Federal Ministry
Economy, Energy
and Tourism
Republic of Austria

Risk-Preparedness Plan for the Electricity Sector of the Republic of Austria

Risk-Preparedness Plan in accordance with Art. 10
Regulation (EU) 2019/941 of the European Parliament and of the Council of 5 June 2019 on risk-preparedness in the electricity sector and repealing Directive 2005/89/EC

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1 General information

1.1 Name of the competent authority responsible for the preparation of this plan

The competent authority that is responsible for the preparation of this plan is the Federal Ministry of Economy, Energy and Tourism, Directorate General V - Energy, Department V/3 - Crisis Management and Energy Intervention. The plan was prepared in cooperation with E-Control and the operational control area manager Austrian Power Grid AG (APG).

1.2 Member States in the region

In accordance with Art. 2 (16) Regulation (EU) 2019/941 "region" means a group of Member States whose transmission system operators share the same regional coordination centre as referred to in Art. 36 Regulation (EU) 2019/943[1].

The Republic of Austria is part of the Central Europe System Operation Region, which also includes the following Member States[2]:

- French Republic
- Kingdom of the Netherlands
- Grand Duchy of Luxembourg
- Hungary
- Slovak Republic
- Republic of Romania
- Republic of Croatia
- Kingdom of Belgium
- Federal Republic of Germany
- Republic of Poland
- Czech Republic
- Republic of Italy
- Republic of Slovenia

[1] Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity.

[2] See Annex I to Decision No. 05/2022 of the European Union Agency for the Cooperation of Energy Regulators (ACER) of 7 April 2022 on the definition of system operation regions.

2 Summary of the electricity crisis scenarios

2.1 Electricity crisis scenarios identified at regional level

In accordance with Art. 6 (1) Regulation (EU) 2019/941 and based on the methodology specified in Art. 5 (6) Regulation (EU) 2019/941 and approved by the Agency for the Cooperation of Energy Regulators (ACER) in decision dated 8th March 2024, No. 02/2024[3], the European Network of Transmission System Operators for Electricity (ENTSO-E) has updated the most relevant regional electricity crisis scenarios. The regional electricity crisis scenarios have to be updated at least every four years.

Compared to the regional scenarios identified in 2020, ENTSO-E has reduced the number of scenarios – by merging them – from 31 to 23, with scenarios 4, 6 and 23 being added for the first time. The ENTSO-E's updated list of the most important regional electricity crisis scenarios is as follows:

Table 1 Regional electricity crisis scenarios in accordance with Art. 6 (1) Regulation (EU) 2019/941

Number	Regional Electricity Crisis Scenarios
1	Severe summer
2	Severe winter
3	Severe storm
4	Heavy ice loading
5	Heavy flooding
6	Dunkelflaute (extremely low wind/solar generation)
7	Unusually big forecast errors
8	Earthquake

[3] Decision No 02/2024 of the European Union Agency for the Cooperation of Energy Regulators (ACER) of 8 March 2024 on the amendment of the methodology for identifying regional electricity crisis scenarios.

Number	Regional Electricity Crisis Scenarios
9	Volcanic eruption
10	Space weather
11	Fossil fuel shortage
12	Nuclear fuel shortage
13	Large industrial/nuclear accident
14	Serial technical defects
15	Pandemic
16	Industrial action, strikes, riots
17	Unforeseen interaction of energy markets
18	Physical attack on critical assets
19	Physical attack on control centres
20	Attack on entities not connected directly to the grid
21	Loss of ICT systems to cyberattack
22	Unauthorised action by personnel
23	Targeted political malicious actions by adversarial states

2.2 Electricity crisis scenarios identified at national level and preventive and preparatory measures

2.2.1 Principles and process of identification

After identifying the regional electricity crisis scenarios, the competent authority of each Member State, i.e. the Federal Minister of Economy, Energy and Tourism for the Republic of Austria, was tasked with identifying the most relevant national electricity crisis scenarios in accordance with Art. 7 (1) Regulation (EU) 2019/941.

These must be consistent with the regional electricity crisis scenarios identified in accordance with Art. 6 (1) Regulation (EU) 2019/941.

For the purposes of updating the most relevant national electricity crisis scenarios the then Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (now Federal Ministry of Economy, Energy and Tourism, abbreviated to BMWET) assessed the

23 regional electricity crisis scenarios in terms of their national relevance. The scenarios depicted in Table 2 are those that qualified as the most relevant national electricity crisis scenarios according to the BMWET as competent authority in accordance with Art. 3 Regulation (EU) 2019/941.

The identification of national scenarios was carried out using a combination of practical experience, knowledge of past disruptions of the same or similar nature, and an assessment based on the national conditions in Austria. A more detailed description of the criticality of each national electricity crisis scenario is provided in Table 2 under the column "Potential Impacts, Comments". For characterizing the individual national scenarios, the immediate impact on the operation of the power grid plays the most significant role, since potential disruptions to the transmission system pose the greatest challenge to security of electricity supply and can also have cross-sectoral effects.

In some of the scenarios listed in Table 2, a spectrum of potential impacts is depicted. This arises from the diverse ways in which a single scenario can potentially unfold. Even instances of multiple damages, in a situation of low demand and corresponding spatial confinement, may result in very locally limited effects. However, during periods of high demand and particularly unfavorable circumstances (such as the simultaneous impact of a widespread and severe weather event on multiple transregional transmission lines), this could also lead to an escalation, potentially resulting in widespread outages.

In principle, the operational situation of the network at the time of the triggering event is crucial for almost all of the national scenarios depicted in Table 2. Thus, the same event can lead to different escalation sequences and, consequently, distinct impacts on other sectors. Similarly, the time horizons can vary significantly.

With the exception of impending (predictable) weather or scarcity situations, most risks have very short lead times.

The components in the high-voltage power grid are highly resilient to environmental influences. Only extreme events may pose a threat due to the largely present overhead construction.

The impacts of climate change on renewable electricity generation are addressed in the Electricity Security of Supply Strategy that was published in 2024 (see Chapter 2.4.1).

The scenarios presented in Table 2 can be distinguished as follows:

- Short lead time with exclusively network-related consequences and short-term impacts (e.g. Scenario No. 14);

- Short lead time with potentially severe damage and longer-term effects (e.g. Scenario No. 18);
- Longer lead time with mostly prolonged consequences (e.g. Scenario No. 11).

Any possible disturbances in close proximity to cross-border lines generally have the greatest potential to impact other member states.

2.2.2 Detailed depiction

The preventive, preparatory and mitigation measures set forth in Table 2 are being implemented by the transmission system operators in coordination with E-Control and relevant partners in accordance with the valid laws. If any laws are referenced in Table 2, their enforcement falls under the responsibility of the competent national authorities respectively.

Table 2 National electricity crisis scenarios in accordance with Art. 7 (1) Regulation (EU) 2019/941

Root cause category: "Weather"					
No.	**Scenario**	**Description of the scenario**	**National rating[4]**	**Potential impacts, comments**	**Preventive, preparatory and mitigation measures**
1	Severe Summer (exceptionally high temperatures and drought)	High and temporarily extreme temperatures, well above seasonal averages, are accompanied by drought/dry periods and forest/bush fires across one or more regions in Europe - leading to increased demand (primarily due the increased use of air conditioning), lower generation availability, and reduced transmission capacities.	6	**Heat wave:** Force majeure - can lead to malfunctions ranging from negligible up to severe damage with cascading failures and widespread power outage. Hydropower plants and thermal power plants (cooling water requirements) can experience severe feed restrictions during extreme cold, heat, or drought; Extreme heat can result in higher system loads in the summer, which could lead to higher powerline temperatures (overall higher thermal stress on the cable insulation). **Dry periods:** Dry periods are not limited to heat wave incidents (e.g. winter). Risk of supply shortages currently low due to (pumped) storage power	**General:** • Monitoring and assessment of the condition of regional and European networks using the process of short-term and seasonal adequacy assessment carried out by ENTSO-E in accordance with Art. 9 Regulation (EU) 2019/941 to identify possible situations of insufficient load coverage, as well as through the WOPT (Weekly Operational Planning Teleconference) between transmission system operators within TSCNET[5] and DACF (Day-Ahead Congestion Forecast) of the transmission system operators in cooperation with the regional coordination centres to carry out load forecasts and identify possible problems and bottlenecks, as well as possible countermeasures if necessary; • Ensuring sufficient flexible capacity for congestion management; The extent to which the grid reserve is further needed will be determined as part of the system analysis to be

[4] The assessment of the national electricity crisis scenarios is based on the amendment to the methodology for identifying regional electricity crisis scenarios prepared by ENTSO-E and approved by ACER in its Decision No. 02/2024 of 8 March 2024. The assessment is carried out using a numerical scale from 0 to 10, with the values 0 (low), 1 (medium), 2 (high), 5 (very high) and 10 (extremely high) serving as reference points. Intermediate values may be used to allow for a more granular differentiation of the assessment.

[5] TSO Security Cooperation Net Services GmbH.

Root cause category: "Weather"					
No.	**Scenario**	**Description of the scenario**	**National rating[4]**	**Potential impacts, comments**	**Preventive, preparatory and mitigation measures**
				plants and good import capacities from other countries to date.	carried out annually by the control area manager in coordination with the regulatory authority in accordance with section 143 (2) Electricity Industry Act (ElWG)[6];[7] • Sufficient availability of storable energy sources for electricity generation[8] (see in particular the measures for gas and fuel storage regarding scenario 11); • Implementation of vegetation control mechanisms and monitoring of networks using dynamic line rating. **Heat wave:** • Maintenance of spare parts stocks, especially for the rapid reconstruction of power poles and lines. **Dry period:** • Contingency plans in place; • Energy intervention measures if the prerequisites in accordance with section 4 Energy Intervention Powers Act 2012 (EnLG 2012)[9] are met; extensive and regular energy intervention exercises;

[6] Federal Act on the Regulation of the Electricity Industry (Electricity Industry Act – ElWG), Federal Law Gazette I No. 91/2025.

[7] Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology [now: Federal Ministry of Economy, Energy and Tourism] (Ed.): Electricity Security of Supply Strategy, Vienna 2024, p. 72 et seq.

[8] Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology [now: Federal Ministry of Economy, Energy and Tourism] (Ed.): Electricity Security of Supply Strategy, Vienna 2024, p. 113 et seq.

[9] Federal Law on Intervention Measures to Safeguard Energy Supplies (Energy Intervention Powers Act 2012 – EnLG 2012), Federal Law Gazette I No. 41/2013, as amended.

Root cause category: "Weather"					
No.	**Scenario**	**Description of the scenario**	**National rating[4]**	**Potential impacts, comments**	**Preventive, preparatory and mitigation measures**
					• Sufficient stockpiling of critical electronic components and strong physical security at the storage location.
2	Severe winter	Cold and temporarily extreme temperatures, well below seasonal averages, are experienced for a period in one or more regions across Europe - leading to increased demand with lower availability of thermal generation, accompanied by reduced renewable generation.	10	Force majeure – can lead to malfunctions ranging from negligible up to severe damage with cascading failures and widespread power outage; hydropower plants and thermal power plants (cooling water requirements) can experience severe feed restrictions during extreme cold, heat, or drought.	• Monitoring and assessment of the condition of regional and European networks using the process of short-term and seasonal adequacy assessment carried out by ENTSO-E in accordance with Art. 9 Regulation (EU) 2019/941 to identify possible situations of insufficient load coverage, as well as through the WOPT (Weekly Operational Planning Teleconference) between transmission system operators within TSCNET and DACF (Day-Ahead Congestion Forecast) of the transmission system operators in cooperation with the regional coordination centres to carry out load forecasts and identify possible problems and bottlenecks, as well as possible countermeasures if necessary; • Maintenance of spare parts stocks, especially for the rapid reconstruction of power poles and lines; operational measures for de-icing are possible in particular cases; • Stockpiling and concept for the use of devices for heating temperature-sensitive components (to maintain the functionality of electronic components, control systems, etc.); • Ensuring sufficient flexible capacity for congestion management; the extent to which the grid reserve is further needed will be determined as part of the system analysis to be carried out

Root cause category: "Weather"					
No.	**Scenario**	**Description of the scenario**	**National rating[4]**	**Potential impacts, comments**	**Preventive, preparatory and mitigation measures**
					annually by the control area manager in consultation with the regulatory authority in accordance with section 143 (2) ElWG;[10] • Sufficient availability of storable energy sources for electricity generation[11] (see in particular the measures for gas and fuel storage regarding scenario 11); The provision of section 89 ElWG allows the operation of energy storage facilities[12] - which is generally reserved for the market - to be carried out by system operators under certain conditions;[13] • Utilization of seasonal demand-side and supply-side flexibilities and shifting possibilities;[14] • Energy intervention measures if the prerequisites in accordance with section 4 EnLG 2012 are met; related exercises with relevant partners.

[10] Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology [now: Federal Ministry of Economy, Energy and Tourism] (Ed.): Electricity Security of Supply Strategy, Vienna 2024, p. 72 et seq.

[11] Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology [now: Federal Ministry of Economy, Energy and Tourism] (Ed.): Electricity Security of Supply Strategy, Vienna 2024, p. 113 et seq.

[12] This includes, for example, batteries, pumped-storage facilities, and conversion plants, which also include electrolysis plants (see the explanatory notes to the ElWG, ErlRV 312 XXVIII. GP, 5).

[13] Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology [now: Federal Ministry of Economy, Energy and Tourism] (Ed.): Electricity Security of Supply Strategy, Vienna 2024, p. 33.

[14] Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology [now: Federal Ministry of Economy, Energy and Tourism] (Ed.): Electricity Security of Supply Strategy, Vienna 2024, p. 52 et seq.

Root cause category: "Weather"					
No.	**Scenario**	**Description of the scenario**	**National rating[4]**	**Potential impacts, comments**	**Preventive, preparatory and mitigation measures**
3	Severe storm	Storms with extreme winds lead to multiple failures of electrical infrastructure components, as well as high-speed shut down of wind generation. Strong hail can affect power poles and conductor lines through mechanical stress and damage to insulators.	6	Force majeure – can lead to malfunctions ranging from negligible up to severe damage with cascading failures and widespread power outage.	• Monitoring and assessment of the condition of regional and European networks through the WOPT (Weekly Operational Planning Teleconference) between transmission system operators within TSCNET; • Maintenance of spare parts stocks, especially for the rapid reconstruction of power poles and lines; • Analysis of endangered areas; • Correspondingly trained personnel; • Personnel and material assistance through the Oesterreichs Energie (Association of Austrian Electricity Companies) troubleshooting platform.
4	Heavy ice loading	Multiple overhead line faults arise as ice loading and/or sticky snow cause/s insulators/fittings to fail, conductors to drop and poles to be damaged. Wind and solar PV generation is impacted due to ice and snow.	4	**Lines:** Heavy mechanical forces on lines and insulators can lead to outages. **Windmills:** Icing of blades on numerous windmills can potentially lead to large scale outages of wind power plants.	• Monitoring and assessment of the condition of regional and European networks using the process of short-term adequacy assessment in accordance with Art. 9 Regulation (EU) 2019/941 to identify possible situations of insufficient load coverage, as well as through the WOPT (Weekly Operational Planning Teleconference) between transmission system operators within TSCNET and DACF (Day-Ahead Congestion Forecast) of the transmission system operators in cooperation with the regional coordination centres to carry out load forecasts and identify possible problems and bottlenecks, as well as possible countermeasures if necessary;

Root cause category: "Weather"					
No.	**Scenario**	**Description of the scenario**	**National rating[4]**	**Potential impacts, comments**	**Preventive, preparatory and mitigation measures**
					• Situation-related adjustment of wind-intraday-forecasts, including marketing of deviations by APG as part of the service for OeMAG[15]; • Implementing of icing sensors and monitoring of lines, respectively; • Heating of wind mill blades; • Forecasting of possible icing.
5	Heavy flooding	Heavy rain and/or rapidly melting snow gives rise to the flooding of electric power substations and power plants, as well as damage to electrical infrastructure (lines and substations); transformer station can potentially be affected (especially "underground stations").	10	Force majeure – can lead to malfunctions ranging from negligible up to severe damage with cascading failures and widespread power outage.	• Monitoring and assessment of the condition of regional and European networks using the process of short-term adequacy assessment in accordance with Art. 9 of Regulation (EU) 2019/941 to identify possible situations of insufficient load coverage, as well as through the WOPT (Weekly Operational Planning Teleconference) between transmission system operators within TSCNET and DACF (Day-Ahead Congestion Forecast) of the transmission system operators in cooperation with the regional coordination centres to carry out load forecasts and identify possible problems and bottlenecks, as well as possible countermeasures if necessary; • Maintenance of spare parts stocks, especially for the rapid reconstruction of power poles and lines; • Provision of sealing materials, e.g. sandbags, and water pumps;

[15] Abwicklungsstelle für Ökostrom AG (Settlement Centre for green electricity).

Root cause category: "Weather"					
No.	**Scenario**	**Description of the scenario**	**National rating[4]**	**Potential impacts, comments**	**Preventive, preparatory and mitigation measures**
					• Analysis of endangered areas; • Correspondingly trained personnel; • Personnel and material assistance through the Oesterreichs Energie (Association of Austrian Electricity Companies) troubleshooting platform.
6	Dunkelflaute (extremely low wind/solar generation)	Total available energy resources are insufficient to meet demand, due to lack of renewable generation over wide areas of Europe (particularly, the lack of solar PV at winter evening peak associated with periods of very low wind).	4	Potential shortage situations and the need to take emergency measures for grid operation, including manual load shedding in accordance with the system defence plan.	• Monitoring and assessment of the condition of regional and European networks using the process of short-term and seasonal adequacy assessment carried out by ENTSO-E in accordance with Art. 9 of Regulation (EU) 2019/941 as well as through the DACF (Day-Ahead Congestion Forecast) of the transmission system operators in cooperation with the regional coordination centres to carry out load forecasts and identify possible bottlenecks; • Ensuring sufficient flexible capacity for congestion management; the extent to which the grid reserve is further needed will be determined as part of the system analysis to be carried out annually by the control area manager in consultation with the regulatory authority in accordance with section 143 (2) Electricity Industry Act (ElWG);[16]

[16] Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology [now: Federal Ministry of Economy, Energy and Tourism] (Ed.): Electricity Security of Supply Strategy, Vienna 2024, p. 72 et seq.

