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RESOLUTION
OF THE CABINET OF MINISTERS OF THE REPUBLIC OF UZBEKISTAN

ON THE APPROVAL OF THE RULES FOR THE USE OF THE MAIN ELECTRIC GRIDS

To facilitate the gradual transition to wholesale and retail electricity market mechanisms, simplify the connection of electricity producers, including independent producers, and large consumers to the main electric grids, and ensure equal conditions for them, the Cabinet of Ministers decides:

1. **To approve the Rules for the Use of the Main Electric Grids**, as per the annex, which provide for:

The connection of electricity producers and large consumers to the **main electric grids**;

The creation of equal conditions for electricity producers and large consumers in accordance with international standards;

The establishment of general technical requirements for all participants in the wholesale and retail electricity market by defining the terms for rational and transparent use of the main grids.

2. It is established that:

The requirements of the **Rules for the Use of the Main Electric Grids** are mandatory for all types of electricity enterprises and consumers connected to or to be connected to the main grids;

As of the effective date of this resolution, the requirements of the Rules for the Use of the Main Electric Grids (Grid Code) shall apply exclusively to **the operational processes** of all types of electricity enterprises, electricity producers, and consumers already connected to the main networks.

3. **The implementation of this resolution shall be supervised by** the Minister of Energy of the Republic of Uzbekistan, J.T. Mirzamahmudov, and the Director of the Energy Market Development and Regulatory Agency of the Republic of Uzbekistan, Sh.X. Khodjayev.

Prime Minister of the Republic of Uzbekistan A. ARIPOV

Tashkent,
June 15, 2024,
No. 338

Annex
to the Resolution No. 338 of the Cabinet of
Ministers dated June 15, 2024

RULES
for the Use of Main Electric Grids (The Grid Code)

Section I. General Provisions

Chapter 1. Basic Rules

1. These Rules regulate relationships in the field of planning main power grids in the territory of the Republic of Uzbekistan and their safe and reliable operation, requirements for connecting to main power grids and the rights to use them, as well as determining their operation procedure, and also connecting to the distribution systems of electricity producers.

These Rules establish general requirements for all Users and authorized bodies by determining the conditions for rational and transparent use of main power networks.

2. The following key concepts are used in these Rules:

isolation – Shutting down all or part of the infrastructure at the connection point of the User's network, leaving no possibility to restore the connection without performing direct work on the network of the relevant system operator;

Isolated Operation– Independent operation of the entire unified power system, or a part of it with at least one generation module controlling frequency and voltage, separated from the interconnected power system after disconnection;

closed distribution system – A system that distributes electricity to industrial, commercial, or other public service facilities within a geographically limited area, that does not supply electricity to household consumers, or has a small number of household consumers, or operates in cooperation with the distribution system operator;

Closed Distribution System Operator – the entity responsible for the operation of the closed distribution system;

generating module – a device or set of devices that generate (produce) electricity synchronously or asynchronously (asynchronously);

Consumer – a legal entity that is directly connected to the transmission system through its networks or plans to be connected to the electricity generation, service and (or) other purposes of electricity User, i.e. large consumers;

Instruction – any order (order, assignment, permission) issued by the operator (dispatcher) to the Users to perform any action within the scope of their authority;

automatic voltage regulator (AVR) – a continuously operating automatic device that controls the voltage at the terminals of the synchronous generator module by comparing the actual voltage at the terminal with the standard value and controlling the excitation system;

maximum power – The continuous maximum active power that can be transmitted after deducting the non-transmissible load (for own needs and other purposes) related to the operation of the generating module(s) specified in the Connection Agreement between the Power Plant Operator and the Relevant System Operator;

minimum stable operating mode – the minimum active power specified in the connection contract or agreed between the Operator of the Relevant System and the Power Plant Operator, with which the generating module can operate stably for an unlimited period of time;

asynchronous generating module – generating devices connected to the single electric power system asynchronously or with the help of appropriate electronics and having a single connection point to the transmission system, distribution system, including the closed distribution system, or their combination;

Minimum Adjustment Level – the minimum indicator that can control the active power of the generating module specified in the connection contract or agreed between the relevant system operator and the operator of the power plant;

synchronous generating module – a total set of devices that generate electricity synchronously with the frequency of the generated voltage, the frequency of rotation of the generator, and the frequency of the network voltage being in constant proportion;

Droop Control – the ratio of steady-state variation of the frequency to the final steady-state value of the active power at the output expressed as a percentage. The change in frequency is expressed in relation to the nominal frequency, the change in active power is expressed by the ratio of the maximum power or real active power at the time of reaching the corresponding limit;

Distribution system operator – a legal entity authorized to carry out activities on the distribution of electricity in a specific region or district of the Republic of Uzbekistan;

Relevant system operator - this is a general term referring to all system operators, in particular, Transmission System Operator, Distribution System Operator and Closed Distribution System Operators, that is, the authorized operator of the network to which the User's network is connected. For the Power Plant Operator or other Users connected to the User's internal networks, they are the Relevant System Operator;

System operator – Real-time management of the unified electric energy system of the Republic of Uzbekistan, ensuring its reliable operation, working in parallel with the energy systems of other countries, based on the demand and supply of electric energy, as well as the production and consumption of electric energy taking into account all the factors affecting its production, the body that manages the hourly regimes of its production and consumption;

transmission system – a complex of main power grid facilities (power transmission networks and substations) with a voltage of 35 kV and above,

connected to power producers, large consumers and distribution systems, providing interregional transmission of power and connected to the power systems of neighboring countries;

Transmission system operator – a legal entity or organization authorized to operate and develop the transmission system in the Republic of Uzbekistan;

Interruptible Load – the load of certain consumers, which may be turned off for a limited period of time by the electricity supplier, System Operator or Relevant System Operator according to the contract;

connection point – limit (point) of connection to the transmission system of the generating module, Consumer networks or distribution system networks, as well as distribution and closed distribution systems specified in the connection contract;

connection agreement – an agreement between the Relevant System Operator and the Power Plant Operator, Consumer Grid Operator or Distribution System Operator, containing specific technical requirements for power plants, Consumers or distribution system devices and the relevant connection point;

flicker – flickering, a condition that occurs as a result of rapid or frequent changes in the load in the electrical network or voltage fluctuations due to other reasons. This condition causes the light to flicker or affect the operation of sensitive equipment;

User – a legal entity or individual who is connected or plans to be connected to the transmission system, or whose networks are connected to or planned to be connected to the distribution system, and who owns generating modules;

frequency leader – an operator appointed by the System Operator to ensure frequency stability in the synchronous operation zone, who is responsible for coordinating the actions of other Users;

Frequency-Responsive Mode – changing the active power at the output of the generating module to restore the frequency in response to the change in frequency;

Frequency Control – the ability to adjust the output active power of generating modules or electric energy storage systems, as well as consumers' own load, in response to a change in the frequency at a set point in order to maintain a stable frequency of the unified electric power system;

limited Frequency-Responsive Mode for Frequency Increase – the mode of operation that leads to a decrease in the active power at the output of the generator module in response to a change in the system frequency above the specified value;

limited Frequency-Responsive Mode in Frequency Decrease – operating mode that causes an increase in active power at the output of the generator module in response to a change in the frequency of the single electric power system below the specified value;

Power plant operator – A legal entity or individual that owns power plants or has put their power plant to use under the condition of maintenance and operation (O&M), including generation module operator;

electrical network – interconnected electrical networks, transformer substations, distribution points and their devices serving for the transmission or distribution of electric energy;

Battery Energy Storage System (BESS) – a complex of accumulator batteries, mechanical storage systems and hydro-accumulating power stations for storage, retransmission and distribution of electric energy;

Power System Stabilizer (PSS) – additional function of the automatic voltage adjuster in the synchronous generator module designed to suppress power fluctuations;

Load Tap Changer (LTC) – a device installed on a power that enables voltage adjustment under load, that is, during the operation of the transformer;

single electric energy system – electricity generating facilities, transmission and distribution networks, energy storage facilities and their dispatching management;

the mode of covering one's own needs – mode of operation related to covering the needs of the generating modules in case of disturbances in the network, which lead to the shutdown of the generating modules and the connection of their backup supply sources;

installation document – a structural document containing information on the generator module of type "A" or the device consuming electricity of the required description, connected to networks with a voltage lower than 1000 V, verifying compliance with relevant standards;

Setpoint – the value determined for each parameter used in control schemes;

3. In these Rules all time indications or references to time used are relative to standard time in the Republic of Uzbekistan (UTC+05:00, which is five hours ahead of Universal Coordinated Time).

Chapter 2. General terms of use of Main Electric Grids

4. The Transmission System Operator, the Distribution System Operators and Users who own and/or operate electrical devices connected to transmission and distribution networks, and Users must install technical and technological systems for the operation of electrical devices, as well as the management infrastructure of these systems in accordance with these Rules, regulatory documents in the field of technical regulation and they must be kept in accordance with the requirements of the manufacturer's technical documents.

5. In the following interconnections:

in connections between transmission and distribution systems Transmission System Operator, Relevant System Operator, Distribution System Operator, Transmission System User;

each Distribution System Operator is a User for other electricity networks to which the electricity networks are connected, and the Relevant System Operator for the Parties connected to its networks;

In connections between Closed distribution systems and electricity network operators, the Closed distribution system operator is the User in relation to the relevant system operator.

6. All connections between the relevant system operator and Users must be equipped with metering systems.

These systems must meet the requirements of the Law of the Republic of Uzbekistan "On Metrology", other legal documents, regulatory documents in the field of technical regulation, electricity market contracts, as well as contracts with the central buyer or contracts for electricity supply.

Section II. Procedure for long-term development planning

Chapter 1. Description and purpose of long-term planning

7. Long-term planning of transmission system development (hereinafter - long-term planning) is coordinated by the Ministry of Energy (hereinafter - the Ministry) and includes planning for the next decade.

8. Organization of long-term planning is carried out by the Transmission System Operator and is based on:

legal documents in the field of electric energy and other;

strategic documents on the development of the electric energy sector;

citizens and infrastructure safety;

environmental policies and restrictions;

the economic efficiency of the transmission system.

9. In the process of long-term planning of the transmission system, the criteria for ensuring the stable operation of the transmission system, its optimal development and all relevant economic indicators should be taken into account.

In this case, the transmission system operator will develop a transmission system investment plan containing detailed information on the investments to be made in the transmission system for the first three years and information on the investments expected until the end of the planned period.

Long-term planning is developed by the Transmission System Operator in coordination with the System Operator, agreed upon with the Energy Market Development and Regulatory Agency (hereinafter referred to as the Regulator), and approved by the Ministry.

10. The main objective of long-term planning is to ensure the stable operation of existing and new transmission systems, ensuring:

safe, reliable and efficient operation of the unified electric energy system;

high safety and quality of electricity supply to final consumers;

non-discriminatory connection of existing and newly connected Users to the transmission system;

the possibility of efficient and cost-effective connection of all new Users to the transmission system;

sustainable development of electricity generating, storage systems and consuming facilities;

effective operation of production, transmission, distribution, storage systems and consumer facilities in the unified electric energy system.

11. The purpose of the long-term planning of the transmission system is to timely inform (provide information) all current and prospective Users, xthe electricity market participants and stakeholders of the electric power sector of the Republic of Uzbekistan, which shows the following:

a compehensive overview of the transmission system configuration for the prospective period;

the main changes planned in the transmission system, including the location of transmission system facilities to be built, reconstructed or dismantled, and interconnection transmission networks and their main indicators.

Chapter 2. Long-term planning requirements and criteria

12. The initial stage of developing the transmission system development plan involves defining the scope of the planning process.

In this case, the basis for the development of the transmission system development plan consists of the planning standard and criteria on the one hand, and the goals of the planning process on the other hand.

Planning requirements and criteria must be formulated depending on the goals and objectives of the transmission system development plan.

13. The objectives of the transmission system development plan are closely aligned with the electric power sector development strategy.

14. The transmission system development plan is typically developed based on several growth scenarios, accounting for changes in consumption load and generation..

15. The following standards and planning criteria are taken into account when developing the transmission system development plan:

a) "n-1" security criterion - being fully resilient (stable) to the sudden loss (shutdown) of any individual transmission, generation, or consumer element within the single power system.;

b) reliability of the unified power system - the response (reaction) of the single electric power system to multiple shutdowns is in accordance with the planned values;

c) short-circuit criterion - keeping short-circuit levels in all elements of the

transmission system within the limits of the design parameters of the equipment;

g) stability criterion:

static stability- planning the transmission system to ensure its operational safety (voltage, frequency, active and reactive power flows) within the permissible limits specified by these Rules;

dynamic stability - stability of the transmission system during transient processes;

d) quality of electricity supplied to the network:

voltage stability criterion - this refers to the ability to maintain the voltage ranges of the transmission network within the predefined values and time limits specified in Sections III and XI of the transmission system.

The quality criterion of voltage sinusoidal forms (harmonics and flickers) – ensuring the required voltage quality in the transmission system, taking into account the effects of harmonics and flickers.

16. The use of special planning requirements and criteria and their impact may change depending on the strategic goals of the single electric power system of the Republic of Uzbekistan.

Chapter 2. Development plans and forecasts

§ 1. The procedure for development of the transmission system development plan

17. The transmission system development plan is developed for a ten-year period, with annual updates. The transmission system development plan is developed (updated) annually by December 31 for the next ten-year period.

18. Time standards of the transmission system development plan are developed in accordance with Appendix 1 to these Rules.

19. In the process of developing and updating the transmission system development plan, the Ministry is responsible for:

Continuous monitoring of the process of developing and updating the transmission system development plan;

presentation of the necessary preliminary information on the macroeconomic indicators of the development of the electric power sector and strategic development plans;

conducting internal public consultations on the proposed Transmission system development plan;

Adoption of the transmission system development plan.

20. During the development of the transmission system development plan, the transmission system operator is responsible for the following:

General coordination of the transmission system development plan development process;

Development and coordination of research models and scenarios in close cooperation with the project organization and the System Operator authorized for this activity by the transmission system operator;

Summarizing, verifying and processing initial data received from relevant system operators, System Operator and the Ministry;

collecting preliminary necessary information from own resources and Users;

Making the necessary calculations for the preparation of the final draft of the transmission system development plan;

conducting internal discussions in the electric power sector and putting the draft of the proposed Transmission system development plan for public discussion;

Preparation of final proposals of the Transmission system development plan for submission to the Ministry and the Regulator.

21. During the development of the transmission system development plan, Users are responsible for providing preliminary information on the current and planned parameters of their respective devices.

22. The plan for the development of the transmission system is formed as follows:

a. planning requirements and criteria, including planning assumptions;

b. preliminary analysis of existing assets in the transmission system, their condition and average age;

c. demand (consumption) forecast – past (historical) data, resources introduced by existing and new Users in the electric power system, and strategic plans of measures planned to be implemented to increase energy efficiency;

d. generation forecast – information on existing and planned objects in accordance with the conditional generation development plan;

e. Results of the power system balance assessment;

f. transmission system stability assessment including:

the option of optimal development of the transmission system determined on the basis of the technical and economic analysis of the current state of the transmission system in the planned period and the necessary indicators;

the result of the inspection of the main objects of the transmission system – a list showing the years of completion of the planned activities grouped according to the priority of the main objects to be built, reconstructed/repaired or decommissioned;

infrastructure development plan for transmission system auxiliary equipment (telecommunication system, data management system, SCADA/EMS, measurement system, information technology support and other systems);

g. a list of sub-projects for the development of the transmission system with

new, reconstructed (repaired) and decommissioned (dismantled) objects of the transmission system (primary, secondary and auxiliary equipment) and their main parameters;

h. cost and benefit analysis of major sub-projects planned for development;

i. the investment plan of the transmission system is developed for the next three years, updated annually and coordinated with the investment plans of the distribution system. The transmission system investment plan should include the following information:

investment rules, designation, type and brief description of planned activities;

mutual relations on investments, works with relevant generation, consumption or distribution facilities;

the cost of equipment, services and works;

investment plan financing implementation schedule;

financial resources for making individual investments;

information on the progress of current investment projects.

23. Drafts of the Transmission system development plan submitted to public discussions and approved are published on the official websites of the Transmission System Operator, the Ministry and the Regulator.

24. The transmission system development plan is developed based on the principles and approaches in accordance with Appendix 2 to the Rules.

25. Basic information for the development of the transmission system development plan is provided by the Ministry, the System Operator, the Transmission System Operator and the Users.

Additional data obtained from other sources are allowed to be used, but they must be verified by the Transmission system operator for accuracy and reliability.

26. Users are obliged to provide planning information in accordance with the requirements of the Rules upon request by the Transmission System Operator.

No delays or significant errors are allowed in identifying new consumption or generation capacity that could lead to limitations or delays in connecting to the transmission system.

27. In order to prepare the transmission system development plan, the following information is provided by the Transmission system operator and System Operators for the last five years:

electricity consumption (hourly electricity consumption demand and peak power during peak hours);

personal forecast of consumption for the next ten years;

General data of users' consumption forecast;

loads of power transmission networks;

operating schemes of the transmission system for characteristic modes, showing power transformers and voltage profiles;

Information on the conditional plan of generation development;

User information necessary for the development of simulation models of the electric power system;

proposals for calculations of power distribution modes, etc.

28. When developing the transmission system development plan, the Ministry presents the following:

Macroeconomic data on the Republic of Uzbekistan;

strategic development information relevant to the energy sector;

information related to the volume of available fuel resources and the strategy of their use;

information on the long-term strategy of electricity export/import;

long-term energy balance forecasts and other information.

29. Users shall submit information in accordance with Appendix 3 to these Rules as part of the transmission system planning process.

30. All Parties providing information for the development of a transmission system development plan must indicate the confidentiality status of the information they provide.

The organization (company) authorized by the transmission system operator to develop the development plan must comply with the terms of confidentiality when using this information.

§ 2. The procedure for developing a conditional plan for generation development

31. The conditional generation development plan is developed by the Transmission System Operator for the next ten years during regular annual updates.

32. Information for the development of a conditional plan for the development of generation will be provided by the existing operators and operators of generating facilities in the electric power system of the Republic of Uzbekistan, as well as by the state or investors planning to develop new generating facilities in the future, and also strategic plans of actions implemented at the state level.

33. Information for the development of a conditional generation development plan is provided in accordance with Appendix 3 to these Rules.

34. The conditional plan for generation development is developed based on the main elements of the approach and methodology in accordance with Appendix 4 to these Rules.

35. The conditional generation development plan is developed every year by July 1 in order to coordinate the terms of the transmission system development plan. Conditional generation development plan will be developed according to the actions and deadlines specified in Appendix 5 to these Rules.

§ 3. A procedure for developing a long-term forecast of transmission system compatibility

36. The long-term system compatibility forecast (hereinafter referred to as LT-SCF) for the transmission system is developed for the next ten years, based on the conditional plans for the development of the transmission system and the generation development plans, and is updated annually.

LT-SCF is a forecast of the power system's ability to maintain a constant power balance and ensure the security of power supply to end users with no or minimal interruptions.

The system operator is responsible for the development and continuous updating of the LT-SCF.

37. The assessment of LT-SCF is based on the demand (consumption) forecast, the Transmission system development plan, the Conditional generation development plan, information on fuel availability, reserve requirements for stable management of the electric power system, electricity market forecasts, performance capabilities of interconnections and other information.

38. The main components of LT-SCF are:

a) compatibility of the transmission system - is the ability of the transmission system to maintain the operating parameters of the transmission system within the limits of predetermined, planned values and to ensure the transmission of power in the transmission system, which includes:

transmission of generated electric energy - the ability of the transmission system to transmit the electric energy produced by generating facilities in full volume at any time and in all modes of operation;

power supply of consumers and distribution networks - the ability of the transmission system, at any time and in all modes of operation, to provide electricity to all consumers and distribution networks connected to the transmission system;

supporting the throughput of inter-system connections - the possibility of maintaining and (or) future expansion of the transmission system, inter-system connections with neighboring electric power systems for export (import) of electricity;

b) compatibility of generation - the ability to fully satisfy the demand and ensure the adequacy of generating capacities in combination with imports at any time and in all modes of operation:

power balance - ensuring the balance between generation and import and consumption demand and export at any time and in all modes of operation;

balancing of the single electric power system - provision of the necessary volume of balancing reserves to ensure power balance in the single electric power system and to maintain the frequency adjustment in intersystem connections.

39. When developing a forecast of transmission system compatibility, load in the power system (maximum power and power consumption demand) while

continuously ensuring the desired level of the given volume of reserves above the energy balance in terms of reliability and reserves controlled in the single power system based on the criterion in accordance with Appendix 6 to these Rules fully offset by domestic generation and imports.

40. Unlike the Transmission system development plan and the Conditional generation development plan, LT-SCF includes the analysis of the dynamics of the implementation of the generation and consumption development plans in the energy sector of the Republic of Uzbekistan along with the analysis of the compatibility of the transmission system.

41. The basic background information for LT-SCF is as follows:

consumption forecast (total electricity consumption, sample graphs of load and maximum daily consumption);

forecast indicators of new generation (installed capacity, power factor and date of commissioning);

decommissioning plans of existing generating modules in the electric power system.

42. The compatibility standard of the transmission system is the level of safety in the power supply of the final consumers, while maintaining the established standards for the most important parameters of the electric power system.

Volume indicators used to determine the safety level of electricity supply are related to the continuity of electricity supply and are determined by "ENS" (unsupplied energy), which defines the total volume of electricity not delivered to final consumers due to the failure of the electric power system.

Section 3. Connection rules

Chapter 1. Purpose of connection rules

43. The connection rules define the procedure and technical requirements for connecting all Users to the transmission system, including the connection of their previously connected electrical devices to the transmission system when the connection points are changed, the capacity of existing devices is increased or new ones are started. The Rules also include procedures for disconnecting and reconnecting Users' devices.

44. The main purpose of the connection rules is to provide a clear and detailed set of data for connection to the transmission system and to ensure that power plants can connect to the distribution networks, access the transmission system or distribution networks without discrimination, in full compliance with the specified transmission system requirements.

45. These Rules and all subsequent connection procedures and methods are published by the Transmission System Operator in order to attract investments for the development of generating facilities, battery energy storage systems and consumer infrastructures in the single electric power system and are publicly

available. They include the procedure for connecting to the transmission system, technical requirements and costs.

46. Requirements for connection conditions are divided into the following groups:

a) general conditions of connection for all Users;

b) conditions for connecting generating modules:

connection conditions applicable to all manufacturers,

connection conditions for synchronous generators only,

connection conditions applicable only to renewable energy sources;

v) Terms of connection applicable to consumers;

g) Conditions for battery energy storage systems Connections.

47. It applies to the Transmission System Operator, the System Operator and all Parties (previously connected and planning to connect, change connection points or change their capacity after overhaul or expansion of the existing connection infrastructure) and all Users planning to connect to the transmission system in the future.

48. All Parties are obliged to fulfill the requirements and conditions of this section of the Rules in a quality and timely manner and to ensure its effective implementation.

Chapter 2. General procedure for connecting to the transmission system

§ 1. The main organizers of the general order of connection to the transmission system

49. The connection procedure defines the procedure for connecting the User's devices to the transmission system. The following are the main components of the general order of connection to the transmission system:

Submitting a for connection application;

conduct connectivity studies;

Agreement between the transmission system operator and the User on the technical solution of the connection study (project);

connection approval;

connection agreement;

construction of infrastructure at the connection point;

testing and commissioning;

voltage supply.

§ 2. Submitting an application for connection to the transmission system

50. The user sends a request (application) to the transmission system operator to connect to the network or to change the existing connection as the first step of the

connection procedure.

51. The application must contain all the information necessary for the transmission system operator to evaluate the requested connection and must be submitted in the form posted on its official website.

52. The application submitted by the User with an installed capacity exceeding 1 MW will be considered by the Transmission System Operator and the System Operator for five days and will agree to the User with their joint conclusion to start the connection research work by the project organization.

If the user wants to connect to the distribution system, the application is submitted to the operator of the Distribution System. The Distribution System Operator processes the application within five days and submits it to the Transmission System Operator and the System Operator along with its conclusion.

§ 3. Conducting grid connectionstudy to the transmission system

53. Potential user networking solutions and specifications for each solution considered will be developed based on these Rules and the Grid Study.

54. Conducting the network connection research is carried out by the project organization duly authorized to perform such activities by the Transmission System Operator. The list of project organizations is approved by the Transmission System Operator in agreement with the System Operator and published on its official website.

55. All costs of conducting the grid study shall be borne by the requesting User.

56. The grid connection study includes an assessment of the effect of the requested connection on the reliability of the network and confirms the compliance of the selected technical solution with the requirements for agreeing to connect the facility to the network.

57. The preliminary data necessary for the preparation of the network connection research shall be provided in accordance with Appendix 7 to these Rules. The Transmission System Operator or the System Operator may ask the User for additional information required for the preparation of the Grid Impact study, in addition to the information provided in the Grid Connection Application.

58. The preparation of the network connection research shall not exceed one hundred and twenty days after the User has provided all the requested information.

59. Grid impact study includes:

analysis of technical solutions for network connection;

technical characteristics of the network connection point infrastructure;

Technical requirements for the user;

Operational requirements for the user;

estimation of network connection infrastructure construction costs, etc.

60. A network design company that conducts a Grid impact study performs all the necessary analyzes (power flows, safety, reactive power management, short-circuit currents, static and dynamic stability, power quality).

In this case, the operation parameters of the transmission or distribution system are checked to ensure the connection and operation of the object, within the previously established limits, without adversely affecting the transmission system, without harming the normal operation of the object.

61. In the Grid connection study, the proposed connection options are aligned with the approved Transmission system development plan.

62. The Grid connection research shows the equipment (device) and works that will be connected during the development of the project concept for connection to the transmission or distribution system.

63. The project organization submits the developed technical solutions to the Transmission System Operator and the System Operator for agreement.

64. If the transmission system operator or the system operator, based on the results of the review of the grid connection research determines the limit parameters of the planned connection system or increases the costs of connecting the electrical devices of the User, they have the right to refuse connection to the electric power system, citing these reasons.

65. The project organization, taking into account the reasons given, makes appropriate corrections or develops alternative solutions and resubmits for agreement. In this case, the re-entry period does not exceed thirty days.

66. The Transmission System Operator and the System Operator shall agree on the results of the reintroduced Grid connection research within ten days. Agreed technical solutions are provided to the User to implement the next steps.

67. If the load level of substations, power transmission networks and (or) transformers reaches its maximum value, the issuance of technical conditionsis suspended.

The user can make an offer to change the transformer or power transmission networks at his own expense.

In this case, theconnection study to the network should include changing the transformer.

§ 4. Agree on a technical solution for connection between the transmission system operator and the User and provide a technical condition

68. The User chooses the technical solutions presented in the Grid connection research that suits him best and sends a request to the Transmission System Operator to obtain a Technical Condition for this solution.

69. After receiving a request from the User, the Transmission System Operator together with the System Operator will review the results of the Grid connection research and the compatibility of the connection with the Transmission system development plan.

Based on the results of the review, prepares a draft of the Technical Conditions for connecting the User's devices to the grid and agrees with the System Operator.

The term of issuing the technical condition shall not exceed fifteen working days from the date of receipt of the application from the user, in which case the technical condition shall be agreed upon by the system operator within three working days.

If, according to the results of the review, reasons affecting the transmission system's safety or the changes in the limit parameters of the transmission system, which were not previously noted, are found, the Transmission System Operator may postpone the issuance of the Technical Condition, citing these reasons.

70. The User may submit a complaint based on these Rules and applicable legal documents regarding the refusal of the transmission system operator to provide technical conditions for the connection.

71. Technical conditions for connecting consumers with a consumption power of more than 10 MW to the transmission system shall be agreed with the Ministry.

72. The technical condition includes:

nominal amount of power and power coefficient allowed (production/consumption) additionally to newly connected or previously connected User;

network connection point(s);

power transmission or external power supply circuit;

calculated values of short-circuit currents;

requirements for relay protection and automatic systems against accidents;

monitoring/control and communication requirements;

requirements for measurements and measuring instruments;

requirements for quality indicators of electricity;

dispatch control hierarchy (dispatch requirements);

automatic connection/disconnection/reconnection conditions, their interfaces, requirements for equipment (device) installation locations and their interfaces to ensure the fulfillment of the User System Operator's requirements for automation;

requirements for installing stabilizers and power quality control devices;

requirements for automatic protection of electrical devices or their shutdown in emergency situations;

operational requirements (adjustment of active power, frequency and voltage);

validity period of the technical condition in designing and performing specified works.

§ 5. Arrangement of connection to the electricity network

73. The transmission system operator, the System Operator and the User jointly agree on the following based on the results of the Grid connection research

and the technical solution given in the Technical Conditions:

the work required to connect to the network;

works necessary to expand and strengthen connected networks and systems as a mandatory condition for connection implementation;

power connected to the network;

the technical requirements specified above in the technical condition for connection;

Operational requirements for the user's facility.

74. As a result of carrying out a Grid connection research and coordinating technical solutions for research (design) between the Transmission System Operator and the User, the Transmission System Operator makes a decision on the agreement to connect the relevant User's equipment (device) to the network within fifteen working days from the date of issuance of the Technical Condition.

75. The decision to agree to grid connection includes:

The results of the Grid connection study and the selected technical solution;

construction of connection infrastructure and implementation of specified works in connected systems and technical requirements for devices;

terms of use of the network;

estimate the costs of connection (spent for the implementation of specified works).

76. If the transmission system operator does not make a decision on agreeing the connection to the network or if the decision is not in accordance with these Rules, the User has the right to appeal to the Ministry.

77. If the construction of the grid connection infrastructure has not been started within two years from the date of approval, or if another term is specified in the technical condition, the technical condition and the decision to agree to the grid connection shall become invalid.

§ 6. Connection agreement

78. The connection agreement is signed between the Transmission System Operator and the User and regulates the technical, legal and economic requirements for individual connection to the transmission system.

79. The transmission system operator and the User ensure that the quantity and quality of the services provided in the conclusion of the connection agreement meet the requirements set forth in these Rules.

80. All Users follow the same requirements for connection and must confirm that their equipment (device) complies with the rules, technical requirements, procedures, and technical specifications specified in these Rules when concluding a connection contract.

81. The connection agreement covers the following processes of construction

and use of the infrastructure for connection to the single electric power system:

preparation of technical project documents;

construction process;

construction of grid connection infrastructure;

tests, commissioning and control (inspection);

permission to use the connection infrastructure;

operation procedure of connection and communication infrastructure.

82. The connection agreement specifies the following:

Network infrastructure for connecting the User in accordance with the results of the Grid connection study and the agreement on connection to the transmission system;

Basic affiliation boundaries between the relevant system operator and User entities;

Obligations of the user to build the infrastructure of connection to electric networks;

procedure for approval of project documents,

conditions for payment of connection infrastructure costs;

Other mutual rights and obligations of the parties.

83. The operator of the transmission system must offer the User a connection agreement no later than thirty days after the decision to agree to network connection was made.

84. It is mandatory for the user to comply with the requirements of the technical conditions during the design, construction and installation, testing and commissioning of the agreed installations.

§ 7. Construction of infrastructure at the point of connection to the grid

85. Based on the request given by the user in accordance with the connection contract, the design organization authorized to perform such activities by the Transmission System Operator develops a connection project to the transmission system in accordance with the approved technical conditions.

86. After the design organization has agreed with the User, the grid connection project will be submitted to the Transmission System Operator, System Operator and Regulatory Authority for review.

Once the project documents are approved upon by all the above authorities, they are re-submitted to the Transmission System Operator for approval.

87. The transmission system operator, the System Operator and the Regulatory Authority shall review the connection project within thirty days and agree or reject it with reasons.

88. The following are the grounds for rejection of the connection project:

non-compliance of the connection project with the requirements of these Rules;

When deviations from the technical conditions given by the transmission system operator are detected;

non-compliance of the project with the current technical regulations and rules or current legislation of the Republic of Uzbekistan.

89. It is not allowed to refuse to agree to the Connection project for other reasons.

90. After the reasons that served as a basis for the rejection of the connection project are eliminated by the design organization, they are re-introduced for approval.

Re-examination will not exceed fifteen days from the date of receipt of the revised draft of the connection.

91. The connection project shall be approved by the Transmission System Operator within three days after agreement with all parties.

92. The work necessary to expand and strengthen the networks and systems connected to the connection point will be carried out by the contracting organization authorized by the transmission system operator at the expense of the User.

93. The construction of the connection point infrastructure must be completed within the terms specified in the connection contract.

94. The construction work of the infrastructure of the Connection Point is considered completed after the Certificate of completion of works is issued by the authorized control body.

§ 8. Testing and commissioning

95. After the completion of the construction of the grid connection infrastructure, testing, commissioning, and startup activities shall be carried out in accordance with the requirements of Sections IX and X of these Rules.

96. Testing and commissioning are performed by the User’s employees with the participation of the Transmission System Operator and the representatives of the Controlling Authority by specialized companies.

97. Testing and commissioning will be completed after the transmission system operator and representatives of the Controlling Authority have confirmed the results and approved the reports on testing and commissioning.

§ 9. Providing electricity

98. After the completion of construction-installation, testing-adjustment works, the User applies to the Controlling Authority and the Relevant System Operator to verify its readiness for connection to the transmission system.

99. Representatives of the supervisory body and the relevant system operator,

together with the User, shall verify within ten days from the date of the request the fulfillment of technical conditions, the compliance of the construction, installation, and commissioning of newly built and reconstructed facilities with the relevant standards and regulations, as well as the availability of appropriate personnel and operational documentation for the operation of the equipment.

100. On the day of the inspection, a certificate of construction-assembly and adjustment-commissioning works and technical inspection of electrical devices will be drawn up in the standard form specified by the Cabinet of Ministers, one copy will be sent to the User and another copy will be sent to the System Operator.

101. If there are no objections or deficiencies in the inspection report, within five working days, the relevant system operator will issue an operative notice on the provision of electricity to the User’s devices.

102. If the User fails to comply with the requirements of these Rules and other technical documents, or if there are deviations from the relevant standards and regulations during construction, installation, and commissioning works, or if trained personnel and necessary equipment for operating the facilities are not available, or if there is insufficient operational documentation, the supply of power to the electrical facilities will be denied.

103. It is prohibited to refuse the issuance of an operational notification for the supply of electricity to commission the User’s facilities for reasons not specified in Clause 102 of these Rules.

104. After eliminating the reasons for the rejection, an operative notice will be issued on the provision of the appropriate electricity supply within three working days from the day of the second application for putting the User’s devices into operation.

105. In the reconsideration process, it is not allowed to give reasons that were not given in the first refusal.

106. The operational notice on the provision of electricity for the operation of the user’s devices is sent to the user on the day of its issuance.

107. Upon receipt of the operational notification for the provision of electricity, the User shall submit the commissioning program together with the approved commissioning scheme to the relevant System Operator and the System Operator to connect their devices to the grid for agreement and approval.

Chapter 3. Disconnecting from the grid (disconnection), turning off and reconnecting

§ 1. Voluntary disconnection

108. Users have the right, at their discretion, to request that their equipment be disconnected from the transmission system for an unlimited period of time.

109. Users must notify the Relevant System Operator and the System

Operator in writing of their voluntary disconnection decisions at least six months prior to disconnection.

110. The User requesting voluntary disconnection shall bear all costs directly related to disconnection and decommissioning.

111. The Transmission System Operator and the Relevant System Operator shall conduct decommissioning activities and notify other Users who may be affected by the outage activities.

§ 2. Forced disconnection or isolation

112. The operator of the transmission system makes a decision to disconnect or remove the User objects from the transmission system in the following cases:

Order of the Ministry or Regulatory Authority on shutdowning or disconnecting from the transmission system;

System operator's guide;

in emergencies and cases (temporary);

in accordance with the requirements of the connection agreement;

in the case of this system-wide failure (temporarily) that caused the shutdown of the transmission system facility.

113. The transmission system operator is obliged to conduct an investigation in all cases of interruptions and disconnections, and after that to provide a report to the relevant User on the circumstances that compel the above actions.

114. No compensation will be paid for the following interruptions without prior notice or notice to users:

in preventing a situation where damage to human health and safety of objects is inevitable;

in accidents at power stations or facilities connected to the network;

In cases of non-fulfilment of the tasks of the System Operator or the Relevant System Operator by the power plant operators;

when receiving instructions from the electricity supplier;

In other circumstances beyond the control of the respective System Operator and not considered the result of any unintentional actions or violations of the Transmission System Operator.

115. The Transmission System Operator shall formulate and submit the relevant report to the Ministry and the Regulator for taking necessary decisions on further actions.

116. Consumers must comply with the following requirements related to the protection of the electric power system:

forced shutdown of the download;

switching off the load when the frequency drops.

§ 3. Obligations to restore electricity supply

117. The Transmission System Operator will restore the User's electricity supply at reasonable prices and in the shortest possible time in agreement with the System Operator in the following cases:

When the transmission system operator eliminates the emergency situation that caused the disconnection of the User from the source and this is confirmed by the System Operator;

If the transmission system operator has evidence based on the fact that the reasons for disconnection from the source in accordance with these Rules, legal documents or the connection agreement do not exist;

If the provider instructs to restore the connection.

Chapter 4. General connection terms for all Users

§ 1. Frequency requirements. Stagnation in frequency deviation

118. In the transmission system of the Republic of Uzbekistan, the frequency deviation must remain within the limits of ± 0.2 Hz in normal operating modes, and the maximum permissible deviation should be ± 0.4 Hz.

119. All Users must be able to remain connected to the network in the frequency range of 47.0 Hz - 52.0 Hz.

120. Depending on the degree of frequency deviation, all Users must remain connected to the network for the following period of time:

For the frequency range $47.0\ Hz \leq f < 48.0\ Hz$, at least 15 minutes;

For the frequency range $48.0\ Hz \leq f < 49.0\ Hz$, at least 30 minutes;

For the frequency range $49.0\ Hz \leq f < 51.0\ Hz$, unlimited;

For the frequency range $51.0\ Hz \leq f \leq 52.0\ Hz$, at least 30 minutes.

121. When the frequency in the transmission system drops below 47.0 Hz or rises above 52.0 Hz, all Users must be disconnected from the network for a period not exceeding 0.3 seconds.

§ 2. Voltage requirements. Stability in voltage deviations.

122. All Users must remain connected to the network for the following time during the change of voltage level at the point of connection to networks with a voltage of 220 kV and below:

$85\%\ U_{nom} < U \leq 90\%\ U_{nom}$ for at least 30 minutes;

$90\%\ U_{nom} < U \leq 110\%\ U_{nom}$ is not limited;

$110\%\ U_{nom} < U \leq 115\%\ U_{nom}$ for at least 30 minutes.

123. All Users must remain connected to the network for the following time during the change of voltage level at the point of connection to networks with a

voltage of 500 kV and above:

90% U_{nom} < U ≤ 95% U_{nom}, at least 30 minutes;

95% U_{nom} < U ≤ 105% U_{nom} is not limited;

105% U_{nom} < U ≤ 110% U_{nom} for at least 30 minutes.

124. of these Rules122 and 123The requirements specified in clauses are the requirements that must be fulfilled by any User at any connection point of the transmission system.

The system operator has the right to set other, more stringent requirements at the connection point where voltage fluctuations are high or of long duration.

125. In the event of a voltage drop in the transmission system as a result of a short circuit, the User's facility must remain connected to the transmission system according to the following conditions:

if the voltage at the connection point drops to 0 V, the device must remain connected for 0.15 seconds;

if the voltage at the connection point drops below the nominal value, the equipment must remain connected for 1.5 seconds;

if the voltage at the connection point is equal to or higher than the minimum level, the device must remain connected until the fault is eliminated;

the time for the nominal magnitudes of voltage values from 0 percent to 90 percent is determined by linear interpolation in accordance with Appendix 8 to the Rules.

126. In case of high voltage in the transmission system, the User's facility must remain connected to the transmission system under the following conditions:

For up to 50 milliseconds, if the voltage at the connection point is equal to or below 120 percent of the nominal value, the equipment is kept in operation;

50for a period of milliseconds to 1000 milliseconds, the equipment remains in operation at a voltage lower than or equal to the value determined by linear interpolation in accordance with Annex 9 to this Regulation.

§ 3. Eliminate short circuits

127. In the transmission system, the short-circuit clearing time for all voltage levels is determined by the Transmission System Operator and agreed with the System Operator.

In order to ensure selective tripping of only that element of the transmission system where damage has occurred, the tripping time of the protection is set during the commissioning of the equipment.

128. The time to eliminate long-term short-circuits in power transmission networks that must be interrupted by the operation of the first level of protection (except for the high impact of the short-circuit on the transition resistance) should not be higher than:

100 ms in a 500 kV electrical system;

100 ms in the 220 kV electrical system;

150 ms in the 110 kV electrical system.

129. In the transmission system, damage to the remote or adjacent tire must be extinguished by the second stage of remote protection.

130. When the main protection is removed, when the remote protection is activated, the shutdown time should not be higher than the following:

350 milliseconds in a 500 kV power transmission system;

500 milliseconds in the 220 kV power transmission system;

500 milliseconds in the 110 kV power transmission system;

131. Faults in power transformers must be eliminated within 100 milliseconds by activating internal fault protection (differential protection, ground fault protection or gas protection of the transformer).

132. In order to ensure the stability of the electric power system and the safety of the equipment, special protection systems are installed for quick elimination of faults (damage) for bus systems with a voltage level of 110 kV and above.

The time for eliminating faults in tires must not exceed the time for eliminating faults (damages) in electrical networks of the same voltage.

§ 4. Requirements for the quality of electricity

133. The design and placement of the user's equipment should not adversely affect the quality of electricity of third parties during their operation, and should not affect the transmission of information and signals.

The user must minimize the generation of voltage flicker at the connection point.

134. According to the reasonable analysis of the system operator, Users who have unstable (intermittent) consumption or generation devices, which pose a risk to the operation of the transmission system, must construct and agree on the flicker curve.

The planned exposure level of short-term flickers should not exceed 0.8, and the planned exposure duration of long-term flickers should not exceed 0.6.

135. The user must satisfy the permissible limits of generation of high harmonics of current and voltage.

136. Depending on the nominal voltage at the point of connection to the electrical network and the nominal power of the User, the permissible limits of the generation of higher harmonics are defined in the normative documents in the field of technical regulation.

137. After connecting to the network, the fulfillment of the criteria set by the User's equipment for higher harmonics is determined by measuring the higher

harmonics of the current and voltage.

The conformity of high harmonics generated by user equipment to the specified limits is confirmed by the test report of the authorized testing laboratory. The equipment is approved by the Cabinet of Ministers for electromagnetic compatibilitymust meet the requirements of the technical regulations on electromagnetic compatibility of technical equipment.

138. If, after the completion of construction of the power plant, there are still impermissible levels of harmonics of current and voltage, the Transmission System Operator and the System Operator have the right to require the User to take practical measures to reduce the generation of harmonics into the network.

139. The maximum level of individual harmonics is determined by the relevant system operator for each voltage level.

According to the user's requirements, 95% of the 10-minute effective values of each individual harmonic of the voltage at the connection point during a week under normal operating conditions should be less than or equal to the values given in Annex 10 to the Rules. Under normal operating conditions, the total harmonic distortion in the high-voltage transmission system must not exceed 3 percent.

140. In normal operation, the maximum component of the reverse sequence voltage of the transmission system phases should remain below 2 percent. A short-term phase shift with a maximum value of 4 percent is allowed in the case of scheduled shutdowns.

§ 5. Defense requirements

141. The transmission system operator and the system operator show the necessary protection schemes and setpoints for network protection, taking into account the characteristics of the user objects.

142. The user independently develops protection schemes related to the protection of his generating module/equipment in accordance with the manufacturer's requirements and recommendations.

143. The protection schemes required to protect the User's facilities and the protection schemes required to protect the power grid shall be coordinated and agreed upon between the relevant system operator and the User.

144. Internal damage protection schemes and setpoints (setpoints) must not endanger the user's work.

145. The user's electrical protection should take priority over operational management, taking into account the safety of the transmission system, the health of the User and Transmission System Operator's employees, the public, and the reduction of damage to the User's facilities.

146. Protection schemes are organized in accordance with the requirements of the relevant system operator and the system operator specified in the grid connection agreement and may cover the following aspects:

external and internal short circuit;

symmetrical loading (reversed sequence of phases);

increased (lowered) voltage at the connection point;

increased (decreased) voltage at the terminals of the generator;

intersystematic fluctuations;

starting current;

power transmission network protection;

block transformer protection;

backup protection in case of failure of the main protection and non-selective operation of the connections of the distribution device, if it does not turn off;

rate of change of frequency.

147. The user organizes his protection and control devices in the following priority (from highest to lowest):

Protection of the user's objects;

network security;

coordination with the automatic system against accidents;

adjust output active power (for generators only).

148. Model requirements for protection when connecting User facilities to 110 kV networks are developed by the Transmission System Operator and published on its official website. When connecting to 220 kV and 500 kV networks, the protection requirements are adjusted separately for each case.

§ 6. Requirements for real-time communication and data exchange

149. In accordance with the requirements of the transmission system operator, all Users must have real-time measurement facilities. The requirements for real-time measurements are specified in the network connection agreement by the Transmission System Operator for a specific User.

150. Certain types of users should have devices for recording crashes and monitoring the behavior of their systems in dynamics. This object should record the following parameters:

Voltage;

electric current;

active and reactive power;

frequency;

value and phase angles of current and voltage vector quantities;

monitoring and performance statistics of power system power stabilizer and automatic voltage adjuster equipment;

the status of the automatic voltage regulator in the power transformer;

the status of switchgear and emergency signals.

151. All Users must be equipped with meters for active and reactive power. Technical requirements for the accuracy of these meters are determined by authorized organizations, but they should not be in the class below 0.2.

§ 7. Remote control center and monitoring requirements

152. The Transmission System Operator may request the User to designate its dispatching control center when agreeing to connect to the Electric Network at the request of the System Operator.

The user's control center must be in continuous operation mode. With regard to remote management, each control center of the User's facilities must be subordinated to the appropriate regional, regional dispatch control center of the System Operator.

153. User, shall provide remote control of the following from its control center:

35-500 kV automatic circuit breakers, disconnectors and voltage regulators of transformers;

circuit breakers on the low voltage side of the transformer.

154. The user's control center must be sufficiently equipped with the following (defined in the connection agreement):

means of communication (private or leased lines, optical fiber cable, radio relay, high-frequency communication, GSM, e-mail, etc.);

devices for remote data transmission;

devices for reading and changing the parameters of protection devices;

functional requirements for monitoring, control and dispatching devices (systems).

155. Control centers and (or) facility control centers of distribution or distribution system operators connected to generating modules with a voltage of less than 110 kV and an installed capacity of more than 1 MW must have the necessary devices to transmit information about general generation to the control center of the system operator.

156. The Transmission System Operator shall determine the requirements for the remote control and monitoring system between the User and the control center designated by the System Operator during the technical specification/connection agreement process.

157. At a minimum, all Users must enable remote control and monitoring of the following parameters:

current, voltage and frequency at the connection point;

active power and its direction;

reactive power and its direction;

condition of high voltage circuit breakers and disconnectors.

The requirements for data that must be transmitted in real time are detailed in Annex 11 to these Rules. These requirements may be changed by the Transmission System Operator at the time of grid connection.

Chapter 5. Connection conditions for electricity producers

§ 1. Requirements for all manufacturers

158. Generating modules shall be capable of remaining connected to the system at a rate of change of frequency of ±2 Nz/s or less. In cases where the rate of change of frequency exceeds ±2 Nz/s, generating modules can be disconnected from the network after 1.25 seconds.

159. In steady-state voltage and frequency deviations in the network, generating modules must be able to generate active power corresponding to the values allocated by voltage levels at the connection points specified in Annex 12 to the Regulations.

160. Generating modules must be able to limit the output active power in any operating mode and from any operating point to the threshold value required by the System Operator.

The required value must be provided by the System Operator for the connection point and must correspond to the percentage value of the active power at the output of the corresponding generating module available at the same time.

Limiting the output active power to a threshold value should be done in steps of at least 10 percent of the installed capacity of the generating module per minute, without disconnecting the generating module from the grid.

161. The synchronous generation module, as well as the production modules in the fleet of power stations, must be able to reduce (decrease) the active power at the output during frequency overshoots in the Frequency-Responsive Mode (LFSM-O) limited by the increase in frequency in accordance with Appendix 13 of these Regulations. Frequency overshoot is determined by the following formula:

$$\boldsymbol{S} = \frac{\left(\Delta \boldsymbol{f} - \Delta \boldsymbol{f_p}\right) * \boldsymbol{P_n}}{\mathbf{50}\ [Hz] * \Delta \boldsymbol{P}} * \mathbf{100}\%, \qquad [\%]$$

s – statism;

Δf – Frequency deviation;

Δfp is the frequency of activation of high-level regulation, that is, at low frequency;

ΔP – active power change;

Pn is the active power of the synchronous generation module, that is, the current active power at the connection point for power park modules.

§ 2. Connection conditions applicable to synchronous generators

162. The load change rate should not be less than 4% Pnom per minute for turbogenerator modules and 30% Pnom per minute for hydrogen generator modules.

During these changes, a stable value of the active power at the output must be ensured at all operating points between the technical minimum and the rated power.

§ 3. Initial setup requirements

163. Except for combined heat and power plants, every generating module with a nominal installed capacity equal to or greater than 50 MW shall be capable of primary adjustment.

164. Each generating module with a nominal asset capacity of less than 50 MW may have the possibility of primary adjustment in accordance with the agreement with the System Operator.

165. The following requirements apply to all generator modules where default adjustment is applied:

the primary adjustable range should not be less than ±2 percent of the rated active power;

active power characteristic - the frequency of the primary control device should be adjusted in the range of 4-6 percent;

primary rectification activation time - commands primary rectification up to 2 seconds after exposure, commands 50 percent or less of full primary rectification power within 15 seconds maximum of primary rectification, 50 percent to 100 percent of full primary rectification in the case of external influences requiring engagement, the initial adjustment time is determined from a linear relationship in the range from 15 to 30 seconds;

operational setpoint - the primary backup should be fully involved when the frequency level deviates from the quasi-steady mode by ± 200 mHz;

the duration of primary reserve recruitment should not be less than 15 minutes;

the insensitivity zone of the frequency adjuster should not exceed ± 10 mHz;

measurement accuracy should be less than or equal to 10 mHz;

the insensitivity (dead) zone of the primary adjustment should be within the limits of 0 to ± 20 mHz;

the period of measuring the rotation frequency of the primary rectification generator should not exceed 0.1 seconds;

monitoring interval should be 1 second (recommended), maximum 10 seconds.

166. If the generating module is capable of operating in primary adjustment mode, it shall be equipped with appropriate devices to participate in primary adjustment (on/off) and to signal its status to the transmission system operator's dispatch control and data acquisition software-hardware complex (SCADA) system, and the controller must receive a signal from the Transmission System Operator to

activate and deactivate the primary adjustment.

§ 4. Requirements for secondary adjustment

167. Each hydro-generating module with a rated power equal to or greater than 20 MW ($P_{nom} \geq 20$ MW) must be capable of secondary adjustment and provide a minimum adjustment range of 30 percent of the rated power (0.3 P_{nom}).

168. Except for generating modules designed for the production of heat and electricity every turbogenerator module with a rated power equal to or greater than 150 MW ($P_{nom} \geq 150$ MW) must be capable of secondary adjustment, the minimum amount of adjustment is 15 percent (0.15 P_{nom}) of the rated power for coal-fired turbogenerators and gas or other fuel should be 25 percent (0.25 P_{nom}) for operating turbogenerators.

169. Generating modules and battery energy storage systems with secondary adjustment provide the following information to the Transmission System Operator's Automatic Control System (SCADA):

maximum and minimum power of the generating module during secondary adjustment;

change in active power fluctuation when secondary adjustment starts;

base power of the generating module;

generating module secondary tuning device status (on/off);

information needed to calculate the share of the generator's participation in the secondary adjustment.

170. The generating module and the battery energy storage system participating in the secondary adjustment must be able to receive the following information in operational mode from the Transmission system operator's automatic control system (SCADA):

status of secondary adjustment command (secondary adjustment on/off), current required power for secondary adjustment;

status of distribution devices in the transmission system to which the generating module is connected;

current values of voltage, frequency, active and reactive power currents in transmission system devices to which the generating module is connected.

§ 5. Requirements for tertiary adjustment

171. Synchronization time of all hydrogen generator modules with transmission system should be less than 15 minutes.

172. Synchronization time (for both modes) with the transmission system of hydroelectric power stations capable of operating in generator mode by raising and lowering water in pumping mode with reversible cycles, i.e. hydroaccumulating power station units, should be less than 15 minutes.

173. Synchronization time of all generator modules of combined cycle power plants with the transmission system should be less than 30 minutes.

174. Each generating module must be able to operate in the limited (reduced) production mode of active power. The minimum level of generation, known as the technical minimum, which guarantees the stable operation of the generator, must correspond to the following values:

for hydrogen generators - $P_{min} \leq 0.45\ P_{nom}$;

for coal-fired turbogenerators - $P_{min} \leq 0.7\ P_{nom}$;

for turbogenerators running on gas or fuel oil - $P_{min} \leq 0.4\ P_{nom}$;

for mixed cycle generators:

for a gas turbine - $P_{min} \leq 0.4\ P_{nom}$,

for a steam turbine - $P_{min} \leq 0.8\ P_{nom}$;

for other types of generators $P_{min} \leq 0.8\ P_{nom}$.

