or the guideline on electricity transmission system operation. More specifically, possible common measures that will be analysed in more detail are: cross-border usage of reserve capacities and flexible loads, exchange about demand disconnection plans, surveillance of the short-term security of electricity supply,

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<sup>35</sup> As for market integration, note that Penta has been at the forefront of running a Flow-Based-Market Coupling regime. High levels of interconnectivity are demonstrated in the report of the Commission Expert Group on electricity interconnection targets “Towards a sustainable and integrated Europe”, for instance.

coordinate information regarding saving appeals to the public, support with electric equipment, knowledge and expertise, and usage of mobile generators. Within the context of Support Group II of the Pentalateral Energy Forum dealing with security of supply, a preliminary exchange on these measures already took place. Based on the mandate and intentions expressed in the MoU, they will be further analysed from a regional point of view with respect to their technical, legal and economic characteristics.

## Public consultation

An essential factor in setting-up an effective and efficient crisis management framework is ensuring its overall consistency. Therefore, the interaction between the regional procedures and measures identified in the previous chapters and the policies set-out at national level should be assessed. Furthermore, the cross-border impact of the measures of individual countries needs to be assessed.

In this context, the Pentalateral Energy Forum organised a regional assessment of the draft national Risk Preparedness Plans amongst its Member States. The focus of this assessment was on cross-checking the consistency of the procedures and measures at national, bilateral and regional level. To achieve this, Competent Authorities shared the English version of their draft Risk Preparedness Plans with the Support Group II of the Forum in May 2021. A dedicated meeting of Support Group II of the Forum was then organized in June 2021, to exchange initial concerns and make clarifications. To align this initiative with the activities on a European level, the European Commission was invited to attend the meeting, and a representative of the Forum was available shortly after to give a presentation of the main results of the outcomes of the regional assessment during a dedicated meeting of the Electricity Coordination Group in June 2021.

The outcomes of this meeting will be included in the progress report on the implementation measures of the regional aspects of the Risk Preparedness Regulation by the Pentalateral Energy Forum, which were presented to Directors-General at the end of June. Afterwards, Penta-members had until mid-July to file written comments to the draft national Risk Preparedness Plans. Member States took these comments into account while finalizing their Risk Preparedness plans.

## Regional emergency test

Penta-members carried out a first joint exercise in 2018 based on the MoU on Emergency Planning and Crisis Management concluded in 2017.

The successful exercise enabled the sharing of different national power crisis management mechanisms and established contact between crisis management bodies in the Penta region for the first time. The report after the joint exercise expressed the following:

1. “The exercise goals were met:
  - The participants got to know each other better, even in a national setting, and strengthened the Penta network,
  - Awareness was raised on national and cross-border issues arising from a Europe-wide scarcity situation,

- Some best practices were identified and explored,
  - This exercise was a first step in jointly working towards an even better collaboration within the Penta community.
2. Penta sets a good example, but needs to keep on running:
    - Penta is a front runner amongst multilateral forums in the area of crisis management and leads the effort on cross border harmonization
    - Penta needs to build a road map for future improvements in effective crisis prevention and management based on the lessons learned and,
    - The effort needs to be expanded to the EU-level
  3. We have to be aware that, in order to maintain grid stability, the technical solution always prevails over political solutions.
  4. At TSO level, there are mechanisms and tools in place to coordinate, to operate and to communicate on a daily basis with each other, but in case of electricity crisis prevention and management a formalization of this platform should be encouraged.”

Given the success of the first joint exercise and the identified action points, Penta members acknowledge the importance of continuing to regularly organise joint exercises. Based on the MoU signed in December 2021 and pursuant to article 12 of the Risk Preparedness Regulation, these will be held biannually starting in the fall of 2022. The exercises will mainly aim to assess the coordination, communication and mutual assistance mechanisms. The specifics of the upcoming joint exercises have been drafted and aligned within Support Group II during the finalisation of the Risk Preparedness Plans.



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*Égalité*  
*Fraternité*

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