TRANSMISION SYSTEM CODE

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DECEMBER 2004

TRANSMISION SYSTEM CODE

INTRODUCTION

Electricity Generation, Transmission, Distribution and Supply activities are the main functions of the Albanian Electric Power System. Electricity is a key element for activities in sectors such as industry, trade, transport, and agriculture. The Transmission System performs electricity Transmission in Albania from Generating Units to other Users of the Transmission System.

In the framework of the new organization based on Law No. 9072, date 22/058/2003 "On the Power Sector", the Transmission System Operator (OST sh.a.) manages the Electricity Transmission System. Assets managed by OST sh.a are:

1. All 400, 220 and 110 kV lines (up to the entry portals of each 110/MV substation and 110 kV substations directly connected to the Transmission System.)
2. 400/220/110 kV, 400/220 kV, 400/110 kV, 220/110/MV kV substations and 220/MV kV substations.
3. 220 kV substations of V. Dejes, Koman and Fierza hydro power plants (from the entry portals of block transformer connection) as well as the 110 kV/150 kV tract including exits and transformer in Bistrica 1 HPP.

A Transmission System Operator licensed to perform transmission activities manages the Electricity Transmission System.
The Transmission System Operator is responsible for the development and expansion of the Transmission System as well as the management of electricity transits among foreign systems using the Albanian electricity network.
The Transmission System Operator provides:

- Integrated operation and reliable functioning of the Electric Power System;
- Transmission System environment and equipment maintenance according to technical safety and functioning requirements;
- Development of the Transmission System according to long-term forecasts and power sector development plans;
- Maintenance and development of transmission auxiliary assets;
- Supply of Customers directly connected to the transmission system;
- Generators and Suppliers access.

A Transmission System Code was prepared and approved by ERE to regulate the Transmission System functioning based on Law No. 9072, date 22/05/2003 "On the Power Sector".
The Transmission System Code regulates:

1. Terms and respective documentation to apply for the right to connect to the Transmission System;

2. Minimal technical and functioning specifications to provide access and connection to the Transmission System of generating installations, Distribution Companies, Eligible Customers as well as interconnection with other networks;
3. Deadline of Transmission System Operator reply to the applicant;
4. Criteria applied by the Transmission System Operator for the management from the Dispatch Center to the available generating installations and use of interconnections;
5. Way, extension, terms and conditions under which the Transmission System Operator, when dispatching generating installations, gives priority to those using electricity renewable resources;
6. Any other necessary details to regulate the functioning of the Transmission System.

In order to fulfill all the established legal obligations, the Transmission System Code is composed by four parts.

1. **General Code,** specifies general technical and procedural issues.

2. **Planning Code,** specifies the criteria and procedures applied by OST sh.a. to design and develop the Transmission System.

3. **Operating and Dispatching Code,** specifies the OST sh.a. operating terms in the Transmission System and SEE in general, for the programming and informing of the Users structure as well as procedures to coordinate the programmed interruption of special units of generating plants, Transmission System, Distribution and Eligible Customers elements.

4. **Interconnection Code,** specifies the Users terms, criteria and time schedules to connect to the Transmission System or modify the existing connection.

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PART 1

GENERAL CODE

1.1 General Issues

1.2 Scope

The Transmission System Code: is a document that defines the boundaries between OST sh.a. and Users and establishes procedures for the operation and development of the Transmission System according to the development of the Albanian and Regional Electricity Market. It contains the required information and managing procedures of relations between OST sh.a. and Transmission System Users.

1.3 Object

The Transmission System Code shall be prepared in order to:

a. allow the economic, efficient and coordinated development, operation and maintenance of the Transmission System according to the Albanian and Regional Electricity Market.
b. allow OST sh.a. to comply with its obligations regarding electricity transmission with neighbor countries.
c. allow OST sh.a. to distribute copies of the code any time it is required with a price not exceeding the reproduction cost.
d. eliminate discrimination in the preparation and application process of the Transmission System maintenance program based on OST sh.a., User or Group of Users preferences.

1.4 Definition of Terms

The following words and phrases used in the Transmission System Code shall have the meaning:

TERMS	DEFINITION
Active Electric Power (W)	Product of voltage, current, and cosine of the angle between them. $P = (U \times I) \cos\varphi$ Metered with Wat (W) unit or standard multiplications: 1000 W = 1kW 1000 KW = 1 MW 1000 MW = 1 GW 1000 GW = 1 TW = 10^{12}W
Active Electrical Energy (Wh)	Electrical energy is the active power generated or passing in an electric circuit during an interval period of time, the established active power integral having time limits. Metered with Wat-Hour unit or standard multiplications: 1000 Wh = 1KWh 1000 KWh = 1 MWh 1000 MWh = 1 GWh

	1000 GWh = 1 TWh = 10^{12}Wh
Reactive Electric Power (VAr)	Product of voltage, current, and sinus of the angle between them. Q = (U x I) x sinφ, metered with volt-reactive ampere (VAr) unit and standard multiplications: 1000 VAr = 1kVAr 1000 KVAr = 1 MVAr 1000 MVAr = 1 GVAr 1000 GVAr = 1 TVAr = 10^{12}VAr
Reactive Electrical Energy (Varh)	Reactive Electrical Energy is the limited integral with time limits of reactive power metered with volt-ampere reactive-hour unit or standard multiplications: 1000 VArh = 1kVArh 1000 KVArh = 1 MVArh 1000 MVArh = 1 GVArh 1000 GVArh = 1 TVArh = 10^{12}VArh
Absolute Electric Power (VA)	Absolute Electric Power is S=P+j Q. Its module is calculated with the formula S = $\sqrt{P^2 + Q^2}$ Expressed in (Volt-Ampere) (VA) unit or standard multiplications: 1000 VA = 1kVA 1000 KVA = 1 MVA 1000 MVAr = 1 GVA 1000 GVA = 1 TVA = 10^{12}VA
Transmission System Code	The Transmission System Code is a document that defines the boundaries and relations between OST sh.a. and Users and established procedures for the operation and development of the Transmission System according to the development of the Albanian and Regional Electricity Market. It contains the required information and managing procedures of relations between OST sh.a. and Transmission System Users.
ERE	Electricity Regulatory Entity
OST sh.a.	Transmission System Operator
Appendix	Appendix of the Transmission System Code
Electric Power System	An interconnected system composed of Electricity Generating Plants, lines, substations and other elements for the Transmission and Distribution of Electricity
Transmission System	The Electricity Transmission System is composed of high voltage electric lines (110 kV, 150 kV, 220 kV, 400 kV), electric transforming stations or any other installation, which function includes transmission or international connection. Assets that include the communication, protection, control, auxiliary services, land and buildings as well as other electric or non-electric auxiliary assets, needed for the appropriate functioning of separate installations of the Transmission System, are compounding elements of the

	Transmission System.
Transmission System User (User)	Physical and legal persons performing licensed activities in the Electric Power System such as Generators, Distributors (Distribution Companies), Eligible Customers, Suppliers, and any legal person benefiting the Transmission Services.
Eligible Customer	An electricity customer that has the right to select the Supplier for the Electricity used for its own needs according to the legislation and ERE applicable regulations.
Electricity Market	Wholesale or retail commercial agreement to sale and purchase electricity in the Electric Power System in order to provide a reliable supply for the customers within the territory of the Republic of Albania.
Ancillary Services	Required services to maintain established security and quality standards of electricity. Ancillary Services include: - Compensation of reactive power from the Users to maintain standard levels of voltage and reduce network losses. - Regulation of active power frequency and related reserves - Compensation for engagements and allocation of capacities in the interconnection lines.
Ancillary Service Tariffs	A list of tariffs prepared by the Licensee and approved by ERE to provide Ancillary Services
Transmission Services	Services that enable the Electricity Transmission between two or more points of the Transmission Network according to quality parameters
Transmission Tariffs	Tariffs approved by ERE, that the Licensee is obliged to apply for Transmission Services in the Transmission System
Primary control reserve	Frequency primary control reserve is a reserve that may be automatically used for 30 sec and continue operation for at least 15 min in case of frequency deviation from the limit (allowed) value. Automatic Speed Regulators (RASH) continuously in service performs this.
Secondary control reserve	Frequency/active power secondary control reserve is a reserve that may automatically operate for an interval no longer than 15 min in case of frequency/power exchange balance deviation from allowed and programmed value. Frequency/active power secondary control reserve overlies on the primary control reserve.
Tertiary control reserve	Tertiary control reserve overlies on the primary, secondary and control reserves, and spinning reserve to establish balance in case of deviations from the program.
Spinning reserve	Spinning reserve overlies on the primary and secondary control reserve and balance establishing in case of deviations from the program.
Access to the network	Users right to have the possibility of connection to the

	Transmission System and use Transmission Network services according to the legislation in force.
Transmission Network Access Agreements	A document signed between OST sh.a. and applicants for access to the network according to respective licenses. Under common responsibility they assume data and information confidentiality.
Electricity Auto-Producer Plants	A defined subject that in addition to its basic economic activity generates electricity, partially or totally for its own needs. Generators outside the Electric Power System having additional Electricity have the right to sell it to the Transmission or Distribution Network, based on contracts with defined terms.
Authority responsible for license issuing	Electricity Regulatory Entity (ERE)
Events (event conditions)	Operating conditions for a specific electric installation with one or more defects causing the impairment of operation or even supply interruption.
Events – Electric Power System Disordering	Status of operation after the loss of a number of Transmission Network or Users system/objects element influencing the Electric Power System deviation of parameters from allowed values, or causing large oscillations of these values, that might damage the Users and neighbors synchronized to our Electric Power System.
Important Events in the Electric Power System	A serious damage of the Electric Power System that causes the interruption of electricity supply to a specific area or to the whole Electric Power System.
Technical Permission for Connection	Document issued by the Transmission System Operator followed by an analysis of the applicant submitting the request for connection to the Transmission System. Specifications include terms and standards for connection to the Transmission System.
Electric Plant	A set of buildings and facilities meant for electricity generation.
Applications for connection to the Transmission System	Documents filled by potential Users that require access for connection to the Transmission System, or by existing User to modify the existing connection. In order to receive the Transmission System Operator approval for connection, documents are prepared according to the Code provisions.
Code, Transmission Code, Transmission Grid Code	Synonyms of Electricity Transmission System Code.
Co-generation	Plant generating concurrently electricity and thermal power
Dispatching	Electric Power System Operation taking in consideration programming and maintaining of operative safety and quality standards according to technical conditions

Electricity Customer	A physical or legal person purchasing Electricity for its own needs or for different processes of its activity
Operative Order	Obligatory order for the receiving unit issued by the Dispatch Center. Orders are transmitted by phone, phonograms and fax or after the installation of SCADA system through digital messages.
Operative Action	Action from the unit receiving the Operative Order issued by the Dispatch Center as well as programmed actions from the Parties affecting the Electric Power System functioning.
Interruptions due to Breakdown in the Electric Power System	Interruption of electricity supply due to breakdown of Electric Power System elements (such as lines, substation transformer, generating unit, etc).
(n-1) Criteria	Criteria used to verify, plan and design the Electric Power System, fulfilled if the following conditions are met: - there is no interruption of electricity supply when this condition is fulfilled - the system remains unique and shifts to a stable regimen with normal parameters, (n-1) criteria is fulfilled when the total generated electricity in a specific area is transmitted even if one element is not working and customers are fed by other elements (other elements transmit the power produced by generators to the customers).
J	Economic J
Load Curve	Load progress during each hour (00 –24 hours) for one day, or another period for a specified element
Island of Electric Power System	The island represent a part or parts of the Electric Power System electrically separated from the main part of the Electric Power System.
Electricity Distributor	Any person or legal subject holding the Distribution license according to the legislation, with a voltage level lower than 110 kV.
Distribution System	Electricity Distribution Networks in average and low voltages (under 110 kV), [35 kV, 20 kV, 6 kV and 0.4 kV including 110/MV transformers]
Energetizing to restart and operate the Electric Power System	Procedures to put under voltage (with load) the electric lines that just starting to work or starting after their possible repair, and supply with electricity to generation units that start-up by receiving Electricity from the local Transmission System or neighbor countries systems.
Parallel operation	Parallel operation occurs when a number of Generating units are working and connected through electric networks, with all Electric Power System operating elements having the same frequency and the same phase of synchronous rotation.
Supplier	A person licensed to supply Electricity to the customers

	according to the legislation in force.
Dispatchable Generating Units	Electricity Generating Units that may be scheduled in the wholesale electricity market, which may be: - Electricity hydro generating units (HPPs) directly connected to the Transmission System, - Electricity thermal generating units (TPPs) directly connected to the Transmission System, - Independent electricity hydro generating units (HPPs) directly connected to the Transmission System, - Electricity Generating Units generating electricity for their own needs and directly connected to the Transmission System that might import/export the electricity from/to the network.
Transmission System Service Indicator	A parameter of the Transmission System Service that assess the Average Time of Supply Interruption, which means the average period of supply interruption from the Transmission System.
Interconnection	Networks connecting two or more Transmission Systems synchronized or not with each other.
License	Technical and legal document issued by ERE to give permission to an Albanian or foreign person or legal subject: - for commercial use of facilities authorized for Generation, Transmission, Distribution Dispatching and metering of electricity - for electricity supply (trade)
Static Stability of the Element	Calculated maximal active power transferred to a specified element of the Electric Power System to which static stability is provided.
Maintenance	Coordination of all technical and organziative actions performed for the Electric Power System elements during the maintenance period in order to recover their performing capacities for designed functions.
Norms	Standards, codes, rules, instructions, decisions and other normative documents established by laws, by-legal acts, official documents and contracts.
Objects of Electric Power Sector	A set of facilities, buildings and different equipment designed to Generate, Transmit and Distribute Electricity.
Merit Order	List of generating units dispatched according to rules and specified time (all kind of electric plants: TPPs, HPPs, etc) in merit order (the plants with minimal cost are placed at the base of the load graphic while high cost plants cover the peak load), an order defined based on offered prices in cooperation with all Generators according to their capacity.
Normal Parameters for the Electric Power	Established parameters according to normal operation standards of the Electric Power System dictated by: a. Technical parameters of quality to perform Electricity

System Operation	Transmission, b. Quality service standards of electricity supply c. Quality standards of electricity distribution d. Quality standards of electricity generation
Indicator of Electric Power System Security	The capacity of Electric Power System to provide electricity supply to customers according to defined terms and standards
Incidents (Breakdowns)	The incident (breakdown) is a phenomenon that occurs due to internal and external reasons and causes the breakdown of electricity parameters or the interruption for a specified period of time of one or more elements that on the other side lead to electricity supply interruption.
Major Incidents (Breakdowns)	Short connections and line interruptions that separate considerable part of the Electric Power System from the main one and force the Electric Power System to have large deviation from established standard parameters.
Wholesale Electricity Market	Market where Electricity is sold with the scope to be resold to retail customers and end users
Power Technical Losses	Technical losses of a network element that are equal to the difference between Electricity injected in the element and Electricity exiting from the element
Total black-out of the Electric Power System	A phenomena caused by internal or external reasons that brings the interruption for a specified period of time of one or more elements causing the interruption of electricity supply in the whole Electric Power System
Partial black-out of the Electric Power System	Phenomena where a part or parts of the Electric Power System are electrically separated causing the interruption of Electricity supply for customers of this area.
Plan to protect the Electric Power System against Major Incidents (Breakdown)	A number of foreseen activities through which OST sh.a. in cooperation with Users plans, for different time periods (annually, quarterly, monthly), for the normal operation of the Electric Power System in order to avoid breakdowns, achieve generation-load balance and meantime supervise the Electric Power System parameter quality according to established standards.
Plan of Electric Power System Start-up after long time without voltage	Technical and organizative measures to avoid further expansion of the Electric Power System breakdown by limiting this way the consequences and reestablishing Electric Power System normal working conditions. Start-up procedures after the breakdown of one part or of the whole system.
Probability of non covering the load	Probability of non covering electricity peak load in the Electric Power System, meaning lack of functioning of the generation-load balance
Electricity Generators	Legal person, holding a license for electricity generation
Privileged Generators of Electricity	Generator of one or more generating systems employing special technologies for Electricity Generation qualified as privileged according to the legislation in force.

