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A PROJECT OF THE GERMAN MARSHALL FUND

dixigroup ANALYTICS ON DUTY

BLACK SEA SECURITY SURVEY

2023

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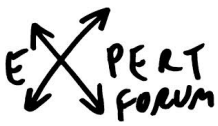
A PROJECT OF THE GERMAN MARSHALL FUND



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CONTENTS

01

EXECUTIVE SUMMARY

The Russian aggression against Ukraine and its economic aftermaths on wider Europe led to a revision of various policy areas in the EU and its neighborhood to tackle emerging challenges on national and regional levels. Energy policy is an illustrative example in this regard. While EU Member States and partners in the neighborhood remain devoted to the goals of decarbonization and integration of energy systems and even opt to accelerate their implementation, the current crisis makes them adjust policies, inevitably prioritizing energy security in the short term and beyond. Thus, the **need for a proper policy cycle, including assessment, planning, implementation, and monitoring of energy security-related matters, increased significantly.**

Having this in mind, the project team developed the pilot edition of the Energy Security Scoreboard. The Scoreboard is an analytical tool that addresses one yet important aspect of energy security – the **institutional and strategic preparedness of countries to indicate, assess, mitigate, prevent, and withstand energy security risks while remaining energy resilient and sustainable.** The preparedness is assessed against best practices of energy security policy in the EU, enshrined in acquis. Additionally, it contains some infrastructural indicators essential for addressing energy crises (e.g., interconnectivity). The study covers four countries – three Energy Community Contracting Parties (Georgia, Moldova, and Ukraine) and one EU member state (Romania) as a benchmark.

The Scoreboard comprises 40 **indicators** in line with the EU best practices, which are divided into five **categories** reflecting the main stages of policy-making in energy security – from risk assessment to reporting. The assessment encompasses electricity, gas, and oil and liquid fuels **markets**. The Scoreboard design enables cross-sectoral, cross-category, and cross-country analysis. In turn, it enables the localization of specific gaps in the energy security policy framework of participating countries and the development of targeted recommendations to address them effectively and in a cooperative manner.

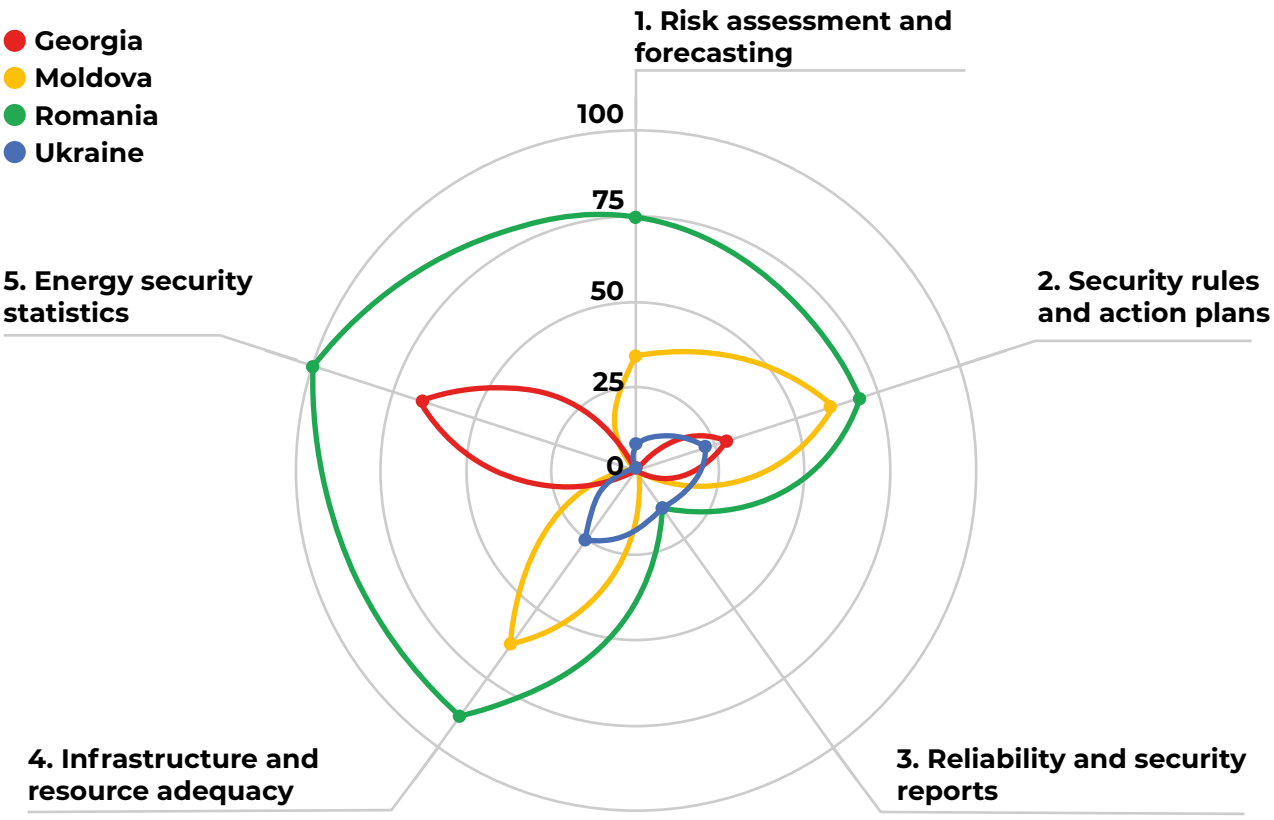
Key findings

In general, the scores of all countries, especially Energy Community Contracting Parties (ECCPs), appeared quite low, indicating the **unacceptable institutional preparedness for energy security risks**. These results, on the one hand, indicate specific gaps which participating countries have to eliminate to build more resilient and sustainable energy systems. On the other hand, a deeper analysis of results enables some generalizations regarding key trends in energy security preparedness and similarities in gaps identified. It also gives insights into some specific traits of energy security planning (namely its holism), which are indispensable for developing an adequate institutional framework for addressing energy security risks. These generalizations are the following:

- The main trait of the policy and institutional system in the energy security domain is its **holism and comprehensiveness**, which ensures that all elements are closely intertwined and mutually dependent. For example, without a well-grounded risk assessment, the development of appropriate plans is problematic. Consequently, due reporting also becomes senseless. Thus, if the first element in the policy chain is lacking or appears mediocre, it inevitably affects other system elements. This interrelatedness partially explains the low scores of the Scoreboard, as one indicator may, in some cases, cause a **'domino effect'** regarding other indicators with which it is inextricably connected. This 'domino effect' proves that a **holistic approach to energy security matters** and should incentivize the development of such an approach among the participating countries.

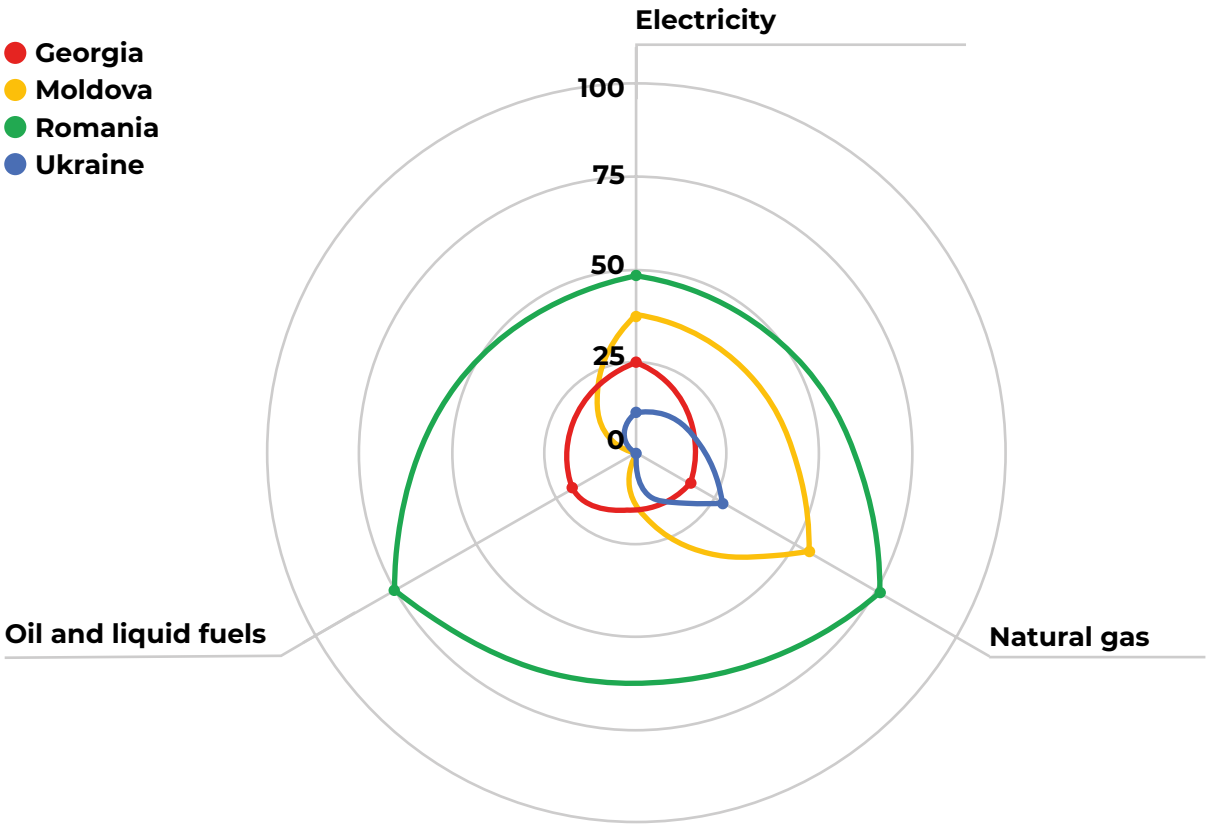
Category	Georgia		Moldova		Romania		Ukraine*	
	Score	Rating	Score	Rating	Score	Rating	Score	Rating
1. Risk assessment and forecasting	0	F	33	F	75	B	7	F
2. Security rules and action plans	27	F	60	C	69	C+	21	F
3. Reliability and security reports	0	F	0	F	13	F	13	F
4. Infrastructure and resource adequacy	0	F	63	C	88	A-	25	F
5. Energy security statistics	67	C+	0	F	100	A+	0	F
Total score	**15**	**F**	**31**	**F**	**58**	**C-**	**14**	**F**

