National Dispatching Center

GRID CODE

Attachment to the Decree#…, of the
Minister of Infrastructure

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Attention! In the text I proposed some modification in the titles

Chapter 1

General provisions

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1.1. Purpose of the Code and its scope of application

1.1.1 The purpose of this Code is to regulate the extent of technical activities of component entities of the grid.

1.1.2 This code shall be implemented together with the Energy Law, Business rule, Central heat supply code, and other legal documents.

1.1.3 The Licensee of Dispatching regulation shall develop this Code by agreeing with other holders of special **(what does it mean ”special?)** licenses. The code shall be approved by the Ministry of Infrastructure and shall be implemented.

1.1.4 The Licensees of generation, dispatching regulation, transmission, distribution, regulated supply, unregulated supply, electrical and/or thermal energy import and export and of construction of energy facilities shall follow the Grid Code.

1.1.5 Other Licensees shall follow decisions made, within the bounds of the Grid Code, by the holder of special **(what does it mean ”special?)** license for Dispatching regulation.

1.1.6 Licensees working separately from the grid shall follow the relevant statements of this code in their daily operation.

1.1.7 When the Grid Code or its provisions bring up a situation that is not suitable for the regulation of the technical operation of the Licensees operating in the Grid, the

National Dispatching Center shall renew or amend the Grid Code or its provisions based on the negotiation with other Licensees.

1.1.8 Renewal or amendments made in the Grid Code or its provisions are valid after it's approval by the Ministry of Infrastructure.

1.2. Main definitions

ATTENTION! DON NOT CARE WITH RENUMBERING OF POINTS. MY COMPUTER DID IT AUTOMATICALLY AND EVEN AN EXPERT COULD NOT SOLVED IT AT ONCE. I DID NOT WANT TO LOOSE TIME IMPROVING IT!!!
I DID NOT MAKE ANY NEW NUMBER IN THE WHOLE GRID CODE.

1.2.1 "Dispatching regulation"
is an activity that balances [energy] generation and demand and regulates consumption in line with the terms and conditions of the contracts made with Licensees of generation, transmission and distribution, in order to supply within the scope of the grid and the central heating reliable electricity and heat of required standards.

1.2.2 "Optimal operating conditions":
Based on the analyses of many years consumption of electricity and heat, least cost criteria of domestic energy production and energy import, reliable technical operation and potential reserve capacity, the optimal operating conditions should be identified in connection with weather condition, technological structure, emergency situation and system stability. Balances of minimum and maximum loads and losses should be identified. The optimal operating conditions should be monitored on daily basis in every moment, and electricity and heat consumption forecasts prepared.

1.2.3. "Load curve"
is the curve diagram estimated and planned in relation with the real consumption of electricity and heat load, in advance for day, **week,** month, and year periods. Estimations should be produced according to this load curve diagram to determine and control generation and demand.
Reamark: load curve can be on historically data too. For estimation process the load curve based on historically recorded data is an outgoing step

1.2.4. "Deviation from the optimal operating conditions"
is the amount of discrepancy between the given optimal operating conditions and the actual operating conditions of power and/or heat supply by power plants.

1.2.5. "Operative work"
is the coordination of the activity of power plants, grid and heat supply line entities and substations (Remark: the substations do not belong to entities?) 24 hours a day according to least cost requirements of generation, transmission and distribution of electricity and heat, and the act of providing unified management furthermore, during emergency situation, expeditious coordination of the energy system.

1.2.6. "Equipment under dispatching control"
are those electricity and heat equipment the operating conditions of which has to be controlled and managed by dispatchers of the National Dispatching Center (hereinafter NDC) in order to provide reliable and stable operation of the grid.

1.2.7. "Switching"
is the act of connecting electrical and thermal equipment to operation or disconnecting them for maintenance or reserve in accordance with specific instructions and programs,

in order to increase reliability or to ensure the Optimal operating conditions of the grid and the central heat supply and to ensure the safety of maintenance personnel.

1.2.8. "Emergency situation"
is a condition when there is capacity shortage resulting in frequency drop, separation of the grid from external grids, internal dividing of the grid, serious obstacle in generation and transmission of electricity and heat causing wide spread restriction or disconnection of electricity and/or heat to clients or serious difficulty in heat supply and so on.

1.2.9. "Placing an order"
is the act of notifying and getting permission, in advance, of an action to be done in or with regard to the equipment at the disposal of dispatchers of NDC, in order to provide for smooth and reliable operation of the grid and the central heat supply and to maintain optimal operating conditions.

