ρυθμιστική αρχή ενέργειας κύπρου
cyprus energy regulatory authority

RISK-PREPAREDNESS REGULATION 2019/941

RISK-PREPAREDNESS PLAN FOR CYPRUS

… 2025

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1. GENERAL INFORMATION

The Cyprus Energy Regulatory Authority (CERA) is the competent authority for the preparation of the Risk Preparedness Plan.

In accordance with the ~~preamble~~ Recital ~~No.~~ 38 of ~~the~~ Regulation (EU) 2019/941 on risk-preparedness in the electricity sector (Regulation 2019/941), Cyprus is currently the only Member State which is not directly interconnected to another Member State. It should therefore be clarified ~~with respect to certain provisions of the Regulation (EU) 2019/941,~~ that, for as long as this situation persists, certain provisions of the Regulation (EU) 2019/941, ~~those provisions~~, ~~namely provisions on~~ specifically those concerning the identification of regional electricity crisis scenarios, ~~on~~ the ~~including~~ inclusion of regional and bilateral measures set out in risk-preparedness plans, and ~~on~~ the provision of assistance, do not apply ~~with respect~~ to Cyprus. Therefore, Cyprus ~~at the time being~~ is not presently required to develop any regional or bilateral procedures and measures with other Member States, as it ~~since in accordance with the Regulation (EU) 2019/941 Cyprus~~ is isolated and is not part of any relevant region under the Regulation.

In this respect, in January 2022, CERA published the first Risk Preparedness Plan for Cyprus ~~has developed~~, with the support of the European Commission. ~~,~~ The plan included alternative measures and procedures ~~in the fields covered by those provisions~~, that do not affect the effective application of the Regulation (EU) 2019/941 ~~between~~ among the other Member States.

This report concerns the second Risk Preparedness Plan for Cyprus which builds upon the provisions set in the first plan.

2. SUMMARY OF THE ELECTRICITY CRISIS SCENARIOS

In accordance with Article 7 of the Regulation (EU) 2019/941 ~~on risk-preparedness in the electricity sector (Regulation 2019/941) Article 7~~, CERA, as competent authority, has identified a set of national electricity crisis scenarios as being the most relevant for the case of Cyprus. The electricity crisis scenarios were identified based on the risks referred to in Article 5(2) of the Regulation 2019/941 and in the "Methodology to Identify Regional Electricity Crisis Scenarios" of ENTSO-E which are consistent with the regional electricity crisis scenarios identified in accordance with Article 6(1).

In identifying the Cyprus' electricity crisis scenarios, CERA consulted the Transmission System Operator of Cyprus (TSOC), the Distribution System Operator (DSO) and the relevant producers through their trade bodies.

~~The electricity crisis scenarios are categorised based on the following risks: (a) rare and extreme natural hazards; (b) accidental hazards going beyond the N-1 security criterion and exceptional contingencies; (c) consequential hazards including the consequences of malicious attacks and of fuel shortages.~~

Each scenario was rated according to its likelihood of occurrence. For the classification of the likelihood of crisis, the ~~five~~six-step scale of the "Methodology to Identify Regional Electricity Crisis Scenarios" of ENTSO-E was used.

The following table presents the electricity crisis scenarios identified for Cyprus and their likelihood of occurrence.

Table 2: Cyprus' electricity crisis scenarios likelihood of occurrence

Crisis Scenario	Name	Likelihood					
		Very likely	Likely	Possible	Unlikely	Very unlikely	Extremely unlikely
1	Cyberattack – entities connected to electrical grid			√			
2	Physical attack – critical assets			√			

3	Physical attack – control centres			√			
4	Threat to key employees			√			
5	Insider attack			√			
6	Precipitation and flooding		√				
7	Winter Incident		√				
8	Fossil Fuel Shortage			√			
9	Local technical failure			√			
10	Multiple failures caused by extreme weather (storm, ice loading)				√		
11	Loss of ICT systems for real-time operation			√			
12	Simultaneous multiple failures				√		
13	Power system control mechanism complexity				√		
14	Human error			√			
15	Serial equipment failure			√			
16	Strike, riots, industrial action				√		
17	Industrial/nuclear accident			√			
18	Unusually big RES forecast errors				√		
19	Pandemic			√			
20	Heatwave	√					
21	Earthquake					√	
22	Forest fire		√				

