

National risk-preparedness plan for Sweden's electricity supply

In accordance with 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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General information

The Swedish Energy Agency (Energimyndigheten) is the Swedish competent authority pursuant to *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*¹, hereinafter referred to as the *Risk Preparedness Regulation*. The term *risk-preparedness plan* is the term used by the European Commission in the English version of the Risk Preparedness Regulation. The Swedish Energy Agency is responsible for drawing up this plan.

The background is the increasingly interconnected electricity markets and systems, which mean that managing electricity crises can no longer be considered a purely national task. In order to ensure a common strategy for electricity crisis prevention and management in the region, the competent authorities of each Member State shall draw up a risk-preparedness plan. The regulation requires Member States to cooperate, at regional level and, where applicable, bilaterally, in a spirit of solidarity.

Member States belonging to the same region are Sweden, Denmark, and Finland. Region is defined herein as the group of Member States whose transmission system operators share the same regional coordination centre. In addition to these countries, Lithuania, Poland, and Germany are also Member States directly connected to Sweden and with which Sweden shall thus share risk-preparedness plans. Norway is not a Member State of the EU but is also directly connected to Sweden.

This document follows the template set out in the Annex to the Risk Preparedness Regulation.

¹ *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*, OJ L 158, 14.6.2019, CELEX number: 32019R0941.

1 Summary of the electricity crisis scenarios

Below is a summary of the most relevant electricity crisis scenarios developed to form the basis for measures outlined in the risk-preparedness plan. The electricity crisis scenarios have been developed jointly by the Swedish Energy Agency (Energimyndigheten) and the Swedish national grid for electricity (Svenska kraftnät). It is not a complete account of all risks associated with electricity supply. A selection has been made to account for the most relevant electricity crisis scenarios in accordance with the requirements set out in the Regulation. A more comprehensive and non-confidential report has been presented to several public authorities and specifically designated network operators as well as to one trade association.²

The Regulation provides that electricity crisis scenarios shall be established on the basis of at least the following risks.

- Rare and extreme natural disasters
- Risk of accidents going beyond the N-1 security criteria and exceptional unforeseen events
- Consequential hazards including the consequences of malicious attacks and of fuel shortages

1.1 Overall risks associated with electricity supply

There are different types of situations that can arise in the electrical system that are different in character and thus require different management measures. The three types of situations - *electric power shortage*, *energy shortage*, and *power outage* - are described below.

Electric power shortage

Electricity cannot be stored to any great extent and there must therefore always be a balance in the network between how much electricity is produced and how much electricity is used. If the demand for electricity were to be greater than what is currently possible to produce, or import, this would lead to an electric power shortage. As this could lead to serious consequences in society, there are measures in place to both prevent and mitigate the consequences of an electric power shortage.

² *Redovisning av elkrisscenarier i enlighet med förordning om riskberedskap inom elsektorn* (Report on electricity crisis scenarios in accordance with regulation on risk-preparedness in the electricity sector) (2019/941), Swedish Energy Agency, registration number 2020-001296.

Svenska kraftnät is responsible for maintaining a balance between production and consumption and have a number of tools at their disposal to ensure, at all times, that the same amount of electricity is added to the system as the amount used. There is a risk of electric power shortages in the electricity system when the demand for electricity becomes very high, for example during severe cold, while production and imports are not sufficient to supply the necessary electricity.

Energy shortage

Energy shortage can occur in a long-term situation where the total supply is not expected to correspond to the overall need for electrical energy over time. This can be caused by a combination of low levels in reservoirs, stationary nuclear reactors, and broken supply chains from neighbouring countries. An energy shortage that the market fails to manage, and which society fails to prevent, can in turn lead to power shortage.

Power outage

Local power outages where a small number of consumers are affected are common and can occur all year round. Local power outages can occur during, for example, storms or heavy snow fall. Strong winds that topple trees or break large branches that fall over power lines or construction work that causes excavation damage to cables can also cause power outages. In summer, the most common cause of disruption is lightning striking power lines or other technical equipment.

1.2 The most relevant electricity crisis scenarios

Below are brief descriptions of relevant risks associated with electricity supply that may cause power outage, electric power shortage, and energy shortage, and thus more comprehensive national disturbances that potentially affect neighbouring countries.

Cyberattack

The deteriorating security situation in the world has increased the need for improved protection against cyberattacks. This is a threat to Sweden's security and integrity but also, by extension, to the country's prosperity. Cyberattacks on energy infrastructure are a reality and more and more actors are acquiring an offensive cyber capability that Sweden needs to protect itself against.

Dry period

Sweden's electricity supply is largely dependent on reliable hydropower, both as an energy source and for balancing consumption and production for stable reliability. An extreme dry period in which most hydropower stations are without water in the dams can lead to large production losses. A severe dry season is likely to affect our neighbouring countries to a

similar extent, why imports and export opportunities are deemed to be very limited.

Forest fire

Sweden is an oblong country with several redundant transmission lines connecting the country from north to south. Forest and ground fires can be caused by lightning but also human activities such as grilling or arson. Fires can quickly spread to large areas with the wind and become very difficult to control and fight, which is why such a scenario can affect several transmission lines over the same period of time, thereby impairing transmission capacity within the country but also affecting foreign connections.

Heat wave

A very high temperature that lasts for several days or weeks can lead to impaired transmission capacity of lines as the transfer capacity of the line decreases at higher temperatures. This could lead to major local problems in supplying communities with electricity. At persistent high temperatures, there is a risk that materials and components of the transmission system will be used to the breaking point, which may lead to local power outages. There is also an increased risk of forest fires and dry periods as described above.

Nuclear power is an important source of electricity generation and reliability. An increased temperature of the cooling water necessary to cool the reactors at the nuclear power plants may impair the ability to produce the required power. Other sources of production such as cogeneration and gas turbines could also experience problems with cooling.

Heavy rainfall, flooding, and dam breaches

The Swedish transmission and regional network normally withstand large amounts of rain. However, local problems such as flooded rivers and land areas present a greater risk, which in turn can cause water-filled transformer substations and fallen power lines.

The potentially greatest danger associated with large amounts of rain is deemed to be if huge water flows cause ground shifts and a collapse of a major hydroelectric power station/dam breach.

Storm

The Swedish transmission network and regional networks can withstand strong winds and power outages caused by strong winds on these lines are rare. The lines have been constructed on a strong foundation and the power line corridors must be tree-safe.

If the wind were to reach such strengths that transmission line materials such as poles and insulators would break at several important transmission connections, it could cause transmission problems between different parts of Sweden and possibly lead to a situation where Svenska kraftnät must use manual load-shedding and limit the transmission to neighbouring countries in order to maintain the transmission network balance.

Extremely cold weather

Svenska kraftnät carries out annual analyses of the power balance where last year's analysis shows that there is an import dependency in a normal winter that becomes even greater in the event of more extreme cold.³ The ability to manage severe power shortages through imports via foreign supply chains may be limited if similar weather conditions prevail in our neighbouring countries. If the power balance cannot be ensured, there is a significant risk that manual load shedding must be used.

Lack of nuclear power production

Sweden is a long country with a lot of hydropower in the north, nuclear power in the south, and a growing share of wind power. The number of nuclear power plants in Sweden is decreasing and so are important technical support services to stabilise and balance the network that the nuclear power plants have historically provided. These technical support services are important in order to balance the quantities of the electricity system, such as reactive power and voltage. The challenges exist throughout the year and not least during the summer months when several nuclear power plants are taken out of service for review as the demand for electric power is low. If nuclear power production decreases without having other technical support services available elsewhere, it may ultimately affect transmission possibilities within Sweden and thus also foreign connections.

Pandemic

A pandemic spreading in Sweden can also spread to essential personnel within electricity supply. Major staff losses can occur at individual or multiple operators at the same time, which could lead to the risk of understaffing and difficulties maintaining normal operations. This in turn can lead to the closure of production sources and difficulties in maintaining the operation of control rooms, which can have a major impact on the electricity supply. Eventually, this may also mean that remedial measures to keep the electricity supply intact are prioritised over service/maintenance and investments, which may impair operational reliability in the long term.

³ *Kraftbalansen på den svenska elmarknaden, rapport 2020, A report to the Ministry of Infrastructure, Svenska kraftnät, case number 2020/334.*

Lower demand for electricity as a result of the pandemic can in turn lead to lower prices and thus a deterioration in profitability for electricity supply operators. A deterioration in profitability for electricity producers may lead to the decommissioning of production with essential electrical support services and may lead to a deterioration in the operational safety of the national transmission network.

A pandemic can also mean closed borders, which can affect the availability of fuels and spare parts as well as foreign experts in service/maintenance and investments.

Control system and complexity of the power system

The electric system relies heavily on well-functioning electronic communications for safe and reliable operation. IT systems, communication equipment, and other technical equipment are interconnected to balance, monitor, control and protect the system to provide an efficient, reliable, and dependable system.