Root cause category: "Weather"					
No.	**Scenario**	**Description of the scenario**	**National rating[4]**	**Potential impacts, comments**	**Preventive, preparatory and mitigation measures**
					• Sufficient availability of storable energy sources for electricity generation[17] (see in particular the measures for gas and fuel storage regarding scenario 11); The provision of section 89 ElWG allows system operators to operate energy storage facilities – an activity normally reserved for the market – under certain conditions;[18] • Utilization of seasonal demand-side and supply-side flexibilities and shifting possibilities;[19] • Postponing of maintenance (lines, substations, power plants); • Maximizing of available generation capacities; • Insofar as the requirements of section 4 EnLG 2012 are met, electricity intervention measures may be taken, especially provisions on the operation and permission to breach emission limits regarding electricity generating facilities in accordance with section 14 (1) no. 4 in conjunction with section 19 EnLG 2012 in order to increase infeed.

[17] Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology [now: Federal Ministry of Economy, Energy and Tourism] (Ed.): Electricity Security of Supply Strategy, Vienna 2024, p. 113.

[18] Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology [now: Federal Ministry of Economy, Energy and Tourism] (Ed.): Electricity Security of Supply Strategy, Vienna 2024, p. 33.

[19] Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology [now: Federal Ministry of Economy, Energy and Tourism] (Ed.): Electricity Security of Supply Strategy, Vienna 2024, p. 52.

Root cause category: "Weather"					
No.	**Scenario**	**Description of the scenario**	**National rating[4]**	**Potential impacts, comments**	**Preventive, preparatory and mitigation measures**
7	Unusually big forecast errors for renewables	Unusually big errors in the forecast of demand and/or renewable generation, leading to problems balancing supply and demand in the power system.	4	The critical need for control energy could exceed the available reserve capacities in very rare cases (e.g. large-scale wind turbine icing or generation surplus).	• Wind-intraday marketing of forecast deviations to close gaps that arise due to forecast deviations, provided that sufficient liquidity is available; • Correspondingly dimensioned control reserves and concepts for penalties with regard to control reserve providers in the event of deviations.

Root cause category: "Supply chain"					
No.	**Scenario**	**Description of the scenario**	**National rating[20]**	**Potential impacts, comments**	**Preventive, preparatory and mitigation measures**
11	Fossil fuel shortage (in particular natural gas)	Fossil fuels cannot be supplied due to supply chain disruptions (external or internal to Europe) - caused by an accident, attack, and/or geopolitical developments.	4	The total capacity of all gas storage facilities on Austrian territory currently amounts to around 100.28 TWh and is therefore higher than the annual gas consumption (gas consumption in 2025 was 80,85 TWh). Gas storage facilities are normally sufficiently filled (the greatest	Austrian legislation contains a number of provisions that contribute to increase the security of gas supply: • Existence of a strategic gas reserve based on section 18a et seq. Gas Act 2011 (Gaswirtschaftsgesetz 2011 – GWG 2011)[21] amounting to 20 TWh;

[20] The assessment of the national electricity crisis scenarios is based on the amendment to the methodology for identifying regional electricity crisis scenarios prepared by ENTSO-E and approved by ACER in its Decision No. 02/2024 of 8 March 2024. The assessment is carried out using a numerical scale from 0 to 10, with the values 0 (low), 1 (medium), 2 (high), 5 (very high) and 10 (extremely high) serving as reference points. Intermediate values may be used to allow for a more granular differentiation of the assessment.

[21] Federal Act Providing New Rules for the Gas Sector (Gas Act 2011 – GWG 2011), Federal Law Gazette I No. 107/2011, as amended.

Root cause category: "Supply chain"					
No.	**Scenario**	**Description of the scenario**	**National rating[20]**	**Potential impacts, comments**	**Preventive, preparatory and mitigation measures**
				risk of this crisis scenario materializing occurs at the end of the heating period, depending on the storage fill level). Short-term bottlenecks can be bridged by reducing the operating pressure in the gas pipelines. Due to the large storage capacity, an actual gas supply scarcity generally only occurs in the case of a prolonged gas shortage, provided storage levels are sufficient. Since January 1, 2025, the previous main import route for Austria, via Ukraine, has no longer been available. Despite the previous infrastructure being primarily oriented toward imports via Slovakia, import capacities from Germany and Italy are significantly higher than Austria's annual demand.	• To ensure security of supply, Austria has expanded its import capacities; The technical capacities currently enable an annual import of 185 TWh of gas into the Market Area East via Germany and Italy; The Market Areas Tyrol and Vorarlberg have a combined annual demand of around 6 TWh and are already supplied to 100 % via Germany; Once the first part of the WAG-Loop (West Austria Gas Pipeline) for the enhancement of the import capacity from Germany is completed (planned from 2027), the import capacity from Germany and Italy to the Market Area East will increase up to 212 TWh per year; In addition, import capacities are available for direct filling of the Haidach and 7Fields gas storage facilities via Germany (capacity: 38 TWh per year); Gas purchases from Slovakia are also still possible, with a technical import capacity of 573 TWh per year.[22] • Possibility of self-storage for industry and the protection of the stored gas quantities in the case of energy intervention measures under the prerequisites in section 26a EnLG 2012; • Mandatory fuel stocks for power plants in accordance with section 28 (1) of the Oil Stockholding Act 2012 (Erdölbevorratungsgesetz 2012 - EBG 2012)[23]: To secure the electricity supply, operators of fossil-fuel-fired power

[22] https://energie.gv.at/versorgung/woher-kommt-oesterreichs-gas-1.

[23] Federal Act on the Holding of Minimum Stocks of Crude Oil and Oil Products (Oil Stockholding Act 2012 - EBG 2012), Federal Law Gazette I No. 78/2012, as amended.

Root cause category: "Supply chain"					
No.	**Scenario**	**Description of the scenario**	**National rating[20]**	**Potential impacts, comments**	**Preventive, preparatory and mitigation measures**
					plants shall maintain fuel stocks in a quantity that allows them, at any time, to continue to supply electrical energy at the maximum capacity for a period of 30 days or to cover their own needs; For operators of generation facilities with a maximum capacity of 50 MW or more that are connected to the public grid and are predominantly operated with natural gas, the provision of section 75 ElWG applies; Through maintainance of gas these operators must ensure that their generation facilities can be supplied with natural gas for a total period of 30 days from 1 October to 1 March, provided that sufficient storage capacity is available for this purpose; • In accordance with the provision of section 121 (5a) GWG 2011, gas suppliers are obliged to guarantee the supply of protected customers for a total period of 45 days from October 1 to March 1, assuming average winter conditions; This obligation is reduced to a period of 30 days in total if it can be proven to the regulatory authority by means of suitable documentation that the gas volumes held in reserve to fulfill this obligation originate entirely in countries that are not affected by a valid measure within the meaning of Regulation (EU) No. 833/2014, OJ L 229, 31.7.2014, p. 1, as amended by L 59I, 25.2.2023, p. 6; • If intervention measures to safeguard natural gas supplies in accordance with section 4

Root cause category: "Supply chain"					
No.	**Scenario**	**Description of the scenario**	**National rating[20]**	**Potential impacts, comments**	**Preventive, preparatory and mitigation measures**
					EnLG 2012 become necessary, special consideration will be given to large gas customers in the energy sector due to their systemic relevance; • Utilization of seasonal demand-side and supply-side flexibilities and shifting possibilities;[24] • The possibility of prioritisation of certain critical gas-fired power plants over the gas supply to certain categories of protected customers in accordance with Art. 11 (7) Regulation (EU) 2017/1938 upon the request of the relevant electricity transmission system operator or gas transmission system operator (in the event that the loss of gas supply to these critical gas-fired power plants could either result in severe damage in the functioning of the electricity system or would hamper the production and/or transportation of gas).

[24] Cf. Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology [now: Federal Ministry of Economy, Energy and Tourism] (Ed.): Electricity Security of Supply Strategy, Vienna 2024, p. 52.

Root cause category: "Technical reasons"					
No.	**Scenario**	**Description of the scenario**	**National rating**	**Potential impacts, comments**	**Preventive, preparatory and mitigation measures**
13	Large industrial/nuclear accident with long-term effects as a result of radioactive or toxic contamination, leading to prolonged staff unavailability (for months or years)	An incident at a nuclear or industrial facility leads to widespread contamination, causing disruptions in electricity supply and rendering large areas inaccessible for extended periods.	2	If a critical number of key employees in network operations (operators, maintenance/repair personnel, operational planning experts, etc.) are not available, the ability to control is threatened, urgent repairs can no longer be carried out, and essential operational processes are severely impaired.	• Lockdown of control rooms in emergencies; • Emergency supplies are already in place; • Protective clothing/equipment is available; • Internal regulations for access to buildings (limitation of spreading), remote work has been made possible (wherever applicable); • Redundancy concepts with system and a certain degree of location redundancy of central control units (control centres).
14	Serial technical defects	The same critical equipment from specialised vendors/manufacturers is used in many grids or power plants; A serial/common failure or safety risk associated with potential failure of this equipment could impact many grids and power plants.	1,2	Extensive inspection and maintenance concept and measures taken in relation to large generation facilities. The likelihood of this scenario materialising is highest for microgeneration facilities if inverters from the same provider are used on a large scale.	• Regular inspection and maintenance, internal CIP (continuous improvement process) for evaluation of every single incident (grid analysis team) in place; • Exchange on expert level between system operators within the working groups of Oesterreichs Energie (Association of Austrian Electricity Companies) for relevant system assets; • Serial equipment failure can be identified and communicated in a timely manner due to international cooperation (between the respective CERTs – computer emergency response teams).

Root cause category: "Human causes"					
No.	**Scenario**	**Description of the scenario**	**National rating**	**Potential impacts, comments**	**Preventive, preparatory and mitigation measures**
15	Pandemic	A highly infectious disease across Europe leads to prolonged staff shortages in the energy sector, which in turn causes problems with energy supply and a safe operation of the power system. Other sectors are also affected, impacting system demand as well as services provided to the sector. Energy markets may also be adversely affected.	4	If a critical number of key employees in network operations (operators, maintenance/repair personnel, operational planning experts, etc.) are not available, the ability to control is threatened, urgent repairs can no longer be carried out; A potential loss of key operating personnel (power plant operators and dispatchers) could also have a critical impact on power plants (impairment of controllability and troubleshooting).	• Lockdown of control rooms in emergencies; • Emergency supplies are already in place; • Protective clothing/equipment is available; • Internal provisions for access to buildings (limitation of spreading), remote work has been made possible (wherever applicable).
17	Unforeseen interaction of energy markets	A highly unusual or unexpected event affecting the bulk energy markets (or related mechanisms) creates a situation, which is unknown to the market participants; A market panic, a flood of automated trades, a sudden rush to take advantage of a newly discovered arbitrage opportunity, or any other event with similar characteristics, may cause the markets to fail to fulfil their role. In particular, security of supply or power grid stability may be affected.	4	Low risk due to the high sense of corporate responsibility of the market partners in Austria.	• Correspondingly dimensioned control reserves and concepts for penalties with regard to control reserve providers in the event of deviations; • Strict regulations (the electricity market code)[25] in Austria.

[25] The market rules for the electricity market are the sum of all regulations, rules and provisions on a legal or contractual basis that market participants in the electricity market must comply with in order to enable and ensure the orderly functioning of this market. E-Control has to develop the market rules in cooperation with the market participants, and to publish and make them available in an appropriate manner. The market rules are divided into general conditions (AB), miscellaneous market rules and technical and organizational rules for operators and users of networks (TOR), see Market Rules - E-Control.

Root cause category: "Human causes"					
No.	**Scenario**	**Description of the scenario**	**National rating**	**Potential impacts, comments**	**Preventive, preparatory and mitigation measures**
		Additionally, the unwanted results may spread beyond the energy markets - to both other sectors of the economy and the households.			
18	Physical attack on critical assets	A coordinated attack in the full spectrum of hybrid operations on one or more physical power system assets such as interconnectors, critical lines, HVDC[26] converter stations, transformers, substations, and power plants at sensitive points of the electric power system.	2,4	Usually of limited effect, but in extreme situations or if neuralgic sites in the network are affected, it can lead to cascading effects (subsequent failures of critical components) up to a widespread power outage.	• Modern property protection concept: In order to adapt property protection to the constantly growing challenges and changing framework conditions, the physical property protection 3.0 (POS 3.0) project was initiated in 2017 by the control area manager APG with the support of the Federal Ministry of the Interior (BMI) and the Federal Ministry of Defense (BMLV); In 2018, following a comprehensive risk analysis for all types of APG locations, a property protection concept adapted to the threat scenarios to be considered was drawn up, which is subject to ongoing development; The POS 3.0 project focuses primarily on further developments in the area of plant and access security; New fences, hardening of the building's outer shell or state-of-the-art alarm systems and video surveillance are just some of the measures; A core objective is the secure detection of unauthorized external persons entering an APG substation; In addition, supplementary organizational measures are implemented to further extend property protection; These include topics such as visitor access and

[26] High Voltage Direct Current.

Root cause category: "Human causes"					
No.	**Scenario**	**Description of the scenario**	**National rating**	**Potential impacts, comments**	**Preventive, preparatory and mitigation measures**
					the handling of mail in the main administration areas; • Ongoing coordination with partners on economically sensible and effective measures through international and national committees; • (N-1) structuring of the transmission system; The "(N-1) criterion" means the rule according to which the elements remaining in operation within a TSO's control area after occurrence of a contingency are capable of accommodating the new operational situation without violating operational security limits.[27]
19	Physical attack on control centres	A successful physical attack on both primary and backup control rooms of TSOs, major DSOs or major power plant operation centres is undertaken; Critical staff may be impacted; As a result, control over the power system is lost and recovering it will require a substantial time; A disruption of power supply may be immediate and will last for a prolonged time. The attack may also manifest in the course of an adversary's military operation (armed conflict or attack).	4	Effects can initially be limited with a backup control centre; However, personnel can also be threatened and, depending on the attack scenario, the crisis scenario can qualify as critical.	• Backup control centre available; • Modern property security concept, project physical property protection 3.0 for further optimisation of physical security is being continued; • Ongoing coordination with partners on economically viable and effective measures by means of international and national committee work; • Correspondingly trained personnel; • Personnel and material assistance through the Oesterreichs Energie (Association of Austrian Electricity Companies) troubleshooting platform.

[27] See Article 3 (2) (14) of Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline for the operation of transmission networks.

Root cause category: "Human causes"					
No.	**Scenario**	**Description of the scenario**	**National rating**	**Potential impacts, comments**	**Preventive, preparatory and mitigation measures**
20	Attack on entities not connected directly to the grid	A successful attack in the full spectrum of hybrid operations against both primary and secondary ICT[28] systems used for trading by market participants not connected directly to the power grid (incl. power exchange platforms, market makers, demand and renewable aggregators), with a possible impact on the operation of the power system; The control of the power system by TSOs and DSOs is not affected directly.	1,2	As long as there is no direct (physical) connection to the network, there is no immediate threat to security of supply; A systematic attack on the ICT systems of market participants can, however, indirectly lead to a critical situation in the power supply (under certain circumstances, the market participants may not be able to or may no longer be able to assess their positions or balance the positions via NEMOS [nominated electricity market operators] and may not be able to process schedule references).	• Periodic training as well as proficiency and knowledge checks; • Organisational implementation through the division of competencies (redundancies in knowledge and the organisation); • Separate ICT infrastructure from the public telecommunications network for operations with corresponding emergency power supplies for major system operators and power generators; • Implementation of security measures for market participants (e.g. protection regarding USB [universal serial bus] interfaces, data exchange, access with maintenance computers).
21	Loss of ICT - Systems to cyber-attack	Loss/unavailability of one or more ICT systems critical for real-time planning and operation of the power system operations due to a cyberattack leads to disruptions in energy supply and possibly a loss of some other power system assets. Energy markets may be adversely affected, as well. The attack may also manifest in the course of an adversary's military operation (armed conflict or attack).	6	Various critical infrastructures within Austria and Europe are highly interconnected, also between different sectors - in case of an attack, the entire system can be affected.	• Regular staff training on IT security; • Redundant connections between different locations; • Separate ICT infrastructure from the public telecommunications network for operations with corresponding emergency power supplies for major network operators and power generators; • Strict firewall and e-mail quarantine concepts; • Two-factor authentication, especially in case of remote access to critical ICT components;

[28] Information- and Communicationtechnology.

Root cause category: "Human causes"					
No.	**Scenario**	**Description of the scenario**	**National rating**	**Potential impacts, comments**	**Preventive, preparatory and mitigation measures**
					• Commission Delegated Regulation (EU) 2024/1366 of 11 March 2024 supplementing Regulation (EU) 2019/943 of the European Parliament and of the Council by establishing a network code on sector-specific rules for cybersecurity aspects of cross-border electricity flows: The network code lays down sector-specific rules for cybersecurity aspects of cross-border electricity flows, including rules on common minimum requirements, planning, monitoring, reporting and crisis management; • Safety measures from the national NIS-Regulation[29] (Annex 1), Implementation of the Austrian Energy CERT (Computer Emergency Response Team); • Periodic and special situation-related training and continuing professional development for staff; regular simulator training for failure and emergency scenarios; • Periodic training and proficiency and knowledge checks, organisational implementation through the division of competencies (redundancies in knowledge and the organisation).
22	Unauthorised action by personnel	An unauthorised action by key personnel with high levels of authorisation destabilizes the power system (using a system such as	4	May qualify as critical depending on the position, but a very good working atmosphere and a high	• Criminal background check of certain key personnel;

[29] Regulation of the Federal Minister for the EU, Arts, Culture and Media on the definition of security precautions and more detailed regulations on the sectors and security incidents under the Network and Information System Security Act (Netz- und Informationssystemsicherheitsverordnung – NISV), Federal Law Gazette II No. 215/2019, as amended.

Root cause category: "Human causes"					
No.	**Scenario**	**Description of the scenario**	**National rating**	**Potential impacts, comments**	**Preventive, preparatory and mitigation measures**
		SCADA[30]); The action may be due to an insider attack, holding key employees hostage, or threatening/blackmailing key employees.		level of caring awareness between managers and employees and between colleagues leads to the early detection of the "development of danger from within". The possibility of an insider threat must always be taken into account.	• Training of staff on the subject, national and international exchange of experience on the subject; • Monitoring of psychosocial factors - dual control principle for critical processes; • Measures relating to access security, facility security, and personnel-centered security in accordance with the project physical property protection 3.0 for the further optimization of physical asset protection.
23	Targeted political malicious actions by adversarial states	The use of non-conventional methods within the framework of hybrid operations below the threshold of war under international law may trigger the scenario.	6	Espionage activities can be accompanied by serious acts of sabotage and technical failures.	• High awareness of all employees against suspicious activities; • Use of artificial intelligence to detect anomalies in OT[31]/IT[32] -systems; • Good level of cooperation with national security services; • With regard to political risks arising from unreliable suppliers of critical infrastructure equipment from third countries, see Chapter 2.4.5 ("Reduction of dependence on third countries in energy technologies").