1.2.10. "By-laws and instructions"
are the rules and instructions developed internally by NDC and other holders of special (?) licenses, regarding technical operation and safety of electrical and thermal equipment, fire safety, and operation rules of equipment.
Remark: I do not understand the meaning of this definition

1.2.11. "Standard requirements"
is the act of maintaining the main indicators of electricity and heat energy quality at fixed levels and creating the condition for smooth operation.
Remark: Standard requirements is requirements and not maintaining them

1.2.12. "Technological requirements"
are estimations of optimal operating conditions of power plants and transmission and distribution lines constituting the grid, estimated in connection with seasonal specifics of electricity and heating consumption.
Remark: a) It is two definitions: (1) Technological requirements and (2) Grid. It should be separated.
Remark b): the "seasonal specifics" should be defined

1.2.13. "Dispatchers' operative communication"
is a communication means for dispatching regulation activity. It is telephone communication, data communication or other equivalent communication means used between relevant personnel of the Licensees.

1.2.14. "Information and communication technology"
is a combination of various application technologies of telecommunication, telemetry and computer network used in Dispatching operative communication, and operation rules, procedures and instructions developed concerning these technologies.

1.2.15. "Technological *shield*" (??)
or Electricity supply shield is the minimum time required in normal shut down of production phases and technological process of a [utility] entity. When this time passes, the electrical equipment [of the entity] must stop completely.

1.2.16. "Emergency *shield*" (??)
or Electricity supply emergency shield is the minimum capacity or energy required– during total or partial shut down of a plant- in preventing danger against equipment of the [utility] plant and lives of personnel and in keeping normal operation of emergency and security lights, ventilation, water supply, heating and fire fighting equipment.

I suggest

(1) to write among the definitions the expression what you use several times and not in text (e.g. in point 4.1.1: “hereinafter "objects") to the electricity transmission network of the central region (hereinafter "electricity transmission network"”)
(2) to prepare more definitions partly because I did not understand some, partly it is useful for the people reading and using the Grid Code. E.g.
tap line
main line
branch line
branch substation
side equipment
operative scheme
component parts of the Grid
system operarion
system planning
order
Electricity Provider
financial conditions of connection
technical conditions of connection
[restriction] schedules
restriction and disconnection program
dispatchers of …… (e.g. dispatchers of NDC)
or NDC dispatcher or NDC dispatching personnel *Please use only one of them*
dispatching personnel of the…..
accident (or technology breach if they are different)
fluctuation of parameters
Sources
These are some exemples!

General suggestion: It is very useful for the using the Grid Code that the definitions should be signed always and every occasion with **bold** or *italic* letters in the full Code!

1.3. General terms and definitions of the electrical equipment in component parts of the grid and development of the scheme

1.3.1 Naming substations

1.3.1.1 . Names of substations of 35 kV or higher voltage should be given in consultation with NDC.

1.3.1.2 . Substations can be named concerning geographical location or peculiarity of consumers, but it is prohibited to give names in the following ways:
- Substations belonging to one energy system have the same names;
- To name using the direction
- To give too long names
- To name the substations, which feed those consumers significant to the country such as defense, military and civil defense organizations, with the title of the organization or consumer.

1.3.1.3 . Names of the substations shall start with the voltage of the substation and then name of the substation. For example: 110/35/10 kV “Tuul” substation etc.

1.3.2 . Operative personnel can use the names of the substations in keeping note and registration of the journal without mentioning the voltage of the substation. For example: Tuul substation etc**Giving a name of operative work for the electricity transmission lines (ETL)**

Use the same title for the same idea: "Naming" or "Giving a name"

1.3.2.1. The operative names of tap (?) lines feeding 35 to 220 kV transmission lines (Line does not feed transmission line)or substations existing or waiting to be commissioned or planned to be constructed in the grid, shall be named only in consultation with NDC.

1.3.2.2. When naming 35-110 kV (It is not better: 35 kV or higher voltage? Like the substations) main lines that is divided into sectionalizer by the substations in the way shall be named with the names of station or substation at two ends of every divided section of the line. For example: 110 kV Choir -- Bor-ondor over-head line /OHL/ etc.

1.3.2.3. To name a line from a substation to another substation shall be named by the name of the substation at the end of the line. For example: The above mentioned line shall be called as 110 kV Choir line by the people of Bon-Ondor substation. (It is not clear. Maybe the translation is not fully correct.