§ 6. Voltage adjustment requirements

175. The generating module must be able to adjust the voltage in the ranges according to Appendix 14 of this Rules. Regardless of whether the generating module is involved in primary or secondary adjustment, it must be able to adjust the voltage continuously within the normal values of the voltage, and temporarily when the voltage is outside the range of normal values.

176. When the voltage falls below the normal operating voltage range, the generator shall increase the excitation current by a minimum of 2 percent for each percent that the voltage falls below the normal range limit, with the ability to increase the excitation current by a maximum of 200 percent.

The increase in excitation current shall begin no later than 20 milliseconds after the voltage dip and continue for at least 500 milliseconds after the voltage has returned to the normal operating range, but not more than 10 seconds after the voltage dip.

§ 7. Dynamic stability in short circuits in transmission networks

177. If the power of the short-circuit on the high-voltage side of the step-up transformer is six times or more than the rated power of the generator, the protection system in the transmission system must ensure that the short-circuits are turned off without a delay of 150 milliseconds to prevent the shutdown of the generating module due to stability failure. In this situation, it is assumed that the generator's own needs are not transferred to another source.

§ 8. Dynamic stability in small impacts

178. Fluctuations of active power currents of small effects in the transmission system should not cause the generator to shut down from the network or reduce the active power generation by operating protective devices.

§ 9. Switching the generator to meet your own needs

179. A turbogenerator module with a nominal capacity of more than 100 MW, as well as all hydrogenerators, regardless of their installed capacity, must have the following capabilities for frequency or voltage deviations from the permissible limits:

to reconnect to self-sufficiency;

to reconnect to the grid for 15 minutes after a shutdown caused by a voltage or frequency deviation.

180. The ability to reconnect the generating module to the mode of covering its own needs should also be provided in the event of a breakdown of the transmission system according to the protection design scheme.

181. After the energy block is transferred to the mode of covering its needs, the turbogenerator module must maintain the ability to work in this mode for at least 60 minutes.

§ 10. Ability to launch from scratch

182. After a complete shutdown, the restarting of the generating module disconnected from the alternating current network without an external power supply source by means of a special backup energy source and maintaining the voltage and frequency, that is, the ability to launch from scratch, is agreed upon during the connection process to the transmission system and is registered in the relevant connection contract.

183. The ability to launch the generating module from scratch shall be provided at the request of the System Operator to restore the power system after a partial or complete blackout.

184. Operation of the generator module in this mode should be ensured for at least 15 minutes.

§ 11. Possibility to operate separately

185. The possibility of separate operation of the generating module must be agreed during the connection process to the transmission system and listed in the relevant connection contract.

186. The possibility of separate operation of the generating module must be provided at the request of the System Operator to restore the power system after a partial or complete power outage.

187. A generating module with the possibility of separate operation must work synchronously in the network surrounded by power production above its own demand and below the rated capacity of this generating module. Separate operating mode must be at least six hours.

188. When the generating module is in stand-alone mode, it must be able to rapidly change the generation up to 10 percent of the nominal capacity.

§ 12. Stability Requirements

189. Turbogenerators with a capacity of more than 200 MW and hydrogenerators with a nominal capacity over 100 MW must be equipped with a power system stabilizer (PSS).

190. The system operator determines the setpoints for the power stabilizer of the power system, taking into account the following:

the device does not respond to changes that do not cause vibrations;

the output signal of the power stabilizer device does not exceed the range of ± 10 percent of the input signal of the voltage regulator;

does not cause rotational oscillations in other generating modules.

Chapter 6. Connection conditions applicable to renewable energy sources

§ 1. Types of renewable energy sources

191. Technical requirements for connecting generating modules based on renewable energy sources are divided into the following types depending on the total nominal capacity of renewable energy sources:

Type "A" - installed power 1 kW renewable energy sources up to 50 kW;

Type "B" - renewable energy sources with installed power from 50 kW to 500 kW;

Type "C" - renewable energy sources with installed capacity from 500 kW to 20 MW;

Type "D" - renewable energy sources with an installed capacity of more than 20 MW.

§ 2. Requirements for adjusting the active capacity of renewable energy sources

192. Generating modules based on renewable energy sources connected to low voltage networks must be able to switch off at the connection point, generating modules based on renewable energy sources connected to medium and high voltage networks on the low voltage side of each block transformer.

193. It is not allowed to connect renewable energy sources directly to high-voltage power grids. It is allowed to connect to power grids with a voltage of 110 kV and higher only by constructing existing or new substations or distribution facilities in accordance with the Grid Connection Research and Connection Contract in agreement with the Transmission System Operator.

194. Type "A" renewable energy sources are automatically disconnected from the grid and reconnected.

195. "B", "C" and "D" types of renewable energy sources must be remotely shut down at any time by the network operator or System Operator to which they are connected, or have the means to limit their output active power.

196. If the "A" renewable energy source is switched off/off due to a grid failure, it can be automatically reconnected to the grid for a period not exceeding 5 minutes after normal operating conditions are restored. The setpoint of connection delay time relays and their setpoints shall be agreed with the relevant system operator.

197. If renewable energy sources of type "B", "C" and "D" are switched off due to a grid failure, then the renewable energy sources can only be reconnected to the grid with the permission of the Relevant System Operator or the System Operator.

198. Renewable energy sources shut down due to external reasons (natural events, weather) can be automatically reconnected to the grid after the elimination of this reason, informing the System Operator.

199. Renewable energy sources are disconnected from the network due to external reasons or before an emergency situation occurs in the network, and these devices cannot be automatically reconnected even if the operating conditions of the single electric power system return to normal. Their reconnection is allowed only after the instruction of the System Operator.

200. If renewable energy sources of type "A" and "B" are disconnected (switched off) from the network due to an internal fault, they may be reconnected after elimination of the faults without consultation with the relevant system operator.

201. The synchronous generating module, as well as renewable energy sources of types "B", "C", and "D", are equipped to increase active power at low frequencies in accordance with the static data determined by the formula specified in Appendix 15 and Clause 161 of the Rules.

202. In order to create a sufficient reserve for balancing the electric power system, the System Operator together with the Transmission System Operator has the right to demand the installation of battery energy storage systems in the amount of 30 percent of the installed capacity of renewable energy sources of type "C" and "D" with an installed capacity of more than 10 MW.

203. Renewable energy sources must be able to reduce the nominal asset power by 25% of the total installed power in one minute.

204. Generating modules must be equipped with equipment that allows the static limit and frequency deviation to activate the active power increase to 2-12 percent, that is, in the range from 49.8 Hz to 49.5 Hz, according to the conditions of intersystem operation. The system operator determines the fixed static limit of the frequency deviation, and this value can be changed over time.

205. The generator module must provide stable tuning up to the technical maximum level of its output in low frequency modes. During operation in this adjustment, the generating module is not involved in the primary and secondary adjustment and is not responsible for this function.

206. The operator of the power plant must inform the System Operator about the actual speed of the response to the correction in high frequency modes.

If this reaction time is slower than 2 seconds, the Power Plant Operator will have to prove to the System Operator that the reaction time is technically not possible to be faster than this.

207. When the frequency decreases below 49 Hz, the reduction in active power does not exceed 2 percent of the full power (full power at a frequency of 50 Hz) for every 1 Hz reduction in frequency.

208. renewable energy sources of "C" and "D" types with an installed capacity of more than 5 MW must provide the System Operator and its regional units with the possibility of remote control of output active power limitation.

209. Type "C" and "D" renewable energy sources with an installed capacity of more than 5 MW must be equipped to participate in secondary adjustment for frequency adjustment and fast tertiary adjustment downward.

They must install all necessary means of data transmission and control signal communication to the dispatch control center of the System Operator.

The provision of these support services by renewable energy sources is carried out on the basis of a contract with the Transmission System Operator and is regulated by this contract.

§ 3. Voltage adjustment requirements for renewable energy sources

210. At the request of the relevant system operator, type "A" renewable energy sources are required to be capable of providing a power factor adjustment range of 0.95 inductive nature and 0.95 capacitive nature at the point of connection.

211. Voltage adjustment of "B" type renewable energy sources connected to electric grids is ensured using the setpoints determined by the relevant system operator for the working voltage at the connection point. The operating voltage setpoint for these renewable energy sources is selected by:

agree on the installation costs;

creating a voltage profile diagram ;

setting the operational setpoint online .

212. When the setpoint value is given operationally (online), the corresponding new requirements for the operating voltage setpoint must be set for one minute at the connection point.

213. Type "C" and "D" renewable energy sources must be able to automatically adjust the reactive power in voltage maintenance, reactive power maintenance modes or power factor maintenance mode.

214. The amplifier or power transformer of all renewable energy sources must be equipped with voltage regulators in proportion to the characteristics of the generating module (adjustment range and step). Booster or power transformers of type "D" renewable energy sources must be equipped with a on-load tap changers .

215. The renewable energy sources included in the consumer equipment must

meet the voltage requirements in accordance with the rules for the use of electricity for consumers or the rules approved by the transmission system operator for enclosed networks.

216. The ability to adjust the voltage of all renewable energy sources, except for "A" types, is limited by the technical condition of the operating circuits.

217. For operation in voltage maintenance mode, renewable energy sources of types "C" and "D" with a step of no more than 0.01 n.b., in the range of 0.95 - 1.05 n.b., with a step of no more than 0.5 percent , it should be able to maintain the voltage at the connection point by exchanging reactive power with the network with the smallest change slope of 2-7 percent.

When the voltage value at the connection point is equal to its given value, the reactive power at the output of the generating module should be zero.

218. The setpoint is 1 n.b. from the installed voltage of the network with a step of no more than 0.5 percent. can operate with or without a dead zone selectable in the range from zero to ±5 percent.

219. Type "C" and "D" renewable energy sources, after step changes in voltage, must be able to achieve 90% of the output reactive power change for 30 seconds and recover to values according to the slope of the change with a step of no more than 5% from the maximum reactive power for 60 seconds.

220. In reactive power holding mode, renewable energy sources of types "C" and "D" must be capable of supplying reactive power within any range, controlling the reactive power at the connection point with a precision margin of ± 5 MVar or ± 5 percent (depending on which indicator is used), and delivering the specified value of reactive power in steps of ± 5 MVar or ± 5 percent (depending on which indicator is smaller) from the full reactive power.

221. In the power factor adjustment mode, renewable energy sources of types "C" and "D" must be able to maintain the power factor at the point of connection within the limits of the range specified in Appendix 16 to this Rules, with a step not exceeding 0.01.

After a sudden change in the output active power, the System Operator shall specify the time interval and power factor tolerance to achieve the required power factor. The deviation of the permissible power factor is represented by the permissible value of the corresponding reactive power.

Allowed reactive power must be expressed either as an absolute value or as a percentage of the maximum reactive power of "C" and "D" types of renewable energy sources.

222. The system operator shall specify which of the above three options of reactive power adjustment modes and associated setpoints are to be applied to the relevant renewable energy generating module and what additional equipment is required to remotely provide the corresponding setpoint.

§ 4. Reactive power requirements for renewable energy sources

223. The following diagrams characterize the minimum technical capabilities of renewable energy sources of types "C" and "D" for voltage/reactive power holding.

The reactive power of the generating module and its adjustment capability must be fully utilized.

If the reactive power of the generating module cannot meet the voltage adjustment needs of the electric power system, centralized reactive power compensating devices should be installed in renewable energy sources, and dynamic reactive power compensating devices should be installed if necessary.

These devices should be installed based on the results of the study and in accordance with the specifications for the respective User's network connection.

224. Renewable energy sources of type "C" and "D", as specified in Appendix 16 to the Rules, providing the magnitude of reactive power characterizing the range of reactive power to the maximum power from + 0.4 to - 0.4, with active power transmission below the maximum value should be able to work.

When operating with active power transmission below maximum power ($P < P_{max}$), "S" and "D" type renewable energy sources must provide reactive power at any operating point of their PQ/P_{max} characteristic.

If all of these renewable energy units are technically in use (unless they are shut down for maintenance or failure), the reactive power may be less than otherwise technically feasible.

225. Type "C" and "B" renewable energy sources must be able to switch to the required values at any operating point within the limits of their PQ/P_{max} description, according to the temporary requirements obtained from the relevant system operator and specified in the connection agreement.

§ 5. Requirements for short-circuit currents for renewable energy sources

226. Asynchronous generation modules of renewable energy sources must support the grid voltage with additional reactive current when the voltage drops. For this purpose, when the voltage of the electric grid drops by more than 10 percent from the actual value of the voltage of the generating module of renewable energy sources, the voltage regulator must be adjusted as shown in the graph in Appendix 17 to these Rules.

Taking into account the use of different types of generating technologies in a single electric power system, the System Operator instructs asynchronous renewable energy sources to maintain the reactive current flow for each individual connection point.

227. Renewable energy sources should be able to supply the required reactive power no later than 40 milliseconds after the occurrence of external effects in the network (start-up time).

It allows measuring the voltage at the terminals of the electrical energy generating equipment inside the renewable energy sources.

When necessary, renewable energy sources should be able to generate reactive power at a rate not less than 100 percent of the rated current.

228. After the voltage is restored within the limits of the permissible range, it must hold the voltage for another 500 milliseconds according to the given characteristic.

After the voltage has been restored, the transition recovery processes must be completed within 300 milliseconds.

If the renewable energy generating modules are located relatively far from the connection point and are ineffective in maintaining this voltage, the System Operator will request that the voltage drop at the connection point be measured and that the voltage at the connection point be maintained depending on the measured value.

§ 6. Special requirements for wind power plants

229. The wind generator module must provide the following additional information to the system operator in operational mode:

the number of wind generators in operation;

the number and reason of non-working wind generators (strong (weak) wind speed, breakdown, repair).

230. The wind generator module must be equipped with the ability to transmit the following meteorological data in operational mode to the technical management systems of the Transmission System Operator and the System Operator:

wind speed and direction at the set height;

air temperature and atmospheric pressure, in the range of 735-1060 mbar.

Chapter 7. Terms of connection for consumers

231. Consumers and/or Distribution System Operators who operate a continuous load connected to the transmission system or participate in load adjustment must have the technical ability to provide information about the actual load on the devices to the System Operator.

232. Consumers and/or Distribution System Operators operating continuous load or participating in load adjustment must be able to receive the following information from the Transmission System Operator's SCADA system in operational mode:

command status to disable the download (on/off command);

the required size of the circuit (control signal in the adjustment circuit);

Connection status of the distribution device connected to the consumer object;

Current values of voltage, frequency, active and reactive power currents in transmission devices connected to the consumer facility.

233. Consumers connected to the transmission system and (or) networks of distribution system operators must be able to disconnect from the network according to the remote action or demand of the system operator.

The transmission system operator may specify requirements for automatic disconnection equipment in the grid connection agreement.

234. Consumers connected to the transmission system and (or) networks of distribution system operators must provide the possibility of automatic "low-frequency" disconnection of a part of their consumption in order to protect the electric power system by reducing (reducing) the load in low-frequency modes.

The system operator can specify a shutdown pulse based on a combination of low frequency and frequency rate of change.

235. Consumers connected to the transmission and (or) distribution system must agree with the System Operator about the protection schemes and setpoints for their facilities.

Minimum security requirements include:

protection against external and internal short circuit currents;

protection against overvoltage and voltage drop at the point of connection to the transmission system;

protection against overload and frequency drop;

protection against failures in switching equipment;

backup protection.

236. Consumers must ensure that the power factor is maintained within the limits of 0.95 inductive nature and 0.95 capacitive nature at the point of connection to the transmission system.

Chapter 8. Connection conditions for battery energy storage systems

§ 1. General conditions for connection of battery energy storage systems

237. The requirements presented in this chapter apply to battery energy storage systems with an installed capacity of 500 kW and more, connected to a single electric power system.

238. The general requirements given in the Rules of chapter 4 of Section 0 the also apply to the battery energy storage system.

239. The requirements for synchronous generator modules are applied to battery energy storage systems connected to the single electric power system through synchronous generator networks.

240. Requirements for renewable energy sources are applied to battery energy storage systems connected to a single electric power system through an asynchronous generating module (renewable energy sources) or electrical

engineering devices (inverters).

Each battery energy storage system must be capable of automatically switching to injection (power generation) mode from consumption mode (power consumption) before the activation of the automatic low-frequency consumption shutdown. Based on the characteristics of this possibility, the system operator determines the time required for the automatic transition of the battery energy storage system from the consumption mode to the production mode.

241. The optimal working area for the battery energy storage system must be in accordance with Appendix 18 of these Rules.

242. The battery energy storage system must withstand a voltage drop without interruption at the connection point in accordance with Appendix 19 of this Rules.

243. In case of frequency overshoot, battery energy storage systems operating in consumption mode (active power absorption) must increase the consumption power based on the limited Frequency-Responsive Mode (LFSM-O) characteristic of frequency increase in accordance with Appendix 20 of this Rules.

Each battery energy storage system must also have an access port that allows for the rapid cessation of active power intake (consumption) based on the instructions from the System Operator.

244. The response of the battery energy storage system when the frequency decreases should correspond to the characteristic of the limited Frequency-Responsive Mode (LFSM-U) in the frequency decrease in accordance with Appendix 21 of this Rules.

The system operator considers the time needed to switch from consumption to generation mode or vice versa for certain technologies of the battery energy storage system, and the possibility of reducing power in both consumption and generation modes.

245. At the maximum production and consumption of active power, the battery energy storage system must be able to produce and consume reactive power at the connection point in the full operating range in accordance with Appendix 22 of these Rules.

246. Battery energy storage systems must be able to produce and consume reactive power at the point of connection in the full operating range in accordance with Appendix 23 of these Rules at maximum active power generation.

§ 2. Reactive power management in battery energy storage systems

247. Battery energy storage systems must be able to provide and receive reactive power at the level specified in these Rules at the connection point. Adjustment of reactive power is carried out as follows:

2 seconds are applied after receiving a command to change the specified setpoint;

starts within 2 seconds after receiving instructions to change the specified setpoint to a new value;

the installation of the new equipment will be completed in 30 seconds.

248. Reactive power management is adjusted using:

the maximum error of the rated reactive power should not exceed 5 percent, where the accuracy is measured for 1 minute;

the accuracy is equal to or better than 5 percent of the rated reactive power.

§ 3. Requirements for power factor control in battery energy storage systems

249. Battery energy storage systems must be able to supply and receive (power factor control) active and reactive power at the connection point according to the power factor. Adjusting the power factor must meet the following:

execute a change command within 2 seconds after receiving a command to change the specified setpoint;

start adjustment within 2 seconds after receiving instructions to change to a new setpoint;

complete the adjustment within 30 seconds of receiving a command to change to a new setpoint.

250. Power factor control is adjusted by:

the maximum error should be ± 2 percent of the nominal reactive power value of battery energy storage systems, where the accuracy is measured over 1 minute;

accuracy must be equal to or better than 0,01.

§ 4. Voltage control in battery energy storage systems

251. Battery energy storage systems must be able to supply and receive reactive power, thereby maintaining a stable and constant voltage at the point of connection.

The voltage adjustment shall be capable of performing 90 percent of the setpoint within 1 second and the remaining 10 percent within 5 seconds of being instructed to change the setpoint.

Voltage adjustment is adjusted using:

maximum error of rated reactive power should be ±5 percent, where the accuracy is measured for 1 minute.

A decrease of 0.5 percent or more is allowed. It should be possible to adjust the decrease in the range of 2-7 percent

the step size for the dead zone shall be set within ±5 percent of U_{ref}, not exceeding 0.25 percent for 220/400 kV and 0.5 percent for 132/150 kV, and shall be symmetrical with respect to the specified voltage adjustment point.

The setpoint specified by the respective system operator in the normal operating voltage range.

§ 5. Management ability of battery energy storage systems

252. Battery energy storage systems must be equipped with control and protection systems that allow adjusting the active power to predetermined values during commissioning by the relevant system operator.

253. The protection system shall adjust the active power of the battery energy storage systems to one or more predetermined points in production and consumption modes in response to the instruction received from the relevant system operator.

Battery energy storage systems must have at least five adjustable control levels in production and consumption mode, which are set to the following levels, unless otherwise provided by the relevant system operator:

70 percent of nominal capacity;

50 percent of nominal power;

40 percent of nominal capacity;

10 percent of nominal power;

uninterrupted, 0 percent of nominal power.

254. In accordance with Clause 253 of these Rules, the control capability must begin within 1 second and be fully implemented within 10 seconds.

255. The accuracy of the completed or continuous adjustment should not deviate more than 1 percent from the specified value measured for 1 minute.

256. Protection requirements and related setpoints for battery energy storage systems or when these systems are part of another facility are defined for the entire facility at the grid connection point.

The Transmission System Operator and/or the Distribution System Operator may allow different protection setpoints in agreement with the Battery Energy Storage Systems Operator.

257. Protection and control functions in battery energy storage systems should be prioritized in the following order:

protection of grid and battery energy storage systems;

synthetic inertia where applicable;

frequency control (active power adjustment);

power limitation;

power gradient limitation.

258. Devices of battery energy storage systems must be able to perform power fluctuation damping. Power vibration damping must meet the following requirements:

a) fluctuation of active power generated by battery energy storage systems should not exceed ± 0.5 percent of current electricity production or ± 0.25 percent of consumption at frequencies from 0.1 Hz to 50 Hz;

b) power fluctuations that exceed the limit indicated in sub-paragraph "a" of this paragraph must be damped to the limit values within 180 seconds after exceeding the limit;

c) power fluctuation damping property applies to all voltages in the normal operating range for voltages and frequencies and in the time-limited operating voltage range;

g) the requirements are applied and checked for normal, stable conditions after certain events occurring at the connection point and outside the battery energy storage systems.

In the case of repeated events in the power system, power fluctuations must be damped to threshold values within 180 seconds after the last event in the power system.

259. All battery energy storage system devices with capacity above 1 MW must provide primary rectification, secondary rectification, fast tertiary rectification and zero-start services.

260. All battery energy storage system devices involved in the provision of additional services must be equipped with a logical interface (input port) so that it can respond to instructions received through the input port.

The respective system operator has the right to set the equipment/device requirements for remote control of this function.

261. Battery energy storage system devices must provide the following information to the Transmission System Operator or Distribution System Operator and the System Operator’s Control Center:

network disconnection - status;

automatic circuit breaker of battery energy storage systems - status;

active power measurement and control – status (on/off) and control signals;

reactive power measurement and control – status (on/off) and control signals;

power factor measurement and control – status (on/off) and control signals;

planned active power in production and consumption mode;

voltage measured at the connection point;

voltage control (on/off), decrease control;

security systems information;

stop/hold signal.

Section 4. Operational planning

Chapter 1. Purpose and scope of operational planning

262. Operational planning in the transmission system is a real-time preparation process for operational activities carried out by the system operator in cooperation with all operators and users, covering a period of one day to one year. The time frame of this process consists of year, season, month, week and day.

263. Operational planning ensures the safe, stable and efficient operation of the transmission system in real time by pre-estimating all situations that may affect the operational safety of the single electric power system, the safety of personnel and equipment at different time intervals.

264. The main goals of operational planning are:

ensuring high reliability of electricity supply to final consumers;

optimization of available resources and organization of effective operation of single electric energy system and facilities belonging to Users.

265. Operational planning includes the following activities:

schedule shutdowns (breaks);

security assessment (consumption and production forecast, power reserve assessment and transmission system compatibility assessment);

planning (daily work plans, graphics development).

Chapter 2. Management of Outages in the Transmission System

§ 1. General Conditions for Managing Outages

266. Outage management planning in the transmission system includes coordination of scheduled outages by the System Operator in all facilities of the transmission system, implementation of unplanned outages and handling of situations related to forced outages.

267. The organization of outage and repair work should be carried out in accordance with the recommendations of equipment manufacturers, as well as internal regulations for specific types of equipment, and should include:

development of outage and maintenance documentation;

planning and preparation for outage activities;

implementation and commissioning of planned works;

assessment of the quality of equipment repair and maintenance work;

reception arrangements.

268. The period and duration of all types of technical maintenance and (or) repair work, with the need to keep them in good working condition in accordance with the regulatory documents in the field of technical regulation, taking into account the manufacturer’s recommendations, the period of use of the equipment and the actual technical condition and changing working conditions is determined.

For certain types of equipment, additional requirements are specified in the Repair Regulations.

§ 2. Scheduled outages

269. Planned outages are organized to carry out repair and (or) maintenance work of objects in the transmission system (electrical transmission networks, cable

lines, substations, power transformers).

270. All scheduled outages in the transmission system must be coordinated as much as possible with outages in the generation capacity and distribution networks.

The main goal of coordination of shutdowns is to reduce the duration of interruptions in electricity supply to final consumers, to ensure the effectiveness of the measures while maintaining the quality indicators of the supplied electricity.

271. When performing any work in the transmission system, including switching off transmission facilities, all safety measures must be taken in accordance with the requirements of normative legal documents, technical regulatory documents.

272. Shutting down of equipment and facilities for maintenance/repair works and putting them into operation is carried out in accordance with the terms specified in the relevant outage schedule and in agreement with the dispatching service responsible for the level of affiliation of the transmission networks.

273. Outage schedulening, implementation, repair, maintenance is carried out in accordance with the System Operator’s "Procedure for Managing Outages in the Transmission System" document.

274. Outage schedulening coordination is done at yearly, monthly and daily intervals.

275. The annual outage schedule for the facilities of the electric power system (hereinafter referred to as the Annual Outage schedule) is prepared for the current year, covering the period from January 1 to December 31 of the following calendar year, broken down into quarterly, monthly, and weekly intervals for necessary outages.

276. The annual outage schedule is developed based on the following outage schedules in the transmission system:

outage schedule of intersystem power transmission networks - this plan must be agreed with operators of neighboring power systems;

outage schedules of generating facility devices connected to the transmission system – generation facility operators submit their outage schedules to the System Operator;

outage schedules of battery energy storage systems connected to the transmission system;

outage schedulesof Consumer facilities connected to the direct transmission system – Operators of Consumer facilities submit outage schedules to the System Operator;

outage schedules in distribution networks – Distribution system operators are required to submit to the System Operator outage schedules for their equipment at the boundaries of the transmission system.

All Users must submit the Annual Outage schedule to the System Operator by September 15 of a year.

277. The system operator develops an Annual Outage schedule. When developing the proposed plan of annual outages, the System Operator takes into account the relevant proposals of the Users and uses all possibilities to organize outages in the transmission system facilities effectively.

The initial draft of the annual outage schedule will be sent to Users by October 1 of the current year.

278. Users will submit their proposals and comments to the System Operator regarding the draft of the Annual Outage schedule submitted by November 1 of current year.

279. The System Operator will study and take into account, as far as possible, the suggestions and comments submitted by the Users regarding the Annual Outage schedule. Conducts negotiations with Users in order to find a convenient solution as necessary.

The System Operator makes the final decision on issues that are not mutually agreed upon during negotiations. The Annual Outage schedule agreed with the parties shall be accepted by the System Operator by December 1 of the current year.

280. The System Operator shall provide the Annual Outage schedule to all Operators and Users for implementation and to the Ministry and the Regulatory Authority for information.

281. After the adoption of the annual outage schedule, amendments and additions are made to it in accordance with the procedure used for the adoption of this plan.

282. Users should submit proposals for changes and additions to the Annual Outage schedule to the System Operator thirty days before the deadline for making changes.

283. The monthly outage schedule for the first month of the year is developed and approved together with the annual outage schedule.

284. Plans for future monthly outages will be developed based on the Annual Outage schedule and the need to make changes to the plan adopted by the System Operator and on the basis of requests submitted by Users.

285. Monthly outage schedules are created in the daily outage schedules section.

286. Users' proposals for the monthly outage schedule must be sent to the System Operator at least forty-five days before the beginning of the relevant month, except for the outage schedule for the first month of the year, where the proposals are submitted together with the Annual Outage schedule.

287. The monthly outage schedule is drawn up at least thirty days before the start of the respective month.

The system operator provides the monthly outage schedule to the Users at least twenty-five days before the start of the implementation of these activities.

288. Monthly outage schedules may be changed by the System Operator upon

reasonable cause and at the request or consent of all Parties and Users participating in these processes.

Changes are considered to apply to the period from the moment of the occurrence of the situation that caused the change to the end of the month in which the outage schedule was adopted.

289. Users can send a request for changes to the monthly outage schedule to the System Operator at least 2 weeks before the beginning of the next month.

290. Daily outage schedules are based on monthly outage schedules and are presented in the hourly outage schedules section.

291. The outage schedules set according to the monthly outage schedules can be revised based on the approved applications for extending the duration of the initiated outages or delaying the outages, requests for changes from the dispatching service of the System Operator, as well as requests for disaster recovery.

292. If, due to reasonable reasons, the work planned in a certain object of the power transmission system is not completed or completed within the period specified in the daily outage schedule, the User must notify the System Operator of a new outage period.

The new outage period must not conflict with the accepted outage schedules.

It is the responsibility of the System Operator and the User to set new deadlines for delayed or extended outages.

293. The System Operator shall follow internal procedures for coordination and approval in order to perform planned outage activities of the transmission system facility.

The system operator notifies the users whose system is expected to change as a result of the planned activities at least three days before the outage, about the start and duration of the outage.

294. In order to carry out planned outage activities, Users must send a outage request in the prescribed form to the System Operator.

295. Users must send notification of planned outages for the next week to the System Operator by 10:00 on Wednesday of the current week.

In the event of an emergency, the User must immediately notify the System Operator to take urgent measures for unscheduled outage.

296. The permission to carry out outages planned for the next week must be given by the System Operator to the Users by 15:00 on Thursday of the current week, for unscheduled (emergency) work immediately, no later than 60 minutes after receiving the message.

297. After the completion of the scheduled outage activities, before putting the facility into operation, the System Operator will notify all Users affected by the power supply regime as a result of the outage.

298. After the completion of planned works for outages, commissioning of the User’s facility is carried out in agreement with the dispatcher of the System

Operator.

§ 3. Unscheduled outage

299. Unscheduled outages are outages that are not specified in the scheduled outage schedules, must be performed due to an emergency situation, and cannot be delayed for the period specified in the next outage schedule.

300. If one of the Parties in the transmission system requests permission for an unscheduled outage, and this outage does not affect other scheduled outages or Users, the System Operator will include the requested outage in the Outage schedule.

301. If the requested unscheduled outage affects other scheduled outages or the electricity supply regime of the Users, the System Operator will negotiate with these Users in order to facilitate the implementation of this outage.

302. If the User's facility requires an unscheduled outage, the relevant User must immediately send a request for unscheduled outage to the System Operator, indicating the reason for the outage, the planned date and start time, as well as the duration of the outage.

303. After receiving a request for an unscheduled outage, the system operator will immediately review it, analyze the impact of this situation on the transmission system and other Users, and inform the requesting Party about the most optimal solution for performing this unscheduled outage.

§ 4. Forced outage

304. Forced outage is an outage that occurs instantly or for a very short period of time, beyond the control of the System Operator.

305. Forced outage affecting the User's facility shall immediately inform the System Operator about the event and the expected duration of the outage, along with the necessary details.

306. If a forced outage affects transmission system facilities, the System Operator shall promptly notify the relevant Users of the expected duration of the outage, along with the necessary details of the event.

307. If the forced outage of the transmission system objects leads to the limitation of the electricity supply of the distribution system or the directly connected User or the inability to transmit the electricity produced from the generating facility, the System Operator must immediately inform the relevant User (Users) about the reasons for the forced outage and the duration of the outage.

308. After the situations that led to the forced outage have been eliminated and the devices affected by the disconnection have been restored to operation, the process of putting the User's equipment into operation is carried out only in coordination with the authorized dispatch center of the System Operator.

309. After the reasons that led to the forced outage of the user's equipment have been eliminated and the functionality of the devices affected by the outages has

been restored, the System Operator will inform the Users affected by the outages of the power supply mode about the connection of the relevant devices and equipment of the transmission systems.

Chapter 3. Assessment of the reliability of the electric power system

§ 1. General conditions for assessing the reliability of the electric power system

310. Reliability assessment of the electric power system is an activity carried out by the system operator, which provides an assessment of the important parameters of the electrical power system and provides an analysis of the conformity of the electricity system's operation during the period of time during which the assessment is carried out.

311. As part of the operational planning, the reliability assessments of the electric power system is carried out regularly on a seasonal basis, with daily updates. In exceptional cases (severe droughts, fuel outages, extreme weather conditions, etc.), the assessment of the conformity of the electric power system can be carried out for a shorter period of time.

312. The results of the assessment of the conformity of the electric power system (for the year, season, month, certain time intervals) are the forecast of the conformity of the transmission system, announced by the system operator.

§ 2. Consumption forecast

313. From the point of view of operational planning, the consumption forecast includes the forecast of the annual, monthly and daily electricity demand of the electric power system.

The consumption forecast also includes forecasts of maximum and minimum consumption of active power, maximum and minimum consumption of reactive power, and sample load graphs, including: seasonal, monthly, weekly, weekdays, weekends and holidays, and days with high or low consumption levels.

314. Consumption forecasts are developed based on User data and historical consumption data.

315. The following categories of users are required to provide the System Operator with consumption forecast data (daily/hourly consumption, active and reactive power, peak power, load graphs):

consumers directly connected to the power transmission system;

each Distribution System Operator for the total consumption of the distribution network at all points of connection to the transmission system;

each Closed distribution system operator for energy (power) balance in the connection of the closed distribution network to the transmission system;

Operators of User Power Stations to partially cover their consumption from the transmission system;

operators of battery energy storage systems.

316. All Users must submit their electricity consumption forecasts to the System Operator in the following terms:

monthly consumption forecast – for the next month by the 20th of each month;

weekly consumption forecast – for the next week until 12:00 on the fourth day of the week;

daily consumption forecast – for the next day until 09:00 on each working day;

on holidays (holidays) - all holidays (holidays) and until the next working day;

in the event of an unforeseen shortage of electricity, force majeure, extreme climatic conditions, with fuel supply, the System Operator may request action within the specified timeframe.

317. All Users shall submit annual and multi-year forecasts for the next year to the authorized body with relevant documents by October 1 of each year.

318. Users' annual electricity consumption forecasts must include at least the following information:

distribution of total annual consumption in months (kW·h);

minimum and maximum expected monthly consumption of active power (kW);

development of measures to adjust the load by the consumer (cost and terms);

amount of reactive power consumption (kVar).

319. Users' monthly electricity consumption forecasts must include at least the following information:

daily distribution of total monthly consumption (kW·h);

weekly and daily minimum and maximum consumption of active power (kW);

development of measures to adjust the load by the consumer (cost and terms);

hourly reactive power consumption (kVar).

320. Users' weekly electricity consumption forecasts must include at least the following information:

hourly distribution of total weekly consumption (kW·h);

projected minimum and maximum consumption of active power (kW);

development of measures to adjust the load by the consumer (cost and terms);

hourly reactive power consumption (kVar).

321. Users' daily electricity consumption forecasts include weekly forecast data, where the data is updated only for a specific day.

322. Forecasts of electricity consumption specified in this section should be given as the total consumption of electricity for each User, as well as the total consumption for each point connected to the transmission system of the respective User.

323. Each User must take into account changes in the amount of electricity consumption associated with new (current or planned) development projects that will be implemented during the forecast period in its electricity consumption forecast.

324. If the system operator considers the provided forecast to be unreasonable while receiving forecasts of electricity consumption, he may reject the forecast provided by him, notifying this User.

325. Users can accept the objections of the System Operator, submit a revised forecast of electricity consumption or reject the objection with reasons, as well as confirm their initial electricity consumption forecast.

326. Users can change electricity consumption forecasts and submit the modified version of this forecast before the specified deadlines.

§ 3. Generation (production) forecast

327. The generation (production) forecast, from the perspective of operational planning, includes annual, monthly, and daily forecasts of electricity production, taking into account the existing maximum and minimum active power generation forecasts, reactive power maximum and minimum consumption, transmission, and the creation of seasonal, monthly, weekly, and daily sample charts for active power generation.

328. The generation forecast is developed by the transmission system operator based on User data, historical data of production and availability of generating modules in accordance with planned outages and historical data of forced outages.

329. Electricity producers and battery energy storage systems must submit generation and available capacity forecasts for all generating modules within the following timeframes:

annual generation forecast - for the next year by October 1 every year;

monthly generation forecast - for the next month by the 20th of each month;

weekly generation forecast - every Thursday until 12:00 for the next week;

daily forecast of generation – for the next day until 09:00 on every working day;

on holidays (holidays) - for all holidays (holidays) and the next first working day.

330. The annual forecast of generation and available capacity shall include the following information:

planned maximum and minimum capacity (kW) of each generator module and battery energy storage system, taking into account the historical indicators of outage schedules and forced outages;

monthly planned electricity production of power plants and each generating module and battery energy storage systems (kW·h);

reactive power (kVar) production capacity of each generating module and battery energy storage system.

331. Monthly forecasts of generation and available operational capacity shall include the following information:

planned weekly and daily maximum and minimum capacity (kW) of each generating module and battery energy storage system, taking into account the past period indicators of outage schedules and forced outages;

daily planned electricity production by power stations and each generating module (kW·h);

sample daily production schedule (kW) of generating module and battery energy storage systems for weekdays and weekends.

332. The weekly forecasts for generation and existing capacity must include data similar to the monthly forecasts, but only in terms of daily segments.

333. Daily forecasts of generation and available capacity should contain updated data only for a particular day, like a weekly forecast.

334. Distribution system operators, Closed distribution system operators and Consumers directly connected to the transmission system must provide the Transmission System Operator with information on the planned total and capacity of distributed generation and (or) energy storage connected to their systems or located in their territory.

335. Forecasts of production and available operating capacity shall be shown as total electricity production and available capacity for each User, as well as total electricity production and available capacity for each point connected to the respective User’s transmission system.

336. Each User takes into account changes in electricity production and actual available capacity in its production and available capacity forecast related to new (current or planned) production and batter energy storage system development projects or decommissioning plans to be implemented during the forecast period.

337. When receiving forecasts of electricity generation and current capacity, the System Operator has the right to reject the forecast if it considers that the forecast is unreasonable, notifying the User who submitted the forecast.

338. Users can accept objections from the Transmission System Operator and submit a revised forecast of electricity generation and actual capacity, or reject the objection based on the basis and confirm their initial electricity consumption forecast.

339. Users are permitted to modify their electricity generation and current capacity forecasts and to submit a revised version of this forecast ahead of schedule.

§ 4. Determining the transmission capacity of inter-system connections

340. The system operator has the right and responsibility to determine the possibility of cross-border electricity transmission with neighboring power systems. This option serves to keep track of the export and import of electricity in the single electric energy system and the electricity delivered to neighboring electric energy systems through the transmission systems of the Republic of Uzbekistan.

341. Determination of the transmission capacity of power transmission networks The system operator, in cooperation with the operators of neighboring power systems, determines the following values for each intersystem power transmission networks and all intersystem connection points connecting neighboring power systems:

transmitted power limit (TPL) is the maximum value of the transmission capacity of inter-system networks (in the network section) determined by calculation, exceeding this value leads to disruption of stability, usually this value is less than the thermal limits;

transmission reliability reserve (TRR) is a part of the transmission power limit intended to be used by the System Operator and other neighboring system operators to provide necessary emergency assistance;

the maximum permissible throughput (MPT) is calculated as follows: MPT = TPL – TRR:

available capacity (CA) - cross-border capacity that can be used according to the agreements between the system operators of neighboring electric power systems and on the basis of various technical and administrative conditions.

342. Cross-state capacity is the capacity to transfer real-time active power flows across an inter-system grid or a set of inter-system grids, which may vary over time.

343. Cross-border capacity is determined by hourly values for the following periods: season, month, week and day.

344. The following factors mainly affect the cross-border transmission capacity of power transmission networks:

capacity of internal transmission networks;

working condition of transmission system devices;

volumes of electric power transit flows between adjacent electric power systems;

safety (n-1) criterion of transmission system operation;

Limitations on transmission capacity related to faults in transmission lines, outages, weather conditions, and other factors.

345. The system operator is based on the forecast and actual data of the operational planning in the singke electricity system to determine the cross-border transmission capacity.

If necessary, the Users and others may be contacted to provide additional information necessary for determining the cross-border transmission capacity in the relevant direction and for a specified period.

346. The transmission system operator shall publish on its website up-to-date information regarding inter-system transmission capacity with neighboring electricity systems across specific borders, as well as the rules for utilizing inter-system connections for conducting electricity export-import operations.

§ 5. Safety assessment

347. The system operator, together with the control body in the field of electric power, is obliged to regularly conduct operational safety analysis and make necessary efforts to maintain the operational reliability of the electric power system at the required level.

348. To conduct an operational safety analysis, the System Operator, together with the Transmission System Operator, develops reference models of the transmission system.

These sample models should include structural information and data on the objects of the single electric power system, including connections with other networks and connected Users.

Data for modeling needs to be regularly updated.

The system operator has the right to request information from the Users and cooperates with other operators in the transmission system in reviewing the interconnection points of the network.

349. Transmission system models are calibrated using data from the SCADA system for fixed time intervals where safety evaluation criteria are determined.

350. Data must be provided by Users and the System Operator for transmission system objects at least for the following modes of total consumption (day/time):

winter maximum and minimum;

spring maximum and minimum;

summer maximum and minimum;

autumn maximum and minimum.

351. he analysis modes for the following year, outlined in Clause 349 of these Rules, must be based on the following basic information:

demand for electricity, availability of traditional generation;

expected generation from renewable energy sources (including total values for distributed generation);

availability of battery energy storage systems and their planning information;

planned volumes of import-export (provided with cross-border transfer capacity in both directions);

planned works on maintenance of transmission networks and commissioning of new facilities in the corresponding planned year.

352. In carrying out safety analysis, accurate models of the transmission system are also based on accurate information about changes in network structures or operating modes, protective system setpoints, automatic fault protection scheme, on-load voltage adjusters of transformers, substation layouts, and changes in operating modes.

353. Operational safety analysis is conducted by the System Operator in the following periods:

annual analysis - by the end of October every year for the next year;

seasonal analysis - one month before the start of each season by March 1 for the "spring-summer" season and September 1 for the "autumn-winter" season;

monthly analysis - up to the 25th of each month for the next month;

weekly analysis - on Thursday of the next week;

daily analysis - for the next day, every working day until 18:00, for holidays and weekends - all upcoming holidays and the next first working day.

354. To conduct the operational safety analysis, the System Operator models the critical and non-steady operational conditions established for the complete scheme in accordance with Clause 1090 of these Rules and verifies their compliance with the operational safety limits (n-1) set forth in Chapter 2, Section XI of these Rules.

355. Before the scheduled shutdown of the main elements of the transmission system, the System Operator conducts an operational safety analysis using the general model of the network.

356. Based on the results of the operational safety analysis, the System Operator will discuss the results of the operational safety analysis with the networks of the neighboring electric power system operators.

357. An annual, monthly and weekly operational security analysis should be conducted by the System Operator to identify possible situations. The following cases are analyzed:

imbalance of the single electric power system and non-availability of reserves to ensure the balance of the electric power system;

power exceeding operational safety limits, on overloads;

high/low voltage at the nodes of the power transmission system;

violation of stability limits in the power transmission system;

change of limit values of short circuit currents.

358. When potential limitations are identified, the System Operator develops corrective measures in accordance with Paragraph 4, Chapter 3, Section V of these Rules.

359. The system operator conducts operational security analysis the day before and during the current day in order to identify potential limitations and

implement corrective measures together with the operators of neighboring electric power systems and Users.

The system operator must monitor the actual consumption and production of electricity and update the operational security analysis in case of significant differences (deviations). When approaching the real-time mode of operation, the assessment of the state of the electric power system should be used.

360. The system operator is responsible for assessing and restoring operational safety at all stages of operation.

Operational safety analysis should take into account the configuration of transmission networks and the stability and dynamic stability of the power system.

361. When analyzing operational safety, the System Operator should use the following information from the operational planning process:

electricity consumption and production forecast data;

outage schedulening information;

forecast of active power reserves for transmission system management;

historical data on the operation of the electric power system;

calculated volumes of interstate flow of electricity;

messages about emergency situations that may affect the safety of the electric power system;

limitations in the electric power system that may affect the forecast of electricity consumption and production;

fuel supply conditions;

weather forecasts;

media materials on situations that may affect the stability and security of the electric power system.

362. The system operator, as necessary, may require the User to provide updated information or to confirm previously provided information for the purpose of the operational security analysis for the relevant period.

363. Operational safety analysis shall be conducted by the system operator for specific operating hours selected based on experience and historical data, but not less than:

for the annual operational safety analysis - one hour of one day of the week of each month;

for seasonal operational safety analysis - one hour of one day of every week during the season;

for monthly operational safety analysis - one hour of one day of the month;

for weekly operational safety analysis - six selected hours of each day;

for daily operational security analysis - every hour of the next day.

364. The information prepared by the System Operator based on the results of

the operational safety analysis includes the following for each relevant period (year/month/week/day/hour):

electricity consumption forecasts taking into account losses in the network and electricity generating facilities for their own needs;

current active capacity generation forecasts;

analysis of possible situations in which operational safety limits of the electric power system may be violated;

analysis of possible situations of insufficient supply of active power reserves;

analysis of possible situations in which the primary and secondary reserves of the single electric power system are adequately provided;

probability of occurrence of accidents in the list of accidents;

measures to eliminate the consequences of accidents in the list of emergency situations;

Other necessary information that, according to the conclusion of the system operator, may affect the security of the electric power system and power supply.

365. According to the results of the operation safety analysis, the System Operator shall determine the volumes of active power reserves of power units for the relevant period for all forecasted modes, the volumes of auxiliary services for frequency adjustment (reserves for frequency maintenance, restoration and support), as well as agreed on interstate flows in accordance with interconnection agreements also determines the scope of other ancillary services for maintenance of deviations.

§ 6. System Operational Stability Forecast (SOSF)

366. The system operator provides the necessary reserves of active power in various operating modes to meet the total consumption in the republic and fulfill export-import obligations, and conducts an analysis of the stability of the power system by assessing the possibility of generating total power in the single power system of the republic.

367. Electricity system stability analysis and transmission system compliance forecast are developed by the system operator based on the results of various forecasts, in particular, the annual outage schedule, consumption forecast, production forecast, determination of inter-system transmission capacity and the results of the electric power system stability assessment (SOSF).

368. Taking into account the data provided in Clause 367 of these Rules, the System Operator assesses the likelihood of compliance, the duration of non-compliance, and the expected volume of electricity shortfall as a consequence.

369. The System Operator must conduct a stability forecast (SOSF) for the upcoming summer and winter seasons twice a year, taking into account the modes corresponding to the seasonal analysis of the power system's security. The results obtained are presented in the unified power system's winter and summer stability forecast (SOSF).

The reports are published on the official websites of the Transmission System Operator and the System Operator and are used as a guide by the Users in planning their work.

370. The system operator has the right to update its stability forecast (SOSF) reports when it detects changes in the operation of generating modules, loads, performance of renewable energy sources or inter-system transmission capacities that may significantly affect the expected stability.

371. The system operator conducts an analysis of the stability of the electric power system on a daily basis, based on:

load forecast;

generation forecast from conventional and renewable energy sources;

list of scheduled outages;

available active power reserves;

import and export of electricity corresponding to the capacity of inter-system borders;

capacity of generating modules and their state of readiness;

Possibilities of managing the consumption of user objects, taking into account their status and availability.

372. As a result of the analyses conducted in accordance with Clause 371 of these Rules, the System Operator identifies the volume of undelivered electricity due to stability disruptions and the duration of this condition.

If the stability is broken and not restored, the System Operator will notify the Ministry, analyze the reasons for the stability disruption, and send its suggestions on measures to eliminate this situation.

Chapter 4. Daily work schedules

§ 1. Daily work schedules of users

373. The system operator is responsible for planning work on the transmission system throughout the country. All Users must comply with the requirements of the System Operator specified in this section.

374. The System Operator carries out the planning of work in the transmission system in direct coordination with the regional control center of the “Energiya” Coordinating Dispatch Center (hereinafter referred to as “Energiya” CDC), as appropriate.

375. The daily work schedules in the transmission system are as follows:

Daily work schedules (graphs) of users;

Hourly work schedules (graphs) of users;

daily work schedules (graphs) of the transmission system.

376. All Users must submit their daily work schedule (graph) to the System

Operator.

377. Daily work schedules of users include the hourly schedule of electricity production, consumption, charging and discharging of battery energy storage systems, internal and external trade (export and import) for objects owned or controlled by a particular User.

378. Daily operating schedules are summarized for the entire transmission system, regardless of the connection point to the transmission system. Cross-border flows are coordinated with neighboring energy system operators (in direct cooperation with "Energiya" CDC).

379. The system operator determines the form of submission of daily work schedules and establishes the order (format) of their submission. The form and manner of submitting daily work schedules, as well as other necessary instructions and guidelines, will be published on the System Operator's website.

380. The System Operator must use a specialized IT platform and separate communication channels between the System Operator and the User to provide daily work schedules.

It will be possible to send daily work schedules by e-mail using the Internet as a backup source.

381. The system operator develops a procedure for submitting, checking and confirming daily work schedules under normal conditions, as well as in cases where the information system is not available, and publishes it on its official website.

382. The main time interval in daily work schedules is one hour.

383. Users submit their daily work schedules for the next day to the System Operator no later than 10:00 a.m. the day before.

384. The system operator receives all daily work schedules by 10:30 a.m. and checks them to ensure that they are submitted in accordance with the prescribed format and requirements.

If the User does not submit the daily work schedules on time or incorrectly, the System Operator shall determine the sample daily work schedules for the relevant User and give him a warning.

If the user does not submit the daily work schedules on time or incorrectly, the System Operator may file a complaint with the Regulator and take appropriate measures.

385. All daily schedules for a single electric energy system should be mutually proportional, that is, the sum of all daily schedules (production, consumption, export and import) should be equal to zero. Until 13:30, the System Operator checks the balance of electricity flows and the proportionality of all daily work schedules with the operators of neighboring energy systems.

386. When all daily work schedules in the transmission system are balanced, the scheduling process is completed. If the system operator detects certain inconsistencies in the daily work schedules, it will advise the relevant Users to make

appropriate corrections to their schedules by 2:00 p.m. Revised daily work schedules are sent to the System Operator in the prescribed form and manner.

387. The proportionality of the revised daily work schedules is re-checked by the System Operator and if the result is satisfactory, the process of making daily work schedules for the planned day is completed. If there are deficiencies in the daily work schedules, they will be rejected.

388. For each generating module with an installed capacity of 5 MW and above, the daily electricity production schedules shall contain the following information, divided into hourly planning intervals:

total active power of each power plant and each of its generating modules;

maximum and minimum active power for each generating module;

presence of each generating and hydroaccumulating (correcting) power plants/devices;

final consumption in the transmission system;

internal and (or) external flows of electricity.

389. The daily consumption tables of Users and Distribution System Operators (including Closed Distribution System Operators) contain the following information divided into hourly planning intervals:

total active power consumption;

total active power output of conventional generating modules;

total active power production of renewable energy sources;

total active power consumption of controlled loads;

availability of controlled loads;

domestic and (or) foreign trade of electricity.

390. Daily operating schedules of battery energy storage systems include the following information, divided into hourly planning intervals:

total active power consumption;

total active power generation;

active power consumption of controlled loads;

availability of energy storage systems;

domestic and (or) foreign trade of electricity.

391. Electricity traders provide detailed information on all domestic and foreign electricity trades in their daily charts.

§ 2. Users' daily work schedules

392. Users' daily work schedules are changes to the daily work schedules that occur as a result of operations in the electricity market or changes in the availability of their facilities.

Daily work schedules are changes in work schedules submitted and approved during the day for production, consumption, storage and internal and external trade of electricity.

393. Daily schedules must be provided to the System Operator on the day of scheduling, at least two hours prior to operations. Users can also submit daily work schedules through a special electronic platform.

394. Daily work schedules are approved by the System Operator based on the same approach as daily work schedules, balancing all operations within the scope and internal and external work schedules.

§ 3. Transmission system daily work schedules

395. The System Operator, together with the Transmission System Operator, develops the daily work schedules of the Transmission System, based on the approved daily and intraday operation schedules of the Transmission System Users and cross-border flows, in agreement with the relevant neighboring energy system operators.

396. Using the approved daily work schedules, the System Operator calculates the availability of reserves for frequency restoration in the single power system and the volume of cross-border flows with each neighboring electricity system.

397. The transmission system’s daily work schedules include:

the table of active power production and availability of all generating modules with a capacity equal to or greater than 5 MW and battery energy storage systems with a capacity equal to or greater than 0.5 MW, in which a separate table is formed for the generation of conventional and renewable energy sources;

a summary table of active power production by generating modules with a capacity of up to 5 MW;

table of total active power consumption;

controlled consumption demand and its availability;

the availability of reserves in the power system in the section of power stations and generating modules;

cross-border flows with neighboring electric power systems;

level of reliability reserve in each cross-border connection;

estimation of losses in the transmission system.

398. The system operator uses the transmission system’s daily plan to assess daily security. If the security analysis shows that the provided daily work schedules do not provide stable operating conditions, the System Operator will take appropriate measures.

Chapter 5. Forecast of extreme loads

399. After the completion of the planning activities in the electric power

system, but before the confirmation of the electric power flow tables, the System Operator will carry out calculations on the forecast of extreme loads to verify that the transmission system is able to provide the planned volumes of production, consumption and transit of electric energy.

The purpose of the calculations is to check the risk of overloading of some elements of the transmission system during the planned day's operation.

The assessment is based on the probability of loss of some important elements of the transmission system for the stable operating mode and "n-1" modes.