Technology may result in vulnerabilities and complexity that can cause technical problems, unstable systems, and cascade effects. This can cause uncontrolled disconnection of production, consumption and lines as well as foreign connections.

Sometimes two different errors in the network create problems around the same time. Sometimes one problem leads to another and it happens very quickly. The technical equipment may have difficulty detecting where the error has occurred and the cause of the error. It could also be that the technical equipment has an incorrect setting that has caused unwarranted load shedding. When unwarranted load shedding occurs, cascade effects may occur and more production sources, consumption, or transmission lines may be automatically disconnected. Several electrical properties, such as power supply and demand, voltage levels, or short circuit effects can become unbalanced and create consequential problems.

Difficulty in planning renewable electricity generation

If assessments of available production from renewable sources are incorrect, this creates great needs for up- or down-regulation of other production sources on erroneous grounds. Current production may be significantly higher than expected and requires extensive down-regulation or there is so much production missing that the market does not have the production needs to even out the imbalance.

Rapid changes and movement of power can lead to overloaded lines and protective equipment that automatically disconnects lines or production sources. Unplanned and uncontrolled load shedding can lead to cascade effects and cause widespread power outages.

Parallel events

The most relevant electricity crisis scenarios listed above can potentially occur during the same time period and thus cause an even worse crisis to deal with. For example can a storm or forest fire occurring at the same time as a pandemic is underway or a cyberattack during an ongoing energy shortage.

2 Roles and responsibilities of the competent authority

When implementing the Risk Preparedness Regulation in Sweden, the ambition was to maintain the relevant authorities' current division of responsibilities and roles to the extent possible. The authorities primarily affected by the Risk Preparedness Regulation are the Swedish Energy Agency as the competent authority for electricity,⁴ Svenska kraftnät as system and balance responsible party for the transmission network and electricity preparedness authority⁵ and the Swedish Energy Markets Inspectorate as national regulatory authority⁶. The Swedish Energy Agency primarily regards the role of competent authority for electricity as a comprehensive and coordinating role, where other actors (specifically Svenska kraftnät), have operational roles and direct responsibilities that they retain. However, the Risk Preparedness Regulation entails increased demands for coordination, collaboration, and further clarification of the division of responsibilities and roles between the Swedish Energy Agency and Svenska kraftnät.

The main task of the Swedish Energy Agency as the competent authority for the application of the Risk Preparedness Regulation is, *inter alia*, to act as a national contact point and coordinator vis-à-vis the EU and the competent authorities of other EU countries.

2.1 Background description of existing roles and responsibilities

This section describes the roles and responsibilities of the relevant authorities in matters relating to the electricity supply in Sweden at a general level.

The Swedish Energy Agency, Svenska kraftnät, the Swedish Radiation Safety Authority et. al. are designated as particularly responsible for emergency preparedness and as designated authorities responsible for taking measures before and in case of heightened preparedness in their respective areas of activity.⁷

In October 2020, the Swedish Government stated in its defence policy bill, which was submitted to the Riksdag, that the capacity in total defence needs to be strengthened, which includes a comprehensive investment in civil defence. The resilience of, *inter alia*, energy supply

⁴ Ordinance (SFS 2014:520) with instructions for the Swedish Energy Agency, Section 3 (16).

⁵ Ordinance (SFS 2007:1119) with instructions for Affärsverket svenska kraftnät, Sections 2-4 etc.

⁶ Ordinance (SFS 2016:742) with instructions for the Swedish Energy Markets Inspectorate, Section 2.

⁷ According to Ordinance (SFS 2015:1052, Section 10) on Emergency Preparedness and the Measures to be taken by Designated Authorities in the Event of Heightened Alert.

needs to be increased and measures should be taken, according to the Government, to ensure a satisfactory level of preparedness.⁸

Role and responsibilities of the Swedish Energy Agency

The Swedish Energy Agency is the administrative authority for issues related to the supply and use of energy in society and shall work to reconcile ecological sustainability, competitiveness, and security of supply in sustainable and cost-efficient energy systems with low impacts on health, the environment, and climate.⁹ The Swedish Energy Agency is leading society's transition to a sustainable energy system, based on the three pillars of energy policy - security of supply, competitiveness, and ecological sustainability - as well as the other two dimensions of sustainable development (social and economic sustainability). These pillars, together with the energy and climate policy objectives in Sweden and the EU, form the basis for the Agency's activities. The Swedish Energy Agency shall develop and coordinate society's emergency preparedness and measures for heightened preparedness in the field of energy preparedness and conduct intelligence activities and analysis. The Swedish Energy Agency shall also support other authorities with expertise in the field.¹⁰ The Swedish Energy Agency is responsible for planning, coordinating, and, to the extent prescribed by the Government, carrying out rationing and other regulations regarding the use of energy.¹¹ The Swedish Energy Agency has taken certain preparatory measures in the event of energy shortage and possible Government decisions on demand restraint measures and rationing of electricity.¹² The Swedish Energy Agency has, together with other actors, developed *Styrel* (steering of electricity), which is a method of planning so that essential consumers can be prioritised in case of load shedding due to electric power shortage. *Styrel* can be summarised as the planning process during which national authorities, county administrative boards, municipalities, private actors, and network operators collaborate to develop the basis for prioritising essential consumers in the event of manual load shedding (MLS). The purpose of *Styrel* planning is to mitigate the societal consequences that arise if MLS needs to be resorted to during an electric power shortage. In other words, the Swedish Energy Agency has the overall responsibility for *Styrel* planning. The Swedish Energy Agency is responsible for issuing regulations on the *Styrel* method^{13 14} and for initiating the planning process every four years.

⁸ Assignment on 11 July 2019 to the designated authorities to provide documentation for the future direction of civil defence (Government Offices of Sweden, reference number Ju2019/02477/SSK, Swedish Energy Agency's reference number 2019-16105).

⁹ SFS 2014:520, Section 1.

¹⁰ SFS 2014:520, Section 2, point 13.

¹¹ SFS 2014:520, Section 2, point 14.

¹² Read more about the Swedish Energy Agency's principled approach in the event of electricity shortage, for example information campaign on reducing consumption, etc.: <http://www.energimyndigheten.se/trygg-energiforsorjning/el/energibrust/>

¹³ Ordinance (SFS 2011:931) on planning for prioritisation of essential consumers, Section 4.

¹⁴ See further, *Styrel, Handbok för styrels planeringsomgång 2019 – 2021*, Swedish Energy Agency, ET 2018:10, ISSN 1404-3343. [handbok-for-styrels-planeringsomgang-2019-2021.pdf](http://www.energimyndigheten.se/trygg-energiforsorjning/el/effektbrust/styrel/) ([energimyndigheten.se](http://www.energimyndigheten.se)), 2021-01-14 and www.energimyndigheten.se/trygg-energiforsorjning/el/effektbrust/styrel/. See also the *Styrel* Ordinance (SFS 2011:931) and the Swedish Energy Agency's *Styrel* regulation (STEMFS2013:4).

Related roles as competent and regulatory authority

In addition to the role of competent authority for the Risk Preparedness Regulation, the Swedish Energy Agency has roles related to security of supply, emergency preparedness, and heightened preparedness. The Swedish Energy Agency is the competent authority¹⁵ pursuant to the Security of gas supply regulation¹⁶ and is the regulatory authority¹⁷ for, and responsible for, Sweden's fuel preparedness¹⁸. The Swedish Energy Agency is also the regulatory authority of the Act implementing the NIS Directive (SFS 2018:1174) on information security for essential and digital services¹⁹ with the associated regulation. In addition, the Authority is proposed as a regulatory authority over parts of the energy supply under the Protective Security Act (SFS 2018:585).²⁰

The Swedish Energy Agency may be appointed sector-responsible authority in the energy supply sector with increased planning, coordination, and targeting responsibilities regarding civil defence and heightened preparedness.²¹

The Swedish Energy Agency also works with advice and knowledge support in case of disturbances in energy supply as well as guidance on auxiliary power aimed at essential consumers, geographical area managers, individuals, and households, etc.²²

Role and responsibilities of Svenska kraftnät

Svenska kraftnät is system responsible for the transmission system (transmission network) and have the task of managing, operating, and developing a reliable power transmission system.²³ Svenska kraftnät's control rooms are staffed 24 hours a day, all year round. In the control room, there is constant monitoring of the balance and security of the electricity system and of the fact that at every moment as much electricity is produced as is consumed (i.e., maintaining the energy balance). Furthermore, Svenska kraftnät has an ongoing responsibility to maintain the transmission network to ensure reliability and to make the necessary

¹⁵ SFS 2014:520, Section 2, point 2.