Independent Power Producers	Electricity Generators separated by the Electric Power System that produces Electricity for their own use, for selling to particular customers, or for selling to the Electric Power System.
Operation Planning (Regime)	Activities of the Transmission System Operator to schedule for a certain time period the normal operation of the Electric Power System, balance the generation and load while maintaining technical parameters in good quality
Electricity Metering Points	Points of connection of metering equipment which meter Electricity in that element
Connection Points	Physical connection point of a User to the Transmission System
Power Scheduling	Active power programmed for generation in order to meet the forecasted demand
Maximal Power	Potential maximum of power that a Power Plant can provide in special mechanical and electrical conditions
Installed capacity	Nominal capacity of the active an Electricity Plant can provide based on generator documentations (certificate of generator) written in the respective label.
Transmission System Overload	A situation occurring during the operation when the current flow between two nodes or zones of the Transmission System is above dynamic and static stability norms and standards of the Transmission System
Electricity Network	Set of lines, substations and interconnection lines that compose the Electricity Network
Import-Export	Wheeling of Power from plants or electric facilities of a country to electric plants or facilities of another country.
Power Transmission Network	Power Transmission Network in the 110 kV, 220 kV, 400 kV levels that enables the Transmission of bulk power over long distances
Static Stability Reserve in an element	Difference between the static stability limit of the element and the actual load of this element
SCADA	Supervisory Control and Data Acquisition
Normal Operation Scheme	Normal scheme of connection of the elements to each node that form the Electric Power System. The Dispatch Center modifies the normal operation scheme depending on circumstances.
Planned Operation Scheme	Electric scheme created by the connection of different elements of the Electric Power System from the Dispatch Center taking in consideration the actual situation, the forecast to absorb Electricity, and Electric Power System capabilities.
Short Circuit	The short circuit occur due to different damages that connect the elements between two points with different potentials
Power Sector	The unity of planning, development, construction, use, and maintenance activity to install Generation,

	Transmission, Distribution plants, systems/objects of Eligible Customers, Electricity Suppliers and Interconnection Lines for import-export and exchanges with neighbor countries
Electric Power System Section	Total number of lines and other ancillary equipment in a specified area of the Electric Power System
Electric Power System Services	Services performed by OST sh.a. and Users in order to maintain the safety level during the operation of the Electric Power System and the quality of the Generated, Transmitted, Distributed and Supplied Electricity. Established parameters in this case are based in respective regulations.
OST sh.a. Services to Electricity Market Participants	OST sh.a. obligations to provide access and non-discriminatory use of the Transmission System to the Parties that participate in the Electricity Market
Dispute Procedures	Procedure described in details by the Code to solve disputes between OST sh.a. and Customers
Parties	OST sh.a. and Users
Transmission System in interconnection with neighbor countries Transmission Systems	The Transmission System works connected in parallel through interconnection lines with neighbor countries Transmission Systems
Applicants	Legal person, actual or future User of the Transmission System applying for permission to connect to or modify the existing connection to the Transmission System.
Static Stability (against small incidents)	Capacity of the Electric Power System to maintain normal working condition when deviation from the regime is very small and within norms. Capacity of the Electric Power System to return quickly to working conditions in normal regime after one or more deviations have forced it out of defined standard parameters.
Critical Operation Regime	Regime in which the elements of the Electric Power System or the whole Electric Power System operate with different parameters from those defined by standards
Normal Operation Regime	Operation regime that fulfills the following condition: - normal operating parameters comply with effective standards and norms
Safe Operation Situation	Operating situation that fulfills (n-1) criteria and static and dynamic stability criteria
Transformation Station (Substation)	Electric facilities, which function is to transfer Electricity from one network to another with different voltage levels.
Average Time of Electricity Supply Interruption	Indicator of the system performance calculated by the following formula: MTI = 8760.EN ---------- [min/year] EC Where:

	EN – lack of Electricity supply due to supply interruption from the Transmission Network [MW/year] EC – net consumption in the Electric Power System (consumption for its own needs not included) [MWh/year]
Peak consumption (MW)	Maximum of load value in MW registered within a specified period of time
Contracted capacity	Related to a generation unit, such as the active electric power injected by a Generating unit to the Transmission System in the interconnection point, excluding the power consumed by the Generating unit for its own needs. In relation to other Users is the active electric power injected by the Transmission System to its systems/objects in the connection point.
De-synchronization	Act of separation of a Generating unit from the Transmission System where it was synchronized
Disconnection	Physical act of separation of Users system/objects from the Transmission System.
Earthing	A way to provide connection between the element and the ground (soil) with earthing equipment.
Earthing equipment	An equipment to provide the connection between the element and the ground, which power and capacity should be conform to standards.
Distribution System	The Distribution System include all elements in the ≤ 110 kV voltage level owned by the Distribution Company
Financial Year	Period starting from January 1 to December 31 of each year.
Frequency	Number of alternative cycles of current per second with which the Electric Power System functions (metered in Hz)
Generating Unit	Any facility generating Electricity
Order for Synchronization	An Order from the Dispatch Center issued to the Generators to synchronize the generating units with the Transmission System.
Outage	- Regarding the generating unit: partial or total outage of generating capability of a unit due to maintenance or breakdowns - Regarding the Transmission System: Outage due to damages or maintenance of a part of the Transmission System - Regarding other Users: Outage of Electricity supply due to damages, partial or total maintenance of the User system/object or due to load shredding schedules
Outage notice	Notice issued by a Customer based on respective provisions of the Code, announcing OST sh.a. for an unplanned outage or a notice issued by OST sh.a. to the Users announcing an unplanned outage of the Transmission System that affects Electricity supply to Users.
Outage Schedule	The interruption schedule is prepared by OST sh.a. with

	Users advice, based on the Grid Code.
Ownership diagram	A diagram containing the number and titles (tags) of connections prepared for every location showing the ownership of each Party element.
Planned Outage	An Outage planned and agreed between OST sh.a. and the Users. Planned outages also mean a separation of part of the Transmission System that may affect the electricity supply of Users.
Power Factor	Ratio of active electric power (W) with absolute electric power (VA) ($\cos\varphi$). The allowed minimal value of $\cos\varphi$ is 0.9 **($\cos\varphi$ - 0.9)**
Protection	Measures to prevent abnormal conditions of the Electric Power System, evidence the breakdowns and activate alarms and signals until the defected element is separated.
Shut Down	Condition of a switched off element (out of work)
Normal Diagram of Location	Prepared schemes for each point of Connection that includes design schemes, electric, protection and control schemes to the connection point.
Starting Date of Outage	Date when planned outage starts
Starting Hour of Outage	Hour when planned outage starts
Static compensator	An electric equipment designed to generate or absorb Reactive Electric Power
Statute Demand for Frequency Control	According to Albanian rules and standards of electricity, the Frequency of alternative electric current supply should not change more than allowed values from the frequency nominal value that is **50Hz**.
Electric Power System Tests	Test performed by OST sh.a. or Customers that includes simulation terms or control of rules and standard implementation.
Frequency Relay	A relay that is activated when frequency value deviates from the relay setting .
Warning notice	Notice issued to the Users by the Dispatch Center warning the User on the failure to comply with mandatory orders of the Dispatch Center.
Test Program	Program prepared by OST sh.a. for the administration of the tests that includes: a. Adapted procedures to perform tests that include the switch off time and proposed minutes for this period; b. Way to conduct the test; c. List of staff members involved in the Electric Power System test including those that shall be responsible for the safety in connection points/ Power Plants location; and d. Other issues that OST sh.a. considers of primary importance including those suggested by the Users and accepted by OST sh.a.

Start-up Capability	Is the possibility of a generating unit to restart work from a shutdown condition without assistance of the Electric Power System.
Load	Load means an equipment or customer receiving electric power from the Electric Power System. Load should not be confused with the Demand that is the metered amount of power required or received by the Load.

1.5 Application and Functioning of the Code

- OST sh.a. is responsible for the application of the Transmission System Code.
- Users are required to implement requirements of the Transmission System Code.
- Users should provide OST sh.a. with access in their objects for necessary services and facilities to implement OST sh.a. responsibilities.
- Users implement orders and guidelines issued by OST sh.a. in order to apply the Transmission System Code.
- If any User fails to comply with a provision of the Transmission Code, the User shall inform OST sh.a. without delay on the reasons of noncompliance. Repeated failures to comply with the Transmission Code may cause disconnection of the User's plant and/or its equipment.
- Users that repeatedly violate the Transmission System Code are responsible for the consequences of disconnection including the payment of damages and compensation of consequences for final customers.
- The Transmission System Code contains procedures that allow accurate management of technical situations in the Electric Power System, taking in consideration a large gamma of operational conditions in normal and abnormal situations.
- The Transmission System Code cannot anticipate and address all potential operational conditions, therefore if unpredictable circumstances occur OST sh.a. may act firmly to fulfill its obligations.
- OST sh.a. is periodically required to review the Transmission System Code application. For this scope a Commission will be established by OST sh.a. with representatives from all Transmission System Users. No review or modification of the Code shall be done without reviewing it by the Commission and ERE's approval.

1.5.1 Code Review Commission (Commission)

1. The Commission shall be headed by OST sh.a. and will be composed of the following members:
    - Chairman appointed by OST sh.a.
    - Secretary appointed by OST sh.a.
    - A member representing Hydro Power Plants
    - A member representing Thermal Power Plants
    - A member representing each Distribution Company

- A member representing all Independent Power Producers
- A member representing all Eligible Customers
- A member representing all Suppliers

2. OST sh.a. authorizes the Chairman and the Commission Secretary to officially inform the Users at least seven working days before, on the Commission first meeting. Every User informs the Commission Secretary on names and functions of their representatives no later than three working days before the first meeting of the Commission.

3. The Commission prepares the regulation governing its activity. The Commission meets every three months.
4. Commission decisions are taken with consensus. In case of lack of consensus the decisions are taken with a simple majority of the participants, but OST sh.a. have the veto right in decision-making process, justified by the importance it may have in the domestic and international electricity market.
5. When issues of Relay Protection are discussed in a Commission meeting, a representative from the Relay Protection Commission should be present.

1.5.2 Tasks of Code Review Commission

The Code Review Commission should:

1. Continuously supervise the Code and take initiatives of Code review.
2. Analyze serious breakdowns and based on those analysis continuously review the Code.
3. Take in consideration all requests for modifications of the Code proposed by the Users.
4. Inform on recommendations for modifications of the Code as well as reasons for these modifications or any objections if there are.
5. Issue guidelines for the interpretation and application of the Code.
6. Examine issues raised by Users.

1.5.3 Special Meetings

OST sh.a. may hold special meetings with particular Users. During the meetings individual requests from Users or a group of Users are discussed and proposals for Commission meetings are prepared.

1.5.4 Code Review and Elaborated Version

The Secretary should submit for evaluation to the Commission all proposals for Code review.

1.6 Administration of Code

OST sh.a. is the Administrator of the Transmission System Code.

1. OST sh.a. in the role of Code Administrator has the right:

a. To inform the Transmission System Users that the use of the network is supervised through the application of Code rules.
b. To follow the evaluation of information according to Code procedures.
c. To prepare and submit to the ERE a detailed annual report regarding the Code Administration.

2. At the end of the Commission meetings, OST sh.a. should send to ERE the following report:
   - conclusions on Code review
   - proposals for Code review
   - written statements or objections by Users during the review process
   - proposals submitted to the ERE for facilities when Users are faced with difficulties to apply the Code.
3. After the approval from the ERE, OST sh.a. shall publish the code modifications.

1.7 Code Responsibilities

In order to meet its obligations according to the Transmission System Code, OST sh.a. shall rely on the information provided by Customers regarding their requirements and objectives. OST sh.a. shall not be responsible for consequences of judgments and actions made or taken based on information provided by the Users on their requirements and objectives.

1.8 Confidentiality

Based on Code provisions, OST sh.a. shall receive information on Users objectives by safeguarding their generation, distribution or supply business. OST sh.a. shall not publish information for third parties without a written approval of the owner of the confidential information, except when required by the Code.

1.9 Disputes

1.9.1 Dispute Settlement Procedures

In case of Disputes between Users and OST sh.a. regarding the interpretation of a Code provision, the conflict shall be solved based on procedures established in the Code. In case of conflict between a Code provision and an Agreement or a contract between the OST sh.a. and the User, the terms of the Code provision shall prevail.

1.9.2 Continuity of Corporate Functioning

The objective of this procedure is that no dispute shall impede the daily work of the Parties (OST sh.a. and Users).
Soon after the raise of a dispute the Parties should discuss and reach an agreement. If the Parties do not reach an agreement the issue is referred to the Commission. The deadline to reach an agreement or to solve the dispute is established by the Regulation of Code Review Commission. If the Commission

decision is not satisfactory to the Parties, the issue is then referred to the ERE. Until the ERE decision, Parties shall respect the existing agreement.

1.9.3 Disputes Regarding Code Interpretation

Temporary Agreement between Parties with different interpretations should be followed until the issue of a new rule from the Code Review Commission. If one or both Parties are not satisfied with the Commission recommendation, the issue shall then be referred to the ERE, which decision is final and obligatory.

1.94 Disputes Regarding Issues Not Addressed by the Code

The issue shall be discussed by Disputing Parties, which will try to come to an agreement. If the Agreement cannot be reached the Parties formulate a temporary working agreement and further refer the issue to the Code Review Commission even in case the issue is not addressed by the Code. The recommendation given by the Code Review Commission suspends the temporary agreement and shall be applied by all parties. If parties are not satisfied with the Commission recommendation, the issue shall than be referred to the ERE. ERE's decision shall be final and obligatory.

1.10 Unpredicted Events

In situations not anticipated by the Code paragraphs, OST sh.a. shall immediately hold a meeting with all Parties affected by the solution and actions to be undertaken under these circumstances. If no agreement is reached, OST sh.a. shall temporary establish actions to be taken after the reasons for issues raised by Parties are given. OST sh.a. shall as soon as possible refer the issue to the Commission, which decision shall supersede all temporary actions undertaken by OST sh.a.. If Party appeals before the ERE against the Commission's decision, the ERE reviews and takes the final decision. Parties' recommendations or OST sh.a. definitions shall be applied until a different decision is issued by the Commission. Commission's decision shall be effective until the issuing of ERE's decision, which is final and obligatory to all Parties.

1.11 Communication between OST sh.a. and Users

Communications between OST sh.a. and the Users shall be in written except when oral communication is required, and in such case a written note shall confirm communications as soon as possible.

1.12 Partial Invalidity

If a provision or part of a Code 's paragraph is declared invalid for any reason, the remained part of the paragraph shall remain effective.

1.13 Implementation of Government Directives

OST sh.a. shall soon inform ERE and all other Users on the requirements of Government decisions on different issues related to SEE. Users shall comply with respective parts of the Code and with respective decisions.

1.14 OST sh.a. attributes and competences

The Transmission System Operator that has a license to perform electricity transmission activity manages the Transmission System. The Transmission System Operator is responsible for the development and expansion of the Transmission System and the management of electricity transit with foreign systems using the Albanian electric network.

The Transmission System Operator provides:

a. the integrated management and stable functioning of the Transmission System;
b. maintenance of environment and equipment of the Transmission System according to technical safety and functioning requirements;
c. development of the Transmission System according to long term forecasts and development plans of the power sector;
d. maintenance and development of auxiliary assets of transmission;
e. electricity supply to the customer directly connected to the Transmission System.

1.15 Transmission System Organization

In the framework of the new organization based on Law No. 9072, date 22/05/2003 “On the Power Sector”, the Transmission System is managed by the Transmission System Operator (OST sh.a.). Assets managed by OST sh.a. are:

1. All 400, 220 and 110 kV lines (in entering portals of each 110/MV substation and 110 kV substations of the plants directly connected to the Transmission System.)
2. 400/220/110 kV substations, 400/220 kV, 400/110 kV, 220/110/MV kV substations 220/MV kV.
3. 220 kV substations of Vau Dejes, Koman and Fierza HPPs (from entering portals of block transformer connection) and the 110 kV/150 kV tract including exits and the transformer in Bistrica 1 HPP.

1.16 System Control

When a User has an agreement with OST sh.a. for coordination, communication and functioning of the Transmission System scheme, OST sh.a. may consider that node of the User as part of the Transmission System, but between OST sh.a. and Users it shall continue to be considered as User’s node.

1.17 Emergency Periods

During emergency periods such as: prolonged droughts, big flows, interruption of fuel supply, wars, natural catastrophes and specific abnormal situations, the Government may issue specific directives for shortages, controls and other rules and if they contradict with Code provisions, those provisions or part of the Code shall be considered as temporary suspended for as long as the emergency situation shall last.

1.18 Communications

Existing communications until the approval of the Code are minimal requirements of communications maintained by Parties in good working conditions. In order to achieve OST sh.a. management and control, communication facilities between Users and OST sh.a. shall comply with specific effective norms. Details of connection to the telecommunication system are established by agreements after the approval of the connection to the Transmission System. OST sh.a. shall provide, develop and perform works for installing SCADA System. Those systems belong to OST sh.a.. Users are obligated to provide access in their connecting points with the Transmission System in order to meter the voltage, current, frequency, active and reactive power, and to provide information on switching on/off equipment that indicate the conditions of facilities and alarm signals in order to transmit those information to SCADA. Control and data acquisition are established after receiving the technical approval for connection.

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PLANNING CODE

PART 2

PART 2
PLANNING CODE

2.1 Introduction

The Planning Code (PC) specifies the criteria and procedures to be applied by OST sh.a. in order to plan and develop the Transmission System.

Transmission System Users should consider the Planning Code as they plan the development of their systems/objects.

2.1.1 Expansion of the Transmission System

The need to develop and expand the Transmission System may rise for many reasons, such as:

1. Development of system/object of Users connected to the Transmission System due to Users development;
2. Introduction of a New Connection Point of Users' system/object to the Transmission System;
3. Need to increase the capacity of the Transmission System and maintain the safety standards according to forecasted increase of transmission demand;

2.1.2 Types of Expansion of the Transmission System

Development or expansion of the Transmission System may include:

1. Connection Points between Transmission System and Users' system/object;
2. Transmission lines or equipment that join Connection Points to the other part of the Transmission System;
3. Transmission lines or equipment within the Transmission System;
4. Transmission Network Substations.

2.1.3 Need for Transmission System Anticipating Plan

The Transmission System should be planned in time in order to allow system Users to plan the expansion of their systems/objects. Therefore PC defines time periods for information exchange between OST sh.a. and Users. For the exchanged information confidentiality is maintained.

2.1.4 Need for Standards and Procedures

Standards and Procedures within the Planning Code aim to consult OST sh.a. and Users on how to have an efficient, coordinated, safe and economic Transmission System that shall fulfill future demand.

2.2 Objectives of Planning Code

The Objectives of Planning Code are:

a. To establish procedures of information exchange between OST sh.a. and Users respecting any User proposal on the development of their systems/objects that may affect the Transmission System behavior;
b. To detail the information that OST sh.a. shall make available to Users in order to facilitate the identification and evaluation of possibilities for use or connection to the Transmission System;
c. To detail the information that OST sh.a. requires from Users in order to plan the development of the Transmission System and assist Users proposed developments;
d. To specify planning and design Standards and Procedures that shall be applied by OST sh.a. for Transmission System planning and development.

2.3 Scope of Planning Code

2.3.1 Executors of Planning Code

The Planning Code should be applied by OST sh.a. and the following Customers:

1. Generators directly connected to the Transmission System
2. Distribution Companies
3. Eligible Customers
4. Suppliers

2.3.2 Application of PC from Prospective Users

Subjects, which future activity shall classify them in any of the above Users categories, as well as actual connected Users, shall be considered as a reference for their perspective role.

2.4 Planning Criteria

OST sh.a. and Users using the Transmission System shall apply planning criteria for the development of systems/objects as detailed in Appendix B.

2.5 Electric Power System Planning and Development

2.5.1 Prospective Plan

1. OST sh.a. shall prepare the Prospective Plan that represents the basis for all further detailed Planning of the Albanian Power Sector. The whole generation and distribution activities and eligible Customer planning shall be based on the Prospective Plan.
2. The Prospective Plan shall cover a 15-year period of forecasts on electricity demand, peak load, additional electric capacity, transmitting capacity, losses and other important parameters of the Electric Power System.
3. The Prospective Plan contains the Transmission System and Users action plan related to electricity imports, exports and load shedding.

4. OST sh.a. shall evaluate the demand for electricity based on data from Distribution Companies and Eligible Customers. However, OST sh.a. shall perform partial analysis to define the demand and load for the following final customer categories:
   - household
   - public services
   - agriculture (pumping stations for water irrigation)
   - industrial

5. Distribution Companies shall analyze in details the load for all customer categories. Similarly, all eligible Customers shall submit their needs for expansion and load to OST sh.a..
6. OST sh.a. shall elaborate all the data and prepare a detailed plan.
7. OST sh.a. shall assess losses, in percentage and in value, for the whole Transmission System as well as for its special elements, as follows:
   - Based on assessment of Transmission System power losses during the peak load determined by Flow Distribution studies carried out using computer software;
   - Based on pilot studies of special elements through metering of electricity in both sides of respective elements.