1.3.2.4. Lines and substations fed from the main line shall be called as branch line and substation. This branch equipment shall be called like 110 kV branch circuit breaker or 110 kV branch line switcher and so on. For example: Bor-Ondor substation shall be called 110 kV branch substation.

1.3.2.5. A name of a double circuit transmission line shall be given according to the provisions 1.3.2.2-1.3.2.4 adding "A" to the first line and "B" to the second line. During the normal operation, "A" line shall be connected to the first-system-busbar of the substation and "B" line connected to the second-system-busbar of the substation. For example: 110 kV Bulgan A, and Bulgan B line etc.

1.3.2.6. Electricity transmission lines fed at one side shall be named with the name of feeding and ending substations. If a transmission line is constructed from the ending substation, the National Dispatching Center shall decide what name to give to that line.

1.3.2.7. Operative names for 110 kV and 220 kV electricity transmission lines shall be given in numbers. 110 kV line shall start with number 1 and number of 220 kV line shall start with 2. Left hand side circuit of double circuit line shall be numbered with odd number and an even number after the odd number shall be given to the right hand side circuit of the line. A branch substation fed from this line shall have the same name.

1.3.2.8. The following procedure shall be complied in naming and writing the name of transmission lines with any voltage.

- what voltage
- what name
- which type (over-head, cable so on.) For example: 35 kV Bayasgalant-Khailaast Over-head line etc.

Please continue the procedure with the naming of one circuit of double circuit line.

1.3.3 Naming switching apparatuses and making the address of these apparatuses

1.3.3.1. General procedure for naming the switching apparatus and writing their abbreviations is enclosed to this Code shown in the attachment 1. All the terms shall be complied by the operational, operative and maintenance personnel of all the entities of the Grid and shall be used in the development of rules, guidelines, operative scheme and order of the switching. It is not valid for the lines and substations too? If so please write it.

1.3.3.2. Voltage of the equipment shall be written before the names of transmission lines, switching apparatus. For example: 110 kV Choir-Bor-Ondor over-head line; Autotransformer 220 kV side equipment; 110 kV busbar "C" of the line 117 etc. But it is not necessary to write the voltage before names of the Grounding switch. The following would be an example of naming Grounding switches: Grounding switch at 220 kV circuit breaker side of transformer 4T of the Power Plant-4 etc.

1.3.3.3. All the electrical equipment of 6, 35, 110 and 220 kV switchgears must have labels in them. The words in the labels in the switching apparatuses and transformers must be in 2-3 lines. Connection name shall be written in the first line, the voltage in the second and type of equipment written in the third line, but a name of a grounding switch shall be written fitting in three lines. The size of an equipment label must be 30 cm in height and 25 cm in width and words must be written 7-cm block letters. The label base-color of grounding switch shall be red and base-color of other labels in blue and words must be written in black.

1.3.3.4. Labels shall be located in a visible place of equipment and/or besides the drive of the disconnector.

1.3.4 **Operative scheme of the Power plants, electricity and heat networks and substations** (be careful: it can be misunderstood: heat substation? the previous word was :heat network)

1.3.4.1. The operative scheme have to be in the offices of the shift engineers, dispatchers, shift heads, duty employees of equipment and substation duties of the all components of the Grid and drawn dashed-line and lines of switching apparatuses must be same as regime scheme during the normal operation approved by the chief engineers of the power plant or networks.

1.3.4.2. Connection of switching apparatus shall be drawn in the operative scheme regardless of whether the connection of some additional parts to the main apparatuses for a full operation is accomplished or not.

1.3.4.3. During the switch of shifts, duty personnel must hand out the daily operative scheme with accurate location of switching apparatuses to the duty personnel of the next shift.

1.3.4.4. When indicating the accurate location of switching apparatus and relay protection disconnected equipment, it should be accomplished by drawing a mark next to that equipment. Such marks shall be drawn with a pencil, ink-pen, ballpoint pen or red color paint.

1.3.4.5. The indication of the connection of a grounding switch to the equipment or a relay protection and automatic equipment in operation shall be done with blue-color pencil, ink-pen or color paint.

1.3.4.6. It is required to indicate the location of switching apparatuses and relay protection automatics in the operative scheme and write a detailed note in the operative journal and notify it in the reporting during the switch of two shifts.

1.3.4.7. It is not allowed (forbidden) to correct or erase the mistaken marks. In case of mistaken mark was indicated it should be circled with blue pencil and indicate the correct mark besides the circle and signed by the person who made the correction.