¹⁶ *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*, OJ L 280, 28.10.2017, CELEX number 32017R1938

¹⁷ Ordinance (SFS 2012:873) on emergency storage of oil, Section 2.

¹⁸ *Council Directive 2009/119/EC of 14 September 2009 imposing an obligation on Member States to maintain minimum stocks of crude oil and/or petroleum products*, OJ L 265, 9.10.2009, CELEX number 32009LO119, and shall comply with Sweden's reporting obligation in accordance with Chapter V.

¹⁹ National legislation implementing the NIS Directive, *Directive (EU) 2016/1148 of the European Parliament and of the Council of 6 July 2016 concerning measures for a high common level of security of network and information systems across the Union*, OJ L 194, 19.7.2016, CELEX number 32016L1148.

²⁰ The study on certain protective security issues proposed in *Supplements to the new Protective Security Act* (SOU 2018:82) on 30 November 2018, that the Swedish Energy Agency be given responsibility for supervising individual operators within district heating, natural gas, oil, and fuel supply (p. 377).

²¹ The Civil Defence Inquiry (Ju 2018:05) has submitted its final report *Structure for Increased Resilience* (SOU 2021:25) to the Ministry of Justice on 1 March 2021, in accordance with Government Directive 2018:79 and 2019:98 (Swedish Energy Agency's reference number 2019-010837).

²² [Knowledge support to the public sector \(energimyndigheten.se\)](https://www.energimyndigheten.se), 2021-01-14.

²³ SFS 2007:1119, Section 3.

investments and expansion of the infrastructure in the system to secure the electricity supply as society's electricity needs increase and production changes. Svenska kraftnät is the supervisory guidance authority for dam safety and the regulatory authority for the security of the electricity supply. As a regulatory authority for the security of the electricity supply²⁴, Svenska kraftnät issues regulations²⁵, supervises the protective security work of operators, and performs record checks for certain operators within electricity supply.

Svenska kraftnät creates the conditions for the electricity trade and is responsible for creating rules and designing agreements and procedures for domestic electricity trade, trade between the Nordic and Baltic countries and with the continent. Svenska kraftnät is working together with other countries in Europe to create a Common Electricity Market.²⁶

Electricity Preparedness Authority

Svenska kraftnät is the electricity preparedness authority with the task of ensuring that the Swedish electricity supply is prepared for events such as war, acts of terrorism, and earthquakes. These are disturbances outside the responsibilities of individual electricity undertakings. Svenska kraftnät also issues regulations and general advice on electricity preparedness aimed at electricity undertakings.²⁷ Actors in the electricity sector have, *inter alia*, an obligation to inform Svenska kraftnät if there is a disturbance in the electricity supply that can cause severe societal challenges²⁸. Svenska kraftnät is primarily responsible for the disturbances that affect large areas. Svenska kraftnät is working on preventing such disturbances and to be able to manage them if they should occur. Svenska kraftnät also ensures that measures are implemented to increase preparedness in technology, communication, and physical protection. In doing so, Svenska kraftnät coordinates preparedness measures at both regional and national level.²⁹

In war or when the Government otherwise decides, it is Svenska kraftnät's job to, in collaboration with other total defence authorities, meet society's need for electric power by planning, directing, and coordinating the resources of the electricity supply. When electricity consumption regulation has been introduced, Svenska kraftnät shall, to the extent prescribed by the Government, be responsible for long-term planning and direction of electricity production.³⁰

Svenska kraftnät offers training and conducts preparatory exercises together with the electricity industry and offer training in crisis management, repair readiness, and various tools used in a crisis.³¹

²⁴ Protective Security Ordinance (SFS 2018:658), Chapter 7 Section 1 p. 3, Chapter 7 Section 8.

²⁵ Affärsverket Svenska kraftnäts föreskrifter och allmänna råd om säkerhetsskydd, SvKFS 2019:1.

²⁶ [International cooperation | Svenska kraftnät \(svk.se\)](#), 2021-01-14

²⁷ [Electrical preparedness | Svenska kraftnät \(svk.se\)](#), 2021-01-14.

²⁸ Electrical Preparedness Act (1997:288), Section 9a.

²⁹ [Electrical preparedness | Svenska kraftnät \(svk.se\)](#), 2021-01-14.

³⁰ SFS 2007:1119, Section 4.

³¹ [Education and training | Svenska kraftnät \(svk.se\)](#), 2021-01-14

Role and responsibilities of the Swedish Energy Markets Inspectorate

The Swedish Energy Markets Inspectorate is the national regulatory authority (NRA) of the energy markets in Sweden and shall ensure that market participants comply with laws and regulations in the field of energy. The Swedish Energy Markets Inspectorate is also responsible for licensing electricity and gas networks and is involved in the development of energy markets at a national and regional level.

The Swedish Energy Markets Inspectorate works to strengthen the position of customers and to safeguard society's need for functioning energy distribution and trade. The supervisory area includes, *inter alia*, review of network operators' quality of delivery, the monitoring of cross-border trade in electricity and gas, and review of the revenue frameworks of network operators and gas undertakings.³²

2.2 Fundamental principles of emergency preparedness

Swedish emergency preparedness aims to protect the life and health of the population, the functionality of society, and the capability to uphold Sweden's fundamental values such as democracy, the rule of law, and human rights and freedoms. The normal day-to-day activities of society are expected to prevent and deal with minor accidents and minor disturbances, while serious events or crises may require reinforcement by additional resources. There are three fundamental principles within Swedish emergency preparedness.

- ***The principle of responsibility:*** the actor responsible for an activity in normal situations also has corresponding responsibilities in the event of disturbances in society. Actors have a responsibility to act even in uncertain situations and shall support and interact with other relevant actors.
- ***The principle of proximity:*** societal disturbances should be dealt with where they occur and by those most affected and responsible.
- ***The principle of equality:*** actors shall not make greater changes to the organisation than the situation requires. Activities during societal disturbances shall function as under normal conditions, to the extent possible.³³

The starting point for all emergency preparedness and crisis management in Sweden is therefore operational responsibility, i.e., operational crisis management should be carried out by the relevant actors in accordance with the principle of responsibility. If necessary, they may receive support from the Swedish Civil Contingencies Agency (MSB), which has specific competence in crisis management, contingency, coordination,

³² [Ei's mission and governance | Ei.se - Swedish Energy Markets Inspectorate](#), 2021-01-14.

³³ [Responsibilities and roles \(msb.se\)](#), 2021-05-1.

communication, etc. To some extent, support can also be obtained from the Swedish Armed Forces. Emergency management and crisis management are exercised based on relevant competence, expertise, and experience, as well as existing collaboration and established networks. The Government rules the kingdom and the Swedish public authorities are under the Government's control. Thus, the political leadership is ultimately responsible and must make the political considerations and judgments – based, *inter alia*, on the expertise and data of the substantive authorities – at national and strategic level and in order to achieve coordination.³⁴

2.3 Existing national duty of reporting in the event of a crisis

As mentioned above, the Swedish Energy Agency and Svenska kraftnät are designated authorities and have, together with some 50 other public authorities, a special responsibility for planning for and taking measures to deal with severe societal disturbances and situations before and during crisis and heightened preparedness³⁵. The Ordinance (SFS 2015:1052) on Emergency Preparedness and the Measures to be taken by Designated Authorities in the Event of Heightened Alert (Emergency Preparedness Ordinance), which identifies the designated authorities, aims to ensure that government agencies, through their activities, reduce society's vulnerability and continually increase the ability to handle their tasks during peacetime crisis situations and before and at times of heightened alert. As designated authorities, Svenska kraftnät and the Swedish Energy Agency shall, in the event of a crisis, keep the Government informed of the events, the permit, the expected development, available resources, and measures taken and planned.³⁶ In such a situation, the Government Offices of Sweden and MSB shall also, upon request, receive the information needed for compiling situational pictures.

2.4 Responsibility in case of early warning and electricity crisis

In a situation where Svenska kraftnät or the Swedish Energy Agency have become aware of the risk of extensive power outages, power shortages, or electricity shortages that are likely to *affect neighbouring countries* and thus may lead to a more extensive electricity crisis according to the Risk Preparedness Regulation, the authorities shall consult and follow procedures according to Chapter 3 below.

An electricity crisis as defined in the EU Regulation on risk-preparedness in the electricity sector is *a present or imminent situation in which there*

³⁴ For example, the Swedish National Audit Office has pointed this out in its report *Regeringen och krisen – regeringens krishantering och styrning av samhällets beredskap för allvarliga samhällskriser (RiR 2008:9, see p. 30)*.

³⁵ Ordinance (SFS 2015:1052) on Emergency Preparedness and the Measures to be taken by Designated Authorities in the Event of Heightened Alert, Section 10, and Ordinance on Total Defence and Heightened Alert (SFS 2015:1053), Sections 2, 4.