400. Based on the results of the extreme loads forecast calculations, when extreme loads are observed in the transmission system in stable operating modes, the System Operator may require changes to the submitted and approved schedules in order to eliminate extreme loads that may occur in the transmission system. Users must make appropriate changes to their schedules at the request of the System Operator.

401. In the absence of changes to the approved schedules, the System Operator instructs the dispatchers to activate the reserves of the electric power system during the period of forecasted extreme loads in stable operating modes.

402. If extreme loads in "n-1" modes are detected in the transmission system based on the extreme loads forecast calculations, the System Operator will instruct the dispatchers to plan the necessary actions in case the "n-1" operational mode occurs.

Standard measures include: redundant dispatching of generation and battery energy storage systems, reduction of export or import transmissions, and deployment of single power system reserves.

Section 5. Control of electrical modes

Chapter 1. The purpose and scope of the control of electrical modes

403. Managing electrical modes is one of the main types of activities in the transmission system, and other types of activities serve its effective operation and are integrally dependent on it. This activity is performed during the operational mode or very close to this mode, in any case during the operational day.

Management of electrical modes is carried out by the operational staff of power plants and substations within the single power system, under the hierarchical supervision of the System Operator and its regional and territorial divisions, in day-to-day working conditions.

404. The main goal of power management is to ensure the safe, stable and efficient operation of the electric power system and the maximum safety of the personnel and equipment involved, while ensuring the continuity of the electricity supply to the final consumers.

405. The tasks of power regime management are to ensure the efficiency of the single power system, to facilitate the operation of the power market, to ensure

stable integration with the power systems of neighboring countries, and to manage parallel power regimes.

406. This section of the Rules applies to the System Operator, Transmission System Operator, all producers, Consumers, battery energy storage systems and distribution and Closed distribution system operators and other Users connected to the transmission system.

407. All Parties to which this Section applies shall actively assist in its successful and effective application.

Chapter 2. Rapid-dispatch management

§ 1. The purpose and scope of the rapid-dispatch management

408. Dispatch management is the activity of operational management of the single electric energy system of the Republic of Uzbekistan in a hierarchical and centralized manner, the main purpose of which is to ensure the continuity, reliability and quality of electricity supply to final consumers in the single electric energy system.

409. The process of rapid-dispatching management is carried out by the System Operator in order to ensure the safe operation of the electric power system in operational (real-time) or near-real-time mode. The system operator performs the following activities together with the coordinating dispatch center "Energiya" CDC and other neighboring system operators in the process of operational dispatching management:

monitoring of planned exchanges of electricity in operational mode;

control of interstate and intraregional flows of electricity;

Implementation of the maintenance program for the facilities of the single electric power system together with the relevant system operator and the operator of the Power Stations;

Providing instructions to users for adjustment of active/reactive power and (or) other system services;

Providing instructions to consumers on adjusting consumption;

Solving the problem of extreme loads in networks together with relevant system operators;

maintaining an appropriate level of operational reliability;

finding solutions to problems related to the occurrence of unexpected, emergency or unplanned situations.

410. The dispatching process is completely performed by the System Operator. The system operator develops and approves and adheres to a set of operational regulations for the process of dispatching management, which define the rights and obligations of individual Parties within the functional hierarchy of the electric power system.

411. Dispatch management in the single electric energy system of the Republic of Uzbekistan is performed centrally by the System Operator.

Regional dispatching offices coordinate the work of regional transmission networks and users connected in their areas of responsibility, under the control of the System Operator and fully subordinated.

§ 2. Dispatcher instructions

412. Dispatcher's instructions are operational instructions given to various Users by operatives of the System Operator.

413. According to the method of transmission, the instructions of the dispatcher can be as follows:

automatic – supplied through SCADA/EMS and (or) automatic frequency and power control system;

manual - operative, given by dispatchers through communication means.

414. According to the type of control effect, the instructions of the dispatcher can be as follows:

directly (straight) – using remotely controlled means or automatically or manually;

indirectly - through the operators on duty at the remote section of the control.

415. Depending on the equipment in the transmission networks, instructions can be given as follows:

electronic - using IT tools for data exchange and communication;

in writing - by fax or e-mail;

orally - by telephone, radio and other means of communication.

§ 3. Procedure for giving and receiving dispatcher instructions

416. Instructions are given in accordance with these Rules.

417. When making decisions and giving instructions, the System Operator should consider the following factors:

the difference between the planned and actual consumption of electricity;

the difference between the plan graphs and actual indicators of cross-border flows of active capacities;

official notifications on the availability of balancing power and electricity received from balancing service providers;

changes in the declared capacity of generating modules and battery energy storage systems;

changes in transmission system configuration;

changes in the topology (location of existing equipment/devices) of distribution networks affecting connection points to the transmission system;

parallel operation, availability of appropriate categories of generating capacity reserves that ensure the reliability and quality of electricity supply to consumers;

compliance with the voltage graphs on the tires of power stations or substations of transmission networks;

in order to ensure the necessary reserve of active power, the need to change the voltage graphs of the busbars of the power stations connected to the transmission system or the busbars of the substations of the transmission system;

changes in the work schedules of generators working from a mixed cycle for the production of heat and electricity;

changes in the work schedules of generating modules that use renewable energy sources to produce electricity;

changes in the schedule of electricity exchanges between systems;

changes in charging/discharging schedules of battery energy storage systems connected to the transmission system;

the occurrence of accidents in the electric power system;

instructions given on the basis of regulations and documents related to operation, including instructions on safety techniques;

the possibility of the risk of interruption in the supply of electricity supplied to consumers;

other factors affecting the quality and reliability of the power system.

418. The instructions given under normal conditions of operation should be in accordance with the stated technical characteristics of the generating modules.

419. In the event of situations (accidents) that lead to a decrease in the reliability of the electric power system and the quality of parallel operation, or when an accident is likely to occur, the System Operator has the following authority:

giving an instruction to stop and/or suspend the operation of the electricity market (trade in the sale or purchase of electricity);

if it is determined that the stability and reliability of the single electric power system is at risk, as well as it is expected that the quality indicators of the supplied electric energy may decrease, to change or introduce restrictions on the planned volumes of electric energy production, consumption, charging (discharging) of storage systems and exchange of electric energy.

420. If the System Operator performs the actions specified in Clause 419 of these Rules, the System Operator shall record the details and reasons for its actions for audit purposes.

421. The System Operator shall provide a written report upon the reasonable request of any User or Regulator.

422. The guidelines include:

synchronization/resynchronization instructions;

activation of system services;

performing disconnection operations for maintenance/removal;

switch to backup mode or work mode;

providing instructions on active/reactive power;

voltage graphs for electric power facilities (stations) and substations of transmission networks;

rules for maintenance and safety during operation related to connection points to the transmission system;

quick measures to eliminate the accident;

other activities related to the operational management of the electric power system.

423. Instructions must be given clearly and concisely in order to reduce the possibility of misunderstandings and errors.

424. The system operator ensures that the instructions are automatically recorded and stored in an electronic form that is convenient for use.

Instructions must be kept for at least two years.

Any User and (or) participant of the electricity wholesale market has the right to request the necessary part of this information for use.

Access to information is provided with the consent of the System Operator, as directed by the Regulator or the Ministry.

425. The successful receipt of instructions must be confirmed immediately.

426. The person who gave the instruction must confirm that he received it correctly. Execution of the instructions will begin only after the approval has been satisfactorily evaluated.

427. In case of non-communication, actions are performed based on special instructions developed by the System Operator. In this:

interested parties take necessary measures to restore communication;

generating modules must maintain the values of active power, voltage and frequency according to the latest applicable graphs;

If necessary, new communication channels will be established, and the interested parties will be informed about it.

§ 4. Compliance with dispatch instructions

428. The instructions of the dispatcher are based on the following cases:

If the instructions are in accordance with the technical limitations of the instructed Party;

if it does not contradict the requirements set forth in these Rules;

if it is developed on the basis of the established procedure, as well as the procedures of giving and receiving;

in accordance with the relevant time period.

429. All Users must respond to Dispatcher's instructions within the specified time and fulfill their obligations in accordance with Paragraph 2, Chapter 3, Section V of these Rules.

430. Power plant operators must follow the instructions of the System Operator.

If the implementation of the instructions can seriously affect the health and life of people (employees) or the safety of equipment, the personnel servicing the generating modules must immediately notify the System Operator about the existence of such conditions.

In this case, the System Operator should cancel the instruction or make changes to it.

431. If at any time and for any reason the User is unable to fulfill the current instruction given by the System Operator, the User must immediately notify the System Operator.

432. If the User does not notify the System Operator about his inability to comply with the instructions, and if the System Operator notes that the User does not comply with the instructions, the System Operator has the right to take all necessary measures to prevent and (or) reduce negative effects on the operation and safety of the electric power system.

433. If the system operator finds out that the User does not follow the instructions, the User will be notified immediately and an order will be sent to him on the immediate implementation of the instructions.

434. If a User fails to fully comply with 1 instruction during an operational day, the instructions will be considered unfulfilled. The System Operator will issue an official warning and send a request for detailed information on the reasons for non-compliance with the instruction..

435. The User, who has received an official warning, undertakes to comply with all further instructions of the System Operator's dispatcher.

436. If the user is not able to follow the instructions of the System Operator's dispatcher for technical reasons, he must apply in writing and request to change the indications of the instruction and make corrections to the instruction accordingly.

437. If the user receives an official warning for non-compliance twice within one calendar year, the System Operator must notify the Ministry and the Regulator and request appropriate action.

§ 5. Duties and obligations of the system operator

438. The system operator is responsible for ensuring the reliable, stable and safe operation of the single electric power system and its efficiency within the permissible limits.

439. The System Operator must ensure a balance between compliance with the requirements outlined in paragraph 438 of these Rules and the obligations regarding the reliability, safety, and quality of the single electric power system in accordance with the regulatory documents in the field of technical regulation.

440. The System Operator is entitled to take necessary actions in all cases to fulfill the requirements of paragraphs 438 and 439 of these Rules; however, they are obliged to provide explanations regarding these actions when a justified request is made. The System Operator must act reasonably and cautiously, taking into account any situation in advance.

441. In the electric power system, the reliability, stability, safety, and quality of electricity supply can only be compromised under exceptional circumstances, in accordance with the requirements of regulatory documents in the field of technical regulation.

The system operator must explain in detail the circumstances that led to non-compliance with the requirements or deviations.

Such exceptions include, but are not limited to, the following situations:

after an emergency situation - the restoration process after a complete interruption of the electricity supply;

after a major accident - during the first 30 minutes of the restoration of the single power system after a major accident.

Chapter 3. Organising rapid-dispatch management in stable modes

§ 1. General conditions for the organization of rapid-dispatch management

442. In real-time (operational) modes, balancing in the single electric power system is carried out on the basis of daily graphs. Generating module operators must adhere to fixed daily schedules of generation and rolling stock during normal operating modes.

443. Consumers of electricity and power are not allowed to exceed the specified hourly schedule of active power consumption.

444. Battery energy storage systems should not exceed (increase or decrease) the specified (hourly) graphs in consumption and production of active power.

445. Management of parallel operation modes is carried out by ensuring the balance of interstate flows of electricity and power determined by the daily schedule.

§ 2. Independent control

446. Operators of generating modules and (or) battery energy storage systems independently monitor the fulfillment of their quantitative obligations according to the daily schedule for the production of active and reactive power and the provision of additional services based on the electricity supply contracts.

447. Generating modules and (or) battery energy storage systems are required

to independently monitor the quality of electric energy and power supply that meets the requirements of regulatory documents and contracts for electric energy supply to the electric power system.

448. Electricity consumers and battery energy storage systems must independently monitor the fulfillment of their obligations in accordance with the approved daily schedules, as well as the fulfillment of their obligations regarding power and electricity consumption.

449. Providers of additional services must independently monitor compliance with the terms of contracts for the provision of additional services.

450. Participants of the balancing market independently monitor the operation of their facilities in accordance with the specified technical parameters.

§ 3. Balancing mechanisms

451. The system operator must always use the available generation capacity to ensure the balance between generation and consumption in the single electric power system.

The system operator shall ensure that power flows between neighboring systems are maintained in accordance with agreed schedules.

452. Based on the amounts of deviations from the agreed graphs of cross-border power flows with neighboring systems, the permissible range of power deviation in the single electric power system of the Republic of Uzbekistan is ± 50 MW.

This range can be changed according to international agreements. If, despite the measures taken to ensure the active power balance, the total deviation of the power in the electric power system exceeds the specified value, the System Operator shall take the necessary measures to restore the cross-border power flows to the agreed values according to the schedule.

453. The System Operator, within the permissible limits set by Clause 452 of these Regulations, ensures that power exchange with neighboring systems does not exceed the planned values. Additionally, it undertakes the obligation not to exceed the export-import values established in bilateral agreements signed with the operators of the neighboring countries' energy systems.

In the event that one of these limits is violated, the System Operator must take the necessary measures to restore the power flows to the agreed values according to the schedule, including the use of automatic shutdown of the load or generating modules.

454. The system operator performs his tasks by giving dispatch instructions, which consist of control signals from his automatic control system, with the following objectives:

Ensuring the active power balance within the power deviations specified in clause 452 of these Rules and within the permissible limits for power flows between neighboring systems specified in clause 453;

confirmation of active power setpoints for generating modules connected to the automatic generation control system;

activation of active power adjustment reserves;

Load shedding of predefined users.

§ 4. Extreme load management. Transmission system capacity limitations

455. The purpose of extreme load management is to ensure the reliable operation of the electric power system with the maximum compliance with the conditions for the transmission capacity of electricity to users.

456. In the process of real-time operational control of electric power system operating modes, the System Operator must monitor the actual loads of inter-system and internal power transmission networks in relation to their maximum throughput.

In this case, relevant system operators provide information on the maximum transmission capacity of power transmission networks to the System Operator.

457. As soon as the fact of an extreme load leading to a decrease in transmission system throughput is detected or the risk of occurrence is noted, the System Operator, together with the relevant system operators, will take all necessary measures to eliminate this situation and fully restore the transmission system throughput.

458. Transmission extreme loads can occur for one or more of the following reasons:

As a result of non-observance of the maximum power transfer limit parameters of the transmission system during the agreement of scheduled power exchanges between users;

in case of emergency shutdown of the transmission system element;

in case of emergency shutdown of the generating module in the transmission system;

in the event of an emergency shutdown of the load in the transmission system;

in the event of faults in the electricity system of the neighboring country or in the connections between the systems.

459. The System Operator will take all necessary measures to eliminate this situation, having determined the possibility of extreme loads in the transmission system at any time of the day.

460. Actions to eliminate extreme loads must be determined by the System Operator according to their effectiveness and implemented immediately in order to reduce the risk of accidents in the transmission system. These activities may include:

reconnection of elements in the transmission system;

change the configuration of the transmission system;

perform re-dispatching;

conducting agreements;

shutdown of pumped-storage power plants operating in pumping mode;

reduction of consumer burden based on the agreement on additional services;

the introduction of backup generation capacity or battery energy storage systems;

Reduction or complete cancellation of planned electricity exchanges between users.

461. Reduction or complete cancellation of planned electricity exchanges between users can be used in cases where other effective restoration measures cannot be implemented.

462. The system operator shall treat all Users equally to the maximum extent possible and, while ensuring full transparency, reduce or completely cancel scheduled electricity exchanges until the extreme loads are eliminated:

First of all, planned exchanges of electricity, which significantly affect the elimination of extreme loads;

Reduction of scheduled electricity exchanges among Users with equal impact to eliminate extreme loads in a mutually proportional manner.

463. Extreme load mitigation by reducing cross-border power flows is used to ensure the security of the single electric power system in cases where all other extreme load mitigation measures have failed.

464. Extreme load management measures are additional services in the power system. If the system operator engages resources that do not belong to him or the transmission system operator in the elimination of extreme loads, he must carry out these activities on the basis of the contract for the provision of additional services and in accordance with the procurement procedure provided for by the market rules.

§ 5. Elimination of accidents in electricity production (generation).

465. In the event of an accident in the generation or in the event of a possible occurrence, on the basis of the signed contracts for the provision of additional services between the Transmission System Operator and the service organizations participating in the balancing market, primary and secondary reserves are activated automatically or according to the instructions of the System Operator.

466. If it is not possible (not eliminated) to eliminate the breakdown in generation by using primary and secondary reserves, the System Operator will instruct generating modules and battery energy storage systems that have accepted offers for supply of reserve power in the market for balancing services to increase active power generation.

467. The main goal of extreme load management measures in the event of a generation accident is to return the power system to normal operating modes in the shortest possible time, i.e. within 30 minutes, in accordance with safety standards.

Otherwise, the System Operator undertakes to announce the emergency mode, issue systematic instructions in accordance with the emergency management conditions, and implement measures to protect the electric power system.

Chapter 4. The order of organization of operative-dispatching management in emergency modes

§ 1. Operational management of emergency modes

468. When implementing measures to identify, prevent and eliminate accidents in the single electric energy system, the System Operator shall comply with the requirements of the Section IX of these Rules and other model instructions.

469. In the event of an identified risk of accident in the electric power system, the System Operator shall issue a notification regarding the single electric power system in accordance with Section 3 of Chapter XI of these Regulations.

470. In the occurrence of emergency situations, the System Operator shall implement measures to ensure the safety of the electric power system in accordance with Section 4 of Chapter XI of these Regulations.

These measures will be carried out based on the instructions provided by the System Operator and the guidelines outlined in Section 419 of these Regulations..

471. In the event of a complete or partial shutdown of the electric power system or any of its parts, the System Operator shall implement measures to restore the electric power system in accordance with Section 6 of Chapter XI of these Rules.

472. After the normal operating mode of the electric power system has been restored, the System Operator shall notify all Users that the emergency mode established in accordance with Section 468 of these Rules has been canceled.

§ 2. Force majeure situations in operational management

473. Force majeure situations in the management of the electric power system include:

force majeure situations declared by the republican or local executive authorities;

special situations of force majeure declared by the Regulator or the Ministry in the electric power system;

Incidents in the electric power system of neighboring countries that have a significant impact on the operation of the single electric power system of the Republic of Uzbekistan and lead to force majeure situations described above.

474. In addition to the official announcement about force majeure, the System Operator must announce the occurrence of force majeure in the electric power system and must indicate at least the following in this announcement:

time of force majeure;

the expected duration of force majeure;

mode of operation of the electric power system in case of force majeure;

special requirements for certain Users in case of force majeure, if such requirements exist.

475. In the case of force majeure, if the System Operator considers it necessary to suspend compliance with these Rules and market regulations, as well as all similar applicable legal documents, he has the right to suspend them and manage the electric power system in accordance with the methods established for force majeure cases.

476. In cases of force majeure, all the instructions of the System Operator must be followed without exception, except for those cases that may lead to deterioration of human life, environmental conditions, or damage to devices or equipment. In such cases, the Parties must immediately notify the System Operator of the possible consequences.

477. After the elimination or completion of force majeure situations, the System Operator shall take all measures to restore the normal working condition of the electric power system. If quick recovery is not possible due to force majeure or its consequences and other reasons, the System Operator will notify all Users about the time to restore normal operation.

Chapter 5. Balancing the electric power system

§ 1. General conditions for balancing the electric power system

478. Balancing of the electric power system is the process of maintaining the active power currents and (or) the frequency within the limits of the specified ranges by continuously adjusting the active power in accordance with the quality requirements of the electric power system parameters specified in the connection conditions.

479. The system operator is responsible for the constant balance between the total required power, which consists of the gross consumption demand and outgoing power flow tables (exports), and the total available power, taking into account the current generation capacities and incoming (import) flows from neighboring systems.

480. Balancing in the transmission system is carried out at the expense of:

automatic management of generator modules and battery energy storage systems operating under the control of the automatic adjustment system;

Dispatching of generating modules and battery energy storage systems providing additional services to the system operator;

Dispatching of generating modules and battery energy storage systems that do not provide additional services to the system operator, but have the opportunity to participate in balancing the single electric power system;

implementation of consumption adjustment measures;

management of electricity exchange between systems (with system operators of neighboring countries) in operational modes.

481. The adjustment power required in a single electric power system is determined by the control field error (CFE) and is determined based on the following formula, which is equal to:

$$\mathbf{CFE = \Delta P + C\ \Delta f,}$$

In this formula:

ΔP – power deviation in the power system (difference between the sum of all power exchanges in operational mode and the sum of all power exchanges in the plan with neighboring power systems), [MW];

Coefficient C – quantity determined by the intersystem connection for each electric power system and determining the frequency deviation in this electric power system, [MW/Hz];

Δf – frequency deviation (difference between the planned and actual value of the frequency), [Hz].

482. The power system management infrastructure of the system operator must be able to provide balancing of the power system in the following operating modes:

frequency adjustment control mode – in which the System Operator controls only the frequency of the power system by changing the available output active power (BMX = C * Δf);

active power balance control mode – in which the System Operator controls the active power balance while keeping the power deviation from the power exchange schedule with neighboring power systems as close to zero as possible (BMX = ΔP);

adjust frequency and active power flows – The system operator adjusts both frequency and active power balance simultaneously while keeping power deviation and frequency deviation close to zero maximum (BMX = ΔP + C*Δf).

483. The system operator has the right to give instructions to the Users on the use of different control methods based on the operating conditions of the single electric power system. These instructions should be sent in advance, taking into account that users will be able to change the setpoints of their calibration equipment and related telecommunications and measuring instruments, if necessary.

§ 2. Frequency adjustment mode

484. The frequency adjustment mode is used in the entire electric power system, in particular, when the electric power system operates independently of the intersystem connection or in the operating modes of the part of the electric power system separated from the single power system.

In this mode of operation, all means of power system control should work only after frequency deviation in the power system.

485. In the frequency adjustment mode, Users must participate in the provision of frequency management services. Frequency adjustment is an additional service and is provided on the basis of an additional service agreement.

486. The system operator has the right to determine the Users who should be involved in frequency adjustment based on the technical requirements for the operation of the electric power system.

487. Frequency adjustment consists of automatic frequency adjustment and manual frequency adjustment. Frequency adjustment in the electric power system is provided by:

automatic control of the production of generating modules equipped with automatic frequency adjustment devices;

automatic management of battery energy storage systems (charging/discharging);

automatic adjustment of consumption load;

manual control of generating modules based on dispatcher's instructions;

manual control of battery energy storage systems (charging/discharging) based on dispatcher instructions;

manual control of consumption load.

488. Frequency adjustment must be ensured by all generating modules and battery energy storage systems that have the capability for frequency adjustment in accordance with Section III of these Rules and the connection agreement.

These generating modules and battery energy storage systems must operate in a Frequency-Responsive Mode in accordance with the System Operator's instructions to provide frequency adjustment services.

489. All generating modules and battery energy storage systems that provide automatic frequency control must operate in a continuous automatic Frequency-Responsive Mode.

The system operator may allow generating modules to operate temporarily in frequency-insensitive mode in case of technical failures or unstable operation of the related equipment.

490. Generating modules and battery energy storage systems that provide manual frequency adjustment are not required to operate in Frequency-Responsive Mode, but they must follow the active output power setpoint specified in the System Operator's Manual.

491. Operators of generating modules and operators of battery energy storage systems have the right to cancel or change the operation of the automatic adjuster for changing the frequency or the Dispatcher's instruction for manual adjustment of the output active power only when there is a threat to the safety of personnel, the station or the public.

492. Frequency adjustment range is the active power available to the

generating module for frequency adjustment in both directions, up and down.

This range should be at least ±5 percent of the nominal active power of the generating modules involved in frequency adjustment.

493. In order to control the frequency, the total power of the minimum reserve, which includes the variable reserve and the reserve of fast-starting generating modules in the single electric power system of the Republic of Uzbekistan, should at least correspond to the capacity of the largest generating module in the electric power system and should be evenly distributed over the entire electric power system as much as possible. .

494. Automatic frequency adjustment must be continuously maintained within the 49.80-50.20 Hz range by the generating modules and battery energy storage systems specified in clause 487 of these Rules.

A single power system is allowed to operate in the range of 49.60-50.40 Hz for up to 8 hours and 24 minutes during the week.

495. Upon the request of the System Operator, automatic frequency adjustment must be ensured in the 47.20-49.60 Hz range, and in exceptional cases, in the 50.50-52.00 Hz range, provided it does not contradict the safety limits of individual generating modules, in accordance with the contract for the provision of additional services.

496. Manual frequency adjustment of the generator modules is provided by the system operator’s requirements for changing the output active power in response to the frequency deviation.

Such services are provided under the same conditions and within the same frequency ranges as automatic frequency control specified in clauses 492 and 493 of these Rules.

497. Each additional service provider responsible for frequency control related to frequency fluctuations must ensure that the response speed of the active power output adjustment meets the reliability standards as outlined in the terms of the additional services provision agreement.

§ 3. Active power balance adjustment mode

498. Active power balance adjustment mode is based on the principle of adjustment of power deviations in operational mode.

The system operator performs the adjustment of the active power balance by controlling the ratio of all actual cross-border power flows to the total planned power flows.

499. Active power balance management consists of automatic active power balance adjustment and manual active power balance adjustment.

Active power balance in the electric power system is provided by:

generating modules by automatically adjusting the active power;

automatic charging/discharging of battery energy storage systems;

through means of automatic adjustment of consumer load;

by manually controlling generating modules based on Dispatcher instructions;

by manually adjusting the consumption load;

through load management activities on the consumer side;

through external electric power systems that are part of the Central Asian single energy system and are considered parties to the parallel operation agreement;

in collaboration with other external Related Parties.

500. Adjustment of active capacity is a service provided voluntarily to the System Operator based on the agreement on the provision of additional services.

501. The system operator has the right to select Users for provision of active power adjustment services based on the technical requirements for the operation of the single electric power system.

502. Automatic adjustment of the active power balance is provided by all additional service providers with the possibility of secondary automatic control of the load frequency.

The existing infrastructure used for automatic secondary adjustment of load and frequency is used to transmit and receive and process incoming signals, generation, active power balance control signals (all adjusters in dispatch centers and generating facilities are set to "power adjustment mode", i.e. ACE= ΔP).

503. Active power balancing services can be provided by neighboring energy systems in the form of immediate assistance, counter trading between their system operators and the System Operator, rescheduling of power exchange schedules for connections between systems, and other forms.

504. All additional service providers providing active power balance auto-adjustment services shall operate in continuous auto-adjustment mode for active power deviations.

505. All additional service providers providing manual balancing of active power shall respond in time to the request of the System Operator to change the output active power in accordance with the relevant instructions of the dispatching service.

506. The active power balance control range is the active power range available for additional service providers to control the active power balance in both directions, i.e. load up and load down.

This range should be at least ±10 percent of the rated active power of the additional service providers participating in the active power balancing.

507. To adjust the active power balance in the electric power system, the overall total reserve must change over time and be determined by the System Operator for different operating intervals.

To control the active power balance, the total reserve sum must be at least equal to the power of the largest generating module in the power system for the upper range of adjustment and the largest load in the power system for the lower range of adjustment.

508. Manual adjustment of the active power balance by additional service providers is ensured by following the instruction of the System Operator to change the active power of the generating module in case of power deviation.

509. Active power supply volume, active power production change rate and active power production stability by each additional service provider performing active power balance management during power deviations should be carried out in accordance with the agreement on the provision of additional services.

510. Consumer load adjustment measures used in automatic and manual adjustment of consumption, as well as in active power balance control mode, are based on the same structure as the electric power system protection measures defined in Section XI of Chapter 4 of the Rules.

Chapter 6. Adjusting the voltage (reactive power)

§ 1. Purpose, criteria and requirements of adjusting the voltage (reactive power)

511. In the transmission system, voltage adjustment with voltage profile management and reactive power adjustment with reactive power flow regulation are interconnected and interdependent processes, which can be considered as a single process known as voltage (reactive power) regulation.

512. The main objectives of voltage (reactive power) regulation in the electric power system include:

Strict adherence to voltage profiles in the electric power system developed by the system operator;

ensuring the voltage level in the transmission system within the limits determined by the technical parameters of the relevant equipment;

limiting reactive power flows in order to reduce active power losses;

supply enough reactive power to maintain the voltage level in the transmission system and thereby ensure the stability and security of the entire power system.

513. Adjustment of voltage (reactive power) in the transmission system is carried out by the System Operator using:

generating modules, including conventional and renewable;

battery energy storage systems;

tools and devices for voltage adjustment in the transmission system;

from User Controlled Voltage Regulators connected to the transmission system.

514. Operational measures to adjust the voltage (reactive power) in the power

transmission system of the Republic of Uzbekistan must be carried out based on these Rules and other technical documents, including the instructions for adjusting the voltage and reactive power in the Single Electric Power System.

515. The main requirement for maintaining the voltage level at the points of connection to the transmission networks of the electric power system is determined by regulatory documents in the field of technical regulation and is provided in the following ranges:

the normal deviation of the voltage does not exceed ±5 percent of the given value;

the maximum voltage deviation does not exceed ±10 percent of the given value;

during emergency frequency reduction, the minimum voltage is reduced by 1 percent proportionally for every 1 Hz reduction in frequency.

516. A special requirement for the voltage level is the maximum permissible voltage in the transmission system, which consists of:

for 500kV voltage step – 525kV;

for 220kV voltage step – 252kV;

for 110kV voltage step – 126kV.

517. Base voltage for most nodes of the transmission system - this is the nominal voltage, but the System Operator may provide other values depending on the characteristics of the power system, the reactive power balance in the relevant part of the transmission system and the general operating conditions.

518. There is no limit to the duration of normal voltage fluctuations.

519. The technical regulations in the field of voltage regulation, as outlined in Clause 516 of these Rules, allow for a maximum voltage deviation for no more than 5% of the daily time.

520. The required voltage levels in cross-border substations are the values that must be agreed with the energy system operators of neighboring countries and, as a rule, are specified in the interconnection agreement.

The working voltage in border substations should be kept as close as possible to the given values. These values are allowed to differ from the voltage limits specified in the operational mode, as long as they do not affect the rest of the power system.

521. The system operator should develop guidelines for adjusting the voltage in the electric power system based on the requirements of this section of the Rules and the listed regulatory documents in the field of technical regulation. This instruction shall also include provisions relating to reactive power adjustment.

522. Reactive power should be compensated and balanced near the reactive power source (consumer) in order to minimize the reduction of transmission capacity of the main networks of the transmission system caused by overloads, the increase of losses in them. Accordingly, it is necessary to always maintain a balance between the generated and consumed reactive power at the nodes of the transmission system.

523. Reactive power currents in electrical networks must be kept to a minimum level based on operating conditions.

524. To ensure the conformity of voltage and reactive power in transmission system facilities, the system operator shall:

switching on/off shunt reactors and capacitor banks directly connected to the transmission system;

turn on/off power transmission networks;

changing the voltage adjusters of transformers and autotransformers under load;

change the operating mode and supplied voltage of synchronous and static compensators.

525. In accordance with the operational conditions that may affect the operating mode of the interconnected power system, or based on the agreement between systems regarding additional services for voltage (reactive power) regulation, the operators of neighboring countries' electric power systems agree on the amount of reactive power exchange during normal operating modes and/or emergency situations.

§ 2. Planning the voltage (reactive power) adjustment process

526. The system operator plans to adjust the voltage (reactive power) based on the following criteria:

permissible limits of voltage at transmission system nodes;

permissible magnitudes of reactive power flow along the transmission system and across the boundary with neighboring electric power systems;

power system stability reserve;

minimal waste of active power in the transmission system.

527. The output of voltage (reactive power) adjustment planning is the optimization of provision of the necessary reactive power reserves for primary and secondary voltage/reactive power adjustment purposes.

528. The System Operator is fully and exclusively responsible for voltage (reactive power) adjustment planning.

§ 3. Voltage (reactive power) graphs

529. Primary adjustment of voltage (reactive power) is carried out based on pre-given graphs of voltage or reactive power for nodes of the transmission system.

Voltage (reactive power) graphs - list of given values of reactive power generation (consumption) depending on the voltage (reactive power) adjustment mode used.

530. The system operator, no later than the 20th of each month, must prepare voltage graphs containing given values of voltage (reactive power) at specific control (connection) points to the transmission system for the next three months and submit them to all relevant entities.

531. The voltage (reactive power) graph may be updated weekly and the System Operator shall provide the updated graph to all relevant parties.

532. In the case of unexpected, unforeseen and sudden changes in the operation of the electric power system or any of its parts, or in an emergency situation, the System Operator may update the voltage (reactive power) schedule daily or issue dispatch instructions according to the changed schedule.

533. The System Operator shall monitor compliance by the Users with the voltage graphs and the voltage/reactive power adjustment instructions issued by it.

534. In case of non-compliance with the instruction, the System Operator has the right to engage other means of voltage (reactive power) adjustment (on the basis of the contract on additional services) at the expense of the User who has not fulfilled his obligations.

535. Power plant operators are responsible for maintaining the voltage level at the point of connection of their generating modules to the transmission system according to the voltage schedule. This requirement must be met within the technical limits set by the manufacturing plants for their equipment.

536. Distribution system operators and Consumers directly connected to the transmission system must maintain the minimum values of reactive power flows at the connection point by keeping the power coefficient (cos φ) within the predetermined limits in accordance with Section III of these Rules and/or the connection agreement.

§ 4. Primary (automatic) adjustment of voltage (reactive power).

537. Primary voltage (reactive power) adjustment is the automatic (operational) adjustment of voltage (reactive power) in the transmission system and is provided by:

voltage adjustment devices of generating modules;

voltage regulators under load of transformers;

static compensators of reactive power.

538. Primary adjustment of voltage (reactive power) is based on the automatic operation of adjustment devices according to the given values of voltage (reactive power) and is provided by the adjustment equipment for primary adjustment of voltage (reactive power), consisting only of a voltage measuring device and control feedback.

539. All Parties providing primary adjustment of voltage (reactive power) shall install and maintain a set of adjustment equipment for primary adjustment of voltage (reactive power).

This requirement also applies to communication channels used to transmit control signals and (or) voltage (reactive power) setpoints.

§ 5. Secondary (manual) adjustment of voltage (reactive power).

540. Secondary adjustment of voltage (reactive power) is a manual (non-automatic) adjustment of voltage (reactive power) in the transmission system and is provided by:

adjusting the reactive power at the output of generating modules;

voltage regulators under load of transformers;

synchronous compensators;

static compensators;

shunt reactors;

capacitor banks;

switching power transmission networks.

541. Secondary adjustment of voltage (reactive power) is performed only on the direct instruction of the System Operator and is activated during operation. In addition to Clause 540 of these Rules, the adjustment is also carried out through the following methods:

voltage reduction – based on the instruction of the system operator to reduce the nominal voltage by a given percentage;

emergency shutdown of the load – manual shutdown of the load according to the instructions of the system operator.

542. The system operator and all users operating stations participating in secondary voltage (reactive power) adjustment must ensure that their equipment complies with the requirements for secondary voltage (reactive power) adjustment at all times in accordance with the operating mode and connection conditions.

§ 6. Voltage (reactive power) control in offline mode

543. Offline voltage (reactive power) control is a set of measures and actions used to ensure consistency of reactive power flows and voltage graphs in a transmission system by automatically and manually adjusting the voltage (reactive power).

544. The offline adjustment of the voltage (reactive power) is performed outside the work schedule and is related to:

changing the state of the transformer’s de-energized tap settings ;

reconnection of de-energized capacitor banks;

reconnecting shunt reactors.

Chapter 7. Additional services

§ 1. Description and types of additional services

545. Additional services are User actions used by the System Operator to ensure stable and safe operation of the single electric power system.

546. The following additional services are provided in the single electric energy system:

balancing of the electric power system is active power (load) and frequency adjustment;

adjustment of voltage (reactive power);

black start capability.

§ 2. Independent automatic adjustment of active power (load) and frequency

547. Automatic frequency independent adjustment (including primary adjustment) is the automatic adjustment of the output active power of the generating module and battery energy storage systems in response to frequency deviation.

548. Primary Adjustment is an additional service and is provided under the applicable additional services agreement.

549. The primary adjustment should be activated immediately after a quasi-steady-state frequency deviation of more than ± 100 mHz and fully operational within 30 seconds.

550. The primary reserve is the value of the working reserve, which is sufficient to automatically perform the actions necessary to restore the frequency by the single electric power system of Uzbekistan.

551. All generating modules and battery energy storage systems must be able to provide continuous primary adjustment during operation.

Except for cases where the system operator is exempted from this obligation under the terms of relief.

552. All generating modules and battery energy storage systems that provide primary automatic adjustment of frequency and active power flow must operate in constant Frequency-Responsive Mode.

In case of technical failure or unstable operation of generating modules and battery energy storage systems, the System Operator may temporarily allow them not to operate in Frequency-Responsive Mode.

553. The operator of the generating module and (or) the operator of the battery energy storage system is allowed to cancel the primary automatic adjustment only in cases where there is a threat to the safety of employees, the station and the community.

554. The system operator provides frequency setpoints one day in advance for all generation modules and battery energy storage systems participating in the primary automatic adjustment.

555. It is mandatory to participate in the primary automatic adjustment of generating modules and battery energy storage systems that have passed special attestation.

556. The system operator has the right to choose the User who provides the primary adjustment service based on the technical requirements for the operation of the electric power system.

557. The system operator monitors the activity of primary adjustment service providers according to the following operational parameters:

availability of the adjustment range – the adjustment range agreed in the contract for the provision of additional services must be available at any time;

activation time – the response time to frequency deviations must comply with the requirements of Clause 549 of these Rules and/or the permissible limits specified in the contract for the provision of additional services;

used rectification capacity – involved primary rectification stock must be in accordance with the contract for the provision of additional services;

reliability of service – the primary adjustment must remain active until it is replaced by an appropriate amount of secondary adjustment.

§ 3. Centralized automatic adjustment of active power (load) and frequency

558. Centralized automatic adjustment of active power (load) and frequency (secondary adjustment) is a centralized automatic control function of generation that has a dual purpose in the power system or a part of it. This includes:

ensuring the balance of active power in the electric power system as close as possible to the planned values;

frequency restoration in cases of significant frequency deviations as a result of disturbances (faults) in the electrical power system and, as a result, restoration of the primary tuning capability.

559. The total reserve requirement for secondary and tertiary adjustment is calculated in the following two ways:

based on probability;

based on the greatest possible imbalance.

560. According to the probabilistic method, the value of the reserve for 15-minute average typical (permanent) breakdowns (failures) (ACEo1) for a period of not less than the previous twelve months is calculated according to the following equation:

$$\boldsymbol{ACEo1 = ACE + aFRRact + FRRact + RRact + IGCC + aFRRxb + mFRRxb + RRxb}$$

here:

$ACEo1$ – the average value of disturbances (deviations) in a certain part of the transmission system in a 15-minute period;

ACE – the average statistical value of disturbances (deviations) in a certain part of the transmission system in a 15-minute period;

$aFRRact$ – the average value of the active power included in the secondary adjustment during the 15-minute period;

$mFRRact$ – the average value of the active power included in the tertiary adjustment in a 15-minute period;

$Rract$ – 15-minute time period activated average value of the replacement stock in the correction part;

$IGCC$ – Average power activated by the platform for adjustment at 15-minute time intervals;

$aFRRxb$ – Average inter-system activated (received or transmitted) power for secondary adjustment over a 15-minute time period;

$mFRRxb$ – The average power activated in the tertiary adjustment at the breakdown (failure) limit during the 15-minute period;

$RRxb$ – Average power replaced from backup with another adjusting power over a 15-minute time period.

561. The requirement is determined by subtracting 1 percent of the highest value from the range of secondary and tertiary reserve (ACEo1) values and accepting the remaining highest value.

562. The total reserve values of secondary and tertiary adjustments should cover 99% of adjustment deviations during the year. Accordingly, first the required reserve for power activation is calculated, and then the reserve for power reduction is calculated based on the same methodology.

563. The largest possible imbalance method is to determine the largest flow imbalance that can occur in the control zone. They are determined separately for the largest possible negative and positive imbalances.

564. When the reserve value of the required total secondary and tertiary adjustment is calculated by the above two methods, the highest values determined are accepted. Calculations are made separately for increasing and decreasing power.

565. The value of the total secondary and tertiary adjustment reserve may be reduced if the relevant contract modules are operating in the automatic dispatch control system of the Energy Management System (EMS) or in the automatic frequency and power control system.

566. If the largest possible imbalance values are greater than the values calculated by the probabilistic method, the reserve power corresponding to the difference between these two values is provided on the basis of contracts with neighboring control modules.

567. The minimum value of the reserve of secondary adjustment of frequency and active power currents for the electric power system is determined in accordance with Appendix 24 of these Regulations.

568. The system operator must determine different values of the secondary reserve for daily or hourly periods, depending on the operating conditions of the single electric power system.

569. Secondary adjustment is carried out by generating modules that comply with all technical requirements and have passed initial certification from the System Operator to provide such services.

570. All generating modules and battery energy storage systems that provide secondary automatic adjustment must provide these services in full within the terms specified in the contracts. Except for cases exempted from this obligation according to the terms of relief granted by the system operator.

571. The system operator is responsible for generating signals for controlling the secondary adjustment and transmitting them to generating modules and battery energy storage systems participating in automatic secondary adjustment.

The duty of generating modules involved in secondary automatic adjustment is to respond efficiently, accurately and reliably to secondary adjustment signals in continuous operation mode.

572. The system operator has the right to monitor the operation of generating modules and battery energy storage systems participating in the secondary adjustment and to stop this service at any time if the quality of the provided service is lower than the indicators specified in the contract for the provision of additional services.

573. The system operator controls the following operational parameters of the secondary adjustment service providers:

availability of the adjustment range – the adjustment range agreed in the contract for the provision of additional services must be available at any time;

service start-up time – in the event of an impulse and (or) in accordance with the contract for the provision of additional services, the secondary adjustment reserve must be started in the specified time interval;

stability of service – when secondary rectification is used to compensate for failure of a generating module or load, the secondary rectification shall remain in operation until replaced by an adequate amount of tertiary rectification.

response time – the delay time of control signals should be in accordance with the limits specified in the contract for the provision of additional services, but should not exceed 2 minutes.

quality of service – the transmitted control power curve should be as close as possible to the control signal curve. It is allowed to deviate from the power amplitude of the control signal up to 5 percent.

574. In the event of the situation specified in Clause 572 of these Rules, the System Operator is entitled to make an additional request for the provision of secondary adjustment services from another service provider.

§ 4. Manual adjustment of active power and frequency

575. Manual adjustment of active power and frequency (tertiary adjustment) is a manual change of generating module installation or loading of User equipment, which is carried out in order to restore the active power balance in the single electric power system or the working frequency in the unified power system of Central Asia.

576. Tertiary adjustment is performed using:

generating modules in the electric power system;

(Consumers) loads controlled by the Dispatcher in the electric power system;

battery energy storage systems in the electric power system;

other (neighbor) power systems.

577. The system operator is responsible for ensuring a sufficient volume of tertiary adjustment services in the power system, which is determined by him for different operating modes, but not less than the power of the largest generating modules that can be lost in the power system, including the existing secondary adjustment:

the largest generating module capacity in the electric power system;

the maximum potential loss of generating capacity due to substation busbar failure.

578. Depending on the time and duration of commissioning, tertiary adjustment differs as follows:

quick tertiary adjustment;

slow tertiary adjustment.

579. The quick tertiary adjustment reserve must be fully available no later than 15 minutes after its activation and allow the secondary adjustment reserve to be released.

Quick Tertiary Adjustment must be provided as part of the additional services agreement. Quick Tertiary Adjustment stock must be available at all times.

The fast tertiary adjustment shall be stable for eight hours, unless a different time duration is specified in the relevant additional services agreement.

580. For "load shedding" in the power system, the volume of the fast tertiary adjustment reserve for frequency and active power should be sufficient to cover the loss of the largest load connected to the common bus of the power system.

§ 5. Power reserve that is not connected to the electrical power system

581. The unconnected power reserve (slow tertiary adjustment) of the power system is designed to release the fast tertiary adjustment and stabilize the power and frequency balance in the long term.

It should be fully operational eight hours after launch.

If no other period is specified in the contract for the provision of additional services, it must be stable (in working condition) for a period of not less than forty-eight hours.

582. In the power system, the capacity of the slow tertiary rectification reserve in the "load" mode must be sufficient to cover the loss of the largest power generation module in the power system.

583. In the power system downward, the size of the slow tertiary adjustment reserve in the "unloading" mode should be sufficient to cover the largest load loss

connected to the common bus of the power system.

584. The system operator monitors the following operational parameters of Users providing tertiary adjustment services:

availability of adjustment reserve – permanent availability of managed adjustment reserve agreed in the contract for provision of additional services;

service activation time - the start-up time must comply with Clause 579 of these Rules and/or the time specified in the contract for the provision of additional services;

service stability - ensuring that the tertiary adjustment remains valid until the imbalance condition is re-adjusted by other means;

quality of services provided;

the maximum error with respect to the required control power is 10 percent, the permissible delay interval is no more than 15 seconds.

§ 6. Time Management (Tracking)

585. The system operator is responsible for coordinating the time management (tracking) process in the electric power system. In this case, the System Operator receives a frequency assignment from the frequency coordinating system operator and distributes the synchronized time among all Users operating in Frequency-Responsive Mode to make the necessary correction to the synchronized time.

586. The system operator has the right to change the given value of the general frequency setpoints only in the case of disconnection from the combined power system or in cases of partial or complete blackout of the power system.

587. Users are responsible for always following the frequency setpoints according to the instructions of the System Operator.

§ 7. Adjustment of voltage and reactive power

588. The System Operator provides the following Dispatch instructions to Users providing these types of adjustments in order to enable voltage and reactive power adjustments by involving other Parties:

voltage setpoint on generating modules and (or) any other party providing primary voltage adjustment;

reactive power setpoint to generating modules and (or) any other Party providing primary adjustment of reactive power;

instructions on voltage restoration and maintenance provided to generating modules and (or) any other party providing secondary voltage adjustment;

reactive power production/consumption instructions given to generating modules and (or) any other Party providing secondary adjustment of reactive power.

589. Generating modules and battery energy storage systems must be able to adjust the voltage and reactive power according to the connection conditions.

590. Generating modules and battery energy storage systems must perform the following:

complying with the voltage graphs at the control (connection) points to the power transmission system within the agreed limits in accordance with the voltage plan graphs;

timely execution of the dispatcher's instructions on changing the scheduled voltage schedule;

in case of emergency situations, to comply with the dispatcher’s instructions to increase the reactive power in order to comply with the given schedule of voltage (reactive power). This may require reducing the active power of the generating module without violating the technical characteristics of synchronous generators;

operational execution of the dispatcher’s instructions on switching from the given voltage holding mode to the reactive power holding mode;

automatic adjustment of excitation of permanently installed synchronous generators and power system stabilizers when the generating modules are in working condition;

implementation of automatic control over compliance with given voltage graphs.

591. Generating modules and battery energy storage systems must provide primary and secondary adjustment of voltage and reactive power in accordance with their technical parameters, description of active and reactive power, and the Connection Agreement with the transmission system operator.

592. Activities in the provision of primary and secondary voltage and reactive power adjustment services by generating modules and battery energy storage systems do not result in a reduction of the active power at the output of generating modules and battery energy storage systems, and should not be compensated for.

593. System Operator Dispatcher’s instructions to provide voltage and reactive power adjustments should be compensated if the generating module and battery energy storage systems reduce active power output.

Appropriate payment shall be made for the services rendered by generating modules and battery energy storage systems.

This payment is made in accordance with the relevant contract on additional services and market rules.

594. In addition to the mandatory requirements for providing voltage and reactive power to all generating modules and battery energy storage systems, such services may be provided to the System Operator by any other Users in accordance with the agreement on the provision of additional services.

§ 8. Launch from scratch

595. Launch from scratch is a recovery operation in the single power system after major accidents that lead to a partial or complete blackout of the power system.

The first stage of these activities is the commissioning of generating modules and battery energy storage systems that can be put into operation without external power supply.

596. All generating modules and battery energy storage systems that have the possibility to launch from scratch must provide their resources (facility management) to the System Operator to provide this additional service.

597. Generation modules and battery energy storage systems selected for participation in the power system recovery plan must be tested at least once a year for their ability to "launch from scratch".

Chapter 8. Requirements for operational dispatch communication systems

598. Ensuring effective and reliable communication in the operational management of the electric power system is mandatory for the Transmission System Operator, System Operator and all Users.

599. To fulfill the requirements of Clause 598 of these Rules, the System Operator, the Transmission System Operator, and all other Users must fully ensure the availability of communication channels, as well as the channels used for technological and dispatch communication, both in normal and emergency modes.

600. Communication channels used for operation in operational mode are not intended for public use and must be physically separated from public communication channels.

If it is not possible to use dedicated means of communication, common means of communication can be used to work in operational mode.

601. General requirements for real-time (operational) data exchange - data exchange with the highest priority, with high reliability between all information exchange points, from a dedicated (leased) network (optical fiber, high-frequency, radio-relay communication devices or public communication network) should be implemented using.

602. In the operational mode of the electric power system, the delay of data transmission between any point of the network should not exceed 1 second.

603. The transmission speed through the communication channel must not be less than 64 kbit/s.

604. The availability coefficient for each direction of data transmission should not be lower than 99.5 percent.

605. The general requirements for voice communication in operational mode must comply with the requirements specified in Clause 670 of these Rules.

606. Dispatch centers must be equipped with special dispatch communication switches to exchange voice data in operational mode.

607. All voice communication between the System Operator, its regional units, Transmission System Operator, Distribution System Operator, Closed Distribution System Operator, Power Station Operators and other personnel on duty

shall be continuously recorded on both sides.

608. Records must be archived and kept for at least five years.

609. Technical requirements for the means of communication used by all Parties for operational purposes are determined by the Transmission System Operator and System Operators.

610. The Parties participating in the implementation of real-time operations (events) are the operators of the means of communication used for the specified purposes, and they are responsible for the use, maintenance and modernization of the relevant facilities.

611. Maintenance and (or) updating of the means of communication used in the operational mode should not reduce the overall availability and reliability.

Section VI. General Contingency Review, Relief, and Data Exchange Requirements

Chapter 1. Contingency handling procedures and effects on ability to comply with regulatory requirements

612. In the event of circumstances that cannot be considered within the framework of these Rules for reasonable reasons, the relevant System Operator will discuss with all affected Parties, the Ministry and the Regulator the actions to be taken immediately.

If an agreement between the relevant system operator and the Parties is not reached within the available time, the relevant system operator, acting as an impartial operator, will determine the appropriate measures and inform the relevant Parties, the Ministry and the Regulator in a short period of time about its decision and the reasons for its adoption.

613. The relevant system operator shall take into account the opinion of other Parties and in any case the opinion of an impartial Party in making decisions.

614. Following a Contingency Event, the Relevant System Operator shall provide information on all Contingencies and any decisions taken to the System Operator, the Ministry and the Regulator for immediate consideration.

The Ministry makes a decision on this situation in agreement with the Regulator.

615. If the Party is unable to fulfill its obligations set forth in these Rules due to force majeure, it shall send a notification to the Parties, the Ministry and the Regulator, which are affected by this situation, detailing the reasons for this, the basis for these reasons to be considered as force majeure, and the duration of the event.

616. For either Party, a force majeure event is any event beyond that Party’s control that causes the terms of these Terms to fail.

Except for strikes, lockouts or other strikes involving the employees of the Parties or the employees of their suppliers, interruptions in the supply of electricity, fuel, transportation, equipment or other goods or services caused by defects in the

procurement agreements of the Parties when alternative suppliers are available, or any Refusal of delivery due to payment problems by any supplier shall not be considered force majeure.

617. In case of force majeure, the obligations of the Parties are suspended.

618. In all situations where force majeure continues for more than seven days, the Claiming Party shall inform all affected Parties and the Ministry of the reasons for its inability to fulfill its obligations at the end of every seventh day and the results of its efforts to eliminate this situation, the reasons why the situation is considered force majeure, as well as the continuation sends a notification (notification) informing about the deadline.

619. If one of the parties considers the claim of force majeure to be unfounded, it may submit the case to the Ministry for consideration. The Ministry makes a decision on this situation in agreement with the Regulator. The Claiming Party shall not be relieved of its obligations if the Ministry considers that the reasons for non-compliance are not due to force majeure or circumstances of force majeure.

Chapter 2. Exceptions to specified requirements

620. At the request of the relevant system operator or the User, the Ministry will consider and, if it deems it possible to grant exemptions (hereinafter referred to as relief) to the requirements of one or more clauses of these Rules for new and existing generating modules or Consumer networks, with its conclusion Makes a proposal to the Cabinet of Ministers.

In this case, the situations during the interim period specified in Section XII of these Rules are an exception.

The criteria for granting relief are justified by the Ministry.

621. The reliefs are provided in order to effectively organize the implementation of the electric power system development concept, transmission system development plans and (or) develop the limited parts (weak points) of this system in order to ensure the stability and reliable operation of the single electric power system and increase the reliability of the electricity supply to consumers.

622. Users may request relief from the requirements of one or more clauses of the Rules for equipment and devices located at their facilities. In this case, a questionnaire containing the following shall be submitted to the Relevant System Operator:

User or potential User’s identification information and person responsible for feedback;

a detailed description of the system for which relief is sought;

references to the requirements of these Rules for which the relief is sought and a detailed description of the relief sought;

substantiated with the relevant supporting documents and an analysis of costs and benefits in the manner prescribed in Chapter 2, Section XII of these Rules;

proof that the relief requested will not adversely affect other Users.

623. Within two weeks of the submission of the request for relief, the Relevant System Operator shall confirm to the User whether the request has been accepted or not.

If the relevant system operator considers the request incomplete, the User shall provide additional requested information within one month from the time the request is returned.