1.3.4.8. Valid time of usage shall not be limited unless any changes made to the operative scheme.

1.3.4.9. Operative scheme must be numbered.

1.3.4.10. If any of the equipment belongs to the direct command or control of the NDC, the operative scheme has to be approved by the chief dispatcher of the NDC.

1.3.4.11. It is strongly prohibited operate and carry out switching of any new or operating station or substation without developing a complete operative scheme according to the related rules and guidance. (prepared and approved by ……)

1.3.4.12. Operative scheme of a station, network and main substations must be made in size of 80*60 cm and scheme of other substations in size of 40*30 cm.

1.3.4.13. The name (of an equipment) in the operative scheme must be exactly same as the name at the label of the equipment.

1.3.4.14. Any confusing issues in the development of the scheme must be resolved with the Technical Management department of the NDC.

1.3.4.15. Chief engineers of Power plants and networks and the head of the Technical Management Department shall be responsible for making enough copies of approved operative scheme and put it in the working places.

1.3.4.16. Management of the component parts of the Grid shall be responsible for informing any changes in the operative scheme to the Technical Management Department of the NDC.

1.3.4.17. The entire operative scheme, guidance and indices for daily information shall be reviewed within January of every month (??) and redeveloped if necessary.

1.4. List of component parts of the grid, and their cooperation system

1.4.1. Central Energy Grid

Abbreviations of names of component entities	Full names of component entities
NDC LLC.	National Dispatching Center, Limited liability company
TPP-2 Co.	Thermal Power Plant II, shareholding company
TPP-3 Co.	Thermal Power Plant III, shareholding company
TPP-4 Co.	Thermal Power Plant IV, shareholding company
Darkhan TPP Co.	Darkhan Thermal Power Plant , shareholding company
Erdenet TPP Co.	Erdenet Thermal Power Plant , shareholding company
CRET Co.	Central Region Electricity Transmission Company
UBHDN Co.	Ulaanbaatar Heat Distribution Network Co.
UBEDN Co.	Ulaanbaatar Electricity Distribution Network , Shareholding company
DSEDN Co.	Darkhan Selenge Electricity Distribution Network, Shareholding company
EBEDN Co.	Erdenet Bulgan Electricity Distribution Network, Shareholding Company
BSEREDN Co.	Baganuur South Eastern Region Electricity

	Distribution Network, Shareholding Company

1.4.2. Western Electricity System

WETN Co.	Western Electricity Transmission Network, Shareholding Company Includes 110/35/6kV substations, and lines of Ulaangom, Khovd, and Bayan-Olgii

1.4.3. Eastern Energy System

EES Co.	Eastern Energy System, Shareholding Company Includes Dornod Power Plant, 110 kV transmission line from Choibalsan to Baruun-Urt, substations and low voltage network.

1.5. The least cost principle during the planning and operation

1.5.1. The NDC shall develop the plan following the energy production based on the least cost principle in the Grid that allows to supply cheap electricity for the consumers and guide the daily operation of the Grid in accordance with this plan approved by the ERA.

1.5.2. The regime operation shall be managed by allowing the least cost power plants to get a full load in whole day, and load of high cost power plants shall be reduced during the day taking account the network losses in the possible extent and reliability of system.

Chapter 2
Quality and its assurance

2.1. Electricity quality and providing assurance of the quality
2.2. Technical requirements for the quality
2.2.1. Frequency quality
2.2.2. Voltage quality
2.3. Continuous electricity supply with assurance of the quality

Chapter 2
Quality and its assurance

2.1. Quality of electricity and providing assurance of the quality

2.1.1. All the Licensees operating as component parts of the Grid are obliged to operate monitoring the following main items of the supply quality and undertake necessary measures on a timely basis:
- frequency
- voltage
- continuous supply of electricity

2.2. Technical requirements for the quality

2.2.1. Frequency quality

2.2.1.1. In the parallel operation with Russian Electricity System, the Central Electricity Network has an obligation to control the frequency in accordance with the contract with Russian Electricity Grid and upper-level operative personnel of all the component parts are obliged to put regular control on the frequency correction and voltage deviation, to balance demand and generation based on the load graphics given for the power plants and to keep the capacity of imported electricity and the energy amount not exceeding the figures specified in the contract. According to the technical and operational rule, frequency deviation of the Grid shall constantly be ± 0,2 Hz as of the average of 10 minutes. It also allowed keeping ± 0,2 Hz in 10 minutes of a temporary operation (this means the same as the previous sentence. Maybe you wanted to say: more than ± 0,2 Hz that is 50± 0,4 Hz temporaly, not?)