³⁶ SFS 2015:1052, Sections 13-14.

*is a significant electricity shortage or in which it is impossible to supply electricity to customers.*³⁷

An early warning shall be issued if an assessment of seasonality or any other qualified source provides concrete, serious, and reliable information indicating that the event is likely to result in a significant deterioration of the electricity supply and is likely to lead to an electricity crisis.

The Swedish Energy Agency shall be able to issue an early warning and announce that there is an electricity crisis in accordance with the Risk Preparedness Regulation. Svenska kraftnät shall provide the Swedish Energy Agency with all necessary information in accordance with the Regulation, Chapter 4, Article 14. The assessment of whether there is an early warning or electricity emergency is made following consultation between the Swedish Energy Agency and Svenska kraftnät. One reason for this procedure is that Svenska kraftnät has real-time access to reliable up-to-date information about the electricity supply and any disturbances and will thus be among the first to be able to determine whether an electricity crisis has occurred or may occur. Responsible national authorities implement measures according to their respective areas of responsibility.

³⁷ Regulation (EU) 2019/941, Chapter I Art. 2 (9).

3 Procedures and measures in the event of an electricity crisis

3.1 National procedures and measures

In the event of an electricity crisis, interruption of the electricity supply, or in situations where the electricity supply is affected, the Swedish Energy Agency will use the systems, equipment, and functions that the Swedish Energy Agency normally uses in communication with others. Virtually all means of communication, e-mail, mobile telephony, ordinary telephony, and fax are directly or indirectly dependent on electricity for their functionality. This means that if an electricity crisis occurs, society's capability to communicate will be severely limited and will only function for the time any auxiliary power is available. The Swedish Energy Agency has auxiliary power in place for maintaining its own operations.

At the national level, there are further reinforcements in communication between Svenska kraftnät and the Swedish Energy Agency. Similar reinforcements exist between Svenska kraftnät and the other transmission system operators (TSOs) in the region.

Additional agreed alternative communication channels that are not dependent on electricity are available for use.

3.1 a) Procedures in the event of early warning or electricity crisis

In the event of early warning

Where a seasonal adequacy assessment or other qualified source provides concrete, serious, and reliable information that an electricity crisis may occur and that an early warning may be issued, the following procedures should be followed.

- If Svenska kraftnät has information that an electricity crisis may occur, Svenska kraftnät shall initiate a consultation with the Swedish Energy Agency on the need to issue an early warning of an electricity crisis.
- If the Swedish Energy Agency has information that an electricity crisis may occur, the Swedish Energy Agency shall initiate a consultation with Svenska kraftnät on the need to issue an early warning of an electricity crisis.
- During the consultation, the parties shall provide each other with information relevant to the assessment of whether Sweden should issue an early warning.

- If the Swedish Energy Agency deems that Sweden should issue an early warning, the Swedish Energy Agency shall decide on and issue an early warning without undue delay.³⁸
- Prior to the publication of information to the public and the market, the Swedish Energy Agency and Svenska kraftnät should consult on common messaging and ensure that the parties disclose information at a jointly determined time.

In the event of an electricity crisis

If Sweden is faced with an electricity crisis, the following procedures shall be followed.

- If Svenska kraftnät has information that there is an electricity crisis, Svenska kraftnät shall initiate a consultation with the Swedish Energy Agency on the need to declare an electricity crisis.
- If the Swedish Energy Agency has information that there is an electricity crisis, the Swedish Energy Agency shall initiate a consultation with Svenska kraftnät on the need to declare an electricity crisis.
- During the consultation, the parties shall provide one another with information relevant to the assessment of whether Sweden should declare an electricity crisis.
- If, following consultation with Svenska kraftnät, the Swedish Energy Agency determines that there is an electricity crisis, the Swedish Energy Agency shall decide on and declare an electricity crisis^{39, 40}. The *National crisis coordinator*⁴¹ are available at the Swedish Energy Agency and are activated in the event of an electricity crisis.
- Prior to the publication of information to the public and the market, the Swedish Energy Agency and Svenska kraftnät should consult on

³⁸ The competent authorities of Finland and Denmark, located in the same region, and the competent authorities of Poland, Lithuania, and Germany, which constitute directly connected Member States, and the European Commission shall be notified of the existence of an early warning without undue delay.

³⁹ The competent authorities of Finland and Denmark, located in the same region, and the competent authorities of Poland, Lithuania, and Germany, which constitute directly connected Member States, and the European Commission shall be notified of the existence of an electricity crisis without undue delay.

⁴⁰ Regulation (EU) 2019/941, Chapter III, Art. 14 2.

⁴¹ Regulation (EU) 2019/941, Chapter II Art. 11 (1d).

common messaging and ensure that the parties disclose information at a jointly determined time.

Contact list

In the event of an electricity crisis, contact details of each actor listed in Appendix 1 to the risk-preparedness plan are used.

Management of market intelligence information

The basis for and information on a declaration of an early warning or electricity crisis are considered to potentially have market-influencing effects. Each actor is therefore responsible for ensuring that documentation that may contain market intelligence information is handled in accordance with internal information security procedures and in accordance with applicable regulatory framework for management of market intelligence information. The Swedish Energy Agency and Svenska kraftnät shall ensure that declarations are made in a coordinated and synchronised manner.

The Transparency Regulation⁴² requires transmission system operators to publish information on network availability, capacity for cross-border interconnections and production, load, and interruption on the network. The Swedish Energy Markets Inspectorate, as regulatory authority, ensures that market actors submit the data to the system operator in accordance with the Regulation.

Request to provide additional information

If the European Commission, the Electricity Coordination Group, the competent authorities of the region⁴³, or the competent authorities of a directly connected Member State⁴⁴, want more information on the announced electricity crisis, the National Crisis Coordinator of the Swedish Energy Agency is responsible for responding to such a request. The same applies if the request has been received by the Swedish Energy Agency from the Government Offices of Sweden or MSB. Before further information is disclosed, the Swedish Energy Agency should consult with Svenska kraftnät and ensure that the information is correct. Answers and information should also be communicated to the communication functions of Svenska kraftnät and the Swedish Energy Agency.

If the request for further information following the announcement is received from the market, distribution system operators (DSOs), trade associations, electricity and natural gas undertakings, TSOs in Denmark, Finland, or Norway, and relates to areas of activity normally falling within the remit of Svenska kraftnät, Svenska kraftnät is responsible for providing further

⁴² Regulation (EU) 543/2013

⁴³ EU Member States in the Nordic countries, Denmark and Finland

⁴⁴ EU Member States Poland, Germany, and Lithuania

information without undue delay. The same applies if such a request has been received by Svenska kraftnät from the Government Offices of Sweden or MSB.

3.1 b) Preventive and preparatory measures

Continuity work

Svenska kraftnät conducts continuity work in accordance with Swedish standards in the field (Societal Security - Business continuity management system, SS-EN ISO 22301:2014). The goal of continuity management involves planning, establishing, implementing, applying, monitoring, maintaining, and constantly improving the continuity of critical operations. The work with continuity shall be a natural part of Svenska kraftnät's operations and continuity aspects must be considered when making decisions. Continuity management contributes to creating a reliable and robust transmission network with high security of supply, good electricity preparedness, and a secure electricity supply in society.

National risk and vulnerability analysis for the electricity sector

Svenska kraftnät analyses threats, risks, and vulnerabilities within their own area of responsibility and prepare a national risk and vulnerability analysis for the electricity sector (production, distribution, and trade in electricity) pursuant to the Electrical Preparedness Act (SFS 1997:288). These two aspects are compiled in a comprehensive risk and vulnerability analysis.⁴⁵ This means that companies in the electricity sector must also carry out risk and vulnerability analyses. It is an important tool to increase the capability to prevent, resist, and manage disruptions to one's own operations and thus make Sweden's electricity supply more robust. The analyses shall identify and document hazards and critical dependencies that may affect the security of the operations. The work shall also include an assessment of how vulnerable the operations are to these hazards and proposed measures. Information must be provided to Svenska kraftnät upon request.⁴⁶

The Swedish Energy Agency, the Swedish Radiation Safety Authority, and other public authorities also report such national risk and vulnerability analyses, based on their respective areas of responsibility and activity.⁴⁷

⁴⁵ *Risk and vulnerability analysis for 2018, Summary*, Svenska kraftnät, p. 5. [risk-och-sarbarhetsanalys-2018.pdf \(svk.se\)](#), 2021-01-14 - based on the requirements set out in the Power Contingency Act (SFS 1997:288) and Power Contingency Ordinance (SFS 1997:294) and Svenska kraftnät's regulations and guidelines on electrical preparedness (SvKFS 2013:2) and in Ordinance (SFS 2015:1052) on Emergency Preparedness and the Measures to be taken by Designated Authorities in the Event of Heightened Alert.