23	Dunkelflaute (extremely low wind/solar generation)		√				
24	Space weather						√
25	High penetration of RES		√				

3. ROLES AND RESPONSIBILITIES OF THE COMPETENT AUTHORITY

~~The Cyprus Energy Regulatory Authority's (~~CERA~~'s)~~ main objective is to design and implement a comprehensive set of regulatory measures and actions that will prepare Cyprus to participate in a smooth, organized and efficient way, in the process of incorporating into the integrated European energy market. At the same time, it must safeguard the necessary security of energy supply in the country, both on a physical and an economic level, and to ensure energy costs accessible to the national economy and the consumer.

CERA has been designated as the competent authority for implementing and carrying out the tasks provided in the Regulation 2019/941.

With respect to the Risk Preparedness Plan, CERA is responsible for the establishment of such plans. More precisely, CERA approves certain procedures and measures provided by the TSOC that are part of the Risk Preparedness Plan.

4. PROCEDURES AND MEASURES IN THE ELECTRICITY CRISIS

4.1. National procedures and measures

With reference to the national crisis scenarios identified, procedures and measures have been put in place to minimise the likelihood of the crisis scenarios materialising, where possible, and to mitigate the consequences of crisis scenarios in case they materialise. These procedures and measures can be summarised under the following categories:

1. Prevention/mitigation of a total or partial system blackout
2. Mitigation of lack of generation adequacy. System preparation for known periods of increased demand, where system operates close to its stability limits. (stress), i.e. the hot summer months
3. Arrangements for emergency operation of the National Energy Control Centre (NECC)
4. Physical and Cyber security measures

It should be emphasised that TSOC has long standing and detailed procedures and measures for the risks identified through the process of Regulation 2019/941. It should also be noted that the TSOC submits annually to CERA for approval certain action plans (Action Plan for System Restoration after a total blackout and Action Plan for electricity crisis during summer period) related and linked to the procedures and measures already mentioned.

Furthermore, the TSOC's and the Distribution System Operator's (DSO) technical staff at district Areas participate in the Earthquake National Plan "EGKELADOS".

These procedures and measures are summarised below for the purposes of Regulation 2019/941.

4.1.1. Action Plan for System Restoration After a Total Blackout

Topics covered: • Prevention/mitigation of a total or partial system blackout
Relevant scenarios: • 1 – 6, 8-17, 21, 22, 24

TSOC, in fulfilling its duty to ensure a safe and reliable operation of the Electrical System, has prepared the "Action Plan for System Restoration after a Total Blackout" which is reviewed and updated annually. This Action Plan, which comprises of the General Plan and a number of Sub-Plans, defines the optimum processes for system restoration after a Total Blackout. It should be noted that the same procedures can also be applied in the case of a Partial Blackout.

All parties involved in the process of restoring the system after a Blackout, that are: the NECC, the Power Stations, the Transmission and Distribution System District and Central Offices, have prepared Sub-Plans regarding the initial processes to be followed after a Blackout, in preparation for the execution of the General Action Plan. These include, for example, contact details and responsibilities of key personnel, alert and communication mechanisms, and actions of the relevant party.

It should be noted that the plan also details actions to be followed in case some of the above steps fail or in case the SCADA System is unavailable.

4.1.2. Action Plan for Electricity Crisis During the Summer Period

Topics covered: • System preparation for known periods of stress, i.e.. the hot summer months • Mitigation of lack of generation adequacy

Relevant scenarios:

- 18, 20, 22, 24, 25

For the case of Cyprus's power system the summer period is the time of year during which the electricity system faces the most stress, due to the high electricity demand resulting from the high summer temperatures. Therefore, TSOC has put in place an Action Plan to cope with Electricity Crisis during this period, which is reviewed and updated at the beginning of every summer.