2023 Energy Security Scoreboard by category

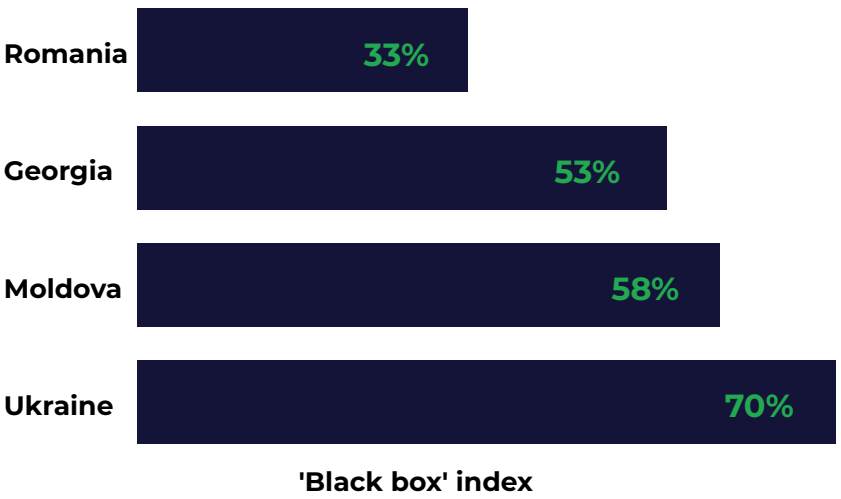


*The assessment for Ukraine was conducted in the circumstances of war and martial law when most energy sector data was locked due to security considerations

2023 Energy Security Scoreboard by energy market



- **Transparency of the policy process in the energy security field should be improved.** The disclosure of information essential for energy security (including policy documents and statistical data) remains an issue for ECCPs. Transparency ensures the accountability of the competent authorities while increasing the wider public's awareness regarding the existing state of play. It is also essential for the inclusivity of the policy process in energy security. In parallel, the Scoreboard study showed several instances when essential documents and data related to energy security were not publicly disclosed. The study revealed a considerable number of **'black boxes'**[1] in the institutional framework of countries' energy security domain. Thus, the competent authorities should prioritize transparency in energy security to the extent it does not conflict with and harm the security itself.



[1] Black box is the Scoreboard indicator where data is absent or unavailable (with a zero score). The black box index is a ratio of those indicators' quantity to the total quantity of indicators.

- One of the factors contributing to the low scores is the **lack of common international mechanisms to risk assessment and bilateral and multilateral planning among the Energy Community countries.** Some multilateral mechanisms are not provided by the EU acquis as adapted for the ECCPs. Yet they are included in the assessment based on the assumption that energy security risks are frequently of cross-border nature and/or tend to have spillover effects on neighboring countries. In parallel, international cooperation facilitates the exchange of best practices among countries, strengthens local expertise, and accelerates the implementation of best practices. Thus, a **cooperative approach in defining and mitigating energy security risks should be deemed optimal and cost-efficient**, and participating countries should make efforts to foster such an approach.

- **Planning documents in the energy security domain reflect a formal approach to their preparation.** Though some plans are formally developed, most lack essential content elements required by the EU acquis, particularly the summary of risk assessments, compensation mechanisms in case of imposing obligations on the market participants in the event of a crisis, information on the economic impact, effectiveness and efficiency of the measures contained in the plans, etc. This harms the quality of energy policy planning and countries' preparedness for risks. Participating countries and their competent authorities should perceive those plans not as formal obligations under the Energy Community Treaty or the EU policy but as valuable tools for identifying, mitigating, and preventing energy security risks. The plans should be developed in a coherent, comprehensive, and to the extent possible in a cooperative manner.

- **Reporting appeared the 'weakest link' in all countries' energy security institutional systems.** Given the holism and 'domino effect' described above, the scores for the respective category are lowest for all participating countries. This result emphasizes the problem of due reporting in the policymaking cycle, which is inherent not only in the energy security field. Additionally, low scores for the Reliability and security reports category are explained by the fact that ECCPs are only in their initial stage of implementing the EU Clean Energy Package acquis while reporting is one of the last phases within the policy cycle and is yet to come. However, ECCPs appeared falling behind schedule as most of that acquis should be implemented by the end of 2023 or earlier.

02

INTRODUCTION

The Energy Security Scoreboard is an analytical tool for a comprehensive **assessment of countries' institutional and policy preparedness for energy security risks.**

The assessment encompasses the whole policy cycle related to energy security planning (from risk assessments to post-crisis evaluations) across three energy markets (gas, electricity, oil and liquid fuels). The Scoreboard consists of forty indicators, i.e., provisions of EU acquis and best practices in the energy security field. These indicators are divided into five thematic categories, corresponding to essential policy stages and corresponding instruments in ensuring energy security.

Scoreboard assessment is quantified, thus enabling **cross-sectoral** and **cross-border** comparisons as well as precise identification of gaps in preparedness for energy security risks. Assessment of categories makes it possible to **identify the 'weakest link'** in the energy security planning process. This is critical because all stages and policy instruments are closely intertwined, and the gaps in one inevitably affect the other. For example, a lack of adequate risk assessment precludes proper preventive and emergency planning, while the absence of up-to-date statistics on energy security complicates both well-informed risk assessment and security planning.

The assessment is supplemented by targeted **recommendations** to improve the ability of countries to identify, assess (ex-ante), prevent, address, and evaluate (ex-post) energy security risks and threats.

The **target audience** of the Scoreboard is primarily policymakers seeking to find ways of enhancing the preparedness of countries for energy security risks in line with the EU best practices. Scoreboard may be useful to energy analysts to consider energy security matters from a more institutional and policy angle rather than in 'traditional' terms of security of physical infrastructure and supply adequacy. Analysts may use Scoreboard as an instrument quantifying the compliance of countries with the EU energy security acquis. The Scoreboard may be of interest to foreign partners seeking to understand the state of play in the institutional aspect of energy security of countries and consequently find specific 'focus points' in their efforts to support reforms.

This is the pilot edition of the Energy Security Scoreboard, which evaluates energy security risk preparedness in four countries of the Black Sea region – Georgia, Moldova, Romania, and Ukraine. All of them are currently facing different but significant energy security challenges – from Russian missiles and drones threatening physical infrastructure to vulnerabilities related to over-dependence on a single source of supply.

The Scoreboard, as an analytical tool, can't propose the solution to all of these problems, yet it may incentivize the establishment of an appropriate institutional and policy framework, fostering the addressing of challenges in a transparent, evidence-based, and cost-efficient manner as well as in close cooperation with neighboring countries. Regular application of the Scoreboard will enable tracking progress and in-depth analysis of energy security risk preparedness.

03

CATEGORIES OVERVIEW

The Scoreboard indicators are categorized to approximately correspond to the essential instruments and stages of the policy cycle in the field of energy security. First, based on risk assessments in a given energy market (*Category 1*), policymakers are able to develop preventive and emergency planning instruments, policies and measures, as well as security standards and codes of conduct in case of emergency (*Category 2*). Due implementation of the plans requires appropriate reporting (*Category 3*). All the stages of risk assessment, planning, and reporting contribute to compliance with certain targets regarding infrastructure and resource adequacy (*Category 4*), which should be reflected in respective statistics and data (*Category 5*). The latter, in turn, serves as a basis for the next iteration of evidence-based and well-informed risk assessment and planning.

The proposed categorization of the Scoreboard gives additional analytical value helping to indicate which of the stages may constitute a 'bottleneck', thus causing ineffectiveness of the whole system of preparedness for energy security risks.

1. Risk assessment and forecasting

This category is aimed at determining the level of implementation of risk assessment procedures in countries. It encompasses national risk and resource adequacy assessments in gas and electricity sectors as well as regional mechanisms to determine common energy security risks.