[30] Supervisory Control and Data Acquisition.

[31] Operational Technology.

[32] Information Technology System.

Those regional electricity crisis scenarios that were classified as comparatively less relevant in relation to the Republic of Austria and were therefore not identified as national scenarios within the meaning of Art. 7 Regulation (EU) 2019/941 and not included in Table 2 are listed in Table 3 below:

Table 3 Regional electricity crisis scenarios which do not belong to the group of most relevant national scenarios according to Art. 7 (1) Regulation (EU) 2019/941

Root cause category: „Natural hazards"				
No.	**Scenario**	**Description of the scenario**	**Potential impacts, comments**	**Preventive, preparatory and mitigation measures**
8	Earthquake	A significant magnitude earthquake occurs, damaging transmission infrastructure and power plants - requiring significant time to repair.	Potential outages of grid components and generation; Low probability of earthquakes of correspondingly high intensity in Austria.	• Maintenance of spare parts stocks, especially for the rapid reconstruction of power poles and lines.
9	Volcanic eruption	A volcanic eruption occurs in Iceland or in the Mediterranean area, impacting power system infrastructure due to lava flow, earthquakes, flooding, and significant amounts of ash.	Can be ruled out in Austria due to the absence of active volcanoes; A significant effect on the Austrian electricity system due to volcanic activity in other European countries is not assumed.	-
10	Space weather	A Coronal Mass Ejection[33] (CME) causes geomagnetically induced currents (GICs) that circulate in the power grid through the grounded transformer neutrals, resulting in the tripping of circuit elements, degradation of or permanent damage to grid infrastructure (particularly transformers), and disturbances of the ionosphere (disrupting high-frequency and satellite communications, navigation, and air travel).	Potential overheating and damage or outages of transformers with possible loss of load; The potential impact on Austria is estimated to be low; An early warning procedure has already been established; Solar storms can be predicted by space agencies several days in advance; The Austrian control area manager and transmission system operator Austrian Power Grid AG (APG) is integrated into the early warning system and would be notified of any relevant prominences	• Cooperation of the control area manager with technical universities for space weather forecasting; • Research project of the control area manager on counter measures.

[33] A coronal mass ejection is a solar flare in which plasma is ejected.

Root cause category: „Natural hazards”				
No.	**Scenario**	**Description of the scenario**	**Potential impacts, comments**	**Preventive, preparatory and mitigation measures**
			or coronal mass ejections by the European Space Agency (ESA).	

Root cause category: “Supply chain”				
No.	**Scenario**	**Description of the scenario**	**Potential impacts, comments**	**Preventive, preparatory and mitigation measures**
12	Nuclear fuel shortage	Nuclear power plants in Europe are not able to purchase nuclear fuel from non-European countries for an extended period and/or the transportation of nuclear fuel is interrupted due to geopolitical developments / government actions.	Possible effects in case of a lack of market liquidity at the pan-European level; However, there are no nuclear power plants in Austria.	• Increasing the installed power plant capacity in Austria.

Root cause category: “Human causes”				
No.	**Scenario**	**Description of the scenario**	**Potential impacts, comments**	**Preventive, preparatory and mitigation measures**
16	Strikes, unrest, industrial action in the energy supply sector	The unplanned unavailability of staff to operate power plants, grids, markets; Depending on the nature of the incident, actions taken during this time may impact control of the system or assets.	Potential lack of personnel for system operation and maintenance.	• Good cooperation with workers union; • Readiness concepts for personnel.

The relevant national electricity crisis scenarios are summarized below in a concise form. Operators of critical infrastructure as well as public authorities may, where appropriate, use the crisis scenarios presented in this overview as a reference for their internal emergency planning.

Table 4 Concise overview of the key national electricity crisis scenarios

Root cause category	No.	Scenario	Priority area
Supply chain, technical causes	11	Fossil fuel shortage (in particular natural gas)	Electricity scarcity situation, power outage, impairment of the grid infrastructure
	14	Serial technical defects	
	13	Large industrial/nuclear accident with long-term effects as a result of radioactive or toxic contamination, leading to prolonged staff unavailability (for months or years)	Nuclear, biological, chemical
Human causes	15	Pandemic	Pandemic
	17	Unforeseen interaction of energy markets	Non-intentional causes
	18	Physical attack on critical assets	Intentional acts of harm
	19	Physical attack on control centres	
	20	Attack on entities not connected directly to the grid	
	21	Loss of ICT - Systems to cyber-attack	
	22	Unauthorised action by personnel	
	23	Targeted political malicious actions by adversarial states	

Root cause category	No.	Scenario	Priority area
Weather	1	Severe Summer (exceptionally high temperatures and drought)	Natural events
	2	Severe winter	
	3	Severe storm	
	4	Heavy ice loading	
	5	Heavy flooding	
	6	Dunkelflaute (extremely low wind/solar generation)	
	7	Unusually big forecast errors for renewables	

2.3 National consultation

The updated version of the most relevant national electricity crisis scenarios was submitted to a national consultation in accordance with Art. 7 (1) Regulation (EU) 2019/941 by the Ministry by official writing dated 23 of January 2025, with an invitation to submit comments (deadline 5 February 2025). The following entities have been consulted in accordance with Art. 7 (2) Regulation (EU) 2019/941:

- The transmission system operators: Austrian Power Grid AG; Vorarlberger Übertragungsnetz GmbH
- The distribution system operators that the competent authority considers to be relevant (those distribution system operators were considered relevant who have a connection to the transmission system): Wiener Netze GmbH; Netz Niederösterreich GmbH; Netz Burgenland GmbH; Netz Oberösterreich GmbH; Linz Netz GmbH; Energienetze Steiermark GmbH; Kärnten Netz GmbH; Salzburg Netz GmbH; TINETZ Tiroler Netze GmbH; Vorarlberger Energienetze GmbH
- The relevant producers or their trade bodies: the following trade bodies were consulted: Oesterreichs Energie - Association of Austrian Electricity Companies; Wirt-schaftskammer Österreich (Austrian Economic Chambers); Industriellenvereinigung (Federation of Austrian Industries)
- Regulatory authority: E-Control

The following institutions issued a statement on the submitted list of national crisis scenarios:

- Writing by Wiener Netze GmbH dated 5 February 2025:
  - Wiener Netze GmbH primarily suggested an adjustment of the severity ranking of the scenarios no. 1, 3 and 21 from 4 to 6.
  - Regarding scenario no. 5, Wiener Netze GmbH proposed the inclusion of the aspect of transformer stations (especially “underground stations”) and of a respective preventive measure (provision of sealing materials, e.g. sandbags, and water pumps).

  The suggestions of Wiener Netze GmbH regarding scenario no. 1, 3 and 21 as well as 5 were implemented in the final list of the most relevant national crisis scenarios.
- Writing by Austrian Power Grid AG (APG) dated 31 January 2025: APG suggested to add preventive measures concerning the scenarios no. 1, 2, 6 and 11. APG especially suggested the consideration of the usage of gas-fired power plants, the ensurance of grid reserve, gas storage, sufficient seasonal flexibility (Power-to-Gas [P2G], H2 storage) as well as sufficient short-term flexibility.

The suggestions of APG were mostly considered in the final list of the most relevant national crisis scenarios. With regard to the proposal to add a reference to grid reserve and the usage of Power-to-Gas facilities, it has been referred to the current national legislation.

2.4 Other preventive and preparatory measures

2.4.1 Electricity Security of Supply Strategy

The Electricity Security of Supply Strategy (E-VSS) was first published in 2024.[34] The strategy was developed on the basis of section 88a Electricity Sector Act 2010 (ElWOG 2010) [now: section 148 ElWG] by the Ministry in consultation with E-Control and APG and in cooperation with the relevant stakeholders in the Austrian electricity market. A comprehensive analysis and forward-looking measures are intended to contribute to maintaining stable and high security of supply in the future. The E-VSS therefore identifies appropriate fields of action and measures. The measures outlined in the strategy contribute to increasing the resilience of the Austrian electricity system. The fields of action include, among other things

- the creation of an overall concept for the potential and possible uses of seasonal flexibility on the demand and supply sides and shifting options,
- the optimisation of the grid infrastructure,
- the analysis of the effects of climate change on the generation volumes of renewables.

Due to the high requirements for system stability and supply reliability, the measures will be regularly evaluated in the form of a status report. This will identify any necessary adjustments and gather valuable insights for a future revision of the strategy. The E-VSS will be updated every five years from the time of publication.

2.4.2 Energy Efficiency Act

According to Recital 14 of Directive (EU) 2023/1791[35], improving energy efficiency throughout the full energy chain, including energy generation, transmission, distribution and end-use, is intended, among other things, to improve energy security by reducing dependence on energy imports from outside the Union.

[34] Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology [now: Federal Ministry of Economy, Energy and Tourism] (Ed.): Electricity Security of Supply Strategy, Vienna 2024, available at Elektrizitäts-Versorgungssicherheitsstrategie (bmwet.gv.at).

[35] Directive (EU) 2023/1791 of the European Parliament and of the Council of 13 September 2023 on energy efficiency and amending Regulation (EU) 2023/955.

The national implementation of Directive (EU) 2023/1791 was carried out through the Federal Energy Efficiency Act (Bundes-Energieeffizienzgesetz, EEffG)[36]. Among other things, the EEffG establishes objectives such as improving energy efficiency and reducing energy consumption. By 2030, a nationwide final energy consumption of a maximum of 920 PJ is to be achieved, and for the period from 2021 to 2030 a reduction in nationwide final energy consumption of at least 650 PJ is to be attained.

Due to increasing electrification, electricity consumption is expected to rise during this period; however, in terms of security of supply, this increase is to be managed as evenly as possible and in line with the expansion of the electricity grid and renewable energy sources. At least 250 PJ of the consumption reduction is to be achieved, inter alia, through federal funding measures, and at least 400 PJ through additional alternative strategic measures, taking into account savings by the federal government and the Federal Real Estate Company (Bundesimmobiliengesellschaft m.b.H.).

For the first time, indicative targets for improving energy efficiency have also been established for the federal provinces. In cooperation with the federal government, the provinces are required to publish, every two years, documentation of their strategy for implementing the "energy efficiency first" principle as part of the integrated progress reports under the National Energy and Climate Plan for Austria (NEKP). Suppliers who, on the basis of a continuing obligation, have sold more than 25 GWh per year of electrical energy, natural gas, district heating or district cooling, or heat or cooling, to final consumers and supply households or eligible households, must offer free telephone consultations on key energy efficiency information such as energy consumption, energy savings, energy costs, and price developments. Energy suppliers with a total volume exceeding 35 GWh per year are additionally required to establish a free advisory service centre. In addition, a coordination body to combat energy poverty ("Coordination Office") is established.

The ongoing decarbonisation across all sectors leads to an increasing level of electrification (e.g. through the use of heat pumps, e-mobility, electrification of the industrial sector, etc.).[37] By increasing energy efficiency, the expected growth curve of electricity consumption can be flattened. At the national level, section 6 (1) of the Federal Energy Efficiency Act provides for the development of a National Energy Efficiency Action Plan, which in particular contributes to achieving national targets and indicative levels of the planned energy efficiency measures. The EEffG covers

[36] Federal Act on Improving Energy Efficiency in Households, Businesses and the Federal Government, as well as Energy Consumption Recording and Monitoring (Bundes-Energieeffizienzgesetz – EEffG), Federal Law Gazette I No. 72/2014, as amended.

[37] Environment Agency Austria (ed.): 14th Environmental Control Report. Environmental Situation in Austria. Vienna 2022, p. 194.

all energy carriers, including electricity. It therefore also provides for measures that may include a direct reduction in electricity consumption by individual end users. Such reductions in electricity consumption can be achieved, among other things, through comprehensive information provided by energy advisory centres to end consumers. Furthermore, large companies are required to carry out energy audits or to implement energy management systems. Measures to improve energy efficiency also make an important contribution to strengthening security of supply.[38]

2.4.3 Expansion of Renewable Energy

In order to cover 100 % of the increasing domestic electricity consumption (national / on balance) from renewable sources, the Federal government is focusing on the expansion of domestic energy sources (photovoltaics, wind, hydropower, biomass).[39]

Section 4 (2) of the Renewable Energy Expansion Act (EAG)[40] sets out the goal that the construction, expansion and repowering of renewable power plants shall be supported to such an extent that domestic renewable electricity generation equals total domestic electricity consumption up to 100 percent (national / on balance) from 2030 onwards. In order to achieve the target value for 2030, section 4 (4) EAG stipulates that, based on production in 2020, annual renewable electricity generation must be increased by 27 TWh by 2030. Of these, 11 TWh shall come from PV, 10 TWh from wind, 5 TWh from hydro, and 1 TWh from biomass. Further objectives of the EAG include increasing quantity of renewable gas produced in Austria to 5 TWh by 2030 and promoting renewable hydrogen as key for sector coupling and integration.

2.4.4 IT security of grid operation and generation

The purpose of Directive (EU) 2022/2555 (NIS 2 Directive)[41] is to achieve a high common level of cybersecurity across the Union, with a view to improving the functioning of the internal market. The NIS 2 Directive entered into force on 16 January 2023. NIS 2 essentially stipulates the following:

- Obligation for all Member States to adopt a national cybersecurity strategy (Art. 7 NIS 2 Directive);

[38] Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology [now: Federal Ministry of Economy, Energy and Tourism] (Ed.): Electricity Security of Supply Strategy, Vienna 2024, p. 78 et seq.
[39] Federal Chancellery (ed.): Doing the Right Thing Now. For Austria, p. 60.
[40] Federal Act on the Expansion of Energy from Renewable Sources (Renewable Energy Expansion Act), Federal Law Gazette I No. 150/2021, as amended.
[41] Directive (EU) 2022/2555 of the European Parlament and of the Council of 14 December 2022 on measures for a high common level of cybersecurity across the Union, amending Regulation (EU) No 910/2014 and Directive (EU) 2018/1972, and repealing Directive (EU) 2016/1148 (NIS 2 Directive).

- Obligation for all Member States to designate or establish national competent authorities (Art. 8 NIS 2 Directive), cyber crisis management authorities (Art. 9 NIS 2 Directive), single points of contact for crisis management (Art. 8 NIS 2 Directive) and Computer security incident response teams (Art. 10 NIS 2 Directive);
- Obligations regarding cybersecurity risk-management (Art. 20 et seq. NIS 2 Directive) as well as reporting obligations (Art. 23 NIS 2 Directive) conerning the relevant entities;
- Provisions and obligations regarding cybersecurity information-sharing (Art. 29 et seq. NIS 2 Directive);
- Obligations regarding supervision and enforcement concerning the Member States (Art. 31 et seq. NIS 2 Directive).

In Austria, measures to achieve a high level of cybersecurity are implemented by the Network and Information Systems Security Act (NISG)[42]. The Federal Minister of the Interior performs is responsible for matters relating to strategic network and information security.[43] For the security of network and information systems, a Single Point of Contact (SPOC) has been established at the Federal Minister of the Interior, which serves as an operational liaison office to ensure cross-border cooperation with the competent authorities in the other Member States of the European Union as well as the Cooperation Group and the CSIRTs[44] network (section 6 (1) NISG).

The Network and Information System Security Ordinance (NISV) issued on the basis of the NISG contains, among other things, more detailed provisions on the sectors covered by the NISG.

Due to their importance for the maintenance of the public supply of energy within the meaning of section 16 (2) NISG, the following essential services are covered in the energy sector, electricity sub-sector, in accordance with section 4 (1) point 1 NISV:

- the operation of a generation facility with a maximum capacity of more than 340 MW,
- the operation of systems for the control of generation facilities with an aggregate maximum capacity of more than 340 MW,
- the operation of a distribution system through which electricity is transported to more than 88,000 metering points or which is located in a provincial capital, and
- the operation of a transmission system by a transmission system operator.

[42] Federal Act to Ensure a High Level of Security of Network and Information Systems (Network and Information Systems Security Act - NISG), Federal Law Gazette I No. 111/2018, as amended.

[43] Part 2 lit. H no. 12 of the Annex to section 2 of the Federal Act on the Number, the Powers and the Organisation of Federal Ministries (Federal Ministries Act 1986 – BMG), Federal Law Gazette No. 76/1986, as amended.

[44] The abbreviation “CSIRT” stands for Computer Security Incident Response Team. According to Recital 42 of the NIS 2 Directive, CSIRTs are entrusted with handling security incidents. This includes processing large amounts of data, some of which may be sensitive. Member States should ensure that CSIRTs have the necessary infrastructure for information exchange and data processing, as well as well-equipped personnel, thereby guaranteeing the confidentiality and reliability of their activities.

Furthermore, the national NISV contains a description of suitable security measures that take into account the state of the art. These are to be taken by operators of essential services to ensure network and information system security. These security precautions essentially include measures in the areas of governance and risk management, dealings with service providers, suppliers and third parties, security architecture, system administration, identity and access management, system maintenance and operation, physical security, incident detection, incident handling, business continuity and crisis management (section 11 NISV).

2.4.5 Reduction of dependence on third countries in energy technologies

With Regulation (EU) 2024/1252[45] on critical raw materials, a binding Union-wide legal framework has been established to ensure a resilient, diversified, and sustainable supply of critical raw materials, which are of central importance for key technologies in energy, climate, digital, and defense policy. The aim of the Regulation is to reduce strategic dependencies on individual third countries, strengthen the European Union's strategic autonomy, and identify and address risks in global supply chains at an early stage. The Regulation entered into force on 23 May 2024.

At the core of the Regulation is the establishment of concrete Union-wide targets along the entire value chain. By 2030, at least 10 % of the Union's demand for critical raw materials is to be extracted within the European Union, 40 % is to be processed domestically, and 25 % is to be covered through recycling (see Art. 5 (1) (a) of Regulation (EU) 2024/1252). In addition, the share of any single third country in the supply of a strategic raw material is not to exceed 65 % in order to avoid one-sided dependencies (see Art. 5 (1) (b) of Regulation (EU) 2024/1252).