2.6 Planning Basis

2.6.1 Generation System Planning

a. The Prospective Plan prepared by OST sh.a. and continuously modified in order to adapt to circumstances of Electric Power System optimization shall be the basis of Generation System Planning.
b. The Independent Generator should prepare and submit a 5-year plan of system/object development as specified by the Planning Code.
c. Any development planned by an Independent Generator should lead to the increase of efficiency and capacity and shall include the following actions:
   - adding of new units
   - removal of old units
   - renewal and modernization of existing units
d. A New Generating Plan shall be included in the generation system planning if it complies with the Power Sector Law.

2.6.2 Transmission System Planning

a. The Prospective Plan prepared by OST sh.a. and continuously modified in order to adapt to the circumstances of Electric Power System optimization shall be the basis for Transmission System planning and development.
b. OST sh.a. shall prepare the Transmission System Perspective Plan based on:
   - Load flow studies
   - Short Circuit studies
   - Static and Dynamic Stability Studies

- Non supplied electricity Studies

During the preparation of above studies, OST sh.a. shall consider the development of Users system/objects.

c. OST sh.a. shall prepare a 5 year plan for the development of Transmission System.

2.6.3 Distribution System Planning

The Prospective Plan prepared by OST sh.a. and continuously modified in order to adapt to the circumstances of Electric Power System optimization shall be the basis for Distribution System Planning. The Distribution Companies will, independently, prepare and submit to OST sh.a. the prospective plan. OST sh.a. will assess the validity and, if necessary, modify plans after studying the methodology and comparing historical data. OST sh.a. will further consolidate the Prospective Plan for the whole structure and use it to prepare the Transmission System Prospective Plan.

2.7 Planning Procedure

2.7.1 Coordinating Unit

OST sh.a. shall coordinate Planning of Users connected to the Transmission System, based on planning data as described by the Code.

2.7.2 Information provided to OST sh.a.

Connected Users as well as those who request to connect to the Transmission System shall provide to OST sh.a. information and data based on Planning Code specifications.

2.7.3 Information provided by OST sh.a.

OST sh.a. shall, upon request provide information and data to connected Users and Users requesting to connect to the Transmission System, based on Planning Code specifications.

2.8 Planning Data provided by OST sh.a.

2.8.1 General

OST sh.a. shall, upon User request, provide information and data regarding part of the Transmission System in order to enable Customers to connect and use the Transmission System. As specified by the Code, such information and data is considered confidential.

2.8.2 Data provided by OST sh.a. upon Users Request

OST sh.a. shall provide any other information that may be reasonably required in order to enable Customers to identify and evaluate the possibilities of connection and use of a part of the Transmission System, as specified in the request. If

required, OST sh.a. will also offer its own opinions on the conditions of that part of the system specified in the request.

2.9 OST sh.a. Transmission System Data

a. The Transmission System Data presents the existing and the future Transmission System as described by the Prospective Plan. Such data include:
   - Country Map showing the existing and prospective elements (indicated in points) of the Transmission System.
   - Single line diagram of Transmission System showing the existing and prospective elements (indicated in points) as well as connecting points of Generating Plants.
b. Distribution data shall be limited to 110/MV substations of the network indicating lines and transformers exits.
c. OST sh.a. shall publish a list of preferred points of connection to the Transmission System.
d. OST sh.a. shall also provide to Users, specific data requested by them.

2.10 Data Payment

OST sh.a. has the right to ask for a payment from the Users for Transmission System Data and inform them on the total cost 15 days after receiving the specific request. The Transmission System data shall be given within two months after the Users request, depending on the nature and complexity of requested data.

2.11 OST sh.a. Right to Keep the Information

OST sh.a. has the right to keep confidential any Transmission System data if according to OST justified opinion, issuing of these information will seriously affect OST commercial interests. However, OST sh.a. shall provide a minimum of data when Users cannot perform their business without these data.

2.12 Data Confidentiality

All data that OST sh.a. shall receive from Users and vice versa, shall be considered as confidential and shall not be discharged to third parties. Data shall be used only for the indicated scope.

2.13 Planning Data Requested by Users

2.13.1 Data System provided by Users to OST sh.a.

Each User shall provide to OST sh.a. data on its system/object in order to:

a. adjourn the database needed to perform Transmission System studies and planning;
b. prepare a complete annual plan for the system/object in the framework of OST sh.a. 5 year plan;
c. review the progress of new projects and developments previously approved under the 5 year plan;

d. confirm compliance to License and Code requirements.

Data provided to OST sh.a. directly from the Generator shall be in the format as established in the Planning Code.

2.14 Planning Data Categories

In order to fulfill the above requirements, Users planning data shall be categorized in two groups as follows:

1. Initial Data of Planned Project;
2. Obligatory Data of Planned Project;

with each group containing:

- Standard Planning Data
- Detailed Planning Data
- Annual System Planning Data
- Data of the 5 year System Planning
- Works in Progress Data
- Final Data;

Each User shall provide these data to OST sh.a. by September 30 of the following year/years.

2.14.1 Additional and Confidential Specific Data

In addition to the above specifications, OST sh.a. may verify the Data accuracy by asking explanations and/or additional information from Users. Until the Connection Agreement between OST sh.a. and User becomes effective, Data shall be considered confidential and not open to third parties.

2.14.2 Initial Data of Planned Project

- Data submitted during the application time for Use and Connection to the Transmission System, shall be named as Initial Data of Planned Project.
- Initial Data of Planned Project shall normally contain only the Standard Planning Data until Detailed Planning Data are specifically required by OST sh.a..

2.14.3 Obligatory Data of Planned Project

After the acceptance of the Connection Agreement offer by the User, Data submitted to and received from OST sh.a. based on the Planning Code, shall be named as Obligatory Data of Planned Project. These data will form the base for the Transmission System Planning. The Obligatory Data of Planned Project shall not be considered as confidential in order for:

- OST sh.a. to include them in its Data system according to Planning Code provisions

- OST sh.a. to disclose those data to other Users after receiving their application form for connection and/or use of Transmission System. Data are used only for reasons they were received.

Obligatory Data of Planned Project will normally include both Standard and Detailed Planning Data.

2.14.4 Standard Planning Data

2.14.4.1Generators

- Required data are listed in the respective paragraph A.1, Part-1, Annex A;
- Data are submitted with the application for New Connection, additional Generation unit, modification of plants and equipment that influence the Transmission System behavior.
- Data should be submitted by Users connected to the Transmission System according to respective provisions.

2.14.4.2 Transmission

- Required data are listed in paragraph A.2, Part 1, Annex A.

2.14.4.3 Distribution

- Required data are listed in paragraph A.3, Part 1, Annex A.
- Data should be submitted with the application for new connections, additional lines and substations, and line and equipment modification that may materially affect the Transmission System behavior.

2.14.4.4 Eligible Customers

- Eligible Customers data are listed in paragraph A.3, Part 1, Annex A.
- Data should be submitted with the application for new connections, additional lines and substations, and line and equipment modification that may materially affect the Transmission System behavior.

2.14.4.5 Formats

In all occasions data shall be submitted in the formats described in Annexes or with a note that covers terms not included in Annexes.

2.14.5 Detailed Planning Data

2.14.5.1 Formats

Required data are listed in Paragraphs: A.4; A.5; A.6; A.7; A.8; A.9; A.10; A.11; Part 2, Annex A.

2.14.5.2 Existing Users Data

Users already connected to the Transmission System shall send their data within September 30 of the next year/years.

2.14.5.3 Prospective Users Data
All Users trying to connect to the Transmission System should submit their Data.

2.14.6 Annual System Planning Data
To be provided by all Users.

2.14.6.1 Formats
Required data are listed in paragraph A, Part 3, Annex A.

2.14.6.2 Deadline
All Users connected to the Transmission System shall send their data within September 30 of next year.

2.14.7 Data of 5 Year Planning
To be provided by all Users.

2.14.7.1 Formats
Required data are listed in paragraph B, Part 3, Annex A.

2.14.7.2 Deadline
All Users connected to the Transmission System shall send their data for the next 5 years, within September 30.

2.14.8 Works in Progress Data
To be provided by all Users.

2.14.8.1 Formats
Required data are listed in paragraph C, Part 3, Annex A.

2.14.8.2 Deadline
All Users connected to the Transmission System shall send their data within March 31.

2.14.9 Final Data
2.14.9.1 Format
Required data are listed in paragraph D, Part 3, Annex A.

2.14.9.2 Deadline
All Users connected to the Transmission System shall send their data at the end of works when ready to connect to the Transmission System.

2.14.10 Additional Data
If a Party requires additional data from another Party in order to perform planning or other functions, such data may be exchanged at any time with

mutual approval between authorized subjects according to general terms and definitions of the Planning Code.

2.14.11 Ignoring of the Data

Parts of data described in the Code may be ignored at any time with a written declaration from the receiving Party upon request of the other Party.

2.15 Planning for Improvement and Modification of Existing Power System Facilities

2.15.1 Introduction

This paragraph examines the improvement planning of existing Electric Power System performance and facilities. This process may include modification and/or total replacement of equipment without interfering to the main equipment. Small modifications and repair of the main equipment are done only with the scope described by this paragraph. Parties identify the areas of modifying works and invest to improve the quality and/or quantity of benefits and develop plans to improve their system/objects performance. OST sh.a. shall encourage and coordinate Users programs to develop plans of modification and improvement of their systems/objects.

2.15.2 Objectives

Objectives of such Plans with small investments are: improvement of equipment behavior, improvement of electricity supply, network reliability, safety and economic criteria, energy loss reduction and improvement of equipment safety and lifespan standards.

2.1.5.3 Transmission System

OST sh.a. shall develop programs to improve the Transmission System performance. Areas of such planned improvements are defined by OST sh.a. time after time. Following are a few examples:

- replacement of existing Relay protection equipment with qualitative ones
- replacement of existing switchers to reduce their action time

Users may require OST sh.a. to modify the relay protection and the control system and perform small modifications to the Transmission System in order to reduce negative impacts in their system/object. OST sh.a. may accept or refuse to perform those modifications based on respective studies.

2.15.3 Distribution System

Distribution Companies shall prepare plans to modify the protection and automatic systems and to install under frequency relays in cooperation with OST sh.a.. OST sh.a. may advise modifications and improvements in the Distribution System such as special maintenance and replacement of vulnerable parts in order to reduce switch off due to frequent breakdowns and their impact on the

Transmission System. Also, when Transmission System parts are overloaded in particular points due to the low level of power factor (cosφ), the problem should be immediately solved from Distribution Companies by urgently installing capacitors. OST sh.a. shall require the Distribution Companies to install capacitors in specific areas based on this paragraph of the Code. Failure of Distribution Companies to install capacitors shall obligate OST sh.a. to immediately reduce the load.

2.15.4 Generating Facilities

OST sh.a. advises individual Generators to install Power System Stabilizers for their generating facilities if it is necessary to increase the static security of Electric Power System . Generators based on OST sh.a request shall cover the cost of modifications in order to improve network's security as well as its static and dynamic stability.

2.15.5 Deadline

OST sh.a. and all Users shall prepare a Two Year Plan to Reinforce and Modify their systems/objects and submit it every January. Users Two Year Plans shall be submitted to OST sh.a. by January 31. Reinforcing and Modification Plans and respective formats are given by OST sh.a. to each User upon request.

2.15.6 Implementation

Implementation of modifications may be renewed or postponed by mutual agreement. A Party may require postponing due to technical reasons or serious difficulties. If no agreement is reached between parties for the reinforcing program, the issue shall be settled according to the procedure described in respective paragraph 1.5 of the General Code.

Annex A. Planning Data
Part 1 Standard Planning Data
A.1 Generators
A.1.1 Thermal Power Plant

Connection

1	Connection Point	Indicates a single line diagram of the proposed Connection to the Transmission System
2	Voltage	(kV) Voltage level in Connection points to the Transmission System
3	Planned Time	Average planned time for connection to the Transmission System

Plant Capacity

1	Total Capacity of the Plant (MW)	Condition of existing plants. Capacity of new plants, divided in phases
2	Number of units and their capacity	

Data of Generating Units

1	Steam Generating Unit	Condition, type, capacity, steam pressure, steam temperature, etc.
2	Steam Turbine	Condition, type, capacity.
3	Generator (Alternator)	Type Nominal characteristics (Sn, Pn in MVA and MW) Nominal Voltage (Un in kV) Power Nominal Factor (cosφ) Capacity for Reactive Power (MVAr) Short Circuit Power Direct axis transient reactance (in p.u. of MVA) Direct axis Sub-transient Reactance (in p.u. of MVA) Auxiliary Power Requirement (Own Needs) in MW Capability Curve of generator Short Circuit Saturation Curve
4	Transformer of Generator-Transformer Block	a. Type b. Nominal Capacity (MVA) c. Voltage Level (HV/LV) d. Tap change Range number of scales and (±%) for each scale and in total

		e. Percentage Impedance (Positive Sequence at Full load)

For own needs

1	Total Power in MW and required MVA for auxiliary equipment	
2	Total external power required to start up	

A.1.2 Hydro Power Plant Connection

1	Connection Point	Indicates a single line diagram of the proposed Connection to the Transmission System
2	Voltage	(kV) Voltage level in Connection points to the Transmission System
3	Type of Hydro Plant	Description of the Plant: with Reservoir or Run-of-River; indicators of work (total reserved volume, active reserved volume, maximal level of water, maximal level of work, minimal level of work, flows, etc)

Plant Capacity

1	Total Capacity of the Plant (MW)	Condition of existing plants. Capacity of new plants, divided in phases
2	Number of units and their capacity	

Generating Units Data

1	Working regimes	Maximal, Minimal, Average.
2	Steam Turbine	Condition, type, capacity.
3	Generator (Alternator)	Type Nominal characteristics (Sn, Pn in MVA and MW) Nominal Voltage (Un in kV) Nominal Power Factor ($\cos\varphi$) Reactive Power Capability(MVAr) Short Circuit Power Direct axis transient reactance (in p.u of MVA) Direct axis sub-transient reactance(in p.u of MVA) Auxiliary Power Requirement (MW) Capability Curve of generator Short Circuit Saturation Curve

4	Transformer of Generator-Transformer Block	a. Type b. Nominal Capacity (MVA) c. Voltage Level (HV/LV) d. Tap change Range number of scales and (±%) for each scale and in total e. Percentage Impedance (Positive Sequence at Full load)

A. 2 Transmission

Line name (Indicating Plants and substations at the beginning of the line and in the end of the line.)
Line Voltage in (kV)
No. of Circuits
Line length (KM)
Conductors
- Type
- Section (mm^2)

Line Parameters (in p.u. and Omik values)
- Resistance/km
- Inductance/km
- Conductivity/km (B/2 in p.u. and μS)

Transmitting capacity in 20°C of ambient temperature (Allowed thermal flow).
Definition of j-economic
Type of poles to be used and respective parameters.
Line Route (Information on the landscape traversed by the line).
Line Map (Information on the topographic map indicating the proposed and existing lines).
For existing Lines give the time when the line will be able for operation,for new lines give the time when it will start to operate.

A.3 Distribution Companies and Eligible Customers

I. General

1	Map (in scales) of Distribution Companies and Eligible Customers extension area	Indicates the area where Distribution Company and Eligible Customers exercise their activity according to the license.
2	Data for Eligibe Customers and data for their loads.	Furnish data of Eligibe Customers and, their connected loads)
3	Data on Distribution Companies and Eligible Customers systems/objects.	

II. Connection

1	Connection Point	Indicates a single line diagram of the proposed Connection to the Transmission System
2	Voltage	(kV) Voltage level in points of Connection to the Transmission System
3	Names of Transmission System Substations that feed the Connection points	

III. Lines and Substations

1	Line Data	Indicates line length and voltage level
2	Substation Data	Indicates details of substations directly connected to the Transmission System and details of installed capacitive groups

IV. Loads

1	Load in Connection points	Indicates loads and load details in Connection points
2	Details of load directly feed by the Transmission System	Indicates customer name, supply voltage, demand according to the contract, and the name of Transmission System substation, supplying line and line length.

V. Demand Data

(Note: This information is required by Eligible Customers that applies for connection to the Transmission System)

1	Load Type	(Condition of load supplying point, quantity of Electricity absorbed by the load, its type, etc).
2	Nominal voltage	KV
3	Equipment Electric Load	
4	Load Sensitivity from voltage and frequency of supply.	
5	Maximum of Load harmonics	
6	Average and maximal disbalance of load phases	
7	Nearest substation supplying the load	
8	Area map in scales	(Showing location of load with reference of lines and substations in the vicinity)

VI. Load Forecast Data

- Peak and minimal load; load forecast for each category of load for each of the succeeding 10 years.
- Details of methodology and summary of forecasts.
- Forecast of energy demand for each category and in total for each of the succeeding 10 years, accompanied with approximate Daily Load curves.
- Details of loads directly connected to the Transmission System.
  - o Name of existing or potential Customer.
  - o Connection Point and load nature.
  - o Feeding Substation.
  - o Supply Voltage.

Annex A
Part 2 – Detailed Planning Data
A.4 Thermal Power Plants
I. General

1. Name of Power Plant
2. Units Number and Capacity (MVA)
3. Nominal Levels of Main Equipment Parameters
   - Boiler (steam/pressure temperature)
   - Location of fuel supply
   - Water supply pumps
   - Turbines
   - Generators (Alternators) (MVA)
   - Transformer Generator (MV)
   - Auxiliary transformers (MVA)
4. Single Line Diagram of Power Plant
5. Schemes of control, Relay protection and metering
6. Neutral Grounding of Generators
7. Excitation Paramerers
8. Earthing and values of earthing resistance.

II. Relay Protection

1. Full description, including the settings of all relay protections and installed relay protection systems in Generators and Transformers units, auxiliary Transformers and electric engines of auxiliary equipment.
2. Full description, including the settings of all installed relay protection in all exiting lines/feeders from Plants substations and key indicators for commuting actions (time of switch on, time of switch off).
3. Full description of switchers in point/s of Connection to the Transmission System.
4. Most probable fault time for electrical faults on the User's system/objects.