The category contains 7 indicators based on the provisions of

- *Regulation (EU) 2019/943 on the internal market for electricity;*
- *Regulation (EU) 2019/941 on risk-preparedness in the electricity sector;*
- *Regulation (EU) 2017/1938 concerning measures to safeguard the security of gas supply.*

2. Security rules and action plans

The category entails:

1) action plans to mitigate energy security risks;
2) reliability standards and definitions of protected customers in electricity and gas sectors;
3) procedures to ensure sufficient stocks of natural gas and oil and liquid fuels;
4) investment planning for critical infrastructure.

The category contains 18 indicators based on the provisions of

- *Regulation (EU) 2019/941 on risk-preparedness in the electricity sector;*
- *Regulation (EU) 2017/1938 concerning measures to safeguard the security of gas supply;*
- *Regulation (EU) 2019/943 on the internal market for electricity;*
- *Regulation (EC) No 715/2009 on conditions for access to the natural gas transmission networks;*
- *Directive (EU) 2019/944 on common rules for the internal market for electricity;*
- *Directive 2009/73/EC concerning common rules for the internal market in natural gas;*
- *Council Directive 2009/119/EC imposing obligation on Member States to maintain minimum stocks of crude oil and/or petroleum products;*
- *Regulation (EU) 2018/1999 on the Governance of the Energy Union and Climate Action.*

3. Reliability and security reports

This category determines the availability of reports and other instruments confirming the implementation of plans and compliance with standards mentioned in Category 2.

The category consists of 8 indicators based on the provisions of

- *Regulation (EU) 2019/941 on risk-preparedness in the electricity sector;*
- *Regulation (EU) 2017/1938 concerning measures to safeguard the security of gas supply;*
- *Regulation (EU) 2019/943 on the internal market for electricity;*
- *Council Directive 2009/119/EC imposing obligation on Member States to maintain minimum stocks of crude oil and/or petroleum products;*
- *Regulation (EU) 2018/1999 on the Governance of the Energy Union and Climate Action.*

4. Infrastructure and resource adequacy

The category examines compliance with specific objectives, targets, and standards related to infrastructure and resource adequacy. The indicators include the 2020 interconnectivity target in electricity, N-1 infrastructure standard and bidirectional capacity of interconnectors in gas, and the availability of minimum stocks of oil and petroleum products.

The category consists of 4 indicators based on the provisions of

- *Regulation (EU) 2018/1999 on the Governance of the Energy Union and Climate Action;*
- *Regulation (EU) 2017/1938 concerning measures to safeguard the security of gas supply;*
- *Council Directive 2009/119/EC imposing obligation on Member States to maintain minimum stocks of crude oil and/or petroleum products.*

5. Energy Security Statistics

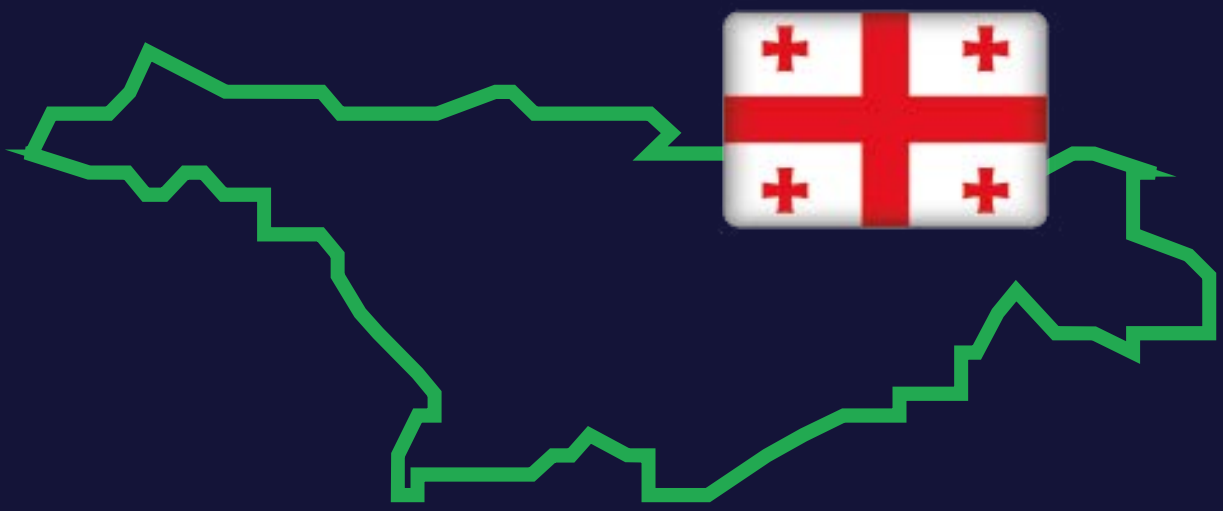
The category defines the level and quality of data disclosures on indicators essential for assessing energy security - inter alia, net maximum electrical capacity of electricity generation, data on gas storages and minimum stocks of oil and petroleum products.

The category consists of 4 indicators based on provisions of

- *Regulation (EC) No 1099/2008 on energy statistics;*
- *Council Directive 2009/119/EC imposing obligation on Member States to maintain minimum stocks of crude oil and/or petroleum products.*

04

ANALYSIS BY COUNTRY



GEORGIA

Total score: 15, F, unacceptable preparedness

Category	Score	Rating	Characteristic
1. Risk assessment and forecasting	0	F	unacceptable preparedness
2. Security rules and action plans	27	F	unacceptable preparedness
3. Reliability and security reports	0	F	unacceptable preparedness
4. Infrastructure and resource adequacy	0	F	unacceptable preparedness
5. Energy security statistics	67	C+	medium preparedness

1. Risk assessment and forecasting

On December 15, 2022, the Energy Community Ministerial Council adopted Decision 2022/03/MC-EnC on the incorporation of the European Union's electricity market acquis in the Energy Community. General implementation deadline of the regulation is 1 January 2024[2]. Georgia has not yet transposed the Regulation (EU) 2019/943 on the internal market for electricity. Therefore, **National resource adequacy assessment has not been conducted** according to the Article 24 (2) Regulation (EU) 2019/943. Georgia has generation capacity adequacy assessment, which does not rely on national resource adequacy assessment methodology.

The legal framework in Georgia transposes most of the provisions of the Risk Preparedness Regulation through the Rules on Security of Electricity Supply. However, until Georgia is directly connected with other Contracting Parties, Article 6 and 12 of the Regulation, which refer to the development of regional electricity crisis scenarios, do not apply to Georgia.

Electricity TSO - Georgian State Electrosystem (GSE) - prepared and submitted to the Ministry of Economy and Sustainable Development (MoESD) a **methodology on Identification of National Electricity Crisis Scenarios**, which was approved on December 2, 2020. Based on the methodology, GSE in cooperation with the MoESD has to identify the most relevant

[2] https://www.energy-community.org/legal/acquis.html

Electricity Crisis Scenarios and the Ministry as a competent authority for electricity security issues has to ensure that all risks relating to the security of electricity supply are assessed. The methodology identifies the most relevant risks and emergency scenarios in relation to system adequacy, system security and fuel security:

- natural hazards;
- accidental hazards going beyond the N-1 security criterion and exceptional contingencies;
- consequential hazards including consequences of fuel shortages, malicious attacks, such as cyberattacks;
- hostile and criminal attacks[3].

Georgia has not yet developed Electricity Crisis Scenarios.

Under the SoS Rules, the MoESD has approved **Methodology of seasonal and short-term adequacy assessments** and **Methodology of medium and long-term adequacy assessment**.

GSE shall carry out long- to medium-term as well as short-term adequacy assessments in accordance with the developed methodology. The relevant system adequacy assessment reports shall be submitted to the Ministry[4]. GSE is working on day ahead, week ahead, two weeks ahead and seasonal adequacy assessments. No final report is available yet.

Regarding the gas sector, Georgia has not yet transposed the Regulation (EU) 2017/1938 concerning measures to safeguard the security of gas supply. **The Rules on Security of Natural Gas Supply are under development.** National risk assessments in the natural gas sector do not exist. Gas TSO plans to develop risk assessments and emergency plans. The deadline for the emergency plan is May 2024.

Recommendations:

- MoESD shall start working on transposition of the Regulation (EU) 2019/943 on the internal market for electricity and preparation of the national resource adequacy assessment in accordance with the Article 24 (2) of the regulation.
- GSE shall identify risks and electricity crisis scenarios in accordance with the methodologies adopted under the Security of Electricity Supply Rules and update it minimum every four years. MoESD should ensure active participation of the relevant authorities (Security of Supply Coordination Group / IGES - Inter-institutional Group for Energy Security) in the development of these scenarios.
- MoESD should speed up transposition of the Regulation (EU) 2017/1938 concerning measures to safeguard the security of gas supply and approve the Rules on Security of Natural Gas Supply to prepare national risk assessments in the natural gas sector.
- MoESD must accelerate the development of a competitive gas market by finalizing pending rules and secondary legal acts, including those related to vulnerable customers and security of supply, in compliance with the Energy Community acquis.

2. Security rules and action plans

Georgia is currently working on its first Integrated National Energy and Climate Plan (NECP) for the period 2021-2030. First draft of the document has been made publicly available[5]. The NECP has a dedicated chapter on Energy Security, where national objectives and targets are outlined.