⁴⁶ See, for example, Svenska kraftnät's [risk-och-sarbarhetsanalys-2018.pdf \(svk.se\)](#), 2021-01-14, and Affärsverket Svenska kraftnät's Regulations and General Advice on Electricity Preparedness (SvKFS 2013:2), and [Vägledning för risk- och sårbarhetsanalyser i elsektorn, Svenska kraftnät, Energiföretagen, vägledning-risk-och-sarbarhetsanalys-2017-08-28.pdf \(svk.se\)](#), 2021-01-14.

⁴⁷ [Risks and vulnerabilities \(energimyndigheten.se\)](#), 2021-01-14, [ssm2020-4480-2-sammanställning-risk-och-sarbarhetsanalys-2020-1225872_57_1.pdf \(stralsakerhetsmyndigheten.se\)](#), 2021-01-14 in accordance with the requirements of Ordinance (SFS 2015:1052) on Emergency Preparedness and the Measures to be taken by Designated Authorities in the Event of Heightened Alert.

According to the Electricity Act (SFS 1997:857) and the Swedish Energy Markets Inspectorate's regulations and general advice (EIFS 2013:3) on risk and vulnerability analyses and action plans regarding security of supply in the network, the network operators must identify hazards and estimate risks in their network and draw up an action plan. By identifying hazards, estimating risks and vulnerability, and identifying and prioritising measures that reduce risk and vulnerability, network operators can plan their improvement measures. A report of the action plan, which shall be based on a risk and vulnerability analysis and action plan not older than one year, is submitted annually to the Swedish Energy Markets Inspectorate.⁴⁸

Electrical Preparedness Act

The Electrical Preparedness Act (SFS 1997:288) regulates the obligations of electricity companies to take measures to secure society's electricity supply needs in the event of severe stress and heightened preparedness. The obligations set out in the Act apply to companies engaged in the production of electricity, the transmission of electricity, and trade in electricity. The scope of the law includes measures linked to heightened preparedness but also to prevent, withstand, and manage serious peacetime crises. Svenska kraftnät has developed regulations on electricity preparedness, Affärsverket Svenska kraftnät's Regulations and General Advice on Electricity Preparedness, (SvKFS 2013:2), which entered into force on 1 September 2013. The regulation includes detailed provisions on the obligations set out in the Act.

The peak load reserve

On very cold winter days, there may be temporary situations where electricity consumption appears to exceed the production of electricity. In these situations, planned resources are not enough. Svenska kraftnät will then have to resort to reserves that have been procured in advance. The so-called peak load *reserve capacity* is created by Svenska kraftnät entering into agreements with actors in the electricity market under the Act on Peak load reserve (SFS 2003:436). The peak load reserve capacity is created by Svenska kraftnät entering into agreements with producers on increased electricity generation⁴⁹. In accordance with Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity⁵⁰, a reserve capacity may only be applied if the Member State has a identified resource adequacy concern.⁵¹ Such assessment shall be approved by the European Commission.⁵² However, the capacity mechanisms agreed by a country prior to the entry into force of the Regulation may be applied without such assessment and

⁴⁸ Applies to all network concession holders for line with a voltage of less than 220kV.

⁴⁹ Act on Reserve Capacity (SFS 2003:436), Section 1.

⁵⁰ Regulation (EU) 2019/943 of the European Parliament and of the Council of 5 June 2019 on the internal market for electricity, OJ L 158, 14.06.2019, CELEX number: 32019R0943

⁵¹ Regulation (EU) 2019/943, Chapter IV, Art. 20.

⁵² Regulation (EU) 2019/943, Chapter IV, Art. 21 (5).

approval, though no longer than to the end of 2025. This possibility is used for the peak load reserve capacity and it can thus remain in its current form until the end of 2025.

Demand restraint measures

In order to avert an energy shortage situation that the market is unable to cope with, the Swedish Government may decide to reduce the national electricity consumption. The Swedish Energy Agency has a prepared information campaign about saving electricity that can be aimed at all households and a prepared measure in the form of national authorities being asked to take measures to reduce their electricity consumption.⁵³ If this is not enough, the Government can decide on rationing electricity.⁵⁴

Production regulation

Svenska kraftnät is permitted to, pursuant to Chapter 8, Section 2 of the Electricity Act (SFS 1997:288), to the extent necessary to exercise systemic responsibility, order electricity producers to increase or decrease the production of electricity. The provision regulates how a shortage situation shall be handled when there is no heightened state of alert for the defence of Sweden.⁵⁵

In war or when the Government otherwise decides, it is Svenska kraftnät's responsibility to, in collaboration with other total defence authorities, meet society's need for electric power by planning, directing, and coordinating the resources of the electricity supply. When electricity consumption regulation has been introduced, Svenska kraftnät shall, to the extent prescribed by the Government, be responsible for long-term planning and direction of electricity production.⁵⁶

System defence plan, restoration plan, and test plan

In accordance with Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation and Commission Regulation (EU) 2017/2196 of 24 November 2017 establishing a network code on electricity emergency and restoration⁵⁷, Svenska kraftnät shall develop a system defence plan, restoration plan, and a test plan⁵⁸. As national regulatory authority, the Swedish Energy Markets Inspectorate is responsible for ensuring that relevant actors fulfil their obligations under the regulations. Svenska kraftnät is working on an

⁵³ *Framtagning av informationskampanj elenergibrust*, Swedish Energy Agency, registration number 2012-001325.

⁵⁴ Rationing Act (SFS 1978:268).

⁵⁵ Government Bill 2010/11:56 Prioritisation of essential electricity consumers, p. 8.

⁵⁶ SFS 2007:1119, Section 4.

⁵⁷ *Commission Regulation (EU) 2017/2196 of 24 November 2017 establishing a network code on electricity emergency and restoration*, OJ L 312, 28.11.2017. CELEX number: 32017R219.

⁵⁸ See Svenska kraftnät's test plan in accordance with Commission Regulation (EU) 2017/2196 of 24 November 2017 establishing a network code on electricity emergency and restoration (version 1.0 2020-10-28, case number 2019/3367).

updated system defence plan and test plan to be approved and adopted by the Swedish Energy Markets Inspectorate.

The regulatory framework aims to ensure that extensive disturbances and breakdowns in the electrical system are avoided and to enable an efficient and rapid restoration of the electricity system in the event of a major disturbance. Svenska kraftnät is currently strengthening the Swedish transmission network with new lines and stations to manage new wind power, remove grid constraints, and meet society's high demands on secure electricity supply.⁵⁹

Supporting measures

By supporting Elsamverkan (disruption preparedness for local and regional network disruptions) and through the development and management of a web-based national tool, used to facilitate cooperation between network operators during disturbances within Sweden, Svenska kraftnät has initiated cooperation and coordination between actors within the area of responsibility with respect to the planning and preparation for crisis management and such work during crises. Through reporting, it is possible for electricity cooperation management to get an overview of the disturbance situation and they can cooperate with network operators in an efficient manner.⁶⁰

Svenska kraftnät can convey resources such as backup materials and communication equipment stored in stockpiles, but also repair personnel. The Swedish Armed Forces' resources can also be used.

In the event of an electricity crisis, procedures and measures may arise that directly or indirectly affect electrical safety. The Swedish National Electricity Safety Board can assist with risk analyses and proposed solutions.

Security of supply and functional requirements

According to the Electricity Act, the transmission network is defined as a technically and operationally coherent power grid with a voltage of 220 kV or more, spans several regions in Sweden and connect the national network to networks in other countries. Svenska kraftnät is the only transmission network operator in Sweden and disturbances on the transmission network that cause disruptions in the electricity supply are uncommon.

Regional and local networks refer to networks with network concession for line or area with a voltage below 220 kV. Network operators with network concessions for line or area annually report data to the Swedish Energy Markets Inspectorate on outages and other information linked to the security of supply. The purpose of the reporting by network operators is, on the one hand, to form a basis for the Swedish Energy Markets Inspectorate's oversight

⁵⁹ [Start | Svenska kraftnät \(svk.se\)](#), 2021-01-14.

⁶⁰ [Elsamverkan och Susie | Svenska kraftnät \(svk.se\)](#), 2021-01-14.

of the security of supply in networks and, on the other hand, to form the basis for the quality adjustment included in the calculation of the revenue frameworks of network operators.

The Electricity Act (SFS 1997:857) imposes a functional requirement that an outage may not exceed 24 hours. However, the functional requirement does not apply if the outage was due to a hindrance beyond the control of the network owner.

The Swedish Energy Markets Inspectorate's regulations and general advice on requirements to be met for the transmission of electricity to be of good quality (EIFS 2013:1) sets out requirements that must be met in order for the transmission of electricity to a customer to be considered of good quality. The regulation specifies requirements for the quality of the voltage but also requirements for the security of supply. The requirements state that transmission line corridors above 25kV must be tree-safe in order to prevent falling trees and branches from causing power outages. Furthermore, there are requirements for the number of disruptions and a special functional requirement for load levels above 2 megawatts.