If the user does not provide the requested information within this period, the request for relief shall be considered withdrawn and a report shall be submitted to the Ministry containing the following:

information including all information provided by the User, including the initial requested relief;

classification of additional requested information;

grounds for recognizing the request as withdrawn.

624. The relevant system operator will jointly assess the cost-benefit analysis of the relief with other operators.

If a request for facilitation is made for type ‘C’ and ‘D’ renewable energy sources, battery energy storage systems, or a Consumer with a capacity equal to or greater than 100 MW connecting to the distribution system, including a closed distribution system, the relevant system operator shall conduct the assessment together with the Transmission System Operator.

625. The relevant system operator shall submit the request for relief and the assessment report to the Ministry within one month from the date of receipt of the request for relief.

626. The Ministry will review the request for relief within one month from the date of receipt of the request. If the Ministry requires additional information from the User or other involved parties, this period can be extended for another month. The new period is calculated from the date of receipt of complete information.

627. The user and the potential operator shall provide the information requested by the Ministry within two months from the date of the request. If the user does not provide the requested information within this period, the request will be rejected.

628. Based on the results of the study, the Ministry prepares a reasonable proposal for relief and submits it to the Cabinet of Ministers. When relief is granted by the Cabinet of Ministers, its duration is also determined.

629. The Ministry will inform the User and all relevant parties about the decision of the Cabinet of Ministers to grant relief.

630. When the conditions and main reasons for relief are no longer relevant, the Ministry may submit a proposal to the Cabinet of Ministers for the premature cancellation of the relief document.

631. The Ministry maintains a register of all reliefs granted or denied. The registry includes:

claims for which relief is granted or denied;

the meaning of lightness;

reasons for granting or denying relief;

the effectiveness of providing lightness.

Chapter 3. General conditions for data (information) exchange

632. Data (information) exchange is important for the operation of the electric power system, as well as for the implementation of the requirements of these Rules.

All Parties are obliged to provide the information specified in these Rules and the technical regulations adopted on the basis of it, as well as in the connection agreement, in the specified time and quality.

If additional information is required by the System Operator or the Transmission System Operator, the requirements of this chapter and Section VII of these Rules must be strictly followed.

633. Data exchange is organized and coordinated by the Transmission System Operator and System Operators, as appropriate.

634. Any confidential information (excluding state secrets and information protected by law) that is received, exchanged, or transmitted in accordance with these Rules is considered an object of professional ethics (professional secrecy) as specified in Clauses 635-637 of these Rules.

635. The obligation to observe professional ethics applies to all persons, bodies and organizations within the scope of these Rules.

636. Disclosure of confidential information received by individuals, bodies or organizations in the course of fulfilling their obligations to a third party or body is prohibited, except in situations aimed at preventing harm, within the framework of national legislation or other provisions of these Rules.

637. Bodies, organizations and their employees or persons receiving and regulating confidential information in accordance with these Rules may use them only for the purpose of fulfilling their official duties in accordance with the procedure established by national legislation and these Rules.

638. Data confidentiality is ensured by identification of information (information) and is divided into the following types:

"For general use" - information without a confidentiality mark, this information is allowed to be used by any Party, including collective use;

"For use within the framework of the Service" - the relevant information is allowed to be used for predefined groups of Users (Parties);

"Confidential" - information that is allowed to be used by authorized representatives of the organization between the parties exchanging information.

639. All interested parties must avoid the risk of misuse, unauthorized use and disclosure of confidential information when processing and using it.

640. Confidentiality does not apply to the following information:

information that is publicly available or required to be publicly available, except in violation of this clause;

information that is in the Recipient's legal possession until it is provided by the Disclosing Party;

Information that must be disclosed by the Recipient as stipulated by applicable legislation or court decision. When such information is disclosed, the requirements of Clause 635 of these Rules shall also apply to the Recipient.

641. Confidentiality provisions shall not affect or limit the obligations of any Party to the court, state bodies and organizations, as well as to the Ministry and the Regulator in accordance with the procedure established by law.

642. In order to effectively organize data exchange, the Transmission System Operator and System Operators and Users may enter into non-disclosure agreements on matters not specified or detailed in these Rules regarding data management and confidentiality.

Section VII. Data management

Chapter 1. Providing data

643. All Users are obliged to provide data in accordance with the requirements of these Rules, in the quality, quantity and terms set by the System Operator and the Transmission System Operator.

644. The System Operator and the Transmission System Operator are also obliged to provide information in accordance with the requirements of these Rules in the specified quality, quantity and terms.

645. The information that users must provide is grouped into the following categories:

project data - data necessary for the object's connection to the single electric power system (research data, project, connection point details, technical parameters, etc.);

registration data (specified in each connection contract) – data provided to the System Operator and Transmission System Operator when connecting to the transmission system and filled (updated) during operation;

planning information – information provided to the System Operator and Transmission System Operator for long-term and operational planning purposes (development plans, decommissioning plans, schedules, etc.);

operational data - data provided to the System Operator, as well as to the Relevant System Operators (real-time measurements, statuses, danger signals, etc.) during operation, in real time and close to it;

summary data - information provided after operation for various accounting and analysis purposes (meter readings, event records, reports, etc.).

646. A list of basic information is provided in accordance with Appendixes 3 and 11 to the Rules.

Chapter 2. Data sharing

§ 1. Parties to Exchange Data

647. The list of Parties participating in the process of data exchange within the single electric power system includes:

Transmission system operator;

System operator;

Distribution System Operator / Closed Distribution System Operator;

Users;

other Parties (state institutions, scientific institutions, professional associations, general public, etc.);

external Parties (related partners, associations, etc.).

648. The party that has the data is the Data Operator, the party providing the data is the Data Provider, the party receiving the data is the Data Receiver, and the party providing the data is the Data User.

649. In order to coordinate and monitor the data exchange process, as well as to harmonize the material and technical support of information technologies, telecommunications and office equipment, an information exchange coordinator (hereinafter - Coordinator) is appointed.

650. Duties and Responsibilities of the Coordinator:

data exchange monitoring, coordination and troubleshooting;

creation of information technology support infrastructure for data exchange, its software, its service (if generally available, an official web portal, a global network or a common platform related to it);

creation and maintenance of infrastructure of telecommunication provision of data exchange;

development and distribution of data exchange formats, User Guides.

651. The task of the coordinator is performed by the Transmission System Operator or a unit designated by it or a Party specifically appointed to perform this task.

§ 2. Data sharing list

652. In the process of data exchange, data is divided into the following types:

individual information - information that belongs only to one Party;

general information - a set of information obtained as a result of combining general individual (personal) information and all other information;

forecast information - all information related to the future period;

real-time information – all operational information related to the current period;

retrospective (historical) data - all data related to the past period.

653. The list of data to be exchanged is determined in accordance with the Rules, as well as in a bilateral (multilateral) agreement between the Parties.

654. The information to be shared is divided into the following functional groups/data types:

a) real-time power flows, such as:

transmission of generation power;

power consumption;

power flows in the transmission system and its nodes;

cross-border power flows.

b) voltage profiles at nodes of the electric power system;

c) real-time operational situations, indicator signals and danger signals;

g) operational planning information, such as:

scheduled maintenance information;

safety assessment information;

forecast information;

information on the assessment of reserves of the unified electric power system;

overloads (inability to transfer power, restrictions), forecast data, etc.

d) electricity accounting information, such as:

final graphics;

real information about the provision of system services;

dispatch log information;

meter readings etc.

e) general information, such as:

analytical data after operational activities;

information on research results;

other non-operational data exchange;

other information.

655. The data exchange matrix provided by the Parties with each individual group (type) of data exchange shall be developed by the Coordinator together with the System Operator and the Transmission System Operator and revised annually.

656. All changes in the data exchange matrix are agreed with the interested Parties, the harmonization process is coordinated and controlled by the Coordinator.

§ 3. Data sharing forms

657. Forms of data exchange are determined by these Rules and other procedures.

658. If the data sharing forms are not defined, they will be determined by the Coordinator.

659. All data exchange formats are developed in the national language, used for cross-border data exchange and prepared in two languages for each relevant cross-border (foreign) Party.

660. Data exchange formats are developed in such a way as to maximize the possibility of automatic data processing.

661. A special type of format commonly developed and used for voice communication is a pre-defined or bilingual glossary of key terms in the local language used for communication related to the management of the unified power system.

§ 4. Data exchange frequency

662. The frequency of data exchange consists of the periodicity of data collection, preparation and exchange. The data exchange frequency is used by all involved Parties (data exchange partners).

663. The exchange of information between the parties shall be carried out in accordance with a predetermined or agreed form and time schedule.

664. To ensure the timely exchange of information with high priority, a frequency of data exchange (FDE) designation will be assigned to each set of information defined by the Coordinator and agreed upon with all interested Parties. In this regard, Clause 654 of these Rules shall apply:

real-time operational information in sub-paragraphs "a", "b" and "v" - exchanged with high priority and full redundancy;

operational planning information in subsection "g" - is exchanged with medium priority and full redundancy;

Electricity accounting information in sub-paragraph "d" is exchanged with low priority and partial redundancy;

General information in subparagraph "e" - low priority and shared without redundancy.

§ 5. Communications requirements

665. Real-time operational management data is exchanged between all points of the highest priority data exchange, using a network with a dedicated and high-reliability backup network (can be a service line, for example, a fiber optic communication cable).

666. Scheduling and forecasting data exchange is done by using a lower

priority dedicated line for backhaul bandwidth planning and cross-border distribution.

As a backup option, e-mail and (or) special software are used.

667. Exchange of other operational planning data is carried out using e-mail and (or) special software and low-priority dedicated networks only in cases where e-mail is not available and the above requirements for data exchange can be used for these purposes.

668. Only e-mail and (or) special software are used, using fax as a backup option in the exchange of data on the electricity bill.

669. General data exchange is carried out by e-mail, fax, mail and other means of communication.

670. As part of system operations and management processes, the following means of telecommunication are used for voice communication:

regular (ordinary) voice communication (under normal operating conditions of the electric power system) - a separate dedicated line for data exchange in real-time mode and (or) leased, except for public communication lines and (or) mobile phone communication;

emergency voice communication (in the case of disturbances in the electrical power system and (or) partial or complete blackout of electricity) - a dedicated line located in the control room and (or) reserve control room, a leased line for general use, as well as a mobile phone intended only for these purposes means of communication.

Chapter 3. Data processing

§ 1. Data verification and validation

671. The Data Operator and (or) the Data Supplier must check and validate the data before sending it to the Recipient and (or) the Data User. Verified or validated information is defined as appropriate.

672. In the event that the verification or validation event fails, the data will be processed until the verification or validation conditions are met. In case of repeated rejection of data verification or validation, the responsible entity stops processing this data.

673. The coordinator is responsible for assisting in the monitoring and coordination of verification or validation processes. In this case, the Coordinator has the right to monitor the exchange of information to process the results in order to ensure the implementation of this process.

§ 2. Data recording, storage and archiving

674. Each Data Recipient, Supplier, and Data User may record, store, and archive data received as part of their activities as long as confidentiality is not violated or jeopardized.

This clause does not apply to the Coordinator unless agreed with other participants in the data sharing process.

Section VIII. Measures to ensure safety equipment

Chapter 1. Purpose and field of application of safety equipment

675. The operator of the transmission system and each User must implement the necessary (required) security rules for themselves, but these rules must be in accordance with the general requirements given in these Rules and not contradict the law.

676. The purpose of this section is to achieve the basic principles of protection of personnel from system effects during work on equipment or devices and (or) conducting tests, and requires taking safety measures in high-voltage networks up to the point of connection of public network users.

677. Safety measures are required when working and (or) testing the equipment and (or) devices of the transmission system operator or the User, and when it is necessary to isolate (isolation) and (or) ground adjacent systems.

678. Measures to ensure safety equipment are mandatory for the following:

Transmission system operator;

Distribution system operators;

Closed distribution system operators whose systems are directly connected to the transmission system;

Power plant operators, including operators of generating modules connected to the distribution network;

battery energy storage systems;

Consumers directly connected to the transmission system.

Chapter 2. Coordination of security measures

§ 1. Responsibility for security management

679. The operator of the transmission system and users performing work and (or) testing on high-voltage equipment or devices in the transmission system must have developed safety rules and implemented a safety management system in order to ensure the safety of employees and prevent accidents. In this case, all established requirements and measures taken must be in accordance with the current legal documents.

680. The Transmission System Operator, Distribution System Operator and all Power Station Operators, Battery Energy Storage System Operators, Consumer Operators, including Closed Distribution System Operators with generating modules connected to their grids, are obliged to comply with the requirements established by the current legislation on safety and these Rules in all activities.

§ 2. Security management system

681. The safety management system defines the applicable safety equipment

rules and other applicable requirements, procedures, and documents that must be followed to ensure the health and safety of all employees performing work or conducting tests on electrical networks or devices connected to them, as well as the procedures for issuing these documents.

The security management system is implemented by the Transmission System Operator and other Users in accordance with the requirements of the Rules.

682. The safety management system shall include requirements for the extent of work or testing to be carried out and provisions for their recording, as well as appropriate security measures at the connection point and required notification periods.

§ 3. The procedure for adopting the rules of safety equipment

683. Within six months from the signing of the connection agreement, each User and Transmission System Operator with a common connection point shall exchange detailed information on the introduction of safety technical rules in the operation of electrical equipment and submit it to the Supervisory Authority at least three months before putting the new connection into operation.

Before connection, the Operator of the Transmission System must familiarize himself with and agree with the User's procedure for applying safety rules for isolation and grounding in order to allow work or tests to be carried out at the connection point.

684. The participating Parties shall jointly decide on the procedure for applying the security management system in the presence of an operational limit at the connection points.

In all cases, the adopted security management system should enable the establishment and maintenance of security measures, provided that:

when works and (or) tests are carried out on high-voltage equipment and apparatus through operational limits;

when the system of the other Party is isolated and (or) grounded.

685. In the event of a change in the implementation of the security management system or security requirements of one of the Parties, this Party shall promptly notify all relevant Parties.

§ 4. Security Coordinators

686. The operator of the transmission system, as well as each User, must appoint security coordinators in order to monitor compliance with security measures related to the works carried out at the network boundary.

Safety coordinators are responsible for coordinating the implementation of the safety management system and ensuring that work is carried out safely. They ensure that the necessary safety measures are followed.

Security measuresfor timely completion of repair works agreed in the connection contract and affecting other Users, includes reconnection, isolation,

grounding, and work permit processes in accordance with the requirements of safety equipment regulations in force in the Republic of Uzbekistan.

Users can use the services of operators with special training and knowledge to quickly perform the work of disconnection, reconnection, formation of security chains until the designated coordinators reach the location. The security coordinator is responsible for the coordination of security equipment in accordance with the rules of security equipment in force in the Republic of Uzbekistan and the requirements set forth in these Rules.

687. In the network of the transmission system operator, only persons with special knowledge and training based on the requirements of the rules for the organization of work with employees in electric power facilities are allowed to perform the above-mentioned functions.

Safety training and instruction should be continuous and multi-level. The Transmission System Operator and Users are responsible for continuous training and certification of all personnel participating in the processes (relevant) in compliance with safety regulations and safety management system requirements.

Chapter 3. Procedure for providing security equipment

§ 1. General conditions for providing security equipment

688. Ensuring safety in the processes of organizing operation, repair and (or) testing of high-voltage equipment in the transmission system must be carried out in accordance with current legislation and regulatory documents.

These Rules must be strictly observed by the Transmission System Operator, System Operator and all Users operating in the Transmission System.

These requirements apply to works and (or) tests within the transmission system operator or any User’s networks, as well as to works and (or) tests at the connection point with the participation of several Parties.

689. Procedures for safe execution of work shall specify the procedures for alternating connection, isolation, grounding, as well as preparation for work and (or) testing and authorization.

They should also specify the procedures to be followed when the equipment is ready for operation after completion of works and/or tests.

§ 2. Notification

690. In order to agree on a shutdown related to carrying out work and (or) tests at the connection point, a written application (notice) must be submitted to the other Parties at least two weeks before the shutdown is requested.

The application (notification) for deletion must be approved by the technical manager of the other Party. The Party that received the application (notification)

must agree to perform the deletion within one week from the date of receipt of the request or propose another work schedule.

691. In case of unplanned work and (or) tests requiring the above-mentioned security measures, coordination of security measures can be organized by telephone and confirmed with an appropriate document with the consent of all interested Parties.

§ 3. Implementation of security coordination

692. For each connected Party, the security coordinator must have the appropriate documentation on security techniques.

These documents specify the sequence of actions to be taken to restore the functionality of the equipment, including switching, isolation, grounding, and after completion of work and (or) tests.

693. All relevant documents related to safety equipment shall be agreed upon by the coordinator making the request and the coordinator performing the safety equipment activities.

694. Organizational and technical measures that ensure the safe execution of all work, including switching, isolation and grounding measures, must be carried out in accordance with the sequence indicated in the forms.

After the planned work and (or) tests are completed, technical measures are carried out in reverse of the sequence indicated above to return the equipment to its initial configuration and start it up.

§ 4. Work on both sides of the connection point

695. If the security measures involve the carrying out of works and (or) tests on both sides of the connection point, then the Parties must agree on these measures and prepare and issue relevant documents for each of them.

The document prepared by each party must include a reference to the document submitted by the other party.

If the permission to operate is given on both sides of the connection point, the security coordinators cancel them at the same time.

§ 5. Agreement on enclosure (isolation).

696. After the circuit or device is shut down, the security coordinators of both Parties agree on the place where containment (isolation) measures should be performed. This agreement is formalized by the Parties in writing.

697. Without reaching an agreement on the place of encirclement (isolation), the work will be stopped and the continuation of the work is strictly prohibited.

§ 6. Implementation of enclosure (isolation).

698. After the security measures have been agreed upon, the Parties may implement enclosure measures in accordance with Section VIII, Chapter 4, Paragraph 4 of these Rules.

699. The parties must notify each other that the agreed enclosure arrangements have been made, ensure that the device(s) to be enclosed are identical to the point of connection, and confirm the identity. The confirmation will show:

device identification, naming, nomenclature, numbering and (or) status of each enclosure point;

surroundin which case it is done, through an isolation device or through physical isolation;

encirclement regardless of the situation where the isolation device is used:

surround (isolation) - if it is carried out through the keys of switching devices, the keys are stored in a special safe, locked;

surround that the equipment is installed or fixed at a point in accordance with the safety regulations of the Party concerned;

surround if physical isolation is used, in such a case physical isolation has been carried out by the Transmission System Operator or the User in accordance with safety technical rules.

700. Encirclement Confirmation must be recorded in writing on both sides.

§ 7. Arrangement of grounding

701. After confirmation of isolation by the Parties, the requesting Safety Coordinator shall request permission to perform grounding from the Safety Coordinator of the other Party.

In this case, the two Parties will draw up written documents on the execution of grounding at the pre-agreed place.

702. These activities are prohibited until an Agreement is reached on the grounding point.

§ 8. Perform grounding

703. The safety coordinator of both Parties shall perform the grounding at the agreed point and confirm that the grounding has been successfully established. Parties shall also confirm the identity of the requesting safety coordinator to the intended connection point for grounding the high-voltage equipment.

The confirmation must include the following:

information related to the identification of high-voltage equipment, naming, nomenclature, numbering;

location and type of each earthing point.

Grounding equipment is used in the following cases:

if it is fixed and earthed, the grounding device is sealed with a key, and this key is kept in a special safe for keys, in a safe place;

performed and (or) secured by other means in accordance with the safety regulations of the Party concerned.

704. Grounding confirmation must be double recorded.

§ 9. Safety engineering reports

705. All activities performed by the security coordinators must be mutually agreed upon and the Parties must be notified, repeated verbally and recorded in writing.

706. Both Parties shall agree on the identification of the equipment for which necessary security measures have been taken.

The requester submits a document that meets the following basic requirements for the work to be carried out by the security coordinator:

the document must be understandable and clear, no additional entries or corrections are allowed in it;

numbering is carried out at the discretion of the transmission system operator or the User;

dates have the standard format "dd-mm-yyyy", and the time is in 24-hour format and corresponds to the time standard in the Republic of Uzbekistan;

including surname, first name, patronymic in capital letters and position;

that the document contains identification information of the device or equipment.

If it is required to expand the place of work, an additional document can be drawn up.

§ 10. Authorization procedure

707. It is possible to start work after signing the appropriate permit for work, obtaining permission to prepare the workplace, and completing organizational and technical measures to ensure safety.

The requesting security coordinator can then authorize the case, but not perform the test. The tests are conducted in accordance with the procedure established in Section VIII, Chapter 3, Paragraph 11 of these Rules.

The authorization procedure is entirely an internal matter for the requesting Security Coordinator.

§ 11. Test procedure

708. The requesting safety coordinator is not authorized to conduct tests under this section until he receives written confirmation that the following activities have been performed and completed. In this:

until the safety coordinator is sure that no employee is working, conducting tests, working on the devices and equipment specified in the work permit, and conducting tests at points other than the place of isolation measures, as well as until the planned testing is completed or canceled, and the requesting safety coordinator is the executive shall not be granted such authorization until he has notified the safety coordinator that all work has been completed or cancelled, thereby allowing the requirements to be waived;

the requesting security coordinator returns control to the executing security coordinator as soon as the test is completed or aborted. If it is necessary to remove an earth connection for test purposes prior to testing and this earth connection is not subsequently re-installed, this will be noted by both Parties.

§ 12. Recovery procedure

709. Upon completion of the work and/or testing, the requesting security coordinator will notify the executive security coordinator that security measures are no longer required.

710. Each security coordinator shall then confirm in writing the cancellation of the agreed security measures and cancel them.

711. The sequence of removal and replacement of security measures shall be carried out as specified in the approved plan, and the report and record of each stage shall be identical to the details used for their application.

712. None of the safety coordinators is authorized to issue instructions to remove insulation as part of the safety measures until it is mutually confirmed that all ground connections have been removed.

713. Once it is confirmed that all earthings have been removed, the safety coordinator will be able to independently arrange for the removal of the insulation, the implementation of these activities being entirely the internal responsibility of the safety coordinator.

Chapter 4. Interrelated requirements

§ 1. Loss of reliability of security measures

714. If any security measures are ineffective for any reason, the executive security coordinator shall immediately notify the requesting security coordinator in detail of the situation that has arisen or is likely to arise, stating the reasons.

§ 2. Ensuring environmental safety

715. The parties must take the necessary measures to comply with the requirements of regulatory documents on object safety and environmental safety, and to ensure environmental protection.

716. The parties must warn employees of the hazards inherent in the facility by means of special means before entering any area of the facility.

It is necessary to take into account the risks that may be temporary or permanent.

If these hazards include contamination or the like, personnel must be provided with special decontamination and protective equipment.

717. All works in the objects must be performed in accordance with the requirements of the current regulatory legal documents in the field of environmental protection, as well as the requirements of the technical operation of power stations and networks, as well as the requirements of safety equipment in the operation of electrical devices.

§ 3. Conducting inspections

718. Arrangements should be made to facilitate inspections by the management and safety representatives of the Parties at the connection points.

§ 4. Management systems procedure

719. The- system operator and the Users shall mutually agree and confirm in writing the schedules defining the obligations for the systematic control of the equipment.

They shall ensure that only one Party at a time assumes responsibility for any item of equipment or installation.

§ 5. Procedure for preparation of documents

720. The Transmission System Operator and the Users The Transmission System Operator must have an appropriate documentation system that records all operational processes occurring in the transmission system or any other system related to it, and coordinate the necessary safety measures during work and (or) testing.

721. The Transmission System Operator and Users must retain all documents related to the coordination of safety in accordance with these Rules, including a chronological record of relevant notifications and detailed information regarding the measures taken to ensure safety for work and/or testing, for a period of no less than five years.

§ 6. Transmission system-wide security schemes

722. The transmission system operator and the relevant User shall exchange schemes that provide sufficient information for the personnel to perform their duties.

§ 7. Connections

723. If the Transmission System Operator reasonably determines the need for communication means, appropriate communication systems must be established between the Transmission System Operator and Users to ensure the safe and reliable

implementation of control functions.

724. If the transmission system operator decides that backup or alternative communication is necessary to ensure the safe and reliable operation of its system, then these means must be agreed with the relevant Users.

725. The Transmission System Operator and Users shall exchange a list of telephone numbers to ensure effective coordination of control measures.

726. The Transmission System Operator and the relevant Users shall ensure the 24-hour presence of appropriately authorized personnel in the event of joint operational requirements.

Chapter 5. Operational communication and cooperation

§ 1. General rules

727. Operational communication covers the principles of establishing and using a reliable communication system between the System Operator, the Relevant System Operator and the Users.

728. The principles of operational communication are applied to the following entities:

System operator;

Transmission system operator;

Distribution system operator;

Closed Distribution System Operator;

Power plant operators;

Consumer operators connected to the transmission system;

Operators of consumers connected to the distribution system, informed about it by the distribution system operator.

§ 2. Reporting on operational activities and events

729. The relevant system operators and Users must notify each other about operational activities and events in accordance with the procedures and methods specified in this paragraph.

730. If the relevant system operator plans an operation that will lead to changes in the operation of the user's system, the relevant system operator must notify the user in a short period of time.

731. If there is a possibility that the User’s planned activities in the power grid or generator module will cause a change in the operation of the system of the relevant system operator, he must notify the relevant system operator about this in a short period of time.

The relevant system operator shall also notify other Users or electricity network operators involved or involved in this process.

732. The notification provided in accordance with Clauses 729-731 of these Rules must include detailed information regarding any hazardous situations that may arise in connection with this case and their consequences. To allow recipients time to assess the risk and address potential situations, these notifications should be submitted as early as possible before the planned activities are carried out.

733. If there is not enough time to prepare a written notification about a malfunction in the single electric power system, caused by the behavior of employees or due to a malfunction of equipment and (or) control equipment, unplanned events that lead to deviations from work or normal operating conditions, then 30 minutes after the occurrence of the event verbal notice may be given during After that, a written statement is required to be sent by fax, e-mail, letter and/or other information system to confirm the verbal notification.

§ 3. Transmission system-wide tests

734. The relevant system operator may request the User to conduct a test at any time if the relevant system operator has sufficient grounds, and may at any time allow the User to conduct the test if the User also has grounds.

735. Any testing conducted is for the sole purpose of confirming or denying that the conditions in question can be met.

736. Under normal circumstances, the Party making the request to the Relevant System Operator, the other Party involved, the intended date of the test, in the absence of adverse or emergency circumstances and must notify about the time at least two weeks in advance. In unplanned cases, this notification period can be shortened to 48 hours.

737. If the Party concerned considers the proposed time and date of the trial to be unreasonable, it shall submit a request to reschedule the trial and the requesting Party shall make reasonable efforts to accommodate the request.

738. If the user believes that the operator of the relevant system or the operator of the transmission system is demanding the conduct of tests in unreasonable periods, he may contact the Ministry regarding this issue.

§ 4. Conducting tests

739. Testing shall be conducted under the supervision of the relevant system operator or representatives acting on its behalf. However, the Party whose equipment is being tested must be fully involved in all phases and be able to participate during the tests.

§ 5. Reports on events (operations) and incidents

740. The respective system operators and Users shall issue notices of operations and events on their systems that affect or may affect the other Party’s system.

Notices shall be issued in the following circumstances, without limitation of requirements:

when the operational instruction to be issued is likely to affect the system or equipment of other Users;

when the equipment is expected to exceed its nominal capacity and may pose a danger to employees (people);

there was a risk of exploitation exceeding the established standards;

when there is a high risk of accidental operation of protection;

when related to basic testing, commissioning and maintenance.

741. In accordance with the requirements of this chapter, copies of the following types of notifications must be submitted to the System Operator and the Ministry:

manual or automatic shutdown of the device and (or) equipment;

common problems in voltage-specified normal limits;

about the noticeable state of the frequency outside the established norms;

instability of the relevant system;

overloading of the relevant system;

serious failures in the communication system affecting the operation of the transmission system;

accidents involving death or serious injury.

742. The Relevant Party will send a notification of any event or transaction (and answer any questions raised). The notification is sent in the following forms:

description of the operation (but it is not necessary to indicate its reason);

detailed information that allows the recipient of the notification to reasonably consider and evaluate the consequences and risks;

the name and surname of the person who reported the operation should be indicated.

743. Notice should be sent as far in advance as possible. Notification of planned transactions must be sent to the recipient in sufficient time to reasonably consider and evaluate the consequences and risks that may arise as a result of the transaction.

744. The respective system operator and Users shall notify each other of incidents in their respective systems that may affect the other Party’s system.

Incident Notifications are provided, without limitation, for:

if the equipment exceeded its rated capacity and posed a danger to people;

activation of any warning signal or indication for any unstable operating conditions;

in adverse weather conditions;

temporary changes in equipment capabilities, damage or failure;

in case of damage or failure of control and measurement equipment, communication and accounting tools;

at a high risk of self-inflicted protection;

in the case of unplanned reduction of the load to the value of 100 MW or more.

Incidents must be reported immediately. Notices and responses to notices may be sent by telephone, but must be confirmed in writing within 30 minutes.

The Relevant Party shall send a notice (answer to any questions) of any other event occurring regardless of any other event or transaction. In the notice:

description of the event (it is not necessary to indicate the reason);

provide detailed information that allows the recipient of the notification to reasonably consider and evaluate the consequences and risks;

must indicate the name of the person who reported the incident.

§ 6. Warning

745. If the Transmission System Operator or the Relevant System Operator becomes aware of any cause that may lead to an emergency or unstable operating conditions, they shall send a warning to all Users who may be adversely affected by such disturbances or unstable operating conditions.

746. The warning shall indicate the probable cause of the failure, the severity level and duration, and the duration of the warning period. The notification must be in the following form:

statement "This alert time (xx:xx)";

Due to (.....) there was a violation at (uu:uu) hour;

the probable impact of the violation (.....) ;

the breakdown lasts for about (zz:zz) hours;

This warning is automatically canceled if it is not renewed and extended within 2 (two) hours.

747. The following conditions should be considered as a minimum reason for a Warning:

Failure of any transmission system or any of its components, generating modules, which leads to a significant decrease in the safety of the single electric power system or violates the criterion (n-1) up to the point of supply;

interruptions or hazards associated with high-voltage or medium-voltage equipment that may affect the overall load or operation of the single power system. In such situations, the Relevant System Operator or Power Plant Operators must also send an alert to the Transmission System Operator;

interruptions or risks associated with generating modules that may significantly affect its production or the operation of the single electric power system;

conditions in which the performance limit is below the specified requirement;

deviation of the voltage or frequency from the permissible limit;

important events and dates (holding national holidays);

basic tests;

accidents.

Notice may be given by telephone, but must be confirmed in writing as soon as possible.

All notified Parties must confirm receipt in writing and report any incidents (indicators).

Chapter 6. Informing, reporting and conducting investigations of faults and incidents in the single electric power system

§ 1. Reporting of faults and incidents in the single electric power system

748. Any events or incidents that occurred in the operation of the transmission system or in the network of any User are approved by the Cabinet of Ministers "On the approval of the regulation on the inspection and accounting of accidents in production and other damage to the health of employees in connection with the performance of work duties" dated June 6, 1997 No. 286 and According to the decisions No. 54 of March 6, 2014 "On approval of the regulation on the procedure for checking and recording technological disturbances in the unified electric power system", if it matches the description of an accident or technological disturbance, it will be checked in the established order, and a copy of the final report will be submitted to the Ministry and the Supervisory Authority.

749. Any event in the Transmission System that has or may have a significant impact on the User’s system, or conversely, any event in the User’s system that has or may have a significant impact on the Transmission System or the electrical networks of other Users, shall be assessed as a significant event by the Transmission System Operator in agreement with the User.

750. The Ministry may determine that any incident of which it is aware, including an incident investigated under any regulations, is a significant incident and conduct an investigation in accordance with the requirements of these Rules. Inspections are conducted by the Controlling Authority.

751. In accordance with the requirements of Section VIII, Chapter 5, Paragraph 5 of these Rules, cases initially reported and assessed as significant events must be communicated and verified in accordance with the requirements of Section VIII, Chapter 6 of these Rules after they have been designated as significant events.

This includes significant malfunctions within the single electric power system, as well as partial or complete outages considered as emergency situations in accordance with the requirements of Section XI of these Rules. In relevant cases, all reports must adhere to the classification specified in the Resolution No. 54 of the Cabinet of Ministers dated March 6, 2014, on the approval of the procedure for the investigation and accounting of technological disruptions in the unified electric power system.

752. The requirements of Clause 749 of these Rules do not exclude the reporting of major accidents, which also includes significant accidents that lead to or may lead to the following consequences:

manual or automatic operation of the device and (or) equipment;

voltage beyond the specified standards;

frequency beyond the established norms;

instability of the single electric energy system;

a serious interruption of communication that affects or may affect the operation of the single electric power system.

753. The Transmission System Operator and the User must designate individuals and/or communication points and channels to meet the requirements of Section VIII, Chapter 6 of these Rules. Such individuals or communication points and channels may be defined in other sections of these Rules.

The Transmission System Operator and the User must promptly notify each other in writing of any changes related to the designated individuals, communication points, and communication channels.

754. If the Transmission System Operator has notified the User in accordance with the requirements of Section VIII, Chapter 5, Paragraph 5 of these Rules and subsequently designates it as a significant event, a written report shall be submitted to the involved User in accordance with the requirements of Section VIII, Chapter 6, Paragraph 2 of these Rules.

755. If the User has been notified based on the requirements of Section VIII, Chapter 5, Paragraph 5 of these Rules and it is subsequently assessed as a significant event by the Transmission System Operator, a written report shall be submitted to the involved User in accordance with the requirements of Section VIII, Chapter 6, Paragraph 2 of these Rules.

756. In all cases, it is the responsibility of the Transmission System Operator to prepare the final report and submit it to the relevant Parties, including the Ministry.

§ 2. Critical incident report form

757. The report must be in writing and include:

Confirmation of the notification submitted in accordance with Section VIII, Chapter 5, Paragraph 5 of these Rules;

Detailed explanation or statement regarding the Significant Event in accordance with Section VIII, Chapter 5, Paragraph 5 of these Rules;

any additional information relevant to the Significant Event since the notification was sent.

758. The report should contain at least the following information:

the date, time and duration of the significant event;

the place where the significant event took place;

directly involved equipment and (or) device;

a brief description of the significant event under investigation;

conclusions and recommendations for corrective actions, if any.

759. Other details that may be required:

consumption load and (or) interruptions of generation in MW and duration of interruptions;

frequency characteristic of the generating module (correction made after the occurrence of an important event, in MW);

efficiency of the generating module in MVar (change in output power after a critical event);

estimated or actual time and date of restart;

photographs of the situation after the incident;

detailed information on the status of re-connectors, recorded in the registration log, after events and situations and in emergency situations;

copies (transcripts) of any relevant notice previously recorded in any form.

§ 3. Deadlines for submitting the report

760. A written report must be submitted within one month following the submission of the preliminary notification provided in accordance with Section VIII, Chapter 5, Paragraph 5 of these Rules.

761. According to the Rules, the Transmission System Operator must request an initial written report within four hours from the time information about any such significant event is received from the relevant User. Subsequently, the User must investigate the cause of the event and take all necessary measures. The official written report must be submitted within three working days in accordance with Section VIII, Chapter 6, Paragraph 2 of these Rules.

762. If a significant event occurs in the Transmission System, the Transmission System Operator must provide a report to the Users affected by the event within three working days from the time it receives the official written report from the User, in accordance with Section VIII, Chapter 6, Paragraph 2 of these Rules.

If it takes more than three working days to notify the user about the occurrence of an important event, he can ask the Transmission System Operator for an additional period to carry out appropriate investigations.

§ 4. Joint inspection procedure

763. If a significant incident has been declared and a report has been submitted, the affected Party or Parties may request a joint investigation in writing.

764. The composition of the audit team should be agreed with all interested Parties relevant to the significant event to be audited.

If no agreement is reached, the decision will be taken by the Ministry.

765. The terms and conditions and all other matters related to the joint inspection shall be agreed upon by the Parties without delay during the joint inspection.

A joint investigation should begin as soon as possible after the occurrence of a significant incident and be completed within ten working days.

The report shall be submitted by the Transmission System Operator on behalf of the inspection team to the affected Parties and the Ministry within the next three working days.

766. Unless this report is considered a final report, the Transmission System Operator shall report the circumstances and conditions to the affected Parties and the Ministry.

If the relevant Party objects to the delay in the preparation of the final report, the Ministry shall determine the deadline for the submission of the complete and final report.

767. If the members of the review team cannot agree on any issue, this should be noted in the report, and the majority report and dissenting opinions should be noted separately.

In order for the report to be prepared in a timely and complete manner, the Chairman of the inspection team, persons with a special opinion - are responsible for the preparation of these parts of the report.

Chapter 7. Identification of devices and equipment

§ 1. Purpose of identification

768. The purpose of identification is:

the need to mark all substations, power generating (stations) devices and connection points with specific (identified) names and unique abbreviations (abbreviations) that exclude misinterpretation;

After the signing of the connection agreement, all equipment in the substations within the operator’s boundaries will have a device and equipment identification system approved by the System Operator within the operational boundaries. Use of the general system of identification of Transmission System Operator and User equipment and devices to reduce the safe and efficient operation of the Transmission System and the human factor in it;

obligations and procedures to be adopted within the operator's boundaries for identification of equipment and devices, changes in existing identification of equipment and devices, and notification of new equipment and (or) device identification;

identification of equipment and devices at the connection point, including in the operation scheme prepared for each site, with the operation limit, in accordance with the connection procedure provided for in these Rules.

§ 2. Names and abbreviations of the parties

769. In order to ensure safety and efficiency of operation, it is important that the names of all objects that are connected to substations, power stations and transmission networks or their parts cannot be misinterpreted and that all abbreviations are unique for the Parties.

770. Basic information on all High Voltage Parties shall be available in a database register maintained and updated by the Transmission System Operator.

771. If the User plans to connect a new Party to the transmission grid, the name of the new Party should be agreed with the Transmission System Operator as soon as possible to avoid confusion.

As soon as the name of the Party is agreed upon, the Transmission System Operator shall provide a unique abbreviation for this Party.

§ 3. Equipment and device identification

772. Equipment and device identification for all Parties shall comply with the requirements of these Rules.

§ 4. New equipment (device)

773. If the user wants to install the device in a part of the network with an operational limit, it must notify the other Parties in this part about the equipment and device identification information that should be accepted.

774. The notice shall be sent in writing to the relevant Parties and shall consist of an operational plan including the proposed new installation and its identification.

775. The notice must be sent to the relevant Parties at least 8 (eight) months before the planned installation date of the device.

776. The recipients of the notice must respond in writing within 1 (one) month from the time of receiving the notice, confirming that the proposed identification of the equipment and devices is accepted or not, that the identification marks are not confused with the identification of other equipment and devices. If this proposal cannot be accepted, then an acceptable alternative will be presented in a written response.

777. In the absence of an agreement between the System Operator and other

facilities, the System Operator has the right, acting reasonably, to determine the identity of the equipment and devices used in this facility.

778. Upon request from the Users, the identification details of equipment and devices will be provided in accordance with Chapter 7 of Section VIII of these Rules, assisting them in planning the identification of their equipment and devices within the operational limits.

779. Equipment and device identification details will be provided to the System Operator and Transmission System Operator for inclusion in the database register once agreed.

780. The System Operator, the Transmission System Operator and each User are responsible for developing and installing clear and unambiguous markings that reflect the identification of their equipment and devices.

§ 5. Available equipment

781. Any Party in a part of the Transmission System, including the Transmission System Operator, shall, upon request of any other Party, provide detailed information on the identification of equipment and facilities at facilities with operating limits.

782. The transmission system operator and Users are responsible for developing and installing clear and unambiguous markings that reflect the identification of its equipment and devices on the parts with operating limits.

§ 6. Changes in existing equipment

783. If the Transmission System Operator or User requests or wishes to change the existing identification on any of its equipment and facilities in any part of the operating boundary, the above provisions shall apply only subject to any adjustments necessary to reflect the change being made.

784. In the event that the User changes the identification of the equipment and device, the User is responsible for providing and installing clear and unambiguous marking.

785. In cases where the transmission system operator changes the identification of its equipment and facilities, it is responsible for developing and installing clear and unambiguous marking.

§ 7. Service Obligation

786. The parties shall not install or allow installation of marked equipment and (or) equipment with a name or abbreviation (abbreviation), numbering and (or) nomenclature that can be misinterpreted at their facility.

787. Neither Party shall install or permit the installation of equipment and/or devices in pre-operational areas that may be confused with the identification of the other Party, and shall not change any identification without the written consent of

the other Party.

788. The transmission system operator, the System Operator or the control body in the power system may visit to verify the correctness of the marking and conduct such inspections at certain intervals.

It is the responsibility of the User to ensure that the marking is correct and meets the specified requirements.

Section IX. Evaluating compliance of relevant system operators and User entities

Chapter 1. General conditions for conformity assessment

789. At the time of connection to the transmission system, as well as during the future operation of the distribution system, consumer equipment or power stations, the users are responsible for ensuring that the equipment and devices in their systems are approved in accordance with the procedure established in the Republic of Uzbekistan and meet the requirements of these Rules.

790. Users must demonstrate compliance of their systems with the requirements of these Rules to the relevant system operator and (or) the Regulatory Authority at the time of connection, regularly and in the event of any event that causes the User's system to be non-compliant with the requirements of these Rules. If necessary, they can provide documents confirming the conformity of their devices issued by a conformity assessment body or registered.

791. The compliance of the equipment and devices in the connection with the requirements is confirmed according to the document on the construction-installation and adjustment-commissioning works and technical inspection of electrical devices presented by the Controlling body in accordance with these Rules and other legal documents.

792. Generating modules connected to the distribution system providing auxiliary services to the system operator and relevant system operators involved in the monitoring of Consumers' compliance with the requirements shall involve the Transmission System Operator.

793. In accordance with the recurrent plan or the general scheme, the relevant system operator has the right to require the User to carry out modeling tests and assessment of compliance with the requirements of the Rules after any condition affecting the level of compliance of the object - device failure, modification, change or replacement. These tests may also be conducted by the Controlling Authority.

794. The relevant system operator is obliged to inform the Users of electric networks about the results of all the conducted tests.

795. If, for reasons related to the relevant system operator, it is not possible to conduct tests based on the agreement between the System Operator and the User within its networks, the relevant system operator must not unjustifiably reject the operational notification specified in Chapter 3 of Section X of these Rules.

796. The relevant system operator shall ensure the transparency of the list of information and documents to be provided, as well as the rules for the assessment of conformity by the Users of electricity networks.

797. All costs associated with meeting the requirements of the conformity assessment shall be borne by the User.

If the User considers that the implementation of conformity assessment and modeling tests by the System Operator or the Operator of the Relevant System is required in unjustified cases, he may apply to the Ministry for a decision on this issue.

Chapter 2. Conformity of user equipment

§ 1. Documents

798. The information that the relevant system operator requires users to provide must include the following supporting evidence:

legislative documents in the field of equipment, electrical energy, normative documents in the field of technical regulation compliance with the requirements and requirements of safety, environmental protection and construction standards;

compliance with all requirements of the equipment connection agreement, technical conditions for connection and agreement on connection to electrical networks;

relevant documents confirming the conformity of all equipment and devices used in the construction of the electrical device by the conformity assessment body.

799. Some Users who are exempted from conformity assessment and modeled tests must provide documents confirming that relief has been granted in accordance with the requirements of the current legislation and these Rules.

§ 2. Frequency range

800. The conformity of the equipment must be demonstrated in accordance with the requirements of Clauses 118-121 of these Rules. Providing the conformity certification documents issued by the conformity assessment body for Users will be sufficient.

§ 3. Voltage range

801. The conformity of the equipment must be demonstrated in accordance with the requirements of Clauses 122-126 of these Rules. Providing the conformity certification documents issued by the conformity assessment body will be sufficient.

§ 4. Quality of electricity

802. The conformity of the equipment must be demonstrated in accordance with the requirements of Clauses 133-141 of these Rules.

In order to confirm the quality of electricity, it will be sufficient for the documents confirming the conformity issued by the conformity assessment body, as well as the general performance of all devices that can be connected at the same time, to be presented to consumers as proof of compliance with these requirements.

803. If the relevant system operator has doubts about the proof of the compliance of the devices with the requirements of the Rules, then the relevant system operator has the right to request additional evidence obtained by performing conformity assessment and model tests at its discretion.

§ 5. Phase imbalance

804. In accordance with the requirements of Clause 140 of these Rules, conformity must be demonstrated prior to the issuance of the operational notification regarding electrical supply by referencing the connection of the device, and it must be confirmed by measurements before the issuance of the Final Operational Notification in accordance with Chapter 2 of Section X.

§ 6. Protection requirements

805. In accordance with the requirements set forth in Clauses 141-148 of these Rules, prior to the issuance of the operational notification regarding electrical supply, the relevant system operator must carry out the necessary commissioning tests and demonstrate compliance through the confirmation of applicable setpoints.

§ 7. Communication and information exchange in operational mode

806. In accordance with the requirements of Clauses 149-151 of these Rules, prior to the issuance of the operational notification regarding electrical supply, the confirmation of compliance must be established based on certification documents or inspections, and information exchange and operational control must be confirmed before the issuance of the Interim Operational Notification.

Chapter 3. Compatibility of generating modules

§ 1. General rules for all generating modules

807. The list of information and documents to be provided by power plant operators should include:

All information, documents and documents confirming compliance required to be provided by the power plant operator for compliance assessment;

information on the technical indicators (characteristics) of the generator module related to network connection;

requirements for stability modeling - static and dynamic stability studies of a single electric power system;

deadlines for providing information necessary for conducting research;

In accordance with the requirements outlined in Paragraphs 4-5 of Chapter 3 of Section IX of these Rules, the expected static and dynamic indicators (characteristics) must be demonstrated through the studies conducted by the Electric Station Operator;

conditions and procedures for obtaining documents confirming compliance of devices or equipment and their formalization;

The procedure and conditions for the use of documents certifying the conformity of the relevant equipment issued by the conformity assessment body to power plant operators, including the field of application.

808. The relevant System Operator shall publish information on the allocation of responsibilities between the Power Plant Operator and the System Operator for testing, modeling and monitoring.

809. In addition to the information provided by the operators of synchronous generating modules with an installed power of up to 50 kW, the manufacturer provides technical data, test results, as well as documents on compliance with the requirements of the legislation of the Republic of Uzbekistan in the field of electric energy, regulatory documents in the field of technical regulation.

No modeling or testing is required for such modules.

§ 2. Scope of compliance modeling of synchronous generation modules with an installed capacity of more than 50 kW

810. Simulation modeling of separate generator modules of power plants should be aimed at demonstrating compliance with the requirements of these Rules.

811. While the minimum requirements for compliance modeling specified in this section are set, the Relevant System Operator has the right to:

Allowing the power plant operator to use an alternative simulation form of compliance assessment and modeled testing that does not conflict with the requirements set forth in these Rules and national legislation and is justified by the effectiveness of these tests;

If the information provided by the power plant operator regarding conformity assessment and modeled tests is deemed insufficient, it shall be required, in accordance with the requirements outlined in Paragraphs 4-5 of Chapter 3 of Section IX of these Rules, to conduct tests, simulate modeled tests, and utilize additional forms as needed from the power plant operator.

812. The power plant operator must submit a report with the results of modeling of each individual generating module of the power plant to confirm compliance with the requirements of the Rules.

The power plant operator must develop and submit a simulated model for this generating module. The summary of the simulation models is provided in Paragraph 3 of Chapter 3 of Section IX of these Rules.

813. The relevant system operator has the right to verify the compliance of

the generating module with the requirements of these Rules by conducting its own simulation tests based on the reports submitted on modeling, simulation models and measurements.

§ 3. Compliance Modeling Scale Limit for Synchronous Generating Modules with an Installed Power Above 50 kW

814. The respective System Operator or, upon request of the System Operator, the Power Plant Operator shall provide simulation models that accurately reflect the behavior of the generating module by modeling static and dynamic modes or electro-magnetic transients.

815. In accordance with the requirements of Paragraphs 4 and 5 of Chapter 3 of Section IX of these Rules, the relevant system operator shall provide all technical data of the relevant network and the simulation model to the power plant operator to conduct the requested simulated modeling.

816. The models provided by the power plant operator must be verified against the testing criteria based on the test results outlined in Paragraphs 6-8 of Chapter 3 of Section IX of these Rules.

If such inspections are conducted by the Controlling Authority, it shall notify the relevant System Operator or System Operator of the results of the inspection.

817. According to the individual components of the models provided by the power plant operator, they should consist of the following sub-models:

alternating current generator and prime mover;

speed and power management;

voltage adjustment, power system stabilizer (PSS) function and excitation adjustment system, if available;

Generation module protection models agreed between the relevant system operator and the Power Plant Operator;

Models of converters for non-synchronous (asynchronous) generating modules.

818. These Rules of the relevant system operator814- should be agreed with the system operator. This request includes:

the format in which the models should be submitted,

submission of documents on the structure of the model and structural schemes,

assessment of the minimum and maximum short-circuit power (expressed in MVA) as the equivalent of the electrical network at the connection point.

819. The Power Plant Operator shall provide the relevant System Operator or System Operator with records of the operation of the generating modules, if required.

The relevant system operator or System Operator may request to compare the characteristics of the models with these records.

§ 4. Compliance modeling for synchronous generation modules with installed capacity above 50 kW

820. The following requirements apply to active power generation modeling:

The generation module must demonstrate its capacity to produce active power across the full voltage and frequency range in accordance with the requirements of Paragraphs 159 and 160 of these Rules;

modeling should be done by creating frequency steps sufficient to run the entire range of the active power frequency characteristic, taking into account the setpoints of the frequency drop and dead zone.

821. The following requirements are set for individual performance modeling:

The working characteristics specified in Paragraphs 185-188 of these Rules must be demonstrated for the generation module in isolated operation mode;

If the generation module reduces or increases its active power from any new working point to its previous working point without disconnecting from the isolated zone during frequency rises or drops, in accordance with Paragraph 188 of these Rules and the limits specified in Appendix 12, the simulation model is considered successful..

822. The following requirements apply to reactive power generation modeling:

a) In accordance with the requirements of Paragraphs 175 and 176 of these Rules, the generation module must demonstrate its ability to provide leading and lagging reactive power;

b) modeling is considered successful if the following conditions are met:

The simulation model of the generation module is confirmed to be compliant based on the results of reactive power tests outlined in Paragraph 830 of these Rules;

Compliance with the requirements of Paragraphs 175 and 176 of these Rules is demonstrated.

823. The following is required in relation to the modeling of the control system of power fluctuation damping (smoothing) of heat generating modules with a capacity of more than 200 MW and hydro-generating modules with a capacity of more than 100 MW:

a) The efficiency of the generation module must be demonstrated from the perspective of its control system (the power system stabilizer (PSS) must show that it can effectively mitigate active power fluctuations in accordance with the conditions specified in Paragraph 190 of these Rules);

b) the setpoint should be such that the actions of the power system stabilizer (PSS) adjusters in accordance with the actions of the automatic voltage adjuster should lead to an improvement in the damping of the output active power;

c) modeling is considered successful if the following conditions are fully met:

power system stabilizer (PSS) dampens fluctuations of the active power of the generating modules in the frequency range specified by the System Operator. This frequency range should include the fluctuations arising from the mode of operation of the generating module and network fluctuations;

1.0 n.p. of the load of the generating module from the maximum power. A sudden drop from 0.6 n.p. should not cause unquenchable oscillations of active or reactive powers of the generating module.

§ 5. Conformity modeling for asynchronous generating modules of type "B", "C" and "D".

824. All "B", "C" and "D" type non-synchronous (non-synchronous) generating modules must undergo modeling tests in accordance with the requirements specified in this paragraph.

The operator of the power station may submit officially certified compliance documents for this equipment issued by the compliance assessment authority instead of conducting all or part of the simulation tests.

825. The following requirements apply to short-circuit current modeling:

According to paragraphs 226-228 of these Rules, the ability of the asynchronous generating module to generate (inject) short-circuit current must be demonstrated;

if compliance with the requirements of paragraphs 226-228 of these Rules is demonstrated, the modeling is considered successful.

826. The following requirements apply to frequency response modeling:

a) As specified in paragraphs 201-209 of these Rules, the asynchronous generating module must demonstrate the ability to produce active power across all frequency ranges;

b) modeling should be done by modeling enough frequency steps to cover the entire range of the frequency characteristic of the active power, taking into account the sudden change and dead zone setpoints;

c) modeling is considered successful in the following cases:

The compliance of the simulation model of the asynchronous generating module with the frequency characteristics specified in paragraph 835 of these Rules is assessed through tests;

compliance with the requirements of paragraphs 192-209 of these Rules is demonstrated.

827. The following requirements apply to reactive power generation (storability) modeling:

a) According to the requirements of paragraphs 210-225 of these Rules, asynchronous generating modules must demonstrate their capability to provide leading and lagging reactive power;

b) modeling is considered successful if all the following conditions are met:

The simulation model of the asynchronous generating module is confirmed to comply with the testing requirements for reactive power production as outlined in paragraph 837 of these Rules;

Compliance with the requirements of paragraphs 210-225 of these Rules is demonstrated.

§ 6. Compliance check of synchronous generation modules with an installed capacity of more than 50 kW

828. The following requirements apply to active power generation and frequency adjustment control:

a) The generating module shall demonstrate that it is technically capable (possible) to continuously vary the active power produced over the full operating range between the maximum power and the Minimum Adjustment Level to provide frequency adjustment. The specified tuning parameters should be checked, including statics, deadband and frequency step response, and dynamic parameters including large and rapid frequency deviations;

b) tests must be conducted by modeling the possibility of real increase or decrease of active power at the output of the corresponding operating point, taking into account the static and dead zone setpoints, the active power change corresponding to the frequency change increases by an amount large enough to operate in all bands. If necessary, the simulated signals of the frequency deviation must be simultaneously transmitted to the speed and load adjuster of the device or the start of the calculation of the control system;

v) modeling is considered successful if the following are fulfilled:

The activation time of the full range of the frequency characteristic of active power should not exceed the requirements specified in paragraph 161 of these Rules;

if no undulating oscillations appear after the response to the frequency change;

The initial time of delay must comply with paragraph 165 of these Rules;

the drop-off and dead zone setpoints should not exceed the values specified in the range indicated in paragraph 165 of these Rules;

the insensitivity of the frequency characteristic of active power is considered successful if it does not exceed the values indicated in paragraph 165 of these Rules at any relevant operating point.

829. It is carried out on the transition to the mode of covering one’s own needs, tests must meet the following requirements:

disconnection of the generating module from the single electric energy system and demonstrate the technical possibilities of autonomous and stable operation to cover its needs;

the test is carried out at the maximum active power and nominal reactive power before the load loss (drop) of the generating module;

The relevant system operator has the right to establish additional conditions, taking into account the requirements of paragraphs 179-181 of these Rules;;

if the disconnection from the network and the compensation of its own needs have been successfully carried out, and it is demonstrated that it operates stably in the mode of compensating its own needs for the duration specified in paragraph 181 of these Rules, and synchronization with the network has been successfully re-established, the testing is considered successful.

830. The following requirements apply to the reactive power test:

The generating module must demonstrate its technical capabilities for providing leading and lagging reactive power in accordance with the requirements of paragraphs 175 and 176 of these Rules;

The test is considered successful if the generating module operates with maximum reactive power, both in advance and in delay mode, at maximum power output, in minimum stable operation mode, and in active power generation operation mode between maximum and minimum values, for a period of not less than one hour. It should demonstrate the ability of the generating module to move the set or negotiated value of reactive power to any range.

831. The following requirements apply to zero start capability tests:

for generating modules with the possibility of starting from zero, the technical possibility of starting without external power supply sources after shutdown should be shown.

The test is considered successful if the start-up time is maintained by the relevant system operator within the limits agreed with the system operator.

832. The operator of power plants can use the documents certifying the conformity issued by the conformity assessment body for the relevant devices, instead of carrying out the appropriate testing. In this case, the declaration of conformity and test reports issued to the device must be submitted to the relevant system operator.

§ 7. Assessment of conformity of asynchronous generating modules of type "B", "C" and "D".

833. Tests are carried out regarding compliance with frequency characteristics in relation to "V", "S" and "D" type asynchronous generating modules.

The operator of power plants can use the documents confirming the conformity issued by the conformity assessment body of the equipment (devices) in order to confirm the conformity, instead of carrying out the appropriate test.

In this case, the documents certifying the conformity of the equipment (devices) are submitted to the relevant system operator.

834. Frequency characteristic tests shall reflect the choice of control scheme selected by the relevant system operator.

835. The following requirements apply to frequency characteristic tests:

the technical feasibility of an asynchronous generating module to produce continuous active power to ensure frequency adjustment in the event of a frequency change in a single electric power system must be demonstrated. In this, static and dead zone and dynamic parameters are checked;

the test shall be carried out by simulating frequency steps to cause a change of at least 10% from the maximum active power, taking into account the static and dead zone. To perform this test, simulated frequency deviation signals are simultaneously transmitted to the control system;

The testing will be considered successful if it meets the requirements outlined in paragraphs 192-209 of these Rules regarding dynamic and static parameters.

§ 8. Additional tests of "C" and "D" type asynchronous generator modules

836. In addition to the tests carried out based on the requirements set forth in paragraph 7 of chapter 3 of this section, power plant operators must also conduct tests regarding asynchronous generating modules of types “C” and “D” in accordance with the requirements specified in this paragraph.

The operator of the power plant can use its documents confirming compliance instead of performing the appropriate test. In such a case, the documents certifying the conformity issued to the device shall be submitted to the relevant system operator.

837. The following requirements apply to reactive power tests:

a) The technical capabilities of the asynchronous generating module to provide leading and lagging reactive power must be demonstrated in accordance with the requirements of paragraphs 213-222 of these Rules;

b) the test should be carried out at the maximum reactive power of the leading and lagging at the same time, and the following parameters should be checked:

Work at 60 percent of maximum power for 30 minutes;

Work in the range of 30-50% above maximum work efficiency for 30 minutes;

Work in the range of 10-20% above maximum work efficiency for 60 minutes;

c) the test is considered successful when the following criteria are met:

operation of non-synchronous (non-synchronous) generating module both leading and lagging at maximum reactive power for a long time not less than the duration required by each parameter specified in sub-paragraph b of this paragraph;

demonstrate the ability of an asynchronous generating module to switch to any given value of reactive power within the limits of the agreed or accepted range of reactive power;

when no protective action is taken within the operating limits specified in the reactive power diagram.

838. The following requirements apply to voltage adjustment mode testing:

a) The asynchronous generating module must demonstrate the ability to operate in voltage regulation mode in accordance with the requirements of paragraphs 217-222 of these Rules;

b) during the test of the voltage adjustment mode, the following parameters are checked:

In accordance with paragraph 217 of these Rules, the rate of change and the deadband must be established;

accuracy of adjustment;

lack of external interference;

reactive power activation time;

v) the test is considered successful when the following conditions are met:

The range of adjustment and the adjustable deadband and deadzone must comply with the parameters specified or selected in paragraph 218 of these Rules;

According to paragraph 217 of these Rules, the deadband for voltage regulation should not exceed 0.01 p.u;

Following a step change in voltage, the output reactive power must reach 90% of its change within the specified time and value indicated in paragraph 219 of these Rules.

839. The following requirements apply to the reactive power adjustment mode test:

a) The asynchronous generating module must demonstrate its ability to operate in the reactive power regulation mode in accordance with the requirements outlined in paragraph 220 of these Rules;

b) the test of the reactive power adjustment mode additionally completes the test of the ability to maintain the reactive power;

v) the following parameters should be checked during the reactive power adjustment mode test:

reactive power setpoint and its gain range;

accuracy of adjustment;

reactive power activation time;

g) the test is considered successful if the following conditions are met:

The reactive power setpoint and its margin must comply with the requirements outlined in paragraph 220 of these Rules;

if the adjustment accuracy is in accordance with the specified conditions.

840. The following requirements apply to the power factor correction mode test:

a) The asynchronous generation module must demonstrate the capability to operate in power factor correction mode in accordance with the requirements outlined in paragraph 221 of these Rules;

b) the test of the power factor correction mode should include the following parameters:

range of power factor setpoints;

accuracy of adjustment;

change in reactive power due to step change in active power.

c) the test is considered successful if all the following conditions are met:

If the power factor setpoint and its enhancement range comply with the requirements of paragraph 221 of these Rules;

If the activation time of reactive power resulting from a step change in active power does not exceed the established values according to paragraph 223 of these Rules;

if the adjustment accuracy is in accordance with the specified values.

841. The relevant system operator may select only one of the three testing conditions specified in paragraphs 838-840 of these Rules for conducting the tests.

Chapter 4. Conformity of objects of distribution systems connected to the transmission system

§ 1. General conditions for modeling the conformity of objects of distribution systems

842. Distribution system operators must ensure that their distribution systems connected to the transmission system comply with the requirements stipulated in these Regulations.

If the requirements are set by the Transmission System Operator or are intended for the operation of the Transmission System Operator’s system, the requirements for performing alternative tests or accepting test results in accordance with these requirements must be agreed with the Transmission System Operator.

843. Any operational events or failures affecting the requirements outlined in Sections 1 and 4 of this chapter of these Rules, as well as interruptions in the distribution equipment or system, must be immediately reported by the Transmission System Operator and the System Operator, directly or indirectly through a third party, following the occurrence of the aforementioned situations.

844. Any test schedules and the procedure for conducting them for the evaluation of the compliance of the distribution devices connected to the transmission system or the distribution system with the requirements of these Rules must be submitted to the Transmission System Operator within the time limits set by the Transmission System Operator, before the start of these activities.

845. The transmission system operator may participate in such tests and record the performance of the distribution equipment or system connected to the transmission system.

846. The transmission system operator, in cooperation with the Regulatory

Authority, may evaluate the compliance of the distribution device or system connected to the transmission system with the requirements of these Rules during the entire operation period of the distribution device or distribution system connected to the transmission system.

The Transmission System Operator shall notify the Closed Distribution System Operator or the Distribution System Operator of the evaluation results.

847. The Transmission System Operator, Distribution System Operator, or Closed Distribution System Operator shall have the right to require testing or modeling in accordance with a repeat plan or general scheme, following the shutdown, modification or replacement of any transmission-connected distribution equipment affecting the requirements of this Code.

Tests may be conducted by the Regulatory Authority in the field of Electricity. The Transmission System Operator, Closed Distribution System Operator or Distribution System Operator shall notify the results of these tests.

848. The Transmission System Operator shall ensure that the list of information and documents to be submitted and the requirements to be met by the Distribution System Operator or the Closed Distribution System Operator during the compliance approval process are transparent to all.

The list includes the following information, documents and requirements:

All documents and compliance documents to be submitted by the distribution system operator or Closed distribution system operator;

detailed technical data of the distribution device or system connected to the transmission system, related to network connection or operation;

requirements for models for research of static and dynamic regimes;

deadlines for providing systematic information necessary for conducting research;

In accordance with the requirements of Sections 3-5 of Chapter 4 of Section IX of these Rules, the expected static (steady-state) and dynamic condition characteristics must be demonstrated through the results of studies conducted by the Distribution System Operator or the Closed Distribution System Operator.;

conditions and procedures, including the volumes of registration of documents confirming the conformity issued to the devices;

Conditions and procedures for the use of documents certifying conformity to equipment (devices) issued by the conformity assessment body of the distribution system operator or Closed distribution system operator.

849. Transmission system operator compliance tests implementation, modeling and monitoring, defines the obligations of the Distribution System Operator or Closed Distribution System Operator and ensures its publication.

850. If the testing for compliance or modeling that is to be carried out based on an agreement between the Transmission System Operator and the Distribution System Operator or the Closed Distribution System Operator cannot be conducted

due to reasons related to the Distribution System Operator, then the Distribution System Operator must not unjustifiably reject the operational notice specified in Chapter 2 of Section X of these Rules.

851. Simulation modeling of the User's work connected to the transmission system shall demonstrate whether the requirements of this Regulation are met or not.

852. Modeling should be carried out in the following cases:

when a new connection to the transmission system is required;

when further improvement, replacement or modernization of devices are carried out;

In case of non-compliance with the requirements of these Rules by the relevant system operator.

853. Despite the minimum requirements for compliance modeling set out in these Regulations, the Transmission System Operator has the following rights:

Allowing the distribution system operator or the Closed distribution system operator to conduct alternative modeling (a set of simulations) that is considered effective and complete, which can demonstrate compliance with the requirements of these Regulations and legal documents;

In cases where the information provided by the Transmission System Operator is insufficient to demonstrate compliance with the requirements of Chapter 4, Paragraphs 3-5 of Section IX of these Rules, the Distribution System Operator or the Closed Distribution System Operator may be required to conduct additional or alternative modeling sets.

854. The operator of the distribution system connected to the transmission system must submit a report on the results of modeling carried out separately for each distribution device connected to the transmission system. The distribution system operator shall develop and submit agreed simulation models for each distribution device connected to the transmission system.

A summary of imitation models is specified in Section IX, Chapter 4, Paragraph 2 of these Rules.

855. The operator of the transmission system has the right to verify the compliance of the distribution system with the requirements of these Rules by conducting personal modeling based on the reports provided on the results of modeling, simulated models and conformity assessment.

856. The Transmission System Operator shall provide the Distribution System Operator or Closed Distribution System Operator with network technical data and a simulation model to the extent necessary to perform the requested modeling.

§ 2. Simulation model of objects of distribution systems

857. The distribution systems connected to the transmission system must meet the requirements related to the simulation models or equivalent data specified in

Paragraphs 859 and 860.

858. The transmission system operator may require simulation models or equivalent data showing the states (behavior) of the distribution system in static and dynamic modes.

859. The transmission system operator shall determine the content and format of these simulation models or equivalent data, which content and format shall include:

static and dynamic situations;

modeling of electromagnetic transition processes at the connection point;

structure and block diagrams.

860. For dynamic modeling purposes, the simulation model or equivalent data specified in the above Paragraph 859 must include the following minor models or equivalent data:

power management;

voltage control;

models of distribution system protection;

different types of loading - technical characteristics;

converter models.

861. The transmission system operator defines the requirements for providing data recorded on the distribution system devices connected to the transmission system for comparison of the results in the model.

§ 3. Compliance modeling for distribution facilities connected to the transmission system

862. Modeling the reactive power maintenance capability of a transmission-connected switchgear includes:

using a static model for calculating the flow of power in the distribution network connected to the transmission system to calculate the exchange of load and generation with reactive power in different modes;

that a combination of steady minimum and maximum loads and generation conditions resulting in the smallest and largest reactive power trade-offs be part of the modeling;

calculation of reactive power generation at a current less than 25% of the maximum value of active power consumption at the connection point should be part of the modeling.

863. When the Transmission System Operator requires the connected distribution system to manage the reactive power exchange at the connection point for the benefit of the entire single power system, the Transmission System Operator may specify the compliance modeling procedure and method for reactive power management.

864. Simulation modeling is considered satisfactory if the results show compliance with the following requirements:

a) When the Transmission System Operator proves the technical or financial advantages of the transmission system through a joint analysis of the Distribution System Operator and other Users connected to the transmission system, or excluding situations where the Transmission System Operator specifies alternative values, the actual range of reactive power for reactive power consumption and production is from should not be higher than:

33 percent of the largest maximum power consumed or maximum power generated in reactive power consumption (power factor 0.95);

33 percent of the largest maximum consumption capacity or maximum production capacity (power factor 0.95) in the production of reactive power;

b) unless otherwise agreed, the distribution network connected to the transmission system does not produce reactive power at the connection point at a current of less than 25% of the maximum possible consumption of active power (at a given voltage at 1 n.p.).

§ 4. Checking compliance with data exchange requirements in distribution equipment connected to the transmission system

865. The transmission system's user technical capabilities connected to the transmission system must demonstrate compliance with the data exchange requirements for the transmitting distribution system specified in Chapter 4 of Section IX of these Rules for rapid or periodic data exchange between the Transmission System Operator and the Distribution System Operator.

866. In cases where the documents confirming the compliance of the equipment are provided by the Transmission System Operator, they can be used in place of some of the tests outlined in Paragraph 865 of these Rules.

§ 5. Checking compliance with the requirements for disconnection and reconnection of consumption connected to the transmission system

867. Users connected to the transmission system must meet the disconnection and reconnection requirements specified in Chapter 5 of Section XI of these Rules and pass the following tests.

868. Reconnection to test reconnection after an accidental outage due to a disruption in network operation shall be carried out with acceptable automation based on the reconnection procedure approved by the Transmission System Operator.

869. During the synchronizing tests, the synchronizing capabilities of the switchgear connected to the transmission system shall be demonstrated. This test shall include checking the setpoints of the synchronizing devices and testing voltage, frequency, phase angle range, voltage and frequency deviations.

870. When performing the remote disconnection test, the technical possibility

of remotely disconnecting the distribution device connected to the transmission system from the transmission system at the connection point or points in the time interval specified and required by the Transmission System Operator must be demonstrated.

871. During the low-frequency demand disconnection tests, the technical capability of the distribution device connected to the transmission system to disconnect in percentages from the load specified by the Transmission System Operator must demonstrate compliance with Paragraphs 1121 and 1122 of these Rules.

872. During underfrequency cut-off relay tests, the ability to operate the switchgear connected to the transmission system with nominal alternating current supply shall be demonstrated. AC power supply parameters shall be determined by the Transmission System Operator.

873. During the disconnection tests under voltage drop, the technical capabilities of the distribution device connected to the transmission system to operate with blocking in one effective mode of the regulation device under the load specified in Paragraph 1115 of these Rules must be demonstrated.

874. In the event that a certificate of conformity of the equipment/installation is submitted to the Transmission System Operator, this certificate of conformity may be accepted as part of the above tests.

Chapter 5. Conformity of consumer equipment connected to the transmission system

§ 1. General conditions for modeling the conformity of consumer equipment

875. Operators of Consumers connected to the transmission system must ensure that compliance tests of consumer equipment (devices) meet the requirements set forth in these Regulations.

The consumer operator or Closed distribution system operator serving the System operator for load adjustment must ensure that the consumer’s equipment (devices) comply with the requirements of these Rules.

876. If the requirements of these Rules are applied to the blocks used for providing services to the System Operator for load regulation by the consumer or the distribution system operator, the Consumer Operator or the Distribution System Operator may fully or partially delegate tasks such as communication with the System Operator and compiling documents confirming compliance with the requirements to third parties.

Third parties are considered as separate Users who have the right to complete the relevant documents and demonstrate the compliance of their total consumers or closed distribution systems with the requirements of these Rules. Consumers providing load balancing services to the system operator or closed distribution systems may act together through third parties.

877. If the obligations are fulfilled through third parties, taking into account their location characteristics, it is necessary to notify the System Operator only about changes in the total volume of services provided.

878. If the requirements are specified by the Transmission System Operator or are intended for the operation of the Transmission System Operator's system, alternative tests or the requirements for acceptance of the results of tests related to the fulfillment of these requirements must be agreed with the Transmission System Operator.

879. Regarding any plans to change the technical capabilities of the consumer or distribution system or unit connected to the transmission system, affecting compliance with the requirements provided for in Chapter 5 of this section, within the time limits set by the relevant system operator, directly or indirectly through a third party, until such change is made. the system operator must be notified.

880. The relevant system operator must be notified directly or indirectly through a third party immediately upon occurrence of any operational events or consumer outages affecting compliance with the requirements provided for in Chapters 1 and 5 of this section.

881. Schedules of any planned tests and procedures for testing compliance of a consumer or unit with the requirements of these Rules shall be communicated to the Relevant System Operator prior to their commencement within the time limits established and approved by the Relevant System Operator.

882. The relevant system operator can participate in these tests and record the operation of the consumer equipment (device) and unit.

883. Together with the regulatory body, the relevant system operator evaluates the compliance of the consumer equipment (device) or block, the object during the entire service life of the requirements of these Rules.

The facility operator or Closed distribution system operator must be notified of the results of this evaluation.

The suitability of the block used by the consumer or closed distribution system to provide load balancing services to the Transmission System Operator shall be assessed jointly with the Transmission System Operator and the Relevant System Operator and, if applicable, in agreement with Third Parties involved in load distribution.

884. The relevant System Operator, Consumer Operator or Closed Distribution System Operator shall have the right to require compliance checks and modeling tests following any re-planning, general scheme or any failure, modification or retrofitting that may affect compliance.

Tests may be conducted by the Controlling Authority. The relevant system operator shall ensure that the Consumer Operator or Closed Distribution System Operator is notified of the test results.

885. The relevant system operator must make publicly available (announce)

the list of information and documents to be provided, the requirements to be fulfilled by the Consumers or Closed distribution system operator as part of the conformity assessment.

The list should contain at least the following information, documents and requirements:

All documents and compliance documents to be submitted by the consumer operator or Closed distribution system operator;

detailed technical information required from the consumer connected to the transmission system or the unit related to its connection or operation;

requirements for models for the study of static (stable) and dynamic regimes;

deadlines for providing systematic information necessary for conducting research;

the results of the Consumer Operator's studies conducted to demonstrate the expected static (steady-state) and dynamic state characteristics in accordance with the requirements of this section, Chapter 5, paragraphs 3 and 4;

conditions and procedures for assessing the conformity of equipment/devices, including registration volumes;

Conditions and procedures for the use of documents confirming the appropriate conformity of equipment/devices issued by the conformity assessment body of the consumer operator.

886. The relevant system operator shall publish the allocation of requirements, modeling and monitoring testing obligations between the Consumer Operator or Closed Distribution System Operator, the Relevant System Operator and the Transmission System Operator.

887. If the tests or modeling cannot be carried out in accordance with the agreement between the Relevant System Operator and the Consumer Operator or the Closed Distribution System Operator for reasons related to the Relevant System Operator or the Transmission System Operator, in such a case the Relevant System Operator shall use the operative notice specified in Section X, Chapter 2 of these Rules should not refuse without reason.

888. The fulfillment of the requirements of these Rules must be demonstrated in the simulated modeling of the operation of a module or a closed distribution system with the possibility of quick adjustment of the load power at the consumer or consumer boundaries.

889. Modeling should be carried out in the following cases:

when a new connection to the transmission system is required;

In order to ensure that the operator of the transmission system adjusts the active power and has a quick effect on the load, when a contract is concluded on the connection of the new equipment of the consumer used by the closed distribution system;

When further improvement, replacement or modernization of equipment (devices) is carried out;

in the event of alleged non-compliance with the requirements of these Rules by the relevant operator.

890. Despite the minimum requirements for compliance modeling set out in these Rules, the Relevant System Operator has the following rights:

allow the consumer operator or the Closed distribution system operator to use an alternative set of simulation models, provided that these simulations are effective and sufficient to demonstrate that the consumer equipment is in compliance with these Rules and regulations;

if the data presented to the Transmission System Operator regarding modeling for compliance, according to the requirements set forth in paragraphs 3 and 4 of Chapter 5 of this section, is insufficient to demonstrate compliance with the requirements of these Rules, a request may be made for the Consumer Operator or the Closed Distribution System Operator to conduct additional or alternative sets of simulation models..

891. A consumer operator connected to the transmission system to the transmission systemshould provide a report with modeling results for each individual connected consumer.

The customer operator connected to the transmission system shall develop and provide an agreed simulation model for this customer connected to the transmission system. Requirements for simulation models are defined in paragraph 2 of chapter 5 of this section.

892. The operator of the transmission system has the right to verify the compliance of the consumer with the requirements of these Rules by conducting personal modeling based on reports submitted on modeling, imitation models, tests, measurements.

893. The Transmission System Operator shall provide the Customer Operator with technical data and simulation model of the network to the extent necessary to carry out the requested modeling.

§ 2. Simulation model of consumer devices

894. The simulation models or equivalent data related to consumer equipment/devices connected to the transmission system must comply with the requirements specified in paragraphs 896 and 897 of these Rules.

895. The transmission system operator may request simulation models or equivalent data showing the condition (behavior) of the consumer equipment(s) in static and dynamic modes.

896. The transmission system operator shall determine the content and form of these simulation models or equivalent data, which shall include:

static and dynamic modes, including a 50 Hz component;

modeling of electromagnetic transients at the connection point;

structure and block diagrams.

897. For dynamic modeling purposes, the simulation model or equivalent data referred to in the second heading of paragraph 896 of these Rules must include the following sub-models or equivalent data:

power management;

voltage control;

the consumer protection system models ;

electrical technical characteristics of the load;

converter models.

898. The transmission system operator defines the requirements for recording the data of the consumer equipment (devices) connected to the transmission networks with the data recorded in the model.

§ 3. Modeling the conformity of consumers connected to the transmission system

899. The following conditions apply to the modeling of the ability to maintain reactive power of consumer equipment (devices) connected to the transmission system without a local generating module:

a) the reactive power must be indicated at the connection point of the Consumer's equipment (devices) connected to the transmission system and not having a local generating module;

b) the simulation model of calculating the power flows of the consumer connected to the transmission system is used to calculate the reactive power exchange of the load under different conditions. The minimum and maximum loading conditions that result in the smallest and largest reactive power transfer at the connection point should be part of the simulation model. Except for the following situations:

technical or financial advantages proven based on analysis in cooperation with the Transmission System Operator and the Consumer Operator;

when alternative values are defined by the Transmission System Operator;

c) modeling is considered satisfactory if the results confirm that the actual range of reactive power for consumption and production does not exceed:

33 percent of the maximum consumption capability in reactive power consumption or the maximum production capability in reactive power generation (power factor 0.95);

33 percent of the maximum consumption capacity or maximum production capacity in reactive power generation (power factor 0.95);

unless otherwise agreed, the facility connected to the transmission system shall not produce reactive power at the point of connection at an active power current of less than 25 percent of the maximum power consumption (at a given voltage of 1 n.p.).

900. Modeling the reactive power generation capability of a local consumer with a generation module connected to the transmission system includes:

a) The simulation model of the consumer equipment (device) connected to the transmission system is used to calculate the reactive power exchange in different conditions of load and generation;

b) the combination of minimum and maximum load and generation conditions resulting in the smallest and largest reactive power at the connection point is part of the modeling;

v) When technical and financial advantages are proven according to the results of a joint analysis by the Transmission System Operator and the Consumer Operator connected to the transmission system, or excluding the situations determined by the Transmission System Operator, the results do not exceed the actual range of reactive power consumption and reactive power for production, the modeling is considered satisfactory. is:

33 percent of the maximum consumption capacity or the maximum production capacity in reactive power consumption (power factor 0.95);

33 percent of the largest maximum consumption capacity or maximum production capacity in reactive power generation (power factor 0.95);

unless otherwise agreed, the facility connected to the transmission system shall not produce reactive power at the point of connection with a current of less than 25 percent (at a given voltage of 1 n.p.) of its maximum active power consumption.

§ 4. Conformity modeling by fast adjustment of load active power for consumer equipment

901. The model of Consumer equipment used by the consumer operator or Closed distribution system operator to ensure the possibility of quick adjustment of the active power of the load must demonstrate the following necessary technical capability for quick adjustment of the active power of the equipment specified in the agreement on frequency reduction:

the change in active power associated with a measure such as the rate of change of frequency for the agreed part of its load;

agreed management system operating principle and relevant operating parameters;

agreed processing time for quick adjustment of active power.

902. Simulation modeling is considered sufficient provided it demonstrates compliance with the agreed terms.

§ 5. Testing the conformity of Consumer equipment connected to the transmission system for data exchange

903. Between the operator of the transmission system and the operator of the Consumer connected to the transmission system, the technical capability of the Consumer connected to the transmission system to meet the requirements for

information exchange specified in Chapter 4 of this section must be demonstrated in relation to the operational mode or periodic information exchange.

904. If the documents certifying the compliance of the equipment (device) are presented to the Transmission System Operator, they may be accepted as part of the tests provided for in paragraph 903 of these Rules.

§ 6. Disconnection and reconnection tests of Consumer equipment connected to the transmission system

905. Consumers connected to the Transmission System must comply with the disconnection and reconnection requirements specified in Chapter 5 of Section XI of these Rules and must undergo the following tests.

906. When checking the possibility of reconnection after an accidental shutdown due to a breakdown in the transmission system, this reconnection should be carried out according to the reconnection procedure with the permission of the transmission system operator, in which case it is desirable to perform the reconnection by automation.

907. Synchronization tests shall demonstrate the synchronization capabilities of the Customer Equipment connected to the transmission system.

In these tests, it is necessary to check the setpoints of the synchronization devices.

The test should cover voltage, frequency, phase angle range, voltage and frequency deviations.

908. During the test on the distance disconnection indicator, the technical capabilities for remote disconnection at the connection point or points of the transmission system of the consumer connected to the transmission system should be demonstrated at the time required by the Transmission System Operator.

909. The technical feasibility of operation of the consumer equipment connected to the transmission system from an alternating current input signal for the underfrequency test of the cut-off relay shall be demonstrated.

Access to the AC supply shall be determined by the Transmission System Operator.

910. During the disconnection tests due to voltage drop, the technical capabilities of the consumer equipment (device) connected to the Transmission System must be demonstrated to operate in a single mode under load by blocking the regulating device in accordance with the requirements specified in Clause 1115 of these Rules.

911. All or some of the tests may be replaced by the use of documents certifying the compliance of the equipment (device). In this case, these documents must be submitted to the Transmission System Operator.

§ 7. Adjustment of active and reactive power of the load and verification of conformity of transmission limitation control equipment

912. Tests on load variation:

The consumer or the distribution system must demonstrate the technical capability of the equipment (devices) to manage the limitation of power transmission for changing its consumption in the specified frequency and voltage range for the agreed duration after receiving instructions from the Transmission System Operator for the adjustment of active power, reactive power, or after receiving guidelines. This demonstration may be conducted individually or in a comprehensive manner;

the test should be carried out based on the instructions or by simulating receiving instructions from the transmission system operator, as well as by changing (correcting) the demand for electricity of the Consumer or the fixed distribution system;

The testing is considered satisfactory if the conditions set by the Transmission System Operator in accordance with the requirements of these Rules are met.;

all or some of the tests may be replaced by the equipment (device) compliance documentation submitted to the relevant system operator.

913. Testing static compensator equipment during disconnection or reconnection:

Technical efficiency of the equipment(s), compensating equipment(s) used by the consumer operator or Closed distribution system operator to provide management of transmission system constraints in response to demand for load active power adjustment, reactive power adjustment or shutdown or reconnection or all processes Transmission System after receiving instructions from the operator, it must be shown by third parties individually or in a complex manner within the agreed terms;

the test shall be conducted by simulating receiving an instruction from the Transmission System Operator and subsequent disconnection of the static compensator equipment and simulating receiving an instruction from the Transmission System Operator and subsequently re-connecting the equipment;

the test is considered successful if the conditions set by the transmission system operator are met in accordance with the requirements of these Rules.

Chapter 6. Verification of conformity of battery energy storage systems and their modeling

§ 1. Checking the conformity of battery energy storage systems

914. All energy storage systems mentioned in Article 237 of these Rules shall undergo compliance testing in accordance with the procedures outlined in this chapter.

Battery energy storage system operators may submit compliance documents to the relevant system operator for all or part of these tests.

915. When modeling the response of battery energy storage systems to frequency changes, the following is required:

a) it must be demonstrated that the asset is capable of transmitting power over the full frequency range;

b) modeling should be done by creating frequency steps sufficient to run the entire range of the active power frequency characteristic, taking into account the setpoints of the frequency drop and dead zone

c) modeling is considered successful if the following conditions are met:

if the modeling of the response of battery energy storage systems to frequency changes has been successfully performed;

when it is demonstrated that the requirements specified in sub-paragraph "a" of this paragraph are met.

916. When modeling power flow control, reactive power and voltage control capabilities of electric energy storage systems, the following are required:

a) In accordance with the requirements outlined in Chapter 8 of Section III of these Rules, the capability of the storage systems to provide leading and lagging reactive power must be demonstrated;

b) modeling is considered successful if the following conditions are met:

when compliance is shown as a result of reactive power tests;

when it is demonstrated that the requirements specified in sub-paragraph "a" of this paragraph are met.

§ 2. Compliance tests of battery energy storage systems

917. The following requirements apply to active power generation and frequency tuning tests:

a) battery energy storage systems must demonstrate that they are technically capable (possibility) of continuously changing the active power generated over the full operating range between the maximum power and the Minimum Adjustment Level to ensure frequency adjustment. The specified tuning parameters should be checked, including statics, deadband and frequency step response, and dynamic parameters including large and rapid frequency deviations;

b) tests must be conducted by modeling the possibility of real increase or decrease of active power at the output of the corresponding operating point, taking into account the static and dead zone setpoints, the active power change corresponding to the frequency change increases by an amount large enough to operate in all bands. If necessary, the simulated signals of the frequency deviation must be simultaneously transmitted to the speed and load adjuster of the device or the start of the calculation of the control system;

c) modeling is considered successful if the following are fulfilled:

The activation time for the full range of the frequency characteristic of active power should not exceed the requirements specified in Clause 161 of these Rules.;

if no undulating oscillations appear after the response to the frequency change;

The initial delay time for the lag must comply with Clause 165 of these Rules;

The drop and dead zone setpoints should not exceed the values specified in the range outlined in Clause 165;

The insensitivity of the frequency characteristic of active power will be considered successful if it does not exceed the values specified in Clause 165 at any relevant operating point.

918. The following requirements apply to the reactive power test:

storage systems Rules according to the requirements, the technical possibilities for providing the advancing and retarding reactive power should be indicated;

If the storage systems operate in both leading and lagging modes with maximum reactive power, maintaining a stable operating mode while producing maximum power, and if they can produce active power within the range of maximum and minimum values for no less than one hour, the test will be considered successful. In this case, the storage system must demonstrate the capability to transition reactive power to any specified or agreed-upon value.

919. The following requirements apply to zero start capability tests:

storage systems with the ability to start from zero should be shown the technical possibility of starting without external power supply sources after shutdown;

The test is considered successful if the start-up time is maintained by the relevant system operator within the limit agreed with the system operator.

920. The operator of the battery energy storage system can use the conformity documents issued by the conformity assessment body for its equipment to confirm the required conformity, instead of carrying out the relevant testing. In this case, the documents confirming the conformity of the device or the declaration of conformity and test reports must be submitted to the relevant system operator.

921. The following requirements apply to voltage adjustment mode testing:

a) Battery energy storage systems must demonstrate their capability to operate in voltage regulation mode in accordance with the requirements of Clause 251 of these Rules;

b) during the test of the voltage adjustment mode, the following parameters are checked:

In accordance with Clause 251 of these Rules, the change slope and dead zone;

accuracy of adjustment;

lack of external interference;

reactive power activation time;

c) the test is considered successful when the following conditions are met:

The adjustment and the range of the dead zone and static zone must correspond to the parameters indicated or selected in Clause 251 of these Rules;

insensitivity level of voltage adjustment is 0.01 n.b. not to exceed;

after a step change in voltage, the output reactive power should achieve a change of 90 percent within the specified time and value indicated in Clause 251 of these Rules.

922. The following requirements apply to the reactive power adjustment mode test:

a) The battery energy storage system must demonstrate its ability to operate in reactive power adjustment mode in accordance with the requirements of Clause 247 of these Rules;

b) the test of the reactive power adjustment mode additionally completes the test of the ability to maintain the reactive power;

v) the following parameters should be checked during the reactive power adjustment mode test:

reactive power setpoint and its gain range;

accuracy of adjustment;

reactive power activation time;

g) the test is considered successful if the following conditions are met:

the reactive power setpoint and its enhancement range must comply with the requirements of Clause 247 of these Rules.;

if the adjustment accuracy is in accordance with the specified conditions.

923. The following requirements apply to the power factor correction mode test:

a) The battery energy storage system must demonstrate the capability to operate in power factor correction mode in accordance with the requirements of Clause 249 of these Rules;

b) the test of the power factor correction mode should include the following parameters:

range of power factor setpoints;

accuracy of adjustment;

change in reactive power due to step change in active power.

c) the test is considered successful if all the following conditions are met:

The power factor setpoint and its enhancement range must comply with the requirements of Clause 249 of these Rules;

if the activation time of the reactive power does not exceed the specified values as a result of the step change of the active power;

if the adjustment accuracy is in accordance with the specified values.

924. The relevant system operator can choose only one of the above test conditions to conduct the test.

Section X. Organization of transmission system work

Chapter 1. General conditions for organizing the operation of the transmission system

925. The system operator is responsible for balancing electricity demand and electricity generation in real time, planning operational activities in the transmission system, and ensuring the safe operation of the transmission system.

During operational activities, the System Operator communicates with all Users in operational mode.

The transmission system operator is responsible for the reliable and stable operation of the transmission system by designing, developing, commissioning, operating and maintaining the transmission system.

926. The purpose of this section is to clarify the details of the organizational activities that must be performed by the Transmission System Operator and System Operators, and in this, the following operational functions should be paid attention to in order to fulfill the tasks assigned to them:

operational connection to the network, including making new connections brought to a ready state;

operation of the unified electric power system in stable conditions and training, upgrading and retraining of personnel who can manage it in emergency situations.

927. The correct operation of automatic circuits in the single electric power system during operation indicates the stability of this system.

928. This section applies to the System Operator and the Transmission System Operator and, as applicable, to:

Distribution system operator;

Closed distribution system operator whose networks are directly connected to the transmission system;

Operators of power plants, including operators with generation modules connected to the distribution network;

battery energy storage systems;

Consumers directly connected to the transmission system.

Chapter 2. Functions of System Operator and Transmission System Operators

929. The transmission system operator is responsible for the design, construction, expansion, maintenance and operation of the transmission system, which ensures the rational use of electricity, in particular, the reduction of technological losses in the transmission system, and the efficient planning of generation capacities.

930. In accordance with the design requirements, the transmission system

operator must ensure that the requirements for automation of the single electric energy system are met by the users.

931. The system operator controls the dispatching functions at the regional level by the central dispatching service for dispatching and network management, and the regional dispatching service supervises the dispatching functions of the regional control centers operating under its coordination.

932. The system operator coordinates the actions of any operating (connected) Parties in the single energy system in real time and implements the unified dispatching management of the single electric power system, as well as coordinates the dispatching management of distribution systems and closed distribution systems.

If the networks of the distribution system operator are disconnected from the single power system, that is, they are working separately, the distribution system operator must perform all the dispatching activities related to the isolated section until the networks are reconnected to the unified power system.

933. A distribution system operator is responsible for managing all network operations within its network.

Chapter 3. Operational notices

934. The relevant system operator shall explain and make publicly available the details of the operational notification procedure for the completion of new connections to its network.

935. The operator of the power stations, the consumer operator, the Closed distribution system operator, or the distribution system operator must notify the Transmission System Operator of compliance with the requirements set out in Section IX of these Rules for connecting their systems. They must also successfully implement the procedure for providing operational notifications described in Section X, Chapter 4, or Section X, Chapter 4, Paragraph 2 of these Rules.

936. When connecting to the distribution system, the operator of the power station or the Closed distribution system operator, who has a power station in their network, must demonstrate to the distribution system operator that they have successfully completed the operational notification procedure established in Section X, Chapter 4 of these Rules for connecting each power-generating module, and that the requirements outlined in Section IX of these Rules have been fulfilled.

937. Each new power station connected to the transmission system, each new power station connected to the distribution network, each new power station connected to the transmission system, each new distribution facility connected to the transmission system, and each new distribution system connected to the transmission system shall have the following operational notices: should include:

Operational notification on the provision of electricity supply - notification sent by the relevant system operator to the Power Plant Operator, Consumer

Operator or Distribution System Operator before supplying electricity to their respective network;

Interim operative notice - a notice issued by the relevant system operator to the User in order to start testing the relevant generation module, consumer or distribution system according to the specification and other requirements using the connection to the electric network in a limited period of time;

Final operational statement - a statement issued by the relevant system operator to the Power Station Operator, Consumer Network Operator or Distribution System Operator, confirming that they meet the relevant technical description and requirements, allowing them to operate the generating module, Consumer devices, as well as distribution systems connected to the electric network.

Chapter 4. Connecting generating modules

§ 1. Operational notification of "A" type renewable energy source devices and synchronous generating (generating) modules with an installed capacity of 50 kW or less

938. The procedure for issuing an operational statement on the connection of each new generation module is by submitting installation documents.

The Power Plant Operator shall complete the necessary information in the installation document obtained from the relevant System Operator and ensure that it is submitted to the System Operator.

A separate installation document is provided for each generating module.

The relevant system operator shall ensure that the necessary information is provided by third parties on behalf of the Power Plant Operators.

939. The relevant system operator shall determine the content of the installation document and this document shall contain the following information:

the place where the connection is made;

connection date;

the maximum capacity of the equipment;

type of primary source of energy;

reference to the conformity assessment documents (certificate of conformity, test reports) issued by the conformity assessment body for the equipment and devices installed at the facility;

information on previously used equipment and devices for which a document confirming compliance has not been obtained (must be provided in accordance with the instructions of the relevant system operator);

Contact information of the power plant operator and installation (installation) organization.

940. The Power Plant Operator shall notify the Relevant System Operator of generating modules being decommissioned and dismantled.

Such notice may also be given to the relevant system operator by third parties.

§ 2. Operational notification of generating modules with a capacity of up to 20 MW

941. The operator of the power plant shall provide an operative notification to the System Operator about the connection of each new generating module, in which the generating module document containing the statement of compliance shall be submitted. A separate document is provided for each generating module.

942. Generating module document is a statement of compliance of the generating module with the technical requirements specified in these Rules, as well as the necessary information and the results of the assessment of compliance with other confirming criteria, submitted by the operator of the power plant to the relevant system operator.

943. The format of the generating module document and the information to be provided shall be determined by the relevant system operator and shall include at least the following:

Documents confirming the agreement between the relevant system operator and the Power Plant Operator about protection and other setpoints related to the connection point;

Statement of compliance in the form prescribed by the relevant system operator in agreement with the transmission system operator;

Detailed technical data of the generating module relevant to the grid connection as defined by the relevant system operator;

if necessary, documents confirming the conformity issued by the conformity assessment body for the equipment and devices related to the generating modules;

Simulation models in accordance with Paragraph 3 of Chapter 3 of Section IX of these Rules;

tests that detail each of the stable and dynamic characteristics required by the relevant system operator in accordance with Paragraphs 6-8 of Chapter 3 of Section IX of these Rules, along with reports prepared based on the measured values during the tests;

Studies demonstrating stable and dynamic characteristics based on tests that detail each case required by the relevant system operator in accordance with Paragraphs 4-7 of Chapter 2 of Section IX of these Rules.

944. Upon acceptance of a complete and substantiated generating module document, the applicable system operator shall provide the Power Plant Operator with a Final Operational Statement.

945. The Power Plant Operator shall notify the relevant System Operator and Transmission System Operator of the generator modules being dismantled.

946. The relevant system operator shall submit the notice of commissioning and decommissioning of generation modules of type "B" and "C" in electronic form.

947. The Generating Module document can be issued by the authorized body on behalf of the Power Plant Operator.

§ 3. Operational notification of "D" type renewable energy source installations and synchronous generating modules with a capacity of 20 MW and above

948. The operational declaration of electricity supply shall be submitted to the relevant system operator with supporting documents upon completion of the agreements between the relevant system operator and the power plant operator regarding protection and other setpoints for the connection point.

949. The operational statement on the supply of electricity gives the power plant operator the right to supply its internal network and generator modules with electricity at the specified connection point.

950. An interim operational statement shall be submitted to the Eligible System Operator at the end of the data and learning analysis process as required by Section X, Chapter 4, Paragraph 3 of these Rules. For the analysis of data and studies by the relevant system operator, the Power Plant Operator shall provide him with:

A detailed compliance statement in the form prescribed by the relevant system operator in agreement with the transmission system operator;

Detailed technical information on the generating module applicable to the network connection as defined by the relevant system operator;

if necessary, documents confirming the conformity issued by the conformity assessment body for the equipment and devices related to the generating modules;

simulation models specified in Paragraph 3 of Chapter 3 of Section IX of these Rules and the requirements set by the relevant system operator;

studies demonstrating the expected stable and dynamic characteristics in accordance with the requirements of Paragraph 4 of Chapter 3 of Section IX of these Rules;

Information regarding the tests planned in accordance with the procedures outlined in Paragraphs 6-8 of Chapter 3 of Section IX of these Rules.

951. The Interim Operational Notice authorizes the Power Plant Operator to operate the generating module and produce electricity using grid connection for a limited period of time.

952. The maximum period that the Power Plant Operator can maintain the Interim Operational Notice is 24 months, the relevant System Operator can reduce the period of maintaining the Interim Operational Notice status.

The operator of the power plant may extend the period of maintenance of the Interim Operational Notice in the event of a positive result in terms of compliance with the established requirements. Unsolved issues and problems should be clearly indicated when sending a request for extension of the term.

953. The operator of the power station may extend the period for which the

interim operational report status can be maintained beyond the period specified in Chapter VI, Article 2 of the Rules, provided that the operator sends a request to the relevant system operator in accordance with the procedure for granting an extension prior to the expiration of the period specified in Article 951 of these Rules.

954. The Final Operational Statement shall be submitted by the Relevant System Operator after all discrepancies identified in the Intermediate Operational Statement have been resolved and the data analysis process as required by Section X, Chapter 4, Paragraph 3 of these Rules has been completed.

955. The final operational notice authorizes the Power Plant Operator to operate the generating module using grid connection.

956. In order to study and analyze the data, the Power Plant Operator shall provide the relevant System Operator with the following:

compliance statement;

the relevant technical data, simulation models, and research indicated in the third, fourth, and fifth paragraphs of Article 950 of these Rules must be updated, including the application of actual measured values during testing..

957. In the event of non-compliance with the issuance of the final operational notice, upon the request of the relevant system operator, it may be granted relief in accordance with the procedure set forth in Chapter 2 of Section VI of these Rules.

In this generating module If the relief requirements are met, a Final Operational Notice will be issued by the Eligible System Operator.

If the exemption request is denied, the relevant system operator and the power plant operator have the right to refuse to allow the operation of the generating module until the discrepancy is resolved and the relevant system operator finds the generating module to be in compliance with the requirements of these regulations.

If the relevant system operator and the operator of the power station do not eliminate the detected non-conformity within the specified time, they may apply to the Ministry for resolution of the issue no later than six months after the notification of the rejection of the relief request.

958. The Power Plant Operator, which has been issued with a final operational notice, shall immediately notify the Relevant System Operator in the following cases:

In case of significant modernization and renewal affecting the operation of the facility;

when loss of activity is observed;

in the failure of equipment and devices that lead to non-compliance with established requirements.

959. If the electricity station operator reasonably expects the situations described in Article 958 of these Rules to persist for more than three months, they must contact the relevant system operator regarding the Limited Operational Notification.

960. The limited operational notification is issued by the System Operator and consists of the following information, which must be clearly identified:

Unresolved issues justifying the issuance of a limited operational statement;

obligations and deadlines for the pending decision;

maximum validity periods, which should not exceed twelve months. Where reasonable evidence is provided that significant progress has been made towards full compliance to the satisfaction of the relevant system operator, the initial submission period may be shortened with the possibility of extension.

961. In relation to the facilities for which the Limited Operational Notice has been issued, the validity period of the Final Operational Notice is suspended during its validity period.

962. A further extension of the period of validity of the restricted operational notice may be granted upon a request for relief until the expiry of this period to the relevant system operator in accordance with the restriction procedure described in Chapter 2 of Section VI of these Rules.

963. The relevant system operator has the right to refuse to allow the operation of the generating module after the expiry of the Restricted Operational Notice. In this case, the Final Operational Statement is automatically considered to be void.

964. If the relevant system operator does not permit the extension of the Limited Operational Notification period in accordance with Article 962 of these Rules, or if the relevant system operator denies permission for the operation of the generating module after the Limited Operational Notification has lost its validity in accordance with Article 963 of these Rules, the electricity station operator may appeal to the Ministry regarding the resolution of the issue within six months after receiving notification of the relevant system operator’s decision.

Chapter 5. Connecting consumer or distribution system devices

§ 1. Operational statement on the provision of electricity supply

965. The operative statement on the provision of electricity is submitted by the Transmission System Operator upon completion of preparatory work, including documents confirming the agreement on protection and other setpoints for the connection point between the relevant System Operator and the Consumer Operator connected to the Transmission System or the Distribution System Operator.

966. The operational statement on the provision of electricity gives the consumer connected to the transmission system or the Operator of the Distribution System the right to supply its internal network and auxiliary equipment and devices with electricity at the specified connection point.

§ 2. Interim operative notice

967. The interim operational notification is issued by the Transmission System Operator after the completion of the process of data study and analysis in

accordance with the requirements of Section X, Chapter 4 of these Rules.

968. The interim operational notice gives the right to operate the consumer connected to the transmission system or the equipment (devices) of the distribution system connected to the transmission system during a limited period of time using the network connection.

969. For the purpose of data study and analysis, the following information is provided to the Transmission System Operator by the Consumer Operator or the Distribution System Operator connected to the transmission system:

a) Statement of compliance in the form prescribed by the transmission system operator;

b) Complete technical aspects of the distribution equipment and devices connected to the system of the Consumer facility connected to the transmission system, related to the network connection, based on the requirements set by the transmission system operator;

v) If the compliance documents issued by the compliance assessment body for consumer facilities connected to the transmission system, distribution devices connected to the transmission system, and equipment related to the distribution systems are used as part of the compliance confirmation;

g) Simulation models required by the Transmission System Operator as specified in Articles 970 and 972 of these Rules;

d) Results of studies determining stable and dynamic characteristics, as outlined in Sections 4 and 5 of Chapter IX of these Rules;

e) Information on the scheduled tests in accordance with Paragraphs 6-8 of Chapter 3 of Section IX of these Rules.

970. The transmission system operator may request the submission of simulation models or similar data showing the steady-state and dynamic behavior of the transmission-connected customer system or the transmission-connected distribution system, or both systems.

971. The transmission system operator shall define the form and content of the simulation models and the data that are identical, including:

stable and dynamic modes with a frequency of 50 Hz;

Electromagnetic transition processes at the connection point modeling;

structure and block diagrams.

972. For dynamic modeling, the simulation models or equivalent data specified in Article 971 of these Rules must consist of the following sub-models or equivalent data:

power adjustment;

voltage adjustment;

models of protection of the Consumer connected to the transmission system and the distribution system connected to the transmission system;

different types of consumption, that is, electrical technical characteristics of the load;

converter models.

973. The transmission system operator defines requirements for characteristics of users connected to the transmission system or distribution devices connected to the transmission system for comparison and analysis of simulation models or similar data.

974. The maximum period during which the Consumer Operator or the Distribution System Operator connected to the Transmission System can maintain the status of Interim Operational Notification is 24 months.

The transmission system operator has the right to reduce the period for which the Interim Operational Notification status can be maintained.

Extension of the period of maintenance of the status of Interim operational notification is allowed if the Consumer Operator or the Distribution System Operator connected to the transmission system achieves significant positive results in ensuring compliance with the established requirements. Unsolved issues and problems should be clearly indicated when sending a request for extension of the term.

975. The Consumer Operator or Distribution System Operator connected to the transmission system may maintain the validity of the Interim operational notification with the Transmission System Operator upon the expiration of the period specified in Article 974 of these Rules, provided that a request for an extension has been submitted in advance in accordance with the grace period procedure set out in Chapter 2 of Section VI of these Rules.

§ 3. Final operational statement

976. The final operational statement shall be submitted after the completion of the data analysis process in accordance with the requirements of Section X, Chapter 4, Paragraph 2 of these Rules, after all discrepancies identified in maintaining the status of the Interim Operational Notification have been resolved.

977. The final operative notice authorizes the Consumer Operator or Distribution System Operator connected to the transmission system to operate the facility of the Consumer Operator or Distribution System Operator connected to the transmission system while connected to the grid.

978. In order to study and analyze the data, the Consumer Operator connected to the transmission system or the Distribution System Operator connected to the transmission system must provide the Transmission System Operator with the following:

a detailed statement of compliance;

Updating the relevant technical information, simulation models, and research outlined in sub-items “b,” “g,” and “d” of clause 969 of these Rules, including the data obtained from actual measured values during the tests.

979. In the event that a non-compliance with the issuance of a final operative notice is found, relief may be granted upon request to the Transmission System Operator in accordance with the procedure set forth in Section VI, Chapter 2 of these Rules. In this case, if the Consumer Operator or the Distribution System Operator connected to the transmission system meets the relaxation rules, the Final Operational Notification will be issued by the relevant Transmission System Operator.

980. If the request for derogation is denied, the operation of equipment and devices of the Consumer Operator or Distribution System Operator connected to the transmission system shall be prohibited until the relevant Transmission System Operator confirms that the equipment and devices of the Consumer Operator or Distribution System Operator connected to the transmission system comply with the requirements of these Rules and the identified non-compliances are rectified.

981. If the transmission system operator and the consumer operator connected to the transmission system or the operator of the distribution system connected to the transmission system do not eliminate the discrepancy within the specified time limits, each Party may apply to the Ministry for resolution of the issue no later than six months after the notification of the rejection of the relief request.

§ 4. Limited operational notice

982. The Consumer Operator or the Distribution System Operator connected to the transmission system for which the final operative notification has been submitted must notify the Transmission System Operator and the System Operator within 24 hours after the following events occur:

in significant modernization and renewal affecting the operation of the facility;

upon termination of employment;

in the failure of equipment and devices that lead to non-compliance with the relevant requirements.

983. If the Consumer Operator or Distribution System Operator connected to the transmission system reasonably expects that the conditions described in clause 982 of these Rules will persist for more than three months, the Consumer Operator or Distribution System Operator must apply to the Transmission System Operator for a Limited Operational Notification.

984. A limited operational notification is issued by the Transmission System Operator and shall contain the following specific information:

Unresolved issues justifying the issuance of a limited operational notification;

obligations and deadlines for the pending decision;

maximum validity periods, which should not exceed twelve months. Where reasonable evidence is provided that significant progress has been made towards full

compliance to the satisfaction of the Transmission System Operator, the initial submission period may be shortened with the possibility of extension.

985. In relation to the objects to which the final operative notice has been issued, the validity of the interim operational notification shall be suspended during its validity period.

986. Further extension of the validity period of the limited operational notification may be granted to the Transmission System Operator according to the request for relief until the end of this period in accordance with the relief procedure specified in Section VI, Chapter 2 of these Rules.

987. The transmission system operator has the right to refuse to allow the operation of the equipment and devices of the consumer operator or the distribution system operator connected to the transmission system with the loss of validity of the Restricted operative notice.

In this case, the Final Operational Notification shall automatically be deemed to have lapsed.

988. If the Transmission System Operator does not grant an extension for the Limited Operational Notification in accordance with clause 986 of these Rules, or if the Limited Operational Notification loses its validity as per clause 987 of these Rules, and refuses permission for the operation of the equipment and facilities of the Consumer Operator or Distribution System Operator connected to the transmission system, the Consumer Operator or Distribution System Operator may appeal to the Ministry to resolve the issue within six months from the date of receiving the notification of the Transmission System Operator’s decision.

Chapter 6. Connection of load balancing service providers and closed distribution system equipment

§ 1. General conditions for connection of load adjustment service providers and closed distribution systems

989. If consumer equipment or closed distribution system equipment is directly connected to the transmission system, the requirements of this chapter specify additional requirements to those specified in Section X, Chapter 4.

990. The procedure for providing operational notification to the Consumer or closed distribution system equipment and devices regarding the provision of load adjustment services by the system operator should be differentiated as follows:

Equipment (devices) of the Consumer or closed distribution system connected to a voltage lower than 1000 V;

Equipment (devices) of the Consumer or closed distribution system connected to a voltage higher than 1000 V.

991. Each Consumer or Closed Distribution System Operator providing load balancing services to a Transmission System Operator shall notify the Relevant System Operator or Transmission System Operator directly or through a third party of the

availability of technical designs and operational requirements for the provision of load balancing services.

992. The consumer or the Closed distribution system operator must inform the transmission system operator directly or through a third party about the suspension of load adjustment services and (or) decommissioning of the equipment (device) performing the load adjustment service. This message may be summarized as determined by the Transmission System Operator.

993. The transmission system operator shall specify and make public additional information related to the operational notification procedureprovides.

§ 2. Procedures for consumer equipment (devices) connected to a network or fixed distribution system with a voltage of 1000 V and below

994. For consumer equipment (devices) connected to a network or closed distribution system with a voltage of 1000 V and below, the procedure for issuing an operational notification should include installation documentation.

995. The model and format of the installation document shall be provided by the relevant system operator in agreement with the transmission system operator.

996. The Consumer Operator or Closed Distribution System Operator connected to the transmission system based on the Installation Document shall provide the information to the Relevant System Operator or Transmission System Operator directly or through a third party.

The date of submission of this information must be earlier than the date of submission of the load adjustment offer in the power market by the Consumer connected to the transmission system.

The requirements set out in the installation documents should distinguish between categories of load balancing services and different connections.

997. Separate installation documents must be provided for each equipment (device) that consumers have the ability to adjust the load.

998. Installation documents of individual equipment (devices) of consumers and the information contained in them can be summarized by the relevant system operator or transmission system operator.

999. The assembly document should include the following:

A place (point) where consumer equipment (device) is connected to the network with the ability to adjust the load;

the maximum power of the consumer equipment (device) with the ability to adjust the load;

Types of consumer load adjustment services;

a document confirming the conformity of the Consumer equipment (device) related to the load adjustment function, identical (equivalent) data in the absence of a document confirming the conformity;

Contact information of the consumer operator, the Closed distribution system operator or the third party connecting the Consumer and the equipment (device) of the closed distribution system.

§ 3. Consumer equipment/devices connected to a network or fixed distribution system with a voltage of 1000 V and above

1000. The document of load adjustment equipment should be included in the procedure for issuing operational notices at the boundaries of the closed distribution system facility connected to consumers or 1000 V and higher voltage.

The relevant system operator shall determine the content of the load adjustment equipment document in agreement with the transmission system operator.

This document must contain the compliance requirements stipulated in Chapter 1 and Chapter 5 of Section IX of these Rules for the Consumer Operator or the Closed Distribution System Operator connected to the transmission system.

The compliance requirements from Chapter 1 and Chapter 5 of Section IX of these Rules for Consumer and Closed Distribution System facilities may be simplified and condensed to the level of operational notifications.

The Consumer Operator or Closed Distribution System Operator connected to the transmission system shall provide the required information to the Relevant System Operator.

Consumers must submit a separate load adjustment device document for each load adjustment device.

1001. On the basis of the document of the load adjustment equipment, the Relevant System Operator shall provide the Final Operational Notification to the Consumer Operator or Closed Distribution System Operator connected to the Transmission System for load adjustment.

§ 4. Connecting battery energy storage systems to the transmission system

1002. Operational notification of electricity supply when the agreements between the relevant system operator and the operator of the battery energy storage system regarding protection and other setpoints for the connection point are concluded, the supporting documents will be submitted to the relevant system operator.

1003. The operational statement on the supply of electric energy gives the operator of the battery energy storage system the right to supply its internal network and generator modules with electric energy at the specified connection point.

1004. An interim operational notification shall be provided to the Eligible System Operator upon completion of the analysis of data and studies as required by this section.

1005. For the analysis of data and studies by the relevant system operator, the

Battery Energy Storage System Operator shall provide it with the following:

A detailed compliance statement in the form prescribed by the relevant system operator in agreement with the system operator;

Detailed technical information on the battery energy storage system applicable to the grid connection defined by the relevant system operator;

if necessary, documents confirming the conformity issued by the conformity assessment body for equipment and devices related to battery energy storage systems;

The simulation models specified in Chapter 6 of Section IX of these Rules and the requirements of the Relevant System Operator;

research demonstrating the expected steady-state and dynamic characteristics in accordance with the requirements of Chapter 6 of Section IX of these Rules;

information about the tests planned according to the procedures outlined in Chapter 6 of Section IX of these Rules.

1006. Interim operational notification gives the operator of the battery energy storage system the right to operate the storage system, generate and consume electricity using grid connection for a limited period of time.

1007. The maximum period for which the operator of the battery energy storage system can maintain the status of Interim Operational Notification is 24 months.

1008. If the battery energy storage system achieves a positive result in terms of compliance with the established requirements, it is allowed to extend the period of maintaining the status of the Interim operational notification. Unsolved issues and problems should be clearly indicated when sending a request for extension of the term.

1009. The Battery Energy Storage System Operator may extend the period during which it can maintain an Interim Operational Notification beyond the time frame specified in Chapter 2 of Section VI of these Rules, provided that the operator submits a request to the Relevant System Operator in accordance with the facilitation procedure outlined in paragraph 1007 of these Rules before the expiration of the specified period.

1010. The Final Operational Notification shall be submitted by the Relevant System Operator after all inconsistencies identified in the Intermediate Operational Notification have been resolved and the data analysis process as required by Section X, Chapter 5, Paragraph 3 of these Rules has been completed.

1011. The final operational notice authorizes the operator of the battery energy storage system to operate the generating module using the grid connection.

1012. The Battery Energy Storage System Operator must provide the Relevant System Operator with the following:

compliance statement;

update relevant technical data, simulation models and studies, including data using actual measured values during testing.

1013. In the event of non-compliance with the issuance of the final operational notification, upon the request of the relevant system operator, it may be granted relief in accordance with the procedure set forth in Chapter 2 of Section VI of these Rules.

In this case, if the storage system complies with the requirements for granting relief, the Final Operational Notification will be issued by the Relevant System Operator.

If the relief request is rejected, the relevant system operator and the operator of the battery energy storage system have the right to refuse to allow the operation of this module until the discrepancy is resolved and the relevant system operator finds the storage system in compliance with the requirements of these regulations.

If the relevant system operator and the operator of the Battery Energy Storage System do not eliminate the identified non-conformity within the specified time, they may apply to the Ministry for resolution of the issue no later than six months after the notification of the rejection of the relief request.

1014. The Battery Energy Storage System Operator who has been given a final operational notification shall immediately notify the Relevant System Operator in the following cases:

in significant modernization and renewal affecting the operation of the facility;

upon termination of employment;

in the failure of equipment and devices that lead to non-compliance with established requirements.

1015. If the operator of the battery energy storage system reasonably expects that the situations defined in paragraph 1014 of these Rules will persist for more than three months, they must apply to the Relevant System Operator for a Limited Operational Notification.

1016. The limited operational notification is issued by the System Operator and consists of the following information, which must be clearly identified:

Unresolved issues justifying the issuance of a limited operational statement;

obligations and deadlines for the pending decision;

maximum validity periods, which should not exceed twelve months. Where reasonable evidence is provided that significant progress has been made towards full compliance to the satisfaction of the relevant system operator, the initial submission period may be shortened with the possibility of extension.

1017. In relation to the facilities for which the Limited Operational Notice has been issued, the validity period of the Final Operational Notice is suspended during its validity period.

1018. A further extension of the period of validity of the restricted operational notice may be granted upon a request for relief until the expiry of this period to the

relevant system operator in accordance with the restriction procedure described in Chapter 2 of Section VI of these Rules.

1019. The relevant system operator has the right to refuse to allow the operation of the storage system after the expiry of the Restricted Operational Notification. In this case, the Final Operational Notification shall automatically be deemed to have lapsed.

1020. If the Relevant System Operator does not permit the extension of the validity period of the Limited Operational Notification in accordance with paragraph 1018 of these Rules or refuses to authorize the operation of the storage system after the Limited Operational Notification has lost its validity in accordance with paragraph 1019 of these Rules, the operator of the battery energy storage system may apply to the Ministry to resolve the issue within six months after receiving notification of the decision of the Relevant System Operator.

Chapter 7. Reconnect procedure

§ 1. General conditions for reconnection

1021. The operator of the transmission system and all users of the transmission system must determine the procedures for reconnection in accordance with the legislation of the Republic of Uzbekistan.

Unless the Users enter into an agreement with the Transmission System Operator for the control of their networks, each Party shall undertake to establish its own control center to manage all operational reconnection activities in its network.

1022. All reconnection activities must be performed by appropriately trained personnel acting under the direct supervision of a responsible supervisor. Except for emergency situations and situations that pose a direct threat to the health and life of people (employees), safety of equipment and devices.

§ 2. Reconnections in emergency situations

1023. Employees of the transmission system operator who are trained and have special skills to perform immediate actions and/or situations that pose a direct threat to the safety of personnel, equipment and devices perform the following tasks:

perform operational reconnection of equipment and devices of the transmission system without contacting the control center of the transmission system operator or any User;

Requiring the User to carry out operational reconnection without prior notification from the Transmission System Operator’s Control Center.

1024. It is necessary to limit disconnection of the disconnector in order to disconnect the circuits affected by operational reconnection. No part of the Transmission System Operator or any User’s network in a fault condition shall be energized by the reconnection.

1025. In the event of such an emergency, the communication between the trained personnel of the Transmission System Operator and the User is carried out by telephone and includes the exchange of names. The user must take all necessary measures to re-connect their equipment and devices operationally.

1026. After the operational reconnection is completed, the trained personnel of the Transmission System Operator must inform the Transmission System Operator's Control Center about the operational reconnection and the reason for its implementation.

1027. In the event of such an emergency, the User has the right to refuse operational reconnection for reasons of safety (regarding personnel or equipment) and must first notify trained personnel of the Transmission System Operator.

1028. Communication with the Control Center of the User Transmission System Operator in order to carry out works and (or) activities that pose a direct threat to the safety of employees, equipment (devices) or require operational reconnection of equipment (devices) in the transmission system in order to eliminate the danger that has occurred, and should apply for operational reconnection of equipment (devices) in the system.

1029. In case of such an emergency, the communication between the Control Center of the Transmission System Operator and the User shall be carried out by telephone and shall include the exchange of names.

1030. The Control Center of the transmission system operator shall take all necessary measures to ensure the operational reconnection of its equipment (devices) and apparatus without delay.

After the completion of the required operational reconnection, the User must inform the Control Center of the Transmission System Operator about the operational reconnection.

1031. In emergency situations, the Transmission System Operator's Control Center may refuse operational reconnection for safety reasons (regarding personnel or equipment) and must notify the User first.

§ 3. Scheduled operational reconnections

1032. All scheduled operational reconnection procedures are coordinated by the Control Center responsible for managing the network where the reconnections are to be made.

Requests to schedule scheduled operational reconnections must be made by certified personnel of the Control Center.

The survey should include detailed information about the planned reconnections and the implementation of the reconnections, certified personnel and necessary documents related to the rules of safety techniques that allow safe execution of the reconnections.

1033. Except in cases where immediate operational reconnection is required,

the person requesting reconnection must give at least 24 hours notice.

The control center can approve or deny the request for fast operational reconnection and also propose changes to the request to satisfy other received requests.

The control center shall ensure that no tests are performed on any circuit where reconnections are made.

1034. All reconnections must be made under the direct instructions of the Control Center.

If the instructions are not given through a system that ensures that the reconnection process is recorded and stored in a prescribed form, then the instruction should be recorded by the receiver and read out for approval by the person in charge.

The time each instruction is given and the time each reconnection is completed shall be recorded and made available to the supervisor.

1035. Before any safety engineering documentation is issued, the reconnection points must be insulated, the isolation devices locked and warning marked, and earthed to protect against any possible surge.

As far as possible, the operating mechanisms of all switchgears that are considered to be the point of isolation and the means of providing the main earth connection should be switched off.

1036. All safety equipment documents must be registered in the Control Center.

1037. A person authorized to issue documents on safety equipment must clearly define a safe workplace in accordance with the rules of safety equipment.

1038. In cases where there is a risk of induced voltage at the work site, or if the work site is far from the location of the main grounding connectors, the person authorized to issue safety engineering documents must use auxiliary grounding connectors at the work site.

These auxiliary earth connections must be removed by a competent person prior to inspection of the safety engineering document.

1039. It is forbidden to remove or reconnect the main grounding connectors from the circuit until the safety engineering documents are fully closed and cancelled.

1040. The Transmission System Operator must implement the training and appropriate certification of employees in accordance with the procedures detailed in paragraph 4 of Chapter 6 and Chapter 8 of Section X of these Rules.

Network Users must implement the same training and certification procedures for their employees.

§ 4. Reconnection errors

1041. In the event that an operator performs a reconnection operation by mistake, it is necessary to notify the Control Center about this situation before attempting to correct the situation.

1042. The supervisory responsible person in the control center must take into account the situations that may arise as a result of the operation of automation and the increase of the load, and determine the appropriate measures.

Chapter 8. Operational training and certification of system operator employees

1043. The system operator shall develop a training program for its employees and relevant system operators responding to the operation of the single electric power system in real time (operational) mode.

1044. Detailed information on the process and extent of training of employees, certification (hereinafter referred to as certification) conducted by the system operator for the purpose of knowledge testing should be provided at the request of the Ministry.

The system operator must develop and approve training programs for personnel located outside the control room and performing operational planning and single power system coordination functions.

1045. The system operator, together with the Regulatory Authority, must include in its training programs the basic elements of the single electric power system, the principles of operation, work processes, compliance with established procedures, and the identification and response to emergency situations.

This knowledge should include practical and theoretical instructions about the operational consequences of the implementation of the requirements for automation specified in the legislation in the field of electric power.

1046. The system operator should also plan to conduct training sessions on interoperability between itself and other operators' dispatch services, and should include in its training programs training on emergency detection, response and emergency response.

1047. The system operator, together with the Supervisory body, conducts training sessions for the purpose of improving and retraining employees.

1048. The detailed content and frequency of training for all relevant positions should be specified in the training program. These training sessions include, but are not limited to:

specialized areas of the electric power sector;

operation of the single electric energy system ensuring the safety of employees and equipment (devices) on time;

operation of the single electric power system in stable and all other modes;

Joint training and experience sharing programs with the Distribution System Operator and Users directly connected to the transmission system.

1049. The System Operator shall conduct training on Dispatching of Generating Modules and on cooperation and interoperability between Transmission System Operators.

1050. Training should be conducted at the System Operator level reflecting real-time and operational planning mode.

1051. System Operator Plans and conducts training sessions for all new operatives of respective System Operators.

The training plan should be made taking into account the position and experience of the employee who is being trained.

Records of the training plans of the employees of the relevant system operators must be kept for a period of not less than three years during the activity of the employees in the system of the relevant operator.

1052. Curriculum includes:

the initial program, in which the System Operator employees are trained in operational mode at the workplace at the level of their position, and then pass an attestation (knowledge test);

Continuous training of the system operator's employees in the operational mode and carrying out periodic knowledge testing of the employees at least once every five years;

on-the-job training program related to operational planning.

1053. The system operator appoints an experienced Training Coordinator who is responsible for planning, monitoring and regularly updating the training programs throughout the training process.

1054. The Training Coordinator is responsible for:

Training of system operator employees;

Training and certification of system operator employees in operational mode;

processes related to keeping documents related to initial and regular training;

The process of certification of system operator employees in operational mode;

The process of extending the period of training and certification of system operator employees in operational mode;

conducting training sessions involving specialists with the necessary practical and theoretical experience operating in the field of electric energy, as well as qualified teachers and trainers.

1055. System Operator personnel acting as trainers must be registered by the Transmission System Operator and their on-the-job training status reviewed

concurrently with re-certification as System Operator personnel.

1056. The system operator shall review and update the training programs at least once a year, taking into account new technologies, generation or load models and any significant changes in the market and the single electricity system, or based on changing operating modes, operational rules and network configurations and characteristics.

1057. The system operator ensures that there are separate and non-separated forms of the read process. On-the-job training must be conducted under the supervision of an experienced System Operator.

Disengagement training should closely resemble actual dispatch facilities with network modeling details appropriate to the training situation.

1058. The System Operator shall ensure that the training sessions are based on a comprehensive model of the relevant data base obtained from neighboring networks, including adequate representation of the operational issues related to the work between the Transmission System Operators.

In appropriate cases, neighboring system operators and Users with a connection point to the transmission system will have to be modeled or directly involved in the reading in "offline" mode.

1059. In order for the training process to be comprehensive in "offline" mode and relevant information about the latest developments in systems, equipment (devices), and new technologies is reflected in the training programs, the System Operator should regularly cooperate with the operators of interconnected systems and the Users of networks with connection points.

1060. The representative of the system operator must provide the employees working in the operational mode with a document that they have been certified to perform the duties specified in the job instructions without an observer.

1061. The system operator must determine the certification process for employees working in the operational mode to meet the requirements of the qualification level and job description.

The employees of the System operator working in the operational mode who have passed the attestation are given the appropriate certificate, a copy of the given certificate must be kept by the System operator.

The certification process shall consist of an oral and/or written examination and an assessment of practical skills with predetermined success criteria. The results of the attestation must be stored in the appropriate system operator. According to the Ministry’s request, the System Operator must provide certification records.

1062. The system operator must register the validity period of the Attestation issued to each employee working in operational mode.

The maximum validity period of the certification shall be determined by the System Operator and shall not exceed five years.

The extension of the certification before the expiration date should be based on the criteria established by the System Operator, including the experience, practical skills and continuous participation of the System Operator's employees in training processes.

1063. The system operator should train the employees to know the languages necessary to communicate with the transmission system operators of neighboring countries, including performing the tasks assigned to them.

1064. The system operator must ensure that each employee is trained in the initial training process on the issues of mutual functional compatibility and operation with neighboring systems and based on the experience and feedback of the training sessions conducted in cooperation with the neighboring transmission system operators.

This part of the initial training process should include issues of stable and mutually agreed operation of the single electric power system in various other modes.

Chapter 9. On-site operational training and certification of operatives

1065. The transmission system operator shall develop and adopt a training program for on-site training for operatives performing network operation tasks in their system.

Detailed information on the training and certification processes carried out by the transmission system operator shall be provided upon request by the Ministry.

1066. The operator of the transmission system must include in his training programs the necessary information on the use of the elements of the single electric power system, the operation of this system, work processes and procedures, as well as knowledge on the identification of unexpected and emergency situations and their elimination.

This knowledge should include practical and theoretical guidance on the operational implications of the implementation of automation requirements specified in legislation in the field of electric power.

1067. The transmission system operator conducts on-site training sessions in order to deepen the knowledge and improve the skills of operative employees.

The detailed content and frequency of training for all relevant positions should be specified in the training program.

These training sessions include, but are not limited to:

specialized areas of the electric power sector;

ensuring the safety of employees and equipment (devices) during operation of the single electric energy system;

reconnection in stable and all other modes of the single electric power system;

Joint training and experience sharing programs with the Distribution System Operator and Users directly connected to the transmission system.

1068. The system operator shall prepare training programs and conduct training for all new operational and operational personnel.

A training plan should be developed for all new operational and operational personnel taking into account the position and experience.

Records of training plans for new operational and operating personnel on site shall be maintained by the relevant operational structure for a period of not less than five years during the personnel's employment with that operational structure.

1069. When planning on-site training sessions, the following should be taken into account:

the initial program, in which operational and operating personnel are trained on the job at the level of the post, and then certified;

continuous improvement of the skills of employees in operational mode;

conducting periodic knowledge tests at least once every three years;

on-the-job training related to the safety of the single electric power system.

1070. The Transmission System Operator appoints an experienced Training Coordinator who is responsible for planning, monitoring and regularly updating the training programs.

1071. The Training Coordinator is responsible for:

qualifications of employees working in the field;

training and certification (knowledge test) of operational and operating personnel in operational mode;

processes related to the maintenance of documents related to initial and continuing education;

the process of certifying (knowledge testing) employees engaged in operational and maintenance activities;

the process of extending the duration for training and certifying (knowledge testing) employees engaged in operational and maintenance activities;

conducting training sessions involving specialists with the necessary practical and theoretical experience operating in the field of electric energy, as well as qualified teachers and trainers.

1072. Operational personnel acting as instructors and trainers must be registered by the Transmission System Operator and their Instructor and Trainer status at their place of work must be reviewed simultaneously with re-certification (testing) as System Operator employees.

1073. Training programs must be reviewed and updated at least once a year, taking into account new technologies, the market and any significant changes in the single electric power system, or taking into account the changing operating modes and operating rules, as well as network configurations and characteristics.

1074. The transmission system operator training process ensures that the training is not separated from the job and in the "offline" mode. On-the-job training

should be conducted on the job under the supervision of an experienced employee.

Training in off-the-job training should be as close as possible to actual dispatch equipment with network modeling details appropriate to the training situation.

1075. The representative of the transmission system operator must issue a certificate of attestation to the operational and operational employees to perform the duties specified in the job instructions without an observer.

1076. The transmission system operator shall define an attestation process for operational and operational personnel according to the qualification level and duties to be performed based on the job description.

Employees engaged in operation and exploitation in the certified operational mode are issued with the appropriate certificate, a copy of the issued certificate must be kept by the operator of the transmission system.

The attestation process shall consist of an oral and/or written examination and assessment based on the principles of a predetermined positive outcome.

The results of attestation evaluations should be stored in the appropriate operational structure.

According to the Ministry’s request, the Transmission System Operator must submit certification records.

1077. The transmission system operator must register the validity period of the certification granted to each employee engaged in operational and maintenance activities at the locations.

The validity period of the certification shall be determined by the transmission system operator and shall not exceed five years.

The extension of the validity period of the certification until its expiration must be based on the criteria set by the transmission system operator, including the sufficient practical experience of employees engaged in operational and maintenance activities at the locations and their continuous participation in the training process.

1078. The transmission system operator must ensure that employees engaged in operational and maintenance activities in regions with multiple control centers receive training on interoperability and operational issues with the systems of neighboring countries during their initial training process.

This training should be based on experience and feedback from training sessions conducted in cooperation with neighboring Transmission System Operators.

This part of the initial training process should include issues of stable and mutually agreed operation of the single electric power system in various other modes.

Section XI. Emergency situations

Chapter 1. The purpose of accident prevention and its subjects

1079. In this section, taking into account the operating limitations (limits) of the generating modules and the single electric power system, the actions and obligations required to be performed in emergency and accidental situations are described after total or partial blackouts in the single electric power system in short periods of time.

1080. The section specifies the organizational and technical requirements for protection plans, including protection against under/over frequency, under-frequency load protection, over/under voltage protection and communication and control equipment.

Also, the requirements for the start-up procedure, including the planning and testing of the start-up, and the planning of actions to be taken in the event of loss of control of the dispatch center of the System Operator are defined.

1081. The purpose of accident prevention is to ensure:

implementation of protective systems capable of preventing and/or mitigating emergency and accident situations that may arise in the single electric power system;

the procedure for restoring the single electric power system after a complete or partial blackout;

agree recovery plans with all participating Parties;

coordination procedure agreed with the combined energy system and neighboring system operators for possible emergencies and emergency situations.

1082. In the event of serious and large-scale emergencies and accidents occurring in the single electric power system, or when potential serious accidents are anticipated, it is required to notify the System Operator’s management, who must promptly make urgent decisions regarding the situation, and to ensure the availability of 24-hour communication networks and tools to promptly inform representatives of Users.

It is necessary for all parties to use such means of communication, and in such cases, the availability of the necessary communication networks and means operating 24 hours a day (being ready for operational use) must be constantly monitored.

1083. Transmission system operator, System operator, Distribution system operator, Power plant operator, storage system operator, including generation modules and storage system operators connected to the distribution system, and Consumers directly connected to the transmission system are the subjects of this section.

Chapter 2. Stable (stable) operation of the network

1084. The transmission system should be continuously operated in accordance with the following conditions, except for accidents and emergency

situations:

to monitor compliance with and avoid exceeding the permissible boundary values for voltage and overloads as specified in Section V of the Rules;

to ensure compliance with the requirements specified in Section V of the Rules regarding the maximum current flows in network equipment, as well as the agreed-upon maximum short-circuit current values at the boundaries (interfaces) between individual branches and directions of the network.;

work with maximum stabilized and high voltage graphs (profiles) to reduce losses in the transmission of electricity in the network and increase the stability of the single electric power system.

1085. Under normal operating conditions, a single electric power system will have the following characteristics:

all consumers are supplied with electricity;

all permissible limit values are observed for all parts (elements) of the transmission system;

The "n-1" criterion is satisfied at all points.

1086. Fulfillment of the above-mentioned requirements ensures stable operation of the single electric power system in all cases and is not affected by overloads.

The system operator must regularly conduct investigations to identify any limitations affecting operations related to normal, emergency, and unforeseen situations in order to ensure the safety and stability of the single electric power system.

The Ministry will be notified of serious limitations identified during the study and testing process.

1087. All elements of the network that can be damaged by overloading must be equipped with overload protection systems.

In this case, in order to take into account the short-term overloads of the element and to create the possibility of unloading the network from being under an overload by dispatching action, these elements should be provided with a warning signal protection before they turn off.

1088. Information on interstate cross-border networks and networks within the borders of connected states is provided in accordance with the terms of interconnection agreements.

1089. The operator of the transmission system must ensure the safe operation of the electric power system by installing and operating the protection in accordance with the established requirements. Several similar accidental shutdowns should be taken into account and cascading of faults should be avoided.

Chapter 3. Emergency situations in the electric power system

§ 1. Classification of emergency situations in the electric power system

1090. The fulfillment of the conditions specified in paragraph 1084 of these Rules is determined based on the frequency of the single electric power system under operating conditions.

According to the range of the frequency value of the single electric power system, the operating conditions are divided into:

normal operating conditions: 49.8 Hz ≤ f ≤ 50.2 Hz;

permissible operating conditions: 49.5 Hz ≤ f < 49.8 Hz and 50.2 Hz < f ≤ 50.5 Hz;

critical conditions of operation: 47.5 Hz ≤ f < 49.5 Hz and 50.5 Hz < f ≤ 52.5 Hz;

non-steady state of operation: f < 47.5 Hz and 52.5 Hz < f.

§ 2. Elimination of emergency situations

1091. In the event of a critical or unstable (unsteady) condition of operation as a result of insufficient (or non-existent) working (primary) stock, the System Operator and Users must take emergency measures in accordance with the following conditions:

inform all Power Station operators and battery energy storage system operators about the emergency situation;

commissioning of operational load adjustment services by Consumer operators who have concluded a contract for the provision of consumer load adjustment services;

automatic shutdown of the load through low-frequency relays;

Scheduled or unscheduled shutdown/reduction of load by or under the direction of the system operator.

1092. In the event of a system separation, emergency measures may be taken in accordance with paragraph 1091 of these Rules to maintain the frequency of the single electric power system within permissible limits and to ensure operational safety in each of the enclosed networks.

1093. In the event of an emergency situation in the system of the neighboring power system operator with which the agreement on mutual support has been concluded, the System Operator must provide maximum support through its interconnected networks.

1094. The disconnection of the single electric power system of the Republic of Uzbekistan from the synchronous system that is part of it shall be accepted only as a final corrective (restorative) measure after coordination with the neighboring

electric power system operators with whom a mutual support agreement has been established.

1095. In the event of an emergency, the System Operator must take actions that eliminate the frequency deviation, prevent further deterioration, and allow for the rapid restoration of stable operation.

§ 3. Emergency recovery measures to be implemented in generating modules

1096. The System Operator, Transmission System Operator or Distribution System Operator shall suspend the normal procedures for dispatching generating facilities as well as battery energy storage systems in the event of an emergency situation being declared in the single electric power system.

In order to ensure the operational safety of the transmission system and the distribution system in emergency situations, the System Operator or the Distribution System Operator in the enclosed part of the distribution system must notify the operators of Power Stations and (or) other Network Users about the emergency.

1097. Upon notification of an emergency, the System Operator or the Distribution System Operators shall instruct the Power Station Operators and the Battery Energy Storage System Operators to take measures to ensure the restoration of the single electric power system to a stable operational state.

If the operator of power plants or the operator of the battery energy storage system is not in a position to take measures to ensure the return of the single electric power system to a stable operating state, he must inform the System Operator or the Operator of the Distribution System about this on a reasonable basis and agree on his participation in the process of restoring the single electric power system.

Chapter 4. Power system protection

§ 1. General principles of electrical power system protection planning

1098. Taking into account the possibility of rapid spread of faults (breakdowns) in complex and closed networks, the high likelihood that simple failures can lead to significant accidents, and the absence of any precautionary measures during operation, it is essential to implement measures to minimize the negative impact of faults in the electric power system on the neighboring state energy systems that operate in parallel.

In this regard, the System Operator and the Transmission System Operator are required to take necessary precautionary measures to maximize the prevention of emergency situations, as well as to develop effective protection systems and a plan for protective measures.

1099. The system operator is responsible for the safe and stable parallel operation of the single power system of the Republic of Uzbekistan, which is a part of it, in accordance with the specified requirements (agreements).

The system operator develops a plan of protective measures, which includes all the main actions to be taken, and comes together with "Energiya" CDC and

neighboring electric power system operators, distribution system operators and other Users.

The measures provided for in this protection plan are binding on all Parties.

1100. A plan of action for protection includes:

a list of measures to be used in different situations;

the procedure for issuing notifications at the scale of the single electric power system in accordance with paragraph 6 of Chapter 5 and Chapter 6 of Section VIII of these Rules;

procedures and principles of organizing the protection system;

requirements for technical equipment (devices);

Correct and clear distribution of obligations and responsibilities between the system operator and the Parties (Users).

§ 2. Power system protection

1101. The transmission system operator is responsible for ensuring the required (adequate) level of protection of the transmission system and determines the necessary organizational and technical requirements to ensure its correct and continuous operation.

The transmission system operator determines the technical service regimes based on the requirements of legislation in the field of electric power of the Republic of Uzbekistan, regulatory documents in the field of technical regulation.

§ 3. Relay protection systems

1102. Protection devices (means) must be installed to prevent the spread and escalation of the accident, to quickly eliminate faults affecting any element of the electric power system.

1103. In this context, protection includes protective signaling equipment (devices) and associated communications.

1104. All circuits must be equipped with automatic switching equipment (devices) in accordance with the requirements of legislative documents in the field of electric power and regulatory documents in the field of technical regulation to ensure quick reconnection of electrical networks after transient short circuits.

1105. The requirements for the operating speed and quantity of protection in each chain are detailed in Section III of these Rules.

Chapter 5. Adjusting the load on consumers

§ 1. Load adjustment and removable (adjustable) loads in consumers

1106. Interruptible (adjustable) loads are consumers who have agreed to use

their load for balancing in the electric power system, meaning they allow for adjustments in consumption. Typically, these consumers have a consumption capacity of not less than 1 MW and include battery energy storage systems.

§ 2. Adjusting the consumer load in accordance with the terms of the contract on the provision of additional services

1107. Customers can provide their own load management in accordance with the terms of the additional services agreement to provide frequency adjustment or backup.

1108. The amount of load that can be removed, the length of time that load can be restricted, and the deadline for sending the appropriate notification (message) should be specified in the contract.

§ 3. As a voluntary agreement with the consumer

1109. If the Consumer connected to networks with a voltage of 110 kV and higher wants to offer the System Operator the use of his load control function to control the load in emergency situations, he must notify the System Operator about this in accordance with Chapter 5 of Section XI of these Rules. This is a voluntary arrangement and there is no charge for it.

1110. The voluntary agreement (agreement) must be submitted in writing to the System Operator by the end of each year (December).

In this agreement, the Consumer confirms that during the next year, the instructions of the System Operator will comply with the instructions of the System Operator on load management, provided that they are in accordance with the parameters specified in his notification.

The new season starts on January 1 every year.

1111. The voluntary agreement should include the following information:

available amount of load shedding capacity;

Notice to be provided by the system operator to the Consumer;

frequency of use, including how many times, for what period or number and periods;

the length of time during which the load can be reduced for each individual case;

any situations that may arise in the management of the shipment specified above in accordance with the agreement.

§ 4. Warning notices

1112. As part of the Voluntary Agreement (Agreement), all activities related to the removal of the load carried out in accordance with the requirements of Section XI, Chapter 5, Paragraphs 2 and 3 of these Rules are agreed in advance, therefore, no formal warning notices are required.

§ 5. Quick adjustment of consumption

1113. Quick adjustment of consumption - in order to prevent the frequency from falling to the operating level of the step-down frequency relay, it is carried out by additional fast (instantaneous) disconnection of the load of consumers to ensure the primary adjustment of the frequency with the help of generating modules.

It is also possible to reduce the load using the possibility of general voltage reduction at some points of the single electric power system.

1114. The services of quick (momentary) adjustment of consumption are provided by the Consumer facilities within the framework of the contract for the provision of additional services for the reduction of active power consumption under the influence of load changes. Dynamic modeling of frequency in a single electric power system and (or)in the event that it falls to the level set by the system operator in accordance with the requirements of the single electric energy system, its load will be automatically turned off based on the agreements on additional service for reducing active power consumption by the Consumer’s facilities.

1115. As part of the overall load reduction process, instructions should be given to the voltage regulation devices that manage the operation of load adjustment devices to reduce consumption by 3%, 5%, and 9% when necessary.

§ 6. Forced shutdown of the user

1116. The distribution system operator, each Closed distribution system operator connected to the transmission system, and each consumer connected to the transmission system must submit the following in writing to the system operator by the end of each calendar year (October) for the upcoming operating year:

total annual maximum consumption;

The percentage value of the total annual maximum consumption, which can be turned off manually for 5, 10, 15, 20, 25 and 30 minutes, where at least 60 percent of the total annual maximum consumption should be turned off;

Confirm that at least 20 percent of the total demand can be manually turned off in the first 5 minutes after receiving an instruction from the system operator.

1117. The distribution system operator, each Closed distribution system operator connected to the transmission system and each Consumer connected to the transmission system must have the ability to automatically disconnect from the network through low-frequency relays at least 60 percent of the maximum consumption power in the total annual consumption.

These measures should include the automatic disconnection of a certain amount of consumption from the network for each level of phased frequency.

The system operator determines the ratio of the load that needs to be disconnected at each reduction stage and coordinates with the relevant distribution system operator to ensure the gradual reduction of the load by agreeing on the feeders to be disconnected based on their geographical location.

1118. Consumers subject to automatic shutdown in the event of a frequency drop are divided into separate power levels (blocks) by the relevant system operator and the system operator.

If automatic power supply restoration schemes are installed in accordance with the requirements of legislative documents and regulatory documents in the field of technical regulation in the field of electric energy, both sources of provision of steps (blocks) should be located in the same steps (blocks).

1119. The number, location, dimensions and corresponding low frequency setpoints of these steps (blocks) shall be determined by the System Operator by the end of each calendar year (October) in the coming calendar year after agreement with the Distribution System Operator.

The system operator annually conducts an analysis of the status of each step (block) and prepares a coordinated schedule of activities covering all geographic locations.

1120. Organizational measures of the distribution system operator, each Closed distribution system operator connected to the transmission system, and each Consumer connected to the transmission system on individual steps (blocks) are intended to ensure that the load of the same size is removed from the network in each section of the distribution system at all connection points.

1121. If the frequency drops to the frequency levels specified by the values (49.0), (48.8), (48.6), (48.4) Hz, the consumer load is automatically disconnected from the network using a low-frequency relay.

When the system frequency drops to 49.0 Hz, 10 to 20 percent of the load is automatically and forcibly disconnected from the grid.

The amount of load to be removed at each step of the frequency after 49.0 Hz is determined by the relevant system operator and the system operator, taking into account the technical requirements of the users of the transmission system.

In case of shutdowns due to frequency reduction, every year, taking into account the social importance of consumers, electricity shutdowns are carried out using a rotating (veer) method in order to ensure equal and non-discriminatory conditions.

1122. The low-frequency relay should have the technical ability to start in 150 milliseconds when the frequency of the single electric power system drops to a given (specified) level.

The sensitivity of low-frequency relays should not exceed 0.05 Hz.

1123. The operation of the low-frequency relay should prevent the operation of automated systems designed to restore the power supply during a shutdown.

1124. The distribution system operator, each Closed distribution system operator connected to the transmission system, and each Consumer connected to the transmission system must submit to the System Operator in a short time the preliminary analysis of the reduction in consumption as a result of the automatic

shutdown of the low-frequency relay.

Verbal information is provided within 10 minutes and written confirmation within a day.

1125. In cases where it is not possible to restore the power supply to a large part of the consumers within a certain period of time after the automatic shutdown of the power supply in the event of a frequency drop, and after the frequency is restored, the System Operator has the right to instruct the Distribution System Operator to manually switch off other consumers and to restore the power supply to the same amount of automatically disconnected consumers.

The main purpose of these actions is to stop (or eliminate) further frequency drops by automatically switching off the load.

1126. If the system operator believes that the conditions of the single power system are such that a frequency drop may cause the load to be automatically turned off, the system operator will instruct all automatic recovery circuits to be turned off.

After the automatic disconnection of the load due to frequency issues, the distribution system operator, along with each connected distribution system operator and each consumer connected to the transmission system, may not supply power to the disconnected part until the system operator provides the relevant instructions for restoring supply.

1127. After the frequency is restored, the System Operator will give instructions to restore the power supply to the outage parts.

The distribution system operator, the operator of the Closed distribution system connected to the transmission system, and the parts (consumers) that have been switched off by each consumer connected to the transmission system must restore the power supply as soon as possible, and the process of repeated (re)connection must begin within 2 minutes after the order of the system operator.

1128. If there is a permanent imbalance (shortage) between the production capacity and the consumer load in the whole or a part of the transmission or distribution system, the load (consumption) is switched off manually using the veer method.

1129. The System Operator, Transmission System Operator and Distribution System Operator shall develop a load shedding plan in coordination with the Users.

Veer shutdown planning should ensure that the available capacity is evenly distributed among the Parties involved.

In veer shutdown, some consumers may be disconnected for a period of up to two hours, after which their supply should be restored and another group of consumers should be disconnected.

1130. The System Operator and the Distribution System Operator may make changes to the veer load shedding plan based on operational conditions prior to the start of the plan’s implementation, upon mutual agreement.

The relevant system operator must inform each User about the total amount of load that should be disconnected from the electricity supply at different times.

1131. If the shutdown is carried out in order to protect the integrity of the entire single electric power system or a part of this system when operating in the closed mode, these shutdowns must be carried out under the control of the System Operator.

Shutdowns carried out in the part of the distribution system operating in the enclosed mode must be carried out under the supervision of the operator of the distribution system.

1132. If automatic backup recovery schemes are used, these schemes must be disabled before implementing a rolling (veer) shutdown plan.

1133. In the event of an emergency situation, the System Operator, the Transmission System Operator and the Distribution System Operator shall take all possible measures to limit the consequences and duration of the emergency situation.

§ 7. Warning Notifications

1134. The system of warning notifications is used to notify that it can be used in accordance with the load reduction measures in accordance with the requirements of Section XI, Chapter 5, Paragraphs 5 and 6 of these Rules.

If there is a shortage of generation capacity or there are other reasons for load adjustment, the System Operator must notify the Distribution System Operator through a load adjustment warning message.

In the event of emergency (emergency) situations, where emergency measures must be taken by the System Operator and there is not enough time to provide a warning notification, the requirements of this section shall not be applied, but the System Operator shall submit a notification containing information about the situation to the above-mentioned organizations (announces) .

1135. If necessary, a further system of warning shall be introduced by the System Operator to enable the Distribution System Operators to take the appropriate preparatory measures deemed necessary to comply with the System Operator’s instructions.

1136. All warnings shall contain at least the following information:

amount of load and (or) voltage drop to be achieved;

expected time of implementation;

expected recovery time.

1137. In accordance with paragraph 1115 of these Rules, in the event of a general reduction of load through voltage regulation, the System Operator shall issue the relevant warning notification for each stage that needs to be implemented.

Such notifications shall include the information detailed above, as well as the zone to which the warning notification applies, if the notification does not apply to the entire single electric power system.

1138. The following parties will receive a copy of the warning notifications:

Distribution System Operators to whom the notification applies;

Ministry.

1139. The System Operator shall issue a red warning in the event of planned or planned load reduction in accordance with the agreements specified in Chapter 5, Paragraph 6 of Section XI of these Rules. It will apply to a single electric power system.

1140. As the Red Warning applies to the single power system and involves load shedding, it is sent to all Distribution System Operators, Power Plant Operators, Users and the Ministry.

1141. All warnings remain in effect until canceled by the System Operator.

§ 8. Report on the occurred situations (incidents)

1142. In cases where the System Operator has issued a warning notification and (or) an instruction to manually reduce the load, the System Operator must prepare a brief report on the incident and submit it to the Ministry within two days after the end of the measures related to the situation (incident).

§ 9. Warning to consumers

1143. Veer load shedding after initial start-up is a planned event and Customers should be notified of when and for how long the supply will be cut.

The responsibility for this is assigned to the Distribution System Operator. These operators must take the necessary measures within the scope of disconnection according to the circular (radial) method based on the load distribution plan.

In addition to these measures, notices to Users include, but are not limited to:

announcements in mass media (newspaper, radio, television);

Distribution system operator announcements available in their offices;

Information on the websites of the Distribution System Operator, Transmission System Operator and (or) System Operator;

Notifications by e-mail or social networks for the registered unprotected layer of consumers.

§ 10. Compensation

1144. No compensation shall be paid to any Party for scheduled and unscheduled manual or automatic download removal in accordance with the instructions of Section XI, Chapter 5 of these Rules, except for the cases specified in Section XI, Chapter 5, Paragraph 2 of these Rules.

Chapter 6. Restoration of the electrical power system

§ 1. Principles of electrical power system restoration

1145. Restoring the operation of the electric power system, in case of partial or complete blackout, by the System Operator, the Transmission System Operator or the Distribution System Operator in a very short period of time, without side effects and ensuring safety, envisages following the principles of continuous supply of electricity to all consumers.

§ 2. Parties participating in the restoration of the operation of the electric power system

1146. The principles of power system restoration are applied to the following Parties:

Transmission System Operator and Distribution System Operators for sections of the enclosed distribution network that cannot be connected to the transmission system;

operators of generating modules and battery energy storage systems with the ability to launch from scratch, who have entered into a contract for the provision of additional services related to the restoration of the operation of the electric power system after a complete or partial blackout of the transmission system.

§ 3. Generating modules with the ability to launch from scratch

1147. Generating modules and battery energy storage systems that can be returned to operation without the need for external supply sources are registered by the System Operator as having the possibility to launch from scratch and may require the conclusion of a contract for the provision of additional services to their operators.

In case of receiving such a request, the operators are prohibited from unjustified refusal and are obliged to conclude a standard contract for the provision of additional services according to the instructions of the Ministry.

The launch from scratch station can be used to supply the electricity transmission system and to supply electricity to consumers and to reconnect other generating modules.

1148. Generating modules and related equipment of battery energy storage systems that provide additional services for launching from scratch must be conducted necessary operational tests confirming the ability to start from scratch.

1149. In accordance with the need to provide means of restoring the operation of the electric power system, it is necessary to use connecting connections and equipment and (or) devices between the enclosed electric power systems.

1150. Equipment start-up capabilities should be regularly tested on site at least once every three years.

§ 4. Plan for restoration of the electric power system

1151. The system operator shall develop and update, as necessary, a detailed plan for the restoration of the operation of the unified electric power system, which includes generating modules and battery energy storage systems included in the contract for the provision of additional services related to the possibility of starting from scratch.

1152. Under the control of the system operator, the general recovery strategy to be followed by the Users must be defined in a plan that includes the following steps in sequence:

creating several enclosed systems designed to launch the stations from scratch;

provision of local load through generating modules and battery energy storage systems;

synchronizing the operation of these enclosed electric power systems with each other;

the final complete restoration of the normal (stable) operation of the entire electric power system.

1153. In addition to defining the overall recovery strategy to be adopted, this plan should address the following issues:

priorities for restoring the operation of the single electric energy system;

equipment and (or) devices necessary to restore the operation of the single electric power system;

Guidance documents to be provided to generating facilities, battery energy storage systems, distribution system operators and other users who follow the instructions of the system operator or act independently to cover in case of simultaneous communication failure;

Government, media and public relations.

1154. The system operator shall start the recovery process based on the specified measures after all measures have been taken according to the plan for the protection of the single electric power system and when the single electric power system has reached a stable state.

1155. The system operator shall develop the recovery procedures necessary to allow the single power system to be gradually restored to a stable state.

Such procedures should at least be validated by simulation modeling or alternative calculations.

1156. The System Operator must be aware of the status of each component of the single electric power system after an electricity outage. This includes elements of the single electric power system that have been restored, isolated and de-energized areas, generation modules or battery energy storage systems operating in a mode to meet their own needs, and the status of modules that face difficulties in meeting their

own needs and urgently require external supply to restart..

The system operator must in any case establish procedures to ensure that such information is available.

1157. During the restoration phase, the System Operator must ensure that the active and reactive power flows in the inter-system networks are kept within the agreed limits.

1158. The system operator determines (specifies):

network status of another transmission system operator operating synchronously with its network;

the length and boundaries of the synchronous section, which is considered a part of the single electric power system, including the size and boundaries of the section agreed with the operators of the transmission system of the neighboring state with whom an agreement on mutual assistance has been concluded ;

the status of the available power reserve in its area of control (including fenced areas).

1159. The system operator shall assist the Frequency Leader in accordance with the principles established at the level of the synchronous area, including in sections far from his area.

1160. During the restoration of the electricity supply, the System Operator shall balance consumption and production in coordination with the frequency leader in order to restore the frequency to 50 Hz with a maximum deviation of 200 mHz.

1161. The system operator adjusts the load connection step by step to minimize deviations from the frequency and reserve limits.

Restoration of electricity supply to consumers is carried out by gradually connecting block loads based on the maximum load of the transmission system determined by the system operator.

1162. The system operator coordinates the reconnection of consumers and generating modules connected to distribution systems with the distribution system operator.

On-site and remote connection of consumers must be agreed in advance between the System Operator and the Distribution System Operator.

Precautions are required to prevent automatic reconnection.

1163. In the event of restoring the operation of the single electric power system, the System Operator, in coordination with neighboring transmission system operators, will manage the reconnection of de-energized generation modules and interconnected chains due to an emergency frequency deviation (based on the frequency leader's indication). This coordination will ensure that sufficient reserves for balancing are maintained to cover the load of consumers that are next in line for connection.

The system operator should set reconnection and disconnection criteria based on conditions that avoid frequency over-tuning.

1164. When resynchronizing the transmission system with the systems of neighboring countries, the system operator must follow the instructions of the Frequency Leader on resynchronization in accordance with the agreement on mutual assistance with transmission system operators of neighboring countries.

§ 5. Updating the electrical power system restoration plan

1165. When additional equipment and (or) devices are connected to the transmission system and some existing equipment and (or) devices are decommissioned, the system operator together with the transmission system operator revises and updates the power system recovery plan. The plan is reviewed and updated at least once every two years.

The system operator may amend the plan to take into account circumstances or other changes affecting the transmission system.

§ 6. Implementation of the single electric power system recovery plan

1166. The Power System Restoration Plan includes guidelines to assist the Parties involved in the restoration process to achieve a speedy and safe full restoration of the power system.

1167. The electric power system restoration plan may be changed taking into account the availability of the generating module and (or) the equipment (device) of the battery energy storage system, their use and maintenance needs over time.

If the plan does not cover all possible partial or total outage scenarios due to these changes, the System Operator must assess the state of the power system and develop a new power system recovery plan.

1168. Each electricity generator, battery energy storage system, Distribution System Operator and Closed Distribution System Operator shall comply with the instructions of the System Operator during the restoration of the electric power system, even if it conflicts with the details contained in the electric power system restoration plan.

§ 7. Training on restoring the work of the electric power system

1169. Each Party shall ensure that its personnel involved in the Power System Restoration Plan are adequately trained and have sufficient skills and experience.

1170. The ability to carry out comprehensive tests on the restoration of the operation of the electrical power system is limited, but partial tests should be carried out regularly under conditions as close as possible to those expected in practice.

The basic tests to be performed regularly should include the tests specified in the following sections.

For all tests of any nature, the System Operator shall issue a blue warning notification (indicating that an organizational test is being conducted and that no changes will be made to the operational and non-operational equipment(s)) to the Parties participating in the tests.

1171. In the process of restoring the operation of the electric power system, the involvement of many personnel is required from the System Operator, Transmission System Operator, Distribution System Operator and Power Plant Operator, etc.

They perform the task of switching off and connecting the load, and in some cases resynchronizing the network, in the operation of generating modules and storage systems during launch from scratch.

Participants involved in the process should fully understand their obligations and responsibilities and have sufficient experience in their implementation.

The system operator regularly conducts exercises in theoretical training rooms, during these exercises, the relevant personnel are contacted by the communication method used in emergency situations and they are directed to their assigned sections, and explanations are given about what is expected of them and how they should perform their duties in such situations.

1172. Provides an opportunity to conduct theoretical training and testing of important elements of the recovery plan, as well as to train personnel involved in the restoration of the power system in the event of a complete blackout.

This allows them to understand where to go, how and when and with whom to interact, and how to perform their duties in the situations described above.

1173. All communication channels and communication nodes necessary to restore the operation of the electrical power system should be regularly tested and/or inspected to confirm that they will continue to function in the event of a complete power failure.

These tests include verifying that the battery energy storage systems are in good condition and will operate for the duration specified in the design, and that the backup diesel generators can be started and can meet the demand for the equipment(s).

§ 8. Loss of central control

1174. The control center of the system operator plays an important role in ensuring the ability of the system operator to manage the electric power system at the required level of safety and reliability.

If the System Operator’s Control Center becomes inoperable due to emergency (accident) situations, it is necessary to have a back-up plan for the planned execution of the functions of the Control Center to ensure the continuous and safe operation of the entire electric power system.

1175. A back-up plan for the planned execution of the functions of the control

center must be developed by the System Operator and include the following:

detailed information about the details of the place where the functions of the control center are to be transferred and the main equipment (devices) at this place are prepared for operation in advance;

detailed information on emergency communication methods to coordinate the transfer of control center functions;

a checklist of actions to be taken and by whom;

detailed procedures for the transfer of management functions.

1176. The back-up plan for the scheduled execution of the functions of the control center should be regularly tested in full or in part at least once every two years to make sure that it is operational, that the necessary information is available in the necessary places, and that the personnel are fully trained to perform the activities specified in the plan.

§ 9. The procedure for solving common system-wide emergency situations

1177. General system situation (General single systems-wide emergency situation) – an emergency situation in one party's system, which, in the opinion of the system operator, has had or can have a significant and (or) extensive impact on the neighboring (other) system.

1178. In the event of a general system situation, each User shall exchange telephone numbers and (or) other communication agreements in writing with the System Operator and the Operator of the Relevant System within 24 hours, through which they have the right to make binding decisions on behalf of their organizations or management representatives.

For new Users, phone numbers and (or) other means of messaging are provided upon signing the connection agreement. The information provided is in written form and the information contained in it must be regularly updated.

1179. The system operator must test these procedures at least once every two years, in which the time spent to obtain an appropriate response from the network user's management personnel must be recorded.

The system operator shall submit a detailed report to the Ministry on the results of this test.

1180. In the event of an emergency, the following actions should be taken:

if the situation occurred in the User's system, the User must notify the System Operator about it, and the User must notify any other Party affected or likely to be affected;

if the situation occurs in the Transmission System Operator's system or in the system of an interconnected neighboring party, and the System Operator is notified of this by the interconnected party, then the System Operator will notify the affected or potentially affected Parties;

The system operator sends a notification to the Ministry.

1181. In accordance with paragraph 1180 of these Rules, after reporting the situation, the System Operator determines whether the event constitutes a general system condition or not. In this case, the System Operator may establish a Central General System Condition Center to monitor the event and address all related issues.

1182. The System Operator must notify all parties as soon as possible about the establishment of the Central General System Condition Center, including its phone numbers and/or communication procedures (if different from those previously provided in paragraph 1178).

1183. Once the Central System Situation Center is established, all communications between senior management representatives of the respective parties regarding situations occurring in the Central Unified System shall be conducted through the Central System Situation Center.

Chapter 7. Support systems and interventions in recovery and protection

§ 1. General conditions for recovery and protection systems

1184. The operation of recovery and protection systems, which are not necessarily used in the course of daily operation, depends on the successful operation of the single power system. Ensuring that recovery and protection systems are in working condition in necessary situations is a key factor in the management of a single electric power system.

1185. Recovery and protection systems must be implemented by all Parties specified in Chapter 1 of Section XI of these Rules, and are responsible for providing them with all the necessary equipment (devices) at the location points.

If regular tests are required to demonstrate the continued operation of such equipment(s), the Parties shall conduct such tests and provide updated inspection and test reports to the System Operator annually (January 31 and November 30).