Georgia harmonized the Regulation (EU) 2019/941 on risk-preparedness in electricity, however, the country does not yet have the electricity risk preparedness plan. Pursuant to Articles 7-8 of the SoS Rules, the MoESD, in cooperation with IGES (Inter-institutional Group for Energy Security), the Regulatory Commission, TSO, distribution system operators, electricity generators and, if necessary, other energy enterprises and organizations representing household and non-domestic consumer interests, shall develop a risk management plan.

The Risk Management Plan will be approved after 2 years from the date of entry into force of the SoS Rules. The plan shall be updated at

[3] Georgia Security of Supply Statement in Electricity Sector, 2021
[4] Georgia Security of Supply Statement in Electricity Sector, 2021
[5] https://nea.gov.ge/Ge/GZSH/1209

least every four years. According to the GSE, the **document is under development**, the deadline is January 2025. Georgia does not have a definition of customers protected from disconnections. This definition should be part of a risk-preparedness plan.

Since Georgia has not conducted a national resource adequacy assessment according to Article 24 (2) Regulation (EU) 2019/943 there is no implementation plan in place regarding identified resource adequacy concerns.

Georgian State Electrosystem (GSE) developed a medium- and long-term generation adequacy assessment for 2021-2035 in 2020[6]. Reliability standards are provided in the report. Procedures for preparing an ex-post evaluation report under Article 17 of the Regulation (EU) 2019/941 on risk-preparedness in the electricity sector are defined by the Resolution of the MoESD on Security of Supply Rules (Chapter V, article 12). It defines monitoring and evaluation of crises and related procedures.

Regarding the gas supply, Georgia does not have preventive action plans in security of gas supply or emergency plan regarding security of gas supply. Gas supply standard or information on the definition of protected customers, consumption volumes corresponding to customers belonging to those categories and the percentage that each of those groups of customers represents in total annual final gas consumption is also missing. The Georgian Law on Energy and Water Supply gives a general definition on protected customers in the natural gas sector.

Regarding the Certification of UGS operators, Georgia has not developed an underground gas storage. According to the draft NECP, absence of strategic gas storage in the face of this critical dependence seriously jeopardizes the country's ability to provide risk-free uninterrupted gas supply to consumers. The country consumes 3.5-4 times more natural gas in winter compared to summer and has no means of balancing the demand and hedging the supply risks increased due to the high strain on exporting countries and their systems. This also impairs the country's ability to independently balance the gas received through the South Caucasus Pipeline contract. Currently, Georgia has an agreement with Azerbaijan to balance demand annually.

There was also a plan[7] to develop a large gas storage facility (500 million m^3) to improve the security of energy supply, However, the government is considering other options instead of a large gas storage facility.

As for the oil and liquid fuel, the draft Oil Stockholding Act was not adopted. The availability of storage capacities for emergency oil stocks remains a key concern. The Government has requested a five-year extension of the full implementation deadline[8].

Agreements on technical, legal, and financial arrangements for the security of electricity and gas supply measures are not applicable for Georgia, as the country does not have direct infrastructural links to the EU/Energy Community member countries.

Ten-year network development plans of the electricity and gas TSOs are developed and available[9].

Recommendations:

- MoESD shall accelerate the process of adopting the National Energy Policy document and integrated National Energy and Climate Plan (NECP).
- GSE and MoESD shall prepare the electricity risk preparedness / risk management plan in accordance with the Security of Electricity Supply Rules until January 2025 and update it at least every four years.
- MoESD shall develop a preventive action plan in security of gas supply, emergency plan regarding security of gas supply, gas supply standard or information on the definition of protected customers as a part of the respective plans.

[6] https://www.gse.com.ge/sw/static/file/Generation_adequacy_2022-2035.pdf
[7] https://www.gogc.ge/en/project/gas-storage/43
[8] Implementation Report 2022, p.9 https://www.energy-community.org/implementation/report/Georgia.html
[9] https://gse.com.ge/sw/static/file/TYNDP_GE-2022-2032_GEO.pdf, https://www.gogc.ge/uploads/tinymce/documents/20

- MoESD shall develop its own means of balancing the seasonal gas demand and hedging the supply risks increased due to the high strain on exporting countries and their systems.
- MoESD shall adopt the Oil Stockholding Act and ensure availability of storage capacities for emergency oil stocks.

3. Reliability and security reports

Reporting on achieving national objectives in energy security is not yet available. As mentioned earlier, energy security objectives are defined in the draft NECP. Reporting will be available in NECP progress reports, after 2 years from adopting the document.

Annual report on the implementation plan regarding electricity resource adequacy concerns, ex-post evaluation report on electricity crisis (ad hoc) and reports on completion of ten-year network development plan of the electricity TSO are not available.

The same is true for the natural gas sector. Reports on the progress achieved in the preparation and adoption of the preventive action plans and the emergency plans and reports on completion of ten-year network development plan of the gas TSO are not available.

Annual report on the measures to ensure and verify the availability and physical accessibility of emergency stocks is not available. The draft Oil Stockholding Act was not adopted.

Recommendations:

- It is recommended to develop a separate report or chapters in the TSOs' ten-year development plans on the completion of the previous plans in the electricity and gas sectors.
- GSE should develop prevention and management plans for the electricity crisis.

4. Infrastructure and resource adequacy

Georgia does not have direct land connection to EU/EnC parties, and it has been granted derogation on EU interconnection targets by 2020 (10%), however, if neighboring countries are taken into considerations, Georgia complies with the 10% target (not including Russia).

The Georgian power system is connected to Russia, Turkey, Azerbaijan, and Armenia. Energy exchange is implemented: from Georgia to Russia, Turkey, Azerbaijan, Armenia and vise-versa as well as from Russia to Turkey, from Azerbaijan to Turkey. Cross-border overhead lines serve for realization of this task; however, such "international" power flows are restricted due to both limitations stemming from the acceptable operating modes of the national power system and transmission capacities of above-mentioned cross-border OHLs.

According to the draft NECP the overall objective for electricity interconnectivity by 2030 is to have cross-border transmission capacity of 5,550 MW which would represent well over 185% of peak load and up to 85% installed capacity of renewable energy sources integrated in the Georgian energy system.

In addition to this, increasing the level of connectivity with EU Member States or Energy Community Contracting Parties is feasible through an undersea cable in the Black Sea. On December 17, 2022, the high officials of Georgia, Azerbaijan, Romania, and Hungary signed an Agreement on the Black Sea Energy submarine cable project[10] in Bucharest, to export green energy to Europe via Georgia. The electricity cable will connect Georgia and the entire South Caucasus to Romania, allowing the export of green energy to Europe and the strengthening of mutual resilience. At the moment feasibility study is under preparation.

As for the natural gas, the gas pipeline system is connected to Russia with the North-South Main Gas Pipeline System at Georgia-Russia border (bidirectional daily capacity of gas supply from Armenia is max 3.14 million m^3); South Caucasus Pipeline, pipeline entering

[10] https://ec.europa.eu/commission/presscorner/detail/en/statement_22_7807

from Azerbaijan at the Georgian-Azeri border, and pipeline connecting to Armenia near the Georgian-Armenian border. The aim of the current pipeline construction-rehabilitation and development works is basically to increase the system's transmission capacity, operational flexibility, and reliability by using new, high conductivity sections and interconnectors.

The Georgian government is working on a project to supply gas from the Caspian Sea to Europe through Georgia. Azerbaijan-Georgia-Romania Interconnector (AGRI) project is intended to build a liquefied natural gas export terminal (LNG plant) at the Black Sea coast of Georgia, from which LNG will be transported to a terminal in Romania where receiving, regasification and distribution systems will be built. The project started in 2015 but it was stopped. It gained new interest and relevance amid the Russian invasion of Ukraine and EU's interest in alternative sources of gas supply.

Currently, the fulfillment of infrastructure standards according to the N-1 formula is not compliant.

The availability of necessary emergency stocks of oil and petroleum products (90 days of imports or 61 days of consumption) is not compliant either.

The draft Law on Maintaining Mandatory Stocks of Crude Oil and Oil Products establishes rules for the creation, management, and use of **mandatory reserves to ensure continuous supply of petroleum products.**

Recommendations:

- MoESD and GGTC should assess and try to fulfill the infrastructure standard according to the N-1 formula in the gas sector.
- MoESD shall adopt the Oil Stockholding Act and ensure availability of storage capacities for emergency oil stocks.
- MoESD should consider the development of bidirectional gas supply from Turkey as a resilience measure in case of a crisis.

5. Energy security statistics

The Georgian National Statistics office (GEOSTAT) provides data on net maximum electrical capacity of generation facilities (by types, including separate indicators for capacities of combustible fuels, newly installed and decommissioned electrical capacities), capacities of electricity storages (by types)[11]. Information is available in the annual energy balance[12].

GEOSTAT provides monthly statistics about oil and oil products stock changes, production, imports, exports, and consumption[13]. Part of locally extracted oil is exported through Batumi and Poti terminals, while a part is processed in local small refineries Veli Ltd. and Zd Oil Company Ltd., with the capacity of 80,000 tonnes and 130,000 tonnes of crude oil per year, respectively. To determine the feasibility of new larger scale oil-refining capacity, Georgia plans to invite potential investors to one of the industrial zones.