The European Commission assumes a central role in coordinating, monitoring, and further developing the regulatory framework, in particular in updating the list of strategic raw materials contained in Annex I, Section I (Art. 3), recognizing strategic projects (Art. 6), and monitoring supply risks related to critical raw materials (Art. 20). The Member States are responsible, inter alia, for developing national exploration programmes (Art. 19), supporting the implementation of strategic projects (Art. 15), and providing relevant data (Art. 21).

The legal framework is complemented by structured cooperation and governance mechanisms between the Commission, the Member States, and relevant stakeholders.

[45] Regulation (EU) 2024/1252 of the European Parliament and of the Council of 11 April 2024 establishing a framework for ensuring a secure and sustainable supply of critical raw materials and amending Regulations (EU) No 168/2013, (EU) 2018/858, (EU) 2018/1724 and (EU) 2019/1020.

Overall, the Regulation on critical raw materials constitutes the central instrument of Union law for reducing raw material dependencies and forms the basis for further measures such as strategic stockpiling, storage, the expansion of the circular economy, and the conclusion of strategic raw material partnerships between the European Union and third countries.

3 Roles and responsibilities of the competent authority

The Federal Minister of Economy, Energy and Tourism is the national competent authority in Austria in accordance with Art. 3 (1) of Regulation (EU) 2019/941 and is as such responsible for carrying out the tasks provided for in this Regulation. None of the tasks assigned to the competent authority in accordance with Regulation (EU) 2019/941 were delegated to other bodies.

4 Procedures and measures in the electricity crisis

4.1 National procedures and measures

4.1.1 Preventive and preparatory measures

The preventive and preparatory measures can be seen in sections 2.2 and 2.4.

4.1.2 Manual load shedding in accordance with Article 22 of the Network Code on electricity emergency and restoration

4.1.2.1 Distinction from energy intervention measures

Commission Regulations (EU) 2017/1485[46] and (EU) 2017/2196[47] constitute a detailed rulebook governing how transmission system operators and other relevant stakeholders should act and cooperate to ensure system security. Those technical rules should ensure that most electricity incidents are dealt with effectively at operational level.[48]

In accordance with Art. 11 (1) Regulation (EU) 2017/2196, every transmission system operator is required to develop a system defence plan. The system defence plan in accordance with Art. 11 (5) lit. b) v) Regulation (EU) 2017/2196 shall include a procedure for manual load shedding. In Austria, Oesterreichs Energie/Defence Plan expert pool drafted the system defence plan for Austria.[49] The manual load shedding procedure described there is applied in the event of acute significant faults and risks to network security, and when there are imminent or present load coverage problems. Faults that go beyond simple incidents in the electricity system or that cannot be rectified effectively at operational level can trigger energy intervention measures if the prerequisites in accordance with section 4 EnLG 2012 are met.

[46] Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation.

[47] Commission Regulation (EU) 2017/2196 of 24 November 2017 establishing a network code on electricity emergency and restoration.

[48] See recital 5 of Regulation (EU) 2019/941.

[49] ÖSTERREICHS ENERGIE/Defence Plan expert pool: System Defence Plan Austria – Technical measures to prevent large-scale disruptions and limit their impacts, 2021.

4.1.2.2 Manual load shedding procedure

The manual load shedding procedure is described in more detail in Annex 13.3 to the Austrian system defence plan.

Basically, depending on the severity of the emergency and the degree of under-coverage, specifications are made for the scope of the required manual load shedding by the operational control area manager Austrian Power Grid AG. These specifications are primarily distributed according to technical necessity to the distribution system operators with a direct connection to the transmission system in each province using an outage-proof digital communication medium ("Austrian Awareness System"). Attention is paid to a sufficient remaining level of reserves for the "automatic under-frequency load shedding" – as a remaining automatic measure of last resort – (i.e. up to around 50% of those loads that are intended for automatic under-frequency load shedding would be used for manual load shedding).

Article 22 (3) Regulation (EU) 2017/2196 specifies that every distribution system operator must disconnect the indicated demand without undue delay after being notified by the control area manager of the requirement to shed load, with indication of the amount of demand to be disconnected. The same applies to all downstream distribution system operators after they have been prompted by the upstream distribution system operator to disconnect demand.[50]

After the notification on required manual load shedding, the control area manager will provide ad hoc information on the cause of the fault to the control centre of the affected transmission system operators and directly connected distribution system operators by e-mail as soon as possible. The situation surrounding the event is depicted by the control area manager. Communication to the public is handled in a coordinated manner by all involved parties under the direction of the control area manager.[51]

4.1.3 Procedures to be followed in the cases of an electricity crisis including the corresponding schemes on information flows

The legal basis for national measures in the event of an electricity crisis is formed by the Federal Law on Intervention Measures to Safeguard Energy Supplies (Energy Intervention Powers Act 2012 – EnLG 2012), Federal Law Gazette I No. 41/2013, as amended.

[50] ÖSTERREICHS ENERGIE/Defence Plan expert pool: System Defence Plan Austria – Technical measures to prevent large-scale disruptions and limit their impacts, 2021, Annex 13.3, item 4.2.1.

[51] ÖSTERREICHS ENERGIE/Defence Plan expert pool: System Defence Plan Austria – Technical measures to prevent large-scale disruptions and limit their impacts, 2021, Annex 13.3, item 4.2.2.

The Energy Intervention Powers Act 2012 differentiates between intervention measures

- for solid/liquid energy products (sections 7 to 12);
- to safeguard electricity supplies (sections 14 to 25a);
- to safeguard natural gas supplies (sections 26 to 35a).

Orders imposing intervention measures regarding energy products, and safeguarding supplies of electrical energy and natural gas shall, without exception, be enacted separately from each other (section 5 [1] EnLG 2012).

The Federal Minister of Economy, Energy and Tourism is responsible for the assessment of whether there is an energy intervention case after hearing the Energy Intervention Council.

If there is an energy intervention case, the Federal Minister of Economy, Energy and Tourism issues an energy intervention measure order in which energy intervention measures are stipulated.

The Energy Intervention Powers Act 2012 sets forth which measures can be taken by energy intervention measure order.

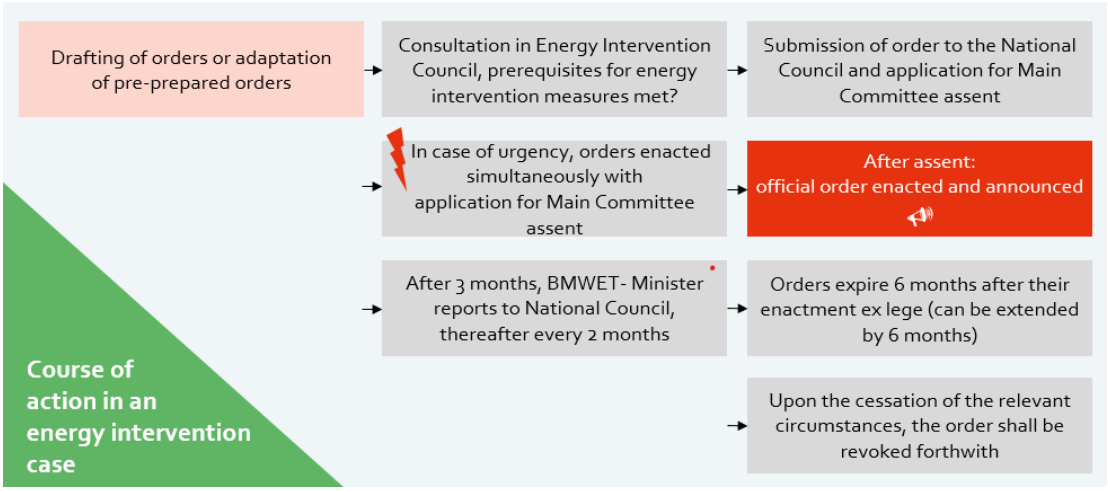
4.1.3.1 Course of action in the event of an electricity crisis

- Consultations are held with experts of the regulator, the provincial governments, the affected power supply companies, and further stakeholders in advance.
- Drafting of an energy intervention measure order, any necessary adaptations to pre-prepared orders.
- Advice to the Federal Minister of Economy, Energy and Tourism in the Energy Intervention Council. The Council is composed of 3 representatives of the BMWET; 1 representative each of the Federal Chancellery (BKA), the Federal Ministry for European and International Affairs (BMEIA), the Federal Ministry of Finance (BMF), the Federal Ministry of the Interior (BMI), the Federal Ministry of Defence (BMLV), the Federal Ministry for Agriculture and Forestry, Climate and Environmental Protection, Regions and Water Management (BMLUK) and the Federal Ministry of Innovation, Mobility and Infrastructure (BMIMI); 2 representatives each of the Austrian Federal Economic Chamber, the Austrian Chamber of Agriculture, the Austrian Federal Chamber of Labour, the Austrian Trade Union Federation, and the Federation of Austrian Industries; 1 representative of E-Control; 1 representative of each province; 1 expert each on the petroleum industry, energy wholesaling and retailing, and gas and heating supply; 1 representative of Österreichs E-Wirtschaft; and 1 representative each of the political parties represented in the Main Committee of the National Council. One of the main tasks of the Energy

Intervention Council is to discuss whether the prerequisites for the application of energy intervention measures in accordance with section 4 EnLG 2012 are met.

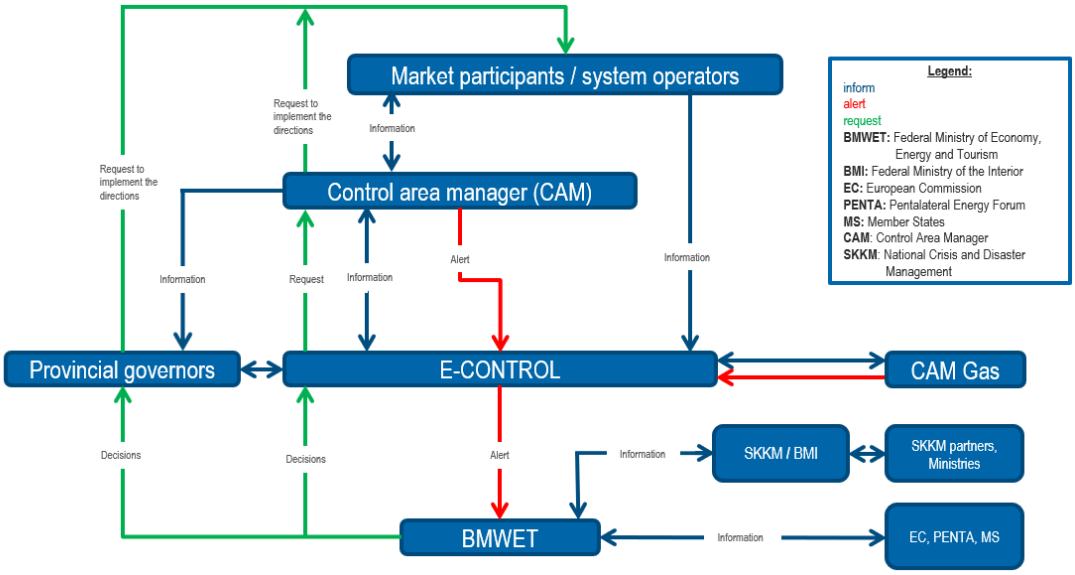
- Submission of the energy intervention measure order to the National Council and application for the Main Committee's assent.
- After assent, the order is enacted and announced.
- In case of urgency, orders requiring the assent of the Main Committee of the National Council shall be enacted simultaneously with the application for the Committee's assent.
- After 3 months, the Federal Minister of Economy, Energy and Tourism is required to submit a report to the National Council on the functioning of the intervention measures taken and thereafter at intervals of 2 months.
- Energy intervention measure orders expire 6 months after their enactment ex lege.
- Should the end of the crisis situation not be foreseeable after 6 months, an extension of up to 6 months is possible, requiring the assent of the Main Committee of the National Council.
- Upon the cessation of the circumstances giving rise to the orders, the latter shall be revoked forthwith.

Figure 1 Course of action in an electricity crisis



4.1.3.2 Information flow in the operational implementation of energy intervention measures

Figure 2 Information flow in the operational implementation of energy intervention measures



4.1.4 Measures to mitigate electricity crises

4.1.4.1 Triggers and conditions of energy intervention measures

According to Article 2 (9) of Regulation (EU) 2019/941, the term "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.

Section 4 of the Energy Intervention Powers Act 2012 (Energielenkungsgesetz-EnLG 2012) specifies the parameters under which a disruption within the meaning of Article 2 (9) of Regulation (EU) 2019/941 can be assumed and intervention measures can be taken to secure Austria's energy supply.

Accordingly, energy intervention measures are taken in the following cases:

- **To avert imminent or overcome actual disruptions of Austrian energy supplies, insofar as these disruptions**
  - **do not represent seasonal shortages or**
  - **cannot be averted or overcome at all, in a timely manner or at reasonable cost by means of market-based measures (section 4 [1] no. 1 EnLG 2012).**

An imminent disruption within the meaning of section 4 (1) no. 1 first case EnLG 2012 is to be assumed if a near-term disruption to Austria's energy supply cannot be ruled out with sufficient certainty, which may also be the case if it is feared that a (currently still) disruption-free situation will "turn into" a disruption-prone situation.
The term "market-based" is described by the technical term "market-based measures" used in the Price Act 1992, the Banking Act, the ORF Act, etc., among others. This refers to state intervention that merely supports and directs the market, but does not interfere with the market mechanism itself.[52]

- **To take emergency measures pursuant to decisions by the governing bodies of international organisations where this is necessary to fulfil obligations under international law (section 4 [1] no. 2 EnLG 2012).**
  On the one hand, these are obligations to be fulfilled by the Republic of Austria on the basis of the Agreement on an International Energy Program (IEP Agreement), Federal Law Gazette No. 317/1976. The IEP Agreement gives the International Energy Agency the option of adopting measures to secure energy supplies in certain crisis situations, which must be implemented by the member states. On the other hand, it also includes obligations arising from the role of the Republic of Austria as a member state of the European Union.[53]

- **To the extent that an obligation to provide solidarity in accordance with Article 13 Regulation (EU) 2017/1938[54] applies (section 4 [1] no. 3 EnLG 2012).**
  Regulation (EU) 2017/1938 introduced a solidarity mechanism between Member States as an instrument to mitigate the effects of a severe emergency with regard to the supply of gas within the Union.[55] According to Article 13 of Regulation (EU) 2017/1938, Member States shall adopt the necessary measures to implement the provisions of the solidarity mechanism, including agreeing technical, legal and financial arrangements between the Member States concerned and providing solidarity to each other on that basis.
- **To the extent that an obligation to provide assistance in the form of regional or bilateral measures in accordance with Article 15 Regulation (EU) 2019/941 applies (section 4 [1] no. 4 EnLG 2012).**
  Regulation (EU) 2019/941 introduces an assistance mechanism between Member States as an instrument to prevent or mitigate an electricity crisis within the Union.[56] In accordance with Article 12 and 15 of Regulation (EU) 2019/941, Member States shall offer each other assistance in the form of regional or bilateral measures where they have the technical ability of doing so.

[52] Cf. the explanatory notes to the EnLG 2012, ErlRV 1962 XXIV. GP, 5.
[53] Cf. ErlRV 1962 XXIV. GP, 5.
[54] Regulation (EU) 2017/1938 of the European Parliament and of the Council of 25 October 2017 concerning measures to safeguard the security of gas supply and repealing Regulation (EU) No 994/2010.
[55] Cf. recital 45 of Regulation (EU) 2017/1938.
[56] Cf. recital 30 of Regulation (EU) 2019/941.

4.1.4.2 Compliance with the requirements of Article 16 (2) of Regulation (EU) 2019/941

Article 16 (2) of Regulation (EU) 2019/941 stipulates that non-market-based measures shall be activated in an electricity crisis only as a last resort if all options provided by the market have been exhausted or where it is evident that market-based measures alone are not sufficient to prevent a further deterioration of the electricity supply situation.

The Austrian system of energy intervention is in line with Article 16 (2) of Regulation (EU) 2019/941. In particular, section 4 (1) no. 1 EnLG 2012 clarifies the subsidiarity of energy intervention with respect to market-based measures. Section 4 (1) no 1 EnLG 2012 states that a case of energy intervention exists if the disruption to Austria's energy supply cannot be averted or overcome at all, in a timely manner or at reasonable cost by means of market-based measures. In line with this principle, the period of validity of energy intervention measures is also limited. Pursuant to section 5 (3) EnLG 2012, intervention measures may only be taken for a period of six months. In the case of an energy supply disruption which has already come about, an extension of up to six months is possible, subject to the assent of the Main Committee of the National Council. Upon the cessation of the circumstances giving rise to the orders, the latter shall be revoked forthwith.

Finally, pursuant to the principle of proportionality set out in section 4 (4) EnLG 2012, intervention measures may only be taken to such an extent and for a duration necessary to avert or overcome supply disruptions, to fulfil the obligation to provide solidarity in accordance with Art. 13 Regulation (EU) 2017/1938, to fulfil the obligation to provide assistance in the form of regional or bilateral measures in accordance with Art. 15 Regulation (EU) 2019/941 or to fulfil obligations under international law to implement emergency measures pursuant to decisions by the governing bodies of international organisations. Infringements of property rights and the freedom to practise a trade or occupation are only permissible if the objects of energy intervention referred to in section 4 (2) EnLG 2012 cannot otherwise be achieved.

4.1.4.3 Objectives of energy intervention measures

In accordance with section 4 (2) EnLG 2012, the objective of energy intervention measures is:

- in the case of section 4 (1) no. 1, to safeguard the fulfilment of essential energy requirements including those of national defence, the undisturbed production of goods and provision of services, and the supply of the general public and other consumers;
    - Safeguarding the fulfilment of essential energy requirements includes supplying those sectors whose functionality is indispensable for the survival of the population, the ability of the state to act, and national security.
    - With regard to national military defense, a reliable energy supply is a prerequisite for the mobilization, operational readiness, and sustained capability of the Austrian Armed Forces.

- in the case of section 4 (1) no. 2, to permit the fulfilment of obligations under international law to take emergency measures pursuant to decisions by the governing bodies of international organisations;
- in the case of section 4 (1) no. 3, to permit the fulfilment of obligations under Union law to provide solidarity in accordance with Art. 13 Regulation (EU) 2017/1938;
- in the case of section 4 (1) no. 4, to permit the fulfilment of obligations under Union law to provide assistance in the form of regional or bilateral measures in accordance with Art. 15 Regulation (EU) 2019/941.