1186. The system operator shall conduct as-needed inspections and tests to ensure that the systems provided by all parties are operational under the circumstances.

§ 2. Auxiliary equipment (devices).

1187. The System Operator must ensure the provision of auxiliary generators and continuous supply sources necessary for the functioning of its critical systems at the control center and designate the location where the functions of the control center will be carried out in emergency situations as specified in paragraph 8 of chapter 6 of section XI of these Rules. Additionally, regular testing (monthly) of these systems must be ensured.

1188. In order to ensure the ability to launch the stations from scratch, the operators of the Power Stations, which are determined to be necessary, must provide the auxiliary generator devices and sources of uninterrupted supply necessary to ensure the operation of such devices, equipment and systems, and they must also be

tested regularly (monthly).

1189. All parties must ensure the necessary auxiliary supply for the proper operation of protection systems at generation facilities located at all designated starting points for launching from scratch and at all connection points to the transmission system, as well as at the boundaries of the transmission system in the case of the Transmission System Operator. Regular testing (monthly) of these systems must also be carried out.

1190. Required auxiliary supply sources are devices (equipment) necessary for ensuring safe control and operation, as well as supporting communication tools and data exchange as specified in paragraphs 3 and 4 of chapter 7 of section XI of these Rules.

§ 3. Communication tools

1191. Each User must comply with the requirements of the System Operator and provide appropriate computer and network equipment(s) to enable the exchange of information between the System Operator and the User, such as e-mail, sending instructions, etc. The User must use the equipment (devices) only for operational communication with the System operator.

1192. Each User of these Rules1191shall take responsibility for optimizing the reliability and safety of the computer equipment specified in paragraph -, including the provision of appropriate devices for the appropriate uninterruptible power supply free of charge.

1193. Each User must take responsibility for ensuring the reliability and security of the computer equipment specified in paragraph 1191 of these Rules, including providing the necessary devices for uninterrupted auxiliary power supply free of charge.

1194. Two separate lines of communication are required for distribution system operator control centers, substations operating at 220 kV and higher voltage, generating facilities designated by the system operator, and users connected to the transmission system.

1195. If the communication means are utilized by one of the Parties from the communication system, all relevant nodes must support the necessary auxiliary sources required to ensure its uninterrupted operation.

§ 4. Data exchange

1196. The Parties shall establish data exchange mechanisms in accordance with the instructions of the System Operator and the Transmission System Operator and approved by the Ministry.

1197. These include, but are not limited to:

exchange of warning notices and notifications of incidents or accidents;

to address the issues specified in paragraphs 753, 1082, and 1178 of these Rules, contracts must be established.

1198. The parties shall ensure that the agreements are updated as necessary.

1199. The system operator must test and confirm the accuracy of the information provided by sending an annual request (in October) and biannual response messages.

The system operator will report the results of this test to the Ministry.

Section XII. Interim (temporary) measures

Chapter 1. Application of the requirements of the Regulations at the point of connection

§ 1. New connections

1200. The requirements of these Rules shall be fully applicable to all new connections to the Network of the Relevant System Operator six months after the date of approval.

1201. Users can use networks that already exist, but do not meet the requirements of these Rules, but fully meet the requirements in force at the time they are connected.

1202. In appropriate cases, if the new devices meet the requirements of the legislative documents in the field of electric power at the time of signing the contracts for their delivery and installation, the requirements of the regulatory documents in the field of technical regulation are applied to these devices.

The requirements shall apply within three months after the approval of these Rules, when a contract is concluded and the relevant system operator is notified of the terms of this contract.

1203. The relevant system operator shall provide documents confirming that the contract has been concluded, the effective date, the content, and the technical specifications of the equipment (devices) to be purchased, assembled, and installed fully comply with the applicable requirements.

§ 2. Available connections

1204. In accordance with the requirements of paragraphs 1201-1203 of these Rules, User networks must take measures to ensure that all equipment/devices comply with these Rules within three years after the day the User Rules are approved if they do not fully comply with the requirements of these Rules. Users are required to continuously ensure that their networks are aligned with the requirements of the Rules by at least 75%.

1205. In the process of considering issues related to the full application of these Rules to all Users, the Transmission System Operator must take into account

the legitimate interests of Users.

The Transmission System Operator shall assess the application of some or all of the requirements of these Rules to existing Users in accordance with the criteria established by the Ministry and the process outlined in these Rules every three years.

Chapter 2. Analysis of costs and benefits

§ 1. Qualitative determination of costs and benefits

1206. Before applying any requirement stated in these Rules to existing Users, the System Operator and the Transmission System Operator together with the User will conduct a qualitative (technical) comparative analysis of the costs and benefits associated with the full implementation of the Rules.

1207. In this comparison, existing systems or alternatives in the market are taken into account. If the comparison results indicate that the expected benefits exceed the anticipated costs, and if permission is obtained from the Ministry to conduct additional analyses, the Transmission System Operator may proceed with the analysis of costs and benefits in accordance with paragraph 2 of Chapter 2 of Section XII of these Rules. If, based on the analysis results, the Ministry considers that the costs are high or the benefits are low, as well as if it deems that other alternatives can be used from a quality (technical) standpoint, the Transmission System Operator will halt actions in this direction.

§ 2. Determining the amount of costs and benefits

1208. In accordance with the requirements of paragraph 1 of chapter 2 of section XII of these Rules, following the completion of the preparatory phase, the Transmission System Operator shall determine the amount of costs and benefits related to any requirement that indicates potential benefits resulting from this preparatory phase.

1209. Within three months after the end of the analysis, the transmission system operator summarizes the results and prepares a report containing the following:

recommendations for future actions;

transitional proposals. The transitional period should not exceed two years from the date of the Ministry’s decision on the applicability of this requirement;

proposals from related parties.

1210. Not later than six months after the discussion, the Transmission System Operator prepares a report containing an explanation of the results of the discussions and a proposal on the applicability of the considered requirement.

The report and proposal will be communicated to the Ministry, all interested Users and the relevant system operators.

1211. Proposals submitted by the transmission system operator to the Ministry

must include:

Procedure for operational notification in order to demonstrate the fulfillment of requirements by the user;

A transitional period in responding to the requirements, taking into account the specific characteristics of the user and the obstacles to the effective implementation of the change, modification/re-equipment of the existing equipment (devices).

§ 3. Principles of cost and benefit analysis

1212. Users and the Distribution System Operator, including the Closed Distribution System Operator, shall assist in the analysis and provide the necessary information within three months of receiving the request, unless otherwise provided by the Transmission System Operator.

1213. The transmission system operator performs the analysis based on one or more of the following calculation principles:

net present value, return on investment;

rate of return;

the time required to pay for itself.

1214. The transmission system operator quantifies the socio-economic benefits of improving the reliability of electricity supply and includes:

a corresponding reduction in the probability of interruptions in the supply of electricity during the period of validity of the modification;

the likely extent and duration of such loss of electricity supply;

hourly costs of such power outages.

1215. In carrying out all User-related analyses, which are operators of generation modules, the Transmission System Operator shall quantify the benefits for the internal electricity market, neighboring trade and integration of renewable electricity sources, including:

stable frequency characteristic;

adjusting stocks;

reactive power supply;

overload management;

protective measures;

direct costs associated with the implementation of this or that requirement;

opportunity costs;

costs related to maintenance and related changes in operation.

Section XIII. Final Provisions

1216. The Transmission System Operator shall, no later than six months after the entry into force of these Rules:

develops and approves detailed instructions for connection to the transmission system;

The System Operator, in collaboration with the Single Electric Power System, shall develop new requirements and regulations for communication tools used in operational activities or update the existing ones.

1217. Not later than six months after the entry into force of these Rules, the Relevant System Operator will publish information about the devices that the Relevant System Operator has accepted into the balance as a result of connecting to the network in order to comply with the requirements of regulatory documents in the field of technical regulation of assets in the transmission system.

1218. The operator of the transmission system must develop a detailed methodology for estimating costs, including comparable costs per unit of work on the connection infrastructure, and submit it to the Ministry for approval no later than six months after the entry into force of these Rules.

1219. The Ministry shall bear the responsibility for the timely development and necessary updates of the documents referenced in paragraphs 1216-1218 of these Rules.

1220. The requirements of these Rules can be applied to the modernization processes of the equipment (devices) that are actually in operation until the approval of the Rules by the relevant system operator or the User based on the conclusion of the Ministry in agreement with the Cabinet of Ministers.

In this case, the results of a complete analysis of costs and revenues should prove that the User’s costs are greater than his costs.

1221. Each Eligible System Operator or User may propose amendments and additions to any section or paragraph of the Rules.

1222. The proposal is submitted to the Ministry. If the proposals are considered reasonable by the Ministry, they will be agreed with the Regulator and submitted to the Cabinet of Ministers in the established order.

1223. Disputes related to non-fulfillment of the requirements of the rules or one’s own obligations shall be resolved in accordance with the procedure established by law.

1224. The relevant System Operator or System Operators may submit a claim (complaint) to the Regulator if the Party is dissatisfied with the actions of non-fulfilment of the requirements of these Rules or their obligations. The regulator will make an appropriate decision to suspend or revoke the license of the guilty party within two months after receiving the complaint. If the regulator asks for more information, the deadline for processing the claim can be extended by another two

months. The regulator’s decision is binding until it is overturned in a court of law.

1225. Persons who are guilty of violating the requirements of this Rules shall be held accountable in accordance with the procedure established by the legislation.

Appendix 1
to the Rules of use of main power grids

Procedure for developing a transmission system development plan

T/r	Actions	Deadline	Explanation
1.	Request by Transmission System Operator to collect data from Users to be sent	March 31	Implementation through the Transmission System Operator's site by sending direct mail and using predefined formats
2.	Submission of information by users to the transmission system operator	April 30	Uploading to the transmission system operator's platform
3.	Provision of available information to the transmission system operator and the Ministry's design company	May 15	Internal coordination of data between the Ministry and the Transmission System Operator
4.	Completion of the development of the "sketch" draft of the transmission system development plan	August 15	Regular consultation between Transmission System Operator, System Operator and Design Company during development
5.	Completion of Draft Transmission System Development Plan development (including internal discussion/consultations).	September 30	The transmission system development plan and the results of internal discussions/consultations in the electricity sector
6.	Finalization of the Transmission System Development Plan (including public consultation/consultation).	December 1	Summarize the "rough" draft of the transmission system development plan and the outcome of the public discussion/consultation
7.	Adoption of the transmission system development plan	December 31	Acceptance by the Ministry

Appendix 2
to the Rules of use of main power grids

METHODOLOGY
for developing a long-term transmission system development plan

Chapter 1. Transmission system development plan

1. Transmission system development plan (hereinafter – Plan) will be developed for the next 10-year period and updated annually.

2. The plan includes detailed information on all aspects of the transmission system and the single power system operation, including the commissioning of new generation capacities in the transmission system, the operation, modernization, reconstruction, and repair of existing facilities, as well as the decommissioning of outdated equipment (devices). This plan also encompasses the development of measurement, control, signaling, and telecommunications tools used in the operation of the power system.

3. The plan includes the following:

Primary forecast data for planning (forecasted consumption volume for one year and peak power demand, distribution of consumption across system nodes, and the planned structure of generating capacities);

Results of the analysis of transmission system facilities, equipment (devices), and their operational condition;

The most optimal option for the development of the transmission system, determined based on technical and economic justifications for the planned period;

Inventory data of facilities/equipment in the transmission system that need to be constructed, reconstructed, or modernized, listed by years and priority;

Plan for the development of auxiliary infrastructure for the transmission system (telecommunication system, data management system, electricity accounting system, etc.).

Assessment and verification of generation adequacy;

Analysis of frequency and power adjustment/control capabilities;

Analysis of voltage adjustment capabilities;

Stability analysis;

Analysis of short-circuit currents.

4. The main primary data for the development of the plan includes:

Consumption (demand) forecast for the entire planning period;

Conditional plan for the development of generation for the entire planning period and beyond, including plans for the decommissioning, technological conservation, or closure of generating modules;

Planned integration of large consumers directly connected to the transmission system.

Chapter 2. Process of developing the transmission system

5. A coordinated set of primary data will be prepared for the development of the plan.

6. If there are significant discrepancies between the data obtained from different sources, an explanation must be provided regarding the accepted data set.

7. In developing the plan, the analysis of the current state of the transmission system will be carried out first (including the year of commissioning of facilities, the absence of certain elements, observed overloads, and analysis of incidents and events), as well as the analysis of the safety and stability of the current state of the transmission system.

8. In the next phase, all facilities currently under construction will be analyzed based on previous development plans, taking into account the years they were commissioned.

Based on this analytical data, various options for alternative solutions for the construction of new electrical transmission facilities and the reconstruction and expansion of existing elements of the electrical transmission network will be developed.

9. The process will be repeated until the end of the planning period, taking into account the proposed solutions for each option.

10. For each option, the costs of depreciation, maintenance, and losses will be assessed and, accordingly, compared in terms of economic efficiency, leading to the selection of the most suitable option for the development of the transmission system.

11. The planning of new transmission networks will be carried out based on regular research and technical-economic justifications. Decisions regarding the construction of these elements of the transmission system will be agreed upon with the operators of neighboring state transmission systems and jointly investigated.

12. The final plan prepared on a yearly basis should include the following:

The construction plan for new facilities in the electricity network and their financing sources;

The reconstruction of existing facilities in the electricity network and their financing sources;

The construction of new inter-system networks.

13. The plan should include an analysis of potential overloads in the system, identifying locations where these overloads may occur, along with proposed solutions (a list of elements of the electrical transmission system and the elements where frequent overloads occur).

If there are any limitations specified for equipment (devices) related to the transmission network or transformers that apply under normal conditions or after the failure of any element of the transmission network, the transmission system operator shall include information on this equipment (devices) in the plan.

Chapter 3. Investment plan for the transmission system

14. The transmission system operator will develop the investment plan for the transmission system for a three-year period, coordinate it with the investment plans of the distribution system, and update it annually.

15. The investment plan for the transmission system includes the following:

The name and type of the project, along with a brief description of the investment conditions and planned activities;

The costs of equipment (devices), services, and works;

An assessment of each investment project over the next three years;

A schedule for the implementation of financing for the investment plan;

Sources and resources for financing;

Analysis of incomplete or ongoing projects and their status.

Chapter 4. Goals and strategies for development

16. The main objective of the planning is to create a safe, reliable, cost-effective, and efficient transmission system that fully meets the requirements for the transmission of electric energy in accordance with established legal obligations. This includes ensuring the transmission capacity of the system, taking into account the development trends of electric energy consumption, the introduction of new generation capacities, the decommissioning of outdated ones, and the flow of capacities in the single energy system.

17. In developing the plan, the transmission system operator analyzes the long-term development needs and various scenarios in terms of economic efficiency. The development needs are identified through long-term forecasting:

The compliance of the transmission system with existing technical standards and regulations is assessed;

The economic indicators of each development scenario are analyzed.

18. In evaluating development options that will meet the expected loads, the transmission system operator primarily considers scenarios that can satisfy multiple needs simultaneously. If this is not possible, a separate scenario will be developed for each of the development needs.

19. The plan envisions further development of the 500 kV and 110 kV voltage systems, while simultaneously phasing out the 220 kV voltage systems as they reach the end of their service life.

The plan aims to maintain the corridor for 220 kV transmission networks and,

in the future, maximize the use of 500 kV and 110 kV transmission networks along the existing routes. The introduction of 220 kV networks will only be allowed when other technical and economic solutions are deemed not feasible.

20. In considering alternative solutions, the transmission system operator analyzes the effectiveness of each scenario to meet long-term development needs.

21. In some cases, solutions that require significant initial investment but provide high efficiency indicators over a long period and do not require long-term development may be selected.

In cases where a solution based on significant financing needs to be implemented over a long period, the project may be divided into several phases for implementation.

Chapter 5. Planning Criteria

22. The operation of the system under stable working conditions must comply with the requirements of legislative documents in the electric power sector and the normative documents regulating technical aspects.

23. During the consideration of future scenarios (for example, over the next 10 years), if there is a possibility of violating the technical criteria (requirements) established in the rules for the use of main power networks or other technical documents in a specific part of the system, the need for the development of that specific part of the system will be considered. These technical criteria include the following:

Allowed voltage deviations;

Maximum thermal loads of system elements;

System safety (“n-1” safety criteria);

System stability;

Values of short-circuit currents.

24. The system must have the capability to operate stably in accordance with established requirements, even after any disruptions, such as the failure of a network, transformer, or generating module.

25. The system must have the ability to operate stably in accordance with established requirements even after the failure of any elements, networks, transformers, or generating modules.

26. These criteria also apply to the capital repair of any network, transformer, or generating module. When choosing a strategy for reinforcing the network, the conditions for identifying violations of requirements will be taken into account on a broad scale.

27. In the context of operating the system and in the event of malfunctions in the network, the following tests will be conducted according to specific operating modes:

winter maximum;

winter minimum;

summer maximum;

summer minimum;

other tests specific to the system.

28. The winter maximum considers the projected maximum annual load. The winter minimum reflects the high or average integration of renewable energy sources, particularly wind and solar energy.

29. The summer maximum indicates the average maximum consumption during weekdays from March to September. Since the total load of the network in summer is lower compared to winter, it may not be related to overloading across all systems.

30. The outages caused by capital repair activities carried out from March to October should not reduce the transmission capacity of the network.

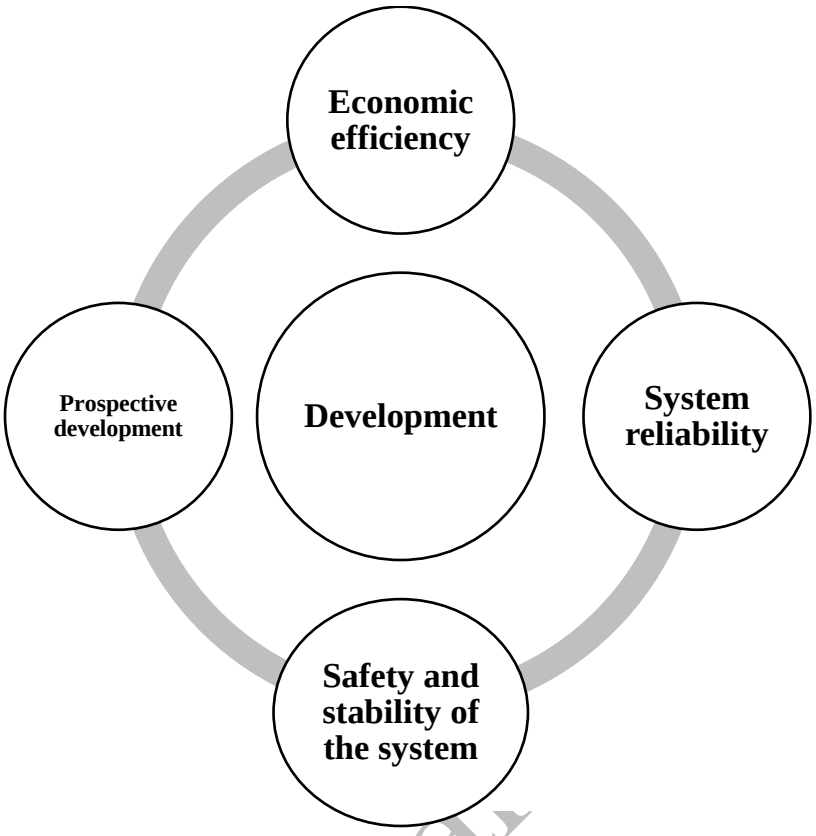
31. The summer minimum is considered the absolute annual minimum. Analyzing the summer minimum includes low loads and, accordingly, low production modes. In this context, the potential occurrence of very high voltage levels on the substation busbars should be taken into account.

32. From a planning perspective, based on the Ferranti effect, excessive voltage may occur in low load modes of the networks, necessitating additional actions by the nearest generation facilities for voltage/reactive power management or planning the installation of reactive power compensation devices at substations.

33. The chosen development scenario should have a minimal impact on the environment and must be agreed upon by the wider public and relevant authorities.

34. The expansion of the transmission system and its capabilities provided to users must fully meet the needs of users and should be implemented in cooperation with the distribution system operator.

35. The criteria for selecting the most optimal scenario for the development of the transmission system are shown in the following diagram.



1. Scheme. Criteria for selecting the most suitable development scenario.

Chapter 6. Process of planning the development of the transmission system.

36. The process of planning the development of the transmission system has a dynamic character. The demand for transmission services continuously changes. The development plan is implemented in the following stages, taking into account the development needs (requirements) at a certain stage of this process:

a. **Updating data:** Reviewing and updating system and user data during the planning process, as well as creating a system model;

b. **Assessing future conditions:** Considering, analyzing, and evaluating factors such as increasing energy security, growth in consumption, reliability, integration of new generation capacities into the system, improving efficiency, and/or the physical and moral aging of infrastructure.

This assessment includes scenarios that differ significantly from each other, which are incorporated into the system model;

c. **Evaluating the efficiency of future system operations:** Based on system models, the efficiency of system operations is assessed for the long term according to relevant requirements. Weak points that may require additional research (studies) may be identified;

This research includes assessing consumption forecasts, various production scenarios, different levels of transit, and system stability factors;

d. **Considering connection requests to the system:** Requests from producers or consumers, or parts of distribution systems for connection to the transmission system are reviewed and analyzed based on the current state of the

network and future connection needs;

e. **Identifying development needs:** Previous stages identify potential problems that may arise in certain parts of the system in the future, and in some cases, these problems do not require immediate resolution. A detailed analysis is conducted for each problem, determining whether there is indeed a need for development in that specific part of the transmission system at a given time;

f. **Selecting the optimal development plan:** In selecting the most suitable option from several scenarios, the following factors are considered:

Compliance with technical planning criteria (standards, regulations);

Consistency with the concept of developing the electric power sector and the objectives outlined in its implementation program;

Minimal impact on the environment and society as a whole;

Economic efficiency;

The time required for implementation;

The ability to eliminate overloading in the transmission system with the help of generation capacities;

The level of stability in ensuring future demand;

Impact on the management, protection, and maintenance of the transmission system;

Compliance with the requirements of the distribution system operator;

Economic and technical impacts on the distribution system.

37. Considering the factors mentioned above and the uncertainties in consumption and production forecasts, reliable solutions that will yield the greatest long-term benefits for all users of the network will be identified.

38. The process of planning the development of the transmission system aims to create a flexible, dynamic, and reliable network that adapts to future changes in production and consumption, rather than establishing a network with any limitations.

39. The plan developer must ensure that it aligns with the scenarios for the development of the energy system, including the future development of electricity consumption and power exchanges with other energy systems, as well as analyze the reliability of the generation and transmission systems. Various software and modeling tools will be utilized in this process.

40. If the results are satisfactory, the plan supports the implementation of the energy system development scenarios.

41. In case of unsatisfactory results (overloads, exceeding the voltage and short-circuit current limits, etc.) it is required to build additional networks and/or new facilities in the transmission system. Based on this, the development plan will be revised.

42. In addition, probabilistic reliability indicators, insufficient supply of electricity (ENS) or time of interruption of electricity supply (LOLE) are analyzed. These indicators must be within predetermined threshold values to ensure the desired reliability and quality of power supply.

43. Verification of compliance with the reliability criteria of the "n-1" transmission system is carried out by analysis based on the classical deterministic approach.

44. The power transmission system is carried out for the current situation, for the next five and ten years. Analyzes are conducted on three specific (critical) operating modes of the energy system:

winter maximum load mode (winter maximum);

summer maximum load mode (summer maximum);

summer minimum load mode (summer minimum). This mode is not analyzed for the current state, but only for the future state of the network.

45. All these calculations for the first three years are critically reviewed. It checks for overloads, voltage and frequency deviations and their exact locations. The cause of each case is carefully analyzed and corrective measures are taken. Calculations are repeated until the results of the operational safety assessment are satisfactory, that is, until the simulation model is reached.

46. Short-circuit currents at the facilities of the users of the transmission system are calculated during the preparation of the plan, if potentially significant changes are expected due to the expected changes in the generation and transmission systems, appropriate adjustments are made or negotiated together with the users.

47. At least once every five years, short-circuit currents are checked in each object of the transmission system.

48. If the value of the short-circuit currents may endanger the installed equipment at the facilities of the electricity grid business and at the facilities of the users of the transmission system, the Transmission System Operator shall take appropriate measures and agree with the users of the electricity transmission system the measures to be applied at their facilities.

49. As part of the development of the plan for the next ten-year period, calculations of short-circuit currents are carried out based on the current state of the system and the projected state for the end of the considered 5-year and 10-year periods by taking into account the winter maximum and summer minimum.

50. Calculation of short-circuit currents is performed in accordance with IEC 60909 and other technical requirements using PSS®E and Power Factory software.

51. In order to model the energy system of the neighboring countries as accurately as possible, the calculations should be carried out in the existing regional model of the single energy system of Central Asia.

52. These calculations should take into account all factors that may affect the change in the value of short-circuit currents during the period provided for in this development plan.

53. The analysis are the level of performance of the system in providing the total consumption, reflected by the possible indicators of production reliability:

LOLE (Load Loss Expectation - expected probability of load loss) - hours in a year when consumption requirements are not satisfied (hours/year);

LOLP (Load Loss Probability) – probability of occurrence of situations where consumer requirements are not satisfied (%);

EENS (Expected Energy Not Delivered) is the amount of electricity (MW) that is not expected to be delivered to consumers.

54. When the risk level falls below the threshold value, the system is assigned a level corresponding to over-installed capacity or excess capacity (capacity reserve).

Conversely, if the risk level is higher than the acceptable level, then additional power input is considered to reduce the risk to an acceptable level based on the identified power shortage in the system.

55. When developing a development plan, a double analysis, not presented in the methodology, should be carried out by assessing the significant impact of renewable energy sources on the system.

56. During planning, it is checked that the primary, secondary and tertiary adjustment reserves in the system are higher than the minimum amount of the specified reserve.

57. If the expected reserve for tertiary adjustment does not correspond to the installed amount, the options of replacing it with imports will be considered during verification of the reliability of generation and transmission.

58. If potential problems related to voltage adjustment are identified, the Transmission System Operator will take the necessary measures within its competence and include relevant clauses in the plan.

59. The transmission system operator must include transmission system stability study analyzes in the plan at least every five years as needed.

60. If the results of stability analyzes show deficiencies of automatic voltage adjustment, primary and secondary adjustment equipment and protection systems, the Transmission System Operator together with the Users will take necessary measures.

Appendix 3
to the Rules of use of main power grids

Planning information
I. Planning of electricity consumption

According to the table below, it is mandatory to provide consumption data by electricity consumers for the next five years and the tenth year of the planning period.

Table 1

Moon	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
P_{max} – power (MW)												
Electricity consumption (mln kW h)												
						Total (million kW·h)						

P_{max} is the maximum amount of active power for the reporting (monitoring) period.

If the user produces electricity for his own needs and also consumes it from the network, the data on production and consumption balances are provided separately.

II . Planning of electricity generation

Electricity producers are required to submit production data for the next five years and the tenth year of the planning period according to the following table.

Table 2

Moon	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Electricity consumption (mln kW h)												
						Total (million kW·h)						

Electricity production indicators should provide information on the volume supplied to the system at the connection point, that is, net production data. In this case, from the total production, one's needs and losses in one's own system are deducted.

III. Information to be provided on conventional power plants and their auxiliary equipment

1. Information about generators

Nominal full (recorded) power (MVA);

Nominal active power (MW);

Power factor;

Connection of stator coils;

Nominal voltage of the stator (kV);

Nominal current of the stator (A);

Nominal current of excitation (A);

Excitation voltage at nominal load (kV);

Negative (reverse) component of reactive resistance (n.b.);

Negative (reverse) organizer of resistance (n.b.);

Zero (homopolar) component of reactive resistance (n.b.);

Zero (homopolar) component of resistance (n.b.);

Stator compression reactive resistance (n.b.);

Stator resistance (n.b.);

Synchronous reactive resistance along the longitudinal axis (n.b.);

Synchronous reactive resistance along the transverse axis (n.b.);

Reactive resistance passing along the longitudinal axis (n.b.);

High-pass reactivity along the longitudinal axis (n.b.);

Reactive resistance passing along the transverse axis (n.b.);

High pass reactive resistance along the transverse axis (n.b.);

Mechanical fading (n.b.);

Aperiodic time continuous interruption of short-circuit current (s);

T'do is the constant time (s) of the excitation circuit in the disconnected stator;

T''do is the high passing constant time (s) of the excitation circuit in the stator disconnected along the longitudinal axis;

T'ds is the time constant (s) passing along the longitudinal axis during the short circuit of the winding;

T''ds is the high-pass constant time (s) of the excitation circuit in a short-circuited stator along the longitudinal axis;

T'qo is the time constant (s) passing along the transverse axis in the disconnected primary winding;

T''qo is the high passing constant time (s) of the excitation circuit in the stator disconnected along the transverse axis;

T'qs is the time constant (s) passing along the transverse axis when the winding is short-circuited;

T''qs is the high-pass constant time (s) of the excitation circuit in the short-circuited stator along the transverse axis;

Inertia coefficient of electric generator device (s);

Tǰ - Inertia coefficient (s);

Working (functional) scheme of the generator;

Jump and short circuit test curves.

2. Information about the generator excitation system

Nominal direct excitation current (A);

Nominal voltage of direct current excitation (V);

Minimum DC excitation voltage (V);

Maximum DC excitation voltage (V);

The maximum step of changing the excitation current (A);

Minimum excitation current (A);

Type of excitation (mechanical or static);

Structural block diagram with common parameters for all blocks;

Basic information about excitation acceleration (coefficient, duration);

Electrical protection devices and their parameters.

3 . Primary (turbine) adjuster

Static range (range) of the turbine adjuster (%);

Default adjustment range (range) (%P_{name});

Insensitivity level of the test tool (mHz);

Structural block diagram with parameters for all blocks;

4. Local equipment for secondary adjustment

Structural block diagram showing parameters for all blocks

5 . Consumption on the spot (for own needs).

The amount of consumption in the distribution device (for own needs) depending on the power of the generator;

The amount of electricity (with power) that the generator receives from the system for its own needs.

6 . Information on transformers

Type;

High voltage side:

nominal installed capacity (MVA);

nominal voltage (kV).

Low voltage side 1:
nominal installed capacity (MVA);
nominal voltage (kV).

2nd low voltage side:
nominal installed capacity (MVA);
nominal voltage (kV).

Connection group (vector);

Type of adjustment;

Adjustment interval, adjustment interval step (%);

Salt walking current (%);

Short circuit voltage $\mathbf{U}_{12}$ (%);

Short circuit voltage $\mathbf{U}_{23}$ (%);

Short circuit voltage $\mathbf{U}_{13}$ (%);

Usage rate (%);

Losses in copper (kW);

Iron losses (kW);

Appearance (location) of the transformer in the zero-sequence (homopolar) system - electrical circuit;

The method of connecting the primary and secondary neutral to the ground;

Electrical protection and its description (characteristics).

7 . Information on power transmission and cable networks

Rated voltage (kV);

Total length (km);

Number of systems;

The number of conductors in a phase;

Conductor type;

Type of grounding wire (earthing wire);

Absolute resistance (Ω)?

Total reactive resistance (Ω)?

Complete reactive conductivity (S);

Zero (homopolar) resistance (Ω)?

Zero (homopolar) reactive resistance (Ω)?

Zero (homopolar) reactive conductivity (S);

Electrical protection and its description (characteristics).

8 . Information on circuit breakers

Rated voltage (kV);

Rated current (A);

Nominal breaking capacity of short-circuit current (kA);

Rated starting current (kA);

Self-off time (ms);

Total shutdown time (ms);

Self-ignition time (ms);

Total switching time (ms).

9. Reactive power compensating equipment

Type;
Rated power (MVar);
Rated voltage (kV);

IV . Information to be provided on renewable energy sources (wind and solar power plants) and their auxiliary equipment

1. Wind power plants ("B" information on type).

Producers of electricity through "B" type wind power plants (wind power plant operators) must provide at least the following information (to the Transmission System Operator or System Operator).

Information about the power plant and its equipment (main structural and technical parameters provided during design, commissioning of the plant and updated during the reconstruction process):

technical parameters of the wind power plant and its turbines;

technical parameters of equipment/devices of wind power plants at the point of connection to the system;

A simulation model and other relevant information required for system analysis as requested by the Transmission System Operator or System Operator.

Quick planning information:

monthly/annual electricity generation data;

monthly/annual electricity consumption data;

information on monthly/annual plans for maintenance and repair of the infrastructure at the wind farm and its system connection points.

Operational data:

power/energy measurement data (active/reactive power and transmission of electricity to the grid);

real time data:

flows of active and reactive power;

status information (equipment/device operational status - Yes/No).

forecast information about the working condition (information about the readiness of the device for operation);

wind speed and direction.

2. Information on wind power plants ("C" and "D" types).

type "C" and "D" wind power plants (wind power plant operators) must provide at least the following information (to the Transmission System Operator or System Operator).

Information about the power plant and its equipment (main structural and technical parameters provided during design, commissioning of the plant and updated during the reconstruction process):

technical parameters of the wind power plant and its equipment;

internal distribution equipment/devices
and substations of wind power plants;

technical parameters of equipment/devices of wind power plants at the point of connection to the system;

A simulation model and other relevant information required for system analysis as requested by the Transmission System Operator or System Operator.

Scheduling Information:

Long-term planning information:

commissioning/decommissioning or replacement of planned wind turbines;

annual expected electricity production amounts;

annual indicators of electricity consumption from the system for own needs;

updated data for the preparation of simulation models;

quick planning information:

information on monthly/annual plans for maintenance and repair of the infrastructure at the wind farm and its system connection points.

monthly/annual electricity generation data;

monthly/annual electricity consumption data;

Operational data:

power/energy measurement data (active/reactive power and transmission of electricity to the grid);

real time data:

tension;

vine;

active and reactive power flows;

the adjustment state of the alternating connector that adjusts the voltage of the transformer;

information about the status of the distribution device;

selected or grouped signals of emergency situations;

status information (equipment/device working condition — Yes/No);

running at the same time (in use) number of wind turbines;

non-working wind turbines and reasons for non-working (strong and weak wind speed, equipment failure, under repair, etc.);

forecast information about the working condition (information about the readiness of the device for operation);

information about the effectiveness of the management system (statistics of the performance of management systems);

meteorological data (if wind power plants are located in different regions, this data must be provided for each region):

wind speed at the height where wind generators are installed;

wind direction;

air temperature;

Atmospheric pressure.

3. Information on solar power plants ("B", "C" and "D" types).

"B", "C" and "D" type solar power plants (solar power plant operators) must provide at least the following information (to the Transmission System Operator or System Operator).

Information about the power plant and its equipment (main structural and technical parameters provided during design, commissioning of the plant and updated during the reconstruction process):

technical parameters of the solar power plant and its equipment;

internal distribution equipment/devices
and substations of solar power plants;

technical parameters of equipment/devices at the point of connection to the system of solar power plants;

A simulation model and other relevant information required for system analysis as requested by the Transmission System Operator or System Operator.

Scheduling Information:

Long-term planning information:

commissioning/decommissioning or replacement of the planned solar power plant (or its panel section);

annual expected electricity production amounts;

annual indicators of electricity consumption from the system for own needs;

updated data for the preparation of simulation models;

quick planning information:

information on monthly/annual plans for infrastructure maintenance and repair at the solar power plant and its grid connection points.

monthly/annual electricity generation data;

monthly/annual electricity consumption data.

Operational data:

power/energy measurement data (active/reactive power and transmission of electricity to the grid);

real time data:

tension;

vine;

active and reactive power flows;

the adjustment state of the alternating connector that adjusts the voltage of the transformer;

information about the status of the distribution device;

selected or grouped alarms of emergency situations;

status information (equipment/device working condition – Yes/No);

running at the same time (in use) number of wind turbines;

the number of non-working wind turbines and reasons for non-working (strong and weak wind speed, equipment failure, under repair, etc.);

forecast information about the working condition (information about the readiness of the device for operation);

information about the effectiveness of the management system (statistics of the performance of management systems);

meteorological data (air temperature and atmospheric pressure, etc.).

Appendix 4
to the Rules of use of main power grids

METHODOLOGY
of development of a conditional plan of generation development

1. Conditional plan for generation development together with the consumption (demand) forecast is the main component of the transmission system development plan.

2. The main difference between the methodology of development of a conditional plan of generation development and the methodology of development of a transmission system development plan is - generation development planning is carried out using power system modeling and power system planning software (tools).

3. Generation development plan is developed on the basis of the data collected by the authors of the projects and the transmission system operator on the planning of electricity production and the construction of new generation capacities.

4. The following sources of primary data are used to prepare the conditional plan of generation development:

Existing production companies – electricity producers that provide plans for the construction of new production facilities, development, restoration, or reconnection of existing generating modules, as well as plans for decommissioning outdated equipment;

State organizations – provide a registry of prospective projects for the construction of new power plants or the modernization/expansion of existing facilities;

Transmission system operator – provides information on projects submitted (or under consideration) for connection to the transmission system;

Distribution system operators – present the results of analyses related to the status and prospects of permits granted for the connection of new generating modules to distribution systems, as well as generation equipment installed by micro and small generation and consumers for their own needs;

Research organizations that forecast the development of small-capacity distributed generation;

National Gross Domestic Product (GDP) growth forecasts, assessments of fuel cost increases, studies on the amount and pricing of emissions released into the atmosphere (CO2), and other necessary macroeconomic data, including the costs of renewable energy source equipment;

Incentive measures to support electricity generation from renewable energy sources.

5. Each project is screened against various technical, organizational, legal/regulatory and financial criteria and its final results are evaluated.

6. The procedure for connecting to the network includes the following several steps:

submitting an application (request);

expert opinion;

connection check;

get permission to connect;

design of connection infrastructure;

conducting tests;

plug and play.

From this point of view, projects that are in the early stages of connection application and connection feasibility studies are considered early stage.

7. Project developers apply different aspects of project development at similar stages, with construction project permits not being issued until pre-financing is secured, or the system connection process not moving beyond connection study procedures until a power plant construction permit is obtained.

8. By evaluating the following criteria, production development projects are classified as follows:

actually completed - the development of the project has been completed or is close to completion, fully financed, permits have been obtained;

approximately completed - the development of the project has not been completed, but its completion is certain, the deadlines have not been determined;

approximately not completed - the project development process is at a late stage, some elements are close to being provided, but may be canceled for various reasons;

unfinished – a project at a very early stage of development can be classified by categories of recorded network connectivity (lack of financial and legal status).

9. These classifications of project readiness are then used in the production of various scenarios of generation development. Planning results are analyzed by parallel evaluation of different scenarios of generation development.

10. The identification of scenarios should be the same as the approach taken in the Transmission System Development Plan methodology. The following

standard scenarios apply:

Conservative - this scenario is based on the available resources of all generation development plans. Only includes projects that have actually been completed with guaranteed financing and a grid connection agreement. A similar approach is used for decommissioning, only strict agreements are taken into account. The development of renewable energy sources generation is limited by current (current) projects and restrictions imposed on the amount of incentives or the ability to balance the energy system;

Realistic - in this scenario, in addition to the information in the conservative scenario, additional projects of the development of new generation that are expected to be completed will be included and against them the data available for the years of operation and the opinions of the project engineers will be evaluated. For renewable generation projects, realistic assumptions on the Conservative Scenario List and incentives and distribution generation assessment data are added. This scenario may include projects that, based on available information, could be completed in the second half of the planning period or near the end;

Green – High level of renewable energy integration and energy efficiency measures. The list of projects in this scenario is the same as the list of real scenarios for conventional power plants, including all feasible projects based on renewable energy sources. In the scenario, energy efficiency measures are implemented by retrofitting and renovating existing production facilities, which in turn increases their production capacity and overall efficiency.

11. The transmission system operator shall provide detailed information on the commissioning and decommissioning of each generation capacity in the planned year with an attachment for each future planning year.

12. On the basis of traditional and renewable energy sources, separate fuels and technologies are grouped for generation facilities. The tabular view shows data on available generation capacity for frequency control for each year in the planning period.

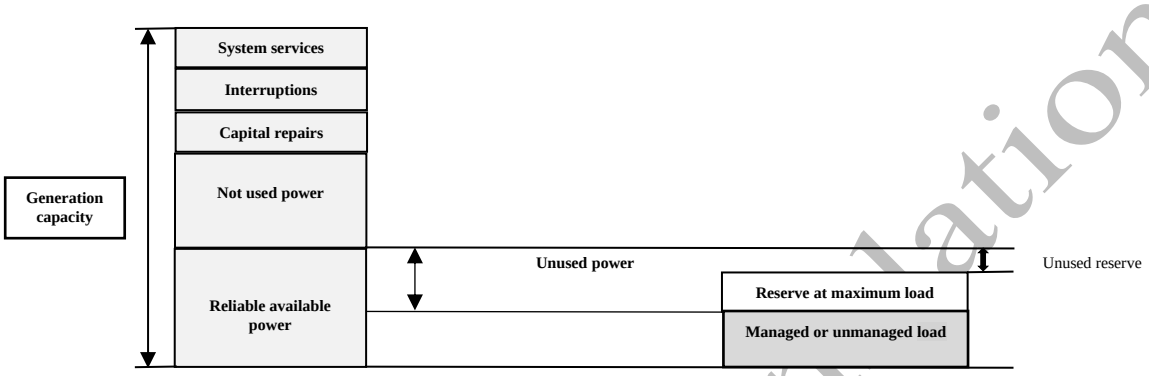
Appendix 5
to the Rules for the use of main power grids

The procedure for developing a conditional plan for generation development

T/r	Actions	Final term	Explanation
1.	Request by the transmission system operator to provide information to existing operators and future generation operators	January 1	By direct mail and using predefined formats on the site of the Transmission System Operator
2.	Providing information to the Generation Operators and other operators and the Transmission System Operator of the Ministry	February 15	Uploading to the transmission system operator's platform
3.	Preparation of a draft conditional plan for generation development by the Transmission System Operator and sending it to the Ministry and the Regulator for review	April 1	
4.	Submission of comments by the Ministry and the Regulator to the Transmission System Operator regarding the conditional plan for generation development	April 15	
5.	Development of the final draft of the conditional plan for generation development by the Transmission System Operator and its submission to the Ministry and the Regulator.	May 1	Ministry consults with Regulator and approves the conditional plan for generation development before sending it to the design company.

Appendix 6
to the Rules for the use of main power grids

Standard for the generation of power



Appendix 7
to the Rules for the use of main power grids

INFORMATION
Required for networking research

Information is provided below to study conventional power plants, renewable energy sources, battery energy storage system, hydro storage power plants and end-consumers grid connection.

1. For conventional power plants:

full name of the lecture station ;

nominal power of the generator P_n [MW] - separate information is provided for each generator;

nominal power of the turbine R_{pt} [MW] − separate information is provided for each turbine;

approved grid connection capacity [MW];

connection (launch) planned year;

total number of block transformers;

the address where the object is located;

description and graphic representation of the location of the power plant (presented in the appropriate form - "dwg" geographic mapping file in AutoCAD);

conceptual solution (if available);

electricity consumption for own needs [MW].

2. For renewable energy sources (wind and solar power plants or parks):

full name of the power plant or park;

nominal power at the connection point (alternating current power) P [MW];

Installed active power of wind power plant Pinstmax [MW];

maximum installed power of solar power plant inverter Pinstmax [MW];

connection (launch) planned year;

single-line (internal, medium voltage) circuit design of the power plant;

total number of network transformers;

object location address;

description and graphic representation of the location of the power plant or park (presented in the appropriate form - "dwg" geographic mapping file in AutoCAD);

conceptual solution (if possible);

electricity consumption for own needs [MW];

hourly production evaluation data of a power plant or park for at least three years (based on measurements of wind speed, radiation, etc.).

3. For battery energy storage systems:

name of the battery energy storage system;

type of battery energy storage system technology;

nominal power at the connection point - R [MW], data must be provided for both (generation/consumption) modes;

maximum active power (installed power) - Pinstmax [MW];

maximum storage capacity (storage capacity) - Einst [MWs];

connection (launch) planned year;

single-line (internal, medium voltage) circuit design of the storage system;

total number of network transformers;

charging (charging) and de-energizing (discharging) rate (C-rate);

address where the object is located.

4. For the Distribution System Operator and large consumers connected to the transmission system:

full name of the object;

required power at the connection point R [MW];

the year the connection is planned;

planned one-line scheme of the facility;

total number of network transformers;

the address of the facility;

description and graphic representation of the location of the power plant or park (provided in the appropriate form - autocadda "dwg" geographic mapping file);

the amount of minimum three-pole short-circuit power at the connection point;

conceptual project (if any);

estimated hourly consumption for at least one year.

5. For hydroaccumulating power stations:

the name of the object;

installed power at the connection point - R [MW], data must be provided for both (generator/pump) modes;

maximum active (installed) power - Pinst [MW], data must be provided for both (generator/pump) modes;

connection (launch) planned year;

planned single-pole installation scheme;

total number of block transformers;

the address of the facility;

description and graphic representation of the location of the power plant or park (presented in the appropriate form - "dwg" geographic mapping file in AutoCAD);

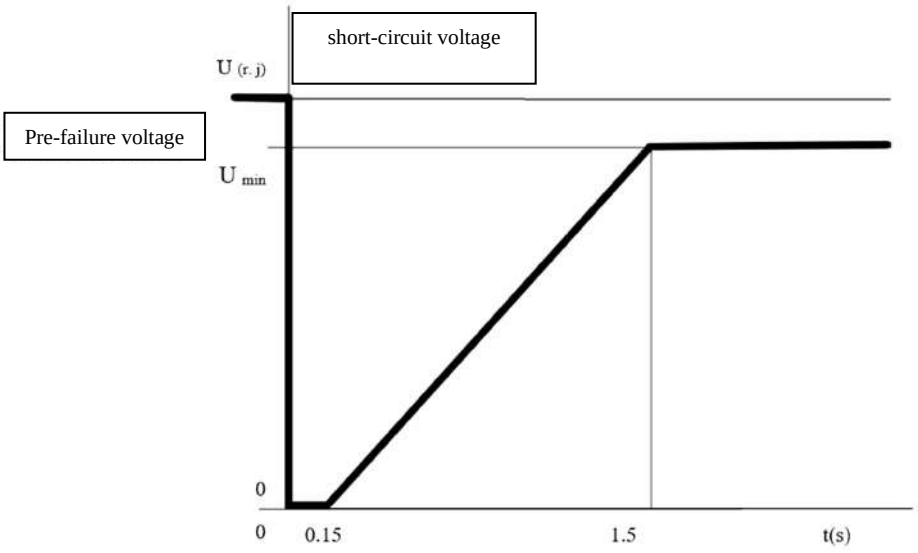
conceptual project (if any);

hourly production and consumption assessment for at least one year;

information on the possibilities of adjusting the active power in pump and generator modes.