Information campaigns

In order to facilitate preparations in society that prevent and mitigate the consequences of disturbances and disruptions in electricity supply, the Swedish Energy Agency has prepared information materials and information campaigns aimed at the public. These information campaigns contain information, advice and tips to different target groups on how to prepare for a situation where a longer outage occurs.⁶¹ The purpose of the information is both to reduce the vulnerability of the individual to disruptions in the electricity supply and to reduce the need for societal emergency relief efforts so that available societal resources have the greatest possible benefit to society. One expected effect of information campaigns of this type is, for example, that the individual's preparations help reduce the need for warming cabins in the event of a longer electricity supply outage during winter, as the individuals themselves can prepare to meet their needs for a longer period of time. Furthermore, the Swedish Energy Agency, together with other authorities, provides advice and information on issues related to auxiliary power⁶² and supports local and regional authorities with knowledge based information in order to improve local emergency preparedness in the event of disturbances and disruptions in energy supply.

3.1 c) Measures to mitigate electricity crises

Production regulation

Svenska kraftnät is permitted, pursuant to Chapter 8, Section 2 of the Electricity Act, to the extent necessary for the exercise of their system responsibility, to order electricity producers to increase or decrease the production of electricity. Alternatively, if system responsibility cannot be

⁶¹ [Power outage – what do I do now? \(energimyndigheten.se\)](https://www.energimyndigheten.se/om-energi/nyheter/2021-01-14-power-outage-what-do-i-do-now/), 2021-01-14.

⁶² [Guidance for the work with auxiliary power \(energimyndigheten.se\)](https://www.energimyndigheten.se/om-energi/nyheter/2021-01-14-guidance-for-the-work-with-auxiliary-power/), 2021-01-14.

exercised through such measures, Svenska kraftnät may order network concession holders to limit or suspend the transmission of electricity to end users. The limitation and suspension of transmission shall, to the extent covered by system responsibility, be carried out in such a way as to give priority to essential consumers. These provisions of Chapter 8 Section 2 of the Electricity Act regulates how to handle a shortage situation when there is no heightened state of alert for the defence of Sweden.⁶³

Import

Before Svenska kraftnät reaches the stage of having to interrupt the transmission of electricity, all available bids in the spot market for electricity⁶⁴ have been used and the possibility of importing power from neighbouring countries has both been investigated and implemented (ASP (agreed supported power) and possibly EPC (emergency power control)).

Disturbance reserve

If the demand for electricity remains high and the possibility of importing electricity is not enough, any available peak load reserve capacity and disturbance reserve will also be started.⁶⁵ When the last 600 MW in the disturbance reserve is started, Svenska kraftnät also carries out manual load shedding to restore sufficient reserves in rolling hydropower, in order to handle dimensioning grid disturbances.

According to Regulation (EU) 2017/2196 of 24 November 2017 establishing a network code on electricity emergency and restoration, a transmission system operator (TSO) may, under certain specific conditions, interrupt market activities⁶⁶. The regulatory authority approves the circumstances in which TSO may interrupt market measures in the Member State concerned. According to the decision of the Swedish Energy Markets Inspectorate, Svenska kraftnät will not interrupt certain market activities when the system is out of normal operation⁶⁷.

3.1 d) Framework for Manual Load Shedding (MLS)

Manual Load Shedding

Should the reserve capacity⁶⁸ prove insufficient, Svenska kraftnät may, as a last resort, order manual load shedding under Regulation (EU) 2017/2196 on establishing a network code on electricity emergency and restoration, and, at national level, the Electricity Act (SFS 1997:857) to

⁶³ Government Bill 2010/11:56 Prioritisation of essential electricity consumers, p. 8.

⁶⁴ Spot market for electricity refers to the marketplace for electricity trading where mainly generators sell electricity to supply undertakings, which in turn sell it to consumers. The majority of hourly trading takes place at Nord-pool, the Nordic electricity exchange. On the Stockholm Stock Exchange Nasdaq OMX, there is also long-term trading for electricity | [Svenska kraftnät \(svk.se\)](https://svenska.kraftnat.se), 2021-01-14.

⁶⁵ [The disruption reserve | Svenska kraftnät \(svk.se\)](https://svenska.kraftnat.se) 2021-01-14.

⁶⁶ Regulation (EU) 2017/2196, Art. 36 p. 2, Art. 39 p. 1 para. 2.

⁶⁷ [ER-Artikel-4.2-a-Ei-beslut-2018-102598.pdf](https://www.ermi.se/ER-Artikel-4.2-a-Ei-beslut-2018-102598.pdf)

⁶⁸ [Reserve capacity | Svenska kraftnät \(svk.se\)](https://svenska.kraftnat.se) 2021-01-14.

maintain the power balance in the electricity system. In this case, network operators must disconnect certain parts of the network on very short notice in order to maintain the level of risk in the electrical system as a whole and to control the consequences of disturbances and to prevent possible spill-over effects in the event of errors.

In order for vital societal functions to continue operating to the extent possible, Sweden has, with the support of Ordinance (SFS 2011:931) on planning for prioritisation of essential consumers, the *Styrel* Regulation, drawn up planning documentation for the desired prioritisation of disconnecting consumers in the event of electric power shortages, also called *Styrel*. The planning documentation shall, ‘to the extent that system responsibility permits’, be considered by Svenska kraftnät in a situation where transmission needs to be restricted or interrupted.⁶⁹ MLS is a final resort when dealing with a power shortage situation in a controlled manner.

Manual Load Shedding procedure

Thus far, MLS has not been needed, but have on a couple of occasions been close to being activated. There are essentially two different types of situations where the need for MLS may arise, expected or unexpected. One expected situation can be that production resources are stretched while consumption is high. Svenska kraftnät can here, given the normal variations in consumption, identify that a consumption peak is to be expected during, for example, the following morning. The unexpected situation occurs suddenly or, for example, when multiple independent errors occur at the same time.

If a situation arises where MLS may be used, personnel in Svenska kraftnät’s control room must quickly identify that the situation can only be solved through MLS. Svenska kraftnät assesses the extent of the need for MLS and locates the geographical route. Svenska kraftnät then communicates what power volume needs to be disconnected to specially designated network operators that have staffed control rooms around the clock. The disconnection shall, unless otherwise stated, take place within 15 minutes of the order from Svenska kraftnät.⁷⁰

The role of network operators in Manual load shedding

The role of network operators in the case of manual disconnection and connection of electricity consumption is regulated in Svenska kraftnät’s regulations and general advice on equipment for load shedding (SvKFS 2012:1). The regulations require network operators to be prepared for and have the necessary equipment to be able to manually disconnect or

⁶⁹ Electricity Act (SFS 1997:857) Chapter 8, Section 2, Regulation (1994:1806) on system responsibility for transmission Section 15 c.

⁷⁰ *Föreskrift om ändring i Affärsverket svenska kraftnäts föreskrifter och allmänna råd (SvKFS 2001:1) om utrustning för förbrukningsfrånkoppling*, SvKFS 2012:1, Section 2 g.

connect electricity consumption at the order of Svenska kraftnät. Disconnection shall be possible to a degree of at least 50 % of the current load. A plan shall be drawn up by each respective network operator for this purpose, and special order routes shall be drawn up. Disconnection and connection shall, where possible, consider prioritised consumers.⁷¹

The designated network operators can connect their own network and forward the order to any underlying network operators. Disconnection is done either by the control room staff systematically remotely operating switches to disconnect loads, or by initiating automatic pre-programmed sequences. Forwarding the order takes time, especially when many underlying network operators are involved. In the case of urgency, it is likely that the own network is responsible for most of the disconnection, and that the priority made of the underlying network can be used for load redistribution when the emergency situation has been resolved.

Procedure for connecting after MLS

When Svenska kraftnät deems it possible to connect loads, Svenska kraftnät notifies the specially designated network operators hereof. This, too, concerns specific power volumes, and could take place in several steps as the situation improves. The net power output may only increase again following notification from Svenska kraftnät. Before then, it is possible, and may be relevant, to redistribute which parts of the network are disconnected. Connection shall also consider prioritised end users.

Svenska kraftnät's duty of reporting in case of interruption of transmission

If Svenska kraftnät has ordered and implemented the interruption of transmission, Svenska kraftnät shall submit a report of the incident to the Swedish Energy Markets Inspectorate within 30 days⁷².