2.2.1.2. The frequency deviation shall not exceed (±)0,2 Hz.

2.2.1.3. Dispatcher of the NDC shall reconcile the frequency meter of the Grid with the frequency meter of the Electricity System of Buriad, Russia and report it in the operative journal.

2.2.1.4. Shift engineer of all the Thermal Power Plants of the Grid reconcile the frequency meter of their power plant with the dispatching frequency meter of the NDC and record it in the operative journal.

2.2.1.5. Frequency meters shall be checked and guaranteed once a year by the professional organization.

2.2.1.6. When the Grid operates separately from the Russian System, Thermal Power Plant-4 shall operate controlling the frequency of the Grid by the decision of the NDC.

2.2.2. Voltage quality

2.2.2.1. Voltage at the control point of the Grid and its maximum and minimum limits (as to me not limit but value. The limit is determined, see below) shall be estimated at least twice a year during the maximum load in winter and minimum load in summer and correct (what to correct?) within that estimated voltage.

2.2.2.2. The Chief Dispatcher of the NDC shall approve the list of main points for the control at voltage level by the NDC dispatcher and their voltage records and chief engineers of power plants, electricity transmission and distribution networks shall set and approve the list of other control points and dispatchers of component parts are obliged to control the voltage control for a normal and reliable operation.

2.2.2.3. Following table shows the standard normative of over 1000 V voltage approved by the Resolution #17, March 29, 2001 of the Board of National Center for Standardization and Measurement of Mongolia.

Normal level of voltage (kV)	Maximum limit of working voltage allowed
6	7.2
10	12
35	40.5
110	123*
220	245*

Explanation: * These amounts are recommended level of voltage by the International Electricity Technical Committee, therefore it is recommended not to exceed this amount.

2.2.2.4. If voltage at the control points deviate from the allowed figure, responsible dispatchers are obliged to take any necessary measures to bring the voltage into the correct level.

Allowed minimum limit of voltage (kV)	Minimum level of voltage	Average level of voltage (kV)	Maximum level of voltage (kV)
5.6	6.0	6.3	6.6
9.4	10	10.5	11
33	35	37	38.5
103	110	115	121
207	218	230	242

What is the “minimum limit of voltage” and “minimum level of voltage”? Please give definition!

2.2.2.5. Although allowed minimum limit of voltage is determined by the estimation of the static stability, it is not allowed to decrease more than 10% from the average level in case of no estimation were made. The minimum level of voltage shall be followed at night. The average level of voltage shall be kept during holidays, weekends and daytime. The maximum level of voltage shall be kept during the peak load period in the morning and evening.

2.2.2.6. Main methods to control the voltage in the Grid are:

- control the reactive capacity of generators
- transformer with an equipment to control the voltage under load, and change the location of regulation under load of autotransformer
- control by switching shunt reactor
- control by modifying connection scheme

request the Dispatcher of Buriad Electricity System to modify the voltage

2.2.2.7. The control points of voltage under the dispatcher's control of NDC

- 35/110 kV busbar of Power plant-3
- 110/220 kV busbar of Power plant-4
- 110 kV busbar of Darkhan Power plant
- 110/220 kV busbar of Darkhan, Erdenet, Baganuur and Ulaanbaatar substations
- 110 kV busbar of Tuul substation

2.2.2.8. The Distribution companies are obliged to supply electricity with voltage deviation not exceeding the allowed amount (ther was not mentioned "allowed amount" earlier. Only "allowed minimum level of voltage" in point 2.2.2.4. In point 2.2.2.3 there is "standard normative of over 1000 V voltage". Please clarify. nd sinusoidal pattern of voltage with no distortion that meets UST 1778-88 requirements.

2.2.2.9. Electricity supply and consumer entities shall conclude a contract on the basis of the quality indices of electricity supply approved by the ERA.

2.2.2.10. Voltage at the point feeding a consumer shall be controlled within the amount of ±10% in condition of normal operation of the transmission and distribution companies.

2.2.2.11. If the figures of electricity quality indices are found to be different from the set amount between electricity supplier and consumers, they have to issue an act (?) on that difference.

2.2.3. Continuous electricity supply with assurance of the quality

2.3.1. The main item for the quality is continuous supply of electricity to consumers.

2.3.2. Consumers shall be notified about the planned disconnection of the electricity supply 4 hours (in Hungary 8 days!) prior to the disconnection.