4.1.4.4 Overview of energy intervention measures

The intervention measures that can be taken to safeguard electricity supplies are listed exhaustively in the Energy Intervention Powers Act 2012 (EnLG 2012). The pertinent legal regulations can be found in section 14 in conjunction with sections 16 to 22 EnLG 2012:

4.1.4.4.1 Directions to generators, system operators, balance group coordinators, balance group representatives, and electricity wholesalers and retailers regarding the generation, transmission, distribution, wholesaling, and retailing of electrical energy (section 14 [1] no. 1 in conjunction with section 16 EnLG 2012)

On the basis of this provision, such directions can be issued to market participants in an electricity intervention measure order as are necessary to safeguard electricity supplies. The specific content of the directions is to be set out in the order to be issued in the event of an energy intervention case. The statutory authorization gives the issuer of the order leeway to take account of the requirements of the individual case. The formulation of the directions within the meaning of this provision would take place in compliance with the general principles of the EnLG 2012 (e.g. the principle of proportionality stipulated in § 4 [4]).

4.1.4.4.2 Appeals and directions to final consumers regarding the allocation, withdrawal, and use of electrical energy, as well as the exclusion of consumers from the withdrawal of electrical energy (section 14 [1] no. 2) as well as calls to district heating consumers about the use of district heating (section 14 [1] no. 9 in conjunction with section 22 EnLG 2012)

Should it be necessary to safeguard electricity supplies in the event of an energy supply disruption in accordance with section 4 EnLG 2012, the following, among other things, could be provided for in an electricity intervention measure order based on this provision:

- An appeal to final consumers to use energy in the form of electrical energy and district heating carefully and only consume it to the extent absolutely necessary.
- Depending on the specific situation and the time criticality in the event of an energy intervention case, a call to large consumers to make the necessary preparations to restrict pro-

duction or their own economic activity may be issued. This measure serves to raise awareness of potentially necessary future consumption restrictions. If, in the event of a further deterioration of the supply situation in the cascade of measures, a restriction of large consumers should actually become necessary, this would be carried out by means of respective intervention measures in accordance with section 14 (1) no. 2 in conjunction with section 17 EnLG 2012 (see Section 4.1.4.4.5).

- Temporary ban on certain uses of electrical energy, particularly in the comfort and leisure sectors.

4.1.4.4.3 Regulations regarding the operation of electricity generating stations and permission to breach emission limits (section 14 [1] no. 4 in conjunction with section 19 EnLG 2012)

- The purpose of this intervention measure is to be able to optimize generation in the event of an imminent or actual disruption in order to ensure the supply of electrical energy.
- In addition, against the background of a tense energy supply situation, deviations may be provided for with regard to possible regulations on emission limit values that prevent an adjustment of the operating mode of generation facilities. Contravening regulations shall not be applied for the duration of the validity of these orders. Due regard shall be paid to avoiding hazardous environmental impacts in accordance with § 19 EnLG 2012.
- In order to be able to issue generation and operating instructions also for green electricity installations in the event of an energy interventions case, the EnLG 2012 stipulates an authorization to regulate the use of energy from renewable sources in accordance with the Green Electricity Act 2012 (Ökostromgesetz 2012), Federal Law Gazette I No. 75/2011, as amended, as well as renewable electricity in accordance with the Renewable Energy Expansion Act (Erneuerbaren-Ausbau-Gesetz), Federal Law Gazette I No. 150/2021, as amended (section 14 [1] no. 6 EnLG 2012). Similarly, an electricity intervention measure order issued by the Federal Minister of Economy, Energy and Tourism may provide for a deviation from other legal provisions with regard to renewable energy, insofar as this is necessary to ensure the supply of electricity (section 14 [1] no. 5 in conjunction with section 20 EnLG 2012).

4.1.4.4.4 Directions to combined heat and power and district heating companies (section 14 [1] no. 8 in conjunction with section 22 EnLG 2012)

The content of possible electricity intervention measure orders based on this provision may be as follows:

- Issuing directions or instructions to generators operating combined heat and power plants with a maximum thermal capacity of at least 50 MW or an annual heat output of at least 300 GW, and district heating companies operating heating stations and district heating power plants with a total maximum thermal output of at least 50 MW or an annual heat output of at least 300 GW,

- to substitute natural gas with other energy sources as far as technically possible.

4.1.4.4.5 Distribution according to the degree of urgency (section 14 [1] no. 2 in conjunction with section 17 EnLG 2012)

Should it be necessary to safeguard electricity supplies, the following could be provided for in an electricity intervention measures order based on this provision:

- Orders pursuant to section 14 (1) no. 2 EnLG 2012 shall provide for the supply of the available electrical energy to final consumers according to the degree of urgency. In particular, such orders may determine that final consumers may, without additional procedures, be temporarily excluded from deliveries or that such deliveries may be limited.
- If necessary, E-Control may be authorized to impose special regulations on final consumers with an average monthly consumption of more than 500,000 kWh in the last twelve months (so-called large consumers).
- If E-Control is authorized to impose special regulations on large consumers in an electricity intervention measure order issued by the Federal Minister of Economy, Energy and Tourism, E-Control shall impose appropriate measures for the temporary exclusion from the electricity supply or the temporary restriction of the electricity supply[57], taking into account the respective restriction level.
- The concrete determination of the restriction levels is conducted in an energy intervention case in the electricity intervention measure order issued by the Federal Minister of Economy, Energy and Tourism.
- Prior to a general addressing of all large consumers, it may, depending on the scenario, be envisaged to implement a targeted quota allocation for specific large consumers (those with at least one metering point at certain grid levels to be defined in the electricity intervention measure order), taking into account their respective individualised load reduction potentials. These large consumers shall declare their individual load reduction potentials via a platform established and administered by APG, on the basis of which directions are issued by E-Control.
- By taking into account individual load reduction potentials, the impacts of restrictions on the affected large consumers can potentially be mitigated, and the implementation of the intervention measures can be carried out in a more targeted and therefore more efficient manner. Through their behaviour, the addressed large consumers can help prevent a further escalation of energy intervention measures.
- Categories of electricity users pursuant to Article 11 (1) (h) of Regulation (EU) 2019/941 that are entitled to receive special protection against disconnection are not provided for in the EnLG 2012. The allocation of large consumers to the respective restriction level is carried out in a specific energy intervention case in an electricity intervention measures order issued by

[57] This would typically be done by stipulating maximum withdrawal loads to be complied with.

the Federal Minister of Economy, Energy and Tourism, taking into account the supply situation existing at the time the order is issued and the existing or forecast supply shortage.

4.1.4.4.6 Regulations regarding the supply of electrical energy to and from EU Member States and third countries (section 14 [1] no 3 in conjunction with section 18 EnLG 2012)

- Possible electricity intervention measure orders based on this provision shall take into account the Austrian electricity supply situation as well as the obligations under international and EU law within the meaning of § 4 (2) EnLG 2012.

4.1.4.4.7 Determination of consumption quotas for the provinces (section 14 [1] no. 7 in conjunction with section 21 EnLG 2012)

- The determination of consumption quotas for the provinces is the last resort within the cascade of energy intervention. The purpose of this measure is to prevent a comprehensive grid collapse and thus a widespread power outage.
- If consumption quotas for the provinces are regulated in an electricity intervention measure order issued by the Federal Minister of Economy, Energy and Tourism, their implementation is the responsibility of the provincial governors.
- With regard to the implementation of the consumption quotas for the provinces, section 21 (5) EnLG 2012 authorizes the provincial governors to exclude or cut off geographically circumscribed areas from electricity withdrawal by order.
- In the orders pursuant to section 21 (5) EnLG 2012, the respective provincial governor determines the shutdown zones[58] which are alternately excluded or cut off from electricity withdrawal.

The provisions of section 14 (1) no. 1 in conjunction with section 16 EnLG 2012 and section 14 (1) no. 3 in conjunction with section 18 EnLG 2012 shall not be applied to power plants that render system services and cover peak loads within control areas if the provision of system services and the coverage of peak loads is not sufficiently ensured in the respective control area through cross-control-area utilisation of these power plants for the purposes of overcoming the crisis (cf. section 14 [1] last paragraph EnLG 2012).

[58] With regard to the term “shutdown zone”, reference is made to the definition in section 1 para. 1 no. 2a of the Regulation of the Executive Board of E-Control concerning the reporting of data for the preparation of intervention measures to safeguard electricity supply and for the monitoring of security of supply in the electricity sector (Electricity Intervention Data Regulation 2017 – E-EnLD-VO 2017), Federal Law Gazette II No. 415/2016, as amended. According to this definition, a “shutdown zone” means a regionally defined area in the system operators’ shutdown plan which, in the event of an area-wide exclusion from electricity (section 21 para. 5 EnLG 2012), is generally treated uniformly with regard to disconnection from electricity supply or shutdown.

In accordance with the principle of proportionality set out in section 4 (4) EnLG 2012, intervention measures may only be taken to the extent and for the duration that is absolutely necessary to avert or overcome supply disruptions, to fulfil the obligation to provide solidarity in accordance with Art. 13 Regulation (EU) 2017/1938, to fulfil the obligation to provide assistance in the form of regional or bilateral measures in accordance with Art. 15 Regulation (EU) 2019/941 or to fulfil obligations under international law to implement emergency measures pursuant to decisions by the governing bodies of international organisations. In principle, less invasive energy intervention measures (such as appeals for the sparing use of energy, regulations regarding the operation of electricity generating stations and permission to breach emission limits, prohibitions of use) therefore have priority over more significant interventions (such as exclusion from or restrictions on supply with electrical energy, the determination of consumption quotas for the provinces).

4.1.5 Implementation of energy intervention measures

The preparation and coordination of the intervention measures to be taken in the Austrian control areas in case of need falls under the responsibility of E-Control (section 15 [1] EnLG 2012 in conjunction with section 5 of the E-Control Act[59]). The operational implementation of the measures enacted by order under sections 16 to 20 EnLG 2012, on the basis of the criteria set out in the energy intervention orders, is the responsibility of the control area managers acting in conjunction with the system operators, balance group coordinators, balance group representatives, and electricity wholesalers and retailers, which shall coordinate their activities in the interests of a uniform approach throughout the federal territory. The control area manager in Austria is Austrian Power Grid AG (APG).

The implementation of intervention measures in relation to provincial consumption quotas in accordance with section 14 (1) no. 7 EnLG 2012 and the enactment of regulations in accordance with section 14 (1) no. 6 EnLG 2012 about the procurement of energy from renewable sources in accordance with the Green Electricity Act 2012 and about the use of renewable electricity in accordance with the Renewable Energy Expansion Act in the provinces falls under the responsibility of the provincial governors. A provincial governor may charge the designated control area manager in the respective province, as well as the system operators, balance group coordinators, balance group representatives and electricity wholesalers and retailers operating in such province with implementing the measures (section 21 [2] EnLG 2012).

[59] Federal Act on the Regulatory Authority for Electricity and Natural Gas (E-Control Act - E-ControlG), Federal Law Gazette I No. 110/2010, as amended.

In the implementation of intervention measures related to the provincial consumption quotas in accordance with section 14 (1) no. 7 EnLG 2012, the provincial governors are bound by the federally uniform distribution regulations provided that the electricity supply situation in the province does not allow for deviation from the federally uniform regulations without running the risk of failing to meet the energy saving target that must be met by the province. If the energy savings target is not met in the province, E-Control can order the necessary measures with binding effect for the province in question (section 21 [3] EnLG 2012).

Regarding the implementation of provincial consumption quotas, section 21 (5) EnLG 2012 stipulates that geographically circumscribed areas may be excluded from electricity withdrawal or cut off by order of provincial governors. This is referred to as an area-wide disconnection.

In accordance with section 21 (5) second sentence EnLG 2012, measures taken based on an order by the Federal Minister of Economy, Energy and Tourism in accordance with section 17 EnLG 2012 shall be taken into account in the event of area-wide disconnections.

4.1.6 Mechanisms used to inform the public about the electricity crisis

Energy intervention measure orders are announced in the Federal Law Gazette, and those enacted by the provincial governors in the respective provincial law gazette. If announcement in the Federal Law Gazette or the provincial law gazettes is not possible or not possible in a timely manner, the order will be announced in another manner – especially by radio, television, or other acoustic medium or publication in one or more periodic publications that accept advertisements, especially daily newspapers – and also made available on the Internet (section 5 [4] EnLG 2012).

A brochure titled “Krisenvorsorgemanagement” (Crisis-Preparedness Management) has been published by the Federal Ministry to inform the public about the mechanisms of crisis management in the energy system.[60]

4.1.7 Digression: Widespread power outage (“blackout“)

In accordance with Art. 18 (4) Regulation (EU) 2017/1485 establishing a guideline on electricity transmission system operation a transmission system shall be in the blackout state when at least one of the following conditions is fulfilled:

[60] Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology [now Federal Ministry of Economy, Energy and Tourism] (Ed.): Krisenvorsorgemanagement Gut vorbereitet: Bestandsaufnahme und Bewältigung möglicher Krisenszenarien im Bereich Energie, Krisenvorsorgemanagement (bmwet.gv.at).

- Loss of more than 50 % of demand in the concerned transmission system operator's control area;
- total absence of voltage for at least three minutes in the concerned transmission system operator's control area, leading to the triggering of restoration plans.

In the event of a blackout, the transmission system operator is responsible, in accordance with the relevant legal provisions, for restoring the transmission system to normal operating condition and coordinating measures for reconstruction after major disruptions to the transmission system (see section 122 [1] no. 12 ElWG, Regulation (EU) 2017/1485 establishing a guideline on electricity transmission system operation, Regulation (EU) 2017/2196 establishing a network code on electricity emergency and restoration). In the event of critical grid conditions, APG activates technical measures in accordance with the system defence plan to prevent major disruptions and limit their effects. In the event of a widespread power outage, APG has a grid restoration concept in place in Austria that has been coordinated with all major distribution system operators and is regularly tested and updated. This provides for the reconstruction of the Austrian grid with the Kaprun (Salzburg) and Malta (Carinthia) power plant groups, which is contractually secured, taking into account the emergency plans of the individual 110 kV system operators in the provinces.

In the event of a widespread power outage, APG immediately informs the BMWET and BMI. Communication is mainly based on “BOS”- radio[61] and, in some cases, via satellite telephones.

The BMI, in close coordination with other affected ministries, is responsible for maintaining public peace, order, and security, as well as for coordinating matters relating to national crisis and disaster management, including the warning and information of the population, and ensures close coordination with the other ministries concerned.

The further procedure regarding the electricity supply is determined by the BMWET in consultation with E-Control and APG. In particular, an analysis is carried out to determine whether energy intervention measures in accordance with the EnLG 2012 are necessary as part of the grid restoration to remedy the disruption to the energy supply.

In particular, it would be conceivable to issue a fuel intervention measure order to supply essential consumers with fuel in order to maintain public order, safety and vital infrastructure, as well as electricity intervention measures to support the restoration of the grid if necessary.

[61] BOS stands for "Behörden und Organisationen mit Sicherheitsaufgaben" (Authorities and Organizations with Security Functions) and refers to the communication systems used by public safety agencies.

In the further procedure, the National Crisis and Disaster Management (SKKM) is activated. Within the framework of the SKKM, an assessment is made of the effects of the widespread power outage on all areas of life and the steps to be taken in this regard are determined.

4.1.8 Differentiation from matters of disaster relief

The national procedures and measures set forth in this Risk-Preparedness Plan in accordance with Art. 10 Regulation (EU) 2019/941 are based on the Energy Intervention Powers Act 2012.

These are discrete from matters of disaster relief, which largely fall under the responsibility of the provincial governments and are regulated by the laws stipulating disaster relief of the provinces.

The incident-related coordination of domestic measures to cope with interregional or international crises or catastrophes falls under the responsibility of the Federal Chancellery (see part 2 lit. A no. 1 of the Annex to section 2 of the Federal Ministries Act 1986 [BMG]).

The coordination in matters of national crisis management and public disaster relief management falls under the responsibility of the Federal Ministry of the Interior (see part 2 lit. H no. 1 of the Annex to section 2 BMG).

4.2 Regional and bilateral procedures and measures

4.2.1 Agreed mechanisms for cooperation within the region and for ensuring appropriate coordination before and during an electricity crisis, including the decision-making procedures for appropriate reaction at regional level

In accordance with Art. 12 Regulation (EU) 2019/941, the Risk-Preparedness Plan shall include not only national measures, but also regional and, if appropriate, bilateral measures to ensure that electricity crises with cross-border impact are properly prevented or managed. Regional measures shall be agreed within the region concerned between Member States that have the technical ability to provide each other assistance in accordance with Art. 15 Regulation (EU) 2019/941. For that purpose, the Member States may also form subgroups within a region.

The Republic of Austria shall conclude agreements on regional measures with the neighbouring EU Member States Germany, Italy, Czechia, Slovenia, and Hungary. Due to the absence of direct connection lines with Slovakia, there is no such obligation with Slovakia.

The existing regional cooperation mechanisms are described below. Intergovernmental agreements that are concluded in future will be taken into account in updates to this Risk-Preparedness Plan.

4.2.2 Regional cooperation relating to security of electricity supply under the framework of the Pentalateral Energy Forum and signing of a Memorandum of Understanding on Risk-Preparedness in the Electricity Sector

4.2.2.1 Introduction and Context

The Pentalateral Energy Forum (called the PENTA-Forum in the following) is the framework for voluntary 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. For over 20 years, the seven Penta countries have been working on initiatives towards improved electricity market integration, electricity security of supply, and accelerating the energy transition. 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. This collaboration is formalized trough the Memorandum of Understanding of the PENTA-Forum, signed on 6 June 2007 in Luxembourg. 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.

In the MoU on Emergency Planning and Crisis Management in the Power Sector, signed on 26 June 20172 in Luxembourg, the Penta countries agreed to strive for joint coordination of national and regional measures in case of a simultaneous emergency situation, for the region covering Austria, Belgium, France, Germany, Luxembourg, the Netherlands and Switzerland.