The Action Plan:

- Examines system adequacy, in light of forecast demand and generation unit availability for the summer period.
- Examines transmission system resilience, through the application of the N-1 security criterion.
- Defines preventive actions to ensure that the system is in the best possible place to cope with stresses. These include ensuring that there are no planned generation or transmission system maintenance activities during the summer period, that transmission line bushings have been washed before the start of the period and that any possible backup generators are in place to respond at any case needed.
- Defines roles and responsibilities and information flows in case of an emergency. More specifically, co-ordinators are appointed for the purposes of this Action Plan by all relevant parties, i.e. the Transmission System Operator, Transmission System Owner, Distribution System Operator, Distribution System Owner and Generation Owners.
- Defines the process for informing the public.

System stability in case of faults that result in loss of generation is ensured

through the automatic Under Frequency Load Shedding Scheme (UFLS). Furthermore, a cyclic load shedding scheme is in place for cases of lack of generation adequacy.

It should be noted that the actions and procedures to be followed in case of an electricity crisis, as detailed in the Action Plan, can be applied to an electricity crisis happening at any time of the year.

During the Summer period and whenever this is necessary, the DSO's District Offices issue rosters for standby Technical Personnel to cope with emergencies, such as multiple distribution network faults. Additionally, DSO activates a plan to improve the 24h local Call Centres response and handling of massive incoming calls.

4.1.3. Under Frequency Load Shedding Schemes

Topics covered:
• Prevention/mitigation of a total or partial system blackout
Relevant scenarios:
• 2, 8, 18 - 22, 25

An automatic Under Frequency Load Shedding scheme (UFLS) is in place. The scheme consists of certain stages which are progressively triggered as the frequency gets lower and it is designed to disconnect a certain percentage of the system load when all the stages are triggered at a certain frequency. Selection of loads for inclusion in the UFLS scheme stages has been performed so that loads of lower economic and social importance are included in the first stages, while supplies to important services are excluded from the UFLS. The scheme is regularly reviewed, for example taking into account the increasing penetration of PV generation at certain substations.

In addition to the above scheme, a Delayed Under Frequency Load Shedding scheme is triggered if the frequency remains below a certain level for more than 20s, with the aim to restore frequency to the normal operating limit. This scheme consists of a number of stages, which disconnect a selection of loads from the Stages of the automatic UFLS.

Where manual load shedding is required, the system provides the operators at the NECC the ability to easily disconnect predefined groups of loads. The first to be manually disconnected are water pumps and tele-controlled heating/air-conditioning, which are loads of low importance. Further disconnection groups have been created with loads taken from the Stages of the automatic UFLS. The groups have been prepared in co-operation with the DSO, ensuring uninterrupted power supply to critical services such as hospitals and airports, and important areas of economic activities. Furthermore, certain vulnerable customers whose life depends on electricity supply, are entitled to receive special protection against disconnection.

4.1.4. Cyclic Load Shedding Scheme

Topics covered: • Mitigation of lack of generation adequacy
Relevant scenarios: • 2, 8, 18 - 22, 25

A cyclic load shedding scheme is in place and ready to be deployed in cases of lack of generation adequacy. The scheme facilitates rolling power cuts to certain number of Groups of loads across the island. The groups have been prepared in co-operation with the DSO, ensuring uninterrupted power supply to critical services, such as hospitals and airports, and important areas of economic activities such as industrial zones/areas and tourist areas. In addition, certain vulnerable customers whose life depends on electricity supply, are entitled to receive special protection against disconnection. The scheme is regularly

revised, taking into account for example the increasing penetration of PV generation at certain substations.

When the scheme is to be deployed, TSOC uses their in-house software to estimate the load shedding cycle for the certain Groups for the day ahead, based on forecast demand and generation unit availability. Subsequently, the public is informed, via press releases, of the time and duration of the power cuts to their area. In periods of prolonged lack of adequacy, the press releases may cover the rolling power cut timetable for longer periods e.g. a week.

4.1.5. Information Security and ICT Systems Resilience

Topics covered:
• Physical and Cyber security measures
Relevant scenarios:
• 1 - 5, 11, 12, 15 - 17

TSOC takes physical and logical security measures in order to secure the network and information of the organisation.

The system and information resilience is achieved through backups, Uninterruptible Power Supply (UPS), generator, redundancy systems and disaster recovery sites. In case there is a communication loss, all the generation units are operating to correct their voltage based on measurements from their terminal.

TSOC SCADA Infrastructure is interconnected by a proprietary Network. Further to the intelligent secured perimeter of the Network, a strong segmentation is used between subsystems and also deep analysis and detection of SCADA communication protocols is performed.