2.3.3. In the following cases, a supplier has a right to suspend consumer's electricity supply for a temporary period or revoke the contract until delinquency is eliminated:

a/ condition of natural disaster or force majueur, shortage of fuel, accidents or obstacles in the electricity supply, a situation dangerous for human life or property or catch fire.
b/ non-payment of electricity
c/ tampering of electricity meter, measuring devices, their seal, location of installation and connection
d/ receipt of electricity in a way not specified in the contract in case of non-metered consumption

e/ re-supply of electricity from his/her place of electricity consumption to another consumer without a supplier's permission

f/ if a consumer does not allow an authorized employee of supplier to examine his/her place of consumption

g/ consumer's electricity equipment, facilities and network do not fulfill the operational and safety requirements

h/ a consumer's violation of technical condition for electricity consumption

i/ a consumer exceeds consumption of electricity capacity specified in the contract

2.3.4. Supplier shall restore consumer's electricity supply once reason for disconnection is eliminated.

2.3.5. A consumer has a right to refuse to pay the energy bill fully or partially and claim compensation for damages incurred if the supplier fails to supply energy in a manner specified in the contract, resulting in insufficient supply or supply of energy of different quantity and quality than that specified in the contract.

2.3.6. Supplier are not allowed to request terms and requirements not specified in the legal acts and contracts and restrict the rights of consumers.

The subjects in point 2.3.2 to 2.3.6 are not in general in Grid Code as it deals with co-operation of entities to maintain the synchronous operation of system. These subjects belongs to the Business Rules. To mention them is not mistake but only unusual. The tasks and responsibilities of Lincencies to maintain the continuous supply should be written (e.g. operate and maintain the equipment in a reliable way to fulfill the planned conditions, etc.

Chapter 3
Role of the National Dispatching Center in the System Planning

Monthly, annual and long term planning of the System operation

3.2 Planning of the system reserve capacity and monitoring its implementation

3.3 Research on consumption, monitoring measurement, calculation of the electricity balance of the Grid

3.4 Planning of the electricity export and import

3.5 Participation of other Licensees in the System planning and principle of their cooperation

Satisfaction of the reliable operation of the System

Role of the National Dispatching Center in the System Planning

3.1. Monthly, annual and long term planning of the System operation

3.1.1. Orders for monthly, quarterly and annual electricity and heating consumption shall be received, included in the estimation of optimal operating conditions; the balance of generation and demand shall be controlled on daily, monthly, quarterly and annual bases. (The meaning of this sentence is not clear. Probably the Mongolian text is clear)

3.1.2. Based on the actual orders for and forecast of consumption of a particular (day, month, quarter and year) period, NDC shall analyze the supply capacities offered by power plants, make various estimations, and identify the daily, monthly and quarterly operating conditions with final optimal distributions of load.

3.1.3. Losses of transmission and distribution network of electricity and heat shall be controlled, verified, and included in estimations of optimal operating conditions, annual plans, expenditures, and prices and tariffs; percentages and amounts shall be checked, and evaluation and conclusions made.

3.1.4. Estimations of static and dynamic stability, active and reactive power loss, grid relay protection and settings of automation equipment shall be conducted and works to be implemented shall be organized.

3.1.5. NDC shall constantly control and operatively coordinate and manage the regulation of the grid voltage (when it is working separately), the pressure and temperature of industrial steam and water distribution lines, maintenance and control of the optimal operating conditions, and maintenance of static and dynamic stability of the system.

3.1.6. NDC shall develop different versions of regime of the emergency situation and implement them when required.

3.1.7. NDC shall produce long term forecasts of electricity and heat demand of the grid every year.

3.1.8. NDC shall plan electricity import and export volume of the grid and implement it.

3.1.9. NDC shall keep constant registration of the main indices of the regime operation in the Grid and create a database.

3.1.10. NDC shall develop and implement a plan(s) for cutting or restricting electricity supply in case of emergency situation or force majeure factors.

3.2 Planning of the system reserve capacity and monitoring its implementation

3.2..1NDC shall provide a prompt dispatching regulation for the coordinated operation of the electricity grid and central heating supply based on the planning of the reserved capacity supplied by other legal entities.

The planning conditions for system reserved capacity is developed by …. and determined by……

3.2.2 NDC shall plan on new generation source and reserved capacity required in the grid based on long term forecast of consumption of the Grid.