Appendix 8
to the Rules for the use of main power grids

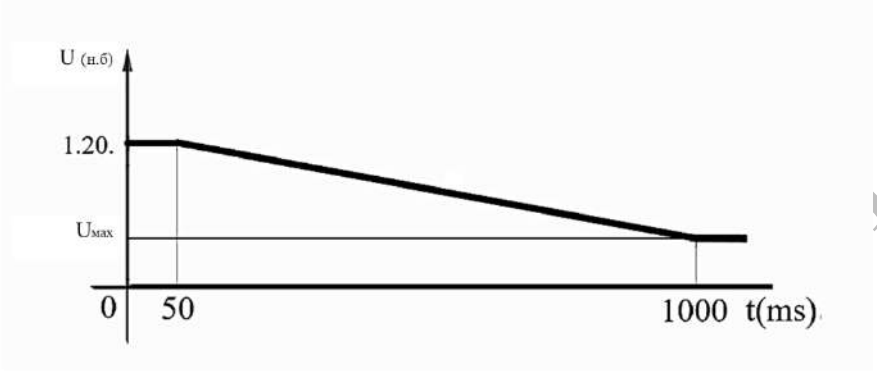
Requirements for users in the event of a voltage drop in the transmission system



U_{min} *- The minimum operating voltage at which the user's facility must remain connected to the transmission network.*

Appendix 9
to the Rules for the use of main power grids

Requirements for users in high voltage situations



Note:

***U max** – maximum voltage;*

***t** - time.*

Appendix 10
to the Rules for the use of main power grids

Values of higher harmonics in the transmission system

Odd harmonics not divisible by 3		**Odd harmonics divisible by 3**		**A pair of harmonicas**	
Harmonic order (h)	Harmonic Voltage (%)	Harmonic order (h)	Harmonic Voltage (%)	Harmonic order (h)	Harmonic Voltage (%)
5	2	3	2	2	1.4
7	2	9	1	4	0.8
11	1.5	21	0.2	8	0.4
13	1.5	21	0.2	8	0.4
$17 \leq h \leq 49$	1.2 * 17/h	$21 \leq h \leq 45$	0.2	$10 \leq h \leq 50$	0.19*10/h +0.16

Appendix 11
to the Rules for the use of main power grids

A list of data exchanged in real time

Type	Description of data	Unit/Status
1. 500 kV, 220 kV and 110 kV substations of the transmission system operator and power transmission networks (cells where users are connected)		
M	Phase current	A (I_0, I_4, I_8)
M	Three-phase active power	MW ("-" consumption, "+" delivery)
M	Three-phase reactive power	MVAr ("-" consumption, "+" delivery)
M	Line voltage	kV (U_{04}, U_{48}, U_{08})
M	Frequency	Hz (min.2 decimal places)
M	Fault finding	km
S	Automatic switch	On, Off, Neutral, Faulty
S	Separator	On, Off, Neutral, Faulty
S	Grounding device	On, Off, Neutral, Faulty
C	Automatic switch	On, Off, Neutral, Faulty
C	Separator	On, Off, Neutral, Faulty
C	Grounding device	On, Off, Neutral, Faulty
A	Select control center	On/Pause
A	The presence of tension	On/Pause
A	Order given to "AHY".	On/Pause
A	"APU" blocking	On/Pause
A	Automatic reconnection successful	On/Pause
A	Remote protection zone 1 - shutdown	On/Pause
A	Remote 2nd zone of protection - shutdown	On/Pause
A	Remote 3rd zone of protection - shutdown	On/Pause
A	Remote 4th zone of protection - shutdown	On/Pause
A	Remote protection in reverse direction - disconnection, shutdown	On/Pause
A	Trigger level of remote protection - disconnection, shutdown	On/Pause
A	Remote protection 0 phase-excitation	On/Pause
A	Remote protection 4 phase-excitation	On/Pause
A	Remote protection 8 phase-excitation	On/Pause
A	Remote protection against earth fault-excitation protection	On/Pause
A	Remote protection is blocked	On/Pause
A	Main protection 1-fault	On/Pause
A	Main protection 2- failure	On/Pause
A	Reserve protection - failure	On/Pause
A	longitudinal differential protection - disconnection, shutdown	On/Pause
A	Unstable longitudinal differential protection - disconnection, shutdown	On/Pause
A	longitudinal differential protection,0 phase-excitation	On/Pause
A	longitudinal differential protection, 4-phase excitation	On/Pause
A	longitudinal differential protection, 8 phase-excitation	On/Pause
A	Longitudinal differential protection-excitation from ground fault	On/Pause
A	longitudinal differential protection-contact failure	On/Pause

Type	Description of data	Unit/Status
A	longitudinal differential protection-blocked	On/Pause
A	Overload protection - disabled	On/Pause
A	Overload protection stage 1 - blocked	On/Pause
A	Overload protection stage 2 - blocked	On/Pause
A	Overload protection level 1 - alarm	On/Pause
A	Overload protection level 2 - alarm	On/Pause
A	Overload protection level 1 - shutdown	On/Pause
A	Overload protection level 2 - shutdown	On/Pause
A	Ground fault protection - disconnection, shutdown	On/Pause
A	Back-up current overload protection - cut-off, shutdown	On/Pause
A	Back-up ground fault protection - disconnect, switch off	On/Pause
A	Fault protection - disconnection, shutdown	On/Pause
A	Interchangeable connector failure protection - disconnection, shutdown	On/Pause
A	Asymmetry of circuit breaker poles-separation	On/Pause
A	Current overload protection - disconnection, shutdown	On/Pause
A	Earth fault protection - disconnection, shutdown	On/Pause
A	Supply interruption-alarm	On/Pause
A	Circuit breaker control 1-Circuit breaker control-alarm	On/Pause
A	Control of circuit breakers 2-Control of circuit-breaker-alarm	On/Pause
A	Low gas pressure warning signal in stage 1 of the automatic switch	On/Pause
A	Elegase pressure drop-blocking in the 2nd stage of the automatic winder	On/Pause
A	Receiving remote protection signals from the other side of the air line	On/Pause
A	Receiving protection signals directed from the other side of the overhead line from the ground fault	On/Pause
A	Sending remote protection signals to the other side of the line	On/Pause
A	Sending directional signals of earth fault protection to the other side of the overhead line	On/Pause
A	Remote protection - communication failure	On/Pause
A	Directed earth fault protection - contact fault	On/Pause
A	Remote protection 2-level acceleration-disengagement, shutdown	On/Pause
A	Ground-fault directional protective acceleration-disconnect, shutdown	On/Pause
A	Interchangeable connector springs-loose	On/Pause
A	Current measurement circuits - failure	On/Pause
A	Voltage measurement circuits - failure	On/Pause
A	Thermal protection-alarm*	On/Pause
A	Thermal protection - disconnect, turn off	On/Pause
A	High oil pressure in the cable *	On/Pause
A	Low oil pressure in the cable *	On/Pause
A	Oil pressure in cable (general)*	On/Pause
A	Low oil pressure in clutch *	On/Pause
A	Final Delete**	On/Pause
IM	Active Energy (Transmit/Receive)***	million k W· h
IM	Reactive Power (Transmit/Receive)***	MVAr·h
** signals of cable (underground) communication lines*		

Type	Description of data	Unit/Status
*** group alarm for activation of protection functions, after which automatic reconnection will not start and activation of protection functions will cause shutdown.*		
**** energy measurements at connection points to the transmission system*		
2. 500/x, 220/x and 110/x transformers with matching transformer cells		
M	Phase current on the high voltage side	A (I_0, I_4, I_8)
M	Phase current on the medium voltage side	A (I_0, I_4, I_8)
M	Phase current on the low voltage side	A (I_0, I_4, I_8)
M	Three-phase active power on the high voltage side	MW ("-" consumption, "+" delivery)
M	Three-phase reactive power on the high voltage side	MVAr ("-" consumption, "+" delivery)
M	Three-phase active power on the medium voltage side	MW ("-" consumption, "+" delivery)
M	Three-phase reactive power on the medium voltage side	MVAr ("-" consumption, "+" delivery)
M	Three-phase active power on the low voltage side	MW ("-" consumption, "+" delivery)
M	Three-phase reactive power on the low voltage side	MVAr ("-" consumption, "+" delivery)
M	Line (line) voltage on the high voltage side	kV (U_{04}, U_{48}, U_{08})
M	Line (line) voltage on the medium voltage side	kV (U_{04}, U_{48}, U_{08})
M	Line (line) voltage on the low voltage side	kV (U_{04}, U_{48}, U_{08})
M	The status of the plug-in connector	Position number
IM	Active energy (production/reception)*	MW h
IM	Reactive energy (production/reception)*	M VAr · h
S	Automatic switch	On, Off, Neutral, Faulty
S	Separator	On, Off, Neutral, Faulty
S	Grounding device	On, Off, Neutral, Faulty
C	Automatic switch off**	On, Off, Neutral, Faulty
C	Separator**	On, Off, Neutral, Faulty
C	Grounding Device**	On, Off, Neutral, Faulty
A	Select control mode	Locally/remotely
A	Gas relay (Buchholtz) circuit breaker - disconnect, switch off	On/Pause
A	Gas relay of the transformer (Buchholtz) - disconnection, shutdown	On/Pause
A	Differential protection disconnect, turn off	On/Pause
A	Limited ground fault protection - disconnect, switch off	On/Pause
A	Body protection - disconnection, shutdown	On/Pause
A	Other protection of the transformer - disconnection, shutdown***	On/Pause
A	Contact thermometer/thermometer- disconnect, turn off	On/Pause
A	Overpressure relay in the transformer- disconnect, turn off	On/Pause
* *Measurement at the point of connection to the transmission system.*		
** *Control signals of switching equipment in transformer chambers with an alarm system.*		
*** *Group alarm of protection functions leading to shutdown*		
3. 500 kV, 220 kV and 110 kV bus systems and bus connectors (connectors)		
M	Phase current through the busbar connector	A (I_4)
M	Tire line voltage	kV ($\sqrt{3}$ U_4 or U_{48})
M	Tire frequency	Hz (min. 2 decimal places)
A	Tension	Low voltage, no voltage
S	Automatic switch	On, Off, Neutral, Faulty
S	Separator	On, Off, Neutral, Faulty
S	Grounding device	On, Off, Neutral, Faulty
A	Tire differential protection- disconnect, turn off	On/Pause

Type	Description of data	Unit/Status
A	Current overload protection - disconnection, shutdown	On/Pause
A	General deletion - disconnection, deletion	On/Pause
A	Circuit breaker failure protection - disconnect, shut down	On/Pause
A	1 level protection-alarm from overload	On/Pause
A	2-level overload protection-alarm	On/Pause
A	2-level overload protection - disconnection, shutdown	On/Pause
4. Hydro and turbo generators		
M	Phase current of the stator	A (I_4)
M	Stator line voltage	kV (U_{48})
M	Phase current of the rotor	A (I_4)
M	Three-phase active power	MW ("-" consumption, "+" delivery)
M	Three-phase reactive power	MVAr ("-" consumption, "+" delivery)
M	Full three-phase power	MBA
M	Basic active power of the generator	MW
M	The rate of change of the secondary adjustment	MW/ min
M	Target active power	MW
M	Static state of the voltage regulator	%
M	Maximum active power in secondary adjustment	MW
M	Minimum active power in secondary adjustment	MW
M	Maximum active power in tertiary adjustment	MW
M	Minimum active power in tertiary adjustment	MW
M	Actual active power fixed installation of the power plant	MW
A	AGC (automatic production release management) status*	Enabled/disabled
IC	AGC Imrules*	Top/bottom
A	Primary management status	Enabled/disabled
A	Generator shutdown-combined alarm	On/off
S	Automatic switch	On, Off, Neutral, Faulty
S	Separator	On, Off, Neutral, Faulty
S	Grounding device	On, Off, Neutral, Faulty
SP	Fixed setting of active power	MW ("-" consumption, "+" delivery)
SP	Fixed voltage setting	kV
SP	Fixed setting of reactive power	MVAr ("-" consumption, "+" delivery)
SP	Fixed power factor setting	/
A	Indication of active power setpoint	Locally/remotely
A	Indication of the specified voltage setting	Locally/remotely
A	Indication of the set reactive power setting	Locally/remotely
A	Indication of the specified power factor setting	Locally/remotely
M	Feedback information to the target setting of active power	MW ("-" consumption, "+" delivery)
M	Feedback information to the specified voltage setting	kV
M	Feedback information to the reactive power target setting	MVAr ("-" consumption, "+" delivery)
M	Feedback information to the specified power factor setting	
M	Low water level	m
M	High water level	m
M	top (head)	m
M	Turbine consumption	m^3/s
M	General flow	m^3/s
M	Overflow through culverts	m^3/s

Type	Description of data	Unit/Status
M	Pay in full	m^3/s
**only for power plants participating in secondary adjustment*		
5 Power plant consumption		
M	Three-phase active power	MW ("-" consumption, "+" delivery)
M	Three-phase reactive power	MVAr ("-" consumption, "+" delivery)
S	Automatic switch	On, Off, Neutral, Faulty
S	Separator	On, Off, Neutral, Faulty
S	Grounding device	On, Off, Neutral, Faulty
6 Wind power plants		
M	Low voltage side-phase current*	A (I_0, I_4, I_8)
M	Low voltage side-active power*	MW ("-" consumption, "+" delivery)
M	Low voltage side-reactive power*	MVAr ("-" consumption, "+" delivery)
M	Low voltage side-system voltage*	kV (U_{04}, U_{48}, U_{08})
M	High voltage side-system voltage*	kV (U_{04}, U_{48}, U_{08})
M	The status of the plug-in connector	Position number
M	Static state of the voltage regulator	%
M	Maximum active power in secondary adjustment*	MW
M	Minimum active power in secondary adjustment*	MW
M	Maximum active power in tertiary adjustment*	MW
M	Minimum active power in tertiary adjustment*	MW
M	Actual active power fixed installation of the power plant	MW
A	AGC (Automatic Gain Control) Status **	Enabled/disabled
IC	AGC Imrules**	Top/bottom
A	Primary management status	Enabled/disabled
S	Automatic switch	On, off, neutral, fault
S	Separator	On, off, neutral, fault
S	Grounding device	On, off, neutral, fault
A	Shutdown by transformer protection-total signal	On/off
M	Three-phase active power from the generator	MW ("-" consumption, "+" delivery)
M	Three-phase reactive power from the generator	MVar ("-" consumption, "+" delivery)
M	Total active capacity of wind power plants	MW ("-" consumption, "+" delivery)
M	Total reactive power of wind power plants	MVar ("-" consumption, "+" delivery)
M	Power factor	-
M	Number of wind generators in operation	piece
M	Number of wind generators that failed due to low wind speed	piece
M	Number of wind generators that failed due to high wind speed	piece
M	Number of wind generators that are out of operation for other reasons (failure, maintenance, testing)	piece
M	Wind speed at the height of the center of the wind generator	m/s
M	Wind direction	°
M	Air temperature	° C
M	Air pressure	mbar
SP	Fixed installation of active power (total, cross-section of power plants)	MW ("-" consumption, "+" delivery)
SP	Fixed voltage setting	kV
SP	Fixed installation of reactive power (total, cross-section of power plants)	MVAr ("-" consumption, "+" delivery)
SP	Fixed power factor setting	

Type	Description of data	Unit/Status
M	Feedback information to the target setting of active power	MW ("-" consumption, "+" delivery)
M	Feedback information to the specified voltage setting	kV
M	Feedback information to the reactive power target setting	MVAr ("-" consumption, "+" delivery)
M	Feedback information to the specified power factor setting	
A	Indication of active power setpoint	Locally/remotely
A	Indication of the specified voltage setting	Locally/remotely
A	Indication of the set reactive power setting	Locally/remotely
A	Indication of the specified power factor setting	Locally/remotely
**Information on the low voltage side of the transformer, i.e. the connection with the distribution devices of wind farms*		
***Only for wind stations participating in the secondary adjustment.*		
7. Solar power stations		
M	Phase current on low voltage side*	A (I_0, I_4, I_8)
M	Three-phase active power on the low voltage side*	MW ("-" consumption, "+" delivery)
M	Three-phase reactive power on the low voltage side*	MVAr ("-" consumption, "+" delivery)
M	Low Voltage Side System Voltage*	kV (U_{04}, U_{48}, U_{08})
M	Socket Interchangeable Connector Status*	Position number
M	Static state of the voltage regulator	%
M	Basic active power of the generator	MW
M	Rate of change of secondary adjustment**	MW/min
M	Target active power**	MW
M	Maximum active power in secondary adjustment**	MW
M	Minimum active power in secondary adjustment**	MW
M	Maximum active power in tertiary adjustment	MW
M	Minimum active power in tertiary adjustment	MW
M	Actual active power fixed installation of the power plant	MW
A	AGC (Automatic Gain Control) Status **	Enabled/disabled
IC	AGC Imrules**	Top/bottom
A	Primary management status	Enabled/disabled
S	Automatic switch	On, off, neutral, fault
S	Separator	On, off, neutral, fault
S	Grounding device	On, off, neutral, fault
A	Shutdown by transformer protection-total signal	On/off
SP	Fixed installation of active power (total, cross-section of power plants)	MW ("-" consumption, "+" delivery)
SP	Fixed voltage setting	kV
SP	Fixed installation of reactive power (total, cross-section of power plants)	MVAr ("-" consumption, "+" delivery)
SP	Fixed power factor setting	
M	Feedback information to the target setting of active power	MW ("-" consumption, "+" delivery)
M	Feedback information to the specified voltage setting	kV
M	Feedback information to the reactive power target setting	MVAr ("-" consumption, "+" delivery)
M	Feedback information to the specified power factor setting	
A	Indication of active power setpoint	Locally/remotely
A	Indication of the specified voltage setting	Locally/remotely
A	Indication of the set reactive power setting	Locally/remotely

Type	Description of data	Unit/Status
A	Indication of the specified power factor setting	Locally/remotely
** Information on the connection of the low-voltage side of the transformer, that is, with the distribution devices of solar photovoltaic power plants*		
PV plants participating in secondary control .		
8. Objects of final consumers connected to the transmission system		
M	Phase current on the low voltage side	A (I_0, I_4, I_8)
M	Three-phase active power on the low voltage side	MW ("-" consumption, "+" delivery)
M	Three-phase reactive power on the low voltage side	MVAr ("-" consumption, "+" delivery)
M	System voltage on low voltage side	kV (U_{04}, U_{48}, U_{08})
M	The status of the plug-in connector	Position number
IM	Active Power*	MW *h
IM	Reactive Power*	MVAr*h
S	Automatic switch	On, Off, Neutral, Faulty
S	Separator	On, Off, Neutral, Faulty
S	Grounding device	On, Off, Neutral, Faulty
A	Shutdown by transformer protection-total signal	Enabled/disabled
Calculation at the point of connection to the electricity transmission system .		
9 Electric energy storage systems		
SP	Fixed setting of active power	MW ("-" consumption, "+" delivery)
SP	Fixed voltage setting	kV
SP	Fixed setting of reactive power	MVAr ("-" consumption, "+" delivery)
SP	Fixed power factor setting	
A	Indication of active power setpoint	Locally/remotely
A	Indication of the specified voltage setting	
A	Indication of the set reactive power setting	Locally/remotely
A	Indication of the specified power factor setting	Locally/remotely
M	Feedback information to the target setting of active power	MW ("-" consumption, "+" delivery)
M	Feedback information to the specified voltage setting	kV
M	Feedback information to the reactive power target setting	MVAr ("-" consumption, "+" delivery)
M	Feedback information to the specified power factor setting	
M	Basic active power of the generator	MW
M	The rate of change of the secondary adjustment	MW/min
M	Target active power	MW
M	Static state of the voltage regulator	%
M	Maximum active power in secondary adjustment	MW
M	Minimum active power in secondary adjustment	MW
M	Maximum active power in tertiary adjustment	MW
M	Minimum active power in tertiary adjustment	MW
A	AGC (Automatic Gain Control) Status *	Enabled/disabled
IC	AGC Imrules*	Top/bottom
A	Primary management status	Enabled/disabled
**only for electricity storage systems participating in secondary rectification*		

Note: The following conventions (abbreviations) are used in real-time data exchange:
M – measure;
S – status (status);
A – signal (warning);
C – instruction;
IM – impulse measurements;
SP – fixed installation;
IC – impulse instruction.

Appendix 12
Rules for the use of main power grids

The ability of generating modules to produce active power in different ranges of system frequency changes when connecting to buses with a voltage of 110 kV and lower

f / U	47.0 - 48.0 Hz	48.0 - 49.0 Hz	49.0 - 52.0 Hz
0.9 U_{name} - 1.15 U_{name}	P > 0.95 P_{nom}	P >0.975 P_{nom}	P = P_{nom}
0.85 U_{name} - 0.9 U_{name}	P> 0.875 P_{nom}	P> 0.875 P_{nom}	P> 0.875 P_{nom}

In this:

U - voltage at the connection point;;

f - frequency in the electric power system;

P_{name} - the nominal active power of the generating module;

U_{name} - the nominal voltage of the electrical network to which the object is connected;

220 and 500 kV busbars

f / U	47.0 - 48.0 Hz	48.0 - 49.0 Hz	49.0 - 52.0 Hz
0.95 U_{nom} -1.1 U_{nom}	P > 0.95 P_{nom}	P >0.975 P_{nom}	P = P_{nom}
0.90 U_{nom} -0.95 U_{nom}	P> 0.875 P_{nom}	P> 0.875 P_{nom}	P> 0.875 P_{nom}

In this:

U - voltage at the connection point;;

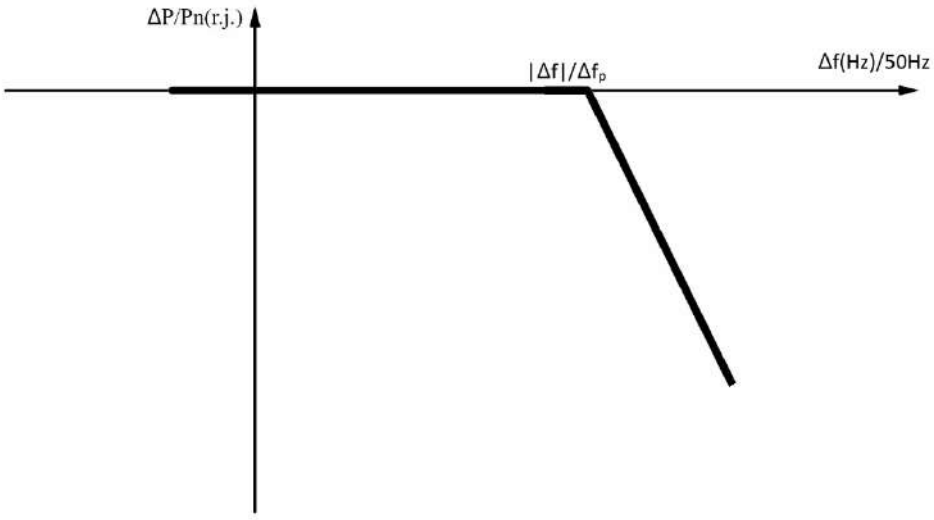
f - frequency in the electric power system;

P_{name} - nominal active power of the generating module;

U_{name} - the nominal voltage of the electrical network to which the object is connected;

Appendix 13
to the Rules for the use of main power grids

Reduction of active power in the case of excessive frequency increase in the electric power system



Note:

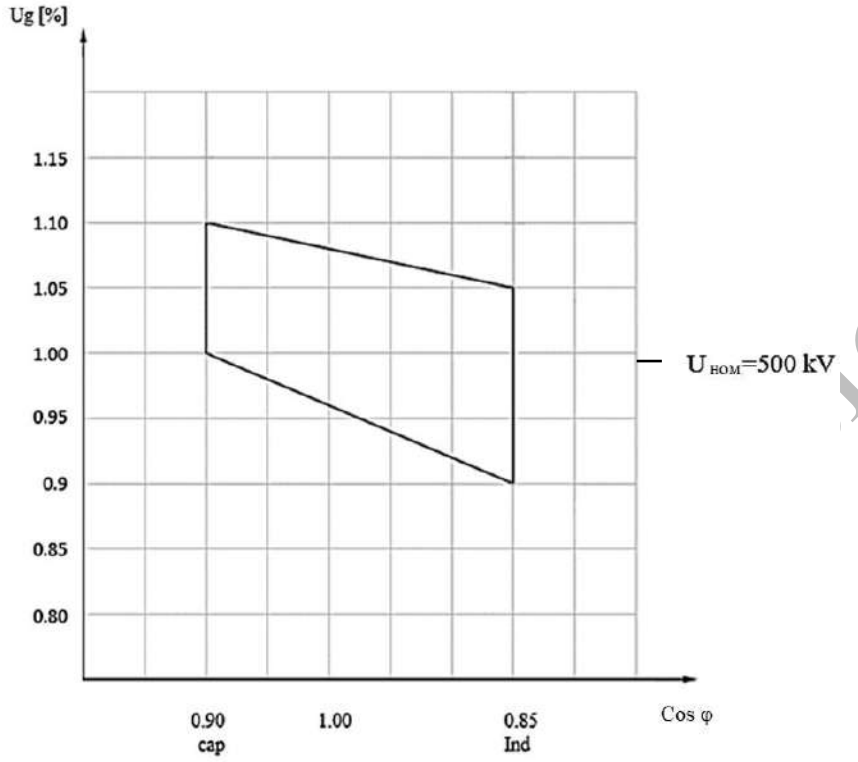
ΔP *– active power change;*

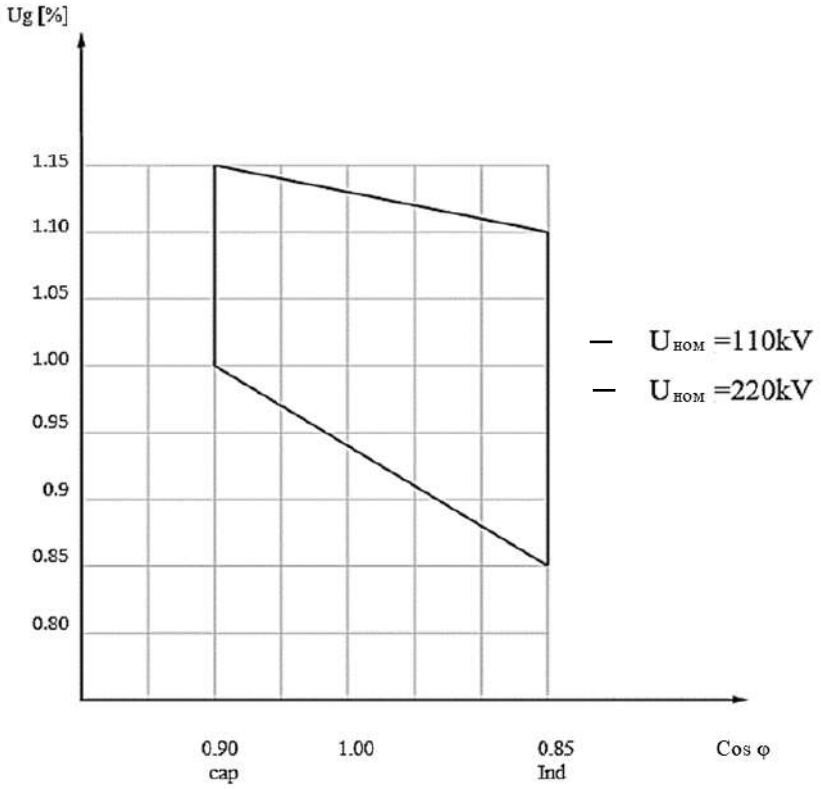
P_n *is the active power of the synchronous generating module or the current active power at the connection point for renewable energy sources ;*

Δf ***is*** *the frequency of the single electric power system* ***;***
$\Delta f / \Delta f_r$ *– frequency change.*

Appendix 14
to the Rules for the use of main power grids

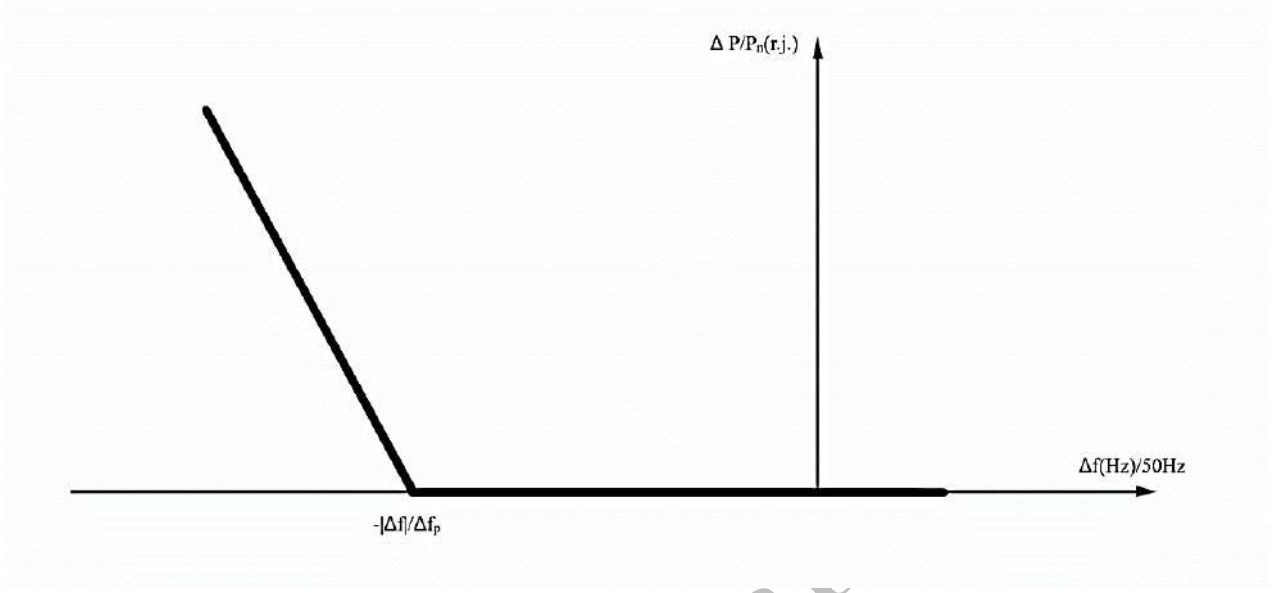
Voltage adjustment of generating modules i





Appendix 15
to the Rules for the use of main power grids

Increasing active power at low frequency



Note:

Δ ***P*** *– active power change;*

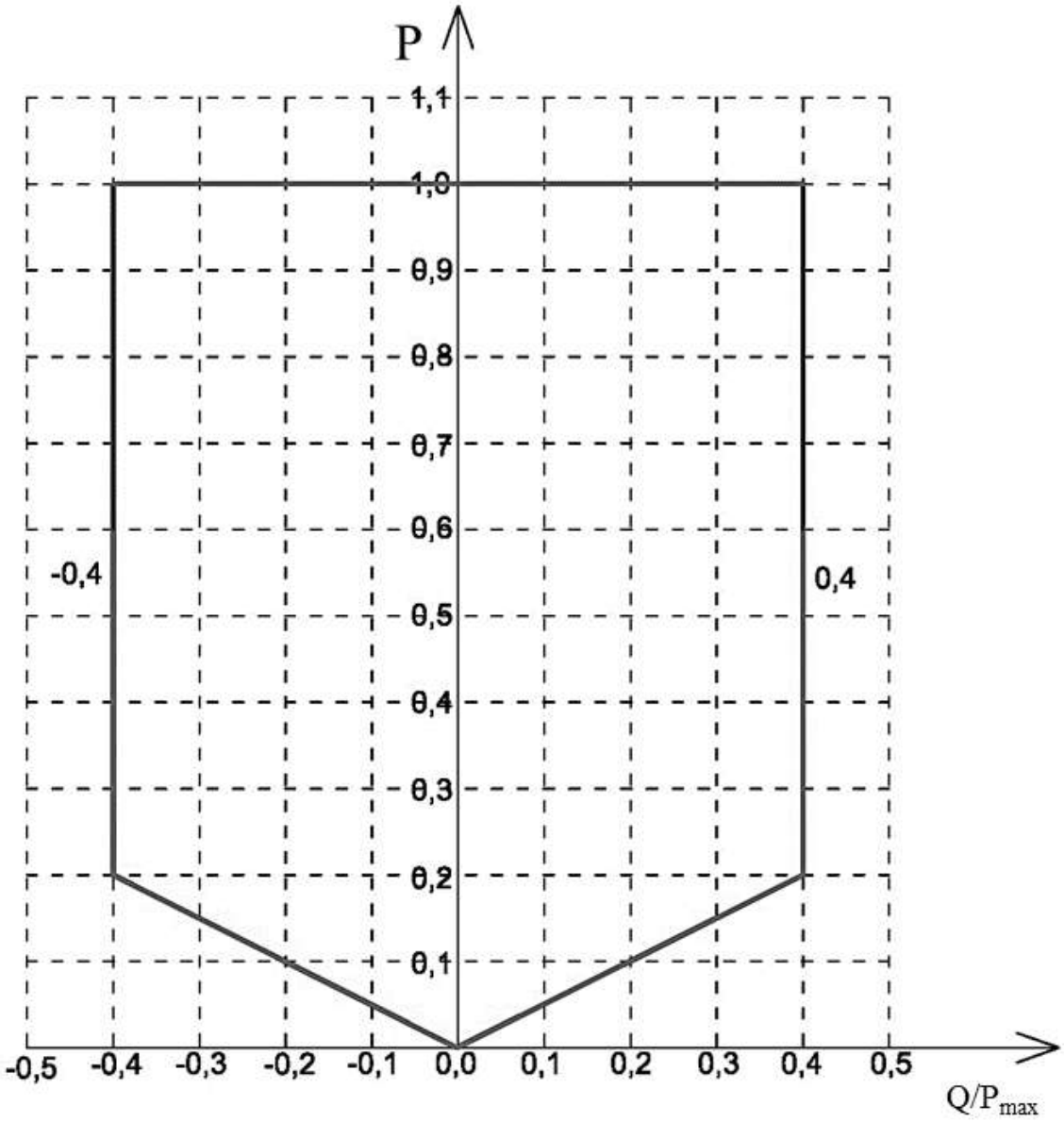
P ***n*** *is the active power of the synchronous generating module or the current active power at the connection point for renewable energy sources ;*

Δ ***f*** *is the frequency of the single electric power system* ***;***

Δ ***f*** */* Δ ***f*** ***r*** *– frequency change.*

Appendix 16
to the Rules for the use of main power grids

Q is the P - Q / P $_{max}$ characteristic of renewable energy sources



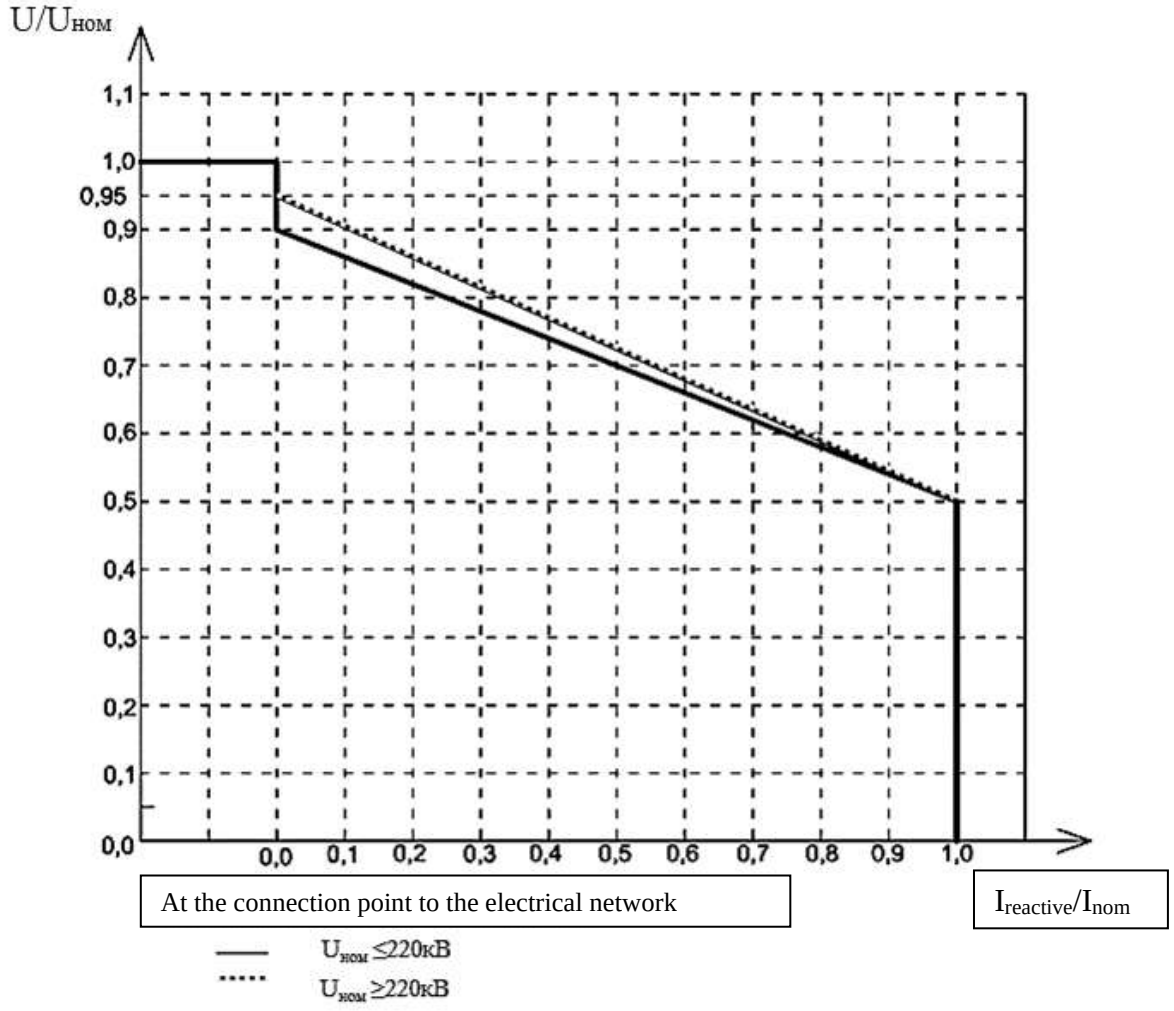
Note:

***P** - active power;*

***Q/P** $_{max}$ is the change in reactive power over active power.*

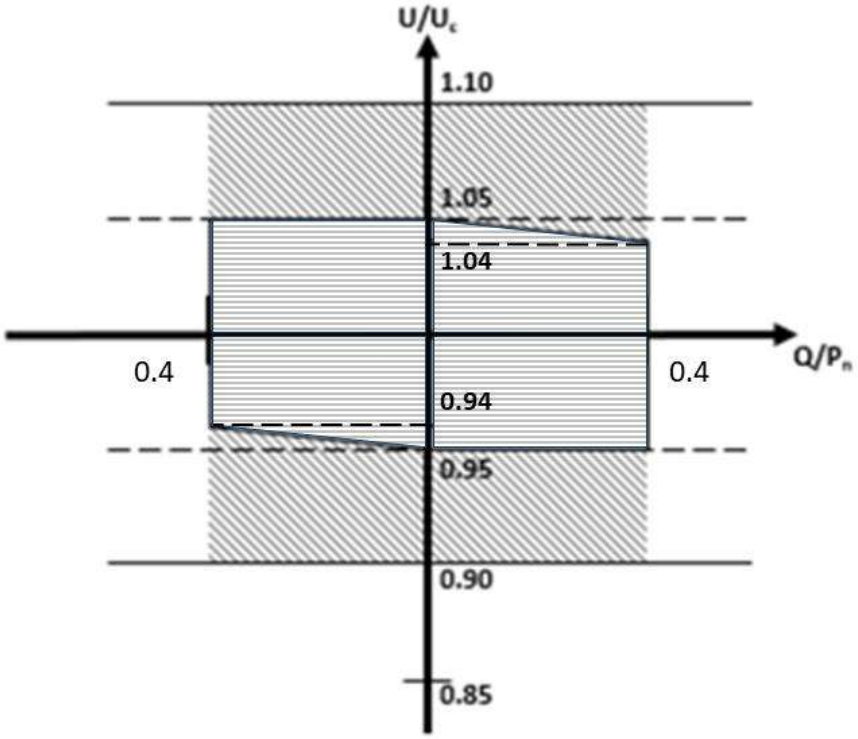
Appendix 17
to the Rules for the use of main power grids

The principle of adjusting the voltage in normal operation and maintaining the voltage when external influences occur



Appendix 18
to the Rules for the use of main power grids

Optimal operating mode for battery energy storage systems

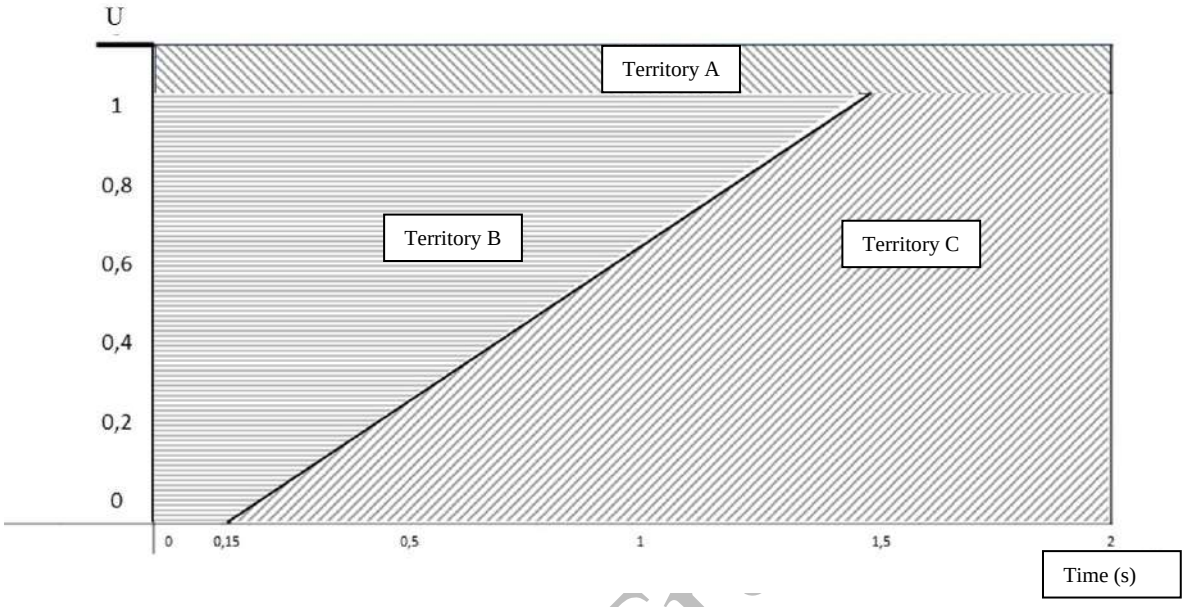


An operational area where technical constraints exist for reactive power.

An operational area where active power reduction is allowed to ensure the provision of reactive power.

Appendix 19
to the Rules for the use of main power grids

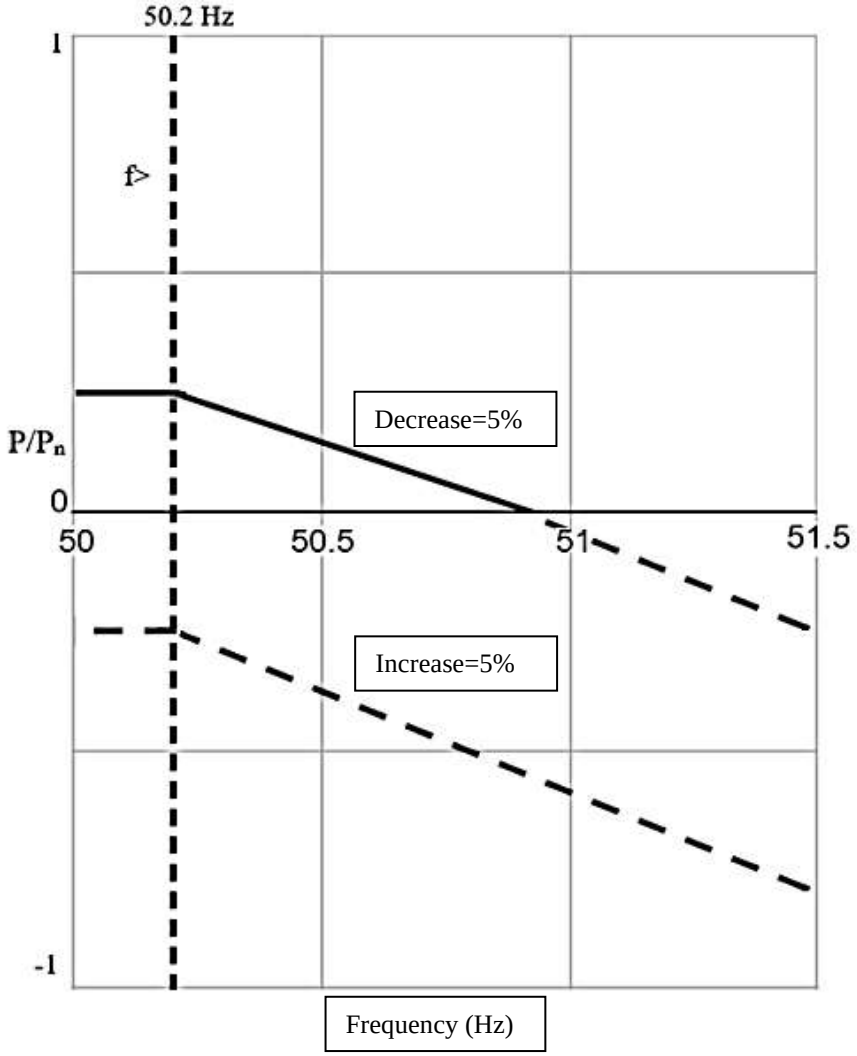
Mode of operation of battery energy storage systems connected to low-voltage networks



Note:
It is mandatory to stay connected to the network within the territory of V;
It is allowed to disconnect from the network at the borders of territory A and C.

Appendix 20
to the Rules for the use of main power grids

Requirements for battery energy storage systems according to LFSM-O



Note:

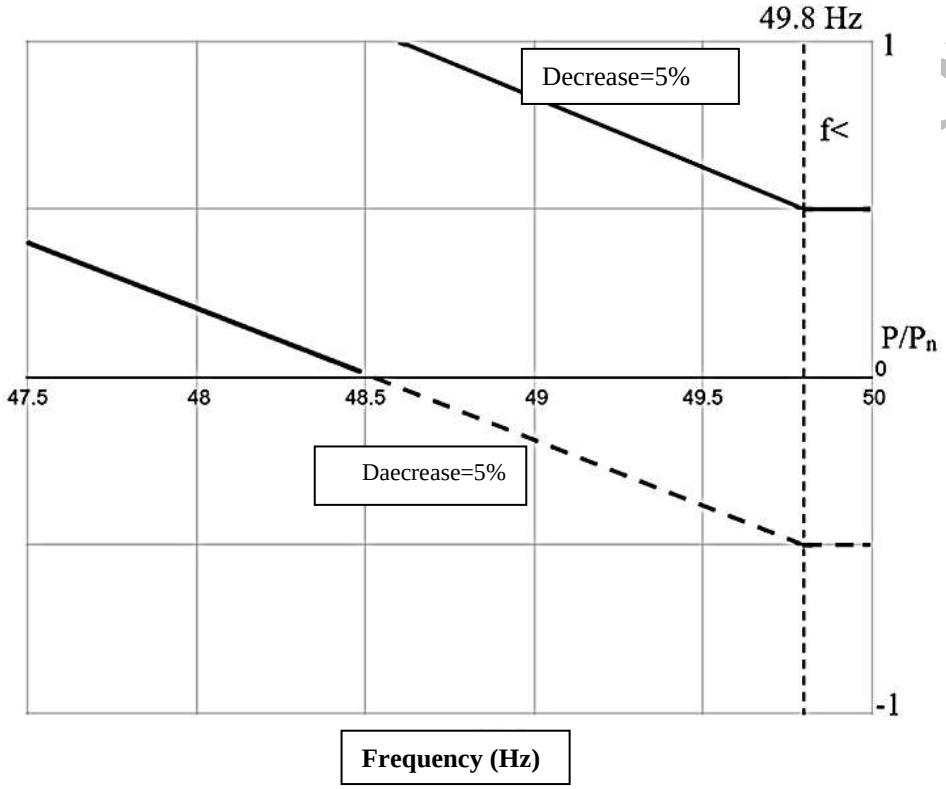
— *mode of production (discharge);*

- - - *consumption mode (charging);*

····· *high frequency*

Appendix 21
to the Rules for the use of main power grids

Requirements for battery energy storage systems according to LFSM-U.



Note:

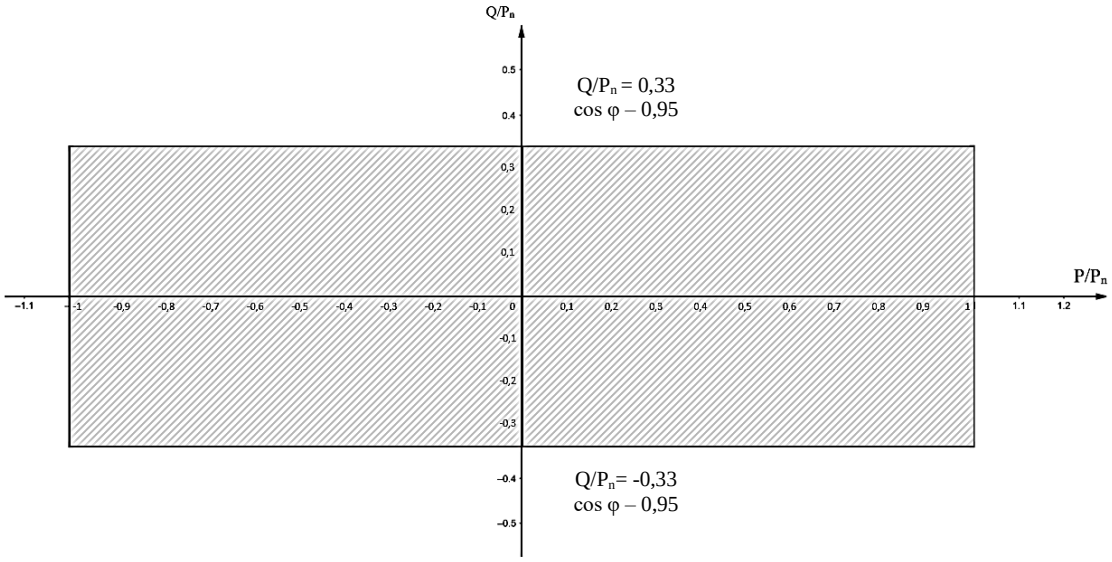
— *mode of production (discharge);*

- - - *consumption mode (charging);*

····· *high frequency*

Appendix 22
to the Rules for the use of main power grids

Reactive power requirements for battery energy storage systems



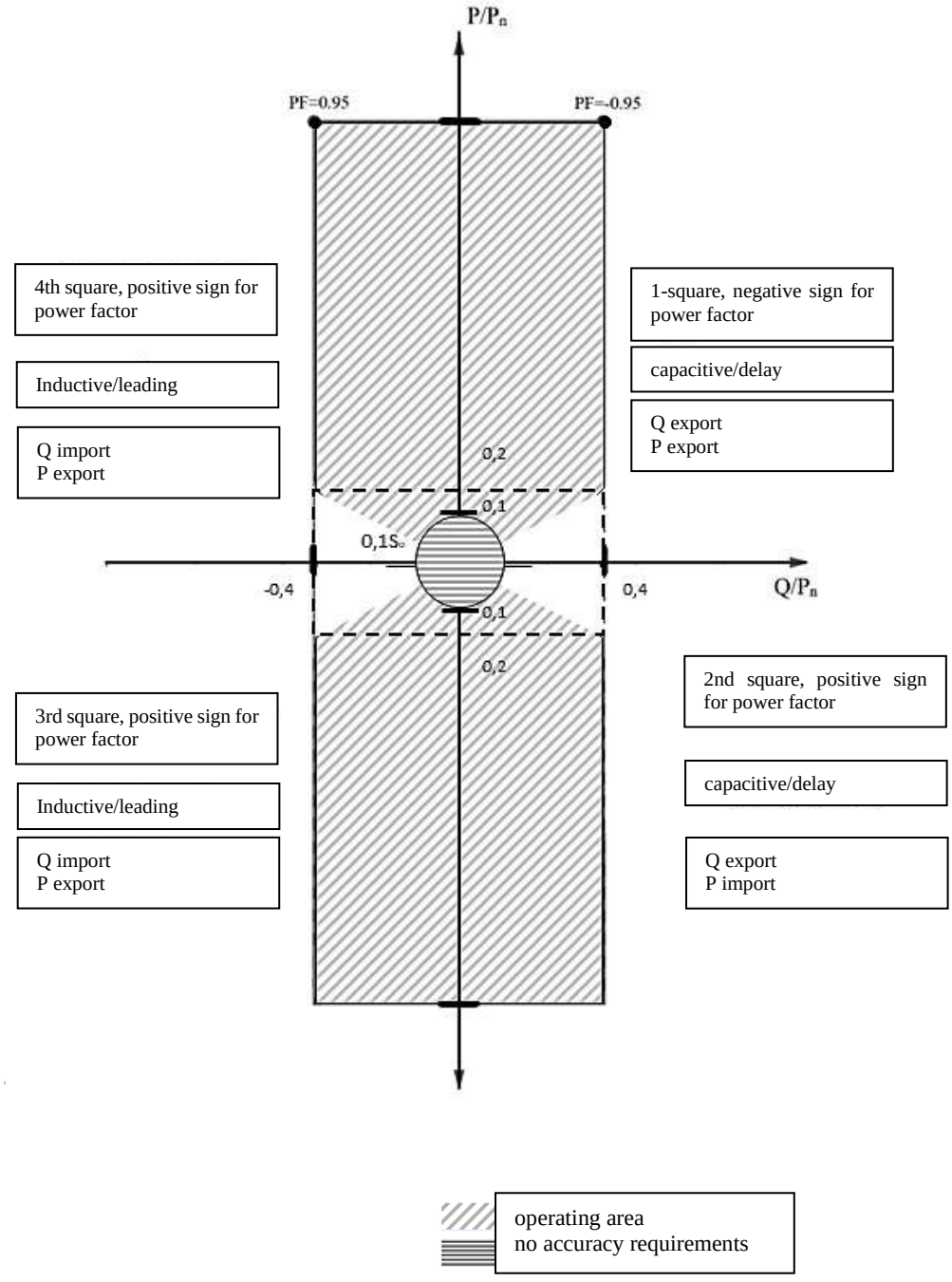
Note:

***R/R n** – active power change;*

***Q/P n** is the reactive power change corresponding to the active power change.*

Appendix 23
to the Rules for the use of main power grids

Reactive power in the maximum active power generation of the battery energy storage system



Appendix 24
to the Rules for the use of main electrical grids

METHODOLOGY
for calculating the necessary reserve capacity for balancing in the system

Chapter 1. Determining the required size of the secondary adjustment reserve

1. The total reserve for balancing load (active power) and frequency in the single electric power system consists of the secondary balancing reserve (automatic frequency balancing reserve - AFBR) and the tertiary balancing reserve (manual frequency balancing reserve - MFBR).

2. The total required reserve of secondary adjustment for the system for the next year is calculated separately for periods of maximum and non-minimum load in the cross-section of months.

3. The peak load period is set from 06:00 to 24:00 every day, regardless of whether it is a workday, weekend, or holiday, while the off-peak load period is defined from 00:00 to 06:00 every day, regardless of the day being a workday, weekend, or holiday.

4. When determining the necessary reserve of secondary adjustment for a single electric power system, it is necessary to take into account the current load adjustment requirements of the electric power system (integration of renewable energy sources, consumption, etc.) and the agreed measures of common or divided rectification reserves in the single power system of Central Asia.

5. The secondary adjustment reserve is calculated based on the following information:

Official information on hourly load (consumption) in the electricity system for the past 12 months, provided by the system operator;

coefficients of expected change of consumption determined on the basis of expected (forecast) change of consumption.

6. The reserve power for secondary adjustment is calculated separately for both peak and off-peak load periods throughout the day, on a monthly basis. The calculation of monthly reserves for the upcoming year is carried out at the beginning of June of the current year.

7. The necessary reserves of secondary adjustment are calculated based on the following algorithm:

a) official information on hourly loads in the electric power system is multiplied by the coefficient of change of the maximum load;

b) for all months of the next calendar year:

normalized maximum values of consumption for the maximum load period;

average values of consumption for the period of minimum load.

The monthly calculated values for the maximum and minimum load periods are used to calculate the required reserve of secondary adjustment through the following empirical formula

$$\boldsymbol{R = \sqrt{a * L_{max} + b^2} - b}\ [\text{ MW }]$$

Here the constant values are a=15 MW and b=150 MW.

Chapter 2. Determination of normalized maximum consumption for periods of maximum load

8. In peak periods, the normalized value of the maximum load is used to determine the necessary reserve power for secondary adjustment, which is calculated for each month according to the following algorithm:

a) hourly consumption values for the period of maximum load;

b) hourly consumption values are sorted in descending order;

v) when switching from the maximum hourly consumption to the minimum hourly consumption, the following procedure is performed:

(n + k) the difference (r) between the current value (n) and the intermediate value (k) is observed $r = L_n - L_{n+k}$;

If the difference "r" is less than or equal to the predetermined value, the current value of the load (n) is equal to the normalized maximum value and the operation is completed;

$$L_{max} = L_n .$$

if the observed difference "r" is greater than the predefined value, the calculations are repeated for the next value in the line.

9. Values of coefficients:

k = 5 – the indicator between the load values that make up the difference;

r_{max} = 10 MW is a predetermined value used to determine the normalized maximum value.

Chapter 3. Determination of the normalized maximum consumption during the minimum load period

10. The normalized value of the maximum load is used to determine the necessary reserve power for secondary adjustment in minimum periods, which is calculated in the cross-section of months according to the following algorithm:

hourly consumption values are obtained for the minimum load period of a given calendar month;

the average monthly cost of consumption for the minimum load period is calculated by summing up all values and dividing by the number of participating values.

$$L = \frac{1}{n} * \sum_{i=1}^{n} L_i$$

Here:

L – is the average monthly value for minimum load period;

L_i – individual hourly consumption value for the minimum load period;

n – is the number of hours in the minimum load period for a calendar month.

11. The backup values of the secondary adjustment presented above are calculated only on the basis of changes in the consumption (load) in the power system, and this is a deterministic approach.

12. At a certain level of integration of electricity production from renewable energy sources in the electric power system, for example, when the share of electricity production from renewable energy sources in the total generation is higher than 3 percent, the indicators should be adjusted taking into account the possible change of electricity production from renewable energy sources.

Chapter 4. Determining the required size of the tertiary adjustment reserve

13. The required size of the tertiary adjustment reserve in the single electric power system is determined taking into account the maximum output power of the generating modules present in the system. That is, it is determined taking into account the maximum consumption demand connected to one bus and regional agreements on the joint use and exchange of tertiary reserve with the operators of other systems.

14. While the secondary adjustment is symmetrically defined by the adjustment range ±, the tertiary adjustment is defined separately for upper and lower adjustment.

15. To determine the necessary reserves of tertiary adjustment, the following initial data are used:

previous years' data on electricity supply (output power) at the connection point of large-capacity generating modules;

data from previous years on tires with high loads at large consumers and substations;

information on the agreed general tertiary adjustment reserves in the synchronous zone.

16. In order to cover the disconnection of the largest power generation module from the grid, the incremental reserve of tertiary adjustment of the power system is calculated monthly, taking into account the maintenance program of the generation modules.

17. As a rule, the reserve of tertiary adjustment should be at least equal to the loss (failure) of the largest generating module in the system.

18. The step-down tertiary adjustment reserve must be at least equal to the largest power consumer load or the sum of the largest consumer loads connected to one bus (the largest loss that can occur due to a single fault in the transmission system).

19. These values may be modified in accordance with agreements on common tertiary reserve (if they are envisaged) to cover the disconnection of the main generating modules in the Central Asian integrated energy system.