Information on gas storages (name, type and working capacities), peak withdrawal capacity of storages, gasifying or liquefying capacity of LNG terminals, amount and structure of oil and petroleum products stocks as of the last day of previous calendar year are not available due to the non-existing infrastructure and practices. According to the Implementation Report of Energy Community, compliance with the Regulation (EC) No 1099/2008 is 93% in annual statistics, 100% monthly statistics and 100% in price statistics[14].

[11] Georgia does not have batteries for electricity storage.
[12] https://www.geostat.ge/media/50333/Publication-Energy-Balance-of-Georgia_2021.pdf
[13] https://www.geostat.ge/en/modules/categories/87/monthly-energy-statistics-indicators
[14] https://www.energy-community.org/implementation/report/Georgia.html

MOLDOVA

Total score: 31, F, unacceptable preparedness

Category	Score	Rating	Characteristic
1. Risk assessment and forecasting	33	F	unacceptable preparedness
2. Security rules and action plans	60	C	medium preparedness
3. Reliability and security reports	0	F	unacceptable preparedness
4. Infrastructure and resource adequacy	63	C	medium preparedness
5. Energy security statistics	0	F	unacceptable preparedness

1. Risk assessment and forecasting

The results of risks assessment are provided for in the Regulations on exceptional situations and the Actions Plans for exceptional situations in the gas and electricity markets, respectively, approved by the government in 2019. These two indicators received a maximum score.

However, no information was published about the role of national authorities in contributing to the development of regional electricity and gas crisis scenarios. The TSO in electricity has not published the assessments about national resource adequacy and short-term adequacy, as required by the Regulations (EU) 2019/941 and 2019/943.

Recommendations:

- The competent authorities shall disclose the information regarding their involvement in the development of regional crisis scenarios for electricity and gas (in case there is the fact of such involvement). If crisis scenarios and common risk assessment preparation is not initiated, Moldova together with interested Energy Community Contracting Parties should initiate respective measures to undertake such assessments
- Electricity TSO shall develop and publish the national resource adequacy assessment and short-term adequacy assessments.

2. Security rules and action plans

Moldova has no energy resources of its own, depending on imports. In terms of energy security, significant steps have been taken within the last 18 months to diversify the gas and electricity supply. Beginning with December 2022, Moldova almost entirely stopped the

purchase of gas from Russian Gazprom, except the breakaway Transnistrian region that has not paid for its gas consumption for years. Moldovagaz purchased insignificant volumes (~2 mcm) from Gazprom in March 2023 to avoid paying any penalties under the "take or pay" provision of the contract.

Following the challenges related to energy security, in February 2023 the Ministry of Energy was established under the new Governmental structure. The national targets on Energy Security will be set in the National Energy and Climate Action Plan, which is currently under development by the Ministry of Energy.

Thanks to the support of Ukraine and Romania, the Moldovan authorities managed to counter the repetitive attempts by Gazprom to create a gas shortage and to undermine the electricity generation. The IFIs provided the necessary financial assistance in order to facilitate the acquisition of gas from other suppliers. However, no agreements, enabling bilateral and regional measures were made public, most probably for security reasons.

According to the Regulation on exceptional situations on the electricity market (Government Decision no. 149/2019) and the Electricity Law no. 107/2016, the Ministry of Energy shall draft a monitoring report regarding the security of electricity supply every 2 years. However, the Art. 17 of the Regulation (EU) 2019/941 requires a report to be submitted after the energy crisis. The emergency situation in the energy sector has been extended until May 29, 2023. After that, a new assessment of this indicator shall be carried out.

Part of further development of the Moldovan electricity market is the elaboration and approval of the reliability standard when applying capacity mechanisms, in line with the Art. 25 of the Regulation (EU) 2019/943.

The Preventive action plan, as well as the emergency plan regarding the security of gas supply were approved by the Government Decision no. 207/2019. The specific measures for the 2022-2023 winter season were approved by the Government Decision no. 606/2022.

On the infrastructure development, Moldova does not have underground gas storages, therefore several indicators related to them are not applicable at present. The TSOs in both electricity and gas sectors have published the ten-year development plans.

The regulations on exceptional situations for gas and electricity markets specify the definition of consumers protected from disconnections. The calculation of the gas supply standard and the consumption volumes of protected customers are included in the Preventive action plan.

Moldova has to transpose the Council Directive 2009/119/EC concerning the obligation to maintain minimum stocks of crude oil and/or petroleum products. At present, no procedures for releasing the emergency stock are in place.

Recommendations:

- Following the elaboration of the national resource adequacy assessment, TSO and the Ministry of Energy shall publish the implementation plan regarding resource adequacy concerns;
- The Regulatory Agency shall develop the reliability standard regarding the electricity supply;
- National authorities shall publish the agreements on technical, legal and financial arrangements on the security of electricity and gas supply measures, if such agreements have been concluded;
- The Parliament and the Government shall transpose the Council Directive 2009/119/EC imposing an obligation to maintain minimum stocks of crude oil and/or petroleum products.

3. Reliability and security reports

The National Energy and Climate Plan is under development. Therefore, no progress reports have been published yet. Although the ten-year development plans in electricity and gas markets had been developed before the pandemic, the progress reports on their implementation were not published.

Another missing item is the annual report concerning the implementation plan on the national resource adequacy concerns, since there was no assessment carried out so far.

The Regulatory Agency approved the Decision 908/2022 regarding the circumstances of emergency interruption of electricity supply to final customers on November 23, 2022. However, no ex-post evaluation report with recommendations is publicly available.

Moldova does not have its own gas storages. Similarly to EU Member States without storages, the obligation is to prove the use of storage volumes corresponding to at least 15% of the average annual gas consumption over the preceding five years. According to Art. 108-1 of the Law on Natural Gas, gas reserves have to cover only 10 days of winter consumption, or less than 5% of the average annual consumption. However, the volumes of natural gas stored in the neighboring countries are not publicly available, as this information has been classified by the Emergency Commission.

Recommendations:

- TSOs shall publish the implementation reports on the ten-year development plans;
- The Ministry of Energy shall develop the National Energy and Climate Plan;
- The Regulatory Agency and Ministry of Energy shall publish the ex-post evaluation report on electricity crisis in line with Regulation (EU) 2019/941;
- The gas suppliers (firstly - Energocom) shall disclose the information concerning the fulfillment of the 15% gas storage filling obligations.

4. Infrastructure and resource adequacy

The existing power interconnector with Romania exceeds the 10% interconnection target with the EU, as shown by the actual data of daily capacity allocations[15]. According to the electricity TSO report on technical and economic indicators for 2022, the capacity of interconnections with neighboring power system is 1000 MW, including 800 MW with the power system of the Ukraine and 200 MW with the power system of Romania. However, the power lines pass the breakaway Transnistria region before reaching the Moldovan regions with peak consumption.

Only the gas TSO Moldovatransgaz publishes the information regarding the booked and available capacities for each interconnection point. The other gas TSO Vestmoldtransgaz (operating the interconnection with Romania) does not disclose such information.

According to §20 of the Action Plan on emergency situations on gas market, the natural gas infrastructure is capable of transporting the necessary volume of natural gas to meet the natural gas requirements for a day with exceptionally high gas demand, even in the case of unavailability of the largest gas infrastructure - the Ananiev-Tiraspol-Ismail pipeline.

Moldova has not yet created the emergency stocks of oil and petroleum products (90 days of imports or 61 days of consumption). Currently, the Regulatory Agency publishes only the information about the commercial stocks of gasoline, diesel oil and liquefied petroleum gas.

5. Energy security statistics

Each generation facility discloses the information related to net maximum electrical generation capacity in every quarter. However, the National Bureau of Statistics does not publish such information.

Since Moldova did not transpose yet the requirements on emergency stocks for petroleum products, there is no statistical information concerning the amount and structure of oil and petroleum products stocks and their changes.

Recommendation:

- The National Bureau of Statistics shall publish the information concerning the net maximum electrical generation capacity.

[15] Moldelectrica annual report, point 15, https://moldelectrica.md/ro/network/annual_report

ROMANIA

Total score: 58, C-, Medium preparedness

Category	Score	Rating	Characteristic
1. Risk assessment and forecasting	75	B	Good preparedness
2. Security rules and action plans	69	C+	Medium preparedness
3. Reliability and security reports	13	F	Unacceptable preparedness
4. Infrastructure and resource adequacy	88	A-	Excellent preparedness
5. Energy security statistics	100	A+	Absolute preparedness

1. Risk assessment and forecasting

In principle, Romania has followed at least formally most of the requirements of EU regulations concerning the preparation of national plans and contributed to regional energy risk assessments. Also, in electricity, Romania has prepared resource adequacy assessments (in 2018 with a not yet published update as of November 2022) and has been involved in the preparation of regional electricity crisis scenarios.

However, the European Commission has commented[16] on Romania's submitted Risk-preparedness Plan as being only partly in compliance with the requirements of the EU regulations. The main shortcomings consist of missing links between national and regional scenarios and incomplete consideration

[16] https://energy.ec.europa.eu/system/files/2022-11/C_2022_7985_F1_COMMISSION_OPINION_EN_V4_P1_2274969.PDF

of certain risks (e.g., cyber, climate) in the scenarios proposed, and noted the absence of the respective preventive measures. As a result, there is little confidence that the plan is more than a document prepared for a formal compliance with the requirements of the EU regulation.

Also, there is no information on Transelectrica's website on the availability of short-term adequacy assessments. This is particularly concerning because Romania must accelerate the shutdown of (inefficient and polluting) coal-fired power plants, finalize ambitious investments in energy generation by state-owned companies and build a proper business environment for private sector investments (there is no new utility-size investment in electricity generation since 2016, mostly for regulatory and network access reasons).

In gas, Romania has prepared a preventive action plan which includes information both on the national risk assessment and common risk assessments in the two regional groups in which Romania participates (Ukraine and Trans-Balkan).

Recommendations:

- The Ministry of Energy must address the concerns raised by the European Commission on the Risk-preparedness plan for electricity, particularly in the part related to the national risk assessment.
- In the broader context, the government must find the right policy balance between consumer protection and incentives for new production of gas and electricity so as not to damage the country's energy security in the long term.

2. Security rules and action plans

The dedicated chapter on energy security in the NECP formally covers the key areas on energy security specified by the EU regulation (diversification of supplies, flexibility of the system and management of constrained / interrupted supply of an energy source). However, it should be noted that the NECP has been prepared in 2021, there is no monitoring of implementation and the plan must be updated by mid-2023 to take into account the latest developments in EU policy and the increased energy security risks caused by the war in Ukraine.

The risk-preparedness plan for electricity, as explained above, needs to be completed with additional information. For example, there is missing information on regional and bilateral measures, lack of a proper definition of the electricity crisis, and on the national procedures and measures that would be triggered by the crisis. Also, there is no information available on procedures for the preparation of an ex-post evaluation report in case of the crisis.

Romania has provisions in the electricity market code on consumers which can be disconnected under certain circumstances which complement the measures provided in the Risk-preparedness plan. On cross-border capacity, the energy regulator prepares a monitoring report which highlights vulnerabilities and provides for corrective actions. Romania does not have a capacity mechanism for electricity and, as a result, it has not prepared an implementation plan regarding resource adequacy concerns and has no reliability standard regarding electricity supply.

In gas, Romania has prepared and submitted to the Commission a preventive action plan and an emergency plan for gas which seem relevant and complete. There is no information on how frequently the Romanian plan would be updated and no comments from the Commission on the two plans. The preventive action plan includes information on gas supply standards, and the Emergency plan has a definition of consumers that are not protected against disconnections. Romania does not have agreements on technical, legal and financial arrangements for security of gas supply measures apart from the minimal solidarity support within the two groups in which Romania takes part.

The two storage operators do not have certification as independent SSOs and there is no explicit legal requirement in the Energy Law 123/2012 (with subsequent amendments) to do

so. The largest gas storage company (Depogaz, which controls 90% of Romania's total storage capacity) has been set up as a legally separate company but remains a subsidiary of one of the two large gas producers, Romgaz.

Recommendations:

- The Ministry of Energy needs to address the concerns raised by the European Commission on the risk-preparedness plan for electricity and to develop procedures for preparation of ex-post evaluation plans;
- The chapter concerning energy security in the NECP must be carefully reassessed by the Ministry of Energy during the expected revision by mid-2023, to take into account the energy security risks that have emerged in the past 2 years;
- The Ministry of Energy and the Parliament must introduce and implement legislative provisions concerning the certification of independent gas storage system operators;
- The Ministry of Energy should consider concluding solidarity agreements for gas with neighboring countries, particularly as Romania is the only EU member that is also a gas producer in the region.

3. Reliability and security reports

In general, Romania does not have a practice of following up the implementation of strategies, plans or programs, in order to collect feedback and adjust policies to ensure the end-targets are achieved. This is a pervasive problem across the administration, beyond the energy sector. As a result, there is no implementation report concerning the NECP and there are no reports concerning the implementation of TYNDP for either gas or electricity. Gas storage operators do not prepare standalone TYNDPs, but have a list of investments that are included in the TYNDPs at EU level (ENTSO-G). The implementation of major projects from the TYNDPs can only be observed from the differences between consecutive plans (e.g. delays in project implementation are observed noting projects taken over from previous years' TYNDPs, with extended deadlines).

In oil and liquid fuels, the Ministry of Energy does send information on stocks that is included in Eurostat, but the Annual report on the measures to ensure and verify the availability and physical accessibility of emergency stocks that should be prepared and sent to the Commission as per the Law 85/2018 is not publicly available. The Ministry issues annually a Ministerial Order comprising a list of emergency stock obligations for major companies (applicable for winter-summer), of which at least 50% must be stored in Romania.

Recommendations:

- The Ministry of Energy (as well as other administrative entities) must build capacity and develop the practice of monitoring implementation of strategies, plans and governmental programs. Overall, reports that are sent to the Commission (e.g., on measures to ensure and verify availability and physical accessibility of oil stocks, but also plans on risk-preparedness and resource adequacy, including corrective measures) should be published also on local websites for the domestic public.

4. Infrastructure and resource adequacy

Romania has largely met formally its EU interconnectivity targets. However, such targets are in principle relevant for the energy security of the EU or regionally, e.g. indicating whether the country has both the import and export capacity to allow for continuity of supply at regional level; while ensuring an adequate level of domestic generation capacity is a concern for national administrations.

In electricity, the major challenge is that Romania is phasing out massive capacities (for inefficiencies and environmental reasons), which are so far not replaced by new investments. This artificially improves the statistics on interconnectivity (interconnection capacity being calculated as share of the country's installed capacity). In reality, to

achieve a reasonable level of energy security, Romania must significantly exceed the interconnectivity target to allow imports to make up for the increasing gap of domestic production - if it is not able to accelerate investments in domestic generation.

In the gas sector, Romania complies with both requirements to have bi-directional physical capacities of interconnection and infrastructure standard under N-1 formula.

The oil stocks are currently slightly below the target (74 vs 90 days), likely also because Romania had supplied oil products to Moldova and possibly Ukraine in 2022 for emergency reasons. A shortcoming is also that the current regulation allows companies to store the mandatory stocks abroad (up to 50%). This may cause additional security of supply issues, e.g. if there is any problem to access the stocks in time because of unexpected transportation constraints.

Recommendations:

- The Ministry of Energy must undertake an analysis of the Romanian electricity sector and markets to identify the bottlenecks to investments in generation, which is currently the biggest threat to the country's energy security. While this will significantly improve the situation, it will also increase the required ambition for interconnectivity given that the target is calculated as a share of installed capacity.
- The regulations issued by the Ministry of Energy should ensure that oil stocks are not only physically available in storage, but also readily accessible in case of an emergency.

5. Energy security statistics

The data concerning detailed capacities by each facility for each electricity generation unit and for gas storage, as well as the availability of commercial and emergency oil and petroleum products stocks is readily available. Data for electricity generation is available on Transelectrica's website in excels updated monthly, whereas gas storage, oil and petroleum stocks are available on EU websites (AGSI for gas storage, Eurostat for mandatory and total oil stocks).

UKRAINE*

Total score: 14, F, unacceptable preparedness

Category	Score	Rating	Characteristic
1. Risk assessment and forecasting	7	F	Unacceptable preparedness
2. Security rules and action plans	21	F	Unacceptable preparedness
3. Reliability and security reports	13	F	Unacceptable preparedness
4. Infrastructure and resource adequacy	25	F	Unacceptable preparedness
5. Energy security statistics	0	F	Unacceptable preparedness

1. Risk assessment and forecasting

Ukraine's policy framework lacks important documents and mechanisms aimed at assessing energy security risks in gas and electricity. Respective disclosure of the results of such assessment is also lagging. The total score for the category is 7 out of 100.

In the regional dimension, Ukrainian authorities do not participate in any regional mechanisms with its Energy Community counterparts to jointly define risks or crisis scenarios in the electricity and gas sectors as stipulated in the Regulation (EU) 2019/941 and the Regulation (EU) 2017/1938. The existing international mechsnisms of Energy Community in the field of energy security (such as SoS coordination group) were mainly used for ensuring and indicating the implementation of the energy security acquis. Yet, there is no public evidence that these institutions were used to define risks or crisis scenarios in the electricity and gas sectors (see agendas of the SoS Coordination Group meetings[17]). Nevertheless common risk assessment and determination of crisis

*The assessment for Ukraine was conducted in the circumstances of war and martial law when most energy sector data was locked due to security considerations

[17] https://www.energy-community.org/events/Past-events.html

scenarios are important as they constitute a basis for respective national efforts to determine the energy security risks.

In the national dimension, risk assessments in gas are to be prepared annually according to the Rules on Security of Gas Supply adopted by the Ministry of Energy in 2015[18]. Yet the last publicly available version of risk assessment results is dated 2019/2020 gas year, while the content of the assessment is limited strictly to descriptive information related to Ukrainian gas market without actual list of risks and their assessment. National electricity crisis scenarios are not developed in Ukraine, and there are no national provisions obliging their preparation. It should be noted that the Rules on Security of Electricity Supply adopted in 2018 oblige the Ministry of Energy to carry out an annual risk assessment in the electricity sector[19]. Yet the Rules does not provide for the development of specific crisis scenarios, thus mere risk assessment cannot be regarded as in line with the Regulation (EU) 2019/941. Moreover, the results of risk assessment are not publicly available, while the EU member states provide a summary of their national electricity crisis scenarios in their risk preparedness plans.

Ukraine also lacks the elaboration and publication of long-term and short-term resource adequacy assessments, instrumental for indicating risks related to the deficit of electricity generation capacities. The electricity TSO, Ukrenergo, regularly develops Generating Capacity Adequacy Assessment Report, but following Russian aggression it is not publicly available due to security considerations[20]. The above-mentioned report is the previous-generation document on resource adequacy, which may not be deemed an equivalent of Resource Adequacy Assessment (as provided by the Regulation (EU) 2019/941), which has a separate methodology.

There is no public evidence of preparation of short-term (seasonal/monthly/week-ahead) resource adequacy assessments by electricity TSO. Yet, there are national regulations in place requiring TSO to develop and publish yearly and seasonal assessments of generating capacities adequacy. According to these national regulations, monthly, week- and day-ahead assessments are not obligatory, yet if prepared, they should also be published on the electricity TSO website.

Recommendations:

- The Ministry of Energy and the Regulator (NEURC) should take organizational, regulatory and other measures to enable joint regional risk assessment and crisis scenario identification together with the EU and Energy Community counterparties, e.g. within the framework Security of Supply Coordination Group;
- The Ministry of Energy should ensure the regular preparation and disclosure of key findings of national risk assessment in gas sector in line with the Regulation (EU) 2017/1938;
- The Ministry of Energy should ensure the regular development and disclosure of key findings of national electricity crisis scenarios in line with the Regulation (EU) 2019/941;
- The electricity TSO, Ukrenergo, should ensure the regular development and disclosure of long-term and short-term resource adequacy assessments in line with the Regulation (EU) 2019/941.

2. Security rules and action plans

With respect to energy security planning, Ukraine still has a number of mechanisms to be transposed and implemented, while those instruments that are already in place should be duly updated and improved. The total score for the category is 21 out of 100.

The Ukrainian government still hasn't adopted the National energy and climate plan (NECP), which, inter alia, should contain the energy security chapter, setting out national targets in this field. Regarding sectoral planning instruments, the risk preparedness plan in electricity provided by the Regulation (EU) 941/2019 is not developed. Implementation plan regarding resource adequacy concerns in

[18] https://zakon.rada.gov.ua/laws/show/z1489-15#Text

[19] https://zakon.rada.gov.ua/laws/show/z1076-18#Text

[20] https://www.nerc.gov.ua/acts/pro-zatverdzhennya-zvitu-z-ocinki-vidpovidnosti-dostatnosti-generuyuchih

electricity is absent, as Ukraine has not prepared the resource adequacy assessment in the first place. In the gas sector, the Ministry of Energy has elaborated both preventive action plan and emergency plan in the form of the Rules on the Security of Gas Supply and the National Action Plan. Both plans are outdated and lack some of the content elements required by the Articles 9 and 10 of the Regulation (EU) 1938/2017.

All sectoral plans mentioned above should contain bilateral and regional measures to prevent and mitigate possible emergency situations. With the view to make these measures effective, the EU legislation provides for the conclusion of agreements on technical, legal and financial arrangements to operationalize bilateral and regional measures. There is no public evidence that Ukraine has concluded such agreements with any interconnected country.

Ukraine adopted the definition of customers protected from disconnections in electricity as well the definition of protected customers in gas. Yet regarding the latter, there are no publicly available and updated figures on gas consumption by protected customers and their share in total consumption. The reliability standard in electricity provided for in Article 25 of the Regulation (EU) 2019/943 is not calculated in Ukraine. The obligatory application of such standard is conditional on the application of capacity mechanism and existence of resource adequacy concerns. Although Ukraine does not formally apply capacity mechanisms and have not identified adequacy concerns based on resource adequacy assessment, the introduction of the reliability standard may be beneficial for incentivizing stable electricity supply. Gas supply standard as defined in the Regulation (EU) 2017/1938 has not been calculated in the preventive action plan.

Ukraine still has not adopted procedures for releasing minimum stocks, as provided by the Council Directive 2009/119/EC. The framework law on the minimum stocks of oil and petroleum products is yet to be adopted. Also, the Ministry of Energy has not adopted gas storage filling trajectories, as provided for by Article 6a(7) of the Regulation (EU) 2017/1938 and respective national legislation[21].

Regarding the ten-year network development plans (TYNDPs), gas and electricity TSOs and the underground gas storage operator are regularly preparing them, though the latest versions of plans are unavailable due to security considerations.

Recommendations:

- The government of Ukraine (Ministry of Economy, Ministry of Energy) should duly develop and adopt the NECP, containing energy security target;
- The Ministry of Energy should develop a risk preparedness plan in line with the Regulation (EU) 2019/941. If the electricity TSO identifies resource adequacy concerns in the course of resource adequacy assessment, the NEURC should prepare and publish an implementation plan to address these concerns;
- The Ministry of Energy should update and supplement preventive action plan and emergency plan to make them correspond to the requirements of the Regulation (EU) 1938/2017;
- The government of Ukraine should consider concluding intergovernmental agreements on technical, legal and financial arrangements to operationalize bilateral and regional measures to enable solidarity assistance in case of the electricity and gas crises;
- The NEURC should consider introducing reliability standard in electricity using at least the value of lost load and the cost of new entry in line with the Regulation (EU) 2019/943;
- The Ministry of Energy should supplement preventive action plan with calculations on gas supply standard as defined in the Regulation (EU) 2017/1938;
- The Verkhovna Rada should adopt the draft law 'On minimum stocks of oil and petroleum products', while competent authorities should adopt all by-laws, necessary for creation of minimum stocks;

[21] https://zakon.rada.gov.ua/laws/show/2850-20#Text

- The Ministry of Energy should adopt gas filling trajectories to comply with the Regulation (EU) 2017/1938 and national regulations;
- Following the cessation of martial law, gas and electricity TSOs and the gas storage operator should resume publication of ten-years development plans.

3. Reliability and security report

Reporting is another gap in the institutional and policy framework on energy security in Ukraine. Some of the reports are not prepared due to the absence of the primary instruments, the implementation of which they should reflect. Others are unavailable because of martial law restrictions on information disclosure.

Reporting on NECP and compliance with related energy security targets is still underway, as the NECP itself is still not formally adopted. An annual report on the implementation plan related to resource adequacy concerns is also not prepared as the implementation plan is absent. The development of the implementation plan is conditional on the identification of resource adequacy concerns, which have not been identified yet, as Ukraine does not prepare national resource adequacy assessments (as provided by the Regulation (EU) 2019/941). Similarly, there are no annual reports on the measures to ensure and verify the availability and physical accessibility of emergency stocks of oil and petroleum products, as Ukraine has not adopted the framework law to establish respective stocks.

The ex-post evaluation report on electricity crisis provided for by the Regulation (EU) 2019/941 is also not prepared, primarily because other elements of the risk preparedness framework such as electricity crisis scenarios and risk preparedness plans are not developed in Ukraine. Nevertheless, given the current situation in the Ukrainian electricity sector, if the respective provisions of the Regulation (EU) 2019/941 were duly transposed into national law, one may assume that Ukraine might have declared an electricity crisis and consequently be obliged to prepare an ex-post evaluation report.

Reports on the TYNDPs by gas and electricity TSO and the gas storage system operator are not publicly available due to martial law restrictions.

Ukraine fulfilled gas storage filling obligations under the Regulation (EU) 2017/1938, and respective reporting provisions were transposed into Ukrainian law.

Recommendations:

- Following the adoption of the NECP, the government of Ukraine should ensure due biennial progress reporting;
- The Verkhovna Rada, the Ministry of Energy, as well as other competent authorities, should take measures to fully implement resource adequacy assessment framework, including the obligation to prepare implementation reports in case of identification of resource adequacy concerns. Preparation of annual reports on the implementation plan should be also provided in national legislation;
- The Verkhovna Rada, the Ministry of Energy as well as other competent authorities should take measures to fully implement a risk preparedness framework in electricity, including the obligation to develop an ex-post evaluation report following electricity crisis;
- Following the cessation of martial law, gas and electricity TSO and the gas storage operator should resume publication of reports on implementing ten-years network development plans.

4. Infrastructure and resource adequacy

Given the circumstances of war and the related destruction and drop in consumption, it is hard to assess the infrastructure and resource adequacy in the Ukrainian energy sector by using open sources. Yet, some EU and Energy Community indicative targets and infrastructure standards applied to the pre-war Ukrainian energy system may help to assess such adequacy.

One of them is the EU 2020 interconnection target in electricity which is equal to a 10% ratio of a country's net transfer capacity (NTC) of imports over its installed generation capacity. The NTC of imports to Ukraine was equal to 1,100 MW[22] as of September 24, 2022. The installed generation capacity of the Ukrainian system was 52.3 GW[23] as of January 2022 (the last available public data). Thus, the interconnectivity target is not fulfilled. However, the installed capacity of the Ukrainian power system currently is much lower than 52.3 GW due to the Russian missile and drone attacks on generation facilities. Precise and up-to-date information on this subject is absent, thus the actual interconnectivity target for Ukraine may not be calculated. The retrospective data, contained in the study "Electricity Interconnection Targets in the Energy Community Contracting Parties" indicates that even before the war Ukraine did not comply with the interconnection target. If interconnectors from Russia and Belarus are not considered, the interconnection/installed capacity ratio was equal to 6%. This number was taken into account when assessing the indicator.