3.2. Research on consumption, monitoring measurement, calculation of the electricity balance of the Grid

3.2.1. Based on the annual consumption forecast of the grid, capacity balance shall be estimated by the NDC; annual maintenance schedules of the main equipment of the grid components shall be checked, approved by the Center's management and reflected

in the optimal operating conditions. Beside annualy, monthly, weekly and daily capacity plans are needed in general cases.

3.2.2. Generation, transmission and distribution companies shall deliver the results of energy balances and estimations by the 5th of each month to NDC. NDC summarizes the estimation results and checks the general balance of electrical energy flowing.

3.2.3. Certified meters of the same make and high precision, possible to be connected to and used compatibly with modern information technology should be used to compute settlements among the above mentioned entities.

3.2.4. At 24:00 hour in the last day of each month, the meters shall be read simultaneously for the transmission and distribution energy estimation of the month.

3.2.5. The purpose of the control metering is accurately determine the balance of actual generation and consumption of electricity of the grid; determine the capacity utilization of electricity transmission and distribution lines and equipment; and the actual capacity of lines related to the automatic offloading equipment driven by frequency change; check voltage level of control points in component parts of the grid and determine the amount of energy loss of transmission and distribution lines as well as to examine measurement precision, and detect error.

3.2.6. All operative personnel of component entities of the grid shall participate in taking timely and accurate measurements as the results of control and measurements are used in controlling the balance of generation and consumption, estimating relay protection and settings of automatic control, estimating the normal and other operating conditions, and in planning technical organizational and perspective measures for the grid.

3.2.7. The control and measurement of the maximum and minimum load of the grid shall be conducted twice a year (- maximum of the winter and minimum of the summer). The date of the control and measurement is set by the NDC Technical management unit and is notified to the component entities of the grid in advance of 10 days.

3.2.8. Maximum or minimum load measurement is taken at 3:00, 10:00 and 19:00 hours on the day [of the above mentioned date] simultaneously throughout the grid.

3.2.9. Monthly meter reading of electricity generation and distribution of the Grid shall be carried out at 24:00 in the last day of every month in every component part exactly at the same time. (A bit similar requirement is written in point 3.3.4. It would be useful to gather together the topics belonging to the same subject.)

3.2.10. Top technical management of a component entity of the grid shall manage the measurement, appoint a working group to control all measurement points and shall coordinate other measures as required.

3.2.11. The working group shall check the measuring situation of all the points in advance, provide technical readiness by keeping [technical]completeness and measurement error at proper level, get tables for measurement ready, and place laboratory and/or standard gauges at required places.

3.2.12. The head of the working group shall instruct all personnel participating in the measurement and control before the measurement his/her watch or clock to that of the NDC dispatcher.

3.2.13. 10-20 minutes before the control and measurement, the NDC dispatcher shall take an organizational measure controlling the clocks of all objects to provide for a simultaneous measurement.

3.2.14. NDC shall be provided with technical possibility to take simultaneous measurement of electricity energy flowing amongst generation, transmission and distribution entities and to have constant control on generation and demand balance.

3.2.15. All component entities of the grid shall take an organizational measure equipping every control and measurement point with measuring instrument and meters that meet technical requirement.

3.2.16. In power plants, active and reactive power, current, and voltage of generators; active and reactive load, current and busbar voltages of internal use transformers; active and reactive loads and currents of all outgoing lines; active and reactive loads and currents of primary and secondary of coupling transformers; active load of lines connected to the automatic offloading equipment driven by frequency change should be measured.

3.2.17. In 35 to 220 kV substations, active and reactive load and current of the primary and secondary, tap setting positions, busbar voltages of220/110/35 kV transformers and autotransformers; active and reactive loads and currents of all outgoing 220, 110, 35, 10 and 6 kV lines; shunt reactor current; active load of lines connected to the automatic offloading equipment driven by frequency change should be measured.

3.2.18. In case of lack of an active demand meter or impossibility of installing one in the object/facility undergoing measurement, the meter reading shall be recorded. If one rotation of a meter takes more than 5 seconds, full rotation of the meter shall be recorded, but the time of the rotation must be less than 50 seconds.

3.2.19. After measuring, the top technical management of component entities shall unify the results, analyze and send within 7 days the final information to NDC.

3.2.20. The Technical Management Department of the NDC shall develop methodology, formula and forms of the control metering.

3.2.21. The computing units of generation, transmission and distribution entities shall agree in advance with NDC on their measurements and estimations tables of monthly electrical energy balance and have the tables approved.