Following the entry into force 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, a first Penta common risk preparedness chapter was drafted, and a new Memorandum of Understanding on Risk Preparedness in the Electricity Sector was signed. Both documents aim to provide an answer to the requirements on regional and bilateral measures pursuant to Articles 12 and 15 of Regulation (EU) 2019/941. The first Penta common risk preparedness chapter was notified to the European Commission in January 2022 and was incorporated into the national risk preparedness plans of the Penta members. The Memorandum of Understanding on Risk Preparedness in the Electricity Sector was signed on 1 December 2021 in Brussels. These documents form the basis for the action points identified and addressed by the Penta Risk Group, the working group focussing on the regional implementation of the Regulation (EU) 2019/941.

In April 2023 the Penta Risk Group notified an updated Penta common risk preparedness chapter to the European Commission. This updated version addressed the recommendations from the European Commission and included important lessons learnt from a drastically changed geopolitical energy context. Since February 2022, the Penta forum proved its added value once more by jointly dealing with the energy supply consequences caused by the Russian invasion of Ukraine. Several ad hoc meetings were organized to exchange best practices on implementing the EU action packages, and to share information on the preparedness measures in place.

Since 2022, electricity security has been a major priority on the international energy policy agenda. Within this context, Penta has been working on strengthening and operationalising the regional electricity risk preparedness tools, without losing sight of the bigger energy security picture. This focus is reflected in this present third update of the Penta Common Risk Preparedness Chapter.

4.2.2.2 PENTA specific regional electricity crisis scenarios

As highlighted in Regulation (EU) 2019/941, regional electricity crisis scenarios play a key role in identifying opportunities for cross-border cooperation and support. With the update of ENTSO-E's methodology for identifying the most relevant regional electricity crisis scenarios, and in line with Article 6 of the Risk Preparedness Regulation, the Penta Region was formally recognized as a subgroup. This recognition gave Penta the opportunity to contribute to ENTSO-E's list of candidate regional scenarios. This allowed the region to assess the relevance of each scenario and to give input on which scenarios should be removed, maintained, updated or combined with other scenarios. The Penta Risk Group also requested ENTSO-E to reduce the number of crisis scenarios and to focus on the most critical ones. Because of its status as a subgroup, a dedicated overview of the most relevant scenarios for the Penta Region was included in the ENTSO-E report. This meant a shift from the 2020 report, where the focus was mainly on Pan-European scenarios.

To make the scenarios more useful for identifying regional measures, Penta experts decided to complement their own scenario ranking with a more generic description of the crisis scenarios, by identifying topical groupings specifically relevant for the region, in order to identify concrete measures and arrangements. For instance, whether a key transmission line fails due to a storm or a severe winter incident, does not necessarily change the type of response needed.

In 2025, Penta experts built on this approach by focusing more on the impact of a crisis and the related measures. By categorizing scenarios based on their consequences, experts gain valuable insights into how initiating factors can affect the electricity system in different ways. The new categorisation therefore allows experts to quickly assess the overall impact of a crisis situation considering key elements such as the event's nature, location and severity.

Concretely, four distinct categories were identified by the Penta Risk Group, each reflecting the consequences of an event in the regional electricity crisis scenarios and which can be addressed with the catalogue of measures as depicted in the Memorandum of Understanding on risk preparedness in the electricity sector:

I. Loss of grid control

The loss of grid control category covers scenarios where the main control systems available to TSOs, large DSOs or critical power plants are affected and significantly impact the safe operation of the grid. Potential triggers include:

a) Control unavailability due to the corruption or destruction of the control systems;
b) Malicious controls caused by internal or external unauthorized actions;
c) External events which cause key assets to be unavailable or inaccessible.

II. Grid congestion

Unexpected grid congestion occurs when the electricity grid suffers reduced transmission capacity to deliver electricity from where it's generated to where it's needed due to an unforeseen event. The main triggers leading to unexpected grid congestion can include:

a) Unforeseen electricity flows caused by forecasting errors or unforeseen energy market interactions;
b) The unavailability of critical infrastructure due to damages or due to having become inaccessible.

III. Supply adequacy

Supply adequacy is not assured when supply cannot meet demand anymore or when supply exceeds demand.

The main triggers can include:

a) Weather-related causes;
b) The unavailability of critical infrastructure such as cross-border interconnectors and power plants due to damage;
c) Unforeseen electricity flows caused by forecasting errors or unforeseen energy market interactions.

IV. Long-term system degradation

Long-term system degradation is understood to be a consequence due to:

a) Large scale (and potentially continuous) damage to critical infrastructure;
b) Supply chain issues (equipment or personnel) affecting the normal system operation and maintenance.

Dividing the scenarios into these four categories helps create a clearer link between regional measures and the consequences of each scenario. It also provides a complementary perspective on regional crisis scenarios, alongside the analyses carried out by ENTSO-E.

It should be noted that some scenarios may appear in multiple categories. For example, the scenario “physical attack on critical assets” appears in three categories (grid congestion, supply adequacy and long-term system degradation). In this case, the nature of the physical attack is decisive to determine the consequences for the energy sector. An attack on transmission infrastructure within the Penta region would most likely lead to internal congestion. Attacks on interconnectors to the Penta region or attacks on generation assets on the other hand would most likely lead to adequacy issues resulting from reduced cross-border flows or decreased production capacity, respectively. In case of continuous and large-scale physical attacks (i.e. a war-like scenario), a long-term system degradation would most likely be the result.

In addition to swiftly understanding and evaluating the impact of a crisis event, timely identification of potential regional measures is essential for an effective crisis response. The expert-developed Catalogue of Measures supports the selection of actions that are tailored to each situation.

The measures are grouped into the different scenario categories. While all measures in the Catalogue of Measures could, in principle, be relevant to any crisis scenario, their actual applicability depends on the nature and context of the specific event. The goal is to better evaluate the relevance of regional measures in different crises and identify those most likely to resolve it.

Some measures appear in more than one category, reflecting their relevance across different domains. Information and knowledge sharing are considered actions that are applicable under all circumstances and form the cornerstone of any regional crisis response. A comprehensive understanding of the crisis is essential to determine the most appropriate and cost-efficient measures, while minimizing the impact on the general public.

Occasionally, crisis prevention and response measures may largely fall outside the scope of the competence of the energy ministries. This includes, for example, preventive measures to enhance the resilience of the electricity system against deliberate physical attacks or cyberattacks. In the field of cybersecurity, legal frameworks such as the NIS 2 Directive and the Network Code on sector-specific rules for cybersecurity aspects of cross-border electricity flows constitute important instruments for strengthening the protection of critical energy infrastructure. Furthermore, the CER Directive[62] introduces additional criteria for critical infrastructures in order to assess potential risks and to enhance their resilience against unforeseen and extreme events.

[62] Directive (EU) 2022/2557 of the European Parliament and of the Council of 14 December 2022 on the resilience of critical entities and repealing Council Directive 2008/114/EC (CER Directive).

Table 5 Overview of the main electricity crisis scenarios in the PENTA region[63]

Loss of grid control		Grid congestion		Supply adequacy		Long-term system degradation	
Loss of ICT systems to cyber-attack	28	Physical attack on critical assets (Targeted attacks within Penta region)	28.4	Physical attack on critical assets (attack on inter-connectors to Penta region or power plants)	28.4	Physical attack on critical assets (large scale attacks)	28.4
Unauthorised action by personnel	20	Heavy flooding (localised flooding damages critical infrastructure)	19.8	Severe winter	28	Heavy flooding (large scale flooding)	19.8
Physical attack on control centres	18	Severe storm (localised damage to critical infrastructure)	18	Severe storm (shutdown of wind turbines)	18	Severe storm (large scale storm)	18
Large industrial/nuclear accident	8	Severe summer (overheating cables and forest fires)	16.4	Severe summer	18	Pandemic	6.4
Space weather	4.2	Unusually big demand / RES forecast errors	16.4	Unusually big demand / RES forecast errors	16.4	Serial technical defects	5.6
		Unforeseen interaction of energy markets	12	Fossil fuel shortage	13.2	Industrial action, strikes, riots	5.6
		Heavy ice loading (localised damage to critical infrastructure)	10.8	Unforeseen interaction of energy markets	12	Earthquake	2.4
				Dunkelflaute	9.6		
				Nuclear fuel shortage	5.2		

Catalogue of Measures

The Catalogue of Measures provides a non-exhaustive overview of identified regional actions. In a given crisis, additional measures may be required to reduce its impact, including those from sectors outside the energy domain. Which of the following measures are applied, and by which countries, in the event of an electricity crisis depends on the specific situation at hand, the concrete way the crisis unfolds as well as the national legal framework in each PENTA-country.

[63] The presented numerical PENTA assessment of the individual scenarios reflects the aggregated overall evaluation of the PENTA countries, which is composed of the respective individual assessments of the participating countries.

Loss of grid control	Grid congestion	Supply adequacy	Long-term system degradation
Relevant measures in all cases: Information, knowledge & expertise sharing			
• (Joint) elaboration on cross-border aspects of potential measures of demand reduction to reduce system stress • Support with electrical equipment via stocks if equipment was damaged	• (Joint) elaboration on cross-border aspects of potential measures of demand reduction to reduce congestion • Depending on location and grid topology, redispatch (activation of available power plants or reserves) to deviate electricity flows and alleviate congestion • Support with electrical equipment via stocks to repair infrastructure	• (Joint) elaboration on cross-border aspects of potential measures of demand reduction to restore adequacy • If cross-border infrastructure is impacted, support with electrical equipment via stocks to repair cross-border infrastructure	• (Joint) elaboration on cross-border aspects of potential measures of demand reduction to reduce system stress • Support with electrical equipment

4.2.2.3 Competent authorities in the PENTA region

The following table provides an overview of the competent authorities in the PENTA region.

Table 6 Overview of the competent authorities under Art. 3 of Regulation (EU) 2019/941 in the PENTA region

Staat	Zuständige Behörde	Kontakt
Belgium	Federal Minister of Energy	https://www.belgium.be/en E-Mail: be-riskpreparedness@economie.fgov.be
Germany	Federal Ministry for Economic Affairs and Energy	https://www.bmwk.de/Navigation/EN/Home/home.html E-Mail: buero-VIIIB2@bmwe.bund.de; riskpreparedness@bmwe.bund.de
France	Directorate General for Energy and Climate	https://www.ecologie.gouv.fr/ E-Mail: ccr.pole-dgec@developpement-durable.gouv.fr
Luxembourg	Minister responsible for Energy	https://meco.gouvernement.lu/fr.html/ E-Mail: secretariat.energie@eco.etat.lu
Netherlands	Ministry of Climate Policy and Green Growth	https://www.rijksoverheid.nl/ministeries/ministerie-van-klimaat-en-groene-groei.nl E-Mail: secretariaatenergiemarkt@minezk.nl
Austria	Federal Ministry of Economy, Energy and Tourism	https://www.bmwet.gv.at/ E-Mail: energielenkung@wirtschaftsministerium.at
Switzerland	Swiss Federal Office of Energy	https://www.bfe.admin.ch/ E-Mail: contact@bfe.admin.ch

4.2.2.4 Regional processes and instruments

4.2.2.4.1 Communication Protocol

One of the most important regional preparedness measures is a common communication protocol. The Penta communication protocol has been tested and further developed in recent years through a series of regional exercises and workshops. Two important elements of this protocol are the contact lists, as noted in the previous chapters, and the Penta Crisis Management Toolkit. Both are available for the Penta Risk Group members through a shared online platform.

4.2.2.4.2 Notification procedure regarding early warning and electiricty crisis

Based on the regional exercises and lessons learnt from previous crises, the Penta Risk Group has agreed on a common procedure for mutual notification in the event of an early warning or an electricity crisis.

In line with Art. 14 of Regulation (EU) 2019/941, Member States are required to inform the European Commission when declaring an early warning or an electricity crisis. Accordingly, if any of the Penta countries declares such a situation, they will simultaneously notify both the European Commission and all other Penta countries.

A first notification by one or several Penta countries will automatically lead to an ad hoc Penta Risk Group call, unless the notifying Penta member country requests otherwise. In the event of an electricity crisis, the Penta Risk Group will assume the role of the central platform for coordination and information exchange among the Penta countries, with the possibility to extend to an informal regional crisis cell if deemed useful. The online platform where the necessary documents are available, also offers the option for the Penta Risk Group members to informally share information via a chat function. Information sharing, including on the online platform, shall comply with each country's national rules on data protection, confidentiality and classified information.

The method of contacting or notifying the other Penta countries in the event of an early warning and/or electricity crisis will depend on the nature and urgency of the crisis, distinguishing between two main scenarios:

- **Imminent threat**:
  - In the event of an imminent threat, the Penta country that is, or will be affected, shall immediately contact the other Penta countries by telephone - using the details provided in the informal contact list—both during and outside office hours. This initial contact will be followed up by a written confirmation via email.

- The other Penta countries are required to acknowledge receipt of the notification by email and confirm their availability for an ad hoc Penta Risk Group meeting.

- **No imminent threat**:
  - In the case of a non-imminent threat, the Penta country that is, or may be, affected shall promptly notify the other Penta countries by email, using the contact details provided in the informal contact list, regardless of office hours.
  - The other Penta countries are required to acknowledge receipt of the notification by email and confirm their availability for an ad hoc Penta Risk Group meeting.

The practical arrangements for these meetings, such as the chair of the meeting, secretariat support, and other organizational details, will be discussed at the start of the first ad hoc Penta Risk Group meeting. These arrangements will remain in effect until the end of the crisis, unless the Penta Risk Group decides to adjust them due to changed circumstances.

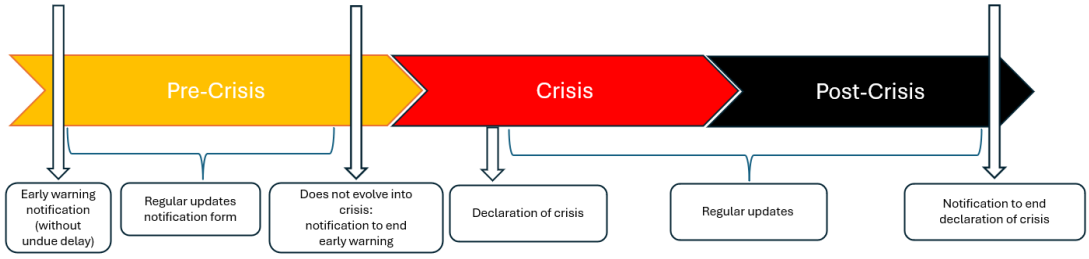
Penta will use the notification template (part of the Penta Crisis Management Toolkit) to formally communicate on:

- Declaration of an early warning
- Declaration of a crisis
- Update on an early warning or a crisis
- Request for assistance
- End early warning
- End of electricity crisis

The template will be filled out in English. Information will be shared as soon as possible.

Following the first notification, an update will be sent at least once every week (even if no new information is available), unless circumstances warrant a different frequency.

Figure 3 Notification procedure on PENTA-level



This coordinated approach aims to ensure timely information sharing, enhance regional situational awareness, thereby facilitating consistency and complementarity between national crisis responses to potential or ongoing electricity crises. It also supports solidarity and consistency in the implementation of national and regional measures, minimizing cross-border impacts and strengthening overall energy security in the Penta region.

4.2.2.4.3 Penta Crisis Management Toolkit

Based on the regional exercises and lessons learnt a comprehensive toolkit was developed, containing all key documents and templates necessary to effectively manage a crisis at the Penta regional level. The toolkit serves as a practical and operational resource to help the Penta Risk Group in implementing the agreed procedures in the event of an early warning or electricity crisis.

This toolkit includes among other things the notification template, situation report (sitrep) template, agenda template, updated contact lists for all relevant stakeholders and the latest Risk Preparedness Plans of the Penta members. These documents are designed to ensure a harmonized and efficient exchange of information, enable swift coordination between the Penta countries, and support transparent decision-making during all stages of an electricity crisis.

4.2.2.4.4 Contact lists

The contact lists form an integral part of the Penta Crisis Management Toolkit.

- Formal Contact List:
  - The formal contact list will be updated at least once a year before the start of winter.
  - This contact list will be used for formal communication including:
    - Notification of an early warning or crisis;
    - Formal updates of the situation;
    - Request for assistance;
    - And formally ending an early warning or crisis situation.
  - The contact details on this formal list are also shared with the European Commission and the members of the Electricity Coordination Group (ECG), with the addition of the main Swiss contacts.
- Informal Contact List:
  - The informal contact list will also be updated at least once a year before the start of winter.
  - This contact list is used for informal information sharing as well as to organize an ad hoc Penta Risk group meeting.

- The list contains the details of the national contact persons involved in electricity and/or energy crisis management. This will allow for swift and informal information sharing ahead of or during a crisis. It is clearly indicated which contacts can be reached in case of an emergency (24/7).

4.2.2.4.5 Emergency Tests

Penta countries carried out a first joint exercise "Pentex" 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 contacts between different crisis management bodies in the Penta region.

Given the success of the first joint exercise and the identified action points, the Penta members acknowledge the importance of continuing to organise joint exercises on a regular basis. In 2022, the Penta countries therefore organised two exercises focussing mostly on the assessment of regional coordination, communication, and assistance mechanisms.

The "Black-out 22" exercise, took place on 24 May 2022 in Paris as part of a French national crisis exercise. The regional layer that was added to the national exercise gave the Penta Risk Group members, representatives of the national TSOs and representatives of the regulatory authorities, the possibility to learn more about each other's roles in crisis management, the national crisis structures, and the national crisis procedures and measures. Among other things, the participants examined the potential cross-border impacts of electricity supply crises and discussed the framework conditions for intergovernmental communication and coordination. Based on these discussions, the PENTA countries identified a number of action points, which were addressed in a follow-up exercise on 13 July 2022 in Brussels in the form of a risk preparedness workshop. In order to further deepen knowledge of the national crisis structures and procedures of the other PENTA countries, both national and cross-border impacts of extreme weather events were discussed. Subsequently, remaining areas for improvement in regional coordination and cooperation were identified, and a joint communication protocol as well as a catalogue of possible regional measures were developed.

Building on the experiences of the previous exercises, further exercises were held in 2023 under the Dutch Penta presidency and in 2024 under the Belgian Penta presidency.

As part of the PENTEX 2023 exercise in The Hague, the communication protocol was practised and potential regional measures were discussed in line with the catalogue of measures that had been developed. The scenario for the exercise involved a successful cyberattack on multiple

power plants, with the threat of more plants potentially being affected. As the scenario primarily presented a looming crisis rather than an immediate full-scale emergency, several critical points were highlighted:

- Establishing a shared understanding of an electricity crisis, including thresholds and triggers for transitioning from national to regional crises.
- The identification of potential regional measures.
- The role of the Penta Risk Group as a regional crisis cell and the need to further strengthen and formalize communication between Penta countries.