The Regulation (EU) 2017/1938 also requires countries to have bidirectional physical capacity at all their interconnections. The exemption from this obligation may be obtained, but only following coordination procedure pursuant to Annex III of the Regulation. Belarus and Russia interconnections aside, Ukraine has bidirectional physical capacity at all interconnections except the Grebenyky interconnector with Moldova and the Uzhhorod/Veľké Kapušany interconnector with Slovakia[24]. There is no open-source evidence that exemptions for these interconnection points were gained by Ukraine. Yet Ukraine jointly with Moldova implements the project[25] of the bi-directional flow of the Trans-Balkan corridor, which includes works on the Grebenyky interconnection.

In accordance with the Rules on Energy Security, the N-1 infrastructure standard in gas under the Regulation (EU) 2017/1938 should be calculated annually by the Ministry of Energy. Yet, the results of such calculations, if performed, are not available neither in the preventive action plan nor in the emergency plan. Yet the practice of the EU member states shows that the N-1 standard in gas is calculated and published in the Preventive action plan (see the example[26] of Romania).

There is no information on the availability of necessary minimum stocks of oil and petroleum products, as the stocks themselves are not created.

Recommendations:

- The electricity TSO should regularly calculate the 10% interconnection target for Ukraine, taking into account existing and planned generation capacities development. It should be one of the basis for taking investment decision on extending existing interconnections as well as constructing new ones;
- The gas TSO and the Ministry of Energy should accelerate cooperation with Moldovan counterparts on implementing the project of bidirectional physical flow between Ukraine and Moldova;
- The Ministry of Energy should annually calculate and publish the calculation of N-1 standard in gas sector;
- The Verkhovna Rada should adopt the draft law 'On minimum stocks of oil and petroleum products', while competent authorities should adopt all by-laws, necessary for creation of minimum stocks.

5. Energy security statistics

The majority of energy-related statistics in Ukraine became unavailable due to the martial law restrictions on information disclosure as well as the right granted to respondents not to submit reports to statistical authorities during

[22] https://ua.energy/uchasnikam_rinku/vidpovidno-do-polozhen-zakonu-ukrayiny-pro-rynok-elektrychnoyi-energiyi/#161

[23] https://map.ua-energy.org/en/resources/c51a16bc-e990-40db-b790-63624d823daa/

[24] https://tsoua.com/wp-content/uploads/2022/01/Perelik-FT-vhodu_vyhodu-05.01.2022.xlsx

[25] https://www.energy-community.org/regionalinitiatives/infrastructure/PLIMA/Gas25.html

[26] https://energy.ec.europa.eu/system/files/2022-03/Preventive_Action_Plan-OJ%20of%20Romania_no_968_bis.pdf

the martial law. Consequently, a number of indicators essential for analyzing the energy security of Ukraine became unavailable, namely up-to-date information on gas, oil and petroleum stocks as well data on the net maximum electrical capacity of generation facilities.

Statistics related to minimum stocks of oil and petroleum products are not available, due to the absence of such stocks.

Recommendations:

- Following termination of martial law, the State Statistics Service should resume the update of information on the stocks of oil and petroleum products;
- Following termination of martial law, the gas storage operator should resume the update of detailed data on its facilities. Throughout the martial law period, the operator may consider publication of regular aggregated information on the use of storages (e.g., aggregated on the national level);
- Following termination of martial law, the electricity TSO should resume the publication and update of the information on net maximum electrical capacity of generation facilities.

05

METHODOLOGY

Indicator is defined as a certain phenomenon in the field of energy security (policy instrument, standard, infrastructure, etc.) whose availability and other characteristics are assessed within the Energy Security Scoreboard.

Indicators may be divided into **three types** based on the approach to their assessment. The first is **multidimensional indicators** assessed by six criteria: availability, accessibility, relevance, frequency, usability, and completeness. These criteria are primarily applied to the indicators describing some complex pieces of information or data (action plan, dataset, etc.). Their mere availability is insufficient for comprehensive assessment, as they are to be disclosed of a certain quality and should contain some obligatory content elements. Here is a brief description of the criteria for multidimensional indicators:

- Availability: the existence of the information provided in the indicator;
- Accessibility: a measure/degree of access to information;
- Relevance: availability of information for the most recent reporting period or the moment of assessment;
- Frequency: compliance with the requirements regarding the regularity of updating and storing the information;
- Usability: convenience and simplicity of using the disclosed information;
- Completeness: availability of exhaustive information as required by legislative/ regulatory provisions.

Transparency criterion	Score
Availability (C_{av})	0 – information unavailable 1 – information available
Accessibility (C_{ac})	0 – access to available information requires payment of a fee or prior request 0.5 – access to available information requires authorization (after providing user's personal data) 1 – information in free access
Relevance (C_{rl})	0 – information for the most recent reporting period unavailable 1 – information for the most recent reporting period available
Frequency (C_{fr})	0 – information not updated and not available for past periods 0.5 – information updated but not available for certain past periods 1 – information updated according to requirements and available for past periods
Usability (C_{us})	0 – information available in a not machine-readable format (jpg, jpeg, png, pcx, tiff, scanned pdf, etc.) 0.5 – available information can be copied or processed (numerical: docx, pdf, html, xlsx (unstructured data)) 1 – information available in a machine-readable format (numerical: xlsx (structured data), csv, xml, json; textual: docx, non-scanned pdf)
Completeness (C_{in})	0 – information to be disclosed unavailable within the required period 0.5 – information to be disclosed partially available within the required period 1 – all information to be disclosed is available within the required period

Each multidimensional indicator was assessed via monitoring the open sources (websites of public authorities and energy companies, open data and institutional repositories). The aggregate score of each transparency indicator was calculated by the following formula:

$$T_i = C_{av} \cdot (C_{ac} + C_{rl} + C_{fr} + C_{us}) \cdot C_{in}$$

with C_{av}, C_{ac}, C_{rl}, C_{fr}, C_{us}, C_{in} are scores for the availability, accessibility, relevance, frequency, usability and completeness criteria, respectively. The maximum score for each multidimensional and other type of indicator is 4.

If any information can be obtained only for a fee or upon prior request (C_{ac} = 0), it is considered unavailable (C_{av} = 0). For all indicators, which don't provide the regular update of the requested information, $C_{rl} = C_{fr}$ = 1 if the information is available (C_{av} = 1) and accessible (C_{ac} = 1).

Binary indicators are the second type, assessed in the dichotomy of availability/ unavailability of information or compliance/ non-compliance with legislative requirements in the energy security field. Such an approach is applied when there are no intermediate states in the assessed phenomenon, i.e., it can't partially comply with best practice/ legislation or provision/target. Thus, in case of unavailability/non-compliance, the score for a binary indicator is 0, while in case of availability/ compliance, it is 4.

The last type – **quantile indicators** – describes phenomena in some transitional state(s) of compliance with legislative requirements/ best practices (e.g., partial implementation). To reflect these transitional states, the final score for the quantile indicator may be equal, for example, to 0 (non-compliance), 2 (partial compliance), or 4 (full compliance). The more transitional states of compliance, the more values the final score for indicator (from 0 to 4 points with a 0.5 step).

If the quantile indicator is quantitative, i.e., reflects some target value (capacity of the interconnector, etc.), this target value is divided with 3 quantiles to get 5 equal ranges which we can normalize to the assessment scale 0-1-2-3-4. For example, let us assume that the 10% interconnection target for Ukraine is equal to 1,000 MW of interconnection import capacity. Accordingly, it can be divided into 5 equal ranges that may be normalized to the range 0-4 in which:

- 0-200 MW of interconnection capacity corresponds to 0 in normalized scale;
- 200-500 MW of interconnection capacity corresponds to 1 in normalized scale;
- 500-750 MW of interconnection capacity corresponds to 2 in normalized scale;
- 750-1,000 MW of interconnection capacity corresponds to 3 in normalized scale;
- 1,000 MW and more of interconnection capacity correspond to 4 in normalized scale.

Aggregation of scores

Given the systematic relations between the phenomena described in the indicators, they were considered of equal weight. Yet, due to the different number of indicators in the categories and their importance for ensuring a proper level of energy security, the weights of categories differ. To calculate the total Scoreboard score, the following weightings of the categories were applied:

Interpretation of scores

All scores were converted into a 100-point scale, rounded off and given the following interpretation:

Score	Rating	Characteristic
95...100	A+	absolute preparedness
90...94	A	excellent preparedness
85...89	A-	
80...84	B+	good preparedness
75...79	B	
70...74	B-	
65...69	C+	medium preparedness
60...64	C	
55...59	C-	
50...54	D+	insufficient preparedness
45...49	D	
40...44	D-	
0...39	F	unacceptable preparedness

Limitations

The Energy Security Scoreboard cannot be used to assess:

- energy security of the country as such, which is a more broad and dynamic phenomenon in its nature;
- institutional preparedness for energy security risks and threats in the real-time, as the assessment, calculation and related analytical activities take time, during which changes in energy security policy may take place;
- institutional preparedness for energy security risks at the local level, which requires separate indicators for respective planning documents/local measures.

Energy Security Scoreboard 2023