Cyber-incidents are properly identified as a risk at the Cyprus' national electricity crisis scenarios analysis, and certain measures are taken to address them. TSOC applies the most recent security standards for installations. In order to avoid

malicious attacks, any device or applications connected in the SCADA SYSTEM, is governed by strong cybersecurity strategies in procedures and policies.

Furthermore, taking into account Directive (EU) 2016/1148 concerning general rules on security of network and information systems, TSOC is following National Digital Security Authority's (NDSA) best practices and recommendations to protect critical infrastructure and data from damage, attack, or unauthorised access. Moreover, TSOC will perform risk assessment according to NDSA~~National Digital Security Authority~~'s time schedules.

In respect to the distribution network and the critical infrastructures (where applicable) the DSO and the owner of the critical infrastructures should follow the guidance of the NDSA~~National Digital Security Authority~~.

4.1.6. National Energy Control Centre (NECC) Security and Resilience

Topics covered: • Prevention/mitigation of a total or partial system blackout • Arrangements for emergency operation of the National Energy Control Centre • Physical and Cyber security measures
Relevant scenarios: • All scenarios

A number of measures are in place to secure the operation of the NECC, as follows:

There is an emergency control centre which can be used in a crisis situation. A procedure is in place for the switching of operations from the main to the emergency control centre when required.

A plan is in place for utilising TSOC day personnel who have received appropriate training to staff the NECC in case of an emergency.

Access to the NECC is physically restricted to authorised personnel.

The NECC is guarded by a 24-hour security service.

4.1.7. Business Continuity During a Pandemic

Topics covered:
• Arrangements for emergency operation of the National Energy Control Centre
Relevant scenarios:
• 19

During a pandemic situation, such as COVID-19, TSOC and DSO implement all the directives and protocols issued by the competent authority, which is the Ministry of Health. Additionally, TSOC's and DSO's Health and Safety teams continuously monitor the evolving situation and government advice, and they can make recommendations for additional preventive measures over and above those mandated by the Ministry.

In addition, DSO implements extended measures to minimise the virus transmission within the organisation by separating the office staff into two groups, those working in house and those working remotely. Apart of this, to limit the virus spread into small number of cases, DSO divides the technical personnel into groups and distributes them at geographically different work base locations.

Particular attention is paid to the NECC, where shift patterns are adjusted to minimise contact of personnel from different shifts. Furthermore, TSOC ensures that a number of day personnel are trained to staff the NECC shifts in case of emergency.

4.1.8. Procedure for Informing the Public During an Electricity Crisis

Topics covered: • Prevention/mitigation of a total or partial system blackout • Mitigation of lack of generation adequacy
Relevant scenarios: • All scenarios

With regard to transmission system or generation faults that result in a disruption of electricity supply to a significant number of consumers and the disruption is expected to have duration longer than a certain period, the NECC follows a standardised procedure to issue a press statement based on a predefined template. With regard to distribution system faults, the relevant DSO procedures are followed.

Where generation inadequacy is anticipated necessitating the use of cyclic load shedding, the public is informed in advance, via press releases, of the time and duration of expected power cuts to their area.

4.1.9. Prevention of Electricity Crisis

Topics covered: • Prevention/mitigation of a total or partial system blackout • Mitigation of lack of generation adequacy • System preparation for known periods of stress, i.e., the hot summer months
Relevant scenarios: • All scenarios

If there is a specific, serious and reliable information from the seasonal adequacy assessment or other competent source that an electricity crisis may occur, CERA takes appropriate measures to avoid it and following consultations with involved parties (where appropriate), proceeds with certain preventive and preparatory measures such as:

- Decision to ensure that the conventional generation units which are in working condition and are connected to the system will be technically available for the 'crisis' period and that they will be available to the TSOC for operation whenever required for ensuring electricity demand for and the margin of installed capacity reserve for the electricity system of Cyprus.
- Decision to use temporary conventional generation units that will be technically available for the 'crisis' period and will be available to the TSOC for operation whenever required for ensuring electricity demand.
- Decision to inform consumers about the possible electricity crisis and the measures taken by CERA to deal with it effectively. Decision for request for assistance from other Member States (where possible).