Building on these lessons, PENTEX 2024 in Brussels was held. The exercise included both the electricity and gas sectors, thereby also bringing cross-sector impacts into focus. The scenario included multiple physical attacks on critical infrastructure, which led to N-1 violations and electricity shortages. The exercise concluded with a scenario where several countries required critical equipment, and the availability of that equipment was subject to varying levels of difficulty. In one case, a TSO-TSO agreement between two countries was reached. In another, a bilateral solution was found. The most complex case involved sourcing a critical piece of equipment from a country that was already using it for its own repairs. This challenging scenario underscored the need for continued development of regional measures and an understanding of the limits of solidarity between countries.

Additionally, the exercise was accompanied by a further improvement in communication and the structured exchange of information between the PENTA countries.

Identified action points included, among other things, legal clarifications regarding the catalogue of regional measures—particularly the limits of solidarity contributions—as well as a detailed analysis of the spare parts available in the PENTA region for critical electricity infrastructure, and the promotion of a shared understanding of crisis management mechanisms in the individual PENTA countries.

Building on the previous exercises, the PENTEX dilemma session was conducted in 2025. The main focus of the workshop was to operationalise the Catalogue of Measures, which includes regional actions such as demand reduction, equipment sharing for the reconstruction of critical electricity infrastructure, and cross-border use of reserves. The exercise sought to identify activation procedures, technical conditions, and potential financial arrangements required to enable regional solidarity in times of electricity crisis.

Overall, Penta countries agreed to continue discussions, build on the lessons learned, and use the outcomes of the past exercises to enhance communication protocols, strengthen resilience against major electricity crises, and improve cross-border cooperation and assistance.

4.2.2.5 Catalogue of regional measures in accordance with Art. 12 und Art. 15 of Regulation (EU) 2019/941

The Following catalogue of regional measures was drawn up to prevent and alleviate the impact of electricity crisis situations in the region, as identified in the Memorandum of Understanding of the Pentalateral Energy Forum on Risk Preparedness in the Electricity Sector signed on 1 December 2021. The descriptions below shall serve as a tangible and concrete basis for further elaboration, and are meant to be neither exhaustive nor restrictive. Further work on the legal, technical, and financial issues related to these regional measures is being carried out within the framework of the PENTA Forum by experts from the PENTA countries.

4.2.2.5.1 Surveillance of the short-term security of electricity supply

On a national level, transmission system operators (TSOs), distribution system operators (DSOs), national regulatory authorities (NRAs) and Ministries have established specific roles and procedures for security of electricity supply. On a European level, several entities and groups carry responsibilities as well, notably ENTSO-E, regional coordination centres (RCCs), and the Electricity Coordination Group (ECG).

Complementary to the above, the Pentalateral Energy Forum adds value by bringing together experts from TSOs, NRAs and Ministries in a well-established, flexible and trusted regional framework. Timely exchanges of information on the evolution of situation are of great importance for joint coordination. More specifically, in case of an imminent or actual electricity crisis situation, i. e. after an early warning or a declaration of crisis in accordance with Art. 14 Regulation (EU) 2019/941 were issued, a standing group can be set up on short notice to, amongst others share the latest information and exchange on (planned) interventions both at an operational and policy level and the impact of the (crisis) situation on the other countries. The standing group can convene on several levels, such as on an expert, crisis coordinator or ministerial level. This tool has proven to be very useful in the past in dealing with stress situations.

4.2.2.5.2 Coordinated information regarding saving appeals to the public

Saving appeals can be an important instrument in preventing an imminent crisis.

While communication strategies need to consider local and national specificities, they also benefit from consistency and coordination across borders.

On a Penta level, detailed information could be shared and discussed concerning saving campaigns in order to avoid possible inconsistencies which could trigger unwanted cross-border spill-overs, ensure alignment, and identify best practices.

4.2.2.5.3 Cross-border usage of reserve capacities and flexible loads

In contrast to wholesale and balancing markets, reserve capacities and flexible loads are being organized on a national level. According to a first assessment, national frameworks for those assets currently neither foresee nor allow for cross-border sharing or only allow this under specific conditions. A regional measure could therefore aim to share these assets for supporting other countries in an imminent or actual electricity crisis, and enhance synergies of the crisis prevention and management measures and thus their economic efficiency and overall system reliability. The main questions to be tackled before applying this measure are:

- Assessment of national frameworks,
- coordinated procedural rules for activating the assets for a regional deployment,
- analysis and mitigation of possible negative interferences with wholesale and balancing markets,
- location of the assets, availability of sufficient transmission capacity, and estimated impact on system operation,
- estimated duration of activating the assets,
- estimation of costs and benefits, followed by an agreement on allocation principle.

4.2.2.5.4 Exchange about demand disconnection plans

According to Art. 4 (5) of the Network Code electricity emergency and restoration (Regulation (EU) 2017/2196), each TSO is required to prepare a system defence plan that includes, among other things, rules on demand disconnection. From a regional point of view, it is important to understand and, where suitable, to align on the contents and corresponding procedures for critical supply situations. A first step would consist in presenting the respective plans to each other, involving TSOs, NRAs and Ministries. This could help to avoid possible inconsistencies, enhance alignment taking national circumstances into account, and identify best practices.

4.2.2.5.5 Support with electric equipment, knowledge and expertise

In case of an electricity crisis, a significant amount of dedicated equipment and workforce is needed that may not be available on a national level. Therefore, similar and complementary to the existing possibilities of international support for civil protection (such as firefighting planes, tracking dogs, etc.), a pool of equipment and experts could be formed and sent to support the

most critical places during an electricity crisis. Once implemented, the Commission Implementing Decision (EU) 2022/1198[64] may provide a suitable framework for this, addressing the following main components:

- Power generators of various sizes,
- adequate connectivity, synchronization, monitoring and power transfer systems to enable connecting the capacity to the affected facilities as well as paralleling control of units,
- adequate number of spare parts and other consumables for the functioning of the capacity, such as batteries, energy harvesting equipment, connectivity and synchronizing equipment, etc.,
- adequate procedures to transport, handle, assemble, install, operate and maintain the capacity,
- lighting equipment, including lighting protection systems,
- adequate storage facilities,
- appropriately trained personnel and assets to handle, assemble, install, operate and maintain the energy supply capacity.[65]

4.2.3 Signing of a Memorandum of Understanding on Risk-Preparedness in the Electricity Sector between Austria, Germany, the Czech Republic, Slovakia, Poland, and Hungary

Consultations were held between Austria and Central Eastern European Member States on the basis of the PENTA Memorandum of Understanding on Risk-Preparedness in the Electricity Sector starting at the end of 2021. These efforts led to the signing of a Memorandum of Understanding on Risk-Preparedness in the Electricity Sector by the Ministries responsible for energy matters of the Republic of Austria, the Czech Republic, the Republic of Germany, of Hungary, Republic of Poland and the Slovak Republic on 27 June 2022.

The contents of the memorandum of understanding correspond largely to the items of the PENTA memorandum of understanding on risk-preparedness in the electricity sector, and include a regular exchange about aspects of risk-preparedness in the electricity sector and national crisis management. The memorandum of understanding also contains the intention of the signatory countries to offer each other assistance in the event of an electricity crisis by means of regional measures, where they have the necessary technical ability. It also contains a non-exhaustive list of regional measures that are to be fleshed out in detail in future. These

[64] Commission Implementing Decision (EU) 2022/1198 of 16 June 2022amending Implementing Decision (EU) 2019/570 as regards rescEU emergency energy supply capacities.
[65] Cf. Implementing Decision (EU) 2022/1198, Annex, Section 13.

include the cross-border usage of reserve capacities and flexible loads, the exchange of information about demand disconnection plans, the surveillance of the short-term security of electricity supply, the exchange of information regarding saving appeals to the public, support with electric equipment, knowledge and expertise, and the usage of mobile generators.

4.2.4 Communication and coordination at Union and regional level in the event of an electricity crisis

Article 14 (1) and (2) of Regulation (EU) 2019/941 regulates information obligations in connection with the early warning and declaration of an electricity crisis.

Where a seasonal adequacy assessment or other qualified source provides concrete, serious and reliable information that an electricity crisis may occur in a Member State, the competent authority of that Member State shall, without undue delay, issue an early warning to the Commission, the competent authorities of the Member States within the same region and, where they are not in the same region, the competent authorities of the directly connected Member States (Article 14 [1] of Regulation [EU] 2019/941).

When confronted with an electricity crisis, the competent authority shall inform the competent authorities of the Member States within the same region and, where they are not in the same region, the competent authorities of directly connected Member States, as well as the Commission, without undue delay (Article 14 [2] of Regulation [EU] 2019/941). Under Austrian law, this would be the case if the parameters of section 4 (1) no. 1 EnLG 2012 are met. The competent authority within the meaning of Regulation (EU) 2019/941 with regard to the Republic of Austria is the Federal Ministry of Economy, Energy and Tourism.

Regulations regarding the intergovernmental exchange of information at regional level are contained in the Memoranda of Understanding described in sections 4.2.2 and 4.2.3. Both agreements provide for experts from the participating countries to meet regularly to discuss the supply situation at national and regional level and the functioning of national and regional crisis management mechanisms.

Furthermore, both MoUs include detailed regulations on mutual intergovernmental communication in the event of an electricity crisis. Accordingly, it is foreseen that the competent authority of each affected country informs the competent authorities of the other MoU countries of an imminent crisis or when confronted with a crisis. This information includes the measures taken and planned at national level as well as possible regional measures identified. To this end, the MoUs each express the intention of the signatory countries to exchange a confidential common contact list with names and contact details of all entities involved in the prevention and

management of electricity crises, including at least the competent authority, the crisis coordinator and the national regulatory authority (if involved in crisis situations) and the transmission system operators of each country, which will be updated regularly unless circumstances warrant more frequent updates.

5 Plans for the development of the future grid

5.1 Integrated Network Infrastructure Plan (ÖNIP)

In accordance with sections 94 to 96 of the Renewable Energy Expansion Act (EAG), the ÖNIP is drawn up every five years. The first version was published in April 2024. Among other things, the plan defines the hydrogen start-up network and describes the future infrastructure requirements in the electricity transmission grid. The integrated consideration of the overarching energy infrastructures for electricity, gas and hydrogen enables coordinated planning of the expansion of renewable energy generation with the development of grids, storage facilities and flexibility options.

5.2 Network development plan

Pursuant to section 123 (1) of the ElWG, the transmission system operators are required to jointly submit a ten-year network development plan (NEP) for the transmission network to the regulatory authority for approval in odd-numbered calendar. This is based on the current situation and the supply and demand forecasts. The NEP contains efficient measures to ensure the adequacy of the system and to achieve a high degree of availability of line capacity (security of supply of the infrastructure).

The purpose of network development planning is in particular to

- to provide market participants with information on which major transmission infrastructures need to be built or upgraded over the next ten years;
- to list all already decided investments and to identify new investments—including prioritization and an indication of interdependencies—that are to be carried out within the next three years;
- to establish a timeline for all investment projects;
- to provide a strategic outlook on the expected future grid development beyond the period referred to in point 1;
- to ensure the coverage of demand for transmission capacity to supply end customers, taking into account emergency scenarios;
- to achieve a high level of availability of transmission capacity (security of infrastructure);

- to meet the demand for transmission capacity in order to reach the minimum level of capacity pursuant to Art. 16 (8) of Regulation (EU) 2019/943;
- to meet the requirement for increased transparency in grid operation and expansion.

When elaborating the NEP, reasonable assumptions are made about the evolution of generation, supply, consumption and electricity exchange with other countries, taking into account the investment plans for regional networks.

Before approving the Network Development Plan, the regulatory authority conducts open and transparent consultations on the submitted plans. The authority publishes the results of these consultations, making particular reference to any identified investment needs. It then examines whether the ten-year network development plan covers the entire investment need identified during the consultations and whether consistency is ensured with the Union-wide network development plan, the national energy and climate plan, the integrated network infrastructure plan, the network development plans of distribution system operators, as well as the coordinated network development plan and the long-term and integrated planning in accordance with the Gas Act 2011.

The current NEP dates from 2025[66].

5.3 Ten-Year-Network Development-Plan (TYNDP)

In order to drive forward the energy policy objectives of creating an efficient grid infrastructure to ensure a high level of supply security, the integration of renewable energies and the further development of an integrated electricity market across Europe, grid expansion planning is coordinated at European level as part of the activities of ENTSO-E and ENTSO-G.[67] The results of this European transmission grid planning are bundled in ENTSO-E's Ten Year Network Development Plan (TYNDP), which was first published in June 2010.[68] The TYNDP 2024 is the eighth and most recent edition. With regard to Austria, 18 transmission grid projects and one storage project are anchored in the TYNDP.[69]

[66] Austrian Power Grid AG (APG) [Ed.]: Network Development Plan 2025, submission version, planning status August 2025.

[67] European Network of Transmission System Operators for Gas.

[68] Europäischer Netzentwicklungsplan - Österreich braucht Strom (apg.at).

[69] European Projects | ENTSO-E TYNDP (entsoe.eu).

5.4 Projects of Common Interest – Austrian project candidates in the electricity sector

An important instrument at EU level for optimizing the European energy infrastructure is the preparation of the list of PCIs (Projects of Common Interest) and PMIs (Projects of Mutual Interest) by the European Commission as part of the PCI process in accordance with Regulation (EU) 2022/869[70] ("TEN-E Regulation"). The BMWET is actively involved in this process and is in close contact with European partners (in particular the European Commission, Member States, transmission system operators, regulatory authorities and stakeholders).

The consultation on the list of project candidates for the 7th list (corresponding to the second Union list of PCI and PMI) ran until 25 April 2025. The project candidates in the field of electricity and smart grids located on Austrian territory are as follows:[71]

Electricity:

- High-voltage power line St. Peter (AT) – Pleinting (DE); Austrian Power Grid AG
- High-voltage power line St. Peter (AT) – Isar/ Altheim/ Ottenhofen (DE); Austrian Power Grid AG
- 220 kV-Power Line Lienz (AT) – Veneto region (IT); Austrian Power Grid AG
- Carinthia power grid area (High-voltage power line Lienz [AT] – Obersielach [AT}); Austrian Power Grid AG
- 220 kV-Power line Westtirol (AT) – Zell/Ziller (AT); Austrian Power Grid AG
- 380 kV-Power line St. Peter (AT) – Dürnrohr (AT); Austrian Power Grid AG
- Pumped storage power station Kaunertal; TIWAG-Tiroler Wasserkraft AG
- Interconnection between Würmlach (AT) – Somplago (IT); Alpe Adria Energia Srl

Smart electricity grids:

- Green Switch; KNG-Kärnten Netz GmbH

[70] Regulation (EU) 2022/869 of the European Parliament and of the Council of 30 May 2022 on guidelines for trans-European energy infrastructure, amending Regulations (EC) No 715/2009, (EU) 2019/942 and (EU) 2019/943 and Directives 2009/73/EC and (EU) 2019/944, and repealing Regulation (EU) No 347/2013.

[71] Energieinfrastruktur (bmwet.gv.at).

The promotion of cross-border energy infrastructure projects within the framework of the Trans-European Networks for Energy (TEN-E) is carried out through the Connecting Europe Facility – Energy (CEF Energy). The TEN-E Regulation defines the strategic direction and the categories of eligible projects, while CEF provides the concrete funding and implementation modalities.
For the current funding period 2021–2027, more than € 5.8 billion in EU funding is allocated to energy Projects of Common Interest (PCIs).[72]

5.5 Other measures in connection with grid expansion

The Renewable Energy Expansion Acceleration Act (EABG) is in preparation, which aims to speed up approval procedures for energy infrastructure projects. More efficient procedures should enable the expansion of renewable energies and the necessary infrastructure to be implemented more quickly.

[72] https://www.bmwet.gv.at/Themen/Europa/OesterreichinderEU/FoerderungenUndProgramme.html?lang=en.

6 Crisis coordination centre

6.1 Designation

Department V/3 - Crisis Management and Energy Intervention of Directorate General V - Energy of the Federal Ministry of Economy, Energy and Tourism.

6.2 Contact details

Address: Stubenring 1, A-1010 Vienna

E-mail: energielenkung@wirtschaftsministerium.at

7 Emergency tests

7.1 National emergency tests

Section 15 (11) EnLG 2012 specifies that E-Control is authorised to order exercises based on the assumption of crisis scenarios every two years.

The Federal Ministry responsible for Energy also carried out numerous exercises and workshops in the energy sector.

In addition, exercises are conducted in the context of National Crisis and Disaster Management (SKKM) – the coordination of which falls under the responsibility of the Federal Ministry of the Interior –, which may also occasionally pertain the energy sector, depending on the scenario and object of the exercise.

In the previous years, the following national exercises were conducted with reference to the electricity sector:

- HELIOS/SKKM exercise in May 2019: The exercise was based on an electricity shortage and involved around 100 representatives of the federal ministries, provinces, first responder organisations, and critical infrastructure assets.
- Energie.21/SKKM exercise in December 2021: The exercise was based on an extreme cold spell in Europe resulting in elevated electricity consumption and limitations on electricity generation. The exercise participants were composed of the relevant federal ministries BMK (now BMWET), BMI, BMLV, and BMAW and the provincial governments. The control area manager APG and E-Control were also represented.
- Gas shortage exercise in December 2022: The exercise focused on the scenario of a gas scarcity situation, but also addressed the importance of gas for a secure electricity supply. In addition to the BMK (now BMWET) as the organizer, representatives of other ministries, E-Control and APG, stakeholders from the energy sector and the provinces took part in the exercise.
- Various workshops and exercises with different provinces in May 2022, November 2022, June 2023 and September 2023.
- Cross-sector energy intervention exercise for gas and electricity in November 2023: In November 2023, the BMK (now BMWET) practised the processes in the event of a fictitious shortage of gas and electricity with E-Control, APG, Austrian Gas Grid Management AG - AGGM - (market and distribution area manager for gas) and other players from the energy

sector. In total, 20 key organizations from the energy sector and administration actively participated in the exercise and 18 observing organizations, with a total of 116 exercise participants.