Styrel

As mentioned above, the Swedish Energy Agency has, together with other actors, developed *Styrel*, which is a method of planning so that essential consumers can be prioritized in the event of disconnection. *Styrel* can be summarised as the planning process during which national authorities, county administrative boards, municipalities, private actors, and network operators collaborate to develop the basis for prioritising essential consumers in case of MLS. The purpose of *Styrel* planning is to mitigate the societal consequences in a situation where MLS must be resorted to in the event of an electric power shortage. The Swedish Energy Agency, pursuant to Ordinance (SFS 2011:931), the *Styrel* Ordinance has issued a regulation on the method for the development of the priority base through

⁷¹ SvKFS 2012:1, Section 2 b.

⁷² Regulation (EU) 2017/2196, Chapter IV, Art. 37 (6).

the Swedish Energy Agency's regulation on planning for the prioritisation of essential consumers (STEMFS 2013:4).

According to the regulation (STEMFS 2013:4), county administrative boards, participating national authorities, network concession holders, and municipalities must plan for prioritising essential consumers according to the method set out in the regulation.⁷³ The regulation states that an essential service is an activity of such importance that the loss or serious disturbance of the activity would entail great risks or danger to the life and health of the population, the functionality of society, or the fundamental values of society.⁷⁴ The essential consumers identified in the planning documentation shall, if possible, be taken into account by Svenska kraftnät in case of MLS. The *Styrel* process is normally repeated every four years and leads to network operators receiving data showing an order of priority of lines out of substations (typically 10-20 kV). The planning documentation is used by the network company to create its plan for MLS.

Priority classes within Styrel

When compiling the planning documentation for *Styrel*, the vital societal functions identified shall be divided into one of eight priority classes.⁷⁵ These are listed below in descending order of priority:

1. Consumers who even in the short term (hours) are of great importance to life and health.
2. Consumers who even in the short term (hours) are of great importance to societal functionality.
3. Consumers who in the longer term (days) are of great importance to life and health.
4. Consumers who in the longer term (days) are of great importance to societal functionality.
5. Consumers who represent major economic interests.
6. Consumers who are of major importance to the environment.
7. Consumers who are of major importance to social and cultural interests.
8. Other consumers.

⁷³ SFS 2011:931, Section 3.

⁷⁴ *The Swedish Energy Agency's regulation on planning for prioritisation of essential consumers* (STEMFS 2013:4), Section 2.

⁷⁵ SFS 2011:931, Section 5.

3.1 e) Mechanisms used to inform the public about the electricity crisis

Svenska kraftnät's mechanisms used to inform the public about an electricity crisis

In a situation where Svenska kraftnät has gained knowledge of the risk of power outage, electric power shortage, or energy shortage likely to have effects in neighbouring countries and thus lead to a more extensive electricity crisis, Svenska kraftnät is responsible for informing the Swedish Energy Agency and the public about the risk of an electricity crisis or that there is an existing electricity crisis. When formulating external communication, Svenska kraftnät uses the current situational picture's direction and overall message as a basis. In the external messages, Svenska kraftnät ensures that the priority order people, environment, property, economy is clear. Through the external information, Svenska kraftnät can, using consistent messaging, convey a picture of the situation and what measures are being taken. External information is important for answering questions from the public, industry, other stakeholders, public authorities, and the media.

Svenska kraftnät's mechanisms

- Continuously updating the website www.svk.se, possibly activating and managing crisis website depending on the degree of crisis. Considering the need for information in English at www.svk.se.
- Updating and responding to social media posts, such as *Facebook*, *Twitter*, and *LinkedIn* based on agreed handling.
- Providing the switchboard and reception with information to answer questions from external visitors and callers.
- Handling the media proactively and reactively, issuing press releases, and arranging a press conference if necessary.
- Updating Svenska kraftnät's pages on Krisinformation.se if necessary.
- If necessary, issuing an IPA (important public announcement) via Sveriges Radio.⁷⁶
- Ensuring that external actors have correct and up-to-date information when cooperating with them.

⁷⁶ See further information under the heading *National mechanisms used to inform the public about crisis*, p. 32

- Keeping in touch with MSB's network of information officers and communication departments of the parties we cooperate with.

The communication department at Svenska kraftnät is responsible for all press contacts and for appointing spokespersons. All requests from journalists regarding statements about Svenska kraftnät's assessment are handled by the press office.⁷⁷ Svenska kraftnät's press and communication preparedness is staffed around the clock and the press office is available for support and advice if necessary. Press releases are designed by the Communications unit at Svenska kraftnät in collaboration with the accountable manager or representative appointed by the accountable manager such as project manager, purchaser, or responsible administrator.

The Swedish Energy Agency's mechanisms used to inform the public about an electricity crisis

As the administrative authority responsible for energy supply and consumption matters and as the competent authority for the Risk Preparedness Regulation, the Swedish Energy Agency is responsible for informing the public and society in the event of a situation involving issuing an early warning or electricity crisis.

The mechanisms of the Swedish Energy Agency

- Prepared web pages on the Swedish Energy Agency's website www.energimyndigheten.se, which can be quickly activated to inform about an electricity crisis. The web pages contain blocks of general information and enable rapid publication on the authority's website in the event of an early warning of an electricity crisis or an electricity crisis. When an incident occurs, the website can be activated and information that has been consulted between the communications functions of Svenska kraftnät and the Swedish Energy Agency can be published quickly. Essential information will also be published in English. Furthermore, links to www.svk.se, krisinformation.se, dinsakerhet.se, or other relevant sources of information may be added to the website.
- The Swedish Energy Agency may share published information from the website www.energimyndigheten.se in other media channels such as *Facebook*, *Twitter*, and *LinkedIn*.
- The Swedish Civil Contingencies Agency should be informed of the situation at an early stage and be provided with information that can be published on krisinformation.se. Other public authorities such as the Swedish National Electricity Safety Board,

⁷⁷See Annex 1 Contact details.

the Swedish Energy Markets Inspectorate, and the Swedish Radiation Safety Authority should also be informed to help disseminate the information.

Communication challenges

The Swedish Energy Agency's capability to continuously provide the public with updated information about early warning of an electricity crisis, electricity crisis, or situation updates is only deemed possible as long as the Swedish Energy Agency has access to electricity supply and operation of its own communications. In the event of a complete loss of electricity, information to the public will not be possible to maintain through websites and social media except possibly for a very limited period of time. In the event of temporary loss of electricity supply or in the event of an electricity crisis, the public's access to information is likely to be very limited. The extent to which communications functions will continue to be available is also affected by the preparations for auxiliary power and manual connection/disconnection that have been made at regional and local level. In this context, the individual's own preparations will also have a major impact on the individual's ability to access information communicated through power-dependent media, such as access to their own auxiliary power, backup batteries, battery-powered radio and so on.

National mechanisms used to inform the public about an electricity crisis

If severe incidents and disruptions to critical infrastructure occur, the IPA (important public announcement) system can be used. IPA is broadcast via radio (Sveriges Radio P4), TV, krisinformation.se, via web, apps (Facebook, Twitter, LinkedIn, and Instagram), but can also be used for very serious events through an outdoor warning system. In order to have a mandate to request an IPA, the person requesting to issue the message must be authorised to do so. In the case of power outages, Svenska kraftnät and the major electricity distributors are authorised to request the IPA. For extraordinary events, the Government through the Government Offices of Sweden, all designated authorities and municipalities and county councils are authorised to make such requests.⁷⁸ Anyone who is authorised and who wishes to have an IPA message broadcast must contact their regional emergency centre, which forwards the request to the broadcasting management at Sveriges Radio, which ensures that Sweden's radio channels broadcast the message and that the message is sent to participating broadcasters.⁷⁹ When an authority requests an IPA via SOS Alarm, Sveriges Radio's broadcasting management formulates the message as the broadcast medium requires a different way of expression. The IPA is also just the first message, which cuts off radio broadcasts, adds a crawl message to the TV screen, adds a banner on sites, sends text

⁷⁸ [Requesting an IPA \(msb.se\)](#), 2021-01-14.

⁷⁹ [VMA \(msb.se\)](#) 2021-01-14

messages to phones, etc. The public authority requesting an IPA must continuously deliver information to the public through Sveriges Radio's broadcasting management throughout the event. Both SOS Alarm and Sveriges Radio have been assigned Rakel to always be available to broadcast an IPA if requested by a public authority.

If an early warning of an electricity crisis is issued, links with information from Svenska kraftnät, the Swedish Energy Agency or other relevant actors can be communicated via the website krisinformation.se, operated by MSB.⁸⁰

The public can also obtain information about ongoing crises by calling 113 13 or visiting the municipalities' websites. For those who need additional support for information, text/videotelephony or Teletal are available.⁸¹

3.2 Regional and bilateral procedures and measures

3.2 a) Agreed cooperation mechanisms within the region

Nordic collaborations

As mentioned above, the Swedish crisis management system has three basic principles: the principle of responsibility, the principle of equality, and the principle of proximity. The person responsible for an activity under normal conditions shall also be responsible in a crisis situation. These are the common principles on which Nordic co-operation is based.