In addition, CERA shall provide an early warning without delay to the relevant national authorities, the European Commission, the competent authorities of the Member State located in the same region and, where they are not located in the same region, the competent authorities of the directly connected Member States. CERA shall also provide information on the causes of a possible electricity crisis and the possible need for assistance from other Member States.

4.2. Regional and bilateral procedures and measures

Cyprus is an isolated island; therefore, it is excluded from Articles 6, 12 and 15(2) to 15(9) of Regulation 2019/941.

5. CRISIS COORDINATOR

With respect to the competences ~~provided~~ assigned to CERA and TSOC ~~within~~ under the L~~l~~aw Regulating the Electricity Market of 2021 – 2023,~~2003-2018~~ and for the purpose~~s~~ of implementing the provisions of Regulation 2019/941, the Director of the TSOC or ~~his~~ a legal representative, shall be responsible for the overall oversight and coordination of any crisis in the electricity sector ~~related to~~falling under the scope of the Regulation 2019/941, as ~~addressed~~ oulined in the Risk Preparedness Plan. During the electricity crisis TSOC's main responsibilities are to act as a contact point, to coordinate measures for mitigating the crisis among participating parties. TSOC also plays an important role in coordinating information flow among information centres, DSOs, ministries, civil protection, etc.The Crisis Coordinator should keep ~~informed the Cyprus Energy Regulatory Authority~~CERA informed of~~on~~ ~~his~~ all actions taken.

The contact details of the Director of the TSOC are the following:

Mr. Stavros Stavrinos
Director
~~Cyprus'~~ Transmission System Operator of Cyprus (TSOC)
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tel: +357 2227 7000
fax: +357 22 611 666
sstavrinos@dsm.org.cy
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6. STAKEHOLDER CONSULTATIONS

As per article 10(1) of the Regulation 2019/941, the mechanism used for the consultations carried out was contacting directly with relevant bodies such as:

- relevant electricity undertakings, including relevant producers or their trade bodies,
- relevant organisations representing the interests of non-industrial electricity customers,
- relevant organisations representing the interests of industrial electricity customers,
- the TSOC, and
- the DSO.

Apart from those entities, CERA decided to consult with the NDSA~~National Digital Security Authority~~ concerning cyber security issues.

Comments were received by the DSO, the EAC-Supply, the Cyprus' Chamber of Commerce and Industry and the NDSA~~National Digital Security Authority~~. There comments were taken into account, and a revised version of the draft plan was prepared.

7. EMERGENCY TESTS

TSOC conducts, every six months, tests for System Restoration after a Total Blackout, in line with the relevant plan. More specifically, proof tests are performed of the ability of black start generators to be started without the presence of grid power and of the communications between the NECC, the power station control centres and the key transmission system substations.

In addition, the TSOC, the DSO and the critical infrastructures (where applicable) following the guidance of the NDSA ~~National Digital Security Authority~~ should examine the development of tests concerning major cyber security incidents and / or crises, which could affect the generation, transmission and distribution of electricity.

NDSA carried out a nationwide, cyber security exercise focused on the energy sector. The exercise was part of the pan-European exercise Cyber Europe 2024 organized by the European Union Agency for Cybersecurity (ENISA). TSOC and DSO participated in the exercise. The scenario included cyberattacks on the electrical network equipment which led to partial electrical outages. In that context, System Operators had the opportunity to examine the implementation of the actions foreseen in the Risk Preparedness Plan, as per EU Regulation 2019/941 concerning risk-preparedness in the electricity sector.

8. LIST OF ACRONYMS AND ABBREVIATIONS

CERA	Cyprus Energy Regulatory Authority
DSO	Distribution System Operator
EAC	Electricity Authority of Cyprus
EMS	Energy Management System
ENTSO-E	European Network of Transmission System Operators for Electricity
GIS	Gas-Insulated Switchgear
ICT	Information and Communications Technology
IT	Information Technology
NDSA	National Digital Security Authority
ODS	Owner of the Distribution System
RES	Renewable Energy Sources
RPR	Risk Preparedness Regulation (EU) 2019/941
SCADA	Supervisory Control and Data Acquisition
TSO	Transmission System Operator
TSOC	Transmission System Operator - Cyprus