5. Details of Protection functions including Instrument Transformers and Cables on Secondary Side.

III. Substations of Power Ststions

1. For transformers of generator-transformer Block and other power transformers.
   a. Nominal Power MVA
   b. Nominal Voltage kV
   c. Vector group
   d. Positive sequence reactance (at maximum, minimum, normal Tap) (% on MVA)

Positive sequence resistance (at maximum, minimum, normal tap) (% on MVA)

   e. Positive sequence resistance (at maximum, minimum, normal tap) (% oF MVA)
   f. Zero sequence reactance (% of MVA)
   g. Tap changer range (±%) and steps
   h. Type of Tap changer (off-load/on-load)

2. For commuting equipment including switchers, circuit breakers located in Connection points.
   a. Nominal Voltage (kV)
   b. Type of switchers, circuit breakers
   c. Rated short circuit current 3ø (kA)
   d. Details of auto reclosing Equipment

3.Details of Control System, local SCADA, RCU (Remote Control Unit), etc.

4. Isolation Level (kV)
   a. Busbars
   b. Commuting equipment (switchers, circuit breakers)
   c. Transformer branches of voltage regulation
   d. Transformer's winding

5.Other Technical Data

IV. Generating Units

a) Alternators (Generators) Parameters

1. Nominal Voltage (Un in kV)
2. Nominal Absolute Power (Sn in MVA)
3. Nominal Active Power (Pn in MW)
4. Phase Nominal Current (In in A)
5. Nominal Power Factor (cosϕ)
6. Nominal Frequency (Fn in Hz)
7. Nominal Speed (Nn in rot/min)

8. Inertia Factor H (MW Sec/MVA)
9. Volant moment (GD^2 in Tm^2)
10. Short Circuit Coefficient (Kc)
11. Direct–Axis Synchronous Reactance (X d in p.u)
12. Direct-Axis Transient Reactance (X' d in p.u)
13. Direct-Axis Sub-Transient Reactance (X" d in p.u)
14. Quadrature-Axis Synchronous Reactance (Xq in p.u)
15. Quadrature-Axis Transient Reactance (X'q in p.u)
16. Quadrature-Axis Sub-transient Reactive (X"q in p.u)
17. Stator Resistance per phase in 75 °C (Ra in om)
18. Direct-Axis Transient Open Circuit time Constant (T'_{do} in sec)
19. Direct-Axis Sub-Transient Open Circuit Time Constant ($T"_{do}$ in sec)
20. Quadrature -Axis Transient Open Circuit Time constant (T'_{qo} in sec)
21. Quadrature -Axis Sub-Transient Open Circuit Time Constant ($T"_{qo}$ in sec)
22. Time factor of stator's winding for short circuit (T_s per sec).
23. Open-Circuit Saturation Curve
24. Generator Capability Curve.

b) Exciting System and Voltage Automatic Regulator Parameters

1. Type of Exciter
2. Nominal Current of Exciter (In in A)
3. Nominal Voltage of Exciter (U in V)
4. Exciter maximal Current along Transient Time ($I_{max.}$ in A)
5. Exciter maximal Voltage (Vmax in V)
6. Excitation System Transient Response
7. Excitation System Open-Loop Response characteristic
8. Excitation System closed loop Response characteristic
9. Dynamic characteristics of over exciting and limits
10. Dynamic characteristics of under exciting and limits
11. Detailed structured scheme of the whole exciting system that shows details of transmitting functions and parameters of its elements.
    K_a – Voltage Regulator Constant
    T_a – Voltage Regulator Time Constant
    V_{rmax} – Normal Max voltage in exit
    V_{amax}, V_{amin} – Maximal and Minimal Voltage of Internal Regulator

Depending on the exciting system type, the structural scheme, transmitting functions and element parameters are based on IEEE standards.
According to these standards, the system models help studying the stability and parameterizing of the Transmission System.

C. Parameters of Regulation and Parameters of Governor

1. Type of Governor
2. kg coefficient to define the working range of the Governor (in MW/Hz) as defined by IEEE norms.
3. Speed and time Constant (T_{SR})
4. Time constant of server engine and Directing Apparatus (T_{SM})
5. Governor value opening with limit number ($C_{V.\ open}$)
6. Governor valve closing with limit number ($C_{V.\ Close}$)
7. Governor valve limit ($C_{V.\ Max}$ and $C_{V.\ Min}$)
8. Based on steam turbine system in CR-IEEE the following parameters should be provided when necessary.

   T_{RH}, T_{RH1} - Reheat Time Constant (first step)

   T_{RH2} - Reheat Time Constant (Second step)
9. Structural Scheme of Regulating System and Governer showing transmitting functions of special elements recommended by IEEE.

A.5 Hydropower Plants

I. General

1. Name of Plant
2. Number and Capacity of Units (MVA)
3. Alignment of all major equipment
   a. Turbines
   b. Generators (MVA)
   c. Generators-Transformers (MVA)
   d. Auxiliary transformers (MVA)
4. Single line diagram of Plant
5. Scheme of control, relay protection and metering
6. Neutral grounding of generator
7. Excitation system and AVR
8. Earthing with Ground Resistance values
9. Reservoir data
   a. Typical Features
   b. Reservoir Type
      - Multipurpose
      - for electricity
   c. Operation table

II. Relay Protection

1. Full description that includes settings of all relays protection and relay protection system installed in Generator and Transformer units, Auxiliary Transformers and electric engines of auxiliary equipment.
2. Full description including settings of all installed relay protection in all exiting lines/feeders from Plants substations and key indicators for commuting actions (time of switch on, time of switch off).

3. Full description of switchers in the point/s of Connection to the Transmission System.
4. Possible duration of electric breakdowns in Users system/objects.
5. Details of relay protection functioning and metering that includes Instrument Transformers and Cables on the Secondary Side.

III. Plant Substations

1. For transformers of generator-transformer Block and other power transformers.
   a. Nominal Power MVA
   b. Nominal Voltage kV
   c. Vector group
   d. On Load Losses P_{cu} in kW
   e. Short circuit voltage Uk in %
   f. No load Losses P_0 in kW
   g. No load current Io in %
   h. Positive sequence reactance (at maximum, minimum, normal Tap) (% on MVA)
   i. Positive sequence resistance (at maximum, minimum, normal tap) (% on MVA)
   j. Zero sequence reactance (% on MVA)
   k. Tap changer level (±%) and steps
   l. Type of Tap changer (Off load/On load)

2. For commuting equipment including switchers, circuit breakers located in Connection points.
   a. Nominal Voltage (kV)
   b. Type of switchers, circuit breakers
   c. Rated short circuit current 3ø (kA)
   d. Details of of auto - reclosing Equipment

3. Details of Control System, local SCADA, RCU (Remote Control Unit), etc.

4. Isolation Level (kV)
   a. Busbars
   b. Commuting equipment (switchers, circuit breakers)
   c. Transformer branches of voltage regulation
   d. Transformer's winding

5. Other Technical Data

IV. Generating Units

a) Generator (Alternator) Parameters

Parameters are equal as for Thermal Power Generators

- Operating Unit (Regime)
  - Maximal
  - Minimal
  - Average
- Discharging ports and their capacity
- Water consumption of generating units for different reservoir (lake) levels; characteristics of generating units' turbines.

b) Exciting System Control Parameters

Same as parameters of exciting system of thermal plants Alternators.

c) Parameters Governors

1. Regulation Speed of Governor (RASH)
2. Normal starting speed
3. Emergency starting Speed
4. Water Inertia Time constant (T_w)
5. Structural diagram of Regulation System and a structural scheme of Governor showing transmitting functions of special elements recommended by IEEE.

A.6 Thermal Plants

For presentation upon OST sh.a. request

I. General

1. Detailed Report of the Project
2. Status Report
   a. Land
   b. Fuel supply
   c. Water
   d. Environmental Impact

3. Technical and Economic Approval by respective Authorities according to Legislation in force.

II. Connection

1. Report of studies on parallel functioning with the Transmission System.
   a. Load flow studies
   b. Short Circuit studies
   c. Static and Dynamic Stability Studies

2. Proposal for Connection with the Transmission System
   a. Number of lines

b. Voltage
c. Connection point/s

A.7 Hydropower Plants

I. General

1. Detailed Report of the Project
2. Report of the Situation
   a. Topological Survey
   b. Geographic Survey
   c. Land
   d. Environmental Impact

3. Technical and Economic Approval by respective Authorities according to Legislation in force.

II. Connection

1. Report of studies on parallel functioning with the Transmission System.
   a. Load flow studies
   b. Short Circuit studies
   c. Static and Dynamic Stability Studies

2. Proposal for Connection to the Transmission System
   a. Number of lines
   b. Voltage
   c. Connection point/s

A.8 Data Submitted by All Types of Generating Plants

Data on the maximal Current value of three and single phase short Circuit infed by the plant in the connection point to the Transmission System.

A.9 Part 1 Detailed Data of the Transmission System

I. General

1. Single line diagram of the Transmission System that indicates connection points of generation plants.
2. Transmission System Map showing connection points of generation plants.
3. Substation name.
4. Substations (for Plants and Transmission System)
   a. Connected power plants
   b. Transformers/Autotransformers
   c. Substation Busbars
   d. Commuting equipment with respective nomination (such as line exit, transformer exit, etc.)
   e. Equipment for Reactive Power Compensation
5. Number, length and parameters of lines.

II. Element Parameters (Lines, Substations)

General

1. Detailed Report of the Project
2. Report on the Situation
   a. Route Survey — Lines
   b. Land Survey — Substations
   c. Environmental Impact
3. Technical and Economic Approval by respective Authorities according to Legislation in force.

Details

1. Name of the Line
2. Line Length (KM)
3. Number of circuits
4. Transmitting capacity for each circuit
5. Voltage kV
6. Positive Phase sequence reactance (pu on 100 MVA) X_l
7. Positive Phase sequence resistance (pu on 100 MVA) R_l
8. Positive Phase sequence susceptance (pu on 100 MVA) B_l
9. Zero Phase sequence reactance (pu on 100 MVA) X_o
10. Zero Phase sequence resistance (pu on 100 MVA) R_o
11. Zero Phase sequence susceptance (pu on 100 MVA) B_o

III. Transformers and Autotransformers Parameters (for all transformers and autotransformers)

1. Nominal Power MVA
2. Windings Power MVA
3. Nominal Voltage kV
4. Winding nominal voltage kV
5. Vector Group
6. On Load losses Pcu in kW (for HV/MV, MV/LV, HV/LV)
7. Short circuit Voltage Uk in % (for HV/MV, MV/LV, HV/LV)
8. No load Losses P_0 in kW
9. No load current I_0 in %
10. Positive sequence reactance, maximum, minimum and normal (pu on 100 MVA) X_l
11. Positive sequence, resistance maximum, minimum and normal (pu on 100 MVA) R_1
12. Zero sequence reactance (pu on 100 MVA).
13. Tap change range(±%) and steps.
14. Details of Tap changer.(OFF load/ON load).

IV. Equipment Details (For all Substations)

a. Power Transformers/Autotransformers
b. Switchers, circuit breakers
c. Isolators
d. Current and Voltage Transformers

Relay Protection

- Details of Relay Protection installed for all transformers/autotransformers; their settings and level of coordination with other Users.
- Details of Relay Protection installed for all lines; their settings and level of coordination with other Users.
- Details of Electricity Metering.

System Studies

- Load flow studies (Peak and Minimum of loads for maximal hydro and thermal generation).
- Transient stability studies for single and three phase short circuits in ,lines, transformers, busbares and small simulations.
- Static and dynamic stability studies and definition of critical times.
- Short circuit studies (three phase and single phase to earth) Three and single phase maximal values fed to the Connection point.
- Studies on Transmission Losses.

A.10 Detailed System Data (Distribution Companies and Eligible Customers)

I. General

1. Map of operation area of the Distribution Company and Eligible Customers (in scales) (indicating all lines and substations that belong to the Distribution Company and Eligible Customers).
2. Single line diagram of the system/object of the Distribution Company and Eligible Customer (indicating lines from the connection point to the Transmission System, 110/35 kV substations, 35/10/6 kV substations) etc.
3. Number and Name of line and substation.
4. Monitoring of Losses in their system/objects.

II. Connection

1. Connection Points (Indicates details of existing Connection equipment).
2. Metering details in Connection points.
3. Details of relay protection in Connection points.

III. Load

1. Connected Load (Category), (Customer's Details), Loads' Details).
2. Daily graphic (for specific days of the year) of the Demand in each Substation of the Distribution Company and Eligible Customer.

3. Daily graphic (seasonal, annual) for the general demand of Distribution Companies and Eligible Customers.

A.11 (To be submitted upon OST sh.a. Request)
In addition to information contained in A.10
I. General

1. Detailed Project Report (For strengthening of the existing Users systems/objects and construction of new ones)
2. Report on the Situation
3. Load Forecast for next 5 years
4. Single line diagram (indicating lines and new proposed substations)
5. Financial Terms

II. Connection

1. Connection Points of Applicants for Connection
    a) New
    b) Improvement of existing Connections
2. Changes of relay protection or metering equipment in Connection points.

III. Loads

1. Load Details and forecasts for next 5 years
2. Load distribution into substations planned (projected) for next 5 years.
3. Details of main loads to be contracted for next 5 years.

IV. Improvement of Users schemes that reduce losses in the Transmission System

- Presentation of evaluation of losses caused by Users in the Transmission System for next years.
- Short description of improved schemes to reduce Losses (presented in a report)
    - New Lines
    - Improvement of existing lines
    - New Substations and improvement of the existing ones
    - Load rearrangement
    - Capacitors installation

Annex A Part 3 Other Planning Data
A. Annual System Planning (to be provided by all Users)

I. Scope (describes working details included in the annual plan)
II. Situation (continued from the previous year or a new work)
III. Expenditure Plan
IV. Increase of Benefits

a. Generation System

Capacity added
Improvement of Parameters

b. Transmission System

Stability Improvement
Loss reduction
Increase of power flow capability

c. Distribution Companies and Eligible Customers

Loss Reduction
Improvement of voltage level
Covering of load growth in the area

B. Five Years System Planning Data (To be provided by all Users)

1. Projection of works for the next 5 years
2. Actual situation and development

C. Works in Progress Data (To be provided by all Users)

1. Report on works performed by Generating Plants connected to the Transmission System
2. Graphic on works performed in Distribution Company areas
3. Graphic on works performed in Eligible Customer areas

D. Final Data

(To be provided by all Users)

Final data represent the date of works termination and readiness to connect to the Transmission System of Users system/objects that influence the Transmission System operation (performance).

Annex B Part 2 Planning Criteria

B.1 Generation Planning Criteria

B.1.1 Load Peak Participation Capacity

The possibility of participation of each Hydro Power plant in the peak load is the maximal power that may generate during peak hours.

- If it is a run-of-river plant the power production should be with 90% hydrological security.
- If it is a reservoir (lake) plant the power production shall depend on the reservoir level and hydrological conditions.
- For thermal plants, the participation capacity during the peak is the maximal net power (without auxiliaries).

For new thermal units, the participating capacity during the peak should be assessed as 86% of installed capacity. This allows the use of approximately 10% for auxiliary consumption, and 4% for transformer losses assessed according to installed capacity of the unit.

B.1.2 Planning Criteria of Regulation Reserves

Described in the Code.

B.13 Power Planning Criteria

Reserved Energy shall not pass 0.15% of the annual average Energy.

B. 14 Power Generation Planning

1. Annual Electricity estimated in a Hydro Power Plant is defined as potential Electricity generated by the Plant with 90%, 75% and 50% of flow hydrological security.
2. For Thermal Power Plants, Electricity generated is estimated as the product of installed capacity for 4000-6000 working hours per year, according to the type of electric plant.

B.2 Transmission System Planning Criteria

B.2.1 Object

The Transmission System shall be planned to operate reliable and safe, and efficiently for all Users in order to guarantee uninterrupted electricity supply with acceptable levels of voltage and frequency according to criteria described by the Code.

B.2.2 (n-1) Criteria of Transmission System Planning

For the Transmission System Planning the (**n-1**) criterion is applied.
(**n-1**) criterion is used to:

- Asses the level of Transmission System use by Users in the existing and future conditions;
- Assess the load that should be limited in the existing situation based on operating conditions of the Electric Power System;
- Assess Transmission System voltage levels;
- Prepare Transmission System Development Scheduling;
- Assess operation safety;

(**n-1**) criterion is applied for regimes with programmed maximal loads.

- For 400 kV, 220 kV lines (**n-1**) criteria is used to define the conductor section of Transmission System lines for the current passing in each line of the system referring to a basic operating regime, which doesn't consider an unplanned outage of the biggest generating units.
- For 110 kV lines, (**n-1**) criteria is applied:
  (i) closing all 110 kV rings;
  (ii) disclosing all 110 kV lines that work in parallel with 400 kV and 220 kV lines.

B.2.3 Technical criteria to check up the Transmission System planning regarding the Stability.

The technical criteria to verify the static and dynamic stability of SEE and the Transmission System performance, takes in consideration:

a. maximal load regimes
b. 5 year verification period
c. a list of simulations prepared based on experience

B. 2.4 Technical criteria to dimension the reactive power compensation installations

Establishing of installation for reactive power generation/absorbing is performed by analyzing the voltage levels in all nodes of the Transmission System and in all operation regimes with (**n**) and (**n-1**) configuration.

a) for the 400 kV rated voltage in the Transmission System, the voltage range allowed by a (**n**) and (**n-1**) configuration is 360-420 kV;
b) for the 220 kV rated voltage in the Transmission System, the voltage range allowed by a (**n**) and (**n-1**) configuration is 198-242 kV;
c) for the 150 kV rated voltage in the Transmission System, the voltage range allowed by a (**n**) and (**n-1**) configuration is 142,5 -162 kV;
d) for the 110 kV rated voltage in the Transmission System, the voltage range allowed by a (**n**) and (**n-1**) configuration is 99 - 123 kV;

The purpose of establishing of installations for reactive power generation/absorbing is to optimize the Transmission System operation in order

to maintain the voltage within allowed levels and reduce transmission technical losses. For this scope, planning is extended to a 5 year period, evaluating the maximal and minimal load regimes of the system.

B.3 References and Standards

International standards shall be used to plan the Transmission System as follows:

a) In designing, construction or modification of elements of the Transmission System (overhead lines, cable lines, conductors, transformers, autotransformers, commuting equipment (switchers, circuit breakers) chargers), etc.
b) In designing, construction or modification of Users systems/objects.

B.3.1 Criterions of Transmission Projection

- Transmission System Lines should be projected as far as possible double circuit lines.
- Existing single circuit lines if it is posible to be reinforced by another circuit.
- The selected line route should be as optimal as possible regarding the passing territory.
- Projection and construction of lines should be according to International Standards and effective Legislation.

The Transmission System should provide an integrated function of SEE for all optional situations. Capacities of the Transmission System are evaluated by OST sh.a. time after time with studies on:

- Load flow studies
- Short Circuit studies
- Static and Dynamic Stability Studies

Studies shall be performed under the following regimes to evaluate if the Transmission System is operating according to safety criteria:

a. The system that shall be planned to maintain the voltage and eliminate overload for (**n**) and (**n-1**) criteria. (**n-1**) criteria shall be applied to switching off generating units, transformers or transmission lines.
b. The peak load shall be covered in two cases:
   - Minimal Thermal Plants generation
   - Minimal Hydro Plants generation
c. The optimum of Transmission System reactive compensation shall be established by studies identifying and metering the current in lines and loads under transformation, in order to define voltage levels during the peak load. Capacitors should be of the regulated type in order to avoid voltage over increase.
d. The voltage level profile should be maintained within the following limits:

   For 110 kV voltage: ± 10%

For 150 kV voltage: ± 10%
For 220 kV voltage: ± 10%
For 400 kV voltage: + 5% - 10%

e. The Relay Protection should be projected to eliminate the faults within the following time periods:
   - 80 millisecond for 400 kV elements
   - 110 millisecond for 220 kV elements
   - 120 millisecond for 110 kV elements

f. Dynamic and Transient over voltage studies shall be carried out on 400kV ,220kV and 110kV lines to ensure that the power frequency and switching surge over voltages do not exceed the acceptable values for the insulation level of equipment and protective devices.

B.3.3 Substation Projection Criteria

Substations shall be designed by taking in consideration the following factors:

- Desired degree of flexibility
- Facility of operation and maintenance
- Safety of operating and maintenance staff
- Provision of spare Bays or space for future expansion
- Safety guarantee of operative staff and equipment to prevent wrong functioning of electric equipment.
- Appropriate equipment to isolate and put out the fire according to Legislation in force, in order to guarantee the staff safety and avoid equipment damages.
- Earth connection of Substation should be in conformity to requirements and Standards.The Earthing System should be designed to have a low overall impedance. The impedance shall not exceed four ohm (4 Ω). The step and touch voltage should be within safety limits.
- In case of outage of one transformer/auto-transformer the loading on the remaining transformers shall not exceed 10 % over load.

B.4.1 Distribution Companies and Eligible Customers systems/objects

Distribution Companies systems/objects are connected to the Transmission System in 110 kV of voltage level.
Users that own, operate and maintain the Distribution System for 110/MV kV substations follow the designing criteria established by the Transmission System Code, and the Distribution Code criteria for the rest.

Eligible Customers systems/objects are connected to the Transmission System with voltage levels established by agreements. Eligible Customers follow the designing criteria established by the Transmission Grid Code.

Appendix C Protection Data

Issues	To be submitted
Users should submit details of relay protection requirements and installed schemes as described in Annex A Part 2	As applicable to Detailed Planning Data.
The **OST sh.a.** shall submit details of protection equipment and schemes installed by them as referred to in Appendix A, Part 2.	As applicable to Detailed Planning Data.

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PART 3
OPERATION AND DISPATCH CODE

PART 3

OPERATION AND DISPACH CODE

3.1 Introduction

The Operation and Dispatch Code, specifies conditions of OST sh.a. operation in the Transmission System especially, and in SEE in general, to schedule and inform the Users structure, as well as coordination procedures of scheduled work interruptions for maintenance purposes of special units of Generation Facilities, Transmission and Distribution System and Eligible Customers elements.

3.2 Data Exchange

3.2.1 From Distribution Companies to OST sh.a.

- Any Distribution Company shall, by end of October, submit to OST sh.a. a written forecasted demand for the next year (January to December).

Data submitted by the Distribution Companies include:

- Annual Power Demand divided by months
- Daily Average Power Demand for each month by specifying the daily demand for specific days, weekends and holidays.
- Active and Reactive Power for the daily peak and night minimum, for the representative day of each month as well as description of daily load graphic.
- Assessment of load shedding divided by respective Substations where load shedding shall be implemented.
- Pertinent data are provided for the Distribution Company activity area as well as for each area and Substation in boundaries with the Transmission System.

3.2.2. From Generators to OST sh.a.

- Any Generator shall, by end of October, submit to OST sh.a. a written annual production plan for the next year including data for the remaining period of current year.

Data provided by the Generator include:

- Annual production divided by months.
- Available power, including availability time periods for each Generation facility combined with the plan and time of work outage.
- Active and Reactive Power for each Generation unit. Their participation during the peak and specific parts of load covering.

3.2.3 From Eligible Customers to OST sh.a.

- Any Eligible Customer shall, by end October, submit in writing to OST sh.a. a forecasted demand for the next year (January to December).

Data provided by Eligible Customers include:

- Annual Power Demand divided by months.
- Daily Average Power Demand for each month by specifying the daily demand on specific days, weekends and holidays.
- Active and Reactive Power for the daily peak and night minimum, for the representative day of month as well as a description of daily load curve.
- Plan of Electricity supply from Generators, Import or Suppliers, based on effective or future contracts, showing the supply profile.
- Assessment of Electricity load shedding divided by respective Substations where load shedding shall be implemented.
- Pertinent data are provided for Eligible Customers activity area as well as for each area and Substation in boundaries with the Transmission System.

3.2.4 From OST sh.a. to other Units:

- After elaborating the information submitted by Users, OST sh.a. shall prepare a complete operation plan for a realistic and economic use.
- OST sh.a. may refuse issuing of any kind of data required by Users, if considers that these specific data are not requested by Users for business management purpose.

3.3 Procedures

3.3.1 Demand Forecast Procedures to be followed by Distribution Companies and Eligible Customers

Distribution Companies and Eligible Customers shall use well known methodologies for Demand Forecasts. The demand and load increase is forecasted for medium and long term periods according to definitions of the Planning Code.

3.3.2 Demand Forecast Procedures to be followed by OST sh.a.

OST sh.a. shall use the information submitted by Distribution Companies and Eligible Customers to asses the demand and load in the territory of the Republic of Albania for the next year by assessing the demand and load for areas and Substations of Distribution Companies and Eligible Customers.

3.3.3 Responsibilities

- Distribution Companies and Eligible Customers are responsible for the annual, monthly and weekly demand and load assessment.
- OST sh.a. is responsible for the demand and load assessment in the territory of the Republic of Albania and distribution of power flows in the Transmission System.
- Supervision of demand and load forecast validity, prepared by Distribution Companies and Eligible Customers, is performed by OST sh.a. OST sh.a. shall independently prepare a demand forecast by using historical data and applying a reasonable increase level. The increase levels are derived from historical increase levels. If differences between Distribution

Companies and Eligible Customers assessment and OST sh.a. assessment are evident, but Users argue the differences with detailed realistic loads, Users assessments shall be accepted as realistic. On the other side, OST sh.a. shall require Users to review the forecasts. If the difference persists, OST sh.a. shall accept an average of Users and its own assessment.

3.4 Scheduling and Coordination of Outages for Maintenance Purpose

3.4.1 Introduction

This paragraph sets out procedures and deadlines for scheduled and coordinated outage in Generation Facilities, internal and interconnection Transmission Lines, power Transformers and Autotransformers for the next year.

3.4.2 Harmonization of Outages Schedule for Maintenance Purpose

The annual outage schedule of Generation Facilities is prepared in order the total power introduced to the injection point with the Transmission Network is sufficient to fulfill the demand for active and reactive power at any time or at least have a minimal mismatch.

Generators shall submit to OST sh.a. their outage plan for maintenance purpose for next year by October 30.

Distribution Companies and Eligible Customers shall submit to OST sh.a. the maintenance outage schedule for their elements in boundaries with the Transmission System, for next year, by October 30.

Based on these plans, OST sh.a. shall prepare its own plan of Transmission System elements maintenance by optimizing the outage schedule for maintenance purpose of generation facilities and by minimizing supply load shedding. OST sh.a. shall submit to Users the coordinated maintenance plan.

3.4.3 Initial Data

All Users shall submit to OST sh.a. initial switch off plans of their elements for the next year by October 30.

Generators shall submit to OST sh.a. the historic of maintenance performance for three previous years as well as the table of unpredicted breakdowns and their extension.

The plan, coordinated and accepted by the Parties shall become effective by December 15.

3.4.4 Methodology

The object of this paragraph is to define the methodology to assist the Dispatch Center for the preparation of a coordinated program of generation outage by taking in consideration all potential resources and obligations of the Transmission System.

The methodology used by OST sh.a. to formulate the generation outage scheduling includes:

- In order to increase Thermal facility generation potential, their performance during the previous three years, has been taken in consideration.
- In order to increase Hydro facility generation potential, the average of water flows in reservoirs during the last 10 years, has been taken in consideration.

3.4.5 Cooperation and Responsibilities

OST sh.a. shall coordinate the cooperation with all Users.

3.4.6 Load/Generation Balance

OST sh.a. shall prepare proposals to combine the Load/Generation balance for the next year based on the generation plan submitted by Generators.
The Load/Generation proposed balance should indicate the possibilities to provide Power and Energy.
In further verifications of monthly schedules, the proposed plan of Load/Generation balance prepared by OST sh.a. shall be studied, and afterward implemented.
OST sh.a. shall periodically review and prepare modification proposals of the Generation Plan in order to optimize the potential sources in coordination with Transmission System outage.

3.4.7 Generation Outage Planning Process

3.4.7.1 Following Year

- OST sh.a. shall use the data provided by all Generators to prepare a plan of Generation outage for the following year.
- OST sh.a. shall define the possibility to provide power and energy every month from each Generation unit, combined with interconnection lines availability.
- OST sh.a. shall prepare tables that describe the possibility to provide power and energy monthly in order to meet power and energy demand as well as conditions of generation units.
- The tables indicate the periods with possibilities of generation increase or decrease as well as deficits or surpluses.
- If both surplus and deficit exist during the planned period, the Dispatch Center shall propose the stable coordination and escalation of generation outage period in order to eliminate or reduce the deficit.
- If only the deficit exists during the planed period, the Dispatch Center shall try to decrease the high deficit by altering the outage periods. It shall also try to reduce the average deficit by organizing the power import.
- After being convinced the highest improvements are achieved, OST sh.a. shall prepare a generation draft plan and submit it to Generators for comments.

- After consultations with regional partners, OST sh.a. shall examine and approve the outage plan of interconnection elements for the following year.
- No outage shall be scheduled for hydro facilities during months with high flow or reservoir overloaded.

3.4.7.2 Amendments to Planned Outages

In case of a scheduled outage where OST sh.a. prefers to move:

- beyond the period or
- within the period

OST sh.a. shall first inform the Generators with a written notice and ask to postpone the starting date or outage period previously decided. If the Generator, or OST sh.a. and the Generator agree for another period/date, the Generator shall execute the outage according to the agreement.

Any time during the year, the Generator may require the OST sh.a. by a written note, the replacement of a generation unit by another one of the same contracted capacity. OST sh.a. should not refuse without reason the approval for such a replacement. If OST sh.a. approves, the final schedule of outages shall be arranged in appropriate way.

3.4.8 The Process of Outage in Transmission System, Distribution Companies and Eligible Customers

The outage of Transmission System elements should initially be coordinated with outages of Generation units and Distribution and Eligible Customers elements.

The scheduled outage of Distribution and Eligible Customers elements for the following year should be reported to OST sh.a, from all Distribution Companies and Eligible Customers, by October 30.

The Dispatch Center shall prepare an Initial Plan of Transmission System outage coordinated with the Generation and Distribution System and Eligible Customers Outage Schedule. OST sh.a. shall modify the outage schedule of Distribution and Eligible Customers by following the priority rule, for ex. Outage of Transmission elements should be coordinated with outage plan of Generation while Distribution and Eligible Customer elements outage should be coordinated with Transmission System outage. The scheduling of Transmission System outage shall be done for the following elements:

- 400 kV Transmission Lines and 400/220 kV, 400/110 kV Transformers and Autotransformers.
- 220 kV Transmission Lines and 220/110 kV Transformers and Autotransformers.
- SEE critical identified lines that influence on the Transmission System and SEE functioning.
- 110 kV radial lines that feed the Distribution System and 110 kV Customers (They shall be scheduled separately after consultations with Distribution Companies and 110 kV Customers).

Outage schedules of Distribution and Eligible Customers reviewed by OST sh.a shall be communicated to Distribution Companies and Eligible Customers by December 15.
OST sh.a. may hold meetings to coordinate the outage schedule of Transmission System elements.
The Dispatch Center shall review the Distribution and Eligible Customers outage schedule in order to coordinate it with Transmission System elements outage schedule. After taking in consideration decisions and recommendations, the Dispatch Center shall prepare the Draft Schedule of Transmission System Outage. The Draft Plan shall be communicated to all Customers by December 15.

3.4.8.1 Outage of Power Transformers whose LV Voltage is 35 Kv, 20kV, and 10 kV.

For transformers owned by OST sh.a, the outage schedule shall be harmonized with Distribution System elements outage. Distribution Companies shall communicate to OST sh.a. the outage schedule of their distribution elements fed up by these transformers, by November 30.

3.4.8.2 Verified Final Outage Schedule

OST sh.a. shall prepare the final outage schedule that includes outage of generation units, Transmission elements, Distribution and Eligible Customer elements by December 20, and shall communicate it to all Generators, Distribution Companies and Eligible Customers. The Final Outage Schedule as agreed upon by the Parties, is issued by December 31.

3.4.8.3 Postponement of Outages

The Dispatch Center is authorized to postpone each planned outage when the following events affect SEE functioning:

- Major disturbance of SEE;
- Total or partial SEE blackout;
- Total SEE isolation or isolation of SEE parts from neighbor systems;
- Large overloads of Transmission System elements.

Despite reserves in every approved outage plan, no interconnection line or generation unit shall be moved out of service without specific permission from the Dispatch Center. This paragraph shall be applied also for Independent Generators if foreseen by the interconnection agreement.
If the interruption for maintenance purpose has already been applied but the maintenance process has been delayed, the Dispatch Center or respective Users shall promptly inform Parties on restart time.

3.5 Scheduling

3.5.1 Dispatch Scheduling

This paragraph specifies procedures applied to schedule and dispatch the generation units in order to meet the power demand and maintain voltage and

frequency levels within acceptable limits, and defines Users contribute in achieving these objectives.

3.5.2 Object

The object of this paragraph is to detail actions and responsibilities of the Dispatch Center in preparing and issuing a generation daily schedule and Users responsibilities to provide the necessary data and adapt to the Schedule. It also specifies the Dispatch Center and Users responsibilities in managing voltage and frequency levels.

3.5.3 Generation Scheduling

OST sh.a. shall issue operative orders and guidelines to inform and obligate Generators to keep under working conditions the scheduled generation units for the following day.

For this scope, OST sh.a. shall use the MW/MVAr demand as a base to prepare operative and maintenance orders by taking in consideration the Outage schedule for maintenance purpose.

In case of lack of operative orders, all generators shall guarantee the possibility to cover the demand for each MW/MVAr hour (00.00 – 24.00) for all available generation units based on the actual daily schedule and submit it to the Dispatch Center for the following day.

The possibility to meet the MW/MVAr demand from hydro units is achieved by taking in consideration the expected flows, their reservoir levels as well as other limitations reported to the Dispatch Center.

The possibility to meet the MW/MVAr demand from thermal facilities is achieved by taking in consideration fuel reserves as well as other limitations reported to the Dispatch Center.

The Dispatch Center shall prepare the generation / import program.

The Dispatch Center shall prepare one day ahead the generation schedule divided by hours, after consolidating all data provided by Generators and shall coordinate the Electricity import based on contracts. The Dispatch Center takes in consideration the hourly assessments for MW/MVAr demand.

In order to prepare the schedule, the Dispatch Center shall take in consideration that generation from Hydro Units should remain in maximal levels in times of high flows and water levels in reservoirs.

If during the schedule implementation day, Generators report to the Dispatch Center for situations that affect the schedule implementation, then the Dispatch Center shall immediately prepare the necessary rescheduling and submit it to all Generators affected by this action.

The Dispatch Center shall require Generators to generate according to its MW/MVAr demand within their capacity limits to maintain required voltage levels in busbars.

The Dispatch Center orders Generators to maintain the necessary reserve capacity as defined by the Code. If during the scheduling the MW/MVAr demand

is not fulfilled, the Dispatch Center shall require the Distribution Companies and Eligible Customers to apply rational load shedding.
The Dispatch Center shall prepare the generation schedule based on:

- Transmission System Obligations;
- Hourly MW/MVAr demand assessed by the Dispatch Center;
- The need to provide reserves for SEE economic operation, Transmission System and obligations from participation in regional and European organizations (UCTE, ETSO, SETSO, SUDEL, etc).

3.5.4 Implementation of Dispatch Schedule by Generators

Generators shall schedule their generation units based on daily generation schedule ordered by the Dispatch Center.
Generation Units not directly connected to the Transmission System shall not be subject of operative orders from the Dispatch Center but shall report on their facilities condition to the Dispatch Center.
The Dispatch Center shall manage the generation and import through operative orders based on the daily generation hour schedule agreed on the day before, except when rescheduling for unpredicted events is required.
Dispatch Center Operative Orders shall be in standard forms.
The Operative Orders of the Dispatch Center include, but are not limited to the following actions:

- Entering in or putting out of work of generation units;
- Generation units in stand by;
- Following details:
    - Active Power in MW injected by the generation unit
    - Reactive Power in MVAr injected by the generation unit
    - Required voltage level in busbar where the generation unit is connected
    - Respective reserve levels of generation unit

3.5.5 Communication with Generators

Operative Orders of the Dispatch Center shall be communicated by phone, phonogram, fax, e-mail and confirmed by sending and receiving operators. Each oral Order by phone shall be registered in writing in the operative book of Parties. With the increase of the Dispatch Center capacities through SCADA system, the operative orders shall be transmitted by computer messages.

3.5.6 Generator's Actions

Generator shall provide hourly injection from generation units (MW and MVAr) in real time.
Generators shall immediately apply operative orders of the Dispatch Center except in cases when this action may compromise the staff or unit's safety.
Generators shall immediately inform the Dispatch Center in case of unpredicted difficulties to apply the order.

Generators shall immediately inform by phone the Dispatch Center for losses or changes of operative possibilities of any Generation Unit synchronized to SEE or scheduled to maintain SEE reserves.
After receiving the Order of synchronization from the Dispatch Center, Generators shall synchronize the respective generation unit to the network within normal time periods. Failure to do so shall immediately be notified to the Dispatch Center.
Generators shall not de-synchronize the Generation Unit without orders from the Dispatch Center, except in cases of staff and unit's safety, which is immediately reported to the Dispatch Center.
All Generation Units shall have a speed regulator in service that may automatically increase or reduce the injection of MW/MVAr power within the declared normal levels.
All Generation Units shall have an Automatic Voltage Regulator in service to regulate the voltage level within the declared normal levels.
Generators shall inform the Dispatch Center on every AVR and/or RASH removal from the service as well as reasons for this.
Generators shall report every hour to the Dispatch Center on facility parameters related to Generation Unit operation.