- Fuel suppy exercise in November 2023 with the provinces of Vienna, Lower Austria and Burgenland, representatives of importers and fuel transporters regarding the fuel supply to essential consumers in the event of a large-scale power outage.
- Energy Intervention exercise of E-Control, 25–26 September 2025: Representatives of the BMWET, Energie Steiermark, the Province of Styria, Verbund, and Styrian industry—namely Voestalpine Stahl Donawitz GmbH and Sappi Austria Produktions-GmbH & Co KG—participated in the exercise, which was led by the regulatory authority E-Control, the transmission system operator Austrian Power Grid AG (APG), and the distribution system operator Energienetze Steiermark.[73]
- Blackout exercise "Silence 25" on 24 November 2025, organized by the Federal Ministry of the Interior: The primary objective was to test and improve communication (and coordination) regarding situation assessment, evaluation, and the transmission of one's own situational picture during the initial phase of a blackout via BOS digital radio in the absence of general communication systems.
  Participants and involved bodies included federal ministries (including the BMWET), the federal states, emergency response organizations, the SKKM coordination committee, APG, as well as ORF (Austrian Broadcasting Corporation) and APA (Austrian Press Agency).
- Ongoing radio exercises within the BMWET and in the context of the SKKM: These exercises are conducted to test communication via BOS radio. Participants practice transmitting situational reports and the key elements of energy intervention measures regulations using BOS radio, with a particular focus on the efficient communication of complex information over radio connections.
- Blackout-Exercise in the building of the BMWET on 18 April 2026: Assuming a blackout, a fuel intervention measure order and an electricity intervention measure order were enacted. The exercise was conducted under simulated real-world conditions by interrupting the regular power supply and using the emergency generator to continue supplying power to the crisis rooms. Communication took place via BOS radio, among other means.

The findings from the exercise activities will be incorporated into the optimization of processes for a possible emergency.

[73] https://www.e-control.at/aktuelle-pressemeldungen/-/asset_publisher/QxlzOPQwGYnK/content/e-control-krisen%25C3%25BCbung-f%25C3%25BCr-strom-in-graz-erfolgreich-durchgef%25C3%25BChrt.

7.2 Regional emergency tests

The memoranda of understanding on risk-preparedness in the electricity sector depicted in 4.2.2 and 4.2.3 contain the intention of the signatory countries to prepare and conduct regional crisis exercises to test, evaluate, and improve the effectiveness of the procedures set forth in the respective memorandum of understanding. On the basis of the PENTA MoU, the PENTA countries agreed on a calendar for holding regional exercises:

- An electricity shortage exercise was conducted in Paris on 24 May 2022. The scenario was a multi-day cold spell in Western Europe including drought and a lack of wind. The focus was placed on mutual communication and the exchange of the existing crisis management systems in the respective PENTA countries.
- PENTEX 2023 from October 24 to 26, 2023: Representatives of the PENTA countries took part in a two-day exercise to practise implementing the necessary measures in the event of a large-scale regional electricity crisis. The exercise, called PENTEX 2023, took place in The Hague. The aim of the exercise was to identify the measures to be taken at national level with regard to the specific exercise scenario, to consider these in an international context and to optimize communication and cooperation between all parties involved. The exercise was based on a scenario in which a cyber attack threatens the security of the electricity supply throughout Europe. Temperature and weather conditions similar to those in October last year were assumed as a realistic starting situation.
- PENTEX 2024 from 22 to 23 October 2024: The exercise took place in Brussels and was based on a scenario involving attacks on critical electricity infrastructure. In particular, regional measures for mutual support in the event of an electricity supply crisis were examined in depth.
- PENTEX Dilemma Sessions on 10 September 2025: Building on the scenario of the PENTEX 2024 exercise, regional cross-border cooperation in the event of an electricity crisis was tested, and possible regional measures were exercised in detail.

8 Consultation of stakeholders

The present Risk-Preparedness Plan was submitted to the following stakeholders from 19 Dezember 2025 to 29 Jänner 2026 in accordance with Art. 10 (1) Regulation (EU) 2019/941:

a) Major electricity and natural gas companies including the major generators or their trade bodies:

   Oesterreichs Energie - Association of Austrian Electricity Companies, Wirtschaftskammer Österreich (Austrian Federal Economic Chamber), Industriellenvereinigung (Federation of Austrian Industries), Fachverband der Gas- und Wärmeversorgungsunternehmungen (Association of Gas and District Heating Supply Companies)

b) Relevant organisations that represent the interests of non-commercial electricity customers:

   Bundesarbeiterkammer (Federal Chamber of Labour); Österreichischer Gewerkschaftsbund (Austrian Trade Union Federation)

c) Relevant organisations that represent the interests of commercial electricity customers:

   Wirtschaftskammer Österreich (Austrian Federal Economic Chamber); Industriellenvereinigung (Federation of Austrian Industries); Landwirtschaftskammer Österreich (Austrian Chamber of Agriculture)

d) Regulatory authority:

   E-Control

e) Regulatory authority:

   Austrian Power Grid AG; Vorarlberger Übertragungsnetz GmbH; Tiroler Übertragungsnetz GmbH

f) Relevant distribution system operators (The operators with a direct connection to the transmission system were defined as relevant):

   Wiener Netze GmbH; Netz Niederösterreich GmbH; Netz Burgenland GmbH; Netz Oberösterreich GmbH; Linz Netz GmbH; Energienetze Steiermark GmbH; Kärnten Netz GmbH; Salzburg Netz GmbH; TINETZ-Tiroler Netze GmbH; Vorarlberger Energienetze GmbH

Beyond the circle of stakeholders in accordance with Art. 10 (1) Regulation (EU) 2019/941, the Risk-Preparedness Plan was also submitted to the following federal ministries and institutions for consultation:

Federal Chancellery (BKA), Federal Ministry of Labour, Social Affairs, Health, Care and Consumer Protection (BMASGPK), Federal Ministry for European and International Affairs (BMEIA), Federal Ministry of Finance (BMF), Federal Ministry of the Interior (BMI), Federal Ministry for Innovation, Mobility and Infrastructure (BMIMI), Federal Ministry of Defence (BMLV), Federal Ministry of Agriculture and Forestry, Climate and Environmental Protection, Regions and Water Management (BMLUK), the Liaison Office of the Federal Provinces, the Austrian Association of Cities and Towns, and the Austrian Association of Municipalities.

The following stakeholders submitted comments on the risk provision plan:

- Federal Ministry of Finance, statement dated 29 Jänner 2026
- Federal Ministry of the Interior, statement dated 4 Februar 2026, no. 2026-0.090.770
- Federal Ministry for Innovation, Mobility and Infrastructure, statement dated 29 Jänner 2026, no. 2026-0.016.124
- Federal Ministry of Defence, statement dated 29 Jänner 2026, no. S93344/8-MilStratE-Koord/2026 (1)
- Federal Chancellery, statement dated 28 Jänner 2026
- Federal Chamber of Labour, statement dated 23 Jänner 2026, no. GEBU/BAK/2026/0020
- Federation of Austrian Industries, statement dated 4 Februar 2026
- Municipal Department of the City of Vienna, Stellungnahme vom 16. Jänner 2026, Zl. MDOS-1713517-2025-4
- Association of Austrian Electricity Companies, statement dated 27 Jänner 2026
- Austrian Association of Cities and Towns, statement dated 27 Jänner 2026, Zl. 30-01-(2026-0100)
- Wiener Netze GmbH, statement dated 30 Jänner 2026
- Austrian Federal Economic Chamber, statement dated 29 Jänner 2026, Zl. Up/0253/26/HP

Table 7 Consultation of national stakeholders – submitted comments

Main content of the comments	Assessment by the competent authority responsible for the preparation of the plan
Regarding crisis scenario no. 23, "Targeted political malicious actions by adversarial states": increase of the severity level from "2" to "6"	The proposal was taken into account in the final version of the risk preparedness plan.
Regarding crisis scenario no. 23, with respect to political risks arising from unreliable providers of decentralized energy generation systems and equipment for critical infrastructure from third countries (hereinafter referred to as "high-risk providers"), it is proposed to introduce a provision allowing the use of certain critical components from individual manufacturers to be prohibited.	A regulatory prohibition power can only be implemented by law. The other existing legal provisions regarding the network and information security of critical infrastructure are set out in Chapter 2.4.4.
The risk preparedness plan provides that employees of electricity companies should receive ongoing training and further education measures to ensure they can be deployed quickly and efficiently in the event of an electricity crisis. The associated costs should be borne by the respective energy companies. In addition, auxiliary services (in particular dispatches) as well as standby duties should be adequately compensated.	The risk preparedness plan does not have a legally binding nature and therefore cannot establish rights and obligations. Requirements regarding mandatory coverage of costs for training and further education measures, as well as appropriate compensation (e.g. for standby duties), cannot therefore be anchored in the risk preparedness plan.
It is questioned whether the scenarios also reflect an event such as the "overvoltage collapse" on the Iberian Peninsula that led to a blackout, and if not, whether such a scenario should be included in the future.	The scenarios contained in the risk preparedness plan cover a broad range of potential triggers. In addition to natural events (e.g. extreme weather) and human-induced impacts (e.g. physical attacks on critical infrastructure), technical causes are also considered.
A brief explanation is requested in Chapter 2.2.2 on how the severity scale functions.	An explanatory footnote has been added.
Regarding crisis scenario 17, "Unforeseen interaction of energy markets": It is questioned whether "low risk due to high sense of responsibility of market participants in Austria" is justified, as such responsibility cannot be assumed for all market participants.	The scenario and related explanations were consulted with relevant market participants, grid operators, and authorities. No objections were raised, therefore the assessment remains unchanged in this version of the risk preparedness plan.
Formal additions or semantic amendments proposed for Chapters 4.2.2.2 and 4.2.2.4.2.	The proposals were accepted.
Table 5: There is a lack of explanation of the numbers in the table, what they mean and how they were derived.	A corresponding explanation has been added in a footnote.
Chapter 5.4 should be updated regarding Projects of Common Interest if the delegated act of the European Commission is adopted by the Council and Parliament.	Since the delegated act amending Regulation (EU) 2022/869 (TEN-E Regulation) had not entered into force at the time of finalisation of the risk preparedness plan, an update was not required. It may be included in the next plan.
Proposal for formal adjustment of the table structure in Table 2.	Adjustments to the tabular presentation of electricity crisis scenarios were made.
Chapter 4.2.2.1: Proposal for terminological adjustment regarding the Pentalateral Energy Forum.	The relevant passage was streamlined to avoid misunderstandings.

Main content of the comments	Assessment by the competent authority responsible for the preparation of the plan
Request to describe financing of PCI/PMI projects through EU funds (e.g. CEF grants).	A paragraph on financing was added in Chapter 5.4.
Chapter 4.1.7: Request for clarification of ministry responsibilities in a blackout.	A clarification has been made.
Request that representatives of critical infrastructure entities be included in preventive measures and consultations in the Energy Intervention Council.	The competent ministries are represented in the Energy Intervention Council pursuant to section 36 of the Energy Intervention Powers Act 2012 and contribute their expertise. Further detailed inclusion of critical service providers is therefore not required.
Coordination of area wide shutdowns with operators of critical infrastructure.	Area wide shutdowns are the last resort in the cascade of energy intervention measures. The definition of shutdown zones is determined in shutdown plans of the provinces and is not pre-empted by the risk preparedness plan.
Chapter 4.1.7: Request for clarification of ministerial responsibilities in a blackout.	A clarification has been made.
Request for clarification regarding military defence.	A more detailed description of the legally determined objectives of energy intervention measures, including military defence aspects, has been included in Chapter 4.1.4.3.
Dependencies on third countries for new climate and energy technologies should be considered more strongly in supply chains, including measures such as stockpiling and circular economy approaches.	A new chapter on reducing dependence on third countries in energy technologies was added, reflecting Regulation (EU) 2024/1252 on critical raw materials.
Possible inclusion of a “disturbance of the electromagnetic spectrum” scenario (e.g. jamming or time spoofing).	Time spoofing and targeted jamming are classified as cyberattacks under Scenario 21, as they affect integrity and availability of systems. An explicit listing is not necessary since the term “cyberattack” encompasses all forms of cybercrime.
Terminological note in scenarios 20, 21, 22 and Table 5.	The terminology has been adjusted accordingly.
Scenarios 18, 20, 23: proposals for additional descriptions.	The proposals were accepted.
Scenario 22: proposal for additional preventive measures.	The proposal was taken into account.
Regarding crisis scenarios no. 19 “Physical attacks” and no. 21 “Cyber attacks”: Request to expand the description to include scenarios involving hostile military operations (armed conflict or attack), as well as the further development of the security and resilience of critical energy infrastructure.	The relevant amendment has been made.
Regarding Chapter 2.4.4 “IT security of network operation and generation”: It is not known to what extent the IT facilities necessary for the operation of energy infrastructure have an appropriate level of security of electricity supply.	Chapter 2.4.4 sets out the national legal basis for cybersecurity implementing the NIS-2 Directive. The respective operator of energy infrastructure is responsible for the functionality of the IT infrastructure. The energy sector has established, on a voluntary basis, a national contact point for IT security incidents in the energy sector with the Austrian Energy CERT (Computer Emergency Response

Main content of the comments	Assessment by the competent authority responsible for the preparation of the plan
	Team), which supports energy companies in the prevention, detection and handling of cyberattacks.
Question regarding the suitability of communication means for contacts between PENTA States in all scenarios.	Communication between experts of the PENTA States in the field of crisis management is tested within the framework of regular exercises under different crisis scenarios.
Demand for the inclusion of scenarios and measures regarding distribution system operators. Both the definition of regional crisis scenarios and local measures to address them are explicitly required by the Commission from Member States.	Regulation (EU) 2019/941 on risk preparedness in the electricity sector is, by its regulatory approach, primarily focused on the transmission network, in particular with regard to cross-border security of supply, system stability, and the role of transmission system operators. The distribution network, by contrast, is not a central reference point of Union-level preparedness measures. It is correct that the Regulation refers to regional crisis scenarios and regional measures; however, the term "regional" in this context refers to Member States within a region and not to local geographical areas within a single Member State.
Proposal of recommendations from the perspective of municipal-level crisis management in the areas of • expansion of operational redundancies, • strengthening personnel resilience, • more intensive cross-sector cooperation, • realistic blackout exercises, • development of risk indicators (early warning systems gas supply, cyber threats, extreme weather; dynamic risk analyses instead of static scenarios).	The risk preparedness plan focuses, in line with its central legal basis, Regulation (EU) 2019/941, on crisis management at federal level, in particular measures under the Energy Intervention Powers Act 2012. A detailed presentation of risk preparedness regarding other territorial authorities is not carried out and does not constitute a mandatory component pursuant to Article 10 of Regulation (EU) 2019/941. The recommendations show valuable optimisation potential. These are already partly contained in the risk preparedness plan. Early warning systems in the field of gas supply, in particular the presentation of different crisis levels and the associated national processes, are set out in the Gas Emergency Plan, which is also published on the website of the BMWET.
Under the scenarios listed in Chapter 2.1, the scenario "heavy hail" should be included and further detailed in Chapter 2.2.	"Heavy hail" can already be subsumed under national scenario No. 3 "Severe storm". A reference to hail was added in the scenario description in Table 2.
Political risks arising from unreliable providers of decentralised energy generation systems and devices of critical infrastructure from third countries, so-called "high-risk providers", should be addressed more strongly. There is a risk that manufacturers, through their unique system knowledge, may access products that include a communication module – either directly through remote maintenance or indirectly through regular software updates – as well as draw conclusions about usage.	The threat scenario is already covered by Scenario no. 14, "Series technical defects", as well as Scenario no. 23, "Targeted politically malicious actions by hostile states".
Companies in certain industrial sectors are key players in energy generation both in terms of heat and electricity production. The particularity in crisis times is that individual companies in the sector feed significant amounts of electricity and district heating into the	When adopting energy intervention measure orders, large consumers of the energy sector as well as those relevant for the supply of the population with essential goods are given special consideration. Measures regarding infrastructure concerning grid expansion or island op-

Main content of the comments	Assessment by the competent authority responsible for the preparation of the plan
public grid and can thus contribute to grid stabilisation. Therefore, in the event of energy intervention, the supply capability of these companies under full operation should be taken into account in crisis plans and crisis staffs. In advance, supporting measures in infrastructure for grid formation or island operation capability should be pursued as prevention.	eration capability fall within the responsibility of grid operators (cf. § 122 para. 1 [1] and 12; § 115 [1] Electricity Industry Act).
Request to revise the chapter on energy efficiency with regard to electricity consumption savings.	The Energy Efficiency Act (EEffG) covers all energy carriers, including electricity. Clarifications were made to specify that increasing energy efficiency can flatten the expected growth curve of electricity consumption

9 List of Tables

10 List of Figures

11 List of Abbreviations

ACER	European Union Agency for the Cooperation of Energy Regulators
APG	Austrian Power Grid AG
Art.	Article
AT	Austria
BKA	Federal Chancellery
BMASGPK	Federal Ministry of Labour, Social Affairs, Health, Care and Consumer Protection
BMF	Federal Ministry of Finance (Since 1 April 2025, the Federal Ministry of Economy, Energy and Tourism has been the legal successor to the BMAW)
BMAW	Federal Ministry for Labor and Economy (
BMI	Federal Ministry of the Interior
BMIMI	Federal Ministry of Innovation, Mobility and Infrastructure
BMK	Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (Since 1 April 2025, the Federal Ministry of Economy, Energy and Tourism has been responsible for energy matters)
BMLUK	Federal Ministry of Agriculture and Forestry, Climate and Environmental Protection, Regions and Water Management
BMLV	Federal Ministry of Defence
BMWET	Federal Ministry of Economy, Energy and Tourism
CAM	control area manager
DSO	distribution system operator
E-Control	Energie-Control Austria für die Regulierung der Elektrizitäts- und Erdgaswirtschaft (government regulator for electricity and natural gas markets in Austria)
EC	European Commission
ENTSO-E	European Network of Transmission System Operators for Electricity
ENTSO-G	The European Network of Transmission System Operators for Gas
etc.	et cetera
et seq.	and the following
EU	European Union

i.e.	that is
IV	Federation of Austrian Industries
LP	legislative period
MoU	Memorandum of Understanding
MS	Member State(s)
p.a	per annum
PENTA Forum	Pentalateral Energy Forum
RES	renewable energy sources
SKKM	National Crisis and Disaster Management
TSO	transmission system operator
WKO	Austrian Federal Economic Chamber