The prerequisites for properly managing crises in a complex system, such as a power system, are based on well-established procedures and processes. The technical fact that the synchronous area covers not only Sweden, but also the Nordic countries, creates an additional complexity that needs to be addressed. Although many measures are local in nature, it is necessary to coordinate so that nothing unexpected happens or incorrect measures are taken.

In order to create the right conditions for ongoing operational work, a number of activities are carried out jointly with the other Nordic system operators such as:

- development of procedures
- joint exercises
- exchange of information for decision support
- incident follow-up
- Nordic groups for management, development and decisions

⁸⁰ [Important public announcement, IPA - Krisinformation.se](#), For public authorities and other actors - Krisinformation.se, 2021-01-14.

⁸¹ [Important telephone numbers -Krisinformation.se](#), 2021-01-14.

The Nordic Operational Coordination Centre (N-RCS) performs a number of tasks in support of planning of and operation.

3.2 b) Regional and bilateral measures

Both within Nordic cooperation and with other connected countries, there are agreed measures to be taken in case of an emergency. For the Nordic countries, this is regulated in the so-called Nordic SOA (System Operation Agreement). For other accession countries, this is regulated in separate bilateral SOAs. The bilateral agreements concluded must relate to the Nordic SOA.

Depending on the nature of the emergency, there are different response mechanisms that are activated in order to return to normal operating mode. The TSO, or country, where an emergency occurs covers the cost of, for example, the use of emergency power from a remedying party. The cost regulation is also agreed in each respective SOA.

For further and more detailed information, please refer to published material of the European Network of Transmission System Operators (ENTSO-E).⁸²

3.2 c) Cooperation and support mechanisms

Nordic cooperation in electrical risk preparedness takes place in addition to the ongoing and operational cooperation between Nordic system operators mentioned above, including in the Nordic cooperation forums NordAM (Nordic Asset Management Forum) and NordBER, an electricity preparedness network for all Nordic energy and electricity preparedness authorities and system operators⁸³. Within the Nordic co-operation NordAM, the Nordic system operators have concluded mutual assistance agreements in the event of major operational disruptions, which means that repair resources can be called off.

NordBER is a cooperation for electricity preparedness in the Nordic region. The aim of the cooperation is to exchange information and experiences and to increase the conditions for the coordination of joint projects and activities relevant to the preparedness and crisis management of electricity supply.

Nordic cooperation can also be mentioned briefly. In April 2009, Nordic Ministers responsible for civil protection and preparedness met at Haga Palace in Stockholm to deliberate on how to strengthen their cooperation with the vision of deepening and broadening the Nordic cooperation within civil protection and preparedness. The first Haga Declaration

⁸² <https://www.entsoe.eu/publications/system-operations-reports/#nordic>

⁸³ Letter of Intent was signed in 2010 between the Nordic energy and electricity preparedness authorities and the system operators regarding the Nordic Contingency Planning and Crisis Management Forum, i.e. NordBER (Swedish Energy Agency's reference number 60-10-00478).

(Haga I) was adopted. Four years later, in 2013, the second Haga Declaration (Haga II) was adopted under Swedish presidency. The declaration embraces a common vision: A robust Nordic region without borders. The vision aims for a society with decreasing vulnerability while strengthening the capability of handling serious accidents and crises and restoring functionality. The new and altered threat landscape has shown that the work on civil protection and preparedness cannot be considered solely from a national perspective; it also requires cross-border cooperation. The ability to help one another across borders in cases of serious incidents is of great importance.⁸⁴

A letter of intent between Sweden and Finland on closer cooperation in the field of civil preparedness and rescue services was signed on 10 February 2021 by the Swedish Minister for Home Affairs and the Finnish Minister of the Interior. The aim is to improve the countries' resilience capabilities and to promote common interests in the field of crisis preparedness. The cooperation is based on the need to strengthen the capability to prevent and manage risks, vulnerabilities, and threats in both the short and long term. The wide range of stresses means that preparedness must be built for different types of accidents and crises and, ultimately, war. Closer cooperation also creates better conditions for mutually providing and receiving bilateral support efficiently, including host nation support.⁸⁵

⁸⁴ <https://www.msb.se/sv/om-msb/internationella-samarbeten/nordiskt-samarbete/> 2021-04-22

⁸⁵ <https://www.regeringen.se/overenskommelser-och-avtal/2021/02/avsiktsforklaring-mellan-sverige-och-finland-rorande-fordjupat-samarbete-inom-krisberedskap-civilt-forsvar-och-raddningstjanst/> 2021-04-22

4 Crisis coordinator

*The National Crisis Coordinator*⁸⁶ at the Swedish Energy Agency is responsible for the Swedish Energy Agency proclaiming an electricity crisis and act as a national contact point in accordance with Regulation (EU) 2019/941, Chapter IV Art. 14.

In the event of an electricity crisis, the national crisis coordinator shall without undue delay notify the competent authorities of Member States within the same region, the competent authorities of directly connected Member States and the Commission.⁸⁷

⁸⁶ Crisis Coordinator is defined in Article 2(13) as a person, a group of persons, a team composed of the relevant national electricity crisis managers or an institution tasked with acting as a contact point and coordinating the information flow during an electricity crisis.

⁸⁷ The competent authorities of Finland and Denmark, located in the same region, and the competent authorities of Poland, Lithuania, and Germany, which constitute directly connected Member States, and the European Commission shall be notified of the existence of an electricity crisis without undue delay.

5 Stakeholder consultation

Consultation has been carried out through a written consultation procedure of the risk-preparedness plan and of reported electricity crisis scenarios in accordance with Article 7(2) of the Risk Preparedness Regulation. The risk-preparedness plan was referred to the list of actors below for approximately five weeks.

Numerous qualified proposals for improvements were received and have entailed some change to the risk-preparedness plan. Other proposals require more extensive investigative work and are governed by work carried out within the framework of other EU regulations and network codes outside the responsibility and control of the competent authority.

Among other things, improvement proposals have been received on how the electricity crisis scenarios are described and how they should be linked to each respective reported measure. Further examples of proposals concerned the clarification of responsibilities in the event of a crisis and how public authorities communicate with each other but also with the public.

The following are the actors invited for written consultation.

a) Relevant electricity and natural gas undertakings, including relevant producers or their trade bodies

The trade bodies Swedish Gas Association (Energigas Sverige) and Swedenergy (Energiföretagen Sverige). The three largest electricity producers in Sweden: Vattenfall, Sydkraft, and Fortum.

b) Relevant organisations representing the interests of non-industrial electricity customers

The Swedish Association of Local Authorities and Regions (SKR) and the Swedish Consumer Energy Markets Bureau (konsumenternas Energimarknadsbyrå).

c) Relevant organisations representing the interests of industrial electricity customers

Confederation of Swedish Enterprise (Svenskt näringsliv)

d) Regulatory authorities

In drawing up this plan, the Swedish Energy Markets Inspectorate has participated in oral consultations as well as consultation procedures regarding electricity crisis scenarios and draft risk-preparedness plan.

The public authorities: the National Electrical Safety Board, the Swedish Radiation Safety Authority, and the Swedish Civil Contingencies Agency.

e) Transmission system operators

The drafting of this plan has been carried out through close collaboration between the competent authority (The Swedish Energy Agency) and the transmission network operator Svenska kraftnät.

f) Relevant distribution system operators

Nine electricity distribution companies⁸⁸ specifically designated by Svenska kraftnät in case of MLS.

⁸⁸ Vattenfall, Elevio, Eon, Göteborg Energi, Jämtkraft, Mälarenergi, Skellefteå kraft, Tekniska verken, and Umeå Elnät

6 Emergency tests

a) Timetable and implementation

Every two years, regional and, where appropriate, national real-time response simulations⁸⁹ for electricity crises shall be carried out. By 2022-12-31, the first regional simulation of real-time responses to electricity crises shall have been carried out. The Swedish Energy Agency shall, before such simulations, consult with Svenska kraftnät and the competent authorities in Denmark, Finland, and Norway on the planning and implementation of such tests. Prior to implementation, Svenska kraftnät shall likewise consult with TSOs in Denmark, Finland and Norway and, if necessary, relevant DSOs and other electricity supply operators in Sweden.

Svenska kraftnät conducts training and exercises for different purposes and for different target groups, both internally for their own operations staff and for external participants.⁹⁰

b) Procedure for carrying out tests

When simulating real-time responses to electricity crises, the agreed mechanisms listed under 3.1 a) shall be followed.

⁸⁹ Real-time simulations refer to emergency drills where the information flow schedule is tested and functional tests of communications are performed.

⁹⁰ [Training and practice | Svenska kraftnät \(svk.se\)](#), 2021-01-14.