3.5.7 Improvement of Scheduling and Dispatching Procedures

Scheduling and Dispatching Procedures shall be improved time by time in order to fulfill future needs.

3.6 SEE Ancillary Services

3.6.1 Introduction

SEE Ancillary Services aim to provide conditions for SEE operation and restarting of normal work in case of serious breakdowns.
Ancillary services are a special category of services from which all Users of the Transmission System shall benefit. Ancillary Services are divided in two categories:

a. Operative
b. Technological

Operative Ancillary Services

SEE operative ancillary services are scheduling and operative management services and other activities performed by the Dispatch Center in order to achieve Users' safe electricity supply with least cost.

Technological Ancillary Services

Technological Ancillary Services are performed by Transmission System Users and OST sh.a with the following scope:

- To preserve SEE Static and Dynamic Stability
- To preserve voltage levels within allowed values;

- To restart SEE in case of partial or total blackout and serious breakdowns.

Ancillary Services offered by the Users are paid by OST sh.a.
Services to provide electricity exchanges with neighbor countries are offered and paid by OST sh.a.

Technological Ancillary Services are achieved by:

a) Providing the Primary Frequency Control;
b) Providing the Secondary Frequency - active power Control;
c) Providing the active power Control Reserve;
d) Providing the reactive power and management of voltage levels;

3.7 Security during Operation

The Transmission Network is designed in order to achieve the safety (**n-1**) criterion, the static and dynamic stability conditions.

3.7.1 Ancillary Services that Provide Frequency Control

The Dispatch Center is obligated to coordinate actions to maintain the frequency within defined limits according to respective norms in this Code.
The Dispatch Center enables the use of the existing SEE power reserve and its use in right time to maintain generation/load balance in cases of prolonged disbalances (for ex. due to deviation of load curve related to the forecast) as well as in cases of unpredicted large disbalances (for ex. in case of generation units interruption or load shedding).
Depending on the time and manner of use (manual or automatic), the power reserve is classified as:

Primary Control Reserve
Secondary Control Reserve
Spinning Reserve
Tertiary Control Reserve

3.7.2 Frequency Deviations

A Frequency Deviation **Δf** is the difference $\mathbf{f_n - f}$ of the nominal frequency of SEE $\mathbf{f_n}$ from the actual frequency **f** of SEE as a results from a disturbance or an incident in SEE.
Nominal Frequency is 50 Hz.

3.7.3 Instant minimal and maximal frequency

The instant minimal frequency should not be lower than 49.2 Hz, that correspond to a -800 mHz Deviation, which is the maximal allowed deviation from nominal frequency. The instant maximal frequency should not be higher than 50.8 Hz, that corresponds to a +800 mHz Deviation, which is the maximal allowed deviation from the nominal frequency.

3.7.4 Frequency Primary Control Reserve

The Frequency Primary Control Reserve is a reserve that in case of the frequency deviation from allowed values may automatically takes effect for 30 seconds and is able to continue operating for at least 15 minutes, realized by Automatic Governors (RASH) continuously in service. The Frequency primary control reserve is activated if frequency deviation exceeds ±20 mHz.

Providing the frequency primary control reserve by the Dispatch Center request shall be an obligation for all local electricity generators.

The Dispatch Center orders the necessary size of Primary Control Reserve according to:

- Conditions of parallel operation of the Transmission System with neighbor countries. The Primary Control Reserve is mutually approved by all Operators of the interconnected Transmission System.
- Conditions of isolated operation of the Transmission System, where the minimal Reserve of Primary Control is scheduled based on analysis that takes in consideration the technical and economic potential, by preserving approx. 5% from the total generated power.

The Primary Control Reserve should be distributed to all Generators directly connected to the Transmission System, in a uniform and proportional way.

In the framework of scheduling activity based on the economic criteria of generation units, OST sh.a. shall schedule the Primary Control Reserve based on Generators offer according to the required size.

Generators' offers should consider the obligation for Primary Control Reserve availability according to technical performance of each generation unit.

3.7.5 Frequency/Active Power Secondary Control Reserve

Frequency/Active Power Secondary Control Reserve is a reserve that with the frequency and/or power exchange deviation from allowed and scheduled values may automatically restart working within an interval of no longer than 15 minutes.

Frequency/Active Power Secondary Control Reserve overlies on the Primary Control Reserve.

In the framework of scheduled activity based on the economic criteria of generation units, the Dispatch Center shall schedule the frequency/active power Secondary Control Reserve according to the required size, based on Generators offers. Generators shall provide the frequency/active power Secondary Control Reserve according to OST sh.a. schedule and requirements.

3.7.6 Spinning Reserve

Spinning Reserve overlies on the Primary and Secondary Control Reserve and establishes the balance in case of open deviation from the schedule.

The Spinning Reserve is provided by Generators by order of Dispatch Center and should be preserved for the period of time required by the Dispatch Center.

3.7.7 Tertiary Control Reserve

Tertiary Control Reserve overlies the Primary and Secondary Control Reserve and Spinning Reserve to establish the balance in case of open deviations from the schedule.

The Tertiary Control Reserve is provided by Generators by Dispatch Center order for the required period of time.

3.7.8 Ancillary Services to provide for maintaining of voltage levels

Maintaining of voltage levels is an important component for the normal operation under the responsibility of the Dispatch Center.

The Dispatch Center is obligated to maintain such voltage levels to safeguard Transmission System equipment.

OST sh.a. shall operate its own installations in order to balance reactive power in the Transmission Network.

Generators should guarantee the reactive power generation/absorbing of generation units by the Dispatch Center request according to the Transmission Network conditions of connection.

Distributors and Eligible Customers connected to the Transmission Network should compensate, according to reactive power consumption/generation norms, from their own systems.

Exchanges of reactive power may be allowed between OST sh.a. and Distributors or Eligible Customers connected to the Transmission System if SEE safe operation is not affected.

Exchanges among the Transmission Network and the Distribution Network or Eligible Customers connected to the Transmission System that influence the economic operation of partners should be compensated based on rules defined by the Parties.

3.7.9 Frequency Administration and Monitoring

The Dispatch Center shall monitor the Transmission System frequency and maintain it within allowed limits. Modifying actions shall immediately be undertaken if frequency deviates from nominal values. As long as the frequency has the tendency to decrease less than 50.0 Hz, the Dispatch Center shall increase supply from Generation Units and interconnection lines according to effective agreements.

The Dispatch Center shall issue orders to all Distribution Companies and Eligible Customers to decrease the load to a given percentage for different frequency reductions.

If Frequency has the tendency to decrease lower than 49.5 Hz, supply from Distribution Companies and Eligible Customers shall be limited. When frequency decreases lower than 49.5 Hz, a necessary load shedding is applied by the Dispatch Center for Distribution Companies and Eligible Customers.

3.7.10 Voltage Management

Time after time, OST sh.a. shall perform studies on the load flow to forecast where the voltage problems may be encountered, and identify respective actions such as: changing transformer tap settings or or change the position of compensation equipment to ensure that voltages remain within the defined limits. Based on these studies, the Dispatch Center shall guide the Generators to maintain specific voltage levels in their connection points with the Transmission System, and define voltage levels in points of Connection with the Distribution Companies and Eligible Customers.

The Dispatch Center shall constantly monitor the 400, 220 and 110 kV voltage levels in its substations and communicate voltage level values of Operators of the Transmission Systems in neighbor countries.

Generators shall submit to the Dispatch Center the updated generation Capability Curves for all Generation units as detailed by the Code, by indicating any restrictions, to allow accurate system studies and effective operation of the Transmission System. Similarly, they shall enable the reactive power net production to inject/absorb from the Transmission System. During the operation in real time, Generators shall immediately inform the Dispatch Center on the potential of their reactive reserve, when required.

The Dispatch Center shall order the Generation Units to regulate the MVAr generation within their declared parameters and require neighbor OST to comply respective agreements.

Distribution Companies and Eligible Customers shall participate in the voltage management by regulating their drawal and making totally available the compensating equipment when required by the Dispatch Center.

If with these measures the voltage cannot be maintained within acceptable levels, the Dispatch Center shall act in the Transmission System in order to meet voltage required criteria, and if this is not sufficient, the Users should accept the situation.

3.7.10.1 Payment for SEE Ancillary Services

Expenses for generation reserves for maintaining defined standards of safety, stability and quality that include reactive compensation from the Generator, power/frequency control, voltage levels, maintenance and rapid delivery of some facilities and reserve capacities as well as other services of this kind are included in Ancillary Service Tariffs. The Ancillary Service Tariff is prepared according to the calculation methodology of Ancillary Service Tariffs, and approved by ERE.

3.7.10.2 Covering electricity technical losses in the Transmission Network

Expenses to cover electricity technical losses in the Transmission Network are included in the Transmission Tariff. The Transmission Tariff shall be prepared based on Transmission Tariffs calculation methodology approved by ERE.

3.7.11 Data Requirement

Users shall present to the Dispatch Center data as specified by this Code.

3.8. Protection and Restoration Plan

3.8.1 Introduction

This paragraph describes actions applied by OST sh.a. and Users to achieve safety through SEE protection and restoration plan.

3.8.2 Purpose

The purpose of this paragraph is to define Users responsibility in preventing partial or total SEE blackout in case of serious breakdown and define the immediate SEE restoration plan. SEE Protection and Restoration Plan requires a coordinated management and Parties participation in order to prevent such events, and resume in time of power supply to Customers. Participants are required to prepare procedures in order to assist the resuming in time of power supply in the whole network.

3.8.3 Protection Plan

The Protection Plan, prepared and approved by all Parties, (OST sh.a. and Customers) is binding for them. The Protection Plan is composed of:

1. Setting Structure of Relay Protection in all Transmission System elements;
2. Setting Structure of Relay Protection in Generation units;
3. Setting Structure of Relay Protection in systems/objects of Distribution Companies and Eligible Customers;
4. The Automatic counter-breakdowns that includes:
    a) Automatic Load Shedding from Frequency Decrease (SHAF);
    b) Automatic Discharge of Generation Units from Frequency Increase (SHAG);
    c) Automatic Overload Discharge in main elements of the Transmission System;
    d) Automatic Load Shedding due to Voltage Decrease in specific nodes of the Transmission System;
    e) Automatic Disconnection due to Frequency Decrease in the Transmission System;
    f) Automatic Disconnection due to Frequency Decrease in interconnection lines.
5. Setting Structure of Relay Protection in elements of the Transmission System and Users systems/objects.

OST sh.a. in cooperation with Users shall prepare the Relay Protection Table. This structure is approved by the Protection and Restoration Committee (KPMR):

a. In conditions of frequency reduction due to **Active Power Deficit,** SHAF installed in SEE shall operate in full coordination with neighbor countries requirements. For this scope, two types of SHAF structure are implemented

as follows. The first two steps of type-1 SHAF have not time restriction for action. The 0.2 second time delay represents the necessary time for circuit breaker and relay protection action. The two other steps with 0.5 seconds of time include the circuit breaker action time.

Underfrequency Load Shedding Structure

SHAF-1			
Step	**Frequency**	**%of load shedding**	**Time Delay**
1	49.0 Hz	10%	0.2 sec
2	48.8 Hz	15%	0.2 sec
3	48.2 Hz	15%	0.5 sec
3	47.8 Hz	15%	0.5 sec

SHAF-2						
Hz Type	**Gradient (Hz/sec)**	**49.0 Hz**	**48.8 Hz**	**48.2 Hz**	**47.8 Hz**	**% of total load**
Quantity of Switched off Load %						
49.0	-0.8	17.77%	7.17%	-	-	2.85
49.0	-1.0	22.65%	10.43%	15.93%	-	6.22
49.0	-1.7	-	12.80%	16.97%	25.90%	8.35
49.0	-2.0	-	10.43%	25.69%	39.70%	11.37
Total	-	**40.42%**	**40.83%**	**58.60%**	**65.60%**	**28.8**

Distribution Companies and Eligible Customers are obligated to install under frequency relays in their systems/objects, and precisely define the potential value of power that should be shedd. The settings of under frequency relays is approved by KPMR. OST sh.a. shall install frequency relays for its own needs, in substations of 110 kV level.

b. In conditions of **Active Power Surplus,** the Automatic Discharge due to Frequency increase (SHAG) shall act. For this reason, a under frequency frequency relay is placed in generation units. Their setting procedures are prepared and approved by KPMR. In order to place them to work according to a daily regimen and predicted events, the Dispatch Center shall order the generation unit to put in work their SHAG. Generators shall apply this order immediately. Surpluses of active power are characteristics of electricity export regimes. In HPPs of Drin River Cascade, a Generator Automatic Discharge equipment (SHAG) is installed to switch off generation units in case of frequency increase. SHAG is put in work only in export regime and acts with time $\mathbf{t_v = 0.5}$ **sec** according to attained frequencies indicated below.
In Vau Dejes, SHAG has been installed in three scales with these action frequencies:

First scale f = 52.0 Hz
Second scale f = 52.2 Hz
Third scale f = 53.0 Hz

SHAG in Koman aggregates may be installed only for the second and third scale (52.2 and 53 Hz).
SHAG in Fierza aggregates may be installed only for the second scale (52.5 Hz).

In such export regimes, the power to be discharged from SHAG should be as close as possible to power calculated by the formula:

$$P_{SHAG} = 1.1\ P_{exp} - 0.1\ P_{sys}$$

c. In conditions when elements of the Transmission System are overloaded beyond allowed normal levels, the **Overload Automatic Discharge (SHAM)** shall act. The objective of automatic SHAM is to stabilize the regime after breakdowns in the Transmission System. Taking into account the difficulty to define the depreciation level of lines, transformers and autotransformers of Transmission System, this automatic device contributes (attempts) to relieve them from non-allowed overloads.
After the automatic action, autotransformers and transformers may be allowed an overload level up to 10% of their nominal power for a defined specific time. After the automatic device action, transmission lines are allowed an overload level up to 15% of the allowed value for a specific time. The working time of overloaded elements is established by KPMR. KPMR shall prepare and approve the table of allowed values of lines for winter/summer seasons. After the automatic device action, the Dispatch Center shall undertake operative actions such as: change of schemes regime that aim to reduce the overload as soon as possible. In case of lack of possibility to reduce the overloads with scheme changes, the Dispatch Center shall order the Users to limit their load.

d. In conditions of voltage decrease in specific nodes of the Transmission System, the **Automatic Load Shedding due to Voltage decrease in specific nodes of the Transmission System (SHAT)** shall act. The objective of this automatic device is to stabilize the SEE regime when considerable decrease of voltage levels is verified in points of connection with Users. For this scope, Distribution Companies and Eligible Customers are obligated to install minimal voltage automatic protection equipment and allocate the calculated load ready for discharge. SHAT placing points, setting and power quantity discharged are compiled and approved by KPMR.

e. In conditions of frequency decrease in specific SEE areas due to breakdown of power load /generation balance, the **Automatic Disconnection Device due to Frequency Reduction in the Transmission System** shall act**.** The objective of this automatic is to separate from SEE specific areas with load/generation balance breakdown and frequency decrease under allowed

levels. The structure of such automatic device, setting and areas of installation are established and approved by KPMR.

f. In conditions when frequency decreases under the setting values in frequency automatic protection device of interconnection lines, the **Automatic Disconnection Device due to Frequency Decrease in Interconnection Lines** shall act**.** The objective of this automatic device is to separate the Albanian SEE from neighbor countries systems connected in parallel, to prevent system disorders.
Separation of Interconnection shall be per frequency f = 48.7 Hz and action time t = 0.5 sec.
This setting shall be placed in interconnection lines upon an agreement with neighbor countries.

3.8.4 Restoration Plan

The Restoration Plan shall be prepared and approved by KPMR.
SEE restoration plan for partial and total SEE blackout shall be applied by OST sh.a. and Users.
The Dispatch Center is responsible to follow in real time the procedures of restoration plan for SEE partial or total blackout. These procedures and orders shall be documented in the dispatch book and reflected in minutes.
While preparing the Restoration Plan, OST sh.a. shall seek the integrated coordination of Users. It is highly important that these procedures recognize the need for an organized and efficient restoration without taking in consideration potential problems of Generators and obligations of Distribution Companies and Eligible Customers within their service areas.
OST sh.a. shall sufficiently prepare and train the Dispatch Center staff for SEE restoration according to procedures.
Users shall be responsible to sufficiently prepare and train their staff in order to apply the procedures. Users' operative staff shall follow Dispatch Center orders according to restoration procedures.
The Dispatch Center shall be responsible for the general management of SEE restoration process through coordination with all Users and Regional Dispatch Centers.
Distribution Companies and Eligible Customers are responsible for fragmentation of their systems in specific sectors, and follow Dispatch Center orders for the synchronized quantity in MW.
Generators shall be responsible to follow their planned procedures for black start, and by Dispatch Center orders shall execute the synchronization of their generation units.
Hydro power plants shall maintain Diesel Groups in good conditions in order that the generation units restart without external power from the Transmission System.

3.8.5 Restoration Procedures

Existing conditions of an event such as the availability of generation units, transmission lines, substations and load shall determine the process to be implemented in case of SEE total or partial black out. The National Dispatch Center and Regional Dispatch Centers shall coordinate their actions in order to define the extension of event and the type of system black out (partial or total). The National Dispatch Center shall counsel all Users on the situation and follow a strategy based on the situation after the event.

Users shall follow and apply guidelines and orders of the Dispatch Center. Orders are transmitted through communication channels limited only for operative actions.

3.8.5.1 SEE Total Black-out

SEE total black out may be caused by unpredicted events within the system or due to regional unpredicted events.

The National Dispatch Center shall define the causes of SEE black out: internal or external (from other systems).

If the total black out is caused by an external event, the National Dispatch Center shall perform Restoration procedures separately from neighbor systems.

If the black out is caused by an internal cause, the National Dispatch Center may ask for assistance from neighbor systems.

The National Dispatch Center shall order all respective Users with generation facilities of independent restarting potential to begin preliminary procedures of generation unit restarting (in stand by condition).

The National Dispatch Center shall prepare the Transmission System for restoration by:

- Switching off all loads by itself and/or in coordination with Distribution Companies and Eligible Customers;
- By creating power islands without interconnection to the transmission;
- By receiving information for generation units ready to be synchronized and supply load.

The National Dispatch Center shall synchronize the generation units with the Transmission System by always maintaining the generation/load balance in specific power islands.

Further, the National Dispatch Center shall expand the power islands by adding generation units and loads in order to maintain the generation/load balance. The National Dispatch Center shall synchronize the islands by gradually extending the synchronization up to complete restoration.

Afterwards, the National Dispatch Center in coordination with Regional Dispatch Centers shall synchronize with neighbor countries synchronizing one by one the interconnection lines.

3.8.5.2 SEE Partial Black Out

SEE partial black out occurs when part/s are electrically separated among them and/or customers in specific parts of the system are not supplied with electricity. The National Dispatch Center shall control and guarantee the safety of SEE's healthy part.

The National Dispatch Center shall assess the event and the availability of generation units, lines and substations of the Transmission System.

The National Dispatch Center shall gradually expand the sound part of the system by restarting generation units, switching on loads and by maintaining the generation/load balance in coordination with the Users.

3.8.5.3 Special Considerations

During the restoration process, in conditions of SEE black out, frequency and voltage level standards shall not apply.

During the restoration process, priority shall be given to important loads for vital sectors that shall be identified by Distribution Companies and Eligible Customers. Other loads shall receive electricity when SEE gradually return to normal situation.

Despite the emergency situation, after the replacement, the National Dispatch Center and all Users shall prepare a document on orders and operative actions performed, in order to assist further investigation of the situation as well as the efficacy of restoration process.

A complete statement on the situation and restoration process shall be prepared and submitted to the Code Review Commission and KPMR, the day after the event.

3.9 Cooperation with Regional and European Electricity Organizations

OST sh.a. Director shall represent OST sh.a. in all issues related to the Transmission System in Albania.

OST sh.a. shall coordinate with Region's Countries on:

1. planning of outage of interconnection lines to improve the Transmission System functioning in coordination with neighbor systems;
2. programs of Transmission System Planning;
3. coordination with Regional Dispatch Centers during emergency situations;
4. coordination of initiatives among TSOs in the Region.

3.10 Committee of Protection and Restoration Plan (KPMR)

KPMR is composed by:

- Chairman to be nominated by OST sh.a.
- Member Secretary to be nominated by OST sh.a.
- One Specialist of Relay Protection to represent all Hydro Power Plants

- One Specialist of Relay Protection to represent all Thermal Power Plants

- One Specialist of Relay Protection from each Distribution Companies
- One Specialist of Relay Protection to represent all Independent Power Producers
- One Specialist of Relay Protection to represent all Eligible Customers
- One Specialist of Relay Protection to represent all Suppliers

KPMR shall hold ordinary meetings, every three months, and special meetings after an important event in SEE.

During ordinary meetings KPMR shall analyze and discuss the causes and actions needed to improve the Protection and Restoration Plan through modification of schemes and setting of Automatic Protection Device and Automatic Equipment Against Failure .

During special meetings after an important event, KPMR shall analyze and discuss causes and actions needed to improve the Protection and Restoration Plan through modification of schemes and setting of Automatic Protection Device and Automatic Equipment Against Failure, only for that event.

After each meeting, KPMR shall propose possible reviews of the Code and submit it to the Code Review Committee.

KPMR shall take its decisions with consensus. If no consensus is reached, decisions are taken with simple majority of participants in the meeting, but with the conditions that OST sh.a. have the veto right upon the grounds of the importance decision has in the national and international electricity market.

KPMR may require participation of other representatives and consultants from respective sectors, without voting right.

KPMR Chairman shall participate in all meetings of the Code Review Commission if issues of the Relay Protection and Restoration Plan are discussed.

3.11 Parties Responsibilities for Mutual Access Permission in Respective Properties

3.11.1 Introduction

This paragraph defines responsibilities of OST sh.a. and Users for mutual access permission in respective properties. It formulates procedures to be followed when work in electric equipment installed in other Parties properties is required.

This paragraph is necessary because between OST sh.a. and Users exist such interfaces that electric equipment or devices of one Party (such as metering and telecommunication equipment, SCADA, power cables, etc) are installed in another Party Property.

3.11.2 Object

The object of this paragraph is to reach an agreement according to principles and Rules of Technical Safety, and mutual work beyond property boundaries of OST sh.a. and Users.

3.11.3 Procedures

3.11.3.1 General

1. OST sh.a. and Users shall define by special agreement, a list of electric equipment or devices under the property of one Party, installed in the property of another Party. Property diagram according to descriptions in Connection Code as well as track ways are attached to this agreement.
2. OST sh.a. and Users shall define a list of persons authorized to enter and perform works in mutual properties.
3. OST sh.a and Users are responsible for the Technical Safety of normal work in their properties till the working conditions are fulfilled.
4. OST sh.a and User agree that works performed in another property should be authorized by an order signed by respective authorities. The working order shall indicate the equipment/group of equipment on which shall be worked, authorized persons, time period and if there will be a supply interruption for customers. The order should also define the electricity supply limitation.
5. Work performed on equipment/group of equipment is considered terminated when services rendered and safety measures are in conformity with the norms. Afterwards, the equipment/group of equipment are put in work.
6. After the termination of works, minutes signed by authorized persons are prepared to describe the works, time period, safety actions, and termination of works and objections of respective Parties.
7. OST sh.a. shall issue Users a working order after receiving the approval by the National Dispatch Center.

3.11.3.2 Compliance with Technical Safety Rules on the Working Field

Parties are obligated to apply Technical Safety Rules on the working place and provide mutual conditions in applying Technical Safety Regulation.

3.12 Control, Supervision, Testing

3.12.1 Introduction

Activities of control, supervision and testing should be performed according to procedures for:

- Control and supervision of all Users (Generation Units, Distribution Companies and Eligible Customers) to verify operation parameters;
- Testing of generation units to verify compliance with parameters and technological systems according to their statements;
- Testing of systems/objects of Distribution Companies and Eligible Customers to verify their compliance to parameters and technological systems according to their statements.

3.12.2 Scope and Area of Application

The scope of this paragraph is to examine if:

- Generation Units operate according to stated technical parameters and their willingness;
- Systems/objects of Distribution Companies and Eligible Customers operate according to stated technical parameters and their willingness;

3.12.3 Reasons

Actions of control, supervision and testing are performed by OST sh.a. when:

- Generation Units operate with different parameters from those stated.
- Systems/objects of Distribution Companies and Eligible Customers operate with different parameters from those stated.
- A Transmission Network User is not following guidelines of the National Dispatch Center or fails to apply its orders.

3.12.4 Testing of Capacities to Comply with OST sh.a. Requirements

a. Testing of generation capacity and absorbing of active power

Once per year, OST sh.a. may require to test the Generation Units, to verify if they respect the generation/absorbing capacity of reactive power.

Testing is required by OST sh.a. and the time period is approved by the National Dispatch Center.

OST sh.a. should inform the Generator on the scope of the test, 48 hours in advance.

If the Generation Facility test indicates that tested parameters do not meet the stated parameters, the Generator should submit within 5 days to OST sh.a, a detailed report that specifies the reasons of and actions to be taken.

If deviations are great and incorrigible, the review of agreement between OST sh.a. and Generator is proposed.

b. Testing of ability for Primary and Secondary Reserve

The testing of ability to make available Primary and Secondary Reserve by OST sh.a. is obligatory.

This test is periodically performed by the National Dispatch Center through SCADA in correlation with control and supervision activity of Generation Units operation.

OST sh.a. should inform the Generator on the scope of testing, 48 hours in advance.

If the Generation unit test indicates that tested parameters do not meet the stated parameters, the Generator should submit within 5 days to OST sh.a. a detailed report that specifies the reasons of and actions to be taken.

If deviations are large and incorrigible, the review of agreement between OST and Generator is proposed.

3.12.5 Testing of Generation Unit Starting Capacity

Testing of Generation Unit starting capacity once per year is binding for each generation Unit in order to evidence whether the Generation Unit comply with the rapid starting capacity according to stated parameters.

The test is required by OST sh.a. with the approval of the National Dispatch Center, during emergency situations of the Generation Unit.

OST sh.a. should inform the Generator on the scope of testing, 48 hours in advance.

If the test of Generation units indicates that tested parameters do not meet the stated parameters, the Generator should submit within 5 days a detailed report to OST sh.a. that specifies the reasons of and actions to be taken.

If deviations are too large and incorrigible, the review of agreement between OST sh.a. and the Generator is proposed.

3.12.6 Testing of Capacities to Participate in SEE Restoration

OST sh.a. shall require testing of Generation Units for SEE Restoration after a breakdown. The test is performed once per year in order to evidence that the Generation Facility has the possibility of restarting in conformity with SEE Restoration Plan requirements.

The test may be performed for the following possibilities:

1. restarting of generation unit from an independent source (for ex. diesel group)
2. restarting of generation unit from auxiliary supply.

OST sh.a. should inform the Generator on the scope of testing 7 days in advance.

If the test of Generation Unit indicates that tested parameters do not meet the stated parameters, the Generator should submit within 5 days to OST sh.a. a detailed report that specifies the reasons of and actions to be taken.

If deviations are too large and incorrigible, the review of agreement between OST sh.a. and Generator is proposed.

3.12.7 Testing of Declared Readiness

Upon OST sh.a. request, Generation Units should be tested on their readiness in conformity to this Code requirements.

3.12.8 Testing of Declared Parameters

OST sh.a. may require every year to test whether the Generation Unit meets the stated technical characteristics.

The test is required by OST sh.a. with the approval of the National Dispatch Center only during declared periods of readiness.

OST sh.a. should inform the Generator on the scope of testing 48 hours in advance.

If the test of Generation Facility indicates that tested parameters do not meet the stated parameters, the Generator should submit within 5 days to OST sh.a., a detailed report that specifies the reasons of and actions to be taken.
If deviations are too large and incorrigible, the review of agreement between OST sh.a. and Generator is proposed.

3.13. Coordination of Operative Actions

3.13.1 Introduction

Coordination of Operative Actions is necessary to exchange information on SEE operative actions and/or events that influence the functioning of:

1. Transmission System in case the operative actions and/or the event occur in Users system/object
2. User system/object in case the operative actions and/or event occurs in the Transmission System.

3.13.2 Purpose

The purpose of this paragraph is to specify the information to be exchanged between the National Dispatch Center and Users in order to identify respective influences from risky operative actions and/or events.

3.13.3 Definitions

Operative Action means every scheduled action that influences SEE functioning.
Event shall mean an unplanned event in SEE that includes breakdowns, incidents and SEE black out.
Influence of Operative Action shall mean any influence in SEE functioning after an operative action that may cause the Transmission System or Users system/object to function differently from their normal function without this operative action.

3.1.3.4 Notice of Operative Actions

The National Dispatch Center (OST sh.a.) and Users notices are done as follows:

a. *The National Dispatch Center*. If an operative action or unplanned event in the Transmission System influences the work of User system/object, the National Dispatch Center shall inform the User if this action is affecting User activity, according to specifications of this paragraph.
b. *Users*. If an operative action or unplanned event in the User system/object affects the work of the Transmission System, the User shall inform the National Dispatch Center, which accordingly, shall inform other Users if the action affects their activity according to specifications of this paragraph.

3.13.5 Nature of Operative Actions Notice

Notice of operative actions should include the scope and sufficient details to describe operative actions.

Illustrative examples of situations when a notice on operative actions and their effects is required are:

- Facilities and/or equipment are functioning beyond their capacities or may represent a risk for the staff;
- Switch off of the facility and/or manual or automatic equipment;
- Voltage levels are out of standards;
- Frequency levels are out of standards;
- Un-stabilized oscillations of SEE elements;
- Alarm activation or other indicators of abnormal functioning conditions;
- If unfavorable conditions and breakdowns of control, communication or metering equipment are noticed or predicted from experience;
- Increase of risks from actions of relay protection device;
- Breakdown of commuting equipment;
- Fire risk, etc.

These are only illustrative examples, but not limited to them.

3.16 Event Reporting

3.16.1 Introduction

This paragraph describes the requirement for a written report on the events orally reported between OST sh.a. and Users.

An incident may follow the event when the event's influence on the Transmission System or User system/object has undesirable consequences.

Events that occur in Users system/object are reported to OST sh.a. and other affected Users. Events occurring to the Transmission System are reported from OST sh.a. to affected Users.

3.16.2 Purpose

The object of this paragraph is to define the events that should be reported, ways of reporting and submitted information.

3.16.3 Reported Events

Typical examples of reported events with incidents are:

- Considerable increase or decrease of SEE frequency and voltage levels.
- Risky problems in main equipment or devices such as lines, transformers, commuting equipment, busbars.
- Events with incident of fire.
- Violation of security standards and Technical Safety rules, etc.

These are only illustrative examples, but not limited to them.

3.16.4 Reporting Procedure

All events accompanied with incidents in the Transmission System or User system/object should be reported.

The operative reporting is always made between the operative staff of the National Dispatch Center and User operative staff during the time of event. These reports are documented in operative books.

If the reported event with incident is classified as not small, respective operative staff of the National Dispatch Center and User shall prepare a written report at the end of their shift.

For events with such incidents, OST sh.a and Users shall prepare detailed reports within 5 days.

3.16.5 Form of Reports

The standard form of report is given in Appendix A.

The form of report is object of modification by the Code Review Commission. OST sh.a. and Users shall cooperate to analyze and investigate the causes of the event and consequences. Investigation for Users is done by OST sh.a. OST sh.a. has the right to inspect Users equipment according to procedures indicated in Appendix B of this Code.

3.16.6 Accident Reporting

If the event is accompanied by accidents, the accident reporting is done according to the Legislation in force.

This reporting is done for cases of fatal accidents and accidents with serious damages. The report is immediately submitted to the inspectorate or responsible authorities.

Appendix A
REPORTING OF EVENTS WITH INCIDENT

REPORTING NUMBER ……

Place ……
Date ……
Hour ……

Date and hour of event with incident ……
Place of event with incident ……
Type of event with incident ……

SEE parameters before event with incident ……
SEE parameters after the event with incident ……
Parameters and Configuration of Network before the event with incident ……
Indications of Relay Protection Devices and their performance ……
Damaged equipment ……
Undertaken repairing operative actions ……
Supply interruption and time period ……
Cause of event with incident ……
Recommendations for future improvements in case of repeating of the event with incident ……

Names and Signatures of Responsible Operative Staff

(……)

Appendix B
Investigation of Event with Incident

The scope of investigation is to enable OST sh.a. to provide information related to equipment and operative procedures.

In order to argue and draw conclusions on the incident, OST sh.a. shall send its representatives to the Users to investigate operative procedures including but without limiting to the investigation of:

- Execution of orders issued by the National Dispatch Center;
- Compliance of Users' operative orders with operative orders issued by the National Dispatch Center;

The investigation may be based only on SEE operative issues, but if necessary, the investigation may extend in time and analyze other elements using recording devices.

Users should accept and provide to OST sh.a. representatives all necessary documents.

The investigation procedure is established by OST sh.a. in a reasonable way and its representatives should have full knowledge on Users.

Appendix C
Prioritized Loads in the Restoration Process

Load Type	**Load (MW**

Load types:

1. Mines
2. Railway stations
3. Ports and Important Industrial Loads
4. Main Cities
5. Hospitals, Water Pipelines, TV Stations and Radios
6. Industries with Processes
7. Defence Institutions

TABLE OF CONTENTS

PART 4
CONNECTION CODE

PART 4
CONNECTION CODE

The Connection Code specifies the conditions, criteria and deadlines Users should fulfill for connection to the Transmission System or modification of their existing connections.

4.1 Application Procedures for Connection

Each User that requires to establish new agreements or to modify existing agreements to and/or use of the Transmission System should follow the procedures stipulated by this Code.
OST sh.a. shall follow procedures and deadlines specified in this Code in the process of application, modification, acceptance or refusal of an offer.

4.1.1 Optimal Place of Connection

OST sh.a. should approve any connection place that is technically optimal for Users to connect their systems/objects to the Transmission System.

4.1.2 Data from OST sh.a.

Any existing or prospective User that desires to change its capacity, after planning studies published by OST sh.a. may require more information from OST sh.a. OST sh.a. shall provide the requested data within 30 days after the request. OST sh.a. may refuse to provide data if considers them confidential or not necessary for User's activity. OST sh.a. shall apply reasonable charges for the cost of providing such data.

4.1.3 Application for Connection

Any User requiring to use the Transmission System may file to OST sh.a. an Application for Connection in the format prepared by OST sh.a.

4.1.4 Acceptance or Refusal of Application for Connection

OST sh.a. shall accept or refuse the Application within 60 days from the Application filing day. In case of refusal, OST sh.a. shall communicate the reasons of. If OST sh.a. requires additional data from the Applicant, the latest date for acceptance or refusal may be postponed 30 days from the day additional data are submitted. Additional data shall be provided to OST sh.a. within 20 days from the request day. If the additional information is not received by OST sh.a. within 20 days, OST sh.a. may refuse the request for Connection.

4.1.5 Data Exchange

Exchange of data between OST sh.a. and Users should comply with Code provisions.

4.1.6 Unaccepted Offers

If an offer is not accepted by the User within the validity period, no further action shall be undertaken by OST sh.a. regarding the Application for Connection.

The validity period is established in the technical and economic study presented by the User and approved under the Connection Agreement.

4.2 Connection Conditions

4.2.1 Introduction

This paragraph presents the conditions to be fulfilled by the User in order to use the Transmission Network.

4.2.2 Purpose

The purpose of this paragraph is to fulfill the following objectives:

1. All existing or prospective Users should be treated equally.
2. New Connections should not cause a negative effect on the existing Users, or a New Connection should not be influenced by negative effects of existing Users.
3. Assist Users to implement License obligations and provide high quality operation and maintenance of their systems/objects.
4. Clearly specify in standard form the obligations and responsibilities of all systems/objects for each place of Connection.

OST sh.a. has the obligation to provide regulated access to all Transmission Network Users.

The Applicant requiring connection permission should provide the following information:

a. data on its activity field and address (name, address, phone, fax, e-mail),
b. information on the System/Object to be connected (power generation, distribution system/object, systems/objects connecting different customers) including the Connection point,
c. written statement on the readiness to apply the Transmission Code,
d. list of documents attached to the application for a New Connection.

4.2.3 Documentation to be attached to the Application for Connection

The documentation should include:

a. Study on Generation Units Connection: Planning data set out in the Code.
b. Study on Distribution Facilities Connection that shall connect their system/object. Planning data set out in the Code.
c. Study on Eligible Customers system/object connection. Planning data set out in the Code.

d. Data on equipment that generate/absorb active power.
e. Submitted proposal with respective phases according to technical and economic studies to achieve project indicators (designing, implementation, testing and commissioning).

For the approval of Connection Technical Permission, OST sh.a. shall analyze the following:

a. Technical data for all kinds of installation when the request of Applicant for Connection has been registered.
b. Possibility of Transmission Capacity use. If the possibility does not exist, Applicants are obliged to undertake technical and financial measures till the full covering of investment within safety technical conditions specified by the Code.
c. Technical possibilities of Connection
d. Selection of New Connection in the respective place analyzing:
    i. Security of supply level
    ii. SEE static and dynamic stability
    iii. Level of short circuit current
    iv. Effect of technical losses in cases of Old and New Connections to the Transmission Network
    v. Power supply for ancillary equipment, especially in cases of connection of one generation unit.
f. Assessment of Connection manner in the existing scheme of Transmission Network,
g. Assessment of OST sh.a Connection cost according to the variant proposed by the Applicant.
h. Fulfillment of technical conditions of Connection.
i. Compliance with respective paragraphs of Transmission Code.

If analysis indicates that voltage Connection should be lower than 110kV, the respective request should be submitted to the Distribution Company. OST sh.a. technical acceptance of Connection, contains:

a. Terms and general conditions for indicators according to the required New Connection,
b. Description of selection for New Connection that includes activities performed to expand and reinforce the Transmission System
c. Specific conditions of Connection,
d. Compliance with the Code,
e. Monitoring and control requirements to define Connection conditions in SCADA and Telecommunication System,
f. Registered data that need verification during as they are used,
g. Assessment of cost, which is out of OST sh.a. responsibility to be paid by the Applicant,
h. Safety level of Transmission Network in the Connection point,
i. Applicant's obligations to participate in SEE Restoration, Protection and Expansion Plan,

j. Requirements regarding relay protection of New Connection and coordination with existing protections,
k. Electricity supply parameters,
l. Conditions under which the User may be disconnected from Transmission Network,
m. Standards requirements that should be meet by connection, metering, control, automatization and telecommunication equipment or devices.

The Document of Connection Technical Acceptance should be issued within 90 calendar days from the day OST sh.a. receives an Applicant's written request accompanied with all above listed documents.

4.2.5 Technical Requirements for Equipment of Connection to the Transmission Network

Technical requirements for specific connections are:

- Technical conditions provided by OST sh.a. in points of Connection should be in conformity with the National and International norms and standards.
- Technical conditions of Connection should be similar for all Users according to respective categories.
- Equipment in points of Connection between Transmission Network and User should be according to effective technical standards.
- Connections between Users and OST sh.a. installations should be performed through switchers capable to switch off with maximal velocity when SEE parameters are out of allowed limits of value.
- Selection and definition of switching off capacities and stability against short circuit currents should be within standards defined for each Connection Point.
- Protection of installation in points of Connection between Transmission Network and Users should fulfill requirements of effective technical norms in order to reduce to the minimum the adverse effect on other Users.

4.3 Connection Agreement

If the Application is accepted, OST sh.a. and Users should proceed with finalizing a Connection Agreement. The Connection Agreement should specify the general conditions of Connection and every specific technical and financial condition applied in the Connection.

4.4 Connection Specifications

The Applicant should attach to the Connection request filed with OST sh.a., the following documentation:

- Connection Place (User's Substation);
- Substation single line diagram;
- Substation scheme;

- Parameters of all substation elements (entering and exits of lines, cables, switchers, busbars, isolators, dischargers, current transformers, voltage transformers, power transformers, etc,);
- Control and Relay Protection Scheme;
- SCADA and Telecommunication;
- Electricity metering equipment;
- Under -Frequency Relays;

The Applicant should also indicate:

- Responsible persons for equipment control and maintenance;
- Responsible persons for equipment operation;
- Responsible persons for staff and Technical safety.

Note: *The settings of Relay Protection shall be made during Connection phase).*

4.5 Point of Connection

4.5.1 Generator

Point of Connection of Generation Facility shall be in 400 kV, 220 kV and 110 kV voltage levels.

4.5.2 Distribution Company

Point of Connection of Distribution Companies shall be in 110 kV voltage level.

4.5.3 Eligible Customers

Points of Connection of Eligible Customers shall be in 220 kV and 110 kV voltage levels.

4.6 Network Characteristics

4.6.1 Introduction

This paragraph specifies SEE parameters that affects the performance of existing and prospective Users systems/objects.

4.6.2 Purpose

The purpose of this paragraph is:

- to make sure that SEE performance meet the standards which are essential for User systems/objects;
- to enable Users to design their systems/objects according to standards.

4.6.3 Voltage Levels

Allowed maximal and minimal voltage levels are detailed below.

System Voltage	Maximal	Minimal
400 kV	420 kV	360 kV
220 kV	245 kV	198 kV
150 kV	242.5 kV	162 kV
110 kV	123 kV	99 kV

4.6.3.1 Voltage Disbalance

Voltage disbalance is defined as:

1. Difference of phase voltage amplitudes,
2. Difference of angles between phases from the 120° value.

Phase voltages should have equal and disphased amplitude of 120°. Any deviation causes the malfunctioning of winding (spinning) equipment, efficiency decrease, vibrations, overheating, etc.

Disbalance voltage limits are:

For 400 kV and 220 kV: 2%
For 154 kV and 110 kV: 3%

4.6.4 Frequency

SEE frequency should be kept within an acceptable level to provide SEE proper functioning. OST sh.a. should fulfill obligations to keep the frequency within allowed levels. The allowed level of frequency change is ± 200mHz.

4.6.4.1 Deformation from Harmonics

Some types of equipment and phenomenon may produce voltage and current in frequencies that are multiple of SEE's frequency. These high frequency components are called harmonics and their balance with the SEE frequency is called harmonic order.

Harmonics are divided in three groups: single, single-triple and double harmonics.

Harmonics have negative effects on SEE and loads connected to SEE, therefore they should be limited to maximum.

Harmonics quality indicators are shown in the table.

Total deformation from harmonics	**Voltage level under 110 kV**	**Voltage level over 110 kV**
	8%	3%

4.6.5 Voltage Flickers

Voltage Flickers may cause electric load problems. If amplitude and frequency oscillation is perceptible from human eye, it is called voltage flicker. Voltage flickers usually are not produced by SEE but from Users loads such as hark furnaces, compressors, big engines, welding factories, etc. As long as SEE voltage flickers affect other Users, OST sh.a. should control and monitor this phenomenon in 100 kV and MV voltage busbars.

Flickers limits, control and metering procedures are based on respective standards.

4.6.6 Power Factor (cosϕ)

SEE loads should have a power factor (cosϕ) as close as possible to the unit (one), in order to have low losses and optimal operation of the Transmission System. Loads with power factor lower than 0.9, deservedly affect the Transmission System and other Users. Therefore, Users should respect the power factor limit for their loads.

The allowed minimal power factor is 0.9 (cosϕ= 0.9)

- Metering of power factor is continuously performed together with voltage metering. Loads with low power factor should immediately place condensers to correct the problem.
- Users with power factor lower than 0.9 may be refused to connect to the Transmission System but existing Users are required to place compensator for improvement of cosϕ.

4.6.7 Requirements and Coordination of Relay Protection

Users electric equipment shall not be connected or continue to remain connected to the Transmission System without necessary relay protection and respective principles of safety, selectivity, velocity, differentiation and sensitivity.

This paragraph describes the requirements of relay protection for coordination and cooperation between the Transmission System and Users. The Transmission System and Users cooperate in calibration of Relay protection devices and improvement of relay protection technology. Relay protection device of Users systems/objects shall not be settted without consultations with OST sh.a. and discussions and approval of KPMR.

KPMR shall be responsible for organizing periodical meetings to discuss the coordination of Relay Protection of Transmission System and Users. KPMR shall investigate the malfunctioning, lack of functioning, delay of functioning or any unacceptable performance of Relay Protection Device.

OST sh.a. shall be responsible for settings of the relay protection devices in the whole Transmission System 400 kV, 220 kV, 150 kV, 110 kV. OST sh.a. shall approve the Relay Protection System of 110 kV lines and make their calibration in coordination with Users. Users are responsible for setting of the relay Protection Devices in their systems/objects and coordinate setting of Relay Protection Devices in boundaries with Transmission System.

4.6.7.1 The Setting of Relay Protection

The following table of Relay Protection actions was prepared by taking in consideration the SEE stability and continuous analysis of Relay Protection System and primary equipment.

Time limits

Voltage Level	Total Time of Relay Protection Functioning + the Time of circuit breaker.
400kV	80 msec
220 kV	110 msec
150 kV, 110 kV	120 msec

4.6.7.2 Relay Protection Requirements

4.6.7.2.1 Generation Requirements

Generation Units connected to the Transmission System shall be protected with a complete and appropriate protection system, therefore the Transmission System shall not suffer from breakdowns originating from Generation Units.

Required protection of Generation Units (Transformer-Generator Block) include:

A. Generators

1. Differential Protection of the Block
2. Differential Protection of the Generator
3. Maximal Protection with Minimal Voltage Blocking
4. Protection from Overload
5. Protection from Asymmetric and Symmetric Short Circuits
6. Protection from Earthing in Stator
7. Protection from Earthing in Rotator
8. Protection from over voltage
9. Protection from Excitement Losses
10. Neuter Protection of the Block
11. Protection of Opposite Order

B. Transformers of Generation

1. Maximal Protection with/without Minimal Voltage Blocking
2. Neuter Protection

Transformers connected in block (generator-transformer) are set together with the generator in block.

C. Ancillary Transformers

Maximal Protection

(Note: Exception may be done for some types of protection in small generation units).

This paragraph describes only the protection that directly affects the Transmission Network. Other protections of Generators, Transformers, Turbines,

Boilers and Auxiliary Systems have been considered as Generators internal issues, and therefore not detailed here.

4.6.7.2.2 Relay Protection Requirements for the Transmission System

Lines of high voltage 400 kV, 220 kV, 150 kV and 110 kV, shall have: Distant and Back-Up Protection. All 440 kV and 220 kV lines shall have two protection schemes: Distant with fast operation and Back-Up Protection. It is preferred that main protections are fed from different sources of voltage and current. The voltage may be provided separately from voltage transformers in busbars and line voltage transformers. Line current transformers may provide the current from two different bobbins. The Transmission System may provide additional back-up protection with selection.

400 kV Lines: Have two Distant Protections and Back-Up Protection. Distant Protection in 400 kV lines may be static or numeric and have at minimum 3 fast action zones.
Main Protections 1 and 2 have the same velocity of action and preferably different principles of functioning.
Time setting of zones should include switchers' action times.
Action timing of the first zone (together with the switcher's action) is 80 mill sec.
Action timing of the second zone (together with the switcher's action) is 400 mill sec.
Timing of other zones is defined according to Transmission System covering zone and configuration. Protection of 400 kV lines is equipped with the single phase Auto Reclosing Device (AKP).

Depending on OST sh.a. judgment, the main Automatic Protections 1 and 2 may have DC supply from different batteries.

220 kV Lines: Have two Distant Protections and Back-Up Protection. Distant Protection in 220 kV lines may be static or numeric and have at minimum 3 fast action zones.
Main Protections 1 and 2 have the same velocity of action and preferably different principles of functioning.
Time setting of zones should include switchers' action times.
Action timing of the first zone (together with the switcher's action) is 110 mill sec.
Action timing of the second zone (together with the switcher's action) is 400 mill sec.
Timing of other zones is defined according to Transmission System covering zone and configuration. Protection of 220 kV lines is equipped with the single phase Auto Reclosing Device (AKP).
Depending on OST sh.a. judgment, the main Relay Protections 1 and 2 may have DC supply from different batteries.

150 kV, 110 kV Lines: Have Distant and Back-Up Protection. Distant Protection in 150 kV, 110 kV lines may be static or numeric and have at minimum 3 fast action zones.

Time setting of zones should include switchers' action times.
Action timing of the first zone (together with the switcher's action) is 120 mill sec.
Action timing of the second zone (together with the switcher's action) is 400 mill sec.
Timing of other zones is defined according to Transmission System covering zone and configuration. Protection of 150 kV, 110 kV lines is equipped with the triple phase Auto Reclosing Device (AKP).

4.6.7.2.3 Earthing

In order to increase the efficiency and selectivity of Transmission System Relay Protection, earthing of power transformers 400 kV, 220 kV, 150 kV, 110 kV is essential. The earthing system is studied, analyzed and established by OST sh.a. The earthing structure is obligatory for Users systems/objects.

4.6.7.2.4 Relay Protection Requirements for Medium Voltage Lines 35 kV, 20 kV, 10 kV.

Lines of medium voltage 35 kV, 20 kV, 10 kV are protected by Maximal Current Protection, Instant Protection and Protection of Defects directed to the Earth. Setting of Relay Protection in Users medium voltage lines shall be established with an agreement between Users and OST sh.a.

4.6.7.2.5 Relay Protection Requirements for Transformers

Autotransformers and power transforms are protected by Differential Protection. In addition, they are protected by Overload Protection, Protection from Maximal Currents, Neuter Protection and Protection from Earth Defects. For parallel functioning, a detailed type of Back-Up Protection is necessary. For Protection against heavy Short Circuits, gas automatic protection, Protection from Winding Temperature, Protection from Oil Temperature and Fire Protection should be provided in addition to electric protection.
Power transformers ≥ 10 MVA of Users systems/objects are equipped with Differential Protection, Protection of Maximal Directed Current and Relay Protection for Earth Defects.
For 110 kV/35 kV/20 kV level transformers of Users systems/objects 10 MVA high Differential Protection and Protection from Earth Breakdowns (of parallel functioning type) shall be provided.

Following are the approved norms of protection for transformers of different voltage levels and nominal power.

4.6.7.2.6 Protection Requirements of Substation Busbars

Substations busbars of 400 kV, 220 kV, 150 kV, 110 kV voltage level are protected by Differential protection. Busbars are also equipped with Protection from Refusal of Switcher Action.

4.6.7.3 Protection from Fire

The Fire Protection System and rules of its application should be in accordance with Standard Specifications and Legislation in force.

4.6.8 Data Required from OST sh.a.

a. Types and setting of all relay protection devices and protection systems installed in Generation Units (Transformer-Generator block, auxiliary Transformers and auxiliary equipment)
b. Types and calibration of all installed automatic protection devices in all 110 kV/MVkV User transformers
c. Types and Setting of installed relay protection in all 110 kV lines
d. Required data to define short circuit currents in every point of connection and switching capacities of commuting equipment short circuits in boundaries with the Transmission System.

4.6.9 Designing Parameters of New Generation Facilities

The requirements of this Code shall be applied for New Generation Facilities. The rehabilitation and modernization of existing facilities should also comply with requirements of this Code.

In addition, OST sh.a. may require Generators to comply with other specifications of bilateral agreements before accepting the Application for Connection, in order to provide the required performance of the Transmission System and whole SEE.

- Generation Units shall be able to supply the nominal production of active power with a power factor value from 0.85 to 0.95.
- Generation Units should have the capability curve.
- The Short Circuit Coefficient (Kc) of Generation Units should not be lower than 0.5.
- Generation Units should be able to supply active power even when system frequency reaches 49.5 Hz and 50 Hz levels.

New Generation Units should have Automatic Governer (RASH) and Automatic Voltage Regulator. The capacity of RASH static setting should be from 3 to 6%. The generation unit should be able to immediately increase the production by 5% within 5 minutes from SEE frequency decrease.

Generation Units should have a star connected stator winding ready for earthing. The earthing of star point is established by the Transmission System in order for the earth connection Factor to be 1.4 or lower.
Thermal Generation Units should have relatively fast Deliverance capacity, to enable the National Dispatch Center to use it as Tertiary Control Reserve.
Hydro Generation Units should be able to continue their reliable functioning for any load between 35% and 105% of capacity.
Generation Units and the plant as a whole are equipped with SCADA. The Generator shall provide to OST sh.a the required functioning parameters through SCADA installed in its system/object.

Each Generation unit should have at least the following capacities:

- To generate and operate with normal parameters for Transmission System frequencies in the diapason of 49.5 Hz – 50.5 Hz.
- To remain synchronized with the Transmission System for frequencies of Transmission System in the diapason of 47.5 Hz – 49.5 Hz and 50.5 Hz – 52.5 Hz for 60 minutes.
- To remain synchronized with the Transmission System for frequencies of the Transmission System in the diapason of 47.0 Hz – 47.5 Hz for 20 seconds. This is required every time the frequency is lower than 47.5 Hz.
- To remain synchronized with the Transmission System for frequencies of the Transmission System in the diapason of 52.5 Hz – 53 Hz for 5 seconds. This is required every time the frequency is lower than 52.5 Hz.
- To remain synchronized with the Transmission System during frequency change of the Transmission System with values higher or equal to 0.5 Hz for second.
- To continue operation in Generation specified minimum within values of 49.8 Hz – 51.0 Hz.
- Remain synchronized during the change of Transmission System voltage levels in values higher and equal to 10%.
- To continue operation according to Reactive capacity Curve as required by the Transmission System to maintain Voltage levels.
- To remain synchronized during breakdown of generation/load balance according to IEC 60034-1 standards.
- The current value of Short Circuit should be according to IEC 60034-1 standards.
- Minimal Generation no higher than 35% of Nominal Capacity.
- Capacity to Increase Generation no lower than 1.5% of nominal capacity per minute, when the unit is under normal operation conditions.
- Capacity to Decrease Generation no lower than 1.5% of nominal capacity per minute when the unit is under normal operation conditions.

Generation Units should continue to operate even when voltage profiles of Transmission System are in levels indicated by the following table:

Voltage level	Connected to:	With maximal Capacity cosφ	With 35% of Maximal Capacity cosφ
99 kV – 123 kV	110 kV	0.93 – 0.85	0.7 – 0.4
90 kV – 100 kV		0.85	0.7 – 0.4
140 kV – 163 kV	150 kV	0.93 – 0.85	0.7 – 0.4
125 kV – 140 kV		0.85	0.7 – 0.4
198 kV – 242 kV	220 kV	0.93 – 0.85	0.7 – 0.4
190 kV – 200 kV		0.85	0.7 – 0.4
360 kV – 420 kV	400 kV	0.93 – 0.85	0.7 – 0.4
350 kV – 360 kV		0.85	0.7 – 0.4

4.7 Implementation

Based on current conditions and future development of the Electric Power System, the implementation of the Transmission System Code shall be achieved gradually.

The final scope of this procedure is for SEE to fulfill the standards established by this Code.

In case of failure to fulfill the Code standards, Parties shall submit their respective arguments on this. These arguments shall be considered and addressed based on the Legislation in force, by decision-making structures established in the Transmission System Code.