3.3. Planning of the electricity export and import

3.3.1. NDC shall plan and implement the amount of export and import electricity supply in relevance with the long-term forecast of electricity demand. The long-term forecast is not enough and what does it mean? Beside long-term (3,5 or 10 year) yearly, quarterly, monthly, weekly plans are needed in general cases.

3.4. Participation of other Licensees in the System planning and principle of their cooperation

3.4.1. Licensees of the Grid shall submit their proposed monthly, quarterly and annual plan of generation, transmission and distribution to the NDC and the NDC shall submit the plan with its own modification to the ERA.

3.4.2. The ERA shall finalize and approve the plan based on the cost and tariffs of Licensees.
REMARK: In general cases The Regulatory Agencies do not approve any plan. In this case the Dispatcher Center approve the plan. In Hungary neither.

3.4.3. Other Licensees shall operate in compliance with the dispatching schedules (graphics) based on the approved plan and follow the regulation of the NDC during the operative situation.

Satisfaction of the reliable operation of the Syste Stable operation of the Grid during the normal or emergency situation shall be provided by the parallel operation with the Russian Electricity System.

3.4.4. Central Electricity Transmission Network shall conclude a contract specifying the conditions of parallel operation with Russia, and electricity export and import and fulfill the technical condition of parallel operation.

3.4.5. NDC shall plan and implement the amount of electricity export and import based on annual, monthly and daily electricity consumption.

3.4.6. The Grid shall be equipped with automatic facilities that provide its own stability (the requirements of these automatic facilities should be prescribed in Grid Code or later prepared by and coordinated by NDC) and Licensees in the component of the Grid shall fulfill the availability of that equipment.

NDC shall calculate the estimations of settings of that automatic facility and carry out related regulation

Chapter Four: CENTRAL REGION GRID CONNECTION INSTRUCTIONS

4.1. General Provisions
4.2. Financial Conditions
4.3. Provisions for Technical Conditions
4.4. Contents of the Technical Conditions
4.5. Connection to Electricity Transmission Network

CENTRAL REGION GRID CONNECTION INSTRUCTIONS

4.1. General Provisions

4.1.1. These Instructions shall be adhered to in cases of individuals and legal entities connecting electric equipment or premises (hereinafter "objects") to the electricity transmission network of the central region (hereinafter "electricity transmission network") for the purpose of supplying and/or purchasing electricity.

4.1.2. CRETCo. (nobody!) shall not use its advantageous position to impose unjustified requirements, nor require documents and materials other than those specified in these instructions from individuals and legal entities making technical applications.

4.2. Financial Conditions

4.2.1. For acquiring electricity and connecting their objects, individuals and legal entities shall pay service charges, in accordance with the service tariffs determined by the electricity provider. The service tariffs shall have been made public.
REMARK: What about connecting line? In Hungary 35m is included in service tariff but often much longer line is needed to connect the object. And what about new power station? In general the cost of connection is included in the cost of power station.

4.2.2. Individuals and legal entities shall include in their applications costs for alleviating adverse environmental effects and environmental rehabilitation, and shall have these works implemented.

4.2.3. The Provider of electricity shall reimburse any damages suffered by individuals and legal entities caused by poorly designed or wrongly installed electricity connections.

4.3. Provisions for Technical Conditions

4.3.1. CRETCo. (hereinafter "provider of electricity ") shall provide electricity taking into consideration the capacity of the electricity transmission network and generation sources.

4.3.2. Technical conditions shall be reviewed each time objects are built or in cases of their expansion or renovation.

4.3.3. The Provider of electricity shall provide technical conditions to economic entities and organizations undertaking electricity generation and distribution activities by means of getting connection to the electricity transmission network.

4.3.4. Electricity distribution companies shall submit reports on the extent of fulfillment of requirements of technical conditions to CRETCo. by 15th December each year. (Why?)

4.3.5. Individuals and legal entities connecting newly built objects to the network shall submit the following documents to Electricity Provider of :

a) application;
b) decision of the authorities on renovation, expansion and construction of new objects;
c) clarification paper on the technical conditions for connecting to the electricity transmission network;
d) decision of the relevant Governor on right to use land.

4.3.6. A Committee on electricity provision of (?) shall be appointed by decree of (? perhaps the head of Committee is) the Executive Director of CRETCo. The Committee shall comprise 5 members. (If it is prescribed in a decree – ministerial? – than it is enough to refer to it)

4.3.7. The Committee shall decide upon providing technical conditions within 14 days after receiving an application and clarification paper from individuals and legