Polskie Sieci Elektroenergetyczne
Operator S.A.

INSTRUCTION OF TRANSMISSION SYSTEM OPERATION AND MAINTENANCE

(Instrukcja Ruchu i Eksploatacji Sieci Przesyłowej - IRiESP)

Terms of use, operation, maintenance and planning of the network development

(Warunki korzystania, prowadzenia ruchu, eksploatacji i planowania rozwoju sieci)

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Preamble

Fulfilling the obligation resulting from article 9g of the Energy Law Act dated 10 April 1997, consolidated text in Official Journal of 2003 No 153 item 1504 as amended, the transmission system operator developed the Instruction of Transmission System Operation and Maintenance.

The Instruction of Transmission System Operation and Maintenance, hereinafter also referred to as IRiESP – the terms of use, operation, maintenance and planning of network development, defines the detailed rules of using the transmission networks by the system users and recipients and the terms and method of operation, maintenance and planning of the development of these networks.

The Instruction of Transmission System Operation and Maintenance also contains a separated part regarding the balancing of the system and management of the system limitations, hereinafter referred to as IRiESP – system balancing and management of system constrains.

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CHAPTER I. INTRODUCTORY PROVISIONS

Terms and Definitions

Automatic load frequency control (ARCM)	Automatic load frequency control system implemented in interconnected power systems, taking into account the criteria that provides for maintaining the power exchange balance with adjacent TSOs and at the same time to restore the system frequency according to the specific algorithm.
Automatic voltage control system (ARNE)	Voltage and reactive power control system at the generation node.
Automatic transformer tap-changer System (ARST)	Voltage control system in the grid using the transformer's voltage control.
Automatic Anti-Swinging and Overloading Protection System (APKO)	Automatic control system preventing the swinging in the national power system and overloads of network elements by reduction of power that is generated by generating units.
Network disturbance	An operating event that trips out from operation a part of the national power system which supplies to or consumes from the network the amount of electrical energy that does not exceed 5% of the current power demand of the national power system.
System disturbance	An operating event that trips out from synchronous operation a part of the national power system, which supplies to or consumes from the network the amount of electrical energy exceeding 5% of the current power demand of the national power system.
Emergency Operating Conditions	Network configuration envisaged by the System Operator in the case of the contingency.
Power Balance Sheet	The numerical sheet of planned or actual values of the electric power demand and supply.
Gas-steam unit	Set of devices composed of the gas turbine, waste heat boiler and generator(s). This equipment converts the chemical energy contained in the gas fuel into the mechanical energy of the gas turbine, while the heating energy generated during this process is used in the waste heat boiler to produce the steam used in turn by the gas turbine and for heating purposes. The set may be composed of more than one gas or steam turbine and synchronous generators, however all this equipment is interconnected through the technological process and meets the definition of the generating unit.
Central metering-settlement system (CSPR)	IT system of the TSO dedicated for the determination of the electrical energy delivery volumes for settlement purposes.
Start-up Time	Time from the moment of issuing the start-up order till the

	moment when the generating unit arrives at the preset load level.
Regulation activities	The regulation (feedback control) activities cover the following operations: a) change of the reactive or active power generated by the generating units; b) overloading or underloading operations of the generating units; c) reprogramming of the ARNE system; d) reprogramming of the ARCM system:
Control activities	The control activities include: a) switching on/off the primary or secondary control of the generating units, b) switching on/off the ARNE system, c) reprogramming or outage of the APKO system, d) control of the pumped-storage power plants, e) control of the line or transformer circuit breaker or transformer tap changer, f) synchronization of the generating units, g) manual changing of the transformer taps, h) change of the voltage on the bus-bars controlling the generation of the reactive power by the generating unit, i) control of the systems such as SPZ, APKO, SZR, APP, j) control of the operation of EAZ systems in the network.
Operating day	A period from 00:00 hours to 24:00 hours, during which the schedules of operation of the grid and the generating units are implemented.
Positive range if primary control	Part of the range of primary control from the base point of operation to the maximum value of the primary control band.
Distribution	Transport of electrical energy using the distribution networks for the purpose of its delivery to the customers except for the sale of this energy.
Working day	A period from 00:00 hours to 24:00 hours of each day, which is not a Saturday or a bank holiday.
Transmission grid operation	A set of activities ensuring the ability of the transmission grid to operate in a reliable manner and supply the customers and cooperate with other networks.
Energy delivered	Electrical energy being the difference between the energy output and input at the place of delivery.
Energy supplied to the network	Electrical energy supplied by the generating unit to the power grid registered by the metering circuit installed at the high

	voltage of the generator transformer of such unit.
Energy generated	Electrical energy generated by the generating unit registered by the metering circuit installed on the generator voltage of such unit.
Wind farm	A set of generating units using wind energy for electrical energy generation, connected to the grid at the single connection point.
Physical metering point (FPP)	A place in the network, equipment or system, where the flow of electrical energy is measured.
Inter-system exchange schedule	Trading data showing the planned execution of the agreement regarding the sale of electrical energy in international trade during every hour of the commercial day.
Hydro-set	The generating unit of the hydro power station.
Dispatch information	Transfer of data among the dispatch services about the events, changes of the network configuration, equipment and installations and about the changes to the parameters, which could have impact and importance for the power system operation.
Generating unit	Isolated set of equipment belonging to the electric utility, designed for generation of energy and described by the technical and trade data. The generating unit includes also the generator transformers and lines to the system including the connections in the place of connection of the unit to the network.
Centrally dispatched Generating unit (JWCD)	A generating unit connected to the transmission network or coordinated 110 kV network that is the subject of central dispatching by the TSO.
Generating unit that is not a centrally dispatched generating unit (nJWCD)	A generating unit that is not the subject of central dispatching by the TSO.
Centrally coordinated generating unit (JWCK)	A generating unit, whose operation is subject to coordination by the TSO.
Generating unit after modernization	A generating unit, whose technical parameters were restored or improved as a result of modernization activities in relation to the parameters observed at the time of its installation.
EIC Identification code	ETSO identification code explicitly identifying the Participant of Inter-System Exchange (UWM) on European electric energy market assigned by ETSP Codes Office or local EIC Code Office.
Conventional generating unit	A generating unit using the fuel (solid, liquid or gas) or water for electric energy generation.
Coordinated 110 kV network	A part of 110 kV distribution network, in which the flows of the electric energy depend also on the operating conditions of the transmission network.

National power system (NPS)	Power system operating in the territory of Poland.
Load curve	Graphic presentation of the variation of load versus time.
Local EIC codes office	Office assigning EIC identification codes, which has the authorization of the Central ETSO Codes Office.
Delivery point	Point in the network to which electric utility is supplying electricity. The point is defined in the connection agreement or the transmission or distribution services provision agreement, which at the same time is the place of consumption the electricity.
Connection point	Point in the grid where the connector is connected to the grid.
Available capacity of the generating unit	The available capacity reduced by the capacity losses notified by the generator.
Available operating capacity of the generating unit	Available capacity of the generating unit reduced by the capacity losses resulting from the network's operating conditions.
Available capacity of domestic power plants	Total available capacity of JWCD and nJWCD.
Available operating capacity of domestic power plants	Total available operating capacity of JWCD and nJWCD.
Available capacity of TSO	Total available operating capacity of JWCD and nJWCD load.
Technical minimum of generating unit	Minimum capacity of the generating unit at which the generating unit of the thermal plant is operating continuously while maintaining the ability to operate under primary and secondary control, if the given unit is required to provide the second or minute reserve services. At hydro power plants this is the minimum admissible capacity of the stable operation of the hydro-electric set.
Available capacity	The maximum continuous capacity of the generating unit or the generator confirmed by the tests under the rated operating conditions.
Connection capacity	Active power scheduled for supply to the grid or take-off specified in the connection agreement as the maximum value set during each hour of the settlement period from the average values of this power during 15 minutes periods, used to design the connection.
Output power	Instantaneous power at the terminals of the generating unit or the sum of instantaneous powers of the generating units operated by the generator.
Installed capacity	The highest continuous capacity that can be generated, transmitted or delivered by the given power equipment, as

	defined by its manufacturer.
Installed capacity of the wind farm	Value of active capacity that is the sum of the rated capacities of the individual generating units comprising the wind farm.
Extra high voltage (EHV)	220 kV or higher voltage.
Rated voltage	Voltage level planned by the manufacturer in reference to operation of particular equipment.
Normal network configuration	Configuration of the grid and connected generating units ensuring the best technical and economical conditions of the transmission of electrical energy and fulfilment of the criteria of the reliability of grid operation and power quality delivered to the grid users.
Normal network operating conditions	Operating condition of the power system, under which all values of its parameters within the acceptable thresholds and all safety criteria of its operation are met.
Electric facility	Facility that includes the electrical energy circuits, devices, installations dedicated for the generation, transmission, processing, distribution and collection of electrical energy, including the buildings they are located in and the area on which they are located.
Facility regulation systems	Systems for automatic primary and secondary regulation with Y_1 signal, tertiary control with Y_0 signal installed at the generating unit.
Customer	Any entity that receives or collects energy under the agreement concluded with the electric utility.
Final customer	Customer that purchases the electrical energy for its own use.
Balancing bid	Production-price bid of the increase of generation of electrical energy or decrease of the generation of this energy or consumption of electrical energy for the scheduling unit submitted within the scope of the balancing market, containing the commercial and technical data.
Network constraints	The constraints in the operation of the generating units resulting from the technical conditions of grid operation.
Energy supply and delivery curtailments	Curtailments applied to the consumption of energy by customers in the case of the deficit of capacity or electric energy and in the case of the disturbance or state of emergency in the NPS.
Operational event	Any change of: a) operating status of equipment, b) system configuration, c) adjustment settings, d) control settings.

Switching operations	The switching operations include specifically: a) shutdown or start-up of lines, transformer, reactor, battery bank, b) switching of equipment in the system of bus bars in the station, c) switching of the power system auxiliaries from the main to back-up power supply, d) shutdown or start-up of the hydro-generators from/for compensation operation.
Trade-Technical Operator (OHT)	An entity that is responsible for control of the scheduling unit of the balancing market participant in the trade and technical context.
Trade Operator (OH)	An entity that is responsible for control of the scheduling unit of the balancing market participant in trade context.
Metering Operator (OP)	Entity that is responsible for the acquisition of the electric energy metering data from the metering-settlement circuits and their transmission to TSO or other operator handling the settlement processes.
System Operator	The transmission system operator or the distribution system operator.
Distribution System Operator (DSO)	Electric utility handling the distribution activity, responsible for the network operation within the energy distribution system, current and long-term secure operation of this system, operation, maintenance, repairs and necessary development of the distribution network, including the connections to other power systems.
Transmission System Operator (TSO)	Electric utility handling the transmission activity, responsible for the network operation within the power transmission system, current and long-term secure operation of this system, operation, maintenance, repairs and necessary development of the transmission network, including the connections to other power systems.
Secondary regulation range	Range of the generating units load regulation within the framework of the secondary control, where the secondary regulator is allowed to exert automatic control in both directions from the current pre-set point.
Daily Coordination Plan (PKD)	Coordination plan developed by OSP during *n-1* day for each hour of day *n* with the support of the Load Distribution Algorithm, which ensures the selection of the Generating Scheduling Units participating in the Balancing Market, based on the trade and technical data submitted in the Balancing Bids, considering the system constraints and the necessary power

	reserve at NPS and the equality of the market participants and notified for the physical execution of the Energy Sale Contracts. The Daily Coordination Plan contains the operating plan of JWCD for every hour of the day considering the balancing of the daily demand forecast, required reserves and system constraints observed in NPS.
Dispatcher O\order	Order issued by the dispatcher regarding the execution of the determined operational events or verification operations carried out at the given power facility.
Overload operation of the generating unit	Operation of the generating unit with the load above the available capacity.
Underload operation of the generating unit	Operation of the generating unit with the load below the technical minimum.
Isolated operation	Independent stable operation of the generating unit or a few generating units within the power plant under the lack of power supply from NPS concerning the auxiliary power supply and power supply for general needs of the power plant and the execution of TSO instructions regarding the increase of the isolated area.
Island operation	Independent operation of a part of NPS that is isolated after its emergency disconnection from NPS, having at least one generating unit in operation, which in the situation of disconnection from NPS is capable to supply the customers and other generating units.
Emergency operations	Unscheduled operations concerning the maintenance of the facilities, equipment and installations of the power system, related to the repair of minor faults or prevention of failures and disturbances.
Special Switching Program	Program of complex switching operations carried out in relation to the conducted network works or system trials.
System trial	Functional trials meant to assess the technical condition of the power system or its part based on its performance under the conditions that simulate the normal operating conditions or the conditions observed under potential disturbances.
Transmission	Transport of electric energy using the transmission network in order to deliver it to the distribution networks or final customers connected to the transmission network excluding the sale of this energy.
Connector	Section or element of the grid designed for connection of equipment, installation or network of the entity characterised by the required by him connection capacity, with the network of the electric utility providing for such entity the transmission or distribution service.

Metering point	Place in the power system, where the volume of electricity and determined electric parameters are measured.
Frequency control	Control system taking place in the power system meant to maintain the stable value of frequency or reduce the deviation of the synchronous time from the astronomic time down to the acceptable limits.
Primary control	Power control system of the generating unit carried out with the support of the individual speed governor according to the grid frequency.
Tertiary control	Automatic or manual shifting of the operation points of the generating units meant to change their spinning capacity that the primary and secondary control is concentrated around.
Secondary control	Load and frequency control system in the power system carried out with the support of the coordinated use of the individual governors of the selected generating units by the automatic load frequency control system (ARCM).
System Controller	The central unit of the automatic load frequency control system (ARCM).
Hourly reserve	Range of the available capacity of the running generating unit available to TSO, available overtime no longer than 15 minutes from the time of issuing the order, according to the description of the increase of the load for the given generating unit, understood as the range of power declared in the bid not covered by the energy sale contract, reduced by the power volume reserved for the second and/or minute reserve based on the control utilisation markets defined in WPKD.
Minute reserve (R_m)	Control range of the generating unit activated under the secondary control system using the Y_1 signal.
Capacity reserve of the generating unit	The dispatchable power of the generating unit not utilised during the given period.
Operating power reserve of the generating unit	The dispatchable operating power of the generating unit not utilised in the given point of time.
Power reserve at domestic power plants	The surplus of the dispatchable operating power of the generating unit over the demand to be covered by the domestic power plants determined for the given period.
TSO's power reserve	The surplus of TSO's dispatchable power over the demand to be covered by domestic power plants determined for the given period.
Second reserve (R_s)	The positive range of control of the given generating unit activated under primary control procedure.

Spinning reserve	Total second, minute and hourly reserve.
Cold reserve	Reserve at generating units that can be started-up from the standstill during the time resulting from their start-up parameters.
Dynamic stability (global stability)	Ability of the system to maintain synchronous operation of the generating units under major disturbances of the operating conditions (of a high amplitude and a high rate of increase).
Static stability (local stability)	Ability of the system to maintain synchronous operation of the generating units under minor disturbances of the operating conditions (of a low amplitude and a low rate of increase).
Trial operation	Uninterrupted operation of the equipment, installations or networks through determined period of time with the specified operating parameters.
Balancing market	Mechanism of the on-going balancing of the electricity demand and generation of this energy in NPS.
Frequency load-shedding protection system (SCO)	Automatic shedding of the defined groups of customers taking place when the frequency is reduced down to the specific level resulting from the capacity deficit in the power system.
Voltage load-shedding protection system (SNO)	Automatic shedding of the defined groups of customers when the voltage drops to the specific level resulting from the deficit of the reactive power, which may cause the loss of voltage stability in the given area of the power system.
SCADA	IT system used for the collection, processing and visualisation of data on the on-going operation of NPS and initiation of the remote operating, switching and control operation procedures.
Distribution Network	High, medium and low voltage power network with DSO being responsible for its operation.
Power System	Connected installations operating in conjunction, use for the transmission or distribution belonging to the electric utility or a system user.
Transmission Network	Extra-high or high voltage power system with TSO being responsible for its operation.
Meshed Network	Transmission network and coordinated 110 kV network.
Force Majeure	Sudden unforeseeable event beyond the control of the parties preventing in all or in part compliance with the contractual obligations either temporarily or permanently, whose outcomes cannot be prevented or counteracted in spite of a due diligence. The events regarded as Force Majeure events include specifically: a) natural disasters, including fire, flood, drought, earthquake, hurricane, hoar-frost, b) actions of government authorities including the state of war,

	martial law, embargoes, blockades etc., c) acts of war, sabotage, terrorism, d) general strikes or other social unrest including public demonstrations, lockouts.
Dispatching or operating service	Organisational unit of an electric utility empowered to proceed with operation of the network and management of operation of the generating units.
Operating parameters monitoring system (SMPP)	Operating parameters monitoring system dedicated to monitor the operation of the generating units for the purposes of effective management of NPS operation, assess their control activities and analyse the operation of the power system.
State of emergency in NPS	Operating conditions entailing the risk of occurrence of network or system disturbance in relation to the non-fulfilment of the requirements regarding the quality and reliability of network operation.
Droop of generating unit control	Ratio of relative change of the frequency to its corresponding relative change of the generating capacity with the fixed setting of the generating unit regulator.
Droop of voltage control	Ratio of relative change of voltage to the relative change of the reactive power in the specified operating point under the specified state.
Controllable load	Load of a value that can be controlled by the proper system operator – remotely or through the installed automatics.
Synchronization with the network	Operation concerning the connection of the generating unit with the power system or connection of different power systems after their frequencies, phase and voltages are equalized to reduce the disparity of the vectors of connected voltages to a value close to zero.
Tele-mechanics system	Set of equipment used for acquisition and remote transmission of data within the power system encompassing telemetry (transmission of measurements), tele-signalling (transmission of discrete signals) tele-control (transmission of orders) or other special information.
Automatic data registration system	Set of equipment performing the function of automatic reading and recording of the values measured by the metering systems equipped with the communication ports for remote data transmission.
Power System	Power networks and connected equipment and installations operating in conjunction with the network.

System for Operating Cooperation with Power Plants (SOWE)	System providing for TSO the communication between the operations departments of the power plants and direct transmission by TSO operations departments to generating units operations departments of the planned loads for generating units to the operations departments of the generating units for 15-minute periods and the operating orders.
Metering-settlement system	Information technology and telecommunication (TELE-INFORMATION) system for acquisition, processing and making available the metering data and metering-settlement data originating from the measurement data remote reading system, automated data recording systems and other systems.
Market Information Exchange System (WIRE)	Information technology and communication system dedicated to exchange the trade, technical, metering and settlement data of the balancing market and control system services, between the trade departments and the technical departments of TSO and Market Operators.
Metering data remote reading system	Subsystem of the metering-settlement system performing the function of the remote acquisition of metering data from the metering systems equipped with the automated data recording system.
Medium high voltage (MHV)	Voltage higher than 1 kV and lower than 110 kV.
Control error	Difference between the given value of controlled variable and its present value at the given moment of time.
Inter-system exchange participant (UWM)	Participant of the Balancing Market who concluded the agreement for the provision of transmission services with TSO regulating specifically the conditions of participation in the Inter-system Exchange.
Metering-settlement system	Metering system used for measurement of electricity and electrical variables used for the quantitative and financial settlements.
Primary metering-settlement system	Metering-settlement system whose readings form the grounds for the quantitative and financial settlements.
Back-up metering-settlement system	Metering-settlement system whose readings form the grounds for the quantitative and financial settlements in the case of incorrect operation of the primary metering-settlement system.
Metering system	Meters and their connection circuits used directly or indirectly for measurement purposes.
Balancing-control metering system	Metering system whose readings form the grounds for the monitoring of the correct indications of the metering-settlement systems through the comparison of the measured variables and/or balancing of the power facilities or network areas.

Excitation control system	Set of equipment for control of voltage or reactive power at terminals of the generating unit through the change of the excitation current.
Excitation system	System used for the generation of the magnetizing current of the generating unit.
Cross-border electricity sales contract (USE_{WM})	The contract notified in the form of the trade schedule in the cross-border exchange area.
The Union for Co-ordination of Transmission of Electricity (UCTE)	Union associating the system operators of Western and Central Europe whose transmission systems cooperate synchronously.
System services	Services provided for TSO necessary for TSO to ensure the correct operation of NPS, its reliability and maintenance of the power quality.
System user	Entity delivering the electric energy to the power system or supplied from such system.
Voltage oscillations	Short-term changes of voltage taking place at the rate higher than 1% of the rated voltage per second.
Instrument protection factor (FS)	Ratio of the instrument rated safe current to the rated primary current. The rated safe current of an instrument is defined as the rms value of the primary current under which the total error of the current transformer for measurement purposes is equal to or higher than 10% under the rated load.
High-frequency voltage factor	Ratio of the square root of the sum square of the rms values of the higher order harmonic contents to the rms value of the first harmonic.
Preliminary Daily Coordination Plan (WPKD)	Preliminary Daily Coordination Plan is the operating plan containing information on NPS status in respect to the generation and transmission capacities, supporting market entities in making the decisions concerning the conclusion of electricity sales contracts and market transactions during individual hours of the day. WPKD plan published on day n-2 also includes the list of generating units envisaged by TSO for the operation under primary and secondary control during each hour of day n.
Circular graph of generating unit	Graph presenting the theoretically admissible operation range of the generating unit defining inter alia the reactive power load of the generating unit.
Generator	Electric utility involved in the generation of electricity, whose generating equipment is connected to the power system.
Disturbance	Unplanned automatic or manual shut-down(s) or the failure to meet the expected operating parameters of the components of network assets. The disturbance can take place with or without the damage to the network assets.

Secondary control range	Range of the generating units power change within framework of secondary control where the secondary regulator is allowed to exert automatic control in both directions from the current operating point.
Static stability margin	Ratio of the disparity between the maximum admissible value of the given operation variable under which the system remains in a state of balance and the value of said variable in the analysed operating condition of the system, to the latter of the two values.
Demand for cover by domestic power plants	Demand to be covered by the domestic power plants, i.e. the power demand of NPS increased by the pumping mode load and reduced by the balance of inter-system exchange.
NPS power demand	NPS power demand is the total power consumed by all domestic customers, the auxiliary power of power plants and the network losses.
Remote control	Equipment operation control performed by the dispatch service of the competent system operator with the use of the dedicated telecommunication equipment.
Operational event	Any change of: a) operating status of equipment, installation or network, b) system configuration, c) regulation settings, d) control settings.

I.A. Transmission system operator

I.A.1. The transmission system operator, hereinafter referred to as TSO or transmission system operator, pursuant to the Energy Law Act dated 10 April 1997 (consolidated text in Official Journal of 2003 No 153 item 1504 as amended), is an electric utility involved in the transmission of electric energy, responsible for network operation within the power transmission system, the on-going and long-term security of the operation of this system, operation, maintenance, repairs and necessary development of the transmission network, including the interconnections with other power systems.

I.A.2. Pursuant to the provisions of the Energy Law the transmission system operator is specifically responsible for:

a) security of supplies of electricity through the assurance of the secure operation of the power system and the appropriate transmission capacity in the transmission network;

b) carrying out the network operation in the transmission grid in an effective manner maintaining the required reliability of the electricity supplies and the quality of its supplies, and coordination of the network operation in the coordinated 110 kV network in cooperation with the power distribution system operators, hereinafter referred to as DSO or distribution system operators;

c) operation, maintenance and repairs of the installations and facilities including the interconnections with other power systems in a manner ensuring the reliable operation of the power system;

d) assurance of the long-term ability of the power system to satisfy the justified needs in respect to the transmission of electricity in domestic and cross-border trade, including the development of the transmission network and where applicable – development of the interconnections with other power systems;

e) cooperation with other transmission system operators or electric utilities to ensure reliable and effective operation of the power systems and coordinate their development;

f) dispatching the capacity of the generating units connected to the transmission network and the generating units with available capacity power equal to 50 MW or higher, connected to the coordinated 110 kV network, considering the agreements with the transmission system users and the technical constraints of this system;

g) management of the transmission capacities of the connections with other power systems;

h) purchase of system services required for the proper operation of the power

system, reliability of operation of the said system and maintenance of the power quality parameters;

i) balancing of the power system, including the balancing of the on-going demand for electricity with the supply of this energy within the domestic power system, hereinafter referred to as NPS, management of system congestions and maintaining the system of settlements with the users of the said system resulting from non-balancing the electricity supplied by and drawn from NPS;

j) management of electricity flows in the transmission system in the manner coordinated with other interconnected power systems and in cooperation with DSO in the coordinated 110 kV network considering the technical constrains of the system;

k) purchase of electricity to cover the losses occurred in the transmission network during the transmission of electricity via this network and the application of the transparent and non-discriminating market procedures regarding the purchase of that energy;

l) delivery to system users and operators of other power systems interconnected with the transmission system of information on the conditions of providing electricity transmission services, including the conditions regarding cross-border trade and network management and balancing of electricity that are necessary to obtain access to the transmission system and use it;

m) developing the action plans in case of a risk of occurrence of a major disturbance in the power system and the restoration of that system after the occurrence of such disturbance;

n) execution of the curtailments in the delivery of electricity;

o) developing the normal system configuration conditions for the operation of the transmission system and in cooperation with DSO of the normal operating conditions for the operation of the coordinated 110 kV network.

I.A.3. Polskie Sieci Elektroenergetyczne Operator S.A. (abbreviation PSE Operator S.A.) performs the function of the TSO in the territory of the Republic of Poland. PSE Operator S.A. has the concession for the transmission of electricity No PEE/272/4988/W/2/2004/MS issued by the President of the Energy Regulatory Office on 15 April 2004.

I.A.4. The transmission system operator executes the duties mentioned in point I.A.2, also through the following entities operating for and on behalf of the TSO:

a) Polskie Sieci Elektroenergetyczne – Centrum S.A.;

b) Polskie Sieci Elektroenergetyczne – Południe S.A.;

c) Polskie Sieci Elektroenergetyczne – Północ S.A.;

d) Polskie Sieci Elektroenergetyczne – Wschód S.A.;

e) Polskie Sieci Elektroenergetyczne – Zachód S.A.

I.A.5. The detailed description of the tasks executed by these entities mentioned in point I.A.4. is provided in further provisions of this Instruction of Transmission System Operation and Maintenance.

I.A.6. The entities required to comply the provisions of the Instruction of Transmission System Operation and Maintenance are required to cooperate with the entities mentioned in point I.A.4 in respect to the tasks performed by these entities for and on behalf of the TSO.

I.B. Legal background for the development of the Instruction of Transmission System Operation and Maintenance and related documents

I.B.1. The Instruction of Transmission System Operation and Maintenance also referred to as IRiESP, was drawn up by the TSO pursuant to article 9g of the Energy Law act.

I.B.2. The Instruction of Transmission System Operation and Maintenance considers the requirements:

a) contained in the national legal acts, including specifically the Energy Law act and the executive regulations issued under that act;

b) resulting from TSO's concession for the transmission of electricity;

c) contained in the regulations of the European Community, including specifically Regulation of the European Parliament and the Council No 1228/2003/EC dated 26 June 2003 on conditions of access to the network for cross-border exchanges in electricity;

d) resulting from the international standards of security and reliability of operation of power systems.

I.B.3. The Instruction of Transmission System Operation and Maintenance is the rules as defined in article 384 § 1 of the Civil Code.

I.B.4. The Instruction of Transmission System Operation and Maintenance is originally written in Polish.

I.C. The objective and subjective scope of IRiESP and its structure

I.C.1. Scope of issues regulated in IRiESP and the structure of IRiESP

I.C.1.1. The Instruction of Transmission System Operation and Maintenance defines the detailed terms of using the power networks by system users and customers and the terms and method of operation, maintenance and planning the development of these networks. The aforementioned conditions are defined in a further part of IRiESP, hereinafter referred to as IRiESP – The Terms of Use, Operation, Maintenance and Planning of Network Development.

The Instruction of Transmission System Operation and Maintenance also contains a separated part regarding the balancing of the system and management of system curtailments, hereinafter referred to as IRiESP – Balancing of the System and System Constraints Management.

The aforementioned parts jointly form the Instruction of Transmission System Operation and Maintenance.

I.C.1.2. IRiESP – The Terms of Use, Operation, Maintenance and Planning of Network Development defines specifically:

a) the terms of connecting the generating facilities, distribution networks, final customers facilities, inter-system connections and direct lines;

b) technical requirements for the facilities, installations and networks including the necessary auxiliary infrastructure;

c) the security criteria for the operation of the power system including the reconciliation of the actions plans in case of the occurrence of a significant disturbance in the power system and the restoration of such system after a disturbance;

d) the terms of cooperation between the power systems operators, including the area of coordinated 110 kV network;

e) the terms of exchanging information between the electric utilities and the customers;

f) the power quality parameters and quality standards of service of system users and the customers.

I.C.1.3. IRiESP – Balancing of the System and Management of System Constraints defines specifically:

a) the terms which should be met in the area of balancing of the system and

management of system constraints;

b) the procedure of submitting and accepting by the TSO for execution of electricity sale contracts and the electricity delivery and collection programs;

c) the procedure of notification to TSO about the contracts regarding the provision of transmission services;

d) the procedure of balancing the system, including the method of settlement of the costs of its balancing;

e) the procedure of the management of system constraints, including the method of the settlement of costs of such constraints;

f) emergency procedures;

g) the operating procedure under conditions threatening the security of electricity supply;

h) the procedures and scope of exchange of information necessary to balance the system and manage system constraints;

i) criteria for dispatching the capacity of the generating units and managing the power system connections.

I.C.1.4. Considering the conditions defined in IRiESP, the TSO also prepares for the purpose of executing its tasks:

a) dispatching instructions;

b) instructions for the operation of the facilities, circuits, equipment and installations;

c) "The Occupational Health and Safety Instruction for power equipment and installations";

d) Organisational and technical procedures.

I.C.2. Entities required to apply IRiESP

I.C.2.1. The provisions of IRiESP – The Terms of Use, Operation, Maintenance and Planning of Network Development apply to:

a) the transmission system operator;

b) distribution systems operators;

c) entities using the services provided by the TSO;

d) entities, to whose networks of rated voltage 110 kV and higher the equipment, installations or networks of the system users and customers are connected;

e) the entities, whose equipment, installations or networks are connected to

the transmission system;

f) the entities planning to use the transmission services provided by the TSO;

g) the entities determining the terms of connection and performing the connection to the network of rated voltage 110 kV and higher;

h) generators with generating units where the TSO is responsible for their power dispatch according to the provisions of the Energy Law act.

I.C.2.2. List of entities required to apply the provisions of IRiESP – Balancing of the System and Management of System Constraints is defined in the separated part of IRiESP.

I.C.2.3. Every entity concluding with the TSO a connection agreement or agreement for provision of transmission services (hereinafter referred to as transmission agreement) receive free of charge one copy of IRiESP.

I.D. Entry into force of IRiESP and procedure of making and implementing changes to IRiESP

I.D.1. Entry into force of IRiESP – *Terms of use, operation, maintenance and planning of network development*

I.D.1.1. IRiESP – *Terms of use, operation, maintenance and planning of network development* and any changes to that part of IRiESP are subject to the approval under the resolution of TSO's Management Board.

I.D.1.2. IRiESP – *Terms of use, operation, maintenance and planning of network development* and any other changes to that part of IRiESP comes into force on the date defined in the resolution of the TSO's Management Board, however no earlier than 14 days after the date of publishing by TSO of accordingly IRiESP – the terms of use, operation, maintenance and planning of network development or the changes to that part of IRiESP.

I.D.1.3. The date of entry into force of IRiESP - *Terms of use, operation, maintenance and planning of network development* is written down on its title page.

I.D.1.4. The transmission system operator publishes the binding IRiESP – *Terms of use, operation, maintenance and planning of network development* on its website and makes it available to the public at its premises.

I.D.2. The procedure of making and implementing changes to IRiESP

I.D.2.1. The changes to IRiESP are made by issuing a new IRiESP – *Terms of use, operation, maintenance and planning of network development* or by issuing the Update Chart for the binding IRiESP – *Terms of use, operation, maintenance and planning of network development*, hereinafter referred to as the Update Chart.

I.D.2.2. Any changes to IRiESP – *Terms of use, operation, maintenance and planning of network development* is preceded by the process of consultation with the system users and the customers.

I.D.2.3. The Update Chart includes specifically:

a) The date of entry into force of the Update Chart;

b) The reason for updating IRiESP – *Terms of use, operation, maintenance and planning of network development*;

c) The scope of update of IRiESP – *Terms of use, operation, maintenance and planning of network development*;

The new wording of the changed provisions of IRiESP – *Terms of use, operation, maintenance and planning of network development* or the text supplementing the current provisions.

I.D.2.4. The process of making the changes to IRiESP – *Terms of use, operation, maintenance and planning of network development* is conducted according to

the following procedure:

a) The transmission system operator develops the new draft IRiESP – *Terms of use, operation, maintenance and planning of network development* or the Update Chart and publishes it on its website;

b) The publication of the new draft IRiESP – *Terms of use, operation, maintenance and planning of network development* or the Update Chart will be accompanied by the publication by the TSO on its website of the communiqué informing about the start of the process of consultation of changes to IRiESP – *Terms of use, operation, maintenance and planning of network development*, the place and method of submitting the comments and the period of time envisaged for consultations.

I.D.2.5. The period of time envisaged for the consultations may not be shorter than 14 days from the date of publishing the draft new IRiESP – *Terms of use, operation, maintenance and planning of network development* or the draft Update Chart, while the TSO rejects the comments or proposals received after the expiry of the time envisaged for consultations in the course of drafting the changes to IRiESP – *Terms of use, operation, maintenance and planning of network development*.

I.D.2.6. The transmission system operator, in the course of the consultation process, may hold the information meetings to present the planned changes to IRiESP – *Terms of use, operation, maintenance and planning of network development*.

I.D.2.7. Upon the expiry of the time envisaged for consultations the TSO:

a) analyses the received comments and proposals;

b) in justified cases submits its own supplements or amendments;

c) prepares the final version of new IRiESP – *Terms of use, operation, maintenance and planning of network development* or the Update Chart considering to justified degree the submitted comments and proposals;

d) prepares the report from the consultation process containing the summary of the received comments or proposals, information on the method of their inclusion and the summary of own supplements or amendments;

e) publishes on its website the final version of the new IRiESP – *Terms of use, operation, maintenance and planning of network development* or the Update Chart including the communiqué determining the date if entry into force of the changes made to IRiESP – *Terms of use, operation, maintenance and planning of network development* and the report from the process of consultation of this part of IRiESP.

I.D.2.8. If the changes to IRiESP – *Terms of use, operation, maintenance and planning of network development* are not accepted by the system user or a customer who has a transmission agreement concluded with the TSO, the system user or customer will be entitled to terminate said agreement upon 10 days notice effective on the day preceding the date of entry into force of the

changes to IRiESP – *Terms of use, operation, maintenance and planning of network development* made by the TSO.

I.D.2.9. When terminating the transmission agreement the system user – provided he still would like to use the transmission services provided by the TSO – informs the TSO in writing about the changes to IRiESP – *Terms of use, operation, maintenance and planning of network development* that he does not agree with and the reason for such disagreement. The submission of the information in writing forms the grounds to come out to the President of the Energy Regulatory Office with application to settle a dispute concerning the determination of the conditions of providing the transmission services and the application to determine the conditions of continuing the provisions of these services until the settlement of the dispute.

I.D.2.10. The procedure of making and implementing the changes to IRiESP – *Balancing and Management of System Constraints* is determined in the separated part of IRiESP.

CHAPTER II. CONNECTION AND USE OF THE NETWORK

II.A. Network characteristics

II.A.1. Structure of EHV and HV network

II.A.1.1. National power transmission network

II.A.1.1.1. National high voltage (HV) and extra-high voltage (EHV) power transmission network has a deciding impact on the safe operation and integrity of NPS. In functional terms it can be divided into:

a) The meshed network encompassing the network elements operating continuously or periodically under ring mode (excluding the unilaterally supplied local 110 kV rings), which should ensure the reliable execution of the transmission functions at NPS. The flows of electricity through individual elements of the meshed network depend on the operating status of other elements of that network and the generation dispatching among the generating units connected to that network (Fig 1.),

b) Open network encompassing 110 kV network elements operating continuously under the radial configuration or unilaterally supplied local rings, which should execute exclusively the distribution functions (Fig 2.).

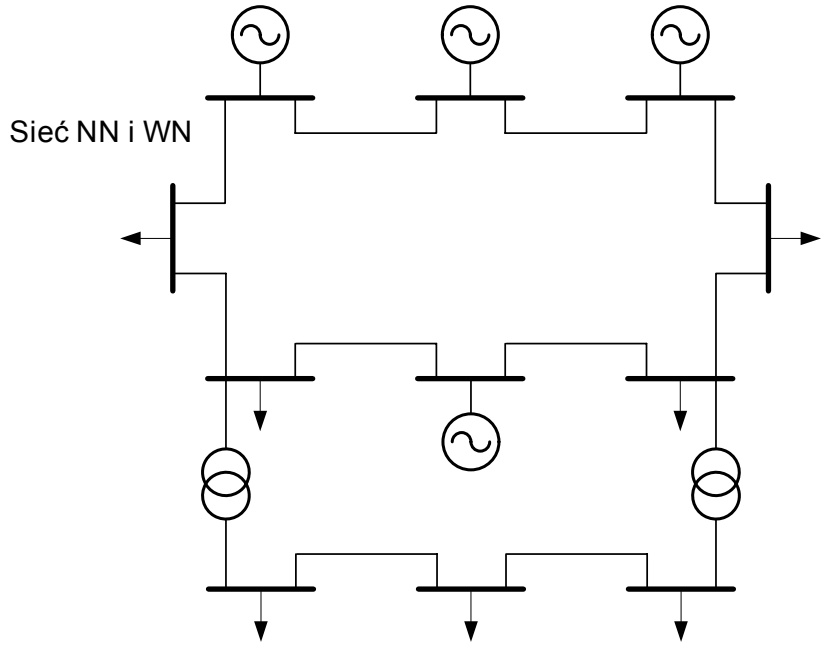

Fig 1. Pictorial diagram of the meshed network configuration

Glossary to Fig 1.: Sieć NN i WN – EHV and HV network

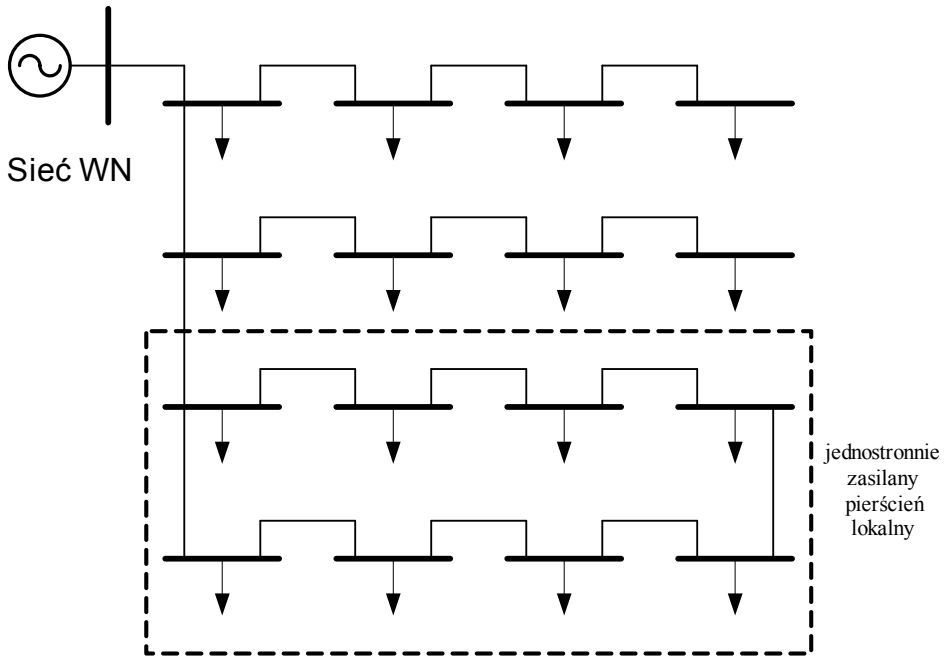

Fig 2. Pictorial diagram of the open network configuration

Glossary to Fig 2.: Sieć WN – HV network

jednostronnie ... – unilaterally supplied local ring

II.A.1.1.2. The meshed network is divided in operating terms into:

a) the transmission network, within which the TSO is responsible for the development, maintenance and operation of the network,

b) 110 kV distribution network working under ring mode with the transmission network, hereinafter referred to as 110 kV distribution network, within which the appropriate DSO is responsible for the development, maintenance and operation of the network subject to the decision making powers of the TSO resulting from the Energy Law act and the executive regulations issued under that act.

II.A.1.2. **Cross-border connections**

II.A.1.2.1. The Polish National Power System is connected to the power systems of neighbouring countries: synchronically (220 and 400 kV alternating current connections) with Czech, German and Slovakian systems and asynchronically (direct current cable) with the Swedish power system.

II.A.1.2.2. The cross-border cooperation with the operators of the synchronously connected systems takes place on the terms defined within The Union for the

Co-ordination of Transmission of Electricity, hereinafter referred to as UCTE.

II.A.1.2.3. The cross-border cooperation with the operator of the Swedish power system takes place on the terms as defined under the bilateral agreement.

II.A.1.2.4. The separated generating units from the power systems of neighbouring countries, operating asynchronously according to the terms defined under the bilateral agreements, can be periodically connected to the NPS through the alternating current connections.

II.A.1.2.5. The connections of the national coordinated 110 kV network with the foreign distribution networks can be realised only under separated circuits through the separation of the generating units or areas of the distribution network. The cooperation in respect to these connections takes place according to the terms agreed between the appropriate system operators.

II.A.1.2.6. The connections mentioned in point II.A.1.2.1., II.A.1.2.4. and II.A.1.2.5. are used to execute the cross-border electricity exchange, which is divided into:

a) parallel exchange executed between NPS and the power systems creating the connected UCTE systems,

b) non-parallel exchange executed with the support of the direct current connections or separated circuits.

II.A.1.3. **Network technical parameters and devices**

II.A.1.3.1. The basic elements of the meshed network include the overhead and cable lines, transformers and EHV and 110 kV substations.

II.A.1.3.2. The scope of the basic data characterising the overhead and cable EHV or 110 kV lines covers:

a) the code of the power line,

b) the codes of the substations, to which the power line is connected,

c) the rated voltage of the power line,

d) the length of the power line,

e) the resistance, reactance, conductance and susceptance of the power line,

f) the thermal capacity of the power line (depending on ambient temperature),

g) the reactance for the zero-sequence symmetric component and reactance for the positive-sequence consistent symmetric component,

h) the name of the system operator, to whom the power line is allocated in operating terms.

II.A.1.3.3. The scope of basic data characterising EHV/EHV and EHV/110 kV transformers covers:

a) the transformer code,

b) the codes of the substations, to which the transformer is connected,

c) the rated power of the transformer,

d) the rated voltages of transformer's windings,

e) the resistance, reactance, conductance and susceptance of the transformer,

f) the short circuit voltage, no-load running and load losses, no-load running current and of transformer connections configuration,

g) transformation ratios and the scope of their regulation,

h) the name of the system operator, to which the transformer is allocated in operating terms.

II.A.1.3.4. The scope of basic data characterising EHV and 110 kV substations covers:

a) name and code of the substation,

b) the rated voltage of the substation,

c) the operating configuration of the substation,

d) the parameters of the equipment of the substation (e.g. transformers, reactors, capacitors banks) required for the execution of network calculations,

e) the available capacity of the generating units connected to the substation or the available capacity of the generating units in the branch of the radial network connected to the substation or the connection capacity or contractual capacity of the customers connected to the substation,

f) the capacity of the controllable power customers connected to the substation,

g) the demand for active and reactive load during the characteristic metering hours (the peak and off-peak for summer and winter),

h) the demand for active and reactive auxiliary load,

i) capacity of the equipment to compensate the reactive power installed at the substation,

j) the short circuit power of the substation,

k) the name of system operator, to whom the substation is allocated in operating terms.

II.A.1.3.5. The scope of basic data characterising the generating units connected to the transmission network or 110 kV distribution network covers:

a) the name and code of the substation and rated voltage of the substation, to which the generating unit is connected,

b) the maximum and minimum active power of the generating unit,

c) the resistance and reactance of the branch, the generating unit – unit transformer,

d) the maximum value of the electromotive power E'max defined at the level of the substation's voltage, to which the generating unit is connected,

e) the relation of reactance for the zero-sequence symmetric component to the reactance for the positive-sequence symmetric component of the branch, the generating unit – unit transformer,

f) the short circuit voltage of the unit transformer and the reference power,

g) the unit transformer ratio module in relative units and the scope of regulation of voltage under load,

h) reactance: synchronous, transient and sub-transient of generating units in d and q axis, in relative units,

i) the stator resistance and the reactance of stator's leakage,

j) mechanical time constant of the turbine set,

k) the transient and sub-transient time constant in d and q axis (set with the open stator's circuit),

l) saturation curve,

m) generator's circular chart,

n) types and settings of the excitation circuits and the power system stabilizer including the unit configuration under IEEE standard,

o) types and settings of turbine regulator,

p) characteristics of the auxiliary demand of the generator (active and reactive power) as the load function.

II.A.2. Requirements regarding quality and reliability of the meshed network operation

II.A.2.1. System frequency

II.A.2.1.1. Rated frequency in the transmission network is 50 Hz.

II.A.2.1.2. The quality of the frequency in the meshed network should meet the following parameters:

1) the average value of the frequency measured through 10 seconds in the connection points should be within the following range:

   a) 50 Hz ± 1 % (from 49.5 Hz to 50,5 Hz) through 99.5% of the week,

b) 50 Hz + 4 %/-6% (from 47 Hz to 52 Hz) through 100% of the week;

2) because of the operation of UCTE connected systems, according to the Operating instruction of UCTE interconnected systems, hereinafter referred to as UCTE Operation Handbook, the quality of the frequency is regarded as satisfactory, if during a month:

a) the standard deviation for 90% and 99% of the measurement brackets is smaller than 40 mHz and 60 mHz respectively,

b) the number of days of operation at the preset frequency of 49.99 Hz or 50.01 Hz does not exceed eight days.

II.A.2.2. **Voltage and reactive power**

II.A.2.2.1. The rated voltage at meshed network amounts to 750, 400, 220 and 110 kV.

II.A.2.2.2. The acceptable average deviation of the rated voltage during 10 minutes at EHV and 110 kV substations, to which the final customers are connected drawing the power at the level no higher than the connection capacity, with tgφ coefficient no higher than 0.4, should stay in the following brackets:

a) from -10 % to +5 % in the network with rated voltage of 400 kV,

b) ±10 % in 220 and 110 kV rated voltage network.

II.A.2.2.3. At EHV and 110 kV substations other than the ones mentioned in point II.A.2.2.2. under normal operating conditions of the network, the voltages should be kept within the brackets defined in Table 1.

Table 1 Voltages at EHV and 110 kV substations under normal network operating conditions

Substation type/network	750 kV	400 kV	220 kV	110 kV
EHV and 110 kV substations, to which the generating units and substations supplied from EHV/110 kV transformers are directly connected	-	400÷420	220÷245	110÷123
Other EHV and 110 kV substations	710÷787	380÷420	210÷245	105÷123

II.A.2.2.4. At EHV and 110 kV substations other than the one mentioned in point II.A.2.2.2 under disturbed operation of the network, the voltages should be kept within the brackets defined in Table 2.

Table 2 Voltages at EHV and 110 kV substations under disturbance operating conditions of the network

Substation type/network	400 kV	220 kV	110 kV
EHV and 110 kV substations, to which the generating units and substations supplied from EHV/110 kV transformers are directly connected	380÷420	210÷245	105÷123
Other EHV and 110 kV substations	360÷420	200÷245	99÷123

II.A.2.2.5. The voltage oscillation amplitudes in relation to the rated value in the network should not be higher than 1%, if the oscillations are recurring on a regular basis. The voltage oscillations not recurring on a regular basis below 3% amplitude are allowed, if it does not form a risk to the equipment.

II.A.2.2.6. The voltage deformation coefficient at the places of connection of entities to the network and the contents of the individual higher harmonics are referred to the basic harmonic should not exceed respectively:

a) 1.5 % and 1 % for the network with the rated voltage of 400 and 220 kV,

b) 2.5 % and 1.5 % for the network with 110 kV rated voltage.

II.A.2.2.7. The maximum value of the negative-sequence symmetric component of the voltage under disturbance conditions should not exceed 1% of the value of the positive-sequence symmetric component.

II.A.2.2.8. The voltage conditions other than defined in point II.A.2.2.2. to II.A.2.2.7. are defined under the transmission agreement.

II.A.2.2.9. The coefficient tan(φ) for the aggregated draw of the hourly active and reactive power at 110/MHV stations in the distribution network areas agreed between the TSO and DSO should not be higher than 0.3 on 110 kV voltage side.

II.A.2.2.10. The keeping of the voltage parameters by TSO in the places of delivery of electricity from the transmission network is conditioned by DSO compensating the reactive power in the distribution network and covering the demand for reactive power in that network from the local reactive power sources insofar as required to keep the level of tg φ defined in point II.A.2.2.9.

II.A.2.2.11. The areas mentioned in point II.A.2.2.9. are agreed upon and updated by TSO and individual DSO once a year based on the technical analysis of the operating configuration of 110 kV distribution network in association with the nodes of EHV and 110 kV transmission network carried out and delivered to TSO by a given DSO at least once per year.

II.A.2.3. Operating reliability

II.A.2.3.1. The following technical conditions determining reliable operation of the

meshed network should be met under normal operating conditions of that network:

a) the current load of the individual elements of the network should be lower than the load acceptable in a long-term perspective,
b) the voltages in individual nodes of the network should be within the acceptable range according to point II.A.2.2.2. and II.A.2.2.3.,
c) the short circuit power (current) in individual substations should not exceed the interrupting power (current) of installed breakers,
d) the individual power plants should be working with the static stability reserve amounting to 10% minimum depending on the method of regulating the excitation voltage. It is adopted that if the excitation voltage cannot be regulated the power plant should operate with at 20% reserve of static stability as a minimum.

II.A.2.3.2. Following the emergency cut-out of the single-circuit line or one circuit of double-circuit line, a single transformer or one system of bus bars, the operating circuits of the network should meet the following technical conditions determining the reliable operation of the network:

a) there should be no interruptions of the supply of the customers except for the customers supplied directly from the cut out element,
b) there should be no losses of the generated power higher than 750 MW (applies to self-cut-out of the bars system),
c) the current load of network elements should be smaller than the long-term acceptable values or exceed them by no more than 20% provided that such overloads can be eliminated within 20 minutes maximum without introducing any limitations in power supply for the customers (by making the switches within the network, over- or under-generation) or exceed them by more than 20% provided that such overloads can be eliminated as a result of automatic actions without limiting the power supply for the customers (through the automatic cut-outs of generating units, over- or under-generation),
d) the voltages in the individual nodes of the network should stay within the acceptable ranges according to point II.A.2.2.4.,
e) the individual power plants should operate with the static stability reserve amounting to 5% minimum depending on the method of controlling the excitation voltage. It is adopted that if the excitation voltage cannot be regulated the power plant should operate with at 10% reserve of static stability as a minimum,
f) there should not be any cases of the loss of dynamic stability by the generating units assuming that the cut-out of the network element was the result of 3-phase short-circuit in the least favourable point of the network, cut off upon the operation of the first or second safeguards zone, while the stability can be maintained as a result of the automatic cut-out of the

generating units located near the short-circuit location.

II.A.2.3.3. In the case of the parallel or sequential cut-out of two lines the operation of the part of the network with the total demand higher than 200 MW should not take place.

II.A.2.3.4. The loss of power supply for the customers should not take place in deficit areas, where the power drawn in this area is higher than the generated power in the case of the cut-out of s largest generating unit working in this area and a single line or transformer supplying this area.

II.A.3. Meshed network models

II.A.3.1. Model structure

II.A.3.1.1. The mathematical models of the meshed network are created to perform the system analyses enabling the determination of operating conditions of the network under its various operating states. The results of system analyses are important decision making element in the short-term, mid-term and long-term planning process.

II.A.3.1.2. The following elements are mapped in the mathematical model of the meshed network:

a) all power lines, transformers and substations forming part of the meshed network,

b) networks of the neighbouring power systems insofar as necessary for the correctness of calculations,

c) generating units connected to the meshed network,

d) reactive power sources other than the generating units,

e) reactive power receivers connected to the meshed network.

II.A.3.1.3. The meshed network model contains the following data:

a) electrical parameters of the power lines (resistance, reactance, susceptance, acceptable ratings resulting from ambient temperature) forming part of the meshed network,

b) electrical and control parameters of the transformers forming part of the meshed network,

c) the assumed level of active power at individual EHV and 110 kV switchgears, to which the generating units are directly connected,

d) the technical parameters of the generating units connected to the meshed network,

e) network topology under node configuration,

f) total power demand divided by individual EHV and 110 kV switchgears, to which the final customers or radial networks are connected.

II.A.3.1.4. The transmission system operator updates the mathematical model of the meshed network to the highest possible degree, in the case of the change of the operating conditions of the meshed network, that the analysis concerns.

II.A.3.1.5. The transmission system operator performs the following system analyses:

a) calculations of the load-flows in the meshed network,

b) calculations of the short-circuit parameters of meshed network,

c) calculations of the static and dynamic stability of meshed network,

d) calculations of the reliability parameters of electricity supplies in meshed network.

II.A.3.2. **Basic models of the meshed network**

II.A.3.2.1. The transmission system operator creates the basic mathematical models of the meshed network for the normal operating conditions of that network.

II.A.3.2.2. The basic mathematical models of the meshed network are created for the below listed characteristic periods of time during the calendar year:

a) morning and evening peak hour and night off-peak hour during the winter season,

b) morning peak hour and night off-peak hour during the summer season.

II.A.3.2.3. The TSO makes the basic mathematical models of the meshed network available to the other system operators.

II.B. Connection to the network

II.B.1. Connection to the network of generating facilities, networks of other operators, devices of final customers, cross-border connections and direct lines

II.B.1.1. Rules of connection to the network

II.B.1.1.1. The connection to the network is the physical connection of the equipment, installations or a network of connected entity to the network.

II.B.1.1.2. The connection to the network enables the entities to use the network's technical infrastructure.

II.B.1.1.3. In order to maximise the utilisation of the existing network's technical infrastructure the connection of equipment, installations or networks of the entities to the existing substations is adopted as the basic rule..

II.B.1.1.4. TSO may issue the connection conditions considering the construction of the new substation if the connection is not possible at the existing substations.

II.B.1.1.5. The connection to the transmission network of the direct lines and cross-border connections requires (in addition to the connection agreement) the conclusion of separate agreement with TSO determining the rules of cooperation with TSO of the operators operating such lines or connections.

II.B.1.1.6. The entities, whose equipment, installations or networks are or can be connected, submit the application to determine the connection conditions to the electric utility involved in the transmission or distribution, to whose network the connection is supposed to take place.

II.B.1.1.7. The connection of the equipment, installations or networks of the entity to the networks takes place upon the conclusion of the connection agreement after the fulfilment of the connection conditions by the entity as defined by the electric utility and mentioned in point II.B.1.1.6.

II.B.1.1.8. The connection of equipment, installations or networks of the entities to the network encompasses the following stages:

a) the submission of the application for the determination of the connection conditions by the entity applying for the connection,

b) determination of the connection conditions by the electric utility, to whose network the entity is to be connected,

c) conclusion of connection agreement,

d) preparation and performance of connector's construction,

e) commissioning of the connector and connected equipment, installations or networks,

f) activation of the connector and connected equipment, installations or networks.

II.B.1.1.9. The connection conditions to the distribution network and the conditions of performing the expert study mentioned in II.B.1.2.1.7.c) require coordination with the transmission system operator in the case of:

a) equipment, installations and networks belonging to the entities classified into the 2nd connection group,

b) interconnections of domestic and international networks of rated voltage of 110 kV.

II.B.1.1.10. The electric utility that is not an operator, prior to issuing the connection conditions for the entity classified into the 1st or 2nd connection group should coordinate them with the operator, to whose network said utility is connected.

II.B.1.1.11. If the connection conditions defined by the electric utility holding the concession for the transmission or distribution of electricity that is not an

operator require coordination with the TSO according to the provisions of point II.B.1.1.9., such coordination is made by DSO.

II.B.1.1.12. The procedure considering UCTE requirement agreed each time between the TSO and the transmission system operator of the neighbouring country is applied for the international connections of the transmission network.

II.B.1.1.13. The changes to the connection conditions for the equipment, installations or networks of connected entities can be made:

a) at the request of the connected entity,

b) at the request of the operator of the system, who documents such need.

The rules of changing the connection conditions for the equipment, installations or networks of the already connected entities are defined in point II.B.1.2.3.

II.B.1.1.14. The model application forms defined by the electric utilities involved in the transmission or distribution of electricity in the area of the connection to the 110 kV rated voltage distribution network should contain the scope of information at least the same as contained in the model application forms defined by the TSO.

II.B.1.2. Determination of connection conditions

II.B.1.2.1. Applications for determination of connection conditions

II.B.1.2.1.1. The entity applying for the connection to the transmission network submits the application for the determination of the connection conditions according to the model form defined by the TSO.

II.B.1.2.1.2. The model application forms for the determination of the connection conditions are published by the TSO on its website.

II.B.1.2.1.3. The application for the determination of the connection conditions should contain:

a) identification of the applicant,
b) determination of the connection capacity for each point of delivery of electricity,
c) projected annual consumption of electricity,
d) expected date of starting the delivery of electricity or its drawing,
e) technical parameters, operating and maintenance characteristics of the connected equipment, installations or networks,
f) determination of the minimum capacity required to ensure the safety of individuals and property in the case of the introduction of the curtailments in the delivery of electricity,
g) technical information regarding the disturbances introduced by the applicant's equipment and of the load characteristics to determine the

connection conditions.

II.B.1.2.1.4. The application for the determination of the connection conditions for the equipment, installations or networks of the generators should define the following in addition to the data and information mentioned in point II.B.1.2.1.3.:

a) the number of connected generating units, dispatchable capacity, available capacity, installed capacity and apparent power of the generating units, the scope of admissible changes to the load of generating units or their groups, maximum annual quantity of the generation of electricity and the quantity of this energy delivered to the network,

b) the value of the planned auxiliary power and electricity demand of the generator in order to cover the auxiliary needs of generator,

c) the degree of compensation of reactive power related to the receipt of electricity for own needs of the generator and related to the delivery of the generated electricity into the network.

II.B.1.2.1.5. The application for the determination of the connection conditions for wind farms in respect to the operating and maintenance characteristic mentioned in point II.B.1.2.1.3. e) should contain:

a) the technical specification of wind turbines,

b) the extract from the test report of power quality supplied by the wind turbines prepared in Polish language,

c) parameters of the capacity of the wind turbine in wind velocity function.

II.B.1.2.1.6. The application for the determination of the connection conditions can also include the requirements differing from the standard technical parameters of electricity or its delivery parameters, including the requirements regarding:

a) the admissible content of interharmonics and higher harmonics,

b) admissible voltage asymmetry,

c) admissible deviations and oscillations of voltage in the electricity delivery point,

d) admissible duration of the interruption in the delivery of electricity.

II.B.1.2.1.7. The following should be enclosed to the application for the determination of the connection conditions:

a) a document confirming the legal title of the applicant to use the object, in which the connected equipment, installations or networks will be used and in the case of not having such document on the application submission date – the statement on its submission before the conclusion of the connection agreement,

b) the land development plan or location draft plan defining the location of the object, in which the connected equipment, installations or networks will be used in relation to the existing network and neighbouring objects,

c) the expert study of the impact of the connected equipment, installations or networks on the NPS performed in the scope and on the terms as agreed with the TSO,

and other documents mentioned in the application for the determination of connection conditions.

II.B.1.2.1.8. The scope of the expert study and the conditions of performing it are valid through the period of 1 year from the date of the delivery the position on this issue by the TSO.

II.B.1.2.1.9. The requirement to carry out the expert study mentioned in point II.B.1.2.1.7. c) do not apply to:

a) the generators submitting the application for the determination of connection conditions for the generating units of the total installed capacity no higher than 2 MW,

b) the final customers submitting the application for the determination of the connection conditions for their equipment of the total connection capacity no higher than 5 MW.

II.B.1.2.2. **Connection conditions**

II.B.1.2.2.1. The following actions are performed to determine the connection conditions to the transmission network:

a) the applicant submits the application to TSO to determine the connection conditions;

b) upon receiving the application for the determination of the connection conditions the transmission system operator verifies it within 14 days from the date of its receipt in terms of the completeness and up to date nature of the data contained therein and the enclosed documents. Following the verification of the application for the determination of the connection conditions, the TSO delivers the applicant the information on its acceptance or rejection or obliges the applicant to supplement the application;

c) the transmission system operator obliges the applicant to supplement the application for the determination of the connection conditions if the application was delivered contrary to the model application form or in the case of the absence of the required data, documents or their incompleteness. The applicant delivers the supplemented application for the determination of connection conditions within 14 days from the date of receiving the information. In the case of the applicant's failure to submit the supplemented application for the determination of connection

conditions by the required deadline, the TSO rejects the submitted application;

d) the information on the rejection of the application for the determination of connection conditions along with the reason of such rejection is provided by the TSO to the applicant in writing form.

The transmission system operator defines the connection conditions within three months from the date of submitting the complete application for the determination of the connection conditions.

II.B.1.2.2.2. The rules of the determination and payment of the fee by the applicant for the connection to the transmission network is defined in TSO's tariff.

II.B.1.2.2.3. The connection conditions are valid for two years from the date of their determination.

II.B.1.2.2.4. The applicant receives the draft connection agreement and IRiESP together with the connection conditions defined by the TSO.

II.B.1.2.2.5. The network connection conditions define specifically:

a) the connection point defined as the point in the network, where the connector is connected with the network,

b) the point of electricity delivery,

c) connection capacity,

d) type of connection,

e) the scope of required changes to the network related to the connection,

f) the rated data of the equipment, installations and networks and the admissible border parameters of their operation and the acceptable level of the variability of the technical parameters of electricity,

g) the place of installation of the metering-settlement system,

h) the requirements regarding the metering-settlement equipment and the metering-settlement system,

i) the type and location of the main safeguard, the rated data and other necessary requirements in respect to the protection and system power automatics,

j) data enabling the determination of the value of the multi-phase short circuit current in the connection point and the times of their cut-outs,

k) data enabling the determination of the value of earth-fault current at the connection point and the time of their cut-out or duration,

l) the required degree of compensation of reactive power,

m) the requirements in the scope of the adaptation of the connected equipment, installations or networks to the dispatch control systems,

n) the requirements in respect to the adaptation of the metering-settlement system to the remote metering data reading systems,

o) the requirements in the area of protecting the network against electric disturbances brought about the equipment, installations or networks of the connected entity,

p) the requirements in respect to fitting the equipment, installations or networks as required for the interaction with the network, to which they are to be connected,

q) the possibility of delivering the electricity under conditions differing from the standards defined in IRiESP, including specifically the electricity of individually define following parameters: content of higher harmonics, voltage asymmetry and deviations and oscillations of voltage,

r) data and information regarding the network necessary for the selection of the system for protection against electric shocks in the installation or network of the entity, whose installations or networks are to be connected.

II.B.1.2.2.6. The transmission system operator may refuse to define the connection conditions when he does not have technical capabilities of making the connection or when the connection to the transmission network is not economically viable.

II.B.1.2.3. **Changes to connection conditions for entities connected to the network**

II.B.1.2.3.1. Each of the following changes requires the determination of the new connection conditions to the meshed network:

a) demand for connection capacity,

b) network operating conditions related to its development or modernisation.

II.B.1.2.3.2. In the case mentioned in point II.B.1.2.3.1. a) the entity is obliged to apply to determine the new connection conditions to electric utility involved in the transmission or distribution, to whose network the equipment, installations or networks of such entity are connected.

II.B.1.2.3.3. The need of changing the connection conditions for the equipment, installations or networks of the already connected entities caused by the changes to the operating conditions of the network as mentioned in point II.B.1.2.3.1. b) should be documented by the system operator, in whose network the changes to the operation occurred that create the need to adapt the equipment, installations or networks of the connected entity to the changed conditions, based on the expert study confirming the need of adapting the connected equipment, installations or networks to the changed network operating conditions or the values of network parameters.

II.B.1.2.3.4. The provisions of point II.B.1. regarding the expert study mentioned in point II.B.1.2.1.7. c) applies accordingly to the expert study mentioned in

point II.B.1.2.3.3.

II.B.1.2.3.5. The connected entity should be informed in written form by the appropriate system operator or electric utility involved in the transmission or distribution of electricity that is not the operator, to whose network the equipment, installations or networks of the entity are connected, about the need to adapt the equipment, installations or networks to the changed operating conditions of the network. The notification should be made at least three years in advance.

II.B.1.2.3.6. The notification mentioned in point II.B.1.2.3.5. should contain:

a) the expert study justifying the need of adapting the equipment, installations or networks of the connected entity to the changes to the network,

b) connection conditions,

c) draft connection agreement.

II.B.1.3. Connection agreement

II.B.1.3.1. During the validity period of the connection conditions the TSO is required to conclude the connection agreement with the entity applying for the connection to the network in accordance with the equal treatment principle provided there are the technical and economical conditions for the connection.

II.B.1.3.2. The connection agreement forms the grounds for the start of the designing and building-assembly works on the terms as defined in the connection agreement.

II.B.1.3.3. The transmission network connection agreement defines specifically:

a) the parties concluding the agreement,
b) the subject of the agreement resulting from the connection conditions,
c) the basic obligations of the parties, including the date of completing the connection,
d) the technical conditions of the execution of the agreement,
e) the connection capacity,
f) the scope of works necessary to make the connection,
g) the requirements regarding the location of the metering-settlement circuit and its parameters,
h) the location of the distribution of the ownership if the electric utility network and the equipment, installations and networks of the connected entity,
i) the level of the connection fee and rules of its payment,
j) the responsibility of the parties for defaulting on the terms of the agreement and cancellation of the agreement,
k) the method of data and information exchange and the confidentiality

clauses,

l) the method of coordination of the works carried out by the parties and the control of complying with the terms of the agreement,

m) the scope and dates of conducting the tests and partial acceptances and financial acceptance of the connector and the connected equipment, installations or networks,

n) the planned volumes of drawn electricity and the planned date of starting the delivery or drawing of the electricity,

o) the conditions of making available to the TSO the real estate belonging to the connected entity for the purpose of the construction or development of the network necessary for the construction of the connection,

p) envisaged date of concluding the transmission agreement,

q) the validity date of the agreement and the provisions regarding the changes to the conditions of the agreement, termination of the agreement and the dispute settlement procedure.

II.B.1.3.4. In the scope of the connections to the transmission network the TSO establishes the Acceptance Commission for the connection and connected equipment, installations and networks with the participation of the authorised representatives of the parties, which concluded the connection agreement.

II.B.1.3.5. The scope of tests and partial acceptances and the final acceptance of the connector and connected equipment, installations or networks should be consistent with the conditions of the connection agreement.

II.B.1.3.6. The results of the tests and partial acceptances and financial acceptance of the connector and connected equipment, installations or networks are confirmed by the parties in the tests and acceptances protocols. The model test and acceptance protocols are defined by the TSO.

II.B.1.3.7. Based on the protocols of the defined tests and partial and final acceptances the Acceptance Commission defined in point II.B.1.3.4. performs the final acceptance of the connector and connected equipment, installations or networks and prepares the application to accept for operation of the connected object, circuit, equipment, installation or network. The rules of accepting for operation of the objects, circuits, equipment, installations or networks are reviewed in point IV.A.2.

II.B.1.3.8. The originals of the protocols of tests and partial and final acceptances of the connector and connected equipment, installations or networks are kept by the TSO through a period of at least five years counting from the date of drawing up the final acceptance protocol. The copies of the protocols of tests and partial and final acceptances are received by the parties, which concluded the connection agreement.

II.B.1.4. Agreeing conditions for connection to the network

II.B.1.4.1. The coordination of connection conditions mentioned in point II.B.1.1.9. includes the coordination of the technical requirements contained in the connection conditions and is carried out within 60 days from the date of receiving by TSO the documents mentioned in point II.B.1.4.2.

II.B.1.4.2. The DSO delivers to the TSO the draft connection conditions accompanied by the following documents to coordinate the connection conditions mentioned in point II.B.1.1.9.:

a) a copy of the application for the determination of the connection conditions,

b) an expert study of the impact of connected equipment, installations or networks on the NPS.

II.B.1.4.3. The expert study of the influence of connected equipment, installations or equipment on the NPS mentioned in point II.B.1.4.2. b) should be made according to the scope and on the terms as agreed with the TSO.

II.B.1.4.4. The coordination with the TSO regarding the scope and terms of the expert study is valid for 1 year from the date of delivering the position on the issue to DSO by TSO.

II.B.1.4.5. The transmission system operator may refuse the coordination of the connection conditions when:

a) the connection conditions submitted for the coordination purposes do not ensure the secure operation of NPS,

b) the expert study was made based on the coordination with TSO regarding its scope and terms, which ceased to be valid or was carried out disregarding such coordination.

II.B.2. Rules of disconnecting from the network

II.B.2.1. The transmission system operator disconnects from the transmission system the equipment, installations or networks of the entities at the request of the entity connected to the transmission network.

II.B.2.2. The application for the disconnection from the transmission network mentioned in point II.B.2.1. contains specifically:

a) the current connection point of the equipment, installations or networks that the disconnection concerns,

b) reason for disconnection,

c) planned disconnection date.

II.B.2.3. Transmission system operator reviews the application for disconnection from the transmission network and determine:

a) the connection place of the equipment, installations or networks that the

disconnection concerns,

b) disconnection date,

c) the data of the individual responsible on TSO side for the correct disconnection of the equipment, installations or networks of the entity,

d) the methods of disconnection of the equipment, installations or networks of the entity encompassing: the scope of required works related to the disconnection of the entity, location of the connectors required to carry out the planned disconnection of the equipment, installations or networks of the entity and the timer schedule of the connection activities in individual substations,

e) the diagram of the transmission network before and after the disconnection encompassing the substations and power lines in the vicinity of the equipment, installations and networks of the disconnected entity.

II.B.2.4. The transmission system operator considers the technical possibilities of carrying out the process of disconnecting the entity's equipment, installations or networks in the determination of the date of disconnecting the equipment, installations or networks of the entity. The disconnected entity is notified by the TSO on the review of the disconnection application and the disconnection date of the equipment, installations or networks within 14 days maximum from the disconnection date.

II.B.2.5. The transmission system operator makes the changes to the transmission system configuration enabling the disconnection of the equipment, installations or networks of the entity from the network. The entity disconnected from the transmission network coordinates with the TSO the procedure and dates of the necessary reconstruction or liquidation of the network assets owned by the entity resulting from the disconnection from the transmission network.

II.B.2.6. The provisions contained in IRiESP ceases to bind the disconnected entity as of the date of disconnecting from the transmission network. The reconnection of the equipment, installations or networks of the entity to the transmission network takes place on the terms identical to the terms for the newly connected objects.

II.B.2.7. The disconnection of the equipment, installations or networks requiring according to the provisions of point II.B.1.1.9. the coordination of the connection conditions with TSO should to be coordinated with the TSO.

II.B.3. Technical requirements for devices, installations and networks including the necessary supporting infrastructure

II.B.3.1. General issues

II.B.3.1.1. The equipment, installations and networks of the entities applying for the

connection should meet the technical and maintenance requirements in accordance with the provisions of the Energy Law act ensuring:

a) the security of operation of the power system,

b) protection of the power system against the damage brought about by the improper operation of the connected equipment, installations and networks,

c) the protection of the connected devices, installations and networks against the damage in the case of the disturbance or implementation of the curtailments in the delivery or drawing of electricity,

d) maintenance of the power quality parameters at the connection point of the devices, installations and networks,

e) the option of measuring the values and parameters necessary for the network operation and settlements for the drawn electricity,

f) fulfilment of the environmental requirements stipulated in separate regulations.

II.B.3.1.2. Devices, systems, installations and networks connected to the network should meet the requirements stipulated in separate legal acts, including specifically the following regulations:

a) contained in the Building Law act,

b) on anti-shock protection,

c) on fire safety,

d) on compliance assessment system,

e) regarding the technology of electricity generation.

II.B.3.1.3. The connection of devices, installations and networks of new entities or the modernisation of the devices, installations and networks of the already connected entities may not bring about the exceeding of the acceptable border power quality parameters at the points of connection to the network of other entities and reduce the level of reliability of electricity delivery.

II.B.3.1.4. The technical requirements regarding generating devices, distribution networks, devices of final customers, cross-border connections and direct lines of the entities connected or applying for the connection to the network as provided for in IRiESP includes the technical requirements for:

a) devices, installations and networks of the recipients of electricity,

b) devices, installations and networks of electricity generators,

c) telecommunication systems,

d) electricity metering circuits

e) metering-settlement systems,

f) power automatic protection systems and associated devices,

g) data transmission and information exchange systems.

II.B.3.1.5. The technical requirements contained in IRiESP applies to the entities mentioned in point I.C.2.1.

II.B.3.1.6. TSO publishes "TSO's technical standards used in the transmission network" to enable the unification of technical solutions within the meshed network.

II.B.3.1.7. The technical requirements regarding devices, installations and networks, which are not or will not be connected to the meshed network can be changed through their individual definition in the network connection agreements, agreements regarding the provision of distribution services or comprehensive agreements.

II.B.3.1.8. The changes to the technical requirements mentioned in point II.B.3.1.7. require the coordination with the DSO appropriate for the connection point.

II.B.3.2. Technical requirements for devices, installations and customers networks connected to the network

II.B.3.2.1. Devices, installations and networks of the customers connected to the meshed network should be adapted to the short circuit conditions at their connection point and should be equipped with apparatus ensuring the elimination of the short circuits through the protection system in the basic zone within the time not exceeding:

a) 120 ms – in the case of short circuits occurred in the network of rated voltage equal to 220 kV or higher,

b) 150 ms – in the case of short circuits occurred in the coordinated 110 kV network.

II.B.3.2.2. The transformers connected to the meshed network, though which the equipment, installations and networks of the customers are supplied, should be:

a) equipped with the tapping regulators operating under load,

b) adapted to work with the superior control systems.

II.B.3.2.3. The meshed network should operate with the directly earthed neutral point so that under all operating conditions the earth fault coefficient defined as the relation of the maximum value of the phase voltage during the short circuit with the earth to the rated value of the phase voltage at the given point of the network does not exceed the following values:

a) 1.3 – in the network of rated voltage equal to 220 kV or higher;

b) 1.4 – in the coordinated 110 kV network.

II.B.3.2.4. The fulfilment of the requirements mentioned in point II.B.3.2.3. is possible subject to ensuring:

a) $1 \le \frac{X_0}{X_1} \le 2$ and $\frac{R_0}{X_1} \le 0{,}5$ – in the network of rated voltage equal to 220 kV or higher;

b) $1 \le \frac{X_0}{X_1} \le 3$ and $\frac{R_0}{X_1} \le 1$ – in the coordinated 110 kV network.

where:

X_1 – second reactance for the positive-sequence symmetric component of the earth-fault circuit,

X_0 and R_0 – reactance and resistance for the zero-sequence symmetric component of the earth-fault circuit.

II.B.3.2.5. For the purpose of meeting the requirements mentioned in point II.B.3.2.3. and II.B.3.2.4., the windings of the transformers of rated voltage equal to 110 kV and higher should be connected into the star with the neutral point adapted for earthing or unearthing.

II.B.3.2.6. In order to keep the required power quality parameters the customer connected to the meshed network should install the devices eliminating the introduction of the deformations of voltage and current. The type of installed devices eliminating the introduction of the voltage and current deformations should be consulted by the customer with the operator appropriate for the connection point.

II.B.3.2.7. If the generating units are connected to the customer's installation connected to the meshed network, then they should meet the technical requirements mentioned in point II.B.3.3.

II.B.3.3. **Technical requirements and recommendations for devices, installations and networks of electricity producers connected to the network**

II.B.3.3.1. **Basic technical requirements and recommendations for the conventional generating units.**

II.B.3.3.1.1. New generating units or after the next modernisation of equipment of the available capacity equal to 50 MW or higher should be equipped with:

a) turbine regulator enabling the operation under rotational speed control mode (type P rotational speed controller) according to the modelled static specification,

b) voltage controllers capable of cooperating with the superior voltage and reactive power control systems,

c) power breakers on the generator voltage side,

d) unit transformers with the option of changing the ratio under load,

according to the detailed requirements defined in point II.B.3.3.

II.B.3.3.1.2. The thermal generating units, condensation generating units and gas-steam units of available capacity equal to 100 MW or higher connected to the meshed network should be adapted to:

a) operation under primary control,

b) operation under automatic secondary power control according to the remotely set control signal,

c) remote setting of the base load,

d) handling tripping to house-load (PPW),

according to the detailed requirements defined in point II.B.3.3.

The requirement defined in point d) applies exclusively to the new generating units or after the next modernisation of devices which condition the fulfilment of that requirement.

II.B.3.3.1.3. The thermal generating units, condensation generating units and gas-steam units of available capacity equal to 100 MW or higher connected to the meshed network should be equipped with:

a) monitoring system of the operation of generating units enabling the control of all values necessary for the efficient operation of NPS, assessment of their regulatory operation and performance of the analyses of the operation of the power system according to TSO requirements,

b) system of efficient cooperation with the power plants enabling the exchange of information necessary for the efficient management of NPS operation compatible with SOWE system used by the TSO,

unless the TSO grants consent for not using such systems.

II.B.3.3.1.4. The functional description of the systems mentioned in point II.B.3.3.1.3. is provided in point VI.B. and VI.C., while the technical requirements are provided in point II.B.3.9. and II.B.3.11.

The generators with the generating units connected to the meshed network not fulfilling the requirements mentioned in point II.B.3.3.1.1. to II.B.3.3.1.32. on the date they come into force are required to agree with the TSO the schedule of adjustment of their generating units to the said requirements.

II.B.3.3.1.5. The generating units should be equipped with the continuously working automatic excitation circuits maintaining the voltage at the terminals of the generating units at the stable level within the entire range of their adjustment.

II.B.3.3.1.6. The excitation circuits of the generating units should be equipped with the following devices:

a) one voltage control circuit of the generating unit with the option of the remote control of the present value,

b) the minimum reactive power limiter (of power angle),

c) limiter of the stator's maximum current,

d) limiter of rotor's maximum current,

e) induction limiter,

f) power system stabilizer,

g) excitation voltage control circuit or generating unit's excitation current control circuit.

II.B.3.3.1.7. The type of the installed voltage control circuits, power system stabilizers and their settings requires coordination with TSO. The power system stabilizers should have two inputs for the new generating units and the units after the next modernization.

II.B.3.3.1.8. The generating unit's excitation voltage control system should ensure the level of the excitation voltage of the value no lower than 1.5 times of the rated excitation voltage value. In the case of the static exciters the level of the excitation voltage should be selected considering the assurance of the selection operation of the protection system of the generating unit and the correct power supply for auxiliary equipment of generating unit.

II.B.3.3.1.9. The voltage excitation and control system of the generating unit should ensure the steepness of the increase of the excitation voltage no lower than 1.5% of the rated voltage per second.

II.B.3.3.1.10. The voltage regulator of the generating unit should ensure the option of regulating the voltage at the terminals of the generating unit in the range from 80 to 110% minimum of the rated voltage.

II.B.3.3.1.11. The scope of settings of current compensation of the voltage regulator of the generating unit should not be lower than ±15 % for the active and reactive power.

II.B.3.3.1.12. The generating unit's voltage regulator should maintain the following relationship between the generator's voltage and frequency:

$$\frac{\Delta U_g}{\Delta f} \leq 0{,}05 \qquad for \quad f \geq 48\ Hz$$

$$U_g \leq \frac{f}{48} U_{g48} \qquad for \quad f < 48\ Hz$$

where:

Δf – frequency variation, in absolute values,

ΔU_g – voltage variation at terminals of generating unit corresponding to the frequency variations of Δf, in absolute values,

U_g – voltage at terminals of the generating unit with the frequency f,

U_g48 – voltage at terminals of the generating unit with frequency 48 Hz.

II.B.3.3.1.13. After the set jump change of the voltage value during the no-load running speed of the generating unit by ±10 %, the time of getting the voltage to the rated value by the voltage regulator should be shorter than:

a) 0.3 s – for thyristor static excitation circuits,

b) 1 s – for electromechanical excitation circuits.

II.B.3.3.1.14. Following the reactive load rejection generated by the generating unit from the rated value of the reactive power to the no-load running speed, the voltage regulation time of the generating unit should be shorter than:

a) 0.5 s – for thyristor static excitation circuits,

b) 1.5 s – for electromechanical excitation circuits.

II.B.3.3.1.15. With self-excitation of the generating unit with the automatic voltage regulation, the increase of the voltage of generating unit by the regulator cannot exceed 15% of the rated voltage value.

II.B.3.3.1.16. The voltage regulator of the generating unit should ensure the local stability throughout the entire allowed operating range stated by the generator, with the short circuit power of the network on the side of the higher voltage of the unit transformer equal to four times of the rated value of the apparent power of the generating unit.

II.B.3.3.1.17. The limiters of the maximum currents of stator and rotor of the generating unit should meet the following requirements:

a) the limiters of maximum currents of the stator and rotor should reduce the set value of the generating unit's voltage when the stator or rotor's current exceeds the set value,

b) the stator current limiter should not reduce the set value of the generating unit's voltage when the overloading of the stator is brought about by the capacitive current,

c) the ranges of the settings of the limited values of stator and rotor currents should stay within the range of 80 to 110% of the rated value,

d) the stator and rotor current should be limited with accuracy no lower than ±5 % of the rated value within the scope of the changes to the voltage from 80 to 100 % of rated voltage,

e) the limiter of stator's maximum current should be equipped with the delaying element allowing for the short-term overloading of the generating unit within the scope allowed in the instructions of the manufacturer of the generating unit, while the time delay should depend on the level of overloading and be shorter than the time of operation of the delay over-current protection of the generating unit,

f) the operation of the limiters should be signalled.

II.B.3.3.1.18. The excitation system should ensure the fulfilment of the following requirements for the auxiliaries of the generating unit:

a) correct operation under normal conditions and under other operating conditions of the power system as defined in point IV.C.11.4.,

b) following the three-phase short circuit on the terminals on the side of upper voltage of the unit transformer, the excitation circuit should ensure the restoration of the voltage on the auxiliary bus bars up to the value of 70% of the rated voltage within 1 s from the time of the disconnection of the generating unit from the network by the backup safeguards of the longest operating time.

II.B.3.3.1.19. The generating units can be equipped with the protection systems ensuring the automatic disconnection from the meshed network in following cases:

a) decrease of the frequency below 47.5 Hz with the time delay agreed with the TSO,

b) loss of stability,

c) decrease of the voltage on the terminals connecting the network with the unit transformer up to the level of 80% of the rated value, despite the generating unit's voltage regulator supporting the voltage with the time delay agreed with the TSO.

The generator is obliged to inform immediately the TSO about the activation of the aforementioned protection systems.

When the aforementioned protection systems do not meet the requirements defined in this part of IRiESP, specifically in respect to the settings and the logics of their operation, the generator at TSO's order is required to turn off such protection systems.

II.B.3.3.1.20. Upon the disconnection of the generating unit from the network for the reasons specified in point II.B.3.3.1.19.., the turbine control system should enable the safe tripping to auxiliary load according to the requirements defined in point II.B.3.3.1.2.

II.B.3.3.1.21. With the increase of frequency to 52.5 Hz the generating unit should not be disconnected from the meshed network before achieving the rotations ensuring the operation of the protection systems against rotation increase.

II.B.3.3.1.22. If two or more generating units operate for one transformer or power line, then in the case of the disconnection of the of generating units from the meshed network, their parallel operation should be interrupted.

II.B.3.3.1.23. The generating units should have the possibility of synchronisation with the meshed network within the frequency range from 48.0 to 51.5 Hz.

II.B.3.3.1.24. The generating units should have the option of operating within the frequency

range from 49.0 to 48.5 Hz continuously though 30 minutes, a total of 3 hours per year; from 48.5 to 48.0 Hz continuously through 20 minutes, a total of 2 hours per year and within the range from 48.0 to 47.5 Hz through 10 minutes, a total of 1 hour per year. With the decrease of frequency below 48.5 Hz the generated capacities of the generating units should amount to at least 95% of the installed capacity subject to the linear characteristics of the power decrease within the range from 48.5 to 47.5 Hz.

II.B.3.3.1.25. All requirements regarding the active power generated by the generating units should be also met when the voltage of the network to which the generating units are connected, falls to the level of 85% of the rated value.

II.B.3.3.1.26. The generating unit should have ensured the possibility of operation without time restrictions within the frequency range from 49 to 51 Hz and within the frequency range on the terminals of upper voltage of the unit transformer from 95% to 105% of the rated voltage, while at the same time maintaining the rated capacity and rated power factor irrespective of the slight deviations of the voltage of generating units within the range from 97% to 103% of the rated voltage.

II.B.3.3.1.27. The generating units should be adapted to the generation of available capacity under the changing power factor within the range from 0.85 of induction nature to 0.05 of capacitive nature. The available range of reactive power should be appropriately higher (according to the circular graph of the generator) when operating with the power lower than the available capacity.

II.B.3.3.1.28. Drives of devices of the generating units should operate in the manner ensuring that the active power of every generating unit with the decrease of the frequency to 47.5 Hz and voltage decrease to 80% of the rated voltage does not fall below the power necessary to supply auxiliaries of the generating unit.

II.B.3.3.1.29. The generating units connected to the transmission network should be equipped with the following power system protection devices:

a) against external short circuits in the network,

b) against internal short circuits in the generating unit,

c) against internal short circuits in the unit transformer,

d) earth-fault in the neutral point of the unit transformer,

e) over-voltage,

f) against loss of excitation,

g) against load asymmetry,

h) against returnable power,

i) reserve against internal short circuits in unit transformer or unit line,

j) against the pole slip.

II.B.3.3.1.30. The generating units should have the option of operating without cut-outs, in the case of the occurrence of the current negative-sequence component during the two-phase short circuits eliminated upon the operation of the backup protection systems in the transmission network.

II.B.3.3.1.31. The generating units should be adapted to continuing the operation within the network in the case of the occurrence of the close short circuits eliminated during the time no longer than:

a) 120 ms – for the networks with the rated voltage equal to 220 kV or higher,

b) 150 ms – for the coordinated 110 kV network.

II.B.3.3.1.32. The settings of the generating units connected to the network should be coordinated with the settings of network protection systems.

II.B.3.3.1.33. It is recommended that the start-up times of the conventional generating units should meet the following requirements:

a) with the standstill up to 8 hours – the start-up time from 1 to 2 hours,

b) with the standstill from 8 to 50 hours – the start-up time from 1 to 3 hours,

c) with the standstill over 50 hours – the start-up time from 2 to 5 hours.

II.B.3.3.1.34. It is recommended that the changes of the generated power necessary to execute the programs of the working generating units at TSO order are executed at the rate of 4 to 8% of the installed capacity per minute.

II.B.3.3.1.35. It is recommend that the generating units should have the option of operating within the range from 40 to 100 % of the installed capacity.

II.B.3.3.1.36. It is recommended that the generating unit is adapted to at least 200 start-ups during the year.

II.B.3.3.2. Detailed technical requirements for the conventional generating units

II.B.3.3.2.1. Technical requirements for the primary, secondary and tertiary control systems and for voltage control automatic group systems of generating units

II.B.3.3.2.1.1. Devices for the primary control at the generating units participating in the primary control should meet the following requirements:

a) the generating units should be equipped with the quickly acting regulators of turbines rotational speed. The operation of the primary control of generating unit in the case of the change of the frequency should occur within the time no longer than 30 s and achieve the entire response range resulting from the set droop of the regulator and the deviation of the frequency with accuracy of $\delta p = \pm 1$ % of rated power – P_n,

b) the generating units should be capable of releasing very quick change of the primary regulatory capacity $\Delta P(\Delta f) = 0 \ldots \pm 5\% P_n$, available throughout the band of the regulatory capacity of the generating unit (Pmin ÷ Pos) including the border regulation reserves +2,5 % P_n on the upper bank and – 2,5 % P_n on the bottom bank of the regulation, with the full response to the jump of the set power $\Delta P_z(\Delta f) = 0 \lceil +5\% P_n$ achieved within 30 s, i.e. $\Delta P(t<30\ s) = \pm 5\ \% P_n$, with accuracy of $\delta p \leq \pm 1\% P_n$ under the set conditions after 30 s,

c) the insensitivity of the frequency control systems should not be higher than $\Delta f_i = \pm 10$ mHz,

d) the frequency measurement cycle for the primary control operation should amount to no less than once per second,

e) the adjustment of the frequency in the power control system should be possible to set within the range of at least $\Delta P(\Delta f) = 0 \ldots \pm 5\% P_n$ with the changes to the droop s = 2…8% and the dead zone of the frequency Δf_0 = (0, ±10, ... ±500) mHz,

f) the structure of the rotational speed and power control systems with the frequency adjustment should ensure the stable operation of NPS under the occurrence of the disturbances through the proper interaction of the quickly reacting turbine rotations controller with the slowly reacting power regulator, considering the optimisation of the settings of the constants of the amplification, diversification and integration,

g) the structure of the turbine control system should provide for blocking the operation of the primary control by setting the dead zone at the level defined by the TSO, without eliminating the power adjustment signal from the frequency (without interrupting the power from frequency adjustment line).

II.B.3.3.2.1.2. The secondary control within the central ARCM controller is executed by the generating units of the heating plants responding to the change of signal Y_1 and the generating units of the hydro-plants responding to the change of signal Y_{1s}. The method of distribution of the control signals is defined by the TSO.

II.B.3.3.2.1.3. The equipment for secondary control at the generating units participating in the secondary control should meet the following requirements:

a) the ability to release the quick change of the secondary controlling power $\Delta P(t)$ following at uniform rate the changes to the set capacity ΔP_{Y1}(-31...0...+31) = (-5%...0…+5 %) P_n,

b) following the interventional (Y_{1i}) jump of signal ΔP_{Y1} ($0 \lceil +31$ or $0 \lfloor -31$) the full response is required within time $t < 30$ s, i.e. $\Delta P\ (t < 30\ s) = \pm 5\ \% P_n$, with the controlling power accuracy $\delta p < \pm 1\ \% P_n$ in the condition determined after time t = 30 s,

c) the availability of the interventional change of signal Y_{1i} throughout the

band of controlling power of generating unit (Pmin ÷ Pos),

d) the requirements defined for the primary control should be met for the cooperation of secondary control with the primary control during the changes to power P(t) following the changes to signal ΔPY1(-31...0...+31).

II.B.3.3.2.1.4. It is required that the equipment for secondary control at the generating units of hydro-plants, which on the date of IRiESP coming into force are capable of participating in the secondary control should maintain such capability. Specifically it is required that the capability should be maintained to release the quick change of the secondary controlling power ΔP(t) following at uniform rate the changes to the set capacity $\Delta P_{Y1s} = 0 \ldots > \pm 5\ \% P_n$ with power control accuracy $\delta p < \pm 1\ \% P_n$ ($t > 30$ s) available throughout the controlling power band of the hydro-set.

II.B.3.3.2.1.5. The remote setting of the base load for the unit within the scope of the central ARCM controller is executed by the generating units of the thermal power plants responding to the change of signal Y_0. The method of distribution of the control signals is defined by TSO.

II.B.3.3.2.1.6. It is required that the facility's control systems, which on the date of IRiESP coming into force are capable of executing the base load set by signal Y_0, maintain this capability and meet the following detailed requirements:

a) The generating units of the thermal power plants should be adapted to remote control with signal $Y_{0(i)}$ at controlling power P(t) following the changes to the set capacity $\Delta P_{Y0(i)}$ under automatic control (controlled remotely by central controller) or manual control changing at the average rate of $2\ \% P_n$/min, with the accuracy of power control $\delta p < \pm 1\ \% P_n$ ($t > 5$ min) throughout the available band of unit's controlling power,

b) Signal $Y_{0(i)}$ can be used as the reserve method of setting the base load of the units in the case of a failure of tele-information systems of TSO or under the situation of a risk to the security of the power system,

c) The generators should have the option of manual or automatic switching on/off the control circuit with signal Y0(i) at TSO order.

II.B.3.3.2.1.7. The following requirements should be met irrespective of the method of using SOWE system for the execution of base the load:

a) utilisation of the current operation point, hereinafter referred to as BPP, to automatically set the base capacity of the unit may not eliminate the option of setting the unit's base capacity according to the current rules with the support of automatic signal $Y_{0(i)}$,

b) the possibility of separate operation of primary and secondary control with the use of signal $Y_{1(i)}$ and control with signal $Y_{0(i)}$,

c) the joint operation of the primary control system, secondary control system $Y_{1(i)}$ and tertiary control system with signal $Y_{0(i)}$ should meet the requirements determined for the individual control systems,

d) the adopted maximum value of the gradient of power changes in the area of the changes to the base power with the use of BPP may not limit the required level of the power gradient in the area of the power controlled by signal $Y_{1(i)}$ provided it is envisaged for use,

e) the acceptable scope of the unit's operation with the activated primary and secondary control systems by signal $Y_{1(i)}$ may not cause the under-load or over-load operation of the generating unit,

f) the current requirements set for the primary and secondary control systems $Y_{1(i)}$ should be met and in the case of any their changes and modifications it is required to obtain the written acceptance of TSO for the implementation of these changes.

II.B.3.3.2.1.8. The technical requirements of automatic voltage control systems in the generating nodes, hereinafter referred to as ARNE systems:

a) ARNE system should enable the voltage control at the substation to which the generating units are connected in respect to the changes to the reactive power in the full area resulting from the circular graph of these units,

b) ARNE system should be adapted to work with the ARST voltage control system controlling the ratio of coupling transformers at the substation, to which the generating units are connected,

c) ARNE system should operate in the manner ensuring that the frequency of the changes to the switches of the coupling transformers taps at the substation, to which the generating units are connected, does not exceed the average daily frequency acceptable for the given switch,

d) ARNE system should enable the adjustment of the voltage deviation to the set value within time shorter than 3 minutes (for ARST system the time of adjusting the deviation is not standardised),

e) ARNE system should block its operation in the case of excess of the border values of the regulated voltage,

f) ARNE system should block its operation in the case of excess of the border value of the generating unit's voltage,

g) ARNE system may not cause the voltage oscillation at the substation and the oscillation of the reactive power during its operating cycle,

h) ARNE system should ensure the even distribution of the reactive power for the generating units of the same rated power operating for the given bus bars system of the substation, and for the generating units of different rated power the system should ensure the distribution of the reactive power pro rata to their capacity,

i) ARNE system should enable setting the locally and remotely regulated values from the superior dispatching centres,

j) ARNE system should enable setting the voltage values within the acceptable voltage changes defined for the given substation by the TSO,

k) ARNE system should enable setting the border value of the voltage of the generating unit according to the relation $U_{gmax} < 1{,}1\ U_{gn}$ (U_{gn} – rated voltage of the generating unit),

l) ARNE system should enable setting the voltage controller droop defined as the relation of the relative change of regulated voltage to the relative change of reactive power at the given operating point under defined conditions (expressed as a percentage) within the range from 0 to 3 %,

m) the voltage regulation error of ARNE system may not be higher than 0.5 %,

n) ARNE system should enable setting the insensitivity zone ε_u defined as the scope of system's insensitivity to the changes of regulated voltage within the range from 0.1 to 1% (for ARST circuit the insensitivity zone ε_T defined as the scope of insensitivity of the module regulating the coupling transfer ratio should be adjustable within the range from 0.5 to 5 %),

o) ARNE system should enable setting the safety margins 2.5 – 5 % Q_{gmax} so that the reactive power changes would not cause the durable operation of the limiters of its operation (for ARST system the control of the ratio of coupling transformers should take place within the zone limited by the acceptable values of the currents and voltages of the primary and secondary side; the excess of that zone should trigger the operation of the control system in the direction, in which the excess of the acceptable values could intensify),

p) ARNE system should enable setting the intervals between the impulses controlling the generating units voltage controllers – $tp > 5$ s (for ARST system the scope of settings of the intervals between the impulses controlling the switches of the transformer taps should be 3 min < tp < 30 min),

II.B.3.3.2.2. **Technical requirements for generating units in the scope of ability for defence and restoration of the national power system**

II.B.3.3.2.2.1. Technical requirements in the area of the adaptation of the generating units to participation in the defence and restoration of NPS supply contained in IRiESP are obligatory for all entities that have the new generating units or after the next modernisation of the equipment, which determine the defence and restoration ability, of available capacity equal to 50 MW or higher, connected to the meshed network unless the TSO grants the consent for derogation from their application.

II.B.3.3.2.2.2. The detailed technical requirements are defined by TSO separately for each generating unit envisaged to participate in the defence and restoration of NPS

supply depending on its location within NPS and its role in the process of defence and restoration of NPS supply and should be considered in the action plans in the case of losing the connection with NPS or complete voltage collapse in that system.

II.B.3.3.2.2.3. Within the scope of adaptation of generating units of power plants to participate in the defence and restoration of NPS supply the following is identified:

a) the ability of the power plant to operate under a separated network configuration – the ability of the power plant for emergency switching to independent operation in the case of the lack of power supply from NPS, according to the plan coordinated with TSO, and the ability of permanent operation in such configuration and readiness to execute TSO orders in respect to the enlargement of the separated area,

b) the ability of the power plant to self-start – the ability to start the power plant without the power supply from NPS, according to the plan coordinated with TSO, and ability of permanent operation in such configuration and readiness to execute TSO orders in respect to the start-up of subsequent power plants and enlargement of the separated area.

II.B.3.3.2.2.4. The controllers of the turbines of generating units in respect to their ability to defend and restore NPS power supply should:

a) be capable of operating under the rotational speed control mode executed by the proportional rotational speed controller RO(P) according to the modelled static parameters (ability to regulate the frequency in the flexible multi-machine network),

b) have the option of advance automated change of the operating mode of the turbine controller from the power control mode RN(PI) to the rotational speed control mode RO(P) (the identification of the creation of an island according to the criteria agreed with the TSO),

c) ensure the certain acquisition of jump increases of power from 0 to + 0.1 P_n during the reconnection of the load in the course of restoration or gradient power increase at the rate v = 1...4 % P_n/min in the case of the quasi-linear loading of the customers in the separated network. The term "certain acquisition of power" means the capability of the rotational speed controller to accept the jump power load $\Delta P = 0 \lceil \pm 0{,}1\ P_n$ under the island/separated operation conditions with various connections and connectors at the frequency varying no more than o $\Delta f < \pm 1{,}0$ Hz,

d) ensure the efficient switching to the separated operation both with the surplus and moderate deficit of the power generated in relation to the power drawn by the island at the time of the separation,

e) the structure of the turbine controller system should enable the automatic and manual change of the operating modes of turbine controller according to the provisions of point b),

f) the control structure should enable setting under the operator mode the dead zone of the static parameters of the turbine set within the range from 0 to 500 mHz.

II.B.3.3.2.2.5. The technical requirements for the generating units in respect to the ability to operate in separated network configurations:

a) the operation of the automatic control systems (UAR) of the load of generating units should be ensured, where the turbine power controllers RP(PI) and boiler fuel controllers RB(PI) following the set power so that the units can if required be stopped automatically or by the unit operator upon the initial operation of the rotational speed controller RO(P),

b) the unloading/loading of the turbine by the rotational speed controller RO(P) should be supported – specifically upon the switch of the operating mode of the generating unit to the separated operation or island operation mode – by the appropriately adapted operation of the control of steam efficiently reacting to the fuel supply to the boiler (assurance of the coordinated operation of the boiler and turbine under the type P rotational speed control mode),

c) the temporary changes to the values controlled at the boiler, which usually have high degree of inertia should not have negative impact on the operation of the turbine rotational speed control in the case of a system disturbance, in the form of additional disturbance for the turbine,

d) operation of the steam pressure controllers of bypass stations WP and SP/Np. should be optimised in the manner ensuring that the deviations of steam pressure during the operation of the station do not have negative impact on the accuracy of the power maintained by the generating unit,

e) the automatic control systems of the turbine and the boiler and the protection systems of generating units should ensure the handling of the tripping to auxiliary load from any level.

f) provision of media other than electricity necessary to start upon the generating unit from the voltage-free condition provided that such need results from the action plan agreed with the TSO in the case of the loss of connection with NPS or complete voltage collapse in that system as mentioned in point IV.C.11.8.,

g) the requirements stipulated in points b), c), d) and e) do not apply to the gas-steam units,

h) the automatics systems of the generating units should ensure the ability to handle the discharge of the load from any operation point of the generating unit to any separated load with special consideration of the auxiliary load operation PPW (without identification of the position status of network breaker).

II.B.3.3.2.2.6 The technical requirements for the generating units in respect to self-start

capability:

a) the generating units should maintain the capability of supplying the voltage to the separated start-up line within 15 minutes from giving the instructions,

b) the generating units should maintain the capability of performing at least three consecutive self-starts within 2 hours,

c) the generating units should have the appropriate generation capacity sufficient to start up another power plant envisaged to be started within the plans of restoration of NPS power supply.

II.B.3.3.2.2.7. The requirements for the voltage controllers of generating units in the area o the ability to defend and restore NPS power supply:

a) the generating units should be adapted to the control of voltage within the admissible change range and to compensate the reactive power within the admissible operating area of the generating unit both during voltage supply and line loading and transmission of the start-up power via that line necessary to start up the generating unit of other power plant,

b) the correct operation of the voltage control maintaining $0.95 \leq U \leq 1.05\ U_n$ during the consecutive jump power increases of network load $\Delta P \leq 0 \lceil +0.05\ P_n$,

c) assurance of the appropriate level of capacitive and inductive reactive power within the range consistent with the circular graph of the generating unit,

d) operation under the automatic voltage control mode in the entire admissible operating area within the range from at least 80 to 110 % U_n.

II.B.3.3.2.2.8. The generator who has the generating units prepared to participate in the defence and restoration of NPS power supply is required to submit to TSO the instruction defining in detail the scope of envisaged actions in the case of the participation of these generating units in the defence or preparation to participate in the restoration of NPS power supply.

II.B.3.3.2.3. **Acceptance tests and tests verifying the ability of generating units to operate under primary and secondary control**

II.B.3.3.2.3.1. The generators are required to perform in the following cases the technical acceptances of the facility circuits executing the primary and secondary control:

a) start up of the new facility control systems,

b) modernisation of the existing control systems,

c) changes to the structure of algorithm of the control systems,

d) hardware changes to the control systems,

e) changes to the control range or power range of the generating unit controlled by the facility control systems encompassing the broader control range in relation to the range covered by the earlier commission acceptance of the control systems (change of the pull-out power or minimum admissible technical load),

f) the modernisation of the generating unit, whose effects could affect the control quality,

g) changes to the algorithms or structures of the automatic BPP execution systems,

h) changes to the procedure of setting the operating mode of the generating unit within SOWE system,

i) upon the performance of general overhaul.

II.B.3.3.2.3.2. The tests and measurements mentioned in point II.B.3.3.2.3.1. are carried out by an independent professional company agreed upon with TSO according to the program coordinated with the TSO.

II.B.3.3.2.3.3. The generators for the purpose of performing the technical acceptances of facility systems responsible for primary and secondary control notifies them for technical acceptance to TSO 14 days in advance. The generator arranges the technical acceptance with the participation of TSO representatives.

II.B.3.3.2.3.4. Should TSO determine the operation of the control circuits in a manner incompliant with the rules defined in the control acceptance protocols or the lack of readiness of the given generating unit to perform the control, the TSO may instruct the performance of the verification tests earlier than stipulated in point II.B.3.3.2.3.1. subject to the provisions of point II.B.3.3.2.3.3.

II.B.3.3.2.3.6. The verification tests carried out in the cases mentioned in point II.B.3.3.2.3.1. and II.B.3.3.2.3.4. are carried out at the generator's expense.

II.B.3.3.2.3.7. In justified cases the transmission system operator reserves the right to perform the other tests than mentioned in this chapter for the purpose of verification of the fulfilment of the requirements set for the new equipment or equipment after the next modernisation, which determine the fulfilment of those requirements by the generating units connected to the meshed network. In this case the tests is carried out at the operator's expense.

II.B.3.3.2.4. Acceptance tests and tests verifying the ability of generating units for defence and restoration of the national power system

II.B.3.3.2.4.1. Within the scope of the conducted tests confirming the readiness of the generating units to defend and restore NPS power supply, the two test categories are introduced:

a) acceptance tests,

b) periodical verification tests and system trials.

II.B.3.3.2.4.2. The objective of the conducted acceptance tests concerns the verification of the adaptation of the generating unit to participate in the defence and restoration of NPS power supply.

II.B.3.3.2.4.3. The objective of the conducted periodical verification tests and system trials concerns the confirmation of the adaptation of the power plants to participate in the defence and restoration of NPS power supply.

II.B.3.3.2.4.4. The verification tests and system trials for the power plants with self-start capability include:

a) the power plant's self-start test concerning the self-start up of the generating units and feeding the voltage to the selected bus-bar of the local substation until the stabilization of the voltage and frequency within the admissible deviation range – the tests are carried out at TSO order at least twice a year;

b) verification of the ability to control the frequency in the flexible network concerning the self-start of the generating unit and its parallel operation with other generating units of the power plant providing the self-start service while at the same time ensuring the minimum load of these units (own and general needs of the power plant, pumps, other available acceptances – the test is carried out at TSO order at least once a year together with the test defined in point a);

c) the power plant self-start test concerning the self-start (as defined in point a) of the random selected generating units feeding of voltage to the separated start-up line to the power plant's generating unit until the stabilization of the voltage at the end of that line at power plant's substation – the test is carried out at TSO order once every 3 years;

d) the self-start test of the power plant concerning the self-start of random selected generating units and feeding the voltage and start-up power to the separated start-up line to the non-self-starting power plant with the start-up of the selected generating unit(s) of main power plant from the operating condition and its(their) synchronization and island operation with the self-starting power plant – the test is carried out at TSO order at least once every 5 years.

II.B.3.3.2.4.5. The verification tests and system trails for the power plants with ability to work in separated circuits include:

a) the power discharge trials at individual generating units with a switch to PPW (individually under single-machine configuration with the activation of type PI rotational speed and double-machine configuration with the activation of type P rotational speed) and connection to them the general needs of the power plant– the test is carried at TSO order at least once every 3 years;

b) the power discharge trials at selected generating units with a switch to PPW and connection to them of the general needs of the power plant and feeding the voltage and start-up power to start-up the neighbouring back-up generating unit or the generating unit(s) of the neighbouring power plant – the test is carried out at TSO order at least once every 5 years.

II.B.3.3.2.4.6. The tests mentioned in point II.B.3.3.2.4.1. are conducted with the participation of TSO representative and independent professional company.

II.B.3.3.2.4.7. In the case of modernisation or change of the technical and organisational status of the power plant having the self-start capability or capable of operating in separated configuration, the TSO may demand the performance of the verification tests according to the procedure and the conditions envisaged for such tests.

II.B.3.3.2.4.8. The transmission system operator informs the generator about the plans to perform the tests with appropriate advance warning no shorter than 72 hours to enable the technical-organisational preparation of the tests mentioned in point II.B.3.3.2.4.1.

II.B.3.3.2.4.9. In the case of determining the lack of the power plant's ability to defend and restore the power supply at NPS as a result of the performed tests mentioned in point II.B.3.3.2.4.1., the generator is required to conduct the additional test. The other test is regarded as the acceptance test. The generator informs TSO about the date of performing anther test at least 72 hours in advance.

II.B.3.3.2.4.10. The tests mentioned in point II.B.3.3.2.4.1. are carried out at the generator's expense.

II.B.3.3.2.4.11. The transmission system operator reserves the right to conduct the other tests than mentioned in point II.B.3.3.2.4.1. system trials to improve the adaptation of NPS to the operation in emergency conditions. The scope and detailed objectives of these tests are defined by TSO. The method of financing these tests is agreed upon each time with the participants of these tests.

II.B.3.3.2.4.12. The transmission system operator reserves the right to conduct the tests other than mentioned in this chapter to verify the compliance with the requirements set for the new equipment or after the next modernisation of the equipment, which determine the fulfilment of those requirements for the generating units connected to the meshed network.

II.B.3.3.2.5. **The acceptance and verification tests for automatic systems of generation units group voltage control**

II.B.3.3.2.5.1. The generators are required to perform the acceptance tests of ARNE circuits in the following cases:

a) start-up of the new facility control systems.

b) modernisation of the existing control systems.

c) the changes to the structure or algorithm of control systems.

d) hardware changes to the control systems.

e) changes to the control range of ARNE systems.

II.B.3.3.2.5.2. The tests mentioned in point II.B.3.3.2.5.1. are carried out by an independent professional company agreed upon with the TSO according to the program coordinated with the TSO.

II.B.3.3.2.5.3. The generators submit ARNE systems for technical acceptance with 14 days advance for the purpose of their acceptance by the TSO.

II.B.3.3.2.5.4. The generator with the participation of TSO representatives arranges the commission technical acceptance verifying the fulfilment of regulatory requirements by the generating unit as defined by the TSO subject to maintaining the other parameters within the safe operation range of devices.

II.B.3.3.2.5.5. The transmission system operator confirms the commissioning of the control system upon the fulfilment of the requirements mentioned in point II.B.3.3.2.5.4.

II.B.3.3.2.5.6. Should TSO resolve that the control systems operate in the manner contrary to the provisions of the ARNE systems acceptance protocols, the TSO may order additional verification measurement tests.

II.B.3.3.2.5.7. The acceptance and verification tests conducted in the cases mentioned in point II.B.3.3.2.5.1. and II.B.3.3.2.5.6. are be conducted at generator's expense.

II.B.3.3.2.5.8. The transmission system operator reserves the right to carry out the tests other than mentioned in point II.B.3.3.2.5.1. to verify the compliance with the requirements set for the new generating units or generating units after the next modernisation of equipment connected to the meshed network, which determine the fulfilment of those requirements.

II.B.3.3.3. Technical requirements and operating conditions for wind farms

II.B.3.3.3.1. The scope of requirements and conditions for wind farms

II.B.3.3.3.1.1. Technical requirements for the wind farms of rated power at its connection point equal, to 50 MW or higher, which are connected to the meshed network, concern:

a) control of active power,

b) operation depending on the frequency and voltage,

c) switching on/off for operation in the meshed network,

d) control of the voltage and reactive power,

e) operation of the wind farms under the disturbances in the meshed network,

f) maintenance of the power quality standards,

g) automatic power protection systems,

h) monitoring and telecommunication systems,

i) verification tests.

II.B.3.3.3.1.2. The technical requirements for the wind farms mentioned in point II.B.3.3.3.1.1. may also apply to the wind farms of rated power at the interconnection point, lower than 50 MW, when:

a) the total rated power of wind farms connected to one switchgear substation of rated voltage 110kV through 110/MV transformers exceeds 50 MW,

b) the total rated power of wind farms connected to the radial line of rated voltage 110kV and higher exceeds 50 MW,

c) the total rated power of wind farms connected to the line route of rated voltage 110 kV connecting at least two substations exceeds 50 MW,

d) the total rated power of the wind farms connected through the separated transformer EHV/110 kV exceeds 50 MW.

The system operator appropriate for the connection point decides on fulfilment of the obligations regarding the aforementioned requirements through the connection conditions.

II.B.3.3.3.1.3. The system operator is entitled to control the execution of the connection conditions and may demand the wind farm operator to release the documentation determining that the wind farm meets the requirements defined in IRiESP and in the connection conditions. Documentation should specifically contain the results of measurements necessary for the assessment of the impact of the wind farm on the quality of electrical energy and the computer simulations with the model accepted by the appropriate system operator that shows the response of the wind farm to the network disturbances.

II.B.3.3.3.1.4. The wind farms connected to the meshed network should be equipped with the devices based on technology enabling the safe cooperation with NPS under various possible operating conditions.

II.B.3.3.3.1.5. The detailed requirements for each wind farm are defined by the appropriate system operator in the connection conditions depending on the rated capacity of the wind farm, its location within the network, situation in the system and the results of the expert assessment of the impact of the connected wind farm on the system.

II.B.3.3.3.1.6. The system operator may define in the connection conditions for the wind farm of rated power equal to 50 MW or higher the requirement of adjusting the wind farm to participate in the control of system parameters and may require that the control of the wind farm power is adjusted to the automatic remote control.

II.B.3.3.3.1.7. The wind farm, in the case of not fulfilling the power quality standards defined in point II.B.3.3.3.7.1. to II.B.3.3.3.7.8., may be disconnected from

the system by the system operator until the irregularities are eliminated.

II.B.3.3.3.2. **Active power control**

II.B.3.3.3.2.1. The wind farm should be equipped with the power control systems enabling the operation under the following regimes:

a) unrestricted operation, with respect to the wind conditions,

b) intervention operation according to the requirements of the appropriate system operator under the situations of disturbances and risks to the operation of the power system,

c) participation in the frequency control (for wind farms of rated power equal to 50 MW or higher).

II.B.3.3.3.2.2. Under normal operating conditions of the system and the wind farm the active power supplied to the network by the wind farm of rated power equal to 50 MW or higher may not exceed the power limit (with ±5 % accuracy) specified by the appropriate system operator.

II.B.3.3.3.2.3. Under normal operating conditions of the wind farm, including normal start-ups and outages, the average gradient of the change of active power of the wind farm for a 15 minutes period may not exceed 10% of the rated power of the farm per minute. The average gradient may not exceed 30 % of the rated power per one minute.

II.B.3.3.3.2.4. Under the system disturbances the aforementioned gradient of load can be exceed by the wind farms participating in the frequency control or when TSO requires the quick unloading or additional loading of the wind farm provided that it is technically feasible.

II.B.3.3.3.2.5. The power control system of the individual generating units should ensure the decrease of power to at least 20% of the rated power during the period shorter than 2 s.

II.B.3.3.3.2.6. The system operator is entitled to temporarily limit the power of the wind farm of rated value equal to 50 MW or higher to the value no lower than 5% of the rated power of that farm. The power limit can be set by external signal in MW or % of the current power of the wind farm or in the form of a relationship with the network frequency and/or voltage. The active power control algorithm of the wind farm should be adapted to the execution of that requirement. The rate of power reduction to achieve the set value should be at least 10 % of the rated power of the wind farm per minute.

II.B.3.3.3.2.7. In situations of a risk to safe operation of the system, the appropriate system operator may require the complete shutdown of the wind farm. The system operator defines in the connection conditions requirements for the adjustment of the wind farm for remote tripping , monitoring and data transmission.

II.B.3.3.3.3. **Operation of a wind farm depending on the frequency and voltage**

II.B.3.3.3.3.1. The wind farm should be capable of operating within the following frequency range:

a) with $49.5 \leq f \leq 50.5$ Hz the wind farm should be able to operate continuously at the rated capacity,

b) with $48.5 \leq f < 49.5$ Hz the wind farm should be able to operate at the capacity higher than 90% of the power resulting from the current wind velocity through the period of minimum 30 minutes,

c) with $48.0 \leq f < 48.5$ Hz the wind farm should be able to operate at the capacity higher than 85% of the power resulting from the current wind velocity through the period of minimum 20 minutes,,

d) with $47.5 \leq f < 48.0$ Hz the wind farm should be able to operate at the capacity higher than 80% of the power resulting from the current wind velocity through the period of minimum 10 minutes,

e) with $f < 47.5$ Hz the wind farm can be disconnected from the meshed network with the time delay agreed with TSO,

f) with $50.5 < f \leq 51.5$ Hz the wind farm should be able to operate continuously with reduced capacity along with the frequency increase to zero at 51.5 Hz,

g) with $f > 51.5$ Hz the wind farm should be disconnected from the meshed network within maximum 0.3 s unless the appropriate system operator defines another value in the connection conditions..

II.B.3.3.3.3.2. The wind farm should meet the conditions mentioned in point II.B.3.3.3.3.1. a) and b) with the variations of the voltage at the interconnection point to the meshed network within the range as defined in point II.A.2.2.4.

II.B.3.3.3.3.3. The voltage and frequency values provided in point II.B.3.3.3.3.1. and II.B.3.3.3.3.2 are quasi-stationary with the change gradient for the frequency smaller than 0.5% per minute and for the voltage smaller than 5% per minute.

II.B.3.3.3.3.4. The decrease of power required under the frequency increase of over 50.5 Hz can be executed through the subsequent outage of the generating units operating at the wind farm.

II.B.3.3.3.3.5. The wind farms of the rated power equal to 50 MW or higher should be adapted to participate in the frequency control at NPS through the change of the power following the change of the frequency. This requirement applies to the full load range of the wind farm.

II.B.3.3.3.3.6. The transmission system determines in the connection conditions for the wind farm of the rated power equal to 50 MW or higher the conditions of the participation of that farm in the frequency control and the required control parameters within the range as defined in Table 3.

Table 3 Summary of values determining the participation of the wind farm in the frequency control

Description	Values of the settings	
	min.	max.
Power reduction (control range)	0 %	25 %
Dead zone in relation to 50 Hz	0,0 Hz	±0,5 Hz
Frequency change causing the load change by 100 % (droop)	3 %	20 %

II.B.3.3.3.3.7. Depending on the location and the extent of development of the wind energy generation in the country the system operator may provide in the connection conditions cessions from the requirements defined in point II.B.3.3.3.3.1. through II.B.3.3.3.3.6.

II.B.3.3.3.4. **Switching operations of wind farms in the meshed network**

II.B.3.3.3.4.1. The wind farm should transmit to the appropriate system operator a signal informing about the current status of its generating units. The signal on the status of the generating units should be generated based on the identification of the status and reasons for the outage of the units. The signal informing on the status of the generating units and the local frequency measurements and network voltage measurements are considered in the algorithms of switching on the wind farm for operation as agreed upon in the Connection Agreement.

II.B.3.3.3.4.2. The power increase gradient of the wind farm may not exceed the value defined in point II.B.3.3.3.2.3. also during the restart of that farm following the decrease of the wind velocity below the limit requiring the switching off of the wind farm.

II.B.3.3.3.4.3. The wind farm start-up algorithm should include the control of voltage conditions at the network connection point.

II.B.3.3.3.4.4. In the case of a wind farm of rated power equal to 50 MW or higher the appropriate system operator should be informed 15 minutes in advance about the planned start-up of the wind farm following the stop longer than 1 minute because the emergency shutdown or excess of the limit wind velocity. Such notification is not required if the wind farm load forecasted for the next hour does not exceed 5 MW or when the start-up is the result of the increase of the wind velocity above the minimum value required for the power generation. For remaining wind farms these conditions are defined in the Connection Agreement.

II.B.3.3.3.4.5. Except for the network disturbances and the disturbances at the wind farm the

reduction of the power of the wind farm should be executed as close as possible according to the active power change gradient defined in point II.B.3.3.3.2.3.

II.B.3.3.3.5. Voltage and reactive power control

II.B.3.3.3.5.1. Devices of the wind farm should be selected in a manner ensuring the maintenance of the voltage conditions defined in the connection conditions at the network connection point and the stable interoperation with NPS.

II.B.3.3.3.5.2. The wind farm should be capable of controlling the power factor or voltage factor at the network connection point. The system operator defines the requirements in this area in the connection conditions and may demand the application of the automatic remote control.

II.B.3.3.3.5.3. During the active power generation the wind farm should be capable of operating with the power factor at network connection point within the range from 0.975 of inductive nature to 0.975 of capacitive nature within the full load range of the farm.

II.B.3.3.3.5.4. Depending on the voltage conditions at the network connection point the appropriate system operator may under operative mode change the range of the power factor control mentioned in point II.B.3.3.3.5.3. or require the operation with the determined fixed power factor. For wind farms of rated power equal to 50 MW or higher the change of the control parameters should take place remotely, while for the other wind farms these conditions are defined in the Connection Agreement.

II.B.3.3.3.5.5. For wind farms of rated power at connection point equal to 50 MW or higher the system of automatic voltage and reactive power control should be provided with maintaining the option of cooperation with the primary voltage and reactive power control systems, including the existing voltage control systems at ARST station.

II.B.3.3.3.6. Operation of wind farms under disturbances in the meshed network

II.B.3.3.3.6.1. The wind farms should be adapted to maintain operation in the case of an occurrence of short-circuits in the network resulting in a decrease of the voltage at the network connection point. The curve presented on graph 3 shows the area, above which the generating units of the wind farm cannot be switched off.

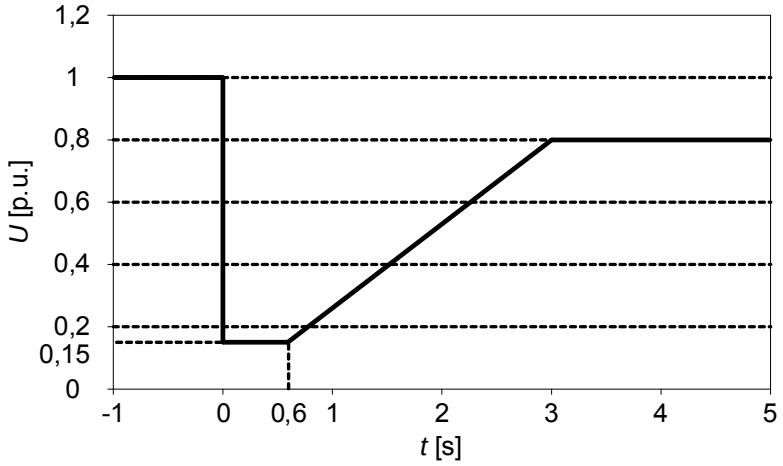

Fig 3. Parameters of the required operation range of the wind farm in the case of occurrence of network disturbances

II.B.3.3.3.6.2. At some locations the system operator may require that the wind farms during the system disturbances generate possibly high reactive power within the range of technical constrains. This requirement is defined by system operator in the connection conditions.

II.B.3.3.3.6.3. Detailed requirements regarding the operation of the wind farm under system disturbances conditions are defined by the system operator in the connection conditions considering the type of the generating units, the capacity of the wind farm, its location within the network, concentration of the wind power generation in the system and results of the assessment of the wind farm connection impact on the NPS.

II.B.3.3.3.6.4. In the course of the disturbances resulting in the voltage variations the wind farm may not lose the capability of the reactive power control and should support the voltage maintenance.

II.B.3.3.3.6.5. At the wind farm of the rated power equal to 50 MW or higher the disturbance recorders should be installed according to the requirements stipulated in point II.B.3.7.22. The recorders should ensure the registration of the runs through 10 s before the disturbances and 60 s after the disturbance.

II.B.3.3.3.7. **Maintenance of the power quality standards**

II.B.3.3.3.7.1. The wind farm should not cause sudden changes and voltage jumps exceeding 3%. Even if the voltage disturbances resulting from the operation of the wind farm are recurring, the range of the single quick change of the effective voltage value may not exceed 2.5% for the frequency of 10 disturbances per hour and 1.5% for the frequency of 100 disturbances per hour. These requirements also apply to the start-up and outage of the generating units.

II.B.3.3.3.7.2. The ratios of the short-term (P_{st}) and long-term (P_{lt}) voltage oscillations of

wind farms connected to the meshed network should not exceed respectively the following values:

a) average for 10 minutes period: $P_{st} < 0.35$ for coordinated 110 kV network and $P_{st} < 0.30$ for the network of rated voltage equal to 220 kV or higher,

b) average for the period of 2 hours: $P_{lt} < 0.25$ for the coordinated110 Kv network and $P_{lt} < 0.20$ for the network of rated voltage equal to 220 kV or higher.

II.B.3.3.3.7.3. The wind farms connected to the network of rated voltage equal to 220 kV or higher should not cause at network connection point the single harmonics of the voltage from 2 to 50 higher than 1.0 %. The total harmonic distortion ratio THD at network connection point should be lower than 1.5 %.

II.B.3.3.3.7.4. The wind farms connected to the coordinated 110 kV network should not cause at network connection point the single harmonics of the voltage from 2 to 50 higher than 1.5 %. The total harmonic distortion ratio THD at network connection point should be lower than 2.5 %.

II.B.3.3.3.7.5. The aforementioned power quality values should be met during weekly periods with 99% probability.

II.B.3.3.3.7.6. The wind farms of rated power equal to 50 MW or higher connected to a single circuit line should be equipped with the power quality measurement and recoding system (measurement of oscillations and voltage and current harmonics) and the system for data transmission to appropriate system operator.

II.B.3.3.3.7.7. Harmonics disturbance factor for the THFF telephony for the connection point of the wind farms to the meshed network should be below 1 %.

II.B.3.3.3.7.8. Because of the protection of telecommunication devices the level of disturbances caused by the wind farm at the connection point to the meshed network should meet the requirements of appropriate telecommunication regulations.

II.B.3.3.3.8. Power system protection automatics

II.B.3.3.3.8.1. The wind farm owner is responsible for the design and installation of the protection devices protecting the farm against the effects of short-circuit currents, recovery voltage after the elimination of short-circuits in the system, asynchronous operation of that farm and other impact of the system disturbances on the wind farm.

II.B.3.3.3.8.2. The protection settings of the wind farms should be coordinated with the protection installed in meshed network.

II.B.3.3.3.8.3. The protection settings of the wind farm should ensure the selectiveness of cooperation with the meshed network protection for the short-circuits, both in that network and at the farm.

II.B.3.3.3.8.4. The short-circuits within the wind farm should be eliminated selectively and cause as little as possible power loss of that farm.

II.B.3.3.3.8.5. At the stage of preparing the basic design of the wind farm the protection analysis should be carried out and coordinated with the system operator including the verification of:

a) completeness of the protection,

b) correctness of the settings at individual generating units and wind farm switchgear,

c) coordination with the protections of the distribution system or the transmission system.

The results of analysis should be submitted to the appropriate system operator. The detailed requirements of TSO for the energy protection automatics are defined in point II.B.3.7.

II.B.3.3.3.9. **Monitoring and communication of wind farms with TSO**

II.B.3.3.3.9.1. The system operator, to which network the wind farm is connected, should have access to the measurement signals and parameters registered according to the rules agreed upon with the wind farm owner. The scope of the data measured and recorded by the transmission system operator is provided in point IV.C.4.

II.B.3.3.3.9.2. The minimum scope of measurements of analogue parameters from the wind farm provided to the system operator includes the temporary values of:

a) active power,

b) reactive power,

c) voltage at the network connection point,

d) average wind velocity for the farm.

II.B.3.3.3.9.3. The minimum scope of double-state data provided to the system operator includes:

a) the current condition of generating units including the number of working units, units ready to work,

b) condition of the frequency control system,

c) other facts that may result in the disconnection of the wind farm, resulting from conditions defined in the Connection Agreement.

II.B.3.3.3.9.4. The standard equipment of the wind farm of rated power equal to 50 MW or higher concerns the real-time monitoring system of the condition and operating parameters ensuring the transmission of data to the appropriate system operator.

II.B.3.3.3.9.5. The wind farm owner will ensure the delivery to the system operator of the average hourly power forecast of the wind farm at least 24 hours in advance and the updated forecast every 6 hours. The method of the fulfilment of this requirement is defined through connection conditions and in the Connection Agreement.

II.B.3.3.3.9.6. The wind farm owner delivers to the appropriate system operator the current parameters of the wind farm equipment (primary devices and control systems) necessary to conduct the system analyses. Before the start-up of the wind farm this would be the data of the device manufacturers.

II.B.3.3.3.9.7. The system operator defines in the network connection conditions the range of technical data for the given wind farm, which is necessary to plan the system operation.

II.B.3.3.3.9.8. The technical parameters of the wind farm telecommunication system will be defined by the appropriate system operator in the network connection conditions.

II.B.3.3.3.10. Verification tests

II.B.3.3.3.10.1. The wind farms connected to the meshed network are required to conduct during the first year of operation the verification tests confirming the fulfilment of the requirements defined in IRiESP. The method of performing the wind farm tests is agreed in the Connection Agreement.

II.B.3.3.3.10.2. The wind farm owner at least 2 months before the start-up date of the wind farm submits to the appropriate system operator the scope and the program of tests and delivers the necessary documents such as instructions for the control systems and the operation manual. The process of coordination of the test plan should be completed one month before the start-up date of the wind farm.

II.B.3.3.3.10.3. The tests should concern specifically:

a) the wind farm power curves as the function of wind velocity,

b) start-up of the wind farm with the wind enabling to reach at least 75% of the rated power with the control of the power increase and voltage changes gradient,

c) outage of the wind farm with the wind velocity exceeding the value, at which the rated power is reached,

d) the speed of voltage changes by the voltage control system,

e) operation of the power and frequency control systems,

f) impact of the wind farm on power quality.

II.B.3.3.3.10.4. The system operator issues consent for the first start-up of the wind farm and performance of the tests.

II.B.3.3.3.10.5. The detailed report from the conducted tests should be delivered to the appropriate system operator within 6 months after their completion.

II.B.3.4. Technical requirements for telecommunication systems

II.B.3.4.1. Technical requirements for the telecommunication systems concern the meshed network objects and devices, installations and networks of the entities connected to the meshed network.

II.B.3.4.2. The meshed network objects and devices, installations or networks of the entities connected to the meshed network should be equipped with the tele-control and telecommunication devices necessary for:

a) dispatching communication,

b) transmission and reception of data necessary for the management of the operation of meshed network, i.e. the signals to/from the tele-controlling systems in the scope of tele-signalling, tele-metering, tele-commanding and tele-governing of generating units,

c) transmission of signals of tele-protections and tele-automatics systems,

d) transmission of metering data for settlement purposes,

e) transmission of commercial-technical information,

f) assurance of the operational communication within the facilities in the scope of facility needs requirements,

g) assurance of communication with public institutions.

II.B.3.4.3. Telecommunication channels necessary for the execution of the aforementioned issues should ensure the data transmission at the transmission rate defined by TSO and should have the physically independent reservation of the links to TSO telecommunication nodes.

II.B.3.4.4. The telecommunication devices should have power supply from the sources resistant to the breakdowns of primary power ensuring the continuity of their operation through at least 8 hours from the time of the disappearance of the primary power supply.

II.B.3.4.5. The technological devices of telecommunication systems should be approved for the installation and use in the territory of the Republic of Poland and the quality certificates in respect to the use of the devices and installations in power facilities. The fulfilment of the criteria and requirements stipulated therein guarantees the correct operation of the telecommunication network and allows the devices producers to submit certificate of conformity of manufacturing and marking with the applicable standards.

II.B.3.4.6. The following additional documents should be delivered for new elements of the telecommunication system commissioned for TSO's operation:

a) acceptance protocols of devices prepared by the investor's acceptance

commission,

b) measurement protocols of the optical fibre lines constructed on high voltage lines, constructed or certified by authorized companies,

c) the complete post-completion documentation including protocols from the post-assembly and start-up tests, verified by the technical supervision inspector of the given investment project and accepted by TSO.

II.B.3.4.7. The meshed network facilities and the networks of the entities connected to the meshed network should be equipped with the following dispatch communication systems:

a) primary and backup dispatch communication system with the hierarchically arranged appropriate dispatch centres,

b) the communication system with neighbouring facilities, including its required reservation for major facilities, depending on the needs.

II.B.3.4.8. The dedicated telephone exchange installed at the power facility is used for the construction of the primary dispatch communication system. In justified cases and in the case of the facilities with the upper voltage of 110 kV it is allowed to use the telephones taken out of other telephone exchanges.

II.B.3.4.9. The backup dispatch communication system can use the networks and tele-transmission and switching structures of other telecommunication operators.

II.B.3.4.10. Any dispatch calls made with the use of the primary or backup dispatch communication system are recorded at each dispatch centre that is a party to such call. The required period of storage of the recorded information must not be shorter than 1 year.

II.B.3.4.11. The Transmission System Operator defines requirements for elements of the dispatch communication system in the transmission system facilities based on the standards adopted at TSO.

II.B.3.4.12. The meshed network facilities and the seats of the dispatch services of TSO and the entities connected to the meshed network should be equipped with data transmission devices enabling the transmission of information necessary for the management and control of operation of the devices and subsystems installed at network facilities in the area of tele-signalling, tele-metering and tele-controlling, monitoring and supervision, particularly:

a) with tele-signalling devices enabling the transmission of information necessary to map the topology of the supervised power facility,

b) with tele-metering devices enabling the transmission of the temporary values of the measurement of values necessary to map the parameters of the supervised power facility,

c) with tele-controlling devices enabling the remote performance of the switching and control actions.

During the transition period, till 31 of December 2010, the departures are allowed from the requirements defined in point c) above.

II.B.3.4.13. The seats of dispatch services of system operators should be equipped with the IT systems used for data exchange regarding network operation. These systems should ensure the exchange of data under ICCP or Elcom protocols. During the transition period till 31 of December 2010 it is allowed to use IEC 870-5-101, IEC 870-5-104, DNP3.0 or Elcom/TASE.1 protocols.

II.B.3.4.14. Telecommunication devices applied for transmission of electrical energy metering data to TSO systems should enable the transmission of the measured values by the metering systems at minimum rate of 9 600 Bd by making use of:

a) commutation systems applied for the direct communication (fixed analogue links or digital links with the support of optical fibre lines) or radio communication by adding the communication port of the automatic data recording system to the selected local or remote telephone exchange,
b) data transmission channels in the power primary telecommunication network or data transmission channels at the networks of other telecommunication operators through the permanent linking of the communication port of the automatic data recording system with the communication port of the system for remote acquisition of metering data,
c) the devices and elements of IT systems of TSO executing the emulated linking of the communication ports of the automatic data recording system and the system for remote reading of metering data.

During the transition period till 31 of December 2010 it is allowed to use the other transmission speed rates.

II.B.3.4.15. The distribution to generating units of the secondary and tertiary control signals can be executed only with the use of UTRT or ICCP protocols. The type of the applied protocol is each time agreed between TSO and the owner of the generating unit.

II.B.3.5. Technical requirements for the energy metering systems

II.B.3.5.1. Technical requirements for the electrical energy metering systems apply to TSO, DSOs in scope of the coordinated 110 kV network and the entities connected to the meshed network.

II.B.3.5.2. The transmission network and the devices, installations and networks of the entities connected to the meshed network should be equipped with the metering systems, with at least, the active and reactive power metering functions in two directions.

II.B.3.5.3. The technical requirements for the metering systems are defined for:

a) metering-settlement systems for which the measured energy amount form

the base for settlements,

b) balance-control metering systems, for which the measured energy amounts form the base for monitoring of readings of metering-settlement systems and the balancing of the network facilities and areas.

II.B.3.5.4. Technical solutions for individual metering systems depend on the level of the rated power of the connected device, installation or network and are divided into 3 categories:

a) category 1 – for the measurement of electrical energy with the rated power of the device equal to 30 MVA or higher,

b) category 2 – for the measurement of the electrical energy with the rated power of the device from 1 MVA to 30 MVA,

c) category 3 – for the measurement of electrical energy with the rated power of the device lower than 1 MVA.

II.B.3.5.5. The following requirements are defined for category 1 metering systems mentioned in point II.B.3.5.4. a):

a) current and voltage transformers in the metering-settlement systems should have two cores and two windings of 0.2 class of accuracy used for the measurement of electrical energy;

b) the electrical energy meters in the metering-settlement systems should have class of accuracy no lower than 0.2 for the active power and 1 for reactive power;

c) the current and voltage transformers in the metering-settlement systems should be of the class no lower than 0.5;

d) the electrical energy meters of the metering balancing-controlling systems should have the class of accuracy no lower than 2 for active power and 3 for reactive power;

e) the electrical energy meters should provide for the cooperation with the automatic data recording systems.

II.B.3.5.6. The following requirements are defined for category 2 metering systems mentioned in point II.B.3.5.4. b):

a) the current and voltage transformers should be of the class no lower than 0.5;

b) the electrical energy meters in the metering-settlement systems should have the class of accuracy no lower than 0.5 for the active power and 3 for reactive power;

c) the electrical energy meters of the metering balancing-controlling systems should have the class of accuracy no lower than 2 for active power and 3 for reactive power;

d) the electrical energy meters should enable the cooperation with the automatic data recording systems.

II.B.3.5.7. The following requirements are defined for category 3 metering systems mentioned in point II.B.3.5.4. c):

a) the current and voltage transformers should be of the class no lower than 0.5;

b) the electrical energy meters in the metering-settlement systems should have the class of accuracy no lower than 1 for the active power and 3 for reactive power;

c) the electrical energy meters of the metering balancing-controlling systems should have the class of accuracy no lower than 2 for active power and 3 for reactive power;

d) the electrical energy meters should enable the cooperation with the automatic data recording systems.

II.B.3.5.8. For category 1 and 2 electrical energy metering-settlement systems the two metering systems are required, i.e. the primary and backup metering systems, with exception for the metering-settlement systems mentioned in point II.B.3.5.15. f), for which only the primary metering-settlement system is required.

II.B.3.5.9. The backup metering system should meet the criteria of equivalence with the primary circuit.

II.B.3.5.10. The metering-settlement system is defined as equivalent if:

a) for category 1 – the electrical energy meters under the primary and backup metering-settlement systems are supplied from separate cores/windings of the transformers installed in the same bay and the primary and backup metering-settlement systems meet the technical requirements defined in point II.B.3.5.5.,

b) for category 2 –the primary and backup metering settlement systems meet the technical requirements defined in point II.B.3.5.6.

II.B.3.5.11. The loading of the voltage and current transformers in the metering-settlement systems and metering balancing-controlling systems should not exceed the rated values and should not be lower than 25% of the rated power of the transformer.

II.B.3.5.12. The safety coefficient of the instrument of current transformers should be FS≤5.

II.B.3.5.13. The automatic data recording systems should perform the following functions:

a) ensure the automatic metering data reading using the integration periods of 15 to 60 minutes,

b) enable the recording of electrical energy with division into zones of the day and seasons,

c) ensure the automatic verification of metering data quality,

d) ensure the storage of metering data through the period not shorter than 45 days with 60 minutes integration period,

e) enable the semi-automatic data reading in the case of the failure of transmission links.

II.B.3.5.14. The automatic data recording systems should ensure the option of connecting:

a) at least one data transmission channel in the case of recording data from the measurement balancing-controlling systems,

b) at least two data transmission channels in the case of recording data from the metering-settlement systems except for the systems mentioned in point II.B.3.5.15. f), which require the assurance of the option of connecting at least one data transmission channel.

II.B.3.5.15. The electrical energy metering-settlement systems should be installed in the following places:

a) on the side of the upper voltage of unit transformers and auxiliary transformers of generating units connected to the network of rated voltage 110 kV and higher,

b) on 110 kV side of EHV/110 kV transformers comprising devices connecting points, installations or networks of other entities,

c) on the side of upper voltage of network transformers or in the feeder bays of rated voltage of 110 kV and higher comprising the place of connecting the end customers,

d) in the feeder bays of 110 kV rated voltage and higher of the lines comprising the connection of NPS with the power systems of neighbouring countries,

e) in the feeder bays of rated voltage of 110 kV lines comprising the connection between DSO networks,

f) at generator terminals of generating units providing regulatory system services and for the units requiring the confirmation by TSO of the amount of electrical energy necessary to obtain the certificates of origin as defined by the Energy Law act.

II.B.3.5.16. The primary metering-settlement systems installed on the side of the upper voltage of the unit transformers and auxiliary transformers of JWCD units and the generating units connected to the network of rated voltage equal to 220 kV and higher, and in the places mentioned in points II.B.3.5.5.15. b) and d) and c) in relation to the end customers connected to 220 and 400 kV network

should be in the possession of TSO.

II.B.3.5.17. The measurement balancing-controlling systems in the transmission network operated by TSO should be installed in the transformer bays, coupling bays and feeder bays of 400, 220 and 110 kV rated voltage, which enables the balancing of the network facilities divided into the individual voltage levels.

II.B.3.5.18. The transition period till 31 of December 2008 has been established for the adaptation of the infrastructure for electrical energy metering systems to the requirements mentioned in II.B.3.5.

II.B.3.6. **Technical requirements for the metering-settlement systems**

II.B.3.6.1. Technical requirements for the metering-settlement systems apply to TSO, entities connected to the network of rated voltage 220 kV and higher and the entities connected to the network of rated voltage 110 kV when they have the Transmission Agreement concluded with TSO.

II.B.3.6.2. The metering-settlement systems should execute the following functions:

a) remote reading of metering data from the automatic data recording systems,

b) making available and acquiring the metering data through WIRE system.

II.B.3.6.3. The remote metering data reading function should allow to obtain the metering data from the metering systems equipped with the automatic data recording system through the telecommunication channels meeting the requirements defined in point II.B.3.4.

II.B.3.6.4. The metering data should be obtained along with the quality markers assigned by the automatic data recording system for the metering data verification purposes.

II.B.3.6.5. The function of making available and acquiring the metering data should enable for the exchange of metering data which forms the base for the determination of the amount of energy delivery being the base for the settlements handled by TSO.

II.B.3.6.6. The metering data should be exchanged together with the data markers assigned by the automatic data recording system.

II.B.3.6.7. The function of obtaining the data from the metering-settlement systems located:

a) on the upper voltage side of unit transformers and auxiliary transformers of JWCD units and generating units connected to the network of rated voltage equal to 220 kV or higher,

b) on the side of 110 kV of EHV/110 kV transformers,

c) on the upper voltage side of EHV/MHV transformers on in the feeder bays of the rated voltage higher than 110 kV,

d) in feeder bays of the rated voltage of 110 kV and higher of the lines comprising the connection of NPS with the power systems of neighbouring countries,

e) at generator terminals of generating units providing the regulatory system services and the units requiring the confirmation by TSO of the amount of electrical energy necessary to obtain the certificates of origin as defined by the Energy Law act,

should be executed:

- for the primary metering-settlement systems by the automatic data recording system and the remote metering data reading system to TSO's metering-settlement system,
- for backup metering-settlement systems through WIRE system to TSO's metering-settlement system.

II.B.3.7. **Technical requirements for power system protection automatics and cooperating devices**

II.B.3.7.1. The general requirements set for the power system protection devices are as follows:

a) the individual elements of the network (overhead and cable lines, lines of the electrical energy consumer, transformers, reactors, bus connectors and bus-bars) should be equipped with the power system protection and the cooperating devices hereinafter referred to as EAZ systems and devices, necessary for reliable, self operating, potentially quick and selective elimination of network disturbances; regulation of reactive power load-flows and voltage levels; operation of the substation of upper voltage of 750, 400, 220 and 110 kV with the support of controls, local measurement and signalling devices; reproduction of disturbances using disturbances and events recorders,

b) EAZ systems and devices should react to the disturbances in the operation of the power system and generating units, devices and networks of the entities connected to the power systems such as: earth-faults and inter-phase faults; metallic and high-resistance short-circuits; transient faults and permanent short-circuits; evolving faults; disturbances of technological nature in the devices; incorrect operation of the breaker; and in special cases also: dangerous voltage increase on power lines; risk of losing the stability of the power system,

c) safeguards and automatic protection of individual elements of the network and connected elements should be adapted to the method of their operation and parameters,

d) settings of EAZ systems and devices and installations of the entities connected to networks of upper voltage of 750, 400, 220 and 110 kV

should be coordinated and calculated by TSO,

e) the backup of EAZ devices should be provided to increase the assurance of eliminating the disturbances by EAZ circuits and devices considering the possibility of the failure of these circuits,

f) the individual elements of the transmission network should be equipped with two independent sets of EAZ devices,

g) two primary protections of lines should be applied in the network of rated voltage of over 220 kV and in the network of rated voltage of 220 and 110 kV if it is impossible to remotely reserve the lines protection and occurring risk of the NPS stability,

h) in order to ensure the independence of individual sets of EAZ devices each of them should cooperate with separate: current and voltage metering systems, auxiliary (control) voltage circuits and breaking circuits (breaking coils),

i) auxiliary voltage control circuits of individual systems of EAZ devices should be supplied from two different sections of direct current substations cooperating with different battery banks; the protection incorporated into individual circuits should use different coils (cores) of current transformers or other windings of voltage transformers. It is recommended that these requirements are also applied to the major facilities of the meshed network of rated voltage of 110 kV,

j) primary EAZ devices should be equipped with the circuits for the control of the continuity of breaking circuits,

k) the ensure the synchronous connection of the lines and transformers to the meshed network it is necessary to equip these network elements with the synchronisation control circuits. This requirement applies to the bus-bar connector field used to replace these fields,

l) the generating units should be equipped with the synchronisers enabling the synchronous connection with the network,

m) at the connection point to the meshed network and on the lines in the major points of that network it may be required to install the synchronizers to restore the system,

n) control and supervisory systems of power facilities operation connected directly to the station of upper voltage 750 kV, 400 kV, 220 kV and 110 kV held by TSO should be adapted to work with TSO control and supervision system,

o) for the purpose of performing the disturbance analysis, the individual meshed network elements and the generating units, devices, installations and networks of the connected entities should be equipped with the disturbances recording systems, events signalling or recording systems and

for lines of rated voltage over 110 kV the fault locating instruments as well; it is recommended to apply fault locating instruments to coordinated 110 kV network as well,

p) on lines of rated voltage higher than 110 kV the links should be used for the concurrent operation of the protection and for the automatics; in exceptional cases it might be necessary to apply the links on the lines of rated voltage of 110 kV,

q) in order to ensure high availability of EAZ devices it is required to use the devices with the continuous control and supervision circuits,

r) assurance of the mutual safety of the secondary circuits through the application of: elements of appropriate isolation, appropriate overvoltage protection, high quality of installation fittings (clamps, inputs, couplings etc.) and installation tools, devices resistant to disturbances (electromagnetic compatibility) in the secondary circuits of the station and assurance of the transparent architecture of the secondary circuits and construction of connections; application of EAZ circuits and devices and installation fittings that have quality certificates, application in the auxiliary circuits of the circuit elements and solutions of appropriate high quality,

s) the damage of one of the protections dedicated to protect a network element at the substations of upper voltage 400 and 220 kV (major system stations and power plant substations) should not cause a need for the shutdown of the field, but should just form the grounds for planning the repair activities.

II.B.3.7.1.A. The technical requirements for EAZ circuits in the scope of assurance over short period of elimination of disturbances should concern:

a) maintenance of conditions of network dynamic stability,

b) mitigation of the scope of faults at disturbance locations

c) prevention of ageing of network and power plant devices,

d) mitigation of technological disturbances at end customers,

e) improvement of safety conditions for people and devices at network facilities.

II.B.3.7.1.B. Obtaining the required short periods of short-circuits and ensuring the selective outages require the application of:

a) primary protections working within period less than 30 ms,

b) breakers with their breaking time not exceeding 40 ms (with the option of departure in justified cases),

c) links for the cooperation with the tele-automatics devices with the signals transmission time not higher than 20 ms – for binary signals and not

exceeding 5 ms for the analogue signals,

d) circuits of local reservation of the breakers with two criteria of the breaker openings: current using the current transformers with quick action and return (under 20 ms) for each phase and breaking using the signal contacts of the breaker,

e) potentially lowest number of intermediating relays,

f) the bus-bar protection with the operating time not exceeding 20 ms,

g) unit protections.

II.B.3.7.2. Transmission lines of rated voltage 750 and 400 kV should be equipped with the following cooperating EAZ devices and circuits:

a) unit protection (on the conditions of availability of the appropriate quality of the link) enabling 1 and 3 phase breaks,

b) two distance protections (from various producers or different operation algorithm in the case of products from the same producer) with the voltage memory, blockade against power swings enabling 1 and 3-phase breaks,

c) double-level directional to ground-fault protection,

d) automatic load restoration circuits (SPZ) enabling the performance of 1 and 3 phase cycle of automatic load restoration,

e) short-circuit locator,

f) voltage and synchronization control circuit,

g) automatics against voltage increase (if required for the system reasons at the required network points).

II.B.3.7.3. The transmission lines of rated voltage of 220 kV should be alternatively equipped with the following cooperating EAZ devices and circuits:

a) unit protections (on the conditions of availability of the appropriate quality of the link) enabling 1 and 3 phase breaks,

b) the same protection should be applied in the outgoing lines of major system substations and power plant substations as for 400 kV lines,

c) in other lines it is allowed to use one distance protection or two primary protections – unit and distance protection,

d) one double-stage current protection reacting on to-ground faults,

e) automatic load restoration circuits (SPZ) enabling the performance of 1 and 3 phase cycle of automatic load restoration,

f) short-circuit locator,

g) voltage and synchronization control circuit.

II.B.3.7.4. The lines of rated voltage of 110 kV should be equipped with the following

cooperating EAZ devices and circuits:

a) one primary protection – distance or unit. In the case of cable lines or overhead lines of length shorter than 2 km the unit protection should be applied,

b) one backup protection - distance or to-ground and current protection for radial lines,

c) automatic 3-phase load restoration protection (SPZ),

d) short-circuit locator recommended for lines characterised by the high number of disturbances.

II.B.3.7.5. Deleted.

II.B.3.7.6. The unit lines should be equipped with the following EAZ and cooperating devices (all protections of unit line should react to 3-phase trip-out of unit breaker):

a) two primary protections enabling 3-phase breaks,

b) backup protection reacting to asymmetric earth-faults in the unit line and external network,

c) automatic protection circuit elements preventing power swings and overloading of network elements, hereinafter referred to as APKO circuits,

d) the circuit of unconditional trip-out of unit breaker from the signal sent by the unit control room.

All aforementioned protections react to 3-phase opening of the breaker.

II.B.3.7.7. The transformers with upper rated voltage of 750 kV, 400 kV and 220 kV should be equipped with the following cooperating EAZ systems and devices:

a) two primary (differential) protections reacting to short-circuits located in the transformer except for the coil short-circuits,

b) two backup protections (distance protection, to ground-fault protection) on each side of the winding of upper and bottom voltage of the transformer,

c) technological protections (producer's protection): flow-gas protections, heat models and the transformer temperature sensors,

d) protections in the neutral point of the transformer,

e) to-ground-fault protection on the side of the upper and bottom voltage of the transformer,

f) over-current protection against transformer's overload,

g) automatic voltage control circuits ARST,

h) circuit signalling the current overload of the transformer,

i) circuit for monitoring of the operating conditions of the transformers, in the case of new units and units just after modernisation of devices.

II.B.3.7.8. Two and multi-winding transformers 110 kV/MV/MV should be equipped with the following EAZ circuits and cooperating devices:

a) primary protection reacting to the short-circuits in the transformer – fault-current protection and differential protection for over 5 MVA transformers,

b) each side of the transformer should be equipped with the over-current-delay protection,

c) each side of the transformer should be equipped with the overload protection (double-winding transformers are protected only on one side),

d) it is recommended that each medium voltage (MV) side of the transformer is equipped with the protection enabling the shortening of the short-circuit time on the medium voltage (MV) bars,

e) the factory protection of the transformers: temperature and gas-flow of tanks and gas-blow of tap changer,

f) transformer's protection reacting to the internal and external short-circuits should react to the break.

II.B.3.7.9. In the case of using the medium voltage winding of the transformers mentioned in points II.B.3.7.7. and II.B.3.7.8. for auxiliary power purposes and/or connection of the reactor, the medium voltage side of the transformer should be additionally equipped with the following EAZ devices:

a) two-stage voltage protection against earth-faults,

b) two-stage over-current protection,

c) additional over-current and zero-voltage protection in the configuration with a breaker on the medium voltage side.

II.B.3.7.10. The reactors with air isolation connected to the medium voltage side of the transformers mentioned in points II.B.3.7.7 and II.B.3.7.8 should be equipped with the following EAZ circuits and devices:

a) two-stage over-current protection,

b) current protection of the negative component,

c) over-current protection of MV bars.

The reactors should be covered by the differential protection of the transformer. The reactors with oil isolation should be additionally equipped with the technological protection.

II.B.3.7.11. The reactors with oil isolation of rated voltage of 750 and 400 kV should be equipped with the following EAZ circuits and devices:

a) differential protection,

b) impedance or over-current-time delay protection,

c) technological protection,

d) in special cases – over-current protection of MV bars.

II.B.3.7.12. The transformers of upper rated voltage of 220 or 110 kV, where the bottom voltage is the medium voltage at radial networks, should be equipped with the following EAZ circuits and devices:

a) differential protection,

b) two-stage impedance or over-current-time delay protection on the upper voltage side,

c) to-ground-fault protection on the upper voltage side of the transformer operating under unit configuration with the line,

d) two-step over-current protection on the bottom voltage side,

e) technological protection.

The protection mentioned in points b) and c) are installed in the connection point of the network transformer.

II.B.3.7.13. All types of bus-bar connectors should be equipped with the following EAZ circuits and cooperating devices:

a) one primary protection operating under the mode for splitting the bus-bars reacting to the 3-phase trip-out of own breaker,

b) the bays of the bus-bar connectors replacing the bays of transmission lines, transformers and unit lines should be equipped with the additional set of EAZ devices enabling the execution of all protection functions, necessary with the use of the bus-bar connector filed to replace other bay, including the circuit enabling the cooperation of the bus connector with the technological protection of the transformer and power plant unit,

c) it is allowed to use one instead of two primary protections and not to use the short-circuit locator.

II.B.3.7.14. Deleted.

II.B.3.7.15. The bus-bars of switchgear with voltage 750, 400, 220 and 110 kV should be equipped with one set of bars protection ensuring the break of the bus-bar systems (sections), including the short-circuits located between the breaker and the current transformer in the bus-bar connectors bay.

II.B.3.7.15.A. The newly constructed, reconstructed and repaired 110 kV switchgears of bus-bar substations should be equipped with the bus-bar protection circuits independent on the local breaker protection.

II.B.3.7.15.B. In simplified 110 kV type “H” substations it is allowed to use the bars automatics based on the reverse zones of distance protection of feeder bays.

II.B.3.7.15.C. In 1.5 and 2 switchgears substations the simplified protection of bus bars should be applied, which does not use information on the position of the bars disconnectors.

II.B.3.7.16. All 750, 400, 220 and 110 kV network substations should be equipped with the local breaker circuits (LRW) independently on the protection circuits of bus-bars, while upon TSO's permission it is allowed to use LRW circuits integrated with the bus bars protection.

The additional control of the bay breaker by LRW element assigned to the bay in which the breaker did not react should be provided prior to the break of the appropriate bus-bar system.

II.B.3.7.16.A. All 750, 400, 220 and 110 kV network substations depending on the operating configuration of the substation should be equipped with the remote reserve breaker circuits – in the case of the operation of bus-bars EAZ circuit. In the case of the breaker's failure the remote reserve breaker circuits should:

a) in the transmission feeder bay – send the signal to its other end,

b) in the unit feeder bay – send the signal shutting down the transformer on the bottom voltage side or the de-excitation signal of the generator – when there is no generator breaker,

c) in the case of breaker's failure in the transformer bay of upper voltage of 400 or 220 kV – send the signal shutting down the transformer on the bottom voltage side,

d) in bus-bar connectors bay coupling the systems – break both bars systems connected by that breaker.

In the case of the failure of any breaker starting by the EAZ circuits and devices of bus bars, the remote reserve breaker circuits should immediately disconnect the damaged breaker.

II.B.3.7.17. The links in EAZ circuits and cooperating devices should provide for the transmission lines the transmission of the following signals:

a) from the first distance protection,

b) from the second distance protection,

c) from unit protections,

d) from to-ground-fault protections,

e) from the system of automatic protection against excessive voltage increase,

f) from remote reserve breaker circuit for unconditional disconnection of the element of the line system at its other end,

g) topologies of opposite bays for the anti-swing-unloading automatics (from APKO systems),

h) on units lines to send the signals from the protection between the substation and the generating unit.

II.B.3.7.17.A. It is recommended to use at the same time for transmission of signals mentioned in point II.B.3.7.17. two independent links, including at least one dedicated exclusively for EAZ circuit.

II.B.3.7.18. The signals of unconditional disconnection of the second end of the line require two independent links – two links, coded signals. The two independent transmission routes should be used for the automatic protection and signals between the generating unit and substation. The outage for the time of repair or review of one link should not result in the operating restrictions in network's operation.

II.B.3.7.19. The unit protection of transmission lines should be equipped with its own link used just for the coupling of half-sets. The separated conductors from the optical fibre bunch installed on the line are used in the case of optical fibre link.

II.B.3.7.20. The transmission of signals from the protection of the transmission lines should take place first with the maintenance of the high reliability of their transmission and have a priority with the maintenance of the high reliability of signals transmission, especially in the case of unconditional disconnection of the other end of the line (two links, coded signals).

II.B.3.7.21. The structure, operating rules and the method of operation of the protection device of the transmission lines and the links cooperating with them should be regarded as one set of devices.

II.B.3.7.22. The network disturbance recorders dedicated for the performance of the analyses of the course of disturbances and operation of EAZ circuits and the breakers should be installed in all active bays of transmission substations. The network disturbance recorders should:

a) record in each bay the analogue signals: 3 voltages and 3 phase currents and voltage $3U_0$ and current $3I_0$,

b) record the signals on the initiation of the primary protection, all signals on initiation of the protection or automatic protection in respect to the cut-off, all tele-protection signals (both broadcasting and receiving), restoration signals from SPZ circuits,

c) record the slow-varying runs,

d) save the record in the recommended Comtrade format.

There should be easy access to the network disturbance recorder – local at the place of its installation and remote.

During the transition period till 31 of December 2010 there are allowed the departures from the requirements defined at this point.

II.B.3.7.22.A. The indirect relays should satisfy the following requirements:

a) it is recommended to use in the protection of output (disconnection) relays – the contacts of disconnection capability adapted to the power consumption level of disconnection coils of breakers and equipped with the circuits limiting the overvoltage occurring during the disconnection of the circuit of coil breaker,

b) the high quality two-state transformers should be used in the control circuits.

II.B.3.7.22.B. The following current transformers should be used in EAZ circuits:

a) the standalone five-core installed in bays of the transmission network elements, where core 3, 4 and 5 are the protection cores of class 5P20 and the capacity appropriate for the given circuits and the supplied EAZ circuits and devices,

b) combined,

c) installed in the transformers' bushings – it is envisaged to use at least two cores of appropriate parameters for EAZ circuits and devices,

d) installed in the conductors earthing the neutral point of transformers.

II.B.3.7.22.C. The capacitive, inductive and combined voltage transformers are used in the bays of the transmission network elements that have three secondary windings, while the third is connected into the open triangle.. Winding No II and III cooperate with EAZ circuits and devices (winding No II of 3P class, winding No III of 6P class of the capacity appropriate to the specific circuits and supplied EAZ devices).

II.B.3.7.22.D. The selection of the capacitive and inductive current transformers and current transformers should ensure the verified correct cooperation with EAZ circuits and devices at the site of their installation.

II.B.3.7.22.E. 750, 400 and 220 kV breakers should be equipped with:

a) with the columns not coupled mechanically, with the protection from incorrect position of its columns,

b) with the blockade, which upon the trip-out of the breaker prevents its activation by the potential permanent activation impulse,

c) with the set of auxiliary contacts in the number and configuration adapted to the needs of secondary circuits of the bay,

d) for the control of opening of the breaker the two criteria should be used: current with the relays for each phase and breaker with the use of the breaker's signal contacts,

– and enable the execution of the automatic restoration function.

II.B.3.7.22.F. The disconnectors should be equipped with a set of contacts in the number and

configuration adapted to the needs of the control, signalling, busbars protection circuits and the local breaker circuit.

II.B.3.7.22.G. EAZ circuits and devices should meet the detailed requirements defined by TSO or appropriate DSO. This applies both to active and newly designed devices. The newly designed EAZ circuits and devices at the stage of the preliminary technical-assembly designs should be coordinated with and approved by TSO or DSO.

II.B.3.7.22.H. EAZ devices and circuits, tools, installation fittings and their elements should have quality certificates and the certificates admitting them for usage in the transmission network objects. This applies specifically to:

a) quality certificates and protocols with the results of the tests performed by the laboratories confirming the compliance of devices with the requirements of the international and European standards,

b) quality certificates and protocols with the results of the tests carried out by the research institutions,

c) current certificate admitting for use in the network.

II.B.3.7.23. The relays executing the function of the automatic frequency shedding (SCO) should meet the following requirements:

a) enable to set the frequency values in the range from 47 to 50 Hz with the step change every 0.05 Hz,

b) enable the setting of the time delay in the range from 0.05 to 1 s with the step change every 0.05 s,

c) the own time of the relays may not be higher than 100 ms,

d) should ensure the proper operation in the range from 0.5 to 1.1 U_n,

e) the accuracy of measurements may not be smaller than 10 mHz,

During the period to 31 December 2008 the own time of the relay higher than 200 ms is allowed for the installed relays.

During the period after 31 December 2010 the own time of all relays may not be higher than 100 ms.

II.B.3.8. Requirements for the energy market information exchange system WIRE

II.B.3.8.1. Requirements regarding communication and data transmission

II.B.3.8.1.1. Data exchange takes place with the support of redundant link using power sector extranet network, including the network mechanisms based on TCP/IP protocol. The direct access to the central system through the modem links (dial-up) can be used as backup links.

II.B.3.8.1.2. TSO data transmission subsystem provides the communication under TCP/IP protocol with any WIRE/UR server at guaranteed 64 kB/s rate for each

channel and has the permanent IP address and the available communication ports.

II.B.3.8.1.3. WIRE/UR data transmission subsystems should ensure the guaranteed communication under TCP/IP protocol between WIRE/UR server and central WIRE server at 64 kB/s rate.

II.B.3.8.1.4. Each WIRE/UR server should have the permanent IP address and the available identified communication ports.

II.B.3.8.1.5. The data transmission subsystem of TSO provides the reliable and secure data transmission between WIRE system servers through the separation of the transmission subsystem used exclusively for the needs of WIRE system.

II.B.3.8.1.6. The detailed requirements regarding the hardware, utility software and system software of WIRE/UR systems contain the security requirements for SOWE/EL, WIRE/UR data transmission subsystems, which is published by TSO on its website.

II.B.3.8.2. **Requirements regarding the protocols and standards**

II.B.3.8.2.1. The encryption and authorization mechanism based on SSL protocol is used for the communication between WIRE/UR and WIRE systems of TSO.

II.B.3.8.2.2. The transmission and reception of documents is provided through WebSphere MQ tools, while the distribution of the documents is executed with the support of JMS libraries in JAVA environment.

II.B.3.8.2.3. The protection of communication between WIRE/UR and WIRE servers of TSO is executed at the level of SSL WebSphere MQ channel. The SSL channel is assembled with the support of the certificates of queue managers WebSphere MQ and based on the name of the channel and IP address.

II.B.3.8.2.4. The rules of generating the certificates of queue managers WebSphere MQ of WIRE/UR system are defined in the requirements mentioned in point II.B.3.8.2.6.

II.B.3.8.2.5. The secure access to WIRE Archives module, WIRE/RP module and CCO module is executed through the encrypted channel suing the EkstranetVPN (AppGate) technology and authorization through RSA SecurID tools.

II.B.3.8.2.6. The detailed specification of the technical solutions for the systems admitted for cooperation with TSO's WIRE system is provided in the security requirements for SOWE/EL, WIRE/UR data transmission systems.

II.B.3.8.2.7. The information exchange under WIRE system takes place through the appropriate preparation of the electronic documents according to the determined format and the recording method under XML standard (eXtensible Markup Language). XML language standard defines the method of describing the documents, the basic data types and the rules of creating the document templates.

II.B.3.8.2.8. The detailed specification of the electronic documents, functions of WIRE/UR systems and the set of XML document templates for WIRE system creates the technical standards of WIRE system, which are published by TSO on its website.

II.B.3.9. **Requirements regarding the system for operating cooperation with power plants (SOWE)**

II.B.3.9.1. **Requirements regarding communication and data transmission**

II.B.3.9.1.1. Data exchange takes place with the support of redundant link using power sector extranet network, including the network mechanisms based on TCP/IP protocol. The direct access to the central system through the modem links (dial-up) can be used as backup links.

II.B.3.9.1.2. TSO data transmission subsystem provides the communication under TCP/IP protocol with any SOWE/EL server at guaranteed 64 kB/s rate for each channel and has the permanent IP address and the available communication ports.

II.B.3.9.1.3. Data transmission subsystems at the power plants should provide the guaranteed communication under TCP/IP protocol between every SOWE/EL server and central SOWE system at 64 kB/s rate.

II.B.3.9.1.4. Each SOWE/EL server should have a permanent IP address and the available communication ports.

II.B.3.9.1.5. The data transmission subsystem of TSO provides the reliable and secure data transmission between SOWE system elements through the separation of the transmission subsystem used exclusively for the needs of SOWE system.

II.B.3.9.1.6. The detailed requirements regarding the hardware, utility software and system software of SOWE/EL systems contain the security requirements for SOWE/EL, WIRE/UR data transmission subsystems, which are published by TSO on its website.

II.B.3.9.2. **Requirements for protocols and standards**

II.B.3.9.2.1. The encryption and authorization mechanism based on SSL protocol is used for the communication between SOWE/EL and SOWE systems of TSO.

II.B.3.9.2.2. The transmission and reception of the documents is provided through WebSphere MQ tools, while the distribution of the documents is executed with the support of JMS libraries in JAVA environment.

II.B.3.9.2.3. The protection of communication between SOWE/EL servers is executed at the level of SSL WebSphere MQ channel. The SSL channel is assembled with the support of the certificates of queue managers WebSphere MQ and based on the name of the channel and IP address.

II.B.3.9.2.4. The rules of generating the certificates of queue managers WebSphere MQ of

SOWE/EL system are defined in the requirements mentioned in point II.B.3.8.2.6.

II.B.3.9.2.5. The secure access to SOWE Archives module and CCO module is realized through the encrypted channel suing the EkstranetVPN (AppGate) technology and authorization through RSA tools.

II.B.3.9.2.6. The detailed specification of the technical solutions for the systems admitted for cooperation with TSO's SOWE system is provided in the security requirements for SOWE/EL, WIRE/UR data transmission systems.

II.B.3.9.2.7. The information exchange under SOWE system takes place through the appropriate preparation of the electronic documents according to the determined format and the recording method under XML standard . XML language standard defines the method of describing the documents, the basic data types and the rules of creating the document templates.

II.B.3.9.2.8. The detailed specification of the electronic documents, functions of SOWE/EL systems and the set of XML document templates for SOWE system creates the technical standards of SOWE system, which is published by TSO on its website.

II.B.3.10. Requirements regarding operation and control systems SCADA

II.B.3.10.1. Requirements regarding communication and data transmission

II.B.3.10.1.1. The acquisition of data from the power facilities takes place via point-point links or with the support of the power sector extranet network.

II.B.3.10.1.2. The data exchange with TSO takes place with the support of the primary link using the power sector extranet network including the network mechanisms based on TCP/IP protocols.

II.B.3.10.1.3. The data transmission subsystem of TSO ensures the guaranteed communication under TCP/IP protocol between all servers which are part of SCADA system.

II.B.3.10.2. Requirements for protocols and standards

II.B.3.10.2.1. The acquisition of data from the power facilities takes place with the support of UTJ, DNP 3.0, IEC 870-5-101, IEC 870-5-104 protocols.

II.B.3.10.2.2. ICCP/TASE.2 protocol is used for data exchange with TSO's SCADA systems. During the transition period till 31 December 2008 it is allowed to use IEC 870-5-101, IEC 870-5-104, DNP3.0 or Elcom/TASE.1 protocols.

II.B.3.10.2.3. TSO's SCADA system enables the assembly of a link with external systems through the dedicated access router. The router is equipped with the function of protection against the access to the servers by unauthorised personnel.

II.B.3.10.3. Requirements regarding the accuracy of the processing of measurements used in the SCADA system

II.B.3.10.3.1. The requirements regarding the accuracy of the measurements of electrical quantities used by SCADA system concern:

a) the range of the detailed measurement, i.e. the range of the measurement, in which the comprehensive accuracy is not worse than resulting from the accuracy class defined in point II.B.3.10.3.3.,
b) comprehensive accuracy of the measurements.

The complex accuracy of measurements is defined as the deviation between the source values (the original measured values) and the values obtained at the place of dedication in relation to the complete rated range of measured values (PN-EN 60870-4).

II.B.3.10.3.2. The following requirements apply in respect to the range of the detailed measurement to the electrical measurement quantities used by SCADA system for the entire measurement route (measurement transformers, converters, transmission route):

a) for the measurement of current's value – it is required to ensure the accurate measurement for the values from 0 to 150 % I_n, under the rated load of the transformers,
b) for the measurement of voltage's value – it is required to ensure the accurate measurement for the values from 0 to 130 % U_n,
c) for power measurement – it is required to ensure the accurate measurement for the values from -150 to +150 % of the rated power,
d) for frequency measurement from 45 to 55 Hz.

II.B.3.10.3.3. In respect to the comprehensive accuracy of the measurements for SCADA system it is required to obtain:

a) for current and voltage measurement – class 0.5 in the case of 0.2 category transformers and class 1.0 in the case of 0.5 category transformers;

b) for the measurement of the calculated values e.g. P, Q – class 2.0;

c) for the frequency – accuracy of ±5 mHz.

II.B.3.11. **Requirements for systems of monitoring of units operating parameters (SMPP)**

II.B.3.11.1. **Requirements for communication and data transmission**

II.B.3.11.1.1. The data exchange takes place via the primary link with the support of the power sector extranet network including the network mechanism based on TCP/IP protocol.

II.B.3.11.1.2. The data transmission subsystem at TSO ensures the guaranteed communication under TCP/IP protocol between all SMPP servers at 64 kB/s rate for each channel and has the permanent IP address and the available communication ports.

II.B.3.11.1.3. The data transmission subsystems at the power plants must ensure the guaranteed communication under TCP/IP protocol between the local node server of SMPP and the central server at 64 kB/s rate.

II.B.3.11.1.4. Each SMPP server should have the permanent IP address and available communication ports.

II.B.3.11.1.5. The data transmission subsystem at TSO ensures the reliable and secure data transmission between SMPP system servers through the separation of the transmission subnetwork used only for the SMPP system needs.

II.B.3.11.1.6. The transmission system operator provides the interested entities with the detailed requirements regarding the hardware, utility software and system software of SMPP systems.

II.B.3.11.2. **Requirements for protocols and standards**

II.B.3.11.2.1. The data transmission is executed with the support of ICCP/TASE.2 protocol (blocks 1 and 2) based on TCP/IP protocol according the following standards: IEC 870-6-503, IEC 870-6-802, IEC 870-6-702, ISO/IEC 9506, while the supplementation of archive data is available through the https protocol.

II.B.3.11.2.2. The detailed specification of technical solutions verified and admitted for use with SMPP system is provided in the technical specification for the local nodes of SMPP system, which is provided by TSO to interested entities.

II.C. Use of electrical power networks

II.C.1. **Characteristics of use of electrical power networks**

II.C.1.1. The use of electrical power networks allows realization of the electrical energy supply in the continuous and reliable manner, subject to the applicable quality requirements.

II.C.1.2. The transmission system operator based on the equal treatment principle and based on principles of the applicable law and IRiESP provides the electrical energy transmission services to meet the justified needs by all system users and the customers in respect to the transmission of electrical energy in domestic and cross-border trade.

II.C.2. **Characteristics and scope of transmission services provided by the transmission system operator.**

II.C.2.1. The transmission system operator provides the domestic and international exchange transmission services.

II.C.2.2. The domestic transmission services include:

a) transmission of electrical energy defined as the transport of electrical energy through the transmission network;

b) maintenance of the continuity of the electrical energy supply and reception within the power system and the reliability of its delivery and the maintenance of the quality parameters of electrical energy;

c) performance of the settlements resulting from the imbalance between electrical energy generation and demand in the NPS.

II.C.2.3. The international exchange transmission services include:

a) determination of the level and provision of transmission capacities for the cross-border power transfer;

b) reservation of transmission capacities for the cross-border power transfer;

c) realization of the cross-border power transfer.

II.C.3. **Domestic transmission services**

II.C.3.1. In the scope of electrical energy supply TSO specifically:

a) transports the electrical energy supplied to or received from the delivery points as defined in the Transmission Agreement;

b) ensures the long-term ability of the NPS to meet the justified needs in the scope of electricity transmission through the appropriate development, enhancement, maintenance, operation and repairs of network infrastructure;

c) transfers the metering-settlement data necessary for the settlement process.

II.C.3.2. In scope of maintenance of the continuity of electricity supply and reception within NPS and the reliability of its delivery and the maintenance of quality

parameters of electricity, TSO specifically:

a) ensures the continuous balance between electricity generation and demand in the NPS;

b) performs the continuous control of frequency and voltage;

c) purchases the power reserve and other system services necessary for the proper operation of the NPS, reliability of its operation and the maintenance of quality electrical energy parameters;

d) ensures the appropriate structure and reliability of the transmission network and in cooperation with the DSO the coordination of operation of coordinated 110 kV network;

e) prevents the occurrence of the failures, including the development and execution of the actions plans in the case of a risk of the occurrence of a failure in the NPS and plans of restoration of the NPS after the occurrence of a failure.

II.C.3.3. In scope of conducting the settlements resulting from imbalance between the electrical power generation and demand in the NPS, TSO specifically:

a) provides the IT system used in the process of balancing of the NPS and conducting the settlements;

b) receives and verifies the electricity sales declaration submitted for the execution;

c) carries out the settlements with the system users and customers resulting from imbalance in the NPS and the management of system constrains.

II.C.3.4. The performance of settlements resulting from imbalance in the NPS takes place according to the rules defined in IRiESP – Balancing of the System and Management of System Constrains.

II.C.4. **Cross-border electricity exchange services**

II.C.4.1. The international transmission services include the parallel cross-border power transfer mentioned in point II.A.1.2.6. a).

II.C.4.2. The levels of the cross-border power transfer capacities are set by TSO according to the document entitled “The rules of setting the transmission capacities on cross-border connections” prepared by TSO and agreed with the President of the Energy Regulatory Office.

II.C.4.3. The transmission system operator agrees with the transmission system operators of neighbouring countries the rules for coordinated auctions of transmission capacity at the common borders.

II.C.4.4. The access and reservation of the cross-border transmission capacities takes places on the terms defined and accepted by TSO and the transmission system operators of neighbouring countries in the rules for coordinated auctions of

transmission capacity at the common borders.

II.C.4.5. Binding "Rules of Setting the Transmission Capacities on the cross-border connections" and the rules for coordinated auctions of transmission capacity at the common borders are published by TSO on its website.

II.C.4.6. In respect to the cross-border power transfer TSO specifically:

a) reserves for the system user or a customer the cross-border transmission capacities obtained by such system user or customer according to the rules for coordinated auctions of transmission capacity at the common borders;

b) receives and verifies the electricity sales contracts in regarding cross-border power trade submitted in the form of the cross-border power transfer schedules;

c) coordinates the submitted cross-border power transfer schedules with the transmission system operators of neighbouring countries;

d) performs the physical execution of the cross-border power transfer in cooperation with the transmission system operators of neighbouring countries.

II.C.5. **Terms of provision of transmission services by the transmission system operator**

II.C.5.1. **Primary conditions of provision of transmission services by the transmission system operator**

II.C.5.1.1. The transmission services are provided by TSO subject to the principle of the equal treatment of all entities that use such services.

II.C.5.1.2. Transmission services are provided based on the Transmission Agreement and on the terms as defined in the documents mentioned in point I.B.2, IRiESP and TSO Tariff approved by the President of the Energy Regulatory Office.

II.C.5.1.3. The system users and customers, who obtained the right to purchase electricity from the seller selected by them as defined by the provisions of the Energy Law act are entitled to use the transmission services provided by TSO.

II.C.5.1.4. The transmission system operator provides the transmission services if the metering-settlement circuits including tele-information systems infrastructure are in place, which are necessary for providing the transmission services and performance of their settlement.

II.C.5.1.5. The detailed conditions of providing the transmission services including the cross-border transmission services are defined in further provisions of IRiESP and the provisions of the Transmission Agreement.

II.C.5.2. **Formal-legal conditions for providing the transmission services**

II.C.5.2.1. **Procedure of commencement of transmission services**

II.C.5.2.1.1. TSO starts the provision of transmission services according to the following procedure:

a) application of the entity to TSO for conclusion of the Transmission Agreement;

b) determination by TSO of the possibilities and conditions of providing the transmission services;

c) conclusion of the Transmission Agreement by the parties;

d) start of the process of providing transmission services.

II.C.5.2.2. **Application for conclusion of the Transmission Agreement**

II.C.5.2.2.1. The entity interested in using of the transmission services provided by TSO is required to submit the application for the conclusion of the Transmission Agreement.

II.C.5.2.2.2. The application template for the conclusion of Transmission Agreement defines specifically:

a) the address, to which completed application should be sent or delivered;

b) identification data of the applicant such as full name of the entity, its address, telephone number, fax number, email address;

c) information regarding the concessions for the generation, transmission, distribution or trade in electricity;

d) type of the applicant determined in terms of the scope of the planned Transmission Agreement;

e) identification numbers of the applicant such as NIP (tax identification number) or REGON (business statistical number);

f) the name, address of the bank and bank account number of the applicant,, which will be used for the settlements on account of the produced transmission services;

g) list of individuals including their telecommunication and data addresses authorised by the applicant for direct contacts with TSO in respect to the issues regarding the Transmission Agreement;

h) data regarding the administrator of the security systems: WIRE/UR or SOWE on the applicant's side.

II.C.5.2.2.3. The entity interested in using transmission services provided by TSO in relation to the cross-border power transfer which is not in the possession of the Transmission Agreement concluded with TSO, in addition to information mentioned above should include in the application for the conclusion of the Transmission Agreement the following, minimum additional information:

a) list of individuals including their telecommunication and address data

authorised by the applicant for direct contacts with TSO on account of applicant's participation in the cross-border power transfer;

b) list of entities and individuals authorised to submit on behalf of the applicant the data and documents regarding the execution of the cross-border power transfer;

c) EIC code(s) held by the entity assigned by the entitled EIC code office.

II.C.5.2.2.4. The additional documents defined in the model application for the conclusion of Transmission Agreement should be enclosed to the application for the conclusion of the Transmission Agreement, including specifically:

a) the current extract from the Business Register of the National Court Register and in the case of the applicant, who does not have its registered office in the territory of the Republic of Poland the current extract from the applicable business register obtained on the terms as defined by the law of the country of applicant's registered office;

b) the documents confirming the right of the individuals representing the applicant to undertake the obligations on its behalf;

c) the statement on the authorization of the entity, which on behalf of and for the applicant will be performing the function of the trade operator or trade-technical operator, drawn up according to the statement template defined by TSO (applies exclusively to the applicants, who will not be holding on their own the function of the trade operator or trade-technical operator).

In the case of an applicant, who does not have its registered office in the territory of the Republic of Poland, the aforementioned documents should be delivered along with their translation into Polish.

II.C.5.2.2.5. The entity interested in using the transmission services provided by TSO related to the cross-border power transfer, who has the transmission agreement concluded with TSO and at the same time is not the participant of cross-border power transfer, submits the application for the participation in the cross-border power transfer according to the rules defined in point II.C.5.3.1.

II.C.5.2.2.6. The binding application template form for the conclusion of the Transmission Agreement is published by TSO in its website.

II.C.5.2.2.7. The transmission system operator upon the receipt of the application for the conclusion of Transmission Agreement verifies it in terms of its completeness and current nature of the data contained therein and enclosed documents. The transmission system operator reviews the application for the conclusion of the Transmission Agreement within 14 days from the date of its reception. Upon the review of the application for the conclusion of the Transmission Agreement, TSO provides the applicant with information about its acceptance or rejection or calls the applicant to supplement the application.

II.C.5.2.2.8. The transmission system operator calls the applicant to supplement the

application for the conclusion of the Transmission Agreement in the case of the absence of the necessary data or their incompleteness. The applicant should deliver the supplemented application for the conclusion of Transmission Agreement within 14 days from the date of receiving the call for supplementation. In the case of not delivery by the applicant the supplemented application for the conclusion of Transmission Agreement by the required deadline, TSO rejects the submitted application.

II.C.5.2.2.9. The information about the rejection of the application for the conclusion of Transmission Agreement along with the explanation of the reason for its rejection will be delivered to the applicant by the TSO in writing.

II.C.5.2.2.10. The transmission system operator rejects the application for the conclusion of Transmission Agreement prepared contrary to the application template published by TSO on its website.

II.C.5.2.2.11. The acceptance by TSO of the application for the conclusion of Transmission Agreement forms the grounds for the determination of the possibility and conditions of providing the transmission services and preparation of the draft Transmission Agreement for the applicant.

II.C.5.2.2.12. The entity submitting the application for the conclusion of Transmission Agreement is required to notify immediately TSO on any changes to the data and documents contained in the submitted application and to resubmit the changed current data and documents. The aforementioned requirement applies to the changes, which would occur between the date of submitting the application for the conclusion of Transmission Agreement by the applicant to the date of concluding the Transmission Agreement with such applicant.

II.C.5.2.2.13. The conclusion of the Transmission Agreement by the applicant means the acceptance of all provisions of IRiESP by this applicant.

II.C.5.2.3. Transmission Agreement

II.C.5.2.3.1. The transmission system operator prepares and makes accessible to the system users and customers standards of the Transmission Agreements applicable to the individual groups of TSO's contracting parties.

II.C.5.2.3.2. In special cases, related inter alia to the changes in IRiESP or legal acts influencing changes to the current conditions of providing the transmission services resulting in changes to the provisions of the concluded Transmission Agreements, TSO may provide the annexes to the Transmission Agreements.

II.C.5.2.3.3. The provision of the annexes to the Transmission Agreements or standard annexes to the Transmission Agreements is executed by their publication and update on TSO's website.

II.C.5.2.3.4. The standards mentioned in point II.C.5.2.3.1. and II.C.5.2.3.2. forms the grounds for the preparation of the draft Transmission Agreement or the draft annex to the Transmission Agreement as mentioned in point II.C.5.2.2.11. and

II.C.5.3.1.11.

II.C.5.2.3.5. The draft Transmission Agreements and annexes to Transmission Agreements prepared by system users or customers do not form the grounds for the preparation of the draft Transmission Agreement or draft annex to Transmission Agreement mentioned in point II.C.5.2.2.11. and II.C.5.3.1.11.

II.C.5.3. Basic conditions for transmission services related to cross-border electricity exchange by the transmission system operator

II.C.5.3.1. Formal-legal conditions for transmission services related to the execution of cross-border electricity exchange by the transmission system operator

II.C.5.3.1.1. The transmission system operator provides the transmission services related to the execution of cross-border power transfer exclusively to the entities which:

a) concluded with TSO the Transmission Agreement stipulating specifically the conditions of participation in cross-border power transfer ;

b) obtained the reservation of the cross-border transmission capacities necessary for the execution of the electricity sales contracts notified to TSO within the scope of cross-border trade.

II.C.5.3.1.2. The reservation of cross-border transmission capacities is obtained according to the rules for coordinated auctions of transmission capacity at the common borders mentioned in point II.C.4.4.

II.C.5.3.1.3. The entity applying for the participation in the cross-border power transfer, which has the Transmission Agreement concluded with TSO and at the same time is not a participant of the cross-border power transfer is required to submit the application for the participation in cross-border power transfer .

II.C.5.3.1.4. The application template for the participation in the cross-border power transfer specifies:

a) address, to which the completed application should be sent or delivered;

b) identification data of the applicant such as the full name of the entity, its address, telephone number, fax number, email address;

c) EIC identification code(s) assigned by the authorised EIC code office;

d) identification code of the applicant as a participant of the balancing market;

e) NIP (Identification Tax Number) number;

f) list of individuals including their telecommunication and address data authorised by the applicant for direct contacts with TSO on account of the participation in the cross-border power transfer by the applicant;

g) list of individuals including their telecommunication and address data

authorised to submit on behalf of the applicant the data regarding cross-border power transfer .

II.C.5.3.1.5. The following documents should be attached to the application for the participation in the cross-border power transfer :

a) current extract from the Business register of the National Court Register and in the case of an applicant who does not have its registered office in the territory of the Republic of Poland – the current extract from the applicable business register obtained on the terms as defined in the legal regulations of the applicant's country of registered office;

b) the documents confirming the right of the individuals representing the applicant to undertake obligations on behalf of the applicant..

In the case of an applicant who does not have its registered office in the territory of the Republic of Poland the aforementioned documents should be delivered together with their translation into Polish.

II.C.5.3.1.6. The application template for the participation in the cross-border power transfer is published by TSO on its website.

II.C.5.3.1.7. The transmission system operator upon receiving the application for participation in the cross-border power transfer verifies it in terms of the completeness and current nature of the data contained therein and enclosed documents. The transmission system operator reviews the application for the participation in the cross-border power transfer within 14 days from the date of its reception. Upon the review of the application for participation in the cross-border power transfer TSO informs the applicant about its acceptance or rejection or call the applicant to supplement the application.

II.C.5.3.1.8. The transmission system operator calls the applicant to supplement the application for participation in cross-border power transfer in the case of absence of the necessary data or their incompleteness. The applicant should submit the supplemented application for participation in cross-border power transfer within 14 days from the date of receiving the call to supplement the said application. In the case of applicant's failure to deliver the supplemented application for participation in the cross-border power transfer by the required deadline, TSO rejects the submitted application.

II.C.5.3.1.9. The information on the rejection of the application for the participation in the cross-border power transfer along with the reason of such rejection will be delivered to the applicant by TSO in writing.

II.C.5.3.1.10. The transmission system operator will reject the application for participation in cross-border power transfer prepared contrary to the application template by TSO on its website.

II.C.5.3.1.11. The acceptance by TSO of the application for participation in the cross-border power transfer forms the grounds to determine the possibilities and conditions of applicant's participation in the cross-border power transfer and prepare the

draft annex to the Transmission Agreement concluded between the parties for the applicant or prepare the draft of the new Transmission Agreement.

II.C.5.3.1.12. The entity submitting the application for application in the cross-border power transfer is required to immediately notify TSO on any changes to the data and documents contained in the submitted application and to resubmit the changed data and documents. The aforementioned requirement applies to the changes that would occur between the date of submitting the application for participation in the cross-border power transfer by the applicant to the date of concluding the annex to the existing Transmission Agreement with such applicant or the date of conclusion of the new Transmission Agreement.

II.C.5.3.2. **EIC identification code and conditions for its obtaining**

II.C.5.3.2.1. Every entity applying for participation in the cross-border power transfer is required to have the EIC (ETSO Identification Code) identification code assigned by the authorised EIC code office.

II.C.5.3.2.2. EIC codes are used in the cross-border power transfer to identify every participant of the cross-border power transfer and trade partners of such participant.

II.C.5.3.2.3. The entity that does not have EIC identification code is required to apply to one of the authorised EIC code offices to assign the EIC identification code.

II.C.5.3.2.4. EIC codes are assigned by ETSO code office or by the local EIC code offices located in individual countries. The local EIC code office in the territory of the Republic of Poland is run by TSO.

II.C.5.3.2.5. The entity applying for the assignment of EIC code by Polish EIC code office is required to submit the application for assignment of EIC identification code to the address of Polish EIC code office. The address and telecommunication data of Polish EIC code office is published by TSO on its website.

II.C.5.3.2.6. The entity which already has the EIC identification code assigned by the authorised EIC code office in other country, is required to inform Polish EIC code office of such code, which enters the data of the entity and its EIC identification code into the database.

II.C.5.3.2.7. The model application for the assignment of EIC identification code and the list of EIC codes assigned by Polish EIC code office is published by TSO on its website.

II.C.5.3.2.8. The transmission system operator upon receiving the application for the assignment of EIC identification code verifies it in terms of the completeness and current nature of the data contained therein. The transmission system operator reviews the application for the assignment of EIC identification code within 14 days from the date of its reception. Upon reviewing the application for the assignment of EIC identification code TSO informs the applicant about its acceptance or rejection or call the applicant to supplement the

application.

II.C.5.3.2.9. The transmission system operator calls the applicant to supplement the application for the assignment of EIC identification code in the case of absence of the necessary data or their incompleteness. The applicant should provide the supplemented application for the assignment of EIC identification code within 14 days from the date of receiving the call to supplement it. In the case of not provision of the supplemented application for the assignment of EIC identification code by the required deadline, TSO rejects the submitted application.

II.C.5.3.2.10. The information about rejection of the application for the assignment of EIC identification code including the identification of the reason for the rejection si provided to the applicant by TSO in writing.

II.C.5.3.2.11. The transmission system operator rejects the application for the assignment of EIC identification code prepared contrary to the application template published on TSO website.

II.C.6. The system users and customers service quality standards

II.C.6.1. Description of system users and customers service standards

II.C.6.1.1. The transmission system operator provides the transmission services according to the principle of equal treatment of all system users and customers.

II.C.6.1.2. For the purpose of executing of this objective TSO specifically:

a) drafts and makes available the model applications and standard agreements and IRiESP;

b) publishes on its website information, based on general rules, administrative decisions and IRiESP;

c) developed and executes the program determining projects, which should be implemented in order to ensure the non-discriminating treatment of system users and customers, hereinafter referred to as the Compliance Program.

II.C.6.2. The Compliance Program developed and implemented by the transmission system operator

II.C.6.2.1. The transmission system operator acting pursuant to the provisions of the Energy Law act developed and implements the Compliance Program, in which he defined in detail the obligations of TSO employees in order to ensure the non-discriminating treatment of system users and customers.

II.C.6.2.2. The Compliance program defines the measures undertaken in order to eliminate the discriminating procedures, conduct the activity exclusively based on the objective and subject-matter criteria and protect sensitive trade information.

II.C.6.3. Discounts for not keeping of the electrical power quality parameters and the service quality standards for system users and customers

II.C.6.3.1. The system users and customers using the transmission services provided by TSO are entitled to discounts for not keeping the quality parameters of electrical energy and quality standards for services offered to the system users and customers.

II.C.6.3.2. The rules of granting discounts for not keeping the power quality parameters and service standards for system users and customers and the method of their calculation is defined by the provisions of the Energy Law act and the executive acts issued pursuant to that law, TSO tariff approved by the President of the Energy Regulatory Office and the provisions of Transmission Agreement.

II.C.6.3.3. The discounts for not keeping the power quality parameters and service standards for system users and customers are entitled to the system users and customers at their request.

II.C.6.4. Applications to issue the certificates of origin

II.C.6.4.1. The transmission system operator confirms the quantity of electrical energy required to obtain the certificate of origin as defined by the Energy Law act originating from the following energy sources:

a) generating units connected to the transmission network,

b) JWCD connected to coordinated 110 kV network.

II.C.6.4.2. The transmission system operator confirms the amount of electrical energy mentioned in point II.C.6.4.1. based on the readings of the metering-settlement circuits considering the procedures of substitution of metering-settlement data as defined in detailed in the Transmission Agreement concluded between TSO and the generator.

II.C.6.4.3. The entity submitting the application to issue the certificate of origin should provide the identification code of the generating unit according to the codification rules applied by TSO in order to determine the location of the electrical energy source

II.C.6.4.4. The transmission system operator publishes on its website the codification rules for the generating units and the address, to which the applications to issue the certificate of origin should be sent.

II.C.6.5. Basic rules of settlement for the transmission services provided by the transmission system operator

II.C.6.5.1. Preliminary provisions

II.C.6.5.1.1. The system users and customers pay a fee to TSO for the transmission services provided by TSO. The fees for the transmission services provided by TSO are charged according to the rates of the fees defined in TSO Tariff approved by the President of the Energy Regulatory Office. The fees not included in TSO Tariff regarding the method of settlement of system balancing costs and settlement of the costs of system curtailments management are charged according to the rules defined in IRiESP – Balancing of the System and Management of System Curtailments.

II.C.6.5.1.2. The rules of settlements for the transmission services provided by TSO as defined in point II.C.6.5.2. do II.C.6.5.7. regarding exclusively the amounts due charged according to the rates of the fees provided in TSO Tariff. The detailed rules of settlement for transmission services provided by TSO are defined in TSO Tariff and the provisions of the transmission agreement concluded between TSO and the system user or a customer.

II.C.6.5.2. **Settlement documents**

II.C.6.5.2.1. The transmission system operator issues settlement documents for the provided transmission services, which forms the grounds for the payment of the amounts due, i.e. VAT invoices, correcting VAT invoices and interest tickets according to the applicable regulations.

II.C.6.5.2.2. The following types of settlement documents are identified that form the grounds for the payment of TSO receivables:

a) VAT invoice – the invoice for the transmission services provided during the given settlement period issued by TSO according to the fee rates stated in TSO Tariff and based on actual data or preliminary settlement data;
b) correcting VAT invoice – the invoice for transmission services provided during the given settlement period issued by TSO for the purpose of correcting the settlements made based on the preliminary settlement data and issued by TSO in the case of identifying any irregularities or errors in the settlements during the given settlement period;
c) interest ticket – issued by TSO in the case of defaulting on the payment deadlines.

II.C.6.5.3. **Settlement periods**

II.C.6.5.3.1. The settlements for the transmission services provided by TSO are carried out during the settlement periods constituting a calendar month.

II.C.6.5.3.2. The transmission system operator issues VAT invoices for the transmission services provided during the given settlement period including the subscription fee to the 7th day of the month following the settlement month.

II.C.6.5.3.3. If the system user or a customer delivers to TSO by 15:00 hours of the 5th day of the month following the settlement month the actual data on electricity

quantities required to determine the amounts due to TSO for the provided transmission services in the part regarding the system fee, TSO issues VAT invoice mentioned in point II.C.6.5.3.2. based on the said data. The submission of that data by fax to the number indicated in the Transmission Agreement concluded between TSO and system user or a customer is regarded as the delivery of that data to TSO. The provision above shall not release the system user or a customer from the obligation to deliver to TSO the original document confirming the concerned data.

II.C.6.5.3.4. If a system user or a customer does not deliver the data mentioned in point II.C.6.5.3.3. or delivers them at later date, TSO issues VAT invoice for the transmission services in the part regarding the system fee based on the preliminary settlement data. The values notified to TSO by system user or a customer at the stage of TSO calculation and adopted for its calculation are adopted as the preliminary settlement data. The levels of the preliminary settlement data for each settlement period are defined in the Transmission Agreement concluded between TSO and system user or a customer.

II.C.6.5.3.5. In the case of issuing VAT invoice containing the amounts due calculated based on the preliminary settlement data, TSO issues the correcting VAT invoice by the 22nd day of the month following the settlement period based on the actual data about amount of electrical energy received from system user or a customer. The system user or a customer should deliver to TSO the actual data by the 20th day of the month following the settlement month. The submission of actual data by fax to the number indicated in the Transmission Agreement concluded between TSO and system user or a customer is regarded as the delivery of that data to TSO. The provision above shall not release the system user or a customer from the obligation to deliver to TSO the original document confirming the concerned data.

II.C.6.5.4. **Delivery and reception of settlement documents**

II.C.6.5.4.1. The settlement documents are sent to system user or customer by registered mail with confirmation of receipt to the address indicated in the Transmission Agreement concluded between TSO and system user or a customer provided that the Transmission Agreement contains such provision, by fax to the number indicated in the Transmission Agreement.

II.C.6.5.5. **Method and dates of payments**

II.C.6.5.5.1. TSO's fees for the provided transmission services including the subscription fee resulting from VAT invoices and correcting VAT invoices are paid by system user and customer by bank transfer to TSO's bank account indicated on the invoices.

II.C.6.5.5.2. The payments of amounts due mentioned in point II.C.6.5.5.1. resulting from VAT invoices and correcting VAT invoices for the transmission services are taken within 14 days from the date of issuing the VAT invoice or correcting

VAT invoice accordingly.

II.C.6.5.5.3. The payment date is the date of acceptance of TSO's bank account.

II.C.6.5.5.4. Each payment made by the system user or a customer is charged towards the oldest amounts due and first towards the interest charged according to the applicable regulations.

II.C.6.5.6. **Defaulting on the payment deadline**

II.C.6.5.6.1. The late payment by the system user or a customer of the amounts due to TSO will result in charging interest for each day of default according to the applicable regulations.

II.C.6.5.6.2. The amount of charged interest mentioned in point II.C.6.5.6.1. shall be paid based on the interest ticket issued by TSO to TSO's bank account indicated in the said interest ticker within 7 days from the date of issuing it.

II.C.6.5.6.3. The transmission system operator is entitled to terminate the Transmission Agreement upon one month notice when the system user or a customer is at least one month late with the payment of the amounts due for the provided transmission services following the expiry of the payment deadline despite a prior written notification on the intention to terminate the Transmission Agreement and setting additional two week deadline for the payment of the overdue and current arrears.

II.C.6.5.6.4. The termination of the Transmission Agreement shall not release the system user or a customer from the obligation of paying all amounts due resulting from the Transmission Agreement including default interest.

II.C.6.5.7. **Complaints**

II.C.6.5.7.1. The complaints regarding the settlement documents provided to the system user or a customer for the transmission services provided by TSO should be filed by the system user or a customer within 14 days at the latest from the date of receiving such documents.

II.C.6.5.7.2. The transmission system operator is required to review the complaint within 14 days from the date of its reception.

II.C.6.5.7.3. In the case of recognising the complaint, TSO shall issue the correcting VAT invoice within 7 days from the date of recognising the complaint and the potential surplus shall be charged towards future amounts due to TSO and will be settled during the next settlement period unless the system user or customer demands its return.

CHAPTER III. PLANNING THE DEVELOPMENT AND COOPERATION FOR THE PURPOSE OF COORDINATING THE DEVELOPMENT OF TRANSMISSION NETWORK AND 110 KV DISTRIBUTION NETWORK

III.A. General provisions

III.A.1. The transmission system operator prepares the development plan in respect to meeting the current and future demand for electricity, hereinafter referred to as the development plan, and cooperates with the distribution system operators in order to coordinate the development of transmission network and 110 kV distribution network.

III.A.2. The development plan encompasses the scope defined in the Energy Law act. The draft development plan is the subject of coordination with the President of the Energy Regulatory Office.

III.A.3. The development plan considers the objectives and tasks resulting from the state energy policy and the periodical assessment of its execution.

III.A.4. The development plan is prepared or updated on annual basis for 15 years long planning periods.

III.A.5. The development plan is prepared based on:

a) requirements regarding the long-term adequacy and security of operation of NPS,

b) the forecasted demand for the power and electricity,

c) the needs in respect to the development of cross-border connections,

d) the plans of construction, modernisation and decommissioning of generating sources, including the distributed and renewable energy sources,

e) the forecasts regarding the projects rationalising the electricity consumption.

III.A.6. The development plan forms the grounds for the preparation of the mid-term 5 year investment plan mentioned in point IV.A.1.2. a) in the area of the extension of the transmission network.

III.A.7. Within the frames of activities mentioned in point III.A.1. the TSO cooperates with:

a) the distribution system operators,

b) the generators connected to the transmission network,

c) the final customers connected to the transmission network.

III.A.8. Within the scope of the preparation of the development plan TSO conducts the necessary analytical works in respect to the transmission network and 110 kV distribution network.

III.A.9. Within the scope of the development of the cross-border connections the planning of the development of transmission network is subject to separate coordination with the operators of the neighbouring transmission networks.

III.B. Process of planning development and cooperation in order to coordinate the development of the transmission network and 110 kV distribution network

III.B.1. The cooperation with the entities mentioned in point III.A.7 concerns specifically:

a) the acquisition by TSO of the data and information necessary to prepare the development plan,

b) making available the results of the analytical works carried out by TSO in the area of planning the development and coordination of the development of the transmission network and 110 kV distribution network.

III.B.2. The TSO's cooperation with DSO for the purpose of coordinating the development of the transmission network and 110 kV distribution network in addition to the tasks mentioned in point III.B.1. includes:

a) issuing the opinion by TSO on the assumptions adopted by DSO for the planning of the development of 110 kV distribution network,

b) coordination between TSO and DSO of the planned development projects in 110 kV distribution network, which require coordinated investment activities in the transmission network and 110 kV distribution network.

III.B.3. The data and information obtained by TSO within the process of planning the development and cooperation in order to coordinating the development of the transmission network and 110 kV distribution network concern:

a) the existing status of the date of their submission to TSO or the last year period,

b) the forecasted status (data of planning nature) for the adopted 15 year planning period or shorter periods as defined by TSO.

III.B.4. The scope of data and information regarding the current status acquired by TSO within the frames of the process of planning the development and cooperation for the purpose of coordinating the development of the transmission network and 110 kV distribution network is defined in point III.C.1.

III.B.5. The scope of data and information regarding the forecasted status acquired by TSO within the scope of the process of planning the development and cooperation for the purpose of coordinating the development of the transmission network and 110 kV distribution network is defined in point III.C.2.

III.B.6. The data and information mentioned in point III.C.1. and III.C.2. are submitted by the entities cooperating with TSO on annual basis by 31 March.

III.B.7. The entity may confirm the up to date nature of the data and information provided to TSO during the previous year within the required scope without the need to resubmit them.

III.B.8. The data and information defined in point III.C.1. and III.C.2. are submitted in the form of the tables, whose model forms are prepared by TSO and made available on its website. This data is submitted by mail and electronically.

III.B.9. The scope of data acquired from the individual entities is as follows:

a) the distribution system operators submit the data and information mentioned in point III.C.1.1. and III.C.2.1,

b) the generators connected to the transmission network submit the data and information mentioned in point III.C.1.3. and III.C.2.2,

c) the final customers connected to the transmission network submit the data and information mentioned in point III.C.1.4. and III.C.2.3.

III.B.10. Within the scope of the process of preparing the development plan, TSO also uses the data and information contained in the transmission agreements within the scope of the technical-operation conditions and the data mentioned in point II.A.1.3.

III.B.11. The scope of the published and facilitated results of conducted analytical works regarding the planning of development and cooperation for the purpose of coordination of development of transmission network and 110 kV distribution network carried out by TSO are defined in point III.D.

III.B.12. The transmission system operator issues the opinion on the assumptions adopted by DSO in the planning of the development of 110 kV distribution network within one month from the date of their receipt.

III.B.13. The distribution system operators submit to TSO for coordination purposes the plan of development projects at 110 kV distribution network, which require coordinated investment activities in the transmission network and 110 kV distribution network.

III.B.14. The coordination mentioned in point III.B.13. is made in the form and according to the procedure agreed between DSO and TSO.

III.C. The scope of acquisition and update of data and information

III.C.1. Data and information regarding the existing status

III.C.1.1. The distribution system operators submit to TSO the data and information regarding the existing status describing the entities connected to the distribution network, encompassing:

a) the diagrams, plans and configuration of 110 kV distribution network,

b) the hourly values of loads for the DSO operating area,

c) the quarterly power balances for DSO operating area,

d) the data regarding the completed demand side management programs (DSM) according to point III.C.1.2.,

e) the data of generating units connected to 110 kV distribution network according to point III.C.1.5., except for the generators connected at the same time to the transmission network,

f) the summary data regarding industrial power plants and distributed generators according to the fuel used, in accordance with point III.C.1.6.,

g) the summary data regarding the renewable energy sources according to the types of these sources in accordance with point III.C.1.6.

III.C.1.2. The data and information regarding the existing status in respect to the demand side management programs include specifically:

a) description and time schedule of project implementation,

b) the savings in respect to power and electricity on account of project implementation.

III.C.1.3. The generators who have the generating units connected to the transmission network provide to TSO the following data and information regarding the current status describing their equipment and installations:

a) the main diagrams of electrical circuits on 110 kV voltage,

b) the data on the held generating units according to point III.C.1.5.

III.C.1.4. The final customers connected to the transmission network submit to TSO the data and information regarding the current status on the generating units held by them in accordance with point III.C.1.6.

III.C.1.5. The data and information regarding the existing status of the generating units connected to the transmission network or 110 kV distribution network include

specifically:

a) name of the node and connection voltage,

b) heat rate,

c) forced outage rate,

d) number of days of planned outages,

e) quality parameters of the fuel (QAS) including its consumption, for the thermal sources,

f) specific emission of basic pollutants (SO_2, NO_x, ash and CO_2),

g) applied environmental protection installations (including their efficiency).

III.C.1.6. The summary data and information regarding the existing status in respect to the generators connected to the network of 110 kV voltage or lower include specifically:

a) available capacity,

b) heat rate,

c) electricity generation,

d) quality parameters of the fuel (QAS) including its consumption, for the thermal sources,

e) specific emission of basic pollutants (SO_2, NO_x, ash and CO_2) for heating sources

III.C.2. **Data and information regarding the forecasted status**

III.C.2.1. The distribution system operators submit to TSO the data and information regarding the forecasted status describing the operating conditions of the installations or networks of the entities connected to 110 kV distribution network for each year of the planning period encompassing:

a) information on the forecasted demand for electricity (divided by the main groups of final customers and the losses) and demand for load (divided by the load of final customers and losses) according to point III.C.2.8,

b) information on the draft demand side management programs (DSM) according to point III.C.2.9.,

c) data of the generating units connected to 110 kV distribution network according to point III.C.2.6.,

d) summary data regarding the auto-producers and distributed generators according to the type of fuel used in accordance with point III.C.2.7.,

e) the summary data regarding the renewable energy sources by type of the sources according to point III.C.2.7.,

f) data on the substations of 110 kV voltage according to point III.C.2.4.,

g) data on the power lines of 110 kV voltage according to point III.C.2.5.,

h) the identification of the areas, in which it is justified to locate the new generating units including the determination of their desired capacity,

i) identification of the areas, in which it is justified to locate the new connection points to the transmission network.

III.C.2.2. The generators with the generating units connected to the transmission network submit to TSO for each year of the planning period the data and information regarding the forecasted status describing the operating conditions of the generating units according to item III.C.2.6.

III.C.2.3. The final customers connected to the transmission network submit to TSO for each year of the planning period the data and information regarding the forecasted status containing:

a) demand for power and electricity according to item III.C.2.8.,

b) data on the draft demand side management programs (DSM) according to point III.C.2.9.

III.C.2.4. The data and information regarding the forecasted status of the substation of 110 kV voltage in respect to forecasted data and information include specifically:

a) name of the substation (node),

b) electric diagram and operation configuration,

c) the active and apparent power of the transformers planned to be installed at the substation,

d) the demand for active power during the characteristic measurement hours (annual peak and off-peak during the subsequent years of the planning period),

e) annual demand for electricity during the subsequent years of the planning period.

III.C.2.5. The data and information regarding the forecasted status of 110 kV voltage power lines in respect to the forecasted data and information include specifically:

a) the name of the initial and end node, the length of the power line,

b) the type and section of the wire,

c) resistance and reactance of the power line for the positive-sequence symmetric component,

d) reactance for the zero-sequence symmetric component,

e) thermal rating for the power line during the winter and summer season.

III.C.2.6. Data and information regarding the forecasted status of the generating unit connected to the transmission network or 110 kV distribution network in respect to the forecasted data concerning the new investment or modernisation project include specifically:

a) name of the node and voltage of the connection,

b) maximum and minimum active power,

c) heat rate,

d) forced outage rate,

e) number of days of planned overhauls,

f) quality parameters of the fuel (QAS) including the consumption for heating sources,

g) specific emission of basic pollutants (SO_2, NO_x, ash and CO_2),

h) applied environmental protection installations (including their efficiency),

i) the period of implementing the project (new or a modernisation) and the year of its commissioning,

j) description of the project,

k) envisaged period of operation.

III.C.2.7. Data and information of summary nature regarding the forecasted status of the generators connected 110 kV or lower voltage network include specifically:

a) available capacity,

b) heat rate,

c) electricity generation,

d) quality parameters of the fuel (QAS) including the consumption for thermal sources,

e) specific emission of basic pollutants (SO_2, NO_x, ash and CO_2) for heating sources.

III.C.2.8. Data and information regarding the forecasted status in respect to the power and electricity demand include specifically:

a) demand for electricity during the subsequent years of the planning period,

b) maximum peak load during the subsequent years of the planning period,

c) the load curves during the selected representative days during the subsequent years of the planning period.

III.C.2.9. Data and information regarding the forecasted status in respect to the demand side management programs include specifically:

a) description and time schedule of project implementation,

b) savings in respect to the load and electricity on account of project implementation.

III.D. Publishing and making available the results of development analyses

III.D.1. The transmission system operator publishes on its website the development plan in the version as coordinated with the President of the Energy Regulatory Office.

III.D.2. The transmission system operator makes the following results of development analyses available to DSO within the scope appropriate for the area of their operation and the analysed planning period:

a) description of the planned development and modernisation projects in the transmission network including their implementation schedule and basic technical parameters,

b) assessment of the identified risks (congestions) in the transmission network and 110 kV distribution network including the resulting recommendations of strengthening the 110 kV distribution network and its couplings with the transmission network.

III.D.3. The transmission system operator makes available to generators connected to the transmission network the results of development analyses in the area of their operation and regarding the analysed planning period concerning the changes to the potential of power output from generating units connected to the transmission network.

III.D.4. The transmission system operator makes available to the final customers the results of the development analyses regarding the potential of changing the power drawing from the transmission system at the customer connection point in respect to the analysed planning period.

III.D.5. The provision by TSO of the results of development analyses according to point III.D.2., III.D.3. and III.D.4. takes place under the procedure agreed on individual basis between the TSO and the identified entities.

III.D.6. In respect to the results of development analyses mentioned in point III.D.1. to III.D.5., the information regarded by TSO as sensitive trade information according to the Compliance Program drawn up and executed by TSO cannot be published and made available.

CHAPTER IV. NETWORK DEVELOPMENT, MAINTENANCE AND OPERATION

IV.A. Development and modernisation of the transmission network

IV.A.1. Rules for planning of investment projects

IV.A.1.1. The transmission system operator prepares the plans of material investments in respect to the operated transmission network.

IV.A.1.2. The transmission system operator prepares two plans of material investments in the transmission network assets:

a) five-year plan hereinafter referred to the mid-term investment plan,

b) annual plan hereinafter referred to as the operating investment plan.

IV.A.1.3. The mid-term and operating investment plan are interrelated, while:

a) the binding 5 year plan is the initial material to starting the works on another operating investment plan,

b) approved operating investment plan is at the same time the plan of the first year following the mid-term investment plan.

IV.A.1.4. The mid-term investment plans are drawn up according to the stepping planning rules, i.e. the plan for the next five years is developed on annual basis.

IV.A.1.5. The mid-term investment plan consists of the following parts:

a) general,

b) list of investment tasks continued and newly started,

c) information on all investment tasks.

IV.A.1.6. The investment tasks are included in the mid-term investment plan in the case of the new projects based on:

a) investment applications resulting from the execution of the long-term development and modernisation plan of transmission network mentioned in Chapter III.,

b) investment obligations resulting from the concluded connection agreements and other documents agreed upon with the system users,

c) other investment applications.

IV.A.1.7. The investment tasks are included in the mid-term investment plan in respect

to the continued tasks based on:

a) results of the current implementations,

b) the decisions made regarding the changes the material and financial scope and the implementation schedule.

IV.A.1.8. The investment application is prepared inter alia based on:

a) the programs of modernisation of the elements of the transmission system facilities,

b) the investment needs identified during the technical condition assessment and in the course of operating the facilities, systems, equipment and installations,

c) decisions of statutory authorities,

d) results of the evaluation of network operation.

IV.A.1.9. The operating investment plans are prepared each year for the following year.

IV.A.1.10. The operating investment plan consists of the following parts:

a) general,

b) list of the investment tasks and projects (continued and new),

c) information on all investment tasks and projects,

d) conditions of the execution of the operating investment plan within the planned scope.

IV.A.1.11. The investment tasks included in the operating investment plan inter alia are based on:

a) approved mid-term investment plan,

b) approved investment applications.

IV.A.2. Rules of commissioning the facilities, systems, equipment and installations

IV.A.2.1. Terms of commissioning

IV.A.2.1.1. The transmission system operator accepts for operation the facilities, circuits, equipment and installations of the transmission network after the performance of technical acceptance.

IV.A.2.1.2. The technical acceptance concerns the facilities, systems, equipment and installations of the transmission network (new, modernised, after the overhaul or maintenance operation).

IV.A.2.1.3. The technical acceptance concerns the determination of the positive results of the tests and measurements and fulfilment of the conditions defined inter alia in:

a) item II.A.3. in the scope of the quality and operation reliability requirements of the meshed network,

b) item II.B.3. in the scope of the technical requirements for devices, installations and networks including the required supporting infrastructure,

c) "TSO Technical Standards Applied in the Transmission Network" published by TSO,

d) "Instruction of the Organisation and Performance of the Maintenance Works at EHV Lines and Stations" mentioned in item IV.B.1.2. a),

e) the occupational health and safety regulations, the provisions of the building law, environmental protection law, fire protection and anti-shock protection, technical supervision and standards,

f) detailed operating instructions of the facilities,

g) the designing factory and acceptance documentation,

h) concluded agreements.

IV.A.2.1.4. The transmission system operator ensures the adaptation of the operated circuits and equipment installed in the transmission network to the current short circuit, voltage and load conditions.

IV.A.2.2. **Rules of organisation and performance of acceptances**

IV.A.2.2.1. The acceptances in the transmission network are conducted according to the procedure defined by TSO.

IV.A.2.2.2. TSO appoints the Acceptance Commission to perform the technical acceptance.

IV.A.2.2.3. The tasks of the Acceptance Commission include:

a) the review of the submitted notification on the readiness of the task or its part for acceptance procedure,

b) assessment of the compliance of the scope of completed works with the approved design and technical documentation, conditions defined in point IV.A.2.1.3. and the agreement,

c) the verification of the completeness and up to date nature of the technical, as-built and legal documentation, verification if the contractor's statements in respect to the compliance of the subject of acceptance with the requirements of the Building law and the agreement,

d) verification of the quality of completed works based on the comparison of the parameters offered by the contractor, including: the results of the external inspection measurements and tests and the entries made in the technical verification protocols,

e) verification and analysis of the protocols from the tests, measurements and

trials,

f) assessment and classification of identified defects, gaps and errors,

g) assessment of the scope of uncompleted works covered by the notification,

h) determination of the dates and individuals/entities responsible for the elimination of the defects, gaps and errors mentioned in point IV.A.2.2.3. f) and g) and the method of verification of their elimination,

i) confirmation of the elimination of the defects, gaps and error mentioned n point IV.A.2.2.3. f),

j) verification of updating the operating instruction of the given facility, in the scope resulting from the subject of acceptance,

k) the determination of the readiness of the subject of acceptance to perform the voltage and load tests,

l) the submission of the findings and recommendations.

m) submission of the application to accept the subject of acceptance for use.

IV.A.2.2.4. The Acceptance Commission upon the performance of the actions mentioned in point IV.A.2.2.3. shall prepare the acceptance protocol containing inter alia:

a) description of the results of the verification of the conditions mentioned in point IV.A.2.1.3.,

b) description of the results of tests and measurements,

c) the result of verification of the completeness and correctness of legal, technical and operating documentation and the lists of this documentation,

d) the list of the guarantee periods for devices, building structures and works,

e) the application for the acceptance of the facility, circuit, equipment or installation for use – in the case of the positive results of the tests and verifications.

IV.A.2.2.5. The scope and operating procedure of the Acceptance Commission for the facilities and networks directly connected and being connected to the transmission network are defined in separate agreements.

IV.A.2.3. **Rules of performing the trial operation of the accepted facilities, systems, equipment and installations**

IV.A.2.3.1. The transmission system operator identifies the facilities, systems, equipment and installations of the transmission network, which prior to their commissioning are subject to the trial start-up.

IV.A.2.3.2. The transmission system operator identifies the rules of performing the trial start-up of the commissioned facilities, systems, equipment and installations of the transmission network.

IV.A.2.3.3. The obligations mentioned in item IV.A.2.3.1. and IV.A.2.3.2. also concern the entities connected to the transmission network in respect to the facilities operated by them.

IV.A.2.3.4. The rules of performing the trial operation for the facilities directly connected to the transmission network are approved by TSO.

IV.B. Transmission network maintenance

IV.B.1. General rules of transmission network maintenance

IV.B.1.1. The maintenance of the transmission network is carried out in a manner ensuring:

a) keeping the transmission network and its connections with the equipment, installations and other networks in a proper technical condition,

b) maintaining the continuity, reliability and effectiveness of the operation of the transmission network,

c) maintaining the safety of operation and to the environment,

d) meeting the fire safety and environmental protection requirements.

IV.B.1.2. The transmission system operator prepares:

a) "The Instruction of Organisation and Performance of Maintenance Works on EHV Lines and Stations",

b) The detailed maintenance instructions for the facilities, circuits, equipment and installations operated by TSO.

IV.B.1.3. The entities connected to the transmission network prepare the operating and maintenance instructions of the equipment, installations and networks with consideration of the conditions defined in IRiESP.

IV.B.2. The organisational structure of maintaining and developing the transmission network

IV.B.2.1. The transmission system operator executes some of the tasks in the scope of the maintenance and development of the transmission network in cooperation with the entities mentioned in point I.A.4. acting on its behalf. The rules of cooperation with such entities are defined in the agreements concluded between TSO and the said entities.

IV.B.2.2. The entities mentioned in point I.A.4. participate in the maintenance of the transmission network in the scopes as defined in the agreements.

IV.B.2.3. The subject of the agreements mentioned in point IV.B.2.2. concern the provision of the operating management services in the scope of network

assets.

IV.B.2.4. The operating management services are defined as acting on behalf of TSO under the following processes:

a) planning of the conducted services including decision making in respect to the directions of allocation of financial resources in order to achieve the planned ratios,

b) optimisation of the number and time of the outage of the elements of the transmission network,

c) making the decisions affecting the level of annual costs,

d) supporting the activity of transmission system operator in the scope of the development of the transmission network,

e) performance of the actions mentioned in point IV.B.2.5. to IV.B.2.9. within the scope of performance of management activities.

IV.B.2.5. The entities mentioned in point I.A.4 acting on behalf of TSO participate in the planning process:

a) of the material and financial scope of maintenance operations including pursuant to IRiESP, Technical Operating Documentation (DTR) of the equipment, "Instruction of Organisation and Performance of Maintenance Operations on EHV Lines and Stations", the results of the technical diagnostics, assessment of technical condition, allocated resources and the costs of the risk of damaging the element,

b) maintenance operations in the integrated long-term plan,

c) other services provided by third parties,

d) taxes and administrative fees.

IV.B.2.6. The entities mentioned in point I.A.4. acting on behalf of TSO:

a) provide permanent supervision of the transmission network assets,

b) perform the technical condition assessment of all facilities of network assets,

c) maintain the network assets,

d) perform the acceptances and work of the Acceptance Commission according to the rules defined in point IV.A.2.2.,

e) perform the trial operation and start-up of the commissioned facilities,

f) carry out the process of preparing the documents necessary for claiming in courts the receivables on account of the damages occurred to network assets and third party liability and to perform enforcement in this area,

g) perform the process of preparing and keeping the legal, financial, maintenance and technical documentation, maintenance instructions and

work position instructions and updating the databases of specialised software,

h) perform the liquidation of redundant elements of network assets.

IV.B.2.7. The entities mentioned in point I.A.4.within the scope of the management functions coordinate:

a) the works performed at the transmission network facilities in order to minimise the number and time of outages,

b) the operation of the equipment in the manner ensuring the reliable operation of the meshed network accompanied by the optimisation of its maintenance costs,

c) under TSO supervision the setting of the network protection settings of the lines and equipment of the entities connected to the transmission network,

d) in close cooperation with TSO the works related to the liquidation of the disturbances and settlement of claims.

IV.B.2.8. The entities mentioned in point I.A.4. within the scope of the management functions inform TSO about:

a) the emergencies and contingencies and the risks of the occurrence of these events,

b) the physical execution of annual plans,

c) the observed risks resulting from the operation and technical condition of the transmission network and third party liability.

IV.B.2.9. Within the scope of the operating management the entities mentioned in point I.A.4. are required to:

a) represent TSO within the scope of the powers of attorney held and granted in respect to the control, supervision, local government and government authorities, private individuals and legal entities and handle on its behalf the issues related to environmental protection and regulation of the rights to the land,

b) participate in the works of the teams established by TSO to solve the technical, economical and organisational problems related to the network assets management,

c) select the contractors holding the appropriate qualifications, certificates or licences of the producers to perform the determined works, conclude the agreements with the contractors and perform the financial and material settlement of these agreements,

d) perform the control activities according to point IV.B.13.,

e) archive the documentation and data regarding: register of assets and legal and maintenance documentation,

f) prepare the repair applications,

g) prepare for its operating area the proposals of program assumptions and tie schedules for the repair and modernisation tasks,

h) cooperate – upon agreeing it with TSO – with the designing offices in the development of the documentation for the newly built, refurbished or modernized facilities of the transmission network,

i) submit to TSO the comments and opinion regarding the documentation prepared by the designing offices.

IV.B.3. **Legal, technical and maintenance documentation**

IV.B.3.1. The transmission system operator is responsible for the preparation and continuous update of the legal, technical and maintenance documentation of the facilities, systems, equipment and installations of the transmission network.

IV.B.3.2. The legal documentation of the transmission network facilities should contain:

a) the building permits,

b) the handover documents or the expropriation of real estate,

c) authenticated deeds of rights acquisition,

d) protocols of the Acceptance Commission,

e) administrative decisions on the permit to use the facilities provided they were required.

IV.B.3.3. The technical documentation of the facilities, circuits, equipment and installations of the transmission network should contain:

a) technical design,

b) technical-operating documentation of the equipment,

c) the protocols of classifying the premises and their zones or external areas into the fire risk category, explosion risk category, depending on needs,

d) basic technical data of the equipment and its locations.

IV.B.3.4. The maintenance documentation of the facilities, circuits, equipment and installations of the transmission network should contain:

a) the commissioning documents,

b) detailed maintenance instructions,

c) lists of maintenance works,

d) protocols of tests and measurements,

e) assessment of technical condition,

f) protocols of disturbance tests,

g) statistics of the damage and disturbances, including the register of outages,

h) list of protective equipment ,

i) Building Object Logs.

IV.B.3.5. The detailed maintenance instructions of the facilities in the transmission network should contain specifically:

a) the general description of the facility including the diagrams and drawings,

b) the organisation of the performance of maintenance works,

c) the procedure of updating the documentation,

d) the list of positions responsible for the maintenance and operation of the facility,

e) the list of maintenance documentation,

f) rules of operation of the station,

g) the occupational health and safety and security rules at the facility, including the fire safety and anti-shock protection,

h) equipment operating manuals.

IV.B.4. Planning of maintenance works

IV.B.4.1. Rules for plans development regarding maintenance works

IV.B.4.1.1. The transmission system operator in accordance with "The Instruction of Organisation and Performance of Maintenance Works on EHV Lines and Stations" mentioned in point IV.B.1.2. a) prepares and update the following plans:

a) three-year plan of repair works,

b) annual plans of repair works,

c) annual plan of maintenance works .

IV.B.4.1.2. The transmission system operator maintains elements of the transmission network considering:

a) the current information on the state, place of use, technical parameters of the facilities, circuits, equipment and installations of the transmission network,

b) information on the status of the backup equipment and spare parts,

c) results of the reliability and failure probability analyses,

d) guidelines contained in the maintenance documentation.

IV.B.4.1.3. The transmission system operator plans the individual maintenance and repair works based on the results of the current maintenance, results of the diagnostics and monitoring of the condition of the equipment and systems and the assessment of the technical condition of individual elements of transmission network considering the performance constrains.

IV.B.4.1.4. The transmission system operator shall make the decision on the need of executing the ad hoc maintenance works based on the results of the inspections and diagnostic tests.

IV.B.4.1.5. In the preparation of the maintenance and repair works the TSO shall strive to ensure:

a) the application of the uniform technical solutions,

b) the fulfilment of the requirements defined in "TSO Technical Standards Applied in the Transmission Network" published by TSO,

c) the integration of the performance of the maintenance, repair and investment works,

d) limiting to minimum the necessary outages of the elements of the transmission network and their duration.

IV.B.4.1.6. The transmission system operator coordinates the plans of maintenance works of JWCD and the generating units centrally coordinated by the TSO, hereinafter referred to as JWCK, considering the operating plans of the meshed network.

IV.B.4.1.7. The plans of the maintenance works in the coordinated 110 kV network prepared by the entities connected to the transmission network should consider the plans mentioned in point IV.B.4.1.1.

IV.B.4.2. **Assessment of technical condition**

IV.B.4.2.1. The transmission system operator ensures the performance of the assessment of technical condition of the facilities, equipment, systems and installations of the transmission network operated by TSO.

IV.B.4.2.2. The assessment of the technical condition of the facilities, equipment, systems and installations of the transmission network operated by TSO includes:

a) assessment of the results of technical diagnostics and monitoring,

b) assessment of the results of disturbances and failures analyses including the identification of the reasons of disturbances and damages,

c) assessment of quality parameters and ageing process,

d) assessment of the fulfilment of the recommendations resulting from the operating plans of transmission network,

e) assessment of the fulfilment of conditions mentioned in point IV.A.2.1.3.,

f) operation history,

g) assessment of the technical condition of the stored backup equipment and spare parts,

h) assessment of occupational health and safety conditions, facility security, including the fire safety and anti-shock protection and environmental protection,

i) assessment of the status of the legal, technical and maintenance documentation,

j) conclusions and final recommendations determining inter alia the necessary supplements to the documentation, purchases and the necessary maintenance, modernisation or overhaul works.

IV.B.4.2.3. Transmission system operator prepares the detailed guidelines for the assessment of technical condition of transmission network operated by TSO.

IV.B.4.2.4. The obligation mentioned in point IV.B.4.2.1. shall also apply to the entities connected to the transmission network in respect to the facilities, equipment, systems and installations operated by such entities.

IV.B.4.2.5. The assessment of the technical condition of EHV/110 kV power facilities, where the maintenance of the part of the facilities and equipment is carried out by the entities connected to the transmission network, will be carried out according to the guidelines mentioned in point IV.B.4.2.3.

IV.B.4.2.6. The transmission system operator and the distribution system operators share the conclusions from the assessments of the technical condition of the meshed network.

IV.B.4.3. **Planning outages**

IV.B.4.3.1. The transmission system operator prepares the plans of outages of the elements of the transmission network and will approve the plans of outages of the elements of coordinated 110 kV network according to the rules defined in point IV.C.

IV.B.4.3.2. The entities planning the performance of the maintenance works requiring the outages of the elements of the meshed network are required to obey the rules and the procedure of planning the operation of the meshed network as defined by TSO in point IV.C.

IV.B.4.3.3. The entities planning the performance of the maintenance, modernisation and overhaul works requiring the outage of the elements of the meshed network notify the TSO about the outages of the elements of the network. The contents and procedure of such notifications is defined in point IV.C.

IV.B.4.3.4. The transmission system operator and the distribution system operators cooperate with each other in order to meet the dates of the planned outages of

the elements of the meshed network and to minimise the duration of such outages.

IV.B.5. **Rules and conditions of performing the maintenance works**

IV.B.5.1. **Planned and unplanned maintenance work**

IV.B.5.1.1. The transmission system operator ensure the execution of the plans of maintenance works for the facilities, equipment, systems and installations according to "The Instruction of the Organisation and Performance of Maintenance Works on EHV Lines and Stations" mentioned in point IV.B.1.2. a), containing inter alia the rules of:

a) carrying out the maintenance operations,

b) carrying out the diagnostics tests,

c) carrying out the inspections or elements of the inspection works,

d) performing the works related to keeping the surroundings, taking into account environmental protection requirements.

IV.B.5.1.2. The transmission system operator within the scope of ad hoc maintenance works ensures the elimination of the identified damage and defects of the equipment at the power facilities of transmission network.

IV.B.5.2. **Repairs**

IV.B.5.2.1. The repairs are one of the basic methods of restoring the technical condition of the transmission network to the original level.

IV.B.5.2.2. The objective of the repairs is to restore the original technical condition of the facilities, configuration, circuits and installations of the transmission network, for which the current and expected operating conditions do not require the material improvement of the technical and quality parameters in relation to the current condition.

IV.B.5.2.3. The transmission system operator ensures the preparation with the progressing structure the three-year plans of repair works of the transmission network containing:

a) the scope of works,

b) the duration of the works,

c) the duration of the outages,

d) estimation of financial outlays.

IV.B.5.2.4. The tasks resulting from the mid-term investment plan mentioned in point IV.A.1.2. a) are considered in the preparation of the plan of repair works.

IV.B.5.2.5. The transmission system operator shall perform the repair works of the facilities, equipment, systems and installations of the transmission network according to the "TSO Technical Standards Applied in the Transmission Network" published by TSO applicable during the period of their preparation. The above provision applies in the case of repairs of the facilities, equipment, systems and installations constructed before the date of starting the publication of "TSO Technical Standards Applied in the Transmission Network", if it is technically feasible.

IV.B.5.2.6. In respect to the repairs, when the exiting elements of the transmission network are replaced by the new ones of other constructional solutions, "TSO Technical Standards Applied in the Transmission Network" published by TSO applies.

IV.B.5.2.7. The transmission system operator accepts for operation the facilities, equipment, systems and installations of the transmission network following the completion of their repair according to the procedure defined in point IV.A.2.

IV.B.6. Elimination of failure effects and disturbances

IV.B.6.1. The transmission system operator ensures the elimination of the effects of the failures and disturbances in the transmission network operated by TSO and shall protect the place of the disturbance or failure against the enlargement of the scope of damage and the occurrence of further damage.

IV.B.6.2. The transmission system operator executes some of the tasks in the area of the elimination of the effects of the failures and disturbances in the transmission network operated by TSO through the entities mentioned in point I.A.4 acting for and on behalf of the TSO. The rules of cooperation with such entities are defined in the agreements concluded between TSO and such entities.

IV.B.6.3. The detailed operating rules in respect to handling the failures and disturbances are defined in point IV.C. and IRiESP – Balancing of the System and Management of the System Constraints.

IV.B.6.4. The transmission system operator starts immediately to eliminate the effects of the failures and disturbances occurring within the transmission network.

IV.B.6.5. The liquidation of the failures and disturbances in the area of:

a) restoration of the technical condition from before the occurrence of a failure or a disturbance,

b) modernisation in relation to the condition before the failure or disturbance,

c) partial restoration and partial modernisation in relation to the condition before a failure or disturbance.

IV.B.6.6. "TSO Technical Standards Applied in the Transmission Network" published by TSO shall apply to the restoration of the technical condition of the

transmission network before the occurrence of the failure or disturbance in the version applicable at the time of the construction. The aforementioned standards shall be used in the case of restoring the facilities, equipment, systems and installations constructed before the date of starting the publication of "TSO Technical Standards Applied in the Transmission Network" if it is technically feasible.

IV.B.6.7. In the case of the partial or complete modernisation of technical condition from before the occurrence of a failure or disturbance, when the existing transmission network elements are replaced or supplemented by new elements of different constructional solutions, "TSO Technical Standards Applied in the Transmission Network" published by TSO are used for the construction of the new elements and parts of the network.

IV.B.6.8. The transmission system operator keeps the register of the failures and disturbances in the transmission network and conducts periodical analyses and identify the preventive measures in respect to the meshed network.

IV.B.6.9. The distribution system operators and the entities connected to the transmission network are required to submit to TSO information regarding the failures and disturbances that might cause the state of emergency of NPS and the dates and effects of their elimination.

IV.B.6.10. In the case of failures and disturbances mentioned in point IV.B.6.9 lasting longer than 7 days the entity, in whose network the failure or disturbance occurred is required to send to TSO the time schedule of their elimination.

IV.B.6.11. The transmission system operator and distribution system operators share the findings and recommendations resulting from the protocols of failures and disturbances analysis in the meshed network.

IV.B.6.12. The transmission system operator is required to inspect the failures and disturbances in coordinated 110 kV network.

IV.B.7. **Rules of decommissioning of facilities, systems, installations and equipment**

IV.B.7.1. The transmission system operator elaborates the procedure of decommissioning and elimination the facilities, systems, equipment and installations of the transmission network.

IV.B.7.2. The transmission system operator prepares the plans of decommissioning the facilities, systems, equipment and installations of the transmission network and eliminating the elements of network assets.

IV.B.7.3. The elimination procedure in the transmission network is carried out by the elimination team appointed by the TSO according to the applicable procedures.

IV.B.7.4. The tasks of the elimination team shall include specifically:

a) the assessment of the suitability of the network assets notified for elimination for further use,

b) the preparation and signing of the protocol on recognising the element of network assets as redundant,

c) preparation of the document of elimination of the element of network assets,

d) preparation and signing of the protocol from physical elimination of the element of network assets,

e) in the case of partial elimination – the identification of appropriate elements of network assets for elimination.

IV.B.7.5. The elimination of the sections of the lines and the transformer-switching stations in coordinate 110 kV network can be started upon obtaining TSO's opinion.

IV.B.8. **Rules of maintaining reserves of equipment and spare parts**

IV.B.8.1. The transmission system operator will ensure the appropriate number of backup equipment and spare parts for the correct operation of the transmission network operated by TSO.

IV.B.8.2. The types and number of backup equipment should be adapted to the number of the installed types and categories of the equipment in the transmission network considering:

a) the role served in the transmission network,
b) the required quality parameters including the reliability,
c) failure rates,
d) delivery times of the equipment and spare parts from the market,
e) compatibility of the types under individual categories of the equipment,
f) maintenance experience.

IV.B.8.3. The backup equipment should be maintained in due operating condition.

IV.B.8.4. The transmission system operator keeps the current list of the backup equipment and spare parts including their storage location.

IV.B.9. **Occupational health and safety during the performance of the works**

IV.B.9.1. The transmission system operator elaborates "The Occupational Health and Safety Instruction for the Power Equipment and Installations" binding the personnel operating the facilities, systems, equipment and installations of the transmission network considering the requirements stipulated by the commonly binding law.

IV.B.9.2. "The Occupational Health and Safety Instruction for the Power Equipment and Installations" mentioned in point IV.B.9.1. shall define specifically:

a) the division of the works, the form and rules of issuing the orders,
b) the duties of the employees in respect to the organisation of work,
c) combination of the functions in respect to the instructed works,
d) issuing and passing the orders,
e) registration and storage of orders,
f) preparation of the place of work and admittance to work,
g) breaks at work and end of work,
h) rules of organisation of work applicable to external contractors,
i) the rules of performing the works in respect to the power equipment and installations of TSO,
j) the rules of safe performance of the works,
k) switching operations,
l) works performed with the support of mechanical equipment,
m) the basic rules of using the protective equipment and working tools,
n) the rules of safe handling of operation of power equipment with SF_6 gas,
o) the operating procedures in respect to saving the individuals electrocuted

and burned by the electric current.

IV.B.9.3. The employees operating the facilities, equipment, systems and installations of the transmission network should have the appropriate qualifications confirmed by the certificate issued by the classification commissions, meet the determined health conditions, be trained in working on their respective positions in accordance with the commonly binding law.

IV.B.10. **Fire safety**

IV.B.10.1. The transmission system operator provides the fire protection for the facilities, equipment, systems and installations of the transmission network operated by TSO according to the applicable regulations and standards.

IV.B.10.2. The transmission system operator ensures the preparation of the fire safety instructions for the determined facilities, systems, equipment and installations of its transmission network.

IV.B.10.3. The transmission system operator ensures the use of the fire protection equipment meeting the requirements defined in separate regulations and standards in the facilities of its transmission network.

IV.B.11. **Environmental protection**

IV.B.11.1. The transmission system operator ensures the maintenance and compliance with the environmental legislation.

IV.B.11.2. The transmission system operator ensures the appropriate management of the waste harmful to the environment.

IV.B.11.3. The transmission system operator ensures the use of the technical and organisational measures in its transmission network reducing the effects to the environment.

IV.B.11.4. The transmission system operator defines the operating rules in respect to the pollution of the environment which may be caused by the facilities, circuits, equipment and installations of its transmission network. The operating rules in the case of environmental damage are coordinated with the competent institutions responsible for preventing the environment from pollution.

IV.B.11.5. The transmission system operator and the entities connected to the transmission network shares any information regarding the risks to the environment at the connection points and to the required degree also in the vicinity of such connection points by coordinating the scope of cooperation in prevention and remove the effects of such risks.

IV.B.12. **Requirements regarding the development and operation for the entities connected to the transmission network**

IV.B.12.1. The devices directly connected to the transmission network should meet the conditions defined in this instruction.

IV.B.12.2. The performance of the maintenance operations regarding the equipment, installations and networks connected to the transmission network and coordinated 110 kV network require the coordination with TSO insofar as such actions affect the operation of the transmission network.

IV.B.12.3. The entities connected to the transmission network operates their equipment, installations and networks in the manner ensuring their maintenance in the due technical condition and enabling the reliable and effective operation of NPS.

IV.B.12.4. It is recommended that the entities connected to the transmission network consider the standards published by TSO in respect to the operation of the transmission network in the operation of their equipment, installations and networks.

IV.B.12.5. In the case of a disturbance or a failure in the systems, equipment, installations and networks of the entities connected to the transmission network these entities should immediately start to eliminate their effects.

IV.B.12.6. The transmission system operator shall coordinate the decisions on the reconstruction of the sections of the lines and transformer-switching stations in coordinated 110 kV network, which were damaged as a result o a failure or a disturbance. The coordination requires the restoration or – if system analyses justify such need – change of the functions executed by the damaged element. The method of reconstruction is not subject of coordination.

IV.B.12.7. The entities connected to the transmission network consider TSO plans mentioned in point IV.A.1.2.and IV.B.4.1.1. in the prepared plans of maintenance, overhaul and investments works. The coordination of the plans takes place through the territorially appropriate entities mentioned in point I.A.4.

IV.B.12.8. The transmission system operator calculates and coordinate the settings of the EAZ automatics and circuits installed in the transmission network and coordinated 110 kV network and the equipment and installations of the entities connected to the network of the upper voltage of 750, 400, 220 and 110 kV.

IV.B.12.9. The scope of coordination mentioned in point IV.B.12.8. includes inter alia:

a) the submission of data necessary for the calculations,

b) the submission and collection of information on the execution of the changes in the settings of EAZ automatics and according to the rules defined in point IV.C.

IV.B.13. **Inspection of facilities, systems, devices, installations and networks of**

entities connected to the transmission network.

IV.B.13.1. The transmission system operator is entitled to inspect the compliance of the requirements defined in the following documents by the facilities, circuits, equipment, installations and networks of the entities connected to the transmission network:

a) concluded agreements,

b) IRiESP.

IV.B.13.2. The inspection mentioned in point IV.B.13.1. is carried out based on the personal authorization and Ids issued by TSO according to the binding executive acts to the Energy Law act.

IV.B.13.3. The inspections are carried out on the days and during the working hours binding at the inspected entity in the manner not disturbing the operation of such entity upon the prior notification about the planned inspection.

IV.B.13.4. The protocols from the conducted inspections are stored by TSO through the period of five years minimum.

IV.B.13.5. Should the deviations from the requirements defined in point IV.B.13.1. be identified as a result of an inspection or analyses, TSO calls the inspected entity to undertake the actions aimed at eliminating such deviations.

IV.B.13.6. The call mentioned in point IV.B.13.5. contains specifically:

a) the identification marking of the inspection protocol, in which the deviations from the requirements were identified,

b) the list of deviations from the requirements,

c) the deadline of elimination of the deviations from the requirements,

d) information on further actions, which will be undertaken in the case of the failure to meet the requirements identified in the call by the entity by the stipulated deadline.

IV.C. Network operation

IV.C.1. General rules

IV.C.1.1. The subject of points IV.C.1. through IV.C.14. concerns the rules of network operation in NPS, including the duties and rights of the individual entities and the rules of their cooperation for the purpose of:

a) maintaining of the integrity and security of operation of NPS and the fulfilment of the conditions enabling its synchronous operation with the foreign systems according to UCTE Operation Handbook standards;

b) maintaining of the required quality parameters and the reliability of NPS meshed network operation according to point II.A.2. and the requirements

of UCTE Operation Handbook;

c) enabling the performance of the required overhaul and maintenance works in the power plants and meshed network;

d) physical execution of the contracts and transactions concluded by the authorized entities in the area of the balancing market;

e) registration of the parameters of operation states of NPS that have material significance for its correct operation;

f) preparing and making available the technical data for the correct operation of the energy market;

g) determining and making available the technical transmission capacities of the cross-border exchange lines for tender purposes.

IV.C.1.2. The network operation in NPS encompasses the following areas:

a) coordination planning,

b) preparation of the technical balances of power in NPS,

c) dispatching the power of the generating units connected to the meshed network,

d) planning the operation of the meshed network,

e) identification of network congestions in the meshed network,

f) performance of switching operations in the meshed network,

g) regulation actions in the meshed network,

h) introduction of breaks and curtailments in the delivery and drawing of electricity,

i) monitoring of the operation of the system and prevention and elimination of network and system disturbances,

j) remote acquisition of the metering data and registration of NPS operating state,

k) information exchange and control systems used for the network operation,

l) central register of the generating units and wind farms at NPS.

IV.C.1.3. The system operators are responsible for network operation, while:

a) the transmission system operator is responsible for network operation in the transmission network and executes the decision making powers in respect to the network operation in the coordinated 110 kV network and in respect to the safety of operation of the entire NPS;

b) the distribution system operators are responsible for the network operation in their allocated distribution network subject to decision making powers of TSO.

IV.C.1.4. The decision making powers mentioned in point IV.C.1.3. are executed by

TSO insofar as results from the responsibility assigned to TSO in the Energy law act for the safety of NPS operation and according to the provisions of the executive acts issued under the said act. The scope and method of exercising the decision making powers by TSO is defined in detail by the provisions of this IRiESP.

IV.C.1.5. Selected operator tasks for and on behalf of TSO are executed by entities mentioned in point I.A.4.

IV.C.1.6. The entities participating in the network operation in the meshed network include also the generators, customers and enterprises involved in the transmission or distribution that are not system operators, whose equipment, installations or networks are directly connected to the meshed network.

IV.C.1.7. The entities participating in the network operation prepare the written list of the individuals and organisational units directly participating in NPS network operation. The lists should be signed by the individuals authorized to represent the given entity. The lists are subject to the on-going update and are subject to mutual exchange.

IV.C.1.8. The transmission system operator defines the rules and procedure of the mutual transmission of data and information defined in point IV.C.3. through IV.C.10 by the entities participating in the network operation process.

IV.C.1.9. The basic tool used by TSO to ensure the consistency of the planning activities of the entities participating in network operation with the security requirements of NPS operation concerns the coordination planning.

IV.C.1.10. The on-going security of NPS operation is ensured by the dispatching services of TSO and DSO and operating services of the generators and customers operating according to the rules defined in point IV.C.2. operating under hierarchical structure.

IV.C.1.11. TSO's cooperation with the transmission systems operators of neighbouring countries in respect to network operation takes place according to the rules applicable to UCTE members and the conditions defined in bilateral agreements.

IV.C.1.12. The transmission system operator is responsible for the Central register of the generating units and wind farms in NPS.

IV.C.2. Organisational structure of the network operation

IV.C.2.1. The transmission system operator executes some of its tasks in the area of network operation also through the entities mentioned in point I.A.4. acting for and on behalf of TSO. The rules of TSO's cooperation with such entities are defined in the agreements concluded with the said entities.

IV.C.2.2. The TSO tasks commissioned to the entities mentioned in point I.A.4 concern the execution of TSO duties in the area of security of NPS operation and the reliability of meshed network operation requiring the area cooperation of

system operators and other entities connected to the meshed network.

IV.C.2.3. The entities mentioned in point I.A.4. are assigned on individual basis the areas of the distribution network and EHV/110 kV substations supplying these areas. The borders of the distribution network assigned to the individual entities will be defined in the agreements concluded between TSO and the entities performing the function of DSO. The following provisions applies until the determination of the issue of the borders in the bilateral agreements:

a) Polskie Sieci Elektroenergetyczne – Centrum S.A. has the following areas assigned: distribution network of STOEN S.A., Zakład Energetyczny Warszawa Teren S.A., Łódzki Zakład Energetyczny S.A., Zakład Energetyczny Łódź Teren S.A., Koncern Energetyczny Energa S.A. Oddział Zakład Energetyczny Płock in Płock and Zakład Energetyczny Białystok S.A.;

b) Polskie Sieci Elektroenergetyczne – Wschód S.A. has the following areas assigned: distribution network of Lubelskie Zakłady Energetyczne S.A., Zamojska Korporacja Energetyczna S.A., Rzeszowski Zakład Energetyczny S.A. and Zakłady Energetyczne Okręgu Radomsko-Kieleckiego S.A.;

c) Polskie Sieci Elektroenergetyczne – Południe S.A. has the following areas assigned: distribution network of Enion S.A., Górnośląski Zakład Elektroenergetyczny S.A. and EnergiaiPro Koncern Energetyczny S.A. Oddział w Opolu;

d) Polskie Sieci Elektroenergetyczne – Zachód S.A. has the following areas assigned: distribution network of EnergiaPro Koncern Energetyczny S.A. Branches in Wrocław, Wałbrzych, Legnica and Jelenia Góra, Grupa Energetyczna Enea S.A. Branches in Szczecin, Gorzów, Zielona Góra and Zakład Główny in Poznań and Koncern Energetyczny Energa S.A. Oddział Energetyka Kaliska in Kalisz;

e) Polskie Sieci Elektroenergetyczne – Północ S.A. has the following areas assigned: distribution network of Grupa Energetyczna Enea S.A. Branch in Bydgoszcz and Koncern Energetyczny Energa S.A. Branches: Zakład Energetyczny Koszalin in Koszalin, Zakład Energetyczny Słupsk in Słupsk, Zakład Energetyczny Gdańsk in Gdańsk, Elbląskie Zakłady Energetyczne in Elbląg, Zakład Energetyczny Olsztyn in Olsztyn and Zakład Energetyczny Toruń in Toruń.

IV.C.2.4. In respect to network operation in the meshed network the TSO executes through the entities mentioned in point I.A.4. the following functions within the scope of the network areas assigned to such entities:

a) acquisition of planning data from DSO and the generators;

b) performance of the continuous analysis of the operation of coordinated 110 kV network and the elaboration of the periodical assessment and of the guidelines regarding the operation of coordinated 110 kV network,

c) decision making in respect to planning the works, performing switching operations, dispatching the generating units, regulatory activities in the coordinated 110 kV network;

d) development and update of the area plans of defence and restoration following the network or system disturbance and holding the training in this area with the participation of the competent services of DSO, generators and customers,

e) in cooperation with DSO dispatching services and operating services of the generators and customers the elimination of the network and system disturbances, and restoration of NPS based on the general defence and restoration plan and the area defence and restoration plans,

f) handling the necessary coordination with the generators, DSO and the end customers for the purpose of preparing the operation cooperation instruction of EHV/110 kV station, to which their networks, installations and equipment are connected,

g) remote acquisition of metering data from the coordinated 110 kV network within the scope defined in point IV.C.12.2.

IV.C.2.5. The tasks executed by the entities mentioned in point I.A.4. are included in IRiESP.

IV.C.2.6. The TSO and DSO dispatching services, the operating services of the generators and final customers directly connected to the meshed network and the operating personnel of the substations working under hierarchical structure are responsible for the on-going operation of the meshed network.

IV.C.2.7. The dispatching services of TSO include:

a) National Power Dispatch operating within PSE Operator S.A., hereinafter referred to as TSO - KDM dispatching services,

b) Area Dispatching Services operating within the scope of the entities mentioned in point I.A.4., .hereinafter referred to a TSO-ODM dispatching services.

IV.C.2.8. DSO dispatching services include the Company Dispatching Services operating within the individual distribution companies, hereinafter referred to as DSO-ZDR dispatching services.

IV.C.2.9. The Power Plant Duty Operation Engineer, hereinafter referred to as DIRE generator's operating services constitutes the operating services of the generators.

IV.C.2.10. The Duty Operation Engineer, hereinafter referred to as DIR final customers' operating services constitutes the operating services of the final customers connected directly to the meshed network.

IV.C.2.11. The cooperation of the dispatching and operating services encompasses:

a) transmission of the on-going information within the scope and under the procedure as defined in IRiESP,
b) issuing the operating orders by the authorized and entitled individuals,
c) confirmation of receiving the order by the authorized and entitled individuals,
d) informing about the execution of the order,
e) recording of the course of execution of point b), c) and d) and recording of obtaining and transmitting information differing from the standard information or affecting the decisions made.

IV.C.2.12. TSO – KDM dispatching service is entitled to issue the operating orders:

a) to TSO – ODM dispatching services in full extent,
b) to DIRE generator's operating services within the scope of operation of all JWCD,
c) to DIRE generator's operating services in respect to the adjustment of the operating program of JWCK connected to the transmission network.

IV.C.2.13. TSO – ODM dispatching service is entitled to issue the operating orders:

a) to TSO– ZDR dispatching services in respect to the operating configuration of the coordinated 110 V network,
b) to DIRE generator's operating services in the area of the synchronization of JWCD and JWCK connected to the transmission network (considering the operating cooperation instruction of the given station),
c) to DIRE generator's operating services in the area of the adjustments to the operating program of JWCK connected to the coordinated 110 kV network,
d) to the operating personnel of the substations in respect to the switching operations at transmission network substations,
e) to DIRE generator's operating services in the area of operation of JWCD (as emergency action in the case of the absence of the direct contact between the TSO-KDM dispatching services and DIRE generator's operating services),
f) to DIRE generator's operating services in the area of the adjustments to the operating program of JWCK connected to the transmission network (as emergency action in the case of the absence of the direct contact between TSO-KDM dispatching services and DIRE generator's operating services),
g) to DIR final customers' operating services in the area of the equipment directly connected to the transmission network.

IV.C.2.14. TSO – ZDR dispatching service is entitled to issue the operating orders:

a) to DIRE generator's operating services in the area of the synchronization of the generating units connected to the coordinated 110 kV network (considering the operating cooperation instruction of the given substation),

b) operating personnel of the substation in respect to the switching operations at coordinated 110 kV network substations,

c) to DIRE final customers' operating services in respect to the equipment directly connected to coordinated 110 kV network.

IV.C.2.15. The list of the individuals authorised and entitled to transmit the operating information, issue and execute the operating orders and handle coordination including the list of the voice communication measures is prepared, updated on the on-going basis and transmitted between the entities, within which the dispatching services operate mentioned in point IV.C.2.7. and IV.C.2.8. and the operating services mentioned in point IV.C.2.9. and IV.C.2.10.

IV.C.3. Coordinated operational planning

IV.C.3.1. The transmission system operator performs the coordination planning at NPS by developing and making available:

a) coordination plans,

b) technical-trade balances.

IV.C.3.2. The transmission system operator prepares the following types of coordination plans and the technical-trade balances:

a) annual coordination plan hereinafter referred to as PKR coordination plan,

b) monthly coordination plan hereinafter referred to as PKM coordination plan,

c) daily coordination plans including: the preliminary daily coordination plan hereinafter referred to as WPKD coordination plan, daily coordination plan hereinafter referred to as PKD coordination plan and the current daily coordination plan hereinafter referred to as BPKD coordination plan,

d) the stepping technical-trade balances hereinafter referred to as BTHD covering the period of 7 consecutive calendar days.

IV.C.3.3. PKR, PKM coordination plans are the technical plans and WPKD, PKD and BPKD coordination plans are the executive plans in the area of the balancing market.

IV.C.3.4. The technical-trade balances are prepared for the purpose of the balancing market and are provided purely for information.

IV.C.3.5. The transmission system operator will prepare and make available the coordination plans by the following deadlines:

a) PKR coordination plan for the period of 3 following years – by the 30th November of the preceding year,

b) PKM coordination plan – for March by the 23rd February and for the other months by the 25 day of the preceding month for the next month,

c) WPKD, PKD and BPKD daily coordination plans – according to the rules defined in IRiESP – Balancing of the System and Management of System Constraints,

d) the technical-trade balances - according to the rules defined in IRiESP – Balancing of the system and management of system curtailments.

IV.C.3.6. PKR coordination plan contains the following elements for the individual calendar months:

a) monthly forecasted average available capacity of the domestic generating units divided by JWCD and nJWCD, specifying the appropriate types of generating units,

b) monthly forecasted average dispatchable capacity of domestic power plants considering the capacity losses resulting from the annual repair plans of JWCD notified by the generators, the notified capacity losses of nJWCD and the planned capacity losses resulting from the network's operating conditions during the daily peak loads of the domestic demand on the working days,

c) monthly forecasted average dispatchable capacity of TSO including the capacity losses resulting from the annual repairs plans of JWCD notified by the generators and the planned load of nJWCD during the daily peak loads of the domestic demand on the working days,

d) monthly forecasted average domestic demand for the peak load of the daily peak loads of the domestic demand on the working days forecasted for the typical weather conditions for the given month,

e) forecasted peak load during the month,

f) monthly forecasted average determined cross-border exchange during the daily peak loads of the domestic demand on the working days resulting from the concluded agreements and notified non-parallel exchange,

g) monthly forecasted average load of nJWCD during the daily peak loads of the domestic demand on the working days,

h) monthly forecasted average capacity reserves at domestic power plants during the daily peak loads of the domestic demand on the working days,

i) monthly forecasted average capacity reserves of TSO during the daily peak loads of the domestic demand on the working days,

j) plan of outages of the elements of the meshed network,

k) the minimum required and maximum potential number of generating units in individual nodes throughout the period covered by the plan,

l) planned cross-border exchange constraints throughout period covered by the plan.

IV.C.3.7. PKM coordination plan contains following elements for individuals days of the month:

a) the forecasted monthly available capacity of the domestic generating units divided by JWCD and nJWCD,

b) the forecasted available capacity of the domestic power plants considering the capacity losses resulting from the planned annual overhaul schedules of JWCD and overhaul schedules corrected in the monthly plans, notified planned capacity losses of nJWCD and the planned capacity losses resulting from the network's operating conditions during the daily peak loads of the domestic demand,

c) the forecasted available capacity of TSO considering the capacity losses resulting from the annual overhaul plans of JWCD notified by the generators, the planned capacity losses of JWCD due to the network's operating conditions and the planned load of nJWCD during the daily peak loads of the domestic demand,

d) domestic power demand during the daily peak loads of the domestic demand for the typical weather conditions forecasted for the given month,

e) forecasted determined cross-border exchange during the daily peak loads of the domestic demand resulting from the concluded agreements and the notified parallel exchange,

f) forecasted load of nJWCD during the daily peak loads of the domestic demand,

g) forecasted capacity reserves at domestic power plants during the daily peak loads of the demand,

h) forecasted TSO's capacity reserves during the daily peak loads of the demand,

i) plan of outages of elements of the meshed network,

j) minimum required and maximum potential number of generating units in individual nodes throughout the period covered by the plan,

k) planned constraints of cross-border exchange throughout the period covered by the plan.

IV.C.3.8. Contents of WPKD, PKD and BPKD coordination plans and BTHD is defined in IRiESP – Balancing of the System and Management of System Constraints.

IV.C.3.9. The rules of determining the technical capabilities of cross-border exchange are defined in the document mentioned in point II.C.4.2.

IV.C.3.10. The rules of determining the minimum required and maximum potential values of JWCD load at individual nodes are defined in point IV.C.7.

IV.C.4. Development of technical power balances in NPS

IV.C.4.1. The transmission system operator prepares the technical power balances in cycles corresponding to the preparation of PKR, PKM, WPKD, PKD, BPKD coordination plans and BTHD. TSO prepares for this purpose the forecasts of the domestic power demand and obtains the necessary data regarding the generating units and cross-border exchange.

IV.C.4.2. The transmission system operator will prepare the power demand forecasts for NPS encompassing:

a) annual forecasts for the needs of PKR coordination plans containing the average monthly values of the domestic power demand during the daily peak loads on the working days for the individual months – to 1 November of the current year for the three next years,

b) monthly forecasts for the needs of PKM coordination plans containing the values of the domestic power demand during the daily peak loads of power demand on individual days – for March by 23 February and for the other months by 25th day of the preceding month for the following month,

c) the daily forecasts for the needs of BTHD, WPKD and PKD coordination plans containing the average hourly values of the power demand for individual hours of the day – by 10:00 hours of each day for the next 9 days,

d) forecasts for the purposes of updating BPKD – on an on-going basis.

IV.C.4.3. The distribution system operators and the final customers connected to the transmission network prepare for their respective operating areas the annual power demand forecasts for the next 3 years and submit them to TSO by 1 October of the preceding year through the appropriate entity mentioned in point I.A.4.

IV.C.4.4. In relation to the planning of technical power balances performed by the TSO, the generators who have JWCD and DSO deliver to TSO the technical data necessary for planning purposes by following deadlines:

a) for the annual planning purposes – by the 1st October of the preceding year for the next 3 calendar years ,

b) for monthly planning purposes – by the 20th day of the preceding month,

c) for the daily planning purposes – by 10:00 hours of the preceding day for the next 9 days,

d) for BPKD update purposes – on an on-going basis.

IV.C.4.5. The generators who have JWCD and JWCK deliver to TSO within the scope of annual planning through the appropriate entity mentioned in point I.A.4.:

a) proposed schedule of planned outages of JWCD and in the case of JWCD connected to the coordinated 110 kV network the schedule coordinated with appropriate DSO,

b) proposed schedule of planned outages of JWCK and in the case of JWCK connected to the coordinated 110 kV network the schedule coordinated with appropriate DSO,

c) the planned average monthly values of the available capacity and dispatchable capacity of generating units for the working days for individual months.

IV.C.4.6. The generators with JWCD deliver to TSO for the purposes of planning the monthly schedule of planned outages of individual JWCD and in the case of JWCD connected to the coordinated 110 kV network the schedule of the overhauls coordinated with the appropriate DSO.

IV.C.4.7. The generators who have JWCK deliver to TSO for the purposes if monthly planning through appropriate entity mentioned in point I.A.4.:

a) the planned values of dispatchable capacity of individual JWCK during the peak loads of each day of the planned period,

b) the planned values of capacity losses for the planned repairs of individual JWCK during the peak loads of each day of the planned period and in the case of JWCK connected to the coordinated 110 kV network the planned values of the capacity losses coordinated with appropriate DSO.

IV.C.4.8. The generators who have JWCD deliver to TSO for the daily planning purposes the planned values of the capacity losses of individual JWCD for each hour of the day according to the rules defined in IRiESP – Balancing of the System and Management of System Constraints.

IV.C.4.9. The generators with JWCK connected to the transmission network deliver to TSO for the daily planning purposes the plans of dispatchable capacity and the capacity losses of individual JWCK for individual hours of the day.

IV.C.4.10. The generators with JWCK connected to the coordinated 110 kV network deliver to TSO for daily planning purposes through the appropriate entity connected to coordinated 110 kV network, the plans of dispatchable capacity, capacity losses of individual JWCK and the planned generation for each hour of the day.

IV.C.4.11. DIRE generator's operating services deliver to TSO-KDM dispatching services the current capacity losses of individual JWCD.

IV.C.4.12. DIRE generator's operating services deliver to TSO-KDM dispatching services the current corrections of the generation plan for individual JWCK connected to the transmission network for the purposes of updating the BPKD coordination plan.

IV.C.4.13. DIRE generator's operating services deliver to TSO-KDM dispatching services the current corrections of the generation plan of individual JWCK connected to the coordinated 110 kV network for the purposes of updating BPKD coordination plan.

IV.C.4.14. The distribution system operators deliver to TSO for the purposes of preparing PKR coordination plan the following data through the appropriate entity mentioned in point I.A.4.:

a) the forecasted average monthly summary available and dispatchable capacity of the generating units connected to the distribution networks other than JWCD or JWCK during the periods of daily peaks for the working days for each month of the planned period divided by: separated power plants, small thermal plants, small hydro plants, wind farms and auto-producers,

b) the planned average monthly values of non-parallel cross-border power exchange executed by network 110 kV during the periods of daily peak loads for the working days for each month of the planned period and the planned values of non-parallel electricity cross-border exchange executed through network 110 kV for each month of the planned period resulting from the concluded agreements,

c) the total forecasted average monthly power generated by the generating units other than JWCD or JWCK, for the peak load on the working days of the planned period divided by: separated power plants, small thermal power plants, small hydro plants, wind farms and industrial plant.

IV.C.4.15. Distribution system operators deliver to TSO for the purposes of preparing PKM coordination plan through the appropriate entity mentioned in point I.A.4.:

a) the forecasted summary values of dispatchable capacity of generating units connected to the distribution network other than JWCD or JWCK during the peak load of each day of the planned period divided by: separated power plants, small hydro plants, small thermal plants, wind farms and industrial power plants ,

b) planned values of non-parallel cross-border exchange executed by 110 kV network during the daily peak load of NPS load for each day of the planned period and the planned values of electricity under non-parallel cross-border exchange executed through 110 kV network for each day of the planned period resulting from the concluded agreements,

c) the total forecasted power generated by the generating units other than JWCD or JWCK during the daily peak load of each day of the planned period divided by: separated power plants, small hydropower plants, small thermal power plants, wind farms and industrial power plants.

IV.C.4.16. The distribution system operators delivers the following data to TSO for the daily planning purposes for each hour of days from *n to n+9* through the appropriate entity mentioned in point I.A.4.:

a) planned summary values of the dispatchable capacity power of generating units connected to the distribution network other than JWCD or JWCK

divided by: separated power plants, small hydro plants, small thermal power plants, wind farms and auto-producers plants,

b) planned values of the non-parallel cross-border exchange executed through 110 kV network,

c) total planned power generated by the generating units other than JWCD or JWCK divided by: separated power plants, small hydro plants, small thermal plants, wind farms and industrial power plants .

IV.C.4.17. TSO-ZDR dispatching services for the purposes of BPKD coordination plan delivers to TSO the on-going corrections of the following data for each hour of the day through TSO-ODM dispatching services:

a) planned values of maximum and minimum dispatchable capacity of individual generating units connected to the distribution network other than JWCD or JWCK divided by: separated power plants, small hydro plants, small thermal plants, wind farms and industrial power plants ,

b) planned values of the non-parallel cross-border power exchange executed through 110 kV network,

c) total planned power generated by the generating units other than JWCD or JWCK divided by: separated power plants, small hydro plants, small thermal plants, wind farms and industrial power plants .

IV.C.4.18. TSO capacity reserves calculated under individual coordination plans in relation to the demand to be covered by the domestic power plants should amount to respectively:

a) for PKR – 18%,

b) for PKM – 17%,

c) for BTHD – 14%.

IV.C.4.19. The transmission system operator programs the operation of JWCD when preparing PKD coordination plans in the manner ensuring the following requirements in regard to TSO capacity reserve for each hour of the day:

a) The summary planned TSO capacity reserve available within the time no longer than 1 hour (in the case of intervention power plants the time constraints of their operation should be considered) should amount to minimum 9% of the planned demand to be covered by the domestic power plants,

b) The planned negative capacity defined as the surplus of the total demand for the capacity to be covered by the domestic power plants over the total minimum technical capacity of JWCD planned for operation and the planned load of nJWCD power plants should amount to minimum 500 MW and should be available during the time no longer than 1 hour.

IV.C.5. **Dispatching of the capacity of generating units connected to the meshed**

network

IV.C.5.1. The transmission system operator controls centrally:

a) the generating units connected to the transmission network except for the generating units which due to technological reasons were included into JWCK under TSO decision,

b) condensing generation units of available capacity higher than 100 MW connected to the coordinated 110 kV network except for the generating units which due to technological reasons were included into JWCK under TSO decision,

c) generating units other than mentioned in point b) connected to the coordinated 110 kV network under the agreements concluded with the appropriate DSO and the generator.

The generating units mentioned in points a) through c) are hereinafter referred to as JWCD.

IV.C.5.2. The transmission system operator coordinates the operation of generating units connected to the meshed network of available capacity equal to 50 MW or higher and not listed in point IV.C.5.1. hereinafter referred to as JWCK

IV.C.5.3. The transmission system operator prepares and makes available to the concerned entities and update on the on-going basis the list of:

a) centrally controlled generating units (JWCD),

b) centrally coordinated generating units (JWCK).

IV.C.5.4. For the purposes of technical power balance in NPS the following classification of generating units other than JWCD and JWCK is defined::

a) separated power plants (thermal power plants, combined heat and power plants, hydropower plants, wind farms),

b) small wind farms,

c) small thermal power plants including combined heat and power plants,

d) small hydropower plants,

e) industrial power plants.

The transmission system operator prepares and makes available to the concerned entities and update on on-going basis the list of separated power plants.

IV.C.5.5. The transmission system operator approves the repairs schedules of JWCD and JWCK. The approved repairs schedules of JWCD and JWCK are sent to the generators and in the case of JWCD and JWCK connected to the coordinated 110 kV network through the appropriate entity mentioned in point I.A.4. to DSO by the following deadlines:

a) the annual repair schedules for the purposes of PKR coordination plans –

by 30 October of the preceding year for the next 3 years,

b) every time when the repair schedules is changed during the current year.

IV.C.5.6. The general rule is that repairs submitted to earlier plans have the priority in relation to the repairs submitted to later plans.

IV.C.5.7. The transmission system operator makes changes to repairs schedules of JWCD units if this is necessary to ensure the safe operation of the system.

IV.C.5.8. The transmission system operator plans the operation of JWCD units for the period of operating day within the scope of preparation of PKD and BPKD coordination plans according to the rules defined in IRiESP – Balancing of the System and Management of System Curtailments.

IV.C.5.9. Within the scope of central control of capacity of the generating units, TSO with the support of TSO-KDM dispatching services defines for individual JWCD units:

a) synchronization time,

b) the time of achieving the technical minimum of the generating unit,

c) the planned active power load,

d) outage time.

IV.C.5.10. TSO-KDM dispatching services at the request of DIRE generator's operating services approves the synchronization time and outage time of JWCK units connected to the transmission network.

IV.C.5.11. The transmission system operator through appropriate TSO-KDM dispatching services at the request of DIRE generator's operating services approves the synchronization time and outage time of JWCK units connected to the coordinated 110 kV network and informs DSO – ZDR about its decision.

IV.C.5.12. In order to enable the start operation of JWCD by the required deadline, TSO-KDM dispatching services orders DIRE generator's operating services to undertake preparatory activities with advance resulting from the time declared by the generator necessary for the synchronization and achievement of the adopted generation capacities.

IV.C.5.13. Immediately before the synchronization of the generating unit to the meshed network, DIRE generator's operating services are required to obtain the approval for the synchronization from the system operator, who manages the switching operations at the substation, to which the given unit is connected (appropriate dispatching services: TSO – ODM or DSO – ZDR). The same procedure applies to the outage of the generating unit.

IV.C.5.14. The synchronization of JWCD and JWCK units with the network takes place according to the operating cooperation instruction of the station, to whose substation the generating units are connected.

IV.C.5.15. TSO-KDM dispatching services provides DIRE generator's operating services for each JWCD the JWCD load plan and the operating orders in the area of:

a) start-up of JWCD,

b) outage of JWCD,

c) utilisation of secondary control,

d) utilisation of primary control,

e) utilization of ARNE system,

f) under-load operation,

g) overload operation.

IV.C.5.16. DIRE generator's operating services are required to execute orders received from TSO-KDM dispatching services and to immediately notify the identified constrains in the operation of JWCD units.

IV.C.5.17. The method and procedure of transferring of load plan and JWCD operating orders to DIRE generator's operating services and the method and procedure of submitting the data and information by DIRE generator's operating services to TSO - KDM/TSO – ODM operating services are defined by TSO. The transmission system operator also defines requirements regarding the necessary equipment, software and data transmission systems.

IV.C.5.18. In the case of the tripping of JWCD as a result of a failure at the generator's side, DIRE generator's operating services are required to inform immediately TSO – KDM dispatching services about the reasons for tripping and the expected time for re-synchronization of the generating unit. In the case of JWCD connected to the coordinated 110 kV network DIRE generator's operating services are required also to notify the appropriate DSO – ZDR operating services. The approval from TSO – KDM dispatching services is required for re-synchronization.

IV.C.5.19. In the case of tripping of JWCD as a result of the failure in the transmission network TSO-KDM dispatching services are required to immediately inform DIRE generator's operating services on the expected time for re-synchronization of the network. In the case of JWCD connected to the coordinated 110 kV network this is the requirement for the appropriate DSO – ZDR operating services. The approval from TSO-KDM dispatching services is required for re-synchronization.

IV.C.5.20. TSO-KDM dispatching services issues orders to DIRE generator's operating services regarding the activation, outage or changes to the setting parameters of primary and secondary control systems for the individual generating units envisaged for operation under this regulation.

IV.C.5.21. TSO-KDM dispatching services controls the operation of the generating units participating in the secondary control executed remotely by the control signal

from the automatic load frequency control within the scope and in the manner agreed under bilateral agreements.

IV.C.5.22. TSO-KDM dispatching services may order the operation of generating units with overload or underload of the generated power provided if this is provided by bilateral agreements or in the case of the occurrence of the conditions mentioned in point IV.C.11.4.

IV.C.5.23. DIRE generator's operating services of the generating units participating in the primary or secondary control executed remotely by the control signal from the automatic load frequency control are required to inform immediately TSO on any faults causing the limitation of the scope or parameters of the execution of these functions.

IV.C.6. Planning the operation of the meshed network

IV.C.6.1. The transmission system operator within the scope of planning of the operation of meshed network:

a) prepares the configuration of the transmission network operation and via appropriate entity mentioned in point I.A.4. approves the operating configuration of the coordinated 110 kV network meeting the conditions specified in point II.A.2.3.,

b) prepares the outage plans of the elements of the transmission network considering the repair plans of the generating units connected to the transmission network and through the appropriate entity mentioned in point I.A.4. approves the outage plans of the elements of coordinated 110 kV network,

c) prepares the special switching programs of the equipment and elements of the transmission network owned by TSO and of the elements of the transmission network owned by the entities connected to it,

d) through appropriate entity mentioned in point I.A.4 approves the special switching programs in the coordinated 110 kV network, selects the settings of automatic systems of the transmission network and delivers to DSO the settings of these automatic systems in the coordinated 110 kV network,

e) plans the levels of voltages at the nodes of the transmission network and utilisation of sources of reactive power connected to that network,

f) through appropriate entity mentioned in point I.A.4. plans the levels of voltage in nodes of coordinated 110 kV network and the utilization of the reactive power sources connected to that network considering the DSO proposals,

g) keeps the network database recording the operating conditions of the transmission network and through appropriate entity mentioned in point I.A.4. of the coordinated 110 kV network,

h) prepares and makes available to DSO through appropriate entity mentioned in point I.A.4. the models of the calculation circuits of the transmission network and the elements of coordinated 110 kV network for the characteristic seasons and times of the day necessary for the analysis of the reliability of operation,

i) prepares the procedures for preventing the occurrence of the state of power system failure and the procedures for the elimination of the state of power system failure in the transmission network and through appropriate entity mentioned in point I.A.4. in the coordinated 110 kV network.

IV.C.6.2. The transmission system operator will use the available computer programs for the performance of network analyses necessary in the process of planning the operation of the meshed network.

IV.C.6.3. The distribution system operators in the area of planning the operation of the meshed network through the appropriate entity mentioned in point I.A.4.:

a) submit the proposals of the outage plans of the elements of coordinated 110 kV network,

b) prepare the special switching programs in the coordinated 110 kV network,

c) set system automatic systems in the coordinated 110 kV network considering the data obtained from TSO,

d) prepare the proposals of the plans of the levels of voltages at the nodes of the coordinated 110 kV network and the proposals of the plans of utilization of reactive power sources connected to them,

e) keep the network database and record the cooperating conditions of the coordinated 110 kV network in the area of their operation,

f) submit the data for the construction of models of computational systems for the characteristic seasons, days and day zones.

IV.C.6.4. The generators and final customers connected to the transmission network for theirs equipment, installations and networks in the area of planning of the meshed network operation:

a) submit to TSO the proposals of outages of the elements of the network and installations,

b) prepare the proposals of special switching programs,

c) deliver data for the database recording the network operating conditions,

d) deliver data for the construction of the models of computational systems of NPS for the characteristic seasons, das and day zones.

IV.C.6.5. The following types of the plans of outages of the elements of meshed network are defined:

a) annual plan,

b) monthly plan,

c) weekly plan,

d) daily plan.

IV.C.6.6. The plan of outages of the elements of the meshed network is made available by TSO to the concerned entities by the following deadlines:

a) annual plan – by the 30th November of the preceding year for the next 3 years,

b) monthly plan – for March by the 23rd February and for the other months by the 25th day of the preceding month for the next month,

c) weekly plan – by Thursday of the preceding week including the week from Saturday 00:00 hours to Friday 24:00 hours,

d) daily plan- by 14:00 hours of the preceding day.

The daily plan can include several subsequent off days . In the scope of elements of the coordinated 110 kV network TSO makes accessible the outage plan through the entities mentioned in point I.A.4.

IV.C.6.7. In order to enable the term preparation and approval of the outage plan of elements of the meshed network the following deadlines of outage notifications are defined:

a) for annual plan- by the 1st October of the preceding year,

b) for monthly plan – by the 10th day of the preceding month,

c) for weekly plan – by Tuesday of the preceding week,

d) for daily plan – (adjustment of the weekly plan) – by 11:00 hours of the preceding day.

IV.C.6.8. The entity submitting the proposed outage of network element to TSO defines:

a) substation and element names,

b) the proposed outage date,

c) operating readiness,

d) outage type (permanent, daily),

e) description of performed works,

f) initiator of works.

IV.C.6.9. The entity notifying to TSO the outages lasting longer than 2 weeks presents the schedule of performed works. The transmission system operator has the right to require from the entity which notifies the outage to present the

detailed schedule of works also in the case of shorter outages.

IV.C.6.10. The outage schedules mentioned in point IV.C.6.9. are delivered to TSO 10 days before the planned outage of the elements of the transmission network and in the case of coordinated 110 kV network – 7 days before the planned outage through the appropriate entity mentioned in point I.A.4.

IV.C.6.11. The general principle is adopted that the outage dates approved in the long-term plans have priority in respect to the proposed outages submitted to the plans of shorter timeframe.

In the case of outages executed under the weekly and daily plans, which were not approved in the annual or monthly plans, TSO is not obligated to send a notification in five days in advance regarding dates and duration of the planned breaks in the delivery of electrical energy related to these outages at sites of delivering of the electrical energy from the transmission network..

IV.C.6.12. Planning of the operating configurations of the meshed network is performed for the following periods of time:

a) mid-term planning including network operation analyses considering new generating units and new network facilities and other expected changes to the network operating conditions and the identification of the network constraints - executed 3 years in advance in relation to the expected changes,

b) seasonal planning (winter, summer) including for the current year the analyses of network operation under extreme conditions and the selection of normal operating configurations for the summer and winter season and containing the list of network constraints – executed by the 15th October and the 15th April respectively,

c) the on-going planning including the reliability analyses of the network operation for the purposes of network operation during the operating day and the selection of its operating configurations for repair states and in the case of the occurrence of a failure, and also the identification of network constraints.

IV.C.6.13. The transmission system operator through the appropriate entity mentioned in point I.A.4 transfers to DSO by the following deadlines the information regarding the approved operating configurations of the coordinated 110 kV network:

a) normal operating conditions of the network expected for the autumn-winter season including the assessment of its reliability and the list of network constraints – by the 30th October of each year,

b) normal operating conditions of the network expected for the summer season including the assessment of its reliability and the list of network constraints – by the 20th April of each year,

c) the current guidelines regarding the network operation including descriptions of the repairs configurations and emergency systems and the method of dispatching actions preventing the occurrence of the failures and the list of network constraints - on an on-going basis following every implementation of any changes and supplements,

d) the enforced operational conditions not included in guidelines mentioned in point c) - within the scope of the daily outage planning.

IV.C.6.14. The rule of the continuous advance update of the settings including the change of network operating conditions is adopted for the system automatics in the meshed network.

IV.C.6.15. The special switching programs are prepared in the case of the need to conduct the complex switching operations in relation to the conducted network works or system tests.

IV.C.6.16. The proposed special switching programs in the meshed network are delivered to TSO for its approval by the following deadlines:

a) the special switching programs of the new elements in the transmission network and in the coordinated 110 kV network – 14 and 16 days respective before the planned switching date,

b) special switching programs of the existing elements of the transmission network and the coordinated 110 kV network – 10 and 7 days respectively before the planned switching date.

The aforementioned programs are transferred to TSO through the appropriate entity mentioned in point I.A.4. The dates mentioned in above points a) and b) do not apply to the special switching programs enforced by the failure elimination process.

IV.C.6.17. The transmission system operator submits the comments to the proposed switching programs according to point IV.C.6.16. with the following deadlines:

a) in the case of the special switching programs in the transmission network – 5 days at the latest before the planned implementation date,

b) in the case of special switching programs in the coordinated 110 kV network – 3 days at the latest before the planned implementation date.

IV.C.6.18. The transmission system operator upon receiving the version of the special switching program considering the comments submitted by TSO delivers to the submitting entity as soon as possible the preliminary consent for its implementation by the notified date. The submission of the final permission by TSO regarding the implementation of the special switching program to the interested entity takes place within the scope of the daily planning process no later than by 14:00 hours on the day preceding its implementation.

IV.C.6.19. The special switching program should contain:

a) the initial status of the switches before the implementation o the program,

b) the detailed description of switching operations according to their chronological order,

c) the operating conditions and settings of system automatics during the individual stages of the program,

d) the diagrams facilitating the assessment of the operating status of the network during the individual stages of the program,

e) the time of starting and time of expected completion of the tests,

f) the catalogue data of newly installed or replaced instruments.

IV.C.6.20. The transmission system operator plans the operating configurations of the meshed network considering the safety rules and technical conditions determining the reliability of the operation of the network according to point II.A.2.3.

IV.C.6.21. The operating configuration of the meshed network is planned in the manner ensuring the minimisation of the occurrence of network disturbances in the operation of the generating units.

IV.C.6.22. Under normal and emergency conditions the operating configurations of the substations in the transmission network and the substations in the coordinated 110 kV network are planned in order to achieve the highest possible level of reliability of the network operation subject o the following criteria:

a) symmetric division of the lines connected to the substation between the individual bus-bar systems,

b) minimisation of the power flows in the bus-bar couplings,

c) if technically possible, the utilisation of all bus-bar systems. .

IV.C.6.23. It is allowed to exclude the individual elements of the meshed network for reserve (power lines, transformers), if:

a) it is financially justified (reduction of network losses),

b) the technical conditions determining the network reliability are kept within the range mentioned in point II.A.3.,

c) the option of quick activation of an element at the order of the appropriate system operator is ensured.

IV.C.6.24. In respect to the outage of the generating units for reserve, upon agreeing with TSO it is allowed to perform the maintenance works on the unit lines provided that the time of operating readiness for the activation of the unit line is shorter than the activation time of the generating unit.

IV.C.6.25. The planned technical data regarding the elements of the meshed network

mentioned in point II.A.1.3. should be delivered by the deadlines defined by TSO and resulting from the cycles of creating the basic NPS models as mentioned in point II.A.3.2. In the case of unplanned changes to the aforementioned data they should be notified to TSO immediately. The entities responsible for the maintenance of this elements are also responsible for the fulfilment of this requirement.

IV.C.6.26. The distribution system operators register the operating conditions of the coordinated 110 kV network for the summer and winter day selected according to point IV.C.6.27., including:

a) the technical balances of active and reactive power in network nodes,

b) flows of active and reactive power.

IV.C.6.27. The transmission system operator selects the days and hours for registration of the network operating conditions and notifies DSO at least two months in advance. .

IV.C.6.28. The distribution system operators provides to TSO through appropriate entity mentioned in point I.A.4. the results of the registration of operating conditions of coordinated 110 kV networks not later than in one month from the recording day.

IV.C.7. **Identification of network constraints in the meshed network**

IV.C.7.1. The transmission system operator identifies network constraints in terms of the fulfilment of the reliability requirements as defined in point II.A.2.3.

IV.C.7.2. The transmission system operator identifies network constraints as:

a) the maximum permissible generated power and/or maximum number of generating units operating at the given node or a group of nodes,

b) the minimum required generated power and/or minimum number of generating units operating at the given node or a group of nodes,

c) the planned transmission constraints in the identified network cross-sections sections. including the cross-border transmission constraints.

IV.C.7.3. The identification of network constraints necessary for the preparation of the network constraints plans mentioned in point IV.C.7.2. is carried out by TSO based on network analyses considering:

a) the outage plan of meshed network elements developed according to the rules specified in point IV.C.6.,

b) the repairs plan of JWCD and JWCK,

c) the requirements regarding the quality and reliability of operation of meshed network contained in point II.A.2.

IV.C.7.4. Network analyses for the purpose of identification of network constraints in the coordination plans are executed by TSO with the support of available

analytical programs and based on the most current mathematical models of NPS.

IV.C.7.5. The network constraints are identified during cycles matching the coordination plans and are made accessible within the scope of the coordination plans.

IV.C.8. **Switching operations in the meshed network**

IV.C.8.1. Switching operations in the meshed network are performed in substations.

IV.C.8.2. The switching operations include changes to the operating conditions of all disconnectors, breakers, load-switchers disconnectors and these earthing switches, which are located in the feeder bays behind the line disconnector looking from the side of the substation bars.

IV.C.8.3. The switching operations in the meshed network are administered by the dispatching services authorized by the appropriate system operator, the switching operations are carried out by the operating personnel of the substation authorized by the owner. At the substations equipped with the remote control systems the switching operations can be carried out by the dispatching services authorized by the appropriate system operator.

IV.C.8.4. The management of switching operations by the dispatching services concerns the submission of the clear order regarding the scope, sequence and time of performing the switching operations to the operating services authorised to perform the switching operations.

IV.C.8.5. The switching operations at the power facilities which are in operation or in reserve can be carried out exclusively at the order or upon the permission of the dispatching services authorized by the appropriate system operator.

IV.C.8.6. The switching operations at the switchgear are carried out by the authorized operating services authorized by the owner. This personnel includes substation operation engineers, power emergency personnel, other individuals authorized by the owner to perform the switching operations. The operating services of the substation performs the ordered switching operations according to the detailed maintenance instruction of the substation prepared by the owner considering the power range of dispatching services as defined in the Instruction of Cooperation of Dispatching Services in the field of substation operation.

IV.C.8.7. At transmission network switchgears the switching operations are managed by TSO – KDM/TSO – ODM dispatching services. In the bays of the unit feeders and unit transformers of the power plant, upon obtaining the direct permission of TSO – ODM dispatching services, DIRE generator's operating services in coordination with the substation operating services will perform remotely the switching operations or will order their permanence by the substation's operating personnel.

IV.C.8.8. At switchgears of coordinated 110 kV network the switching operations are managed by DSO – ZDR dispatching services. The scope and time of performing these switching operations requires each time the permission of TSO – ODM dispatching services. In the bays of unit feeders and unit transformers of the power plant, upon obtaining the direct consent of DSO - ZDR dispatching services, DIRE generator's operating services in coordination with the substation operating services will perform remotely the switching operations or will order their permanence by the substation's operating personnel.

IV.C.8.9. In 110 kV bays of EHV/110 kV transformers the orders to perform the switching operations are issued by TSO-ODM dispatching services upon obtaining each time the permission of DSO-ZDR dispatching services unless the substation operating instruction stipulates differently.

IV.C.8.10. The authorized operating services may perform the switching operations at the substation without TSO or DSO consent only in the case of a risk to life or a risk of a equipment damage. The aforementioned operating services must immediately notify the appropriate system operator about the performance of switching operations.

IV.C.8.11. The transmission system operator jointly with the appropriate DSO and other entities, whose equipment is connected to EHV/110 kV switchgear, prepares the instruction of cooperation of dispatching and operating services in respect to substation operation. The developed instruction of the cooperation of dispatching and operating services is must be approved by TSO.

DSO is responsible for the development and approval of instructions determining competences of dispatching and operating services in respect to the operation of the substation of the upper voltage 110 kV, to which the equipment of other entities is connected.

IV.C.8.12. The meshed network operating configurations as a result of the conducted switching operations should meet the technical conditions determining the reliability as mentioned in point II.A.2.3. The short-term departures from the technical conditions determining the reliability are allowed for the temporary configurations of switchgears as a result of the sequence of switching operations.

IV.C.8.13. The order to perform the switching operations causing the feeding of voltage to the equipment of the generator, other operator, end customer or causing the activation of system element under load requires earlier coordination with the authorized dispatching services of the concerned entity.

IV.C.8.14. Prior to issuing consent for energizing or load activation of the network element to the transmission network, TSO should obtain the statement from the appropriate entity on the readiness for energizing or load activation. In the case of new or modernised elements such statement must be in written form.

IV.C.9. Control actions in the meshed network

IV.C.9.1. The control activities in the meshed network include:

a) power and frequency control,

b) voltage control.

IV.C.9.2. The Polish Power System operates synchronously with the transmission systems of the operators associated in UCTE and the requirements regarding the primary and secondary control and accuracy of keeping the balance of the agreed cross-border power transfer defined in UCTE Operation Handbook apply in that system in respect to the control of power and frequency. TSO is responsible for the fulfilment of the requirements in respect to the control of frequency and maintenance of the capacity of cross-border exchange.

IV.C.9.3. In the performance of power and frequency control TSO uses:

a) the primary control reserve,

b) the secondary control reserve.

IV.C.9.4. The transmission system operator will ensure the execution of the technical requirements of UCTE regarding the control through:

a) provision of access to the required range of primary and secondary control reserves,

b) provision of parameters of the primary and secondary control,

c) maintenance of the central power and frequency controller.

IV.C.9.5. The minimum level of the required primary control reserve is defined annually within UCTE for all systems within UCTE according to the rules defined in UCTE Operation Handbook.

IV.C.9.6. The beginning of operation of primary control should take place a few seconds from the time of the occurrence of a disturbance, while up to 50% of the control power band should be activated within maximum 15 seconds and from 50% to 100% of the power band should be activated under linearly increasing time of maximum 30 seconds.

IV.C.9.7. The minimum level of the required secondary control reserve results from the rules defined in UCTE Operation Handbook and considers all current possibilities of restoring this reserve by issuing the order by TSO to change the base load of the generating units.

IV.C.9.8. The activation time of the full range of secondary control may not be longer than 15 minutes.

IV.C.9.9. The transmission system operator will define the type, category and scope of equipment necessary for the performance of the automatic control of exchange power and frequency, including:

a) type and parameters of the central power and frequency controller for exchange purposes and its operation algorithm,

b) the type and parameters of the applied communication measures,

c) the structure, operation algorithm and settings of the automatic systems in the facilities,

d) the measures used for the inspection of control discipline.

IV.C.9.10. The transmission system operator provides the central instruments, communication means for the facility instruments and the algorithms and software necessary for the automatic control of exchange frequency and power.

IV.C.9.11. The central frequency and power exchange controller operates based on the measurements of the frequency and active power in the agreed measurement points on cross-border lines. These measurements are taken in 1-2 s cycle.

IV.C.9.12. The central controller minimises the level of the control error set in the following manner:

$$E = \Delta P + k \cdot \Delta f$$

where:

ΔP - difference between set and actual cross-border power transfer within the controlled cross-section,

k - power equivalent of frequency equal to the ratio of overbalance or deficit of power in the controlled area to the difference of frequency Δf resulting from changes of this power,

Δf - difference between set and actual frequency of NPS.

IV.C.9.13. The control signals from the central controller are transmitted to the generating units participating in the secondary control.

IV.C.9.14. ARCM central controller as the automatic system for frequency and voltage control is used for the activation of the secondary control band of the generating units cooperating with that controller. Under emergency conditions of system operation and in the case of failures of tele-information systems of TSO it can be also used to set the base load for these generating units.

Within the scope of the central automatic frequency and power control system the secondary control is carried out by the generating units of the thermal power plants responding to the change of signal Y_1 and the generating units of hydropower plants responding to the change of signal Y_{1s}. The base load can be only set by the generating units of the thermal power plants responding to the change of signal Y_0. TSO decides on the introduction of the base load set function with the support of signal Y_0.

IV.C.9.15. The detailed description of the control signals set by ARCM controller:

a) signal Y_1 is a digital fast-variable signal with change range (–31...0...+31). The frequency of the changes of signal Y_1 depends on the value of the calculated area control error and on the value of signal Y_{1s}. The limitation of the most frequent change of that signal is 1 degree per 10 s,

b) signal Y_{1i} is the interventional change of signal Y_1 by TSO-KDM dispatching services. The change of the signal concerns the step-change of the signal by the value set by TSO-KDM dispatching services in the range from 2 to 40 degrees and is used by it in the case of the immediate need to change the total power generated by NPS within the time not exceeding 1 minute,

c) signal Y_{1s} is a digital fast-variable signal with change range (–31...0...+31). The frequency and level of changes of this signal depends on the level and rate of changes of the calculated area control error of NPS. The limitation of the most frequent change of this signal is 1 degree per 7 s,

d) signal Y_0 is a digital slow-variable signal with the change range (0...+31). The frequency of the changes of signal Y_0 depends on the value of the NPS area control error and on the value of signal Y_1.

IV.C.9.16. The set frequency for the central controller is 50.00 Hz. When the difference between the astronomical time and the synchronous time exceeds the set value, the synchronous time is adjusted according to the rules binding at UCTE.

IV.C.9.17. The generators, whose generating units are technically adapted to operation under primary control are required (at TSO order) to participate in the primary control, while:

a) the primary control for the generating units that do not have the option of setting the dead zone is activated by activating at TSO order of the control path of power adjustment from the frequency,

b) the primary control for the generating units capable of setting the dead zone is activated by setting the appropriate dead zone at the level defined by TSO with the permanently activated control path of the power adjustment from the frequency,

c) the electricity producers are required to maintain the settings of primary control according to TSO order,

d) the generators are obligated to inform about every change of the operating parameters of primary control.

IV.C.9.18. The generators, whose generating units are anticipated to participate in the secondary control provides:

a) the activation and outage of the secondary control system exclusively at TSO order,

b) retaining of the secondary control range as coordinated with TSO,

c) notification about every change of the operating parameters of secondary control circuit.

IV.C.9.19. The transmission system operator in cooperation with the entities mentioned in point IV.C.9.23 controls the voltages and reactive power flows in the meshed network for:

a) retaining of the voltages at the network nodes within the limits admissible for network equipment as defined in point II.A.3,

b) assurance of stability of NPS,

c) keeping of agreements between TSOs in respect to the cross-border power transfer of reactive power on the tie-lines,

d) realization electricity transmission with the lowest possible energy and power losses,

e) retaining the voltage at 110 kV switchgears at the level proposed by appropriate DSO provided it is not in conflict with the binding technical conditions determining the reliability of network operation as defined in point II.A.3.

IV.C.9.20. Voltage control and control of flow of reactive power encompasses the following preparatory actions:

a) determination of the voltage levels and creation of the reactive power utilisation plans and other elements of control in the meshed network followed by its operational execution by the operating services,

b) development of the operating procedure in respect to emergency voltage situations,

c) keeping the databases on the primary devices and control systems used for the control of voltage and reactive power,

and operating actions according to the needs of the proper operation of the power system:

d) setting voltages at network nodes,

e) setting reactive power loads of generating units (JWCD, JWCK),

f) issuing the orders in respect to the required operating mode of the automatic voltage and reactive power control systems for individual network nodes,

g) issuing orders in respect to the activation and deactivation of the static reactive power sources (reactors and capacitors) installed in NPS.

IV.C.9.21. Primary devices used for voltage and reactive power control in meshed network are as follows:

a) generating units,

b) synchronous compensators,

c) static compensators,

d) shunt reactors,

e) capacitor banks,

f) transformers with the option of taps control under load.

IV.C.9.22. The following primary automatic control systems are used for the control of voltage and reactive power flows in meshed network:

a) automatic voltage control systems based on generating units,

b) automatic voltage control systems based on transformers.

IV.C.9.23. The entities cooperating with TSO in the area of control of voltage and reactive power in the meshed network include:

a) producers of electrical energy are obligated according to point II.B.3.3.1.1. to possess voltage control systems adapted to work with ARNE systems,

b) other domestic producers of electrical energy,

c) distribution system operators,

d) final customers connected to the meshed network.

IV.C.9.24. The transmission system operator controls the voltage and reactive power in the meshed network according to point IV.C.9.19. with the support of the voltage control devices mentioned in point IV.C.9.21. and IV.C.9.22. TSO-ODM dispatching services issues for this purpose the appropriate orders to the dispatching and operating services of the entities mentioned in point IV.C.9.23.

IV.C.9.25. The entities mentioned in point IV.C.9.23. are required to coordinate with TSO for the period no shorter than one year the technical capabilities and conditions of using devices for control of voltage and reactive power.

The subject of such coordination concerns specifically:

a) permitted operating range of the generating units,

b) the type and settings of parameters of generating units excitation circuits including the parameters of the systems stabilizers,

c) the method of using ARNE systems,

d) the control range of transformer ratio,

e) the method of using ARST circuits,

f) the technical parameters and location of synchronous and static compensators, reactors and capacitor banks.

IV.C.9.26. The entities mentioned in point IV.C.9.23. inform immediately TSO on changes to technical parameters of the equipment for the control of voltage and reactive power mentioned in point IV.C.9.21. and IV.C.9.22.

IV.C.10. Shedding of load and curtailments in power supply and consumption

IV.C.10.1. Limitations in power supply and consumption are one of the components enabling TSO to ensure the security of NPS operation.

IV.C.10.2. The two modes of introducing limitations in power supply and consumption have been adopted:

a) the normal mode defined in point IV.C.10.4.,

b) the emergency mode defined in point IV.C.10.17. through IV.C.10.26.

IV.C.10.3. Limitations in power supply and consumption are introduced according to the normal mode upon exhausting by TSO and DSO of all possible measures of satisfying the customers' demand for the electrical energy and upon ensuring the maximum supply from the available sources.

IV.C.10.4. The Council of Ministers according to the provisions of the Energy Law act (normal mode) will implement under a regulation at the request of the minister competent for economy limitations in power supply and consumption for the determined period of time in the territory of the entire country or its part, in the case of the possibility of occurrence of:

a) a risk to energy security of the Republic of Poland concerning the long-term imbalance on the fuel-energy market,

b) a risk to the safety of people,

c) a risk of the occurrence of substantial material losses.

IV.C.10.5. The request mentioned in point IV.C.10.4. is prepared by the competent minister for the economy at its/her own initiative or based on TSO notification.

IV.C.10.6. The notification mentioned in point IV.C.10.5. should be delivered by TSO to the competent minister for the economy by the deadline enabling the prevention of the risks listed in point IV.C.10.4.

IV.C.10.7. Limitations in power supply and consumption introduced under the normal mode can apply to the customers with contractual capacity higher than 300 kW.

IV.C.10.8. The transmission system operator in cooperation with DSO prepares plans of implementing limitations in power supply and consumption in the case of the occurrence of circumstances mentioned in point IV.C.10.4. Limitations in power supply and consumption may not cause a risk to the safety of people and damage or destruct the technological facilities and disturb the operation of the facilities dedicated to the performance of the tasks in the area of state

defence or security, health care, telecommunication and education.

IV.C.10.9. The allocation of the amount of permitted consumption of electrical energy under individual degrees of electricity supply to the customers mentioned in point IV.C.10.7. should be defined in the agreements concluded with these customers.

IV.C.10.10. The plans mentioned in point IV.C.10.8. apply for the period from 1st of September of the given year to the 31st of August of the next year and require:

a) coordination with the President of the Energy Regulatory Office in the case of the plans developed by TSO,

b) coordination with TSO in the case of plans developed by DSO,

c) annual update by the 31st August.

IV.C.10.11. The transmission system operator develops procedures of implementing under the normal mode limitations in power supply and consumption by the customers connected to the transmission network, which defines:

a) the method of notification of customers,

b) the appropriate dispatching services authorized to transfer orders.

IV.C.10.12. The transmission system operator notifies customers connected to the transmission network on the plans and procedures of implementing limitations in power supply and consumption under the normal mode.

IV.C.10.13. The transmission system operator sends reports to customers connected to the transmission network on the implementation of limitations in power supply and consumption under normal mode in according to the rules defined in the executive act to the Energy Law act.

IV.C.10.14. Customers included in plans for limitations in power supply and consumption execute dispatching orders.

IV.C.10.15. The provisions of point IV.C.10.11. through IV.C.10.14. applies to DSO and the customers included in plans for limitations in power supply and consumption, which are connected to the distribution network.

IV.C.10.16. Customers covered by the plans for limitations in power supply and consumption record during limitation period:

a) the ordered with power supply degrees,

b) amount of power consumption under individual power supply degrees.

IV.C.10.17. Emergency disconnections of customers should be executed within 1 hour from the time of issuing the order by shutting down the lines and medium voltage stations. The nine-level scale of emergency shutdowns is adopted (from A1 to A9). The A1-A9 levels should provide for the uniform decrease of power consumption. The emergency outage under A9 level should ensure the decrease of power consumption by 15%.

IV.C.10.18. The catastrophic disconnections of the customers should be executed within 30 minutes through the shutdowns of the lines of rated voltage 110 kV and 110 kV/MHV transformers. The three-level scale of catastrophic shutdowns is adopted (SK1 to SK3). The SK1-SK3 levels should ensure the uniform decrease of power consumption. The SK3 catastrophic shutdown should provide for the decrease of power consumption by 15 %.

IV.C.10.20.A. The total introduction of limitations under the emergency mode under A9 and SK3 level should ensure the reduction of power consumption by 30% irrespective of limitations curtailments implemented under the normal mode.

IV.C.10.19. The transmission system operator in coordination with DSO defines annually for each month, for morning and evening periods, values of consumption reduction in the distribution system under individual levels of the emergency and catastrophic shutdowns.

IV.C.10.20. The transmission system operator defines the changes to the values of the shutdown capacities by the automatic SCO systems divided into individual DSOs by the 31st March of each year. The power values are calculated for individual SCO levels in respect to the peak load of NPS. The individual SCO levels are defined for the frequency range between the upper value of 49 Hz and bottom value of 47.5 Hz. Devices and installations of the customers connected to the network of rated voltage 6 kV or higher should be equipped with the SCO automatic protection circuits. The distribution system operators should ensure the option of shutting down the power at the level of at least 50% of the peak demand by the automatic SCO circuits.

IV.C.10.21. The distribution system operators execute the requirements stipulated in point IV.C.10.22. by the 30th September of each year according to the rule of the potentially uniform distribution of power in the network.

IV.C.10.22. The transmission system operator prepares plans of shutdowns by SCO automatic circuits in relation to the customers connected directly to the transmission network and DSO in relation to the customers connected to the distribution network of rated voltage 6 kV or higher. The customers deliver to the appropriate system operator the information on the installed SCO automatic circuits and the settings. The distribution system operator delivers to TSO the information on the installed SCO automatic circuits and the settings for its network area.

IV.C.10.23. The transmission system operator in relation to the customer connected directly to the transmission network and DSO in relation to the customers connected to the distribution network of rated voltage higher than 6 kV can inspect the status of the execution of the requirements regarding SCO automatic circuits and in the case of the activation of SCO automatic circuits – the determination of the reason and scope.

IV.C.10.24. The transmission system operator carries out the clarification proceedings and prepares the protocol determining the reasons of introducing under emergency

mode limitations in power supply and consumption and their duration.

IV.C.11. **System operation monitoring, prevention and elimination of network and system disturbances.**

IV.C.11.1. The dispatching services of system operators and the operating services of the electrical energy producers and final customers connected to the meshed network according to the scope of tasks defined in point IV.C.2. continuously monitors the operation of NPS with the support of SCADA systems. The scope of the data and signals collected continuously from the meshed network is described in point IV.C.12.

IV.C.11.2. The dispatching services within the scope of their actions use the available technical and organisational measures defined in IRiESP for the purpose of satisfying the needs of the customers regarding electrical energy supply and ensures the required quality and reliability of operation of the meshed network as defined in point II.A.2.

IV.C.11.3. The system operators are required to ensure the continuous operation and required reliability of SCADA systems.

IV.C.11.4. The basic operating conditions of the system requiring the intervention of the dispatching services and operating services are as follows:

a) system failure,

b) network failure,

c) emergency state of NPS.

The Force Majeure can be one of the reasons of the occurrence of one of the aforementioned conditions.

IV.C.11.5. In the case of occurrence of the conditions mentioned in point IV.C.11.4., TSO in cooperation with the entities listed in item IV.C.11.6. undertakes the necessary actions. These actions are aimed to restore the normal operating conditions of the network.

IV.C.11.6. The entities cooperating with TSO in undertaking the actions necessary for the restoration of the required quality and reliability of the meshed network operation are as follows:

a) distribution system operators,

b) electrical energy producers with JWCD and JWCK,

c) other electrical energy producers if their participation is necessary for the efficient elimination of the conditions mentioned in point IV.C.11.4.,

d) final customers if their participation is necessary for the efficient elimination of the conditions mentioned in point IV.C.11.4.

IV.C.11.7. The disconnection of the generating units from the meshed network is allowed to enable the energy producer to protect its devices and participate in the

process of NPS restoration unless the agreement between electrical energy producer and TSO stipulates otherwise, especially when the following occurs:

a) decrease of frequency in NPS below 47.5 Hz, with the time delay agreed with TSO,

b) the decrease of the voltage on the upper side of unit transformer below 80% of the rated voltage, with the time delay agreed with TSO,

c) loss of stability of cooperation with NPS.

IV.C.11.8. Electrical energy producers with generating units are connected to the meshed network are required to prepare and deliver to TSO for each of their power plants or combined heat and power plants, the action plan in the case of losing the connection with NPS or complete voltage collapse in NPS and to adapt their devices and auxiliary drives to continue operation by at least one generating unit under the conditions of the loss of connection with NPS or complete voltage collapse in NPS in accordance with the developed plan.

IV.C.11.9. The transmission system operator develops and on on-going basis update the general defence plan and restoration of NPS considering the following assumptions:

a) at least one of the variants of the restoration plan assumes the lack of option of feeding the voltage and start-up power from the neighbouring power systems,

b) the priority of supplying the electrical energy producers should be given during NPS restoration,

c) restoration plans should ensure as quick as possible of restoration of NPS.

IV.C.11.10. The general NPS defence and restoration plan encompasses, inter alia, the following elements:

a) scheme of automatic actions in the case of the frequency drop in NPS,

b) scheme of automatic actions in the case of increase of frequency in NPS,

c) the plan of introduction of limitations of delivery and consumption of electrical energy which must be agreed with the President of the Energy Regulatory Office,

d) implementation of limitations plan under the emergency mode in accordance with the rules defined in point IV.C.10.17. through IV.C.10.26.,

e) the dispatching operating procedure during the catastrophic failures and restoration of NPS such as the instructions of start-up of shutdown generating units with the use of the generating units ready for automatic start-up, the island operation plans of the generating units mentioned in point IV.C.11.6. b) and c) prepared in cooperation with the electrical energy producer and the appropriate DSO,

f) the area defence and restoration plans.

IV.C.11.11. The detailed dispatching procedures mentioned in point IV.C.11.10. e) include:

a) the division of competences of individual dispatching service level,

b) the emergency network operating plans developed according to rules presented in point IV.C.6.,

c) the list of operational events performed during the individual stages of NPS restoration,

d) technical data necessary for the restoration of NPS,

e) the mode and method of exchanging the information and dispatching orders including the application of special procedures.

These procedures are subject to coordination with appropriate DSO, electrical energy producers and final customers.

IV.C.11.12. The distribution system operators prepares in coordination with TSO and update on an on-going basis the dispatching procedures for the period of restoration of power supply of their parts of NPS encompassing the distribution networks and the entities connected to them, containing inter alia:

a) the division of competences of individual levels of dispatching services,

b) the emergency network operation plans prepared according to rules presented in point IV.C.6.,

c) the list of operational events performed during the individual stages of NPS restoration,

d) technical data necessary for the restoration of NPS,

e) the mode and method of exchanging the information and dispatching orders including the application of special procedures.

IV.C.11.13. The customers mentioned in point IV.C.11.6. d) develops the necessary operating procedures in the case of the occurrence of the conditions mentioned in point IV.C.11.4. The operating procedures should be coordinated with the appropriate system operators.

IV.C.11.14. The transmission system operator in cooperation with DSO eliminates the conditions mentioned in point IV.C.11.4. TSO and DSO (if possible and purposeful) uses developed elements of the general defence and restoration plan mentioned in point IV.C.11.10. c) through f) in the course of elimination of the conditions mentioned in point IV.C.11.4.

The transmission system operator provides the DSO within the scope corresponding to their operating area with the general NPS defence and restoration plan through the appropriate entity mentioned in point I.A.4.

IV.C.11.15. In the case of the occurrence of the system operating conditions mentioned in point IV.C.11.4., the division of competences of the dispatching services mentioned in point IV.C.2. remains unchanged unless the dispatching procedures listed in point IV.C.11.12. stipulate otherwise.

IV.C.11.16. If the state defined in point IV.C.11.4. or the envisaged procedure of eliminating these states constitute a risk to system users not included in elimination procedure, TSO or DSO notifies such system users and provide necessary information on a risk and the methods of preventing the spreading of the NPS operating conditions mentioned in point IV.C.11.4.

IV.C.11.17. Within the scope of the process of eliminating the conditions defined in point IV.C.11.4. TSO may implement limitations of delivery and consumption of electrical energy under emergency mode in accordance with the procedure defined in point IV.C.11.13.

IV.C.11.18. The entities mentioned in point IV.C.11.6. organise and maintain the dispatching communication system necessary for the elimination of the conditions defined in point IV.C.11.4. The dispatching communication system provides for recording the information exchange.

IV.C.11.19. The entities mentioned in point IV.C.11.6. hold the regular employees training in the area of the execution of the tasks resulting from the execution of the procedures mentioned in point IV.C.11.12. through IV.C.11.14.

IV.C.11.20. The entities mentioned in point IV.C.11.6. are required to install the receiving and transmitting devices of dispatching communication system necessary for the elimination of the conditions mentioned in point IV.C.11.4.

IV.C.11.21. In the case of the occurrence of the system or network disturbance the commission is established, which determines the course of the disturbance and its reasons and proposes the actions preventing the occurrence of the similar disturbance in the future. The representatives of the entities mentioned in point IV.C.11.6. and the entities affected by the disturbance will participate in the works of this commission.

IV.C.11.22. TSO appoints the commission mentioned in point IV.C.11.22. in the case of the occurrence of system or network failure in the transmission network. In the case of the network failure in the coordinated 110 kV network the commission is appointed by appropriate DSO in coordination with TSO.

IV.C.11.23. The transmission system operator is entitled to participate in the works of the commissions appointed by DSO or the entities connected to the meshed network.

IV.C.12. Remote acquisition of metering data

IV.C.12.1. Requirements regarding the remote acquisition of metering data

IV.C.12.1.1. The transmission system operator provides for the on-line acquisition of the data mentioned in point IV.C.12.2.1. and IV.C.12.2.2. necessary for the monitoring of the operation of the switchgears and 750, 400, 220 and 110 kV bays held by it.

IV.C.12.1.2. The distribution system operator provides for the on-line acquisition of the data mentioned in point IV.C.12.2.1. and IV.C.12.2.2. necessary for the monitoring of the operation of its 110 kV switchgears.

The transition period till the 31st December 2008 is applied in order to allow for adjustment of the infrastructure for the purpose of on-line acquisition of the required scope of data.

IV.C.12.1.3. The electricity producer ensures the on-line acquisition of data mentioned in point IV.C.12.3.1. and IV.C.12.3.2. necessary for the monitoring of operation of JWCD and JWCK and its 400, 220 and 110 kV substations.

IV.C.12.1.4. The end customers connected to the meshed network provides for the on-line acquisition of data mentioned in point IV.C.12.2.1. and IV.C.12.2.2. necessary for the monitoring of the operation of their 400, 220 and 110 kV substations.

IV.C.12.1.5. The transmission system operator provides the transmission devices enabling the on-line transmission of data mentioned in point IV.C.12.2. to SCADA systems in TSO dispatch centres.

IV.C.12.1.6. The distribution system operator provides the transmission devices enabling the on-line transmission of data mentioned in point IV.C.12.2. to SCADA systems in the DSO dispatch centres and will enable their transmission to SCADA systems in TSO dispatch centres.

IV.C.12.1.7. The electrical energy producer provides the transmission devices and the communication channels enabling the on-line transmission of data mentioned in point IV.C.12.3. to SCADA systems in the appropriate TSO or DSO dispatch centres according to the standards defined by the appropriate operator.

IV.C.12.1.8. The customer mentioned in point IV.C.12.1.4. provides the transmission devices and communication channels enabling the on-line transmission of data mentioned in point IV.C.12.2. to SCADA systems at TSO and DSO dispatching centres according to the standards defined by the appropriate operator.

IV.C.12.1.9. The transmission system operator equips SCADA systems at its dispatching centres with the transmission devices enabling the exchange of data mentioned in point IV.C.12.2. through IV.C.12.3. with TSO's SCADA systems.

IV.C.12.1.10. The distribution system operator equips SCADA systems at its dispatching centres with the transmission equipment enabling the exchange of data mentioned in point IV.C.12.2. through IV.C.12.3. with TSO's SCADA

systems with the support of the protocols mentioned in point. II.B.3.10.2.2.

IV.C.12.1.11. The transmission system operator and DSO, each for its given needs provide the communication channels of parameters sufficient for the execution of the functions mentioned in point IV.C.12.1.5., IV.C.12.1.6., IV.C.12.1.9. and IV.C.12.1.10.

IV.C.12.2. **List of measurement data from the meshed network**

IV.C.12.2.1. The measurements from the meshed network include:

a) the measurement of the active and reactive power, currents and voltages from all bays of 750, 400, 220 and 110 kV substations, including specifically the following bays: 750, 400, 220 and 110 kV power lines, 750/400 kV, 400/220 kV, 400/110 kV and 220/110 kV transformers, EHV/MHV and 110/MHV transformers including the unit transformers of the generators, generating units, couplings (active and reactive power only), reactive power compensation devices (only reactive power);

b) the measurement of frequency from all sections of the bus-bar system of 750, 400 and 220 kV substations;

c) measurement of voltage from all sections of bus-bar systems of 750, 400, 220 and 110 kV substations;

d) measurement of reactive power at terminals of devices for the compensation of reactive power connected to MHV winding of transformers of the upper voltage of 400 kV or 220 kV,

e) the position of switches of taps of 750/400 kV, 400/220 kV, 400/110 kV, 220/110 kV and 220/MHV transformers;

f) position of the phase switches of 400/220 kV transformers;

g) position of taps of EHV/110, EHV/MHV and 110/MHV coupling transformers of the wind farms supplying the power directly to 400, 220 and 110 kV substations.

IV.C.12.2.2. Indication of operating condition of devices at meshed network substations includes:

a) indication of switches and disconnectors states from all bays of 750, 400, 220 and 110 kV substations, including specifically the bays mentioned in point IV.C.12.2.1. a);

b) indication of the position of earthing switches from the bays of the cross-border exchange lines at 750, 400, 220 and 110 kV substations;

c) indication of connectors states of devices for compensation of reactive power connected to MHV winding of the transformers of upper voltage of 400 or 220 kV.

IV.C.12.3. **List of measurement data acquired from power plants and wind farms**

IV.C.12.3.1. The measurements from power plants and wind farms include:

a) the measurement of active and reactive power at the generator terminals (gross) for each JWCD and JWCK connected to the network of rated voltage of 400, 220 and 110 kV,

b) the measurement of auxiliary active and reactive power for each JWCD and JWCK connected to the network of rated voltage of 400, 220 and 110 kV,

c) the measurement of active and reactive power at generator terminals (gross) and behind the unit transformer (net) for each generating unit forming a part of a separated power plant,

d) the measurement of the total value of gross active and reactive power for each power plant, in which generating units are not either JWCD or JWCK,

e) the measurement of the active and reactive power of the wind farm on the bottom side of its EHV/110, EHV/MHV or 110/MHV coupling transformer(s) for ach wind farm connected to the network of rated voltage of 400, 220 and 110 kV,

f) the voltage measurement at the generator terminals for each JWCD and JWCK connected to the network of rated voltage of 400, 220 and 110 kV,

g) voltage measurement at generator terminals for each generating unit forming part of the separated power plant,

h) voltage measurement on the bottom side EHV/110, EHV/MHV or 110/MHVSN coupling transformers of wind farms,

i) the position of tap switches of EHV/MHV unit transformers for each JWCD and JWCK with power output to 400, 220 or 110 kV substation,

j) the position of the tap switch of EHV/MHV and 110/MHV transformers, to which the generating units of separated power plants are connected,

k) determination of the average wind velocity for each territorially separated part of the wind farm connected to the network of rated voltage of 400, 220 or 110 kV,

l) measurement of water level of the bottom and upper reservoirs of the pumped storage hydropower plant and the water level of upper reservoir of other hydropower plants that have JWCD or JWCK.

IV.C.12.3.2. Indication of the operating status of devices in the substations of power plants and wind farms:

a) indication of the position of the switches and disconnectors on the generator at the voltage side for each JWCD and JWCK connected to the network of rated voltage of 400, 220 and 110 kV,

b) indication of the status of switches and disconnectors on MHV voltage side for each generating unit of separated power plants,

c) indication of the position of switches and disconnectors on medium voltage side of wind farms,

d) signalling the operating status of the generating units of pumped storage hydropower plants.

IV.C.12.4. **Data quality requirements**

IV.C.12.4.1. The measuring cores of current and voltage transformers are sources of power, voltage and frequency measurement mentioned in point IV.C.12.2.1. and IV.C.12.3.1. The accuracy of the cores may not be lower than category 0.5. The recommended accuracy category of the measuring cores at generating lines of JWCD and JWCK should be 0.2. The required accuracy of measuring cores used for ARCM is 0.2.

IV.C.12.4.2. The maximum error entered into the measurement path by the secondary circuits of the transformer may not exceed the values acceptable for the error of the transformer used.

IV.C.12.4.3. The instruments processing the data obtained from the transformers should represent the accuracy category no lower than 0.2.

IV.C.12.4.4. The instruments used for the acquisition, processing and transmission of data should ensure the update of measured data in TSO's SCADA systems in time intervals no longer than 2 s.

IV.C.12.4.5. The instruments used for the acquisition, processing and transmission of data should ensure the update of measured data in ARCM system in time intervals no longer than 1s.

IV.C.12.4.6. The transition period till the 31st December 2009 is applied in order to adapt the measurement transformers and the instruments for the acquisition, processing and transmission of measured data to the requirements defined in point IV.C.12.4.1. and IV.C.12.4.5.

IV.C.13. **Information exchange and control systems used for network operation**

IV.C.13.1. The information exchange and control of power facilities within the scope of managing NPS network operation takes place with the support of:

a) system of operational cooperation with the power plants,

b) system of monitoring of units operating parameters,

c) SCADA system,

d) ARCM central controller system.

IV.C.13.2. The technical requirements for SOWE, SCADA and SMPP systems are defined in detail in point II.B.3.9. through II.B.3.11. and technical

requirements for ARCM system in point II.B.3.3.2.1. and IV.C.9.

IV.C.13.3. The functional description of tele-information systems mentioned in point IV.C.13.1. a), b) and d) is presented in point VI.B., VI.C and VI.E. respectively.

IV.C.14. **The central register of generating units and wind farms in NPS**

IV.C.14.1. The transmission system operator keeps the central register of generating units and wind farms connected to NPS with the available power equal to 5 MW and higher, hereinafter referred to as the central register of generating units.

IV.C.14.2. The submission of the new generating units and wind farms to the central register of generating units and making the changes to the recorded data is the obligation of the electrical energy producers.

IV.C.14.3. The generators with JWCD, JWCK or wind farms with available power equal to 50 MW o higher should register the new generating units and the submit the changes to the already registered data directly to TSO with a copy to the entity mentioned in point I.A.4 appropriate for the given area.

IV.C.14.4. In the case of generators with JWCD, JWCK or wind farms with available power equal to 50 MW or higher connected to the distribution network, the electrical energy producers are required to inform the appropriate DSO on the notification to register the available and installed power or on the notification regarding the changes to the data in the central register of generating units.

IV.C.14.5. Electricity producers with generating units or wind farms of capacity under 50 MW register new generating units and changes to the registered data to TSO through the appropriate DSO. The distribution system operator delivers a copy of the notification to the entity mentioned in point I.A.4 appropriate for the given area.

IV.C.14.6. The new commissioned conventional generating units must have defined following factors: rated power, available power and technical minimum. The value of the rated power, available power and technical minimum of the generating unit is determined by the producer, while the value of the rated power results from the level of the power defined on the rating plates of the equipment being part of the given generating unit. The generating units of the wind farms must have the description of the generated active power as function of the wind velocity determined by the manufacturer.

IV.C.14.7. The values recorded by TSO for JWCD include specifically:

a) available power [MW],

b) technical minimum of the generating unit [MW],

c) primary control range [±MW],

d) secondary control range [±MW],

e) values of the acceptable current operation points for the individual control markets (BPP_{min}, n, BPP_{max}, n) [MW],

f) the maximum change of power between individual current operating points (BPP) in the updated BPKD plan [MW],

g) load increase factor [MW/min],

h) load shedding factor [MW/min],

i) start-up characteristics of the unit from the hot, warm and cold status,

j) other technical data mentioned in point II.A.1.3.5.

IV.C.14.8. The values recorded by TSO for JWCK include specifically:

a) available power [MW],

b) technical minimum of the generating unit [MW],

c) gross-net factor [-],

d) other technical data mentioned in point II.A.1.3.5.

IV.C.14.9. The available power and technical minimum of the generating unit is registered by the electrical energy producer for the period of the preliminary operation of the new JWCD and JWCK until the completion of the acceptance tests defined in point IV.C.14.10. and IV.C.14.11.based on the technical-designing documentation of the facility and the agreements subject to the procedure defined in point IV.C.14.14. In this case upon the synchronization of the generating unit the electrical energy producer is required to perform the acceptance tests defined in point IV.C.14.10. and IV.C.14.11. confirming the technical-designing values entered into the Central register of generating units for the period of time.

IV.C.14.10. The acceptance test of available power encompasses:

a) for thermal power plant – no shorter than 15 hours long operation of the unit on a basic fuel,

b) for run-off-river hydropower plant – no less than 5 hours operation of the hydro-set,

c) for pumped storage hydropower plant – the operation of the hydro-set through the period agreed with TSO dependent on the capacity of the main reservoir, however no less than 5 hours,

with the capacity declared by the generator as available power under the rated operating conditions. The test is regarded as positive if the generating unit maintains continuously the unit's capacity at the level no lower than declared, while maintaining the option -under new available power- of generating the reactive power with the rated power factor cosφ of the generator and other parameters within the range of secure operation of devices. The transmission system operator reserves the right to participate in the performed acceptance

tests of JWCK and JWCD.

IV.C.14.11. The acceptance test of technical minimum of the generating units encompasses:

a) for thermal power plant – 4 tests of 8 hour long operation of the unit, during which the thermal power plant's generating unit operates continuously, while maintaining the operating ability under primary and secondary control provided that the given unit is required to provide the second or minute reserve services,

b) for run-off-river hydropower plant and pumped storage power plant – the operation of the hydro-set through the period agreed with TSO depending on the hydrological conditions,

at the capacity no lower than the capacity declared by the generator as technical minimum of the generating unit under rated operating conditions. The test is regarded as positive if the generating unit maintains continuously during each test the unit's capacity at the level no higher than declared, while maintaining other parameters within the range of secure operation of devices. The transmission system operator reserves the right to participate in the performed acceptance tests of JWCK and JWCD.

IV.C.14.12. Acceptance tests of the available power and technical minimum of the conventional generating unit are carried out by the electricity producer with the participation of the independent professional company agreed with TSO.

IV.C.14.13. The registration of changed available power or technical minimum of JWCD or JWCK in the central register of generating units takes place according to the following procedure:

a) the electricity producer notifies in written form TSO and entity mentioned in point I.A.4 appropriate for the given area 7 days in advance about the plans of conducting the acceptance test of available power or technical minimum for JWCK and JWCD. The notification should contain the description of the conducted modernisation, which justifies the change of the available power or technical minimum of the generating unit,

b) upon the successful completion of the acceptance test defined in point IV.C.14.10. and IV.C.14.11., the generator prepares the protocol from the measurements and submits a written application to TSO with a copy to the entity appropriate for the given area as defined in point I.A.4 to enter the changes to the appropriate agreements and to update the data in the central register of generating units subject to the provisions of point IV.C.14.16.,

c) upon obtaining the protocol and submitting the application by the electricity producer to change the available power or technical minimum of the generating unit, TSO makes the appropriate changes to the central register of generating units,

d) the date of the application of the new power results from the date of annexes in the appropriate transmission agreements.

IV.C.14.14. The registration of the new available power or technical minimum of JWCD, JWCK or a wind farm of the capacity equal to 50 MW or higher in the central register of generating units takes place according to the following procedure:

a) The electricity producer submits the written application to TSO with a copy to the entity mentioned in point I.A.4. appropriate for the given area regarding the registration of the new generating unit or a wind farm for the period of preliminary operation following the completion of the investment. The application should contain the date of the planned synchronization and the power parameters of the new generating unit or w wind farm subject to the provisions of point IV.C.14.9.,

b) TSO makes the appropriate changes to the central register of generating units upon obtaining the electricity producer's application,

c) the date of the application of the new power results from the dates of the annexes to the appropriate transmission agreements. TSO informs the generator in written form about the date of accepting the new capacities for operation,

d) upon the end of the period of preliminary operation of JWCD or JWCK and completing the investment, the generator will carry out the acceptance tests mentioned in point IV.C.14.10. and IV.C.14.11.,

e) the electricity producer transfers the generating unit from the investment stage into operational stage through registration of the generating unit in the central register of generating units with the designed or amended capacity according to the procedure as for the registration of the changed available power mentioned in point IV.C.14.13.

The acceptance tests of the generation capacity are not required for the wind farms and the rated power and available power of the wind farm is registered in the central register assuming initially that it is equal to the rated power. The results of the tests mentioned in point II.B.3.3.3.10. are provided to system operator with the potential application regarding the connection of the wind farm available power.

IV.C.14.15. The acceptance for operation of a new or modernised facility control systems in the central register of generating units and the technical parameters of the generating units takes place according to the following procedure:

a) the electricity producer informs in written form TSO and the competent entity mentioned in point I.A.4. on plans of performing the facility control system tests 14 days in advance. The application should contain the description of the conducted modernisation, which justifies the changes to the parameters of the facility control systems,

b) upon the successful completion of the tests electricity producer prepares the protocol from the measurements and submits a written application to TSO with a copy to the entity appropriate for the given area as defined in point I.A.4. to enter the changes to the central register of generating units,

c) upon obtaining the protocol from the conducted tests and the application of the power plant mentioned in point b), TSO makes the appropriate changes to the central register of generating units,

d) the transmission system operator informs in written form the generator on the date of accepting the new parameters of the facility control systems for operation.

IV.C.14.16. Following the increase of the available power or the reduction of the technical minimum of JWCD, the electricity producer is required to adjust the unit's control range (primary and secondary control) to the levels resulting from the new values of the power within 1 month from the date of conducting the acceptance tests of the available power or technical minimum of the generating unit. Upon obtaining the positive result of the acceptance tests of the control systems, the changes resulting from the increase of the available power or decrease of technical minimum of the unit will be implemented under an annex to the transmission agreement and the agreement regarding the provision of control system services.

IV.C.14.17. The electricity producer is entitled to access the data contained in the central register of generating units insofar as it refers to the data regarding its own generating units.

CHAPTER V. INFORMATION EXCHANGE BETWEEN THE TRANSMISSION SYSTEM OPERATOR AND SYSTEM USERS AND CUSTOMERS

V.A. Forms of information exchange

V.A.1. The information exchange between TSO and system users and customers can take place:

a) via tele-information systems,

b) by phone,

c) electronically,

d) by fax,

e) by mail,

f) by publishing it on a website.

The application of the aforementioned forms for the specific information is defined by TSO.

V.A.2. The TELE-INFORMATIONsystems used for the collection, transmission and exchange of information mentioned in point V.A.1. a) include:

a) market information exchange system,

b) system for operating cooperation with power plants,

c) system for monitoring the operating parameters of the units,

d) central metering-settlement system.

The architecture and functions of the aforementioned tele-information systems are defined in detail in point VI.A. through VI.D.

V.A.3. The requirements regarding protocols and standards used by tele-information systems mentioned in point V.A.2 a) are presented in detail in:

a) WIRE system – item II.B.3.8.2.,

b) SOWE system – item II.B.3.9.2.,

c) SMPP system – item II.B.3.11.2.

V.A.4. In the case of a failure of tele-information systems, TSO undertakes the following actions in the area of information exchange:

a) informs as soon as possible the interested entities on the failure,

b) informs of the conditions binding during a failure,

c) informs of the progress of the situation.

V.A.5. In the case of system disturbances, TSO informs of the forms and procedures of transmitting the information that have direct or indirect impact on the correct and safe operation of NPS.

V.A.6. Information mentioned in point V.A.5. can be provided by mail, electronically, by fax or by phone.

V.A.7. The electronic exchange of information can be executed via electronic mail in the form of brief notes, messages or text files and in the form of directly transmitted text files or other electronic documents.

V.A.8. Information transmitted in the form mentioned in point V.A.6. and V.A.7. should be authorized by the authorized individuals, who are included in the lists of authorized individuals according to point IV.C.2.15.

V.B. Scope of information published by the transmission system operator

V.B.1. The transmission system operator publishes IRiESP on its website.

V.B.2. The transmission system operator publishes on its website and update on the on-going basis the information on its organisational structure. This information concerns specifically:

a) organisational diagram,

b) the scope of tasks executed by the individual organisational units,

c) telecommunication and address data.

V.B.3. TSO publishes on its website the applications templates for the determination of the connection conditions.

V.B.4. Within the scope regarding the operation of NPS, TSO publishes on its website the monthly and annual reports summarising the operation of NPS during individual months and years.

V.B.5. In respect to the balancing of NPS, TSO publishes on its website:

a) the aggregated reports regarding PKR coordination plans – annually by 31 December of the given year,

b) the aggregated reports regarding PKM coordination plans – monthly by the last day of the previous month,

c) hourly prices and amounts of electrical energy on the balancing market on day n – at the latest on day $n+2$.

V.B.6. In respect to cross-border power transfer, TSO publishes on its website:

a) application templates for the participation in the cross-border power transfer and the forms of documents required by TSO,

b) application template for assignment of EIC identification code including the list of EIC codes assigned by the Polish EIC Code Office,

c) the rules of determining the transmission capacities of the cross-border lines,

d) the rules for coordinated auctions of transmission capacity at the common borders,

e) the levels of the technical transmission capacities (TTC/NTC) of the cross-border power transfer,

f) information on the results of the coordinated auctions of transmission capacity at the common borders,

g) the telecommunication and address data of the Polish EIC Code Office.

V.B.7. In respect to the provision of transmission services by TSO, TSO publishes on its website:

a) standards for Transmission Agreements,

b) application template for the conclusion of Transmission Agreement.

V.B.8. The transmission system operator publishes on its website the development plan in the version coordinated with the President of the Energy Regulatory Office considering the provisions of point III.D.6.

V.B.9. TSO publishes on its website the following information in respect to the tele-information systems:

a) the security requirements for data transmission systems SOWE/(ODM, EL), WIRE/UR.

b) technical standards of WIRE system.

c) technical standards of SOWE system.

V.B.10. The transmission system operator publishes on its website rules of codification of generation units and the address, to which the applications for the certificate of origin should be submitted.

V.C. Information protection

V.C.1. In respect to information received from system users and the customers and information regarding the agreements concluded with these entities, TSO is required to observe the regulations on the protection of non-public

information and other information protected by law.

V.C.2. Information mentioned in point V.C.1. can be used by TSO exclusively for the purpose of executing its duties resulting from the agreement concluded with system user or a customer and for the purpose of executing the tasks of TSO as defined in the Energy Law act, the executive acts, and IRiESP in the manner excluding the option of causing a risk or infringement of interests of system user or a customer.

V.C.3. The obligation of keeping in secrecy information obtained from individual system users or customers continues after the termination of the agreement concluded between TSO and such system user or customer, however no longer than 5 years from the date of its expiry or termination.

V.C.4. The aforementioned confidentiality provisions does not prevent TSO from disclosing information to the consultants and subcontractors acting for and on behalf of TSO in the execution of the tasks defined by the provisions of the Energy Law act, executive acts and IRiESP reserving the requirements stipulated in point V.C.5. and from disclosing commonly known information or information, whose disclosure is required pursuant to the applicable legal regulations or when the system user or a customer granted the consent for such disclosure in writing. The transmission system operator is also entitled to disclose information acting for the purpose of complying with the provisions of IRiESP, the requirements of regulatory authorities, in relation to the pending court proceedings or proceedings handled by the regulatory authorities.

V.C.5. The transmission system operator ensures that all entities, which will participate for and on its behalf in the execution of the tasks defined in the provisions of Energy Law act, executive acts and IRiESP will be required to keep in secrecy information mentioned in point V.C.1.

V.C.6. The obligations of TSO employees in respect to protection of information obtained from system users and customers and information regarding agreements concluded with these entities are defined in the Compliance Program prepared and executed by TSO.

V.C.7. The provisions of point V.C.1. through V.C.5. applies to system users and customers in scope of the information protection obtained from TSO and also in respect to the information regarding the agreements concluded with TSO.

CHAPTER VI. TELE-INFORMATION SYSTEMS USED BY THE TRANSMISSION SYSTEM OPERATOR

VI.A. Electricity market information exchange system

VI.A.1. Role of WIRE system

VI.A.1.1. WIRE system is dedicated for information exchange between TSO and the entities entitled to exchange information with TSO according to IRiESP – Balancing of the System and Management of System Curtailments, hereinafter referred to as market operators.

VI.A.1.2. WIRE system is dedicated to collect, transmit and exchange information on the energy market in the area of balancing market.

VI.A.1.3. WIRE system us used as a tool and platform for trade information exchange in the form of standard electronic documents.

VI.A.1.4. The detailed description and functional requirements of WIRE system are contained in the technical standards of WIRE system, which are published by TSO in its website.

VI.A.2. Architecture of WIRE system

VI.A.2.1. The architecture of WIRE system includes the central communication module of WIRE system in the version for TSO, external WIRE/UR modules in the version for market operators and backup WIRE/RP module.

VI.A.2.2. The information exchange between the central WIRE module and WIRE/UR modules takes place under "the star" topology, i.e. the communication is possible only between central server of WIRE system located at TSO and the local servers of WIRE system located at market operators.

VI.A.3. WIRE functional structure and application requirements

VI.A.3.1. The central module located at TSO handles the collection and transmission of documents to/from the IT systems of market operators subject to the requirements regarding the control and security of the transmitted data.

VI.A.3.2. The central module of WIRE system enables the archiving of all transmitted information and provides access to the documents archives to the authorised users.

VI.A.3.3. The backup module WIRE/RP located at TSO enables the transmission of the notifications of the sale agreements, balancing bids and cross-border power transfer schedules in the case of a fault of WIRE/UR module or a failure of the dedicated communication links.

VI.A.3.4. Local modules WIRE/UR located at market operators enable the access to the central module and data exchange according to the standards defined for WIRE system in respect to the structure of documents, security, and control of transmitted data.

VI.A.3.4.A. TSO's Certification Centre (CCO) executes the functions related to the management of digital certificates used in WIRE system. The centre enables the authorization of the certificates of WebSphere MQ queue managers unambiguously identifying WIRE/UR servers of market operators.

VI.A.3.5. The technical requirements for WIRE system are defined in point II.B.3.8.

VI.A.4. **Scope of information transmitted with the support of WIRE system**

VI.A.4.1. WIRE system encompasses the information exchange in the area of: notification of sale agreements and the balancing bids, notification of the cross-border power transfer schedules, coordination plans and metering data and metering-settlement data of the electrical energy and settlement data. The detailed scope of trade information exchanged through WIRE system is included in IRiESP – Balancing of the System and Management of System Curtailments.

VI.A.5. **Procedures of WIRE system**

VI.A.5.1. **Scope of WIRE system procedures**

VI.A.5.1.1. The management of the configuration of WIRE system is executed according to the procedures regulating the processes of connecting new market operators, management of changes to the standards and configuration changes.

VI.A.5.1.2. The transmission system operator publishes the procedures regarding WIRE system on its website.

VI.A.5.2. **The procedure of connection and acceptance of WIRE/UR IT system to TSO's IT systems for WIRE/UR and WIRE**

VI.A.5.2.1. The connection and acceptance of WIRE/UR IT system to TSO's IT system takes place upon meeting the conditions by the entity as stipulated in the procedure of connection and acceptance defined by TSO.

VI.A.5.2.2. The procedure of connection and acceptance of WIRE systems applies in the process of starting-up WIRE/UR systems of market operators. The procedure encompasses the technical issues regarding the cooperation of the security systems and data exchange systems of TSO and market operators.

VI.A.5.3. **Procedure for the management of WIRE archives authorizations**

VI.A.5.3.1. The authorization of the users of WIRE/UR systems takes place upon meeting the condition by the entity as defined in the procedure of the management of user authorizations of WIRE system archives developed by TSO.

VI.A.5.3.2. The procedure for the management of authorizations of WIRE system archives contains steps, which should be undertaken by the market operator's security administrator in order to obtain access to WIRE system archives for the representatives of the market operator authorized by the market operator to review the documents stored in WIRE system archives.

VI.A.5.3.3. The archives of WIRE system is available only to the representatives of market operator authorized to review the documents, in scope of documents exchanged between TSO and the appropriate market operator.

VI.A.5.4. **Tests procedures for WIRE/RP backup system for transmission of notifications for market operators**

VI.A.5.4.1. The procedure of tests of WIRE/RP backup system for transmission of notifications for the market operators encompasses the process of testing the solutions of WIRE/RP system by the market operators, necessary for the correct operation of the module by the representatives of market operators.

VI.A.5.4.2. The backup module of WIRE/RP system is available only to the authorized representatives of the market operators.

VI.A.5.5. **Tests procedures supplementing the operational scope of market operators**

VI.A.5.5.1. The procedure of tests supplementing the scope of operation of the market operators includes steps, which should be undertaken by TSO and the market operators in order to enhance the scope of operation of the market operators on the balancing market.

VI.A.5.5.2. The procedure of tests supplementing the scope of operation of the market operators applies during the change of the function of the market operator from the trade operator to the trade-technical operator or the enhancement of the scope of the function by disposing the schedule units of cross-border exchange of the balancing market participant.

VI.A.5.6. **Change procedures to technical standards of WIRE system**

VI.A.5.6.1. The implementation of changes to WIRE technical standards requires the adaptation of WIRE/UR systems by market operators and the approval of the implemented changes through the documents exchange compliance tests.

VI.A.5.6.2. The procedure of making the changes to technical standards of WIRE system contains the steps, which should be performed by TSO and market operators in order to implement the changes defined in such standards to WIRE system.

VI.B. System of operational cooperation with power plants

VI.B.1. Role of SOWE system

VI.B.1.1. SOWE system is dedicated to exchange technical information between TSO's dispatching services and operating services of the managing JWCD units.

VI.B.1.2. SOWE system is dedicated to collect, transmit and exchange information for the purposes of the management operation of JWCD units in NPS.

VI.B.1.3. SOWE system enables the information exchange during the stages of the periodical and current planning of the availability of individual generating units and the control of electrical energy generation.

VI.B.1.4. The detailed description and functional requirements of SOWE systems are contained in the technical standards of SOWE system published by TSO on its website.

VI.B.2. Architecture of SOWE system

VI.B.2.1. SOWE system includes two modules: central SOWE communication module in a version for TSO and the external module SOWE/EL in a version for the entities managing JWCD units.

VI.B.2.2. The information exchange between the central communication module of SOWE system and SOWE/EL modules takes place under the star topology, i.e. the communication is possible only between the central server of SOWE system located at TSO and the local servers of SOWE system located at power plants.

VI.B.3. The functional structure and application requirements of SOWE system

VI.B.3.1. The central module located at TSO handles the collection and transmission of documents to/from SOWE/EL IT systems of power plants maintaining the control and security of the transmitted data.

VI.B.3.2. The central module of SOWE system enables the archiving of all transmitted information and provides the archives of documents to authorized users.

VI.B.3.3. Local SOWE/EL modules located at power plants enable the access to the central module and the data exchange in accordance with the standards defined for SOWE system in respect to the structure of documents, security and control of transmitted data.

VI.B.3.3.A. TSO's Certification Centre (CCO) executes the functions related to the management of digital certificates used in SOWE system. The centre enables the authorization of the certificates of WebSphere MQ queue managers unambiguously identifying SOWE/EL servers.

VI.B.3.4. Technical requirements for SOWE system are defined in point II.B.3.9.

VI.B.4. **Scope of information transmitted with the support of SOWE system**

VI.B.4.1. SOWE system provides for the direct transmission by TSO-KDM dispatching services to DIRE generator's operating services of the load plans of JWCD units for 15 minute periods and the operating orders and enables the exchange of information between DIRE generator's operating services and TSO dispatching services in the area of the availability of the generating units, operational events and network events. The detailed scope of information exchanged via SOWE system is contained in IRiESP – Balancing of the system and management of network curtailments.

VI.B.5. **Procedures of SOWE system**

VI.B.5.1. **Scope of procedures of SOWE system**

VI.B.5.1.1. The management of the configuration of SOWE system takes places according to the procedures regulating the connection of new power plants, management of the changes to the standards and changes to the configuration.

VI.B.5.1.2. The transmission system operator publishes on its website the procedures regarding SOWE system.

VI.B.5.2. **The procedure of connection and acceptance of SOWE/EL IT system to TSO IT systems for SOWE/EL and SOWE**

VI.B.5.2.1. The connection and acceptance of SOWE/EL IT system to TSO IT system takes place upon meeting the conditions by the entity as defined in the procedure of connection and acceptance determined by TSO.

VI.B.5.2.2. The procedure of connection and acceptance of SOWE systems applies to the process of start-up of SOWE systems of power plants with JWCD units. The procedure encompasses the technical issues regarding the cooperation of the security systems and data exchange systems of TSO and the power plants.

VI.B.5.3. **Procedure for management of authorizations to SOWE archives**

VI.B.5.3.1. The authorization of the users of SOWE/EL systems takes place upon meeting the conditions by the entity as defined in the procedure of management of the authorizations of the users of SOWE system archives developed by TSO.

VI.B.5.3.2. The procedure of management of authorizations of SOWE system archives contains the steps, which should be undertaken by power plant's security administrator to obtain the access to SOWE system archives for the representatives of the power plants authorized to review the documents stored in SOWE system archives.

VI.B.5.3.3. The archives of SOWE system is accessible only to representatives of the

power plants authorized to review the documents in respect to the documents exchange between TSO and the power plants.

VI.B.5.4. **Changes procedures to technical standards of SOWE system**

VI.B.5.4.1. The implementation of the changes to SOWE technical standards requires the adaptation of SOWE/EL systems by power plants and the approval of the implemented changes through documents exchange compliance tests.

VI.B.5.4.2. The procedure of implementing the changes to SOWE system technical standards contains the steps, which should be undertaken by TSO and the power plants in order to make the changes to SOWE system as defined in such standards.

VI.C. Operating parameters monitoring system

VI.C.1. **Role of SMPP system**

VI.C.1.1. SMPP system is dedicated to monitor the operation of JWCD units for the purposes of operational management of NPS, the assessment of their regulatory operation and performance of analyses of NPS operation according to UCTE requirements.

VI.C.1.2. The local nodes of SMPP system acquire on-line the data from the generating unit's automatic systems and make it available to the central node of SMPP system.

VI.C.1.3. The central node of SMPP system acquires on-line the data from all local nodes of SMPP system, from local TSO system in respect to the values of the control signals and NPS frequencies and receives from TSO systems the operating plans and technical parameters of generating units.

VI.C.1.4. SMPP system provides for the on-line transmission from TSO to the generating units.

VI.C.2. **Architecture of SMPP system**

VI.C.2.1. SMPP system includes two modules: central module in aversion for TSO and local nodes located at power plants.

VI.C.2.2. The exchange of information between the central node and local nodes take place under "star" topology, i.e. the communication is possible only between the central server located at TSO and the local servers located at power plants.

VI.C.2.3. SMPP system nodes contain the communication subsystem used for data exchange based on WAN.

VI.C.3. **Functional structure of SMPP**

VI.C.3.1. The components of the set power, including the set values of the power in

control paths, the control operating state and the value of signal Y_1 are transmitted on-line within SMPP system from power plants to TSO by the automatic systems of each generating unit.

VI.C.3.2. Based on the collected data, SMPP system monitors on-line the operation of JWCD units according to the identified criterion, enables on-line analysis of the condition and parameters of JWCD units in relation to the planned values and calculates on the on-going basis the average electrical energy values for individual units and refers them to the planned values.

VI.C.3.3. Data processed in the system is archived. The system has tools enabling the presentation and expert of data to other systems.

VI.C.3.4. The acquisition of historical data from the power plants to TSO is conducted off-line in order to supplement the missing data in the central node of SMPP system under the mode of the automatic supplementation of the missing data or for requirement of the operator of the central node of SMPP system.

VI.C.4. SMPP system procedures

VI.C.4.1. Information exchange procedures

VI.C.4.1.1. The current parameters of the unit obtained from the unit automatic system are transmitted to the local node of SMPP system and then transmitted to the central node of SMPP system located at TSO premises. The acquired data is used for the monitoring of operation of generating units and supporting the NPS operation according to the guidelines defined by TSO in the technical documentation of SMPP system.

VI.C.4.2. Connection procedures

VI.C.4.2.1. The connection of local node of SMPP to the central node of SMPP system takes place upon meeting the conditions by the entity as defined in the technical specification for the local nodes of SMPP system and the SMPP connection procedure, which is made available by TSO to interested entities.

VI.C.4.2.2. The detailed conditions of connection of local nodes of SMPP system are determined individually and provided by TSO for each power plant.

VI.D. Central metering-settlement system (CSPR)

VI.D.1. Role of CSPR system

VI.D.1.1. CSPR system is dedicated to set the amounts of electrical energy deliveries for the purposes of the settlements conducted by TSO.

VI.D.1.2. CSPR system executes the function of collecting, processing and making available the metering data and metering-settlement data.

VI.D.2. The functional structure of CSPR

VI.D.2.1. The metering and metering-settlement data collected in CSPR system come from TSO system of remote reading of metering data, from DSO systems dedicated for the determination of the metering-settlement data representing the electrical energy deliveries in the fragments of the distribution network not covered by the area of the Balancing Market and from the IT systems of the market entities used to collect and make available the metering data hereinafter referred to as the Local Metering-Settlement Systems (LSPR systems).

VI.D.2.2. The metering data obtained for the system of remote reading of metering data originate from the automatic data recording systems enabling the access to the values recorded by the metering circuits.

VI.D.2.3. The acquisition of data from LSPR systems and DSO systems to CSPR system and the provision of metering data from CSPR system to LSPR systems is executed through WIRE system.

VI.D.3. The scope of information obtained with the support of CSPR system

VI.D.3.1. Under the data conversion process, the CSPR systems is processing the metering data originating from the metering-settlement systems and the metering-settlement data representing the energy deliveries in the fragments of the distribution network not covered by the area of the Balancing Market defined by TSO and is using the algorithms for the aggregation and determination of the electrical energy deliveries.

VI.D.3.2. The determined amounts of electrical energy deliveries are the product of processing the metering and metering-settlement data by CSPR system.

VI.D.4. CSPR system procedures

VI.D.4.1. The data processing executed by CSPR system is based on the uniform codification rules of the Physical Metering Points (FPP) and the Energy Delivery Points of the Balancing Market representing the deliveries of electrical energy in the fragments of the distribution network not covered by the area of the Balancing Market ($_{FD}$MB), which are published by TSO on its website.

VI.D.4.2. The detailed rules of exchange of metering data and metering-settlement data with the support of CSPR system are defined in IRiESP – Balancing of the system and management of system curtailments.

VI.E. Automatic load frequency control system (ARCM)

VI.E.1. Role of ARCM system

VI.E.1.1. ARCM system is used to generate and transmit control signals from TSO to JWCD units.

VI.E.1.2. ARCM system is used to activate the secondary control band of the cooperating generating units and the backup setting of the base load of generating units.

VI.E.1.3. ARCM system controller acquires the data on the current frequency in NPS and power balance of NPS and information on the generation plan and exchange balance.

VI.E.1.4. The central controller of ARCM system is generating on on-going basis the control signals and sending them on-line to the generating units under broadcasting mode.

VI.E.2. **Architecture of ARCM system**

VI.E.2.1. ARCM system is comprised of: central controller of ARCM system generating the control signals ordering the increase or decrease of the active power generated by the generating units within the scope of the control band dedicated for this purpose, the metering communication subsystem for the acquisition of data describing the current balance of exchange capacity and frequency in 1 second intervals, IT subsystem determining the planned average power exchange balance, communication subsystem for the distribution of the control signals with the support of UTRT protocol.

VI.E.2.2. The configuration of the central controller of ARCM system and its subsystems ensures the redundancy of its elements in order to ensure the reliability of ARCM operation.

VI.F. Transmission system operator website

VI.F.1.1. TSO's website is used by TSO as the platform for the provision of information to interested entities.

VI.F.1.2. TSO's website is available at: www.pse-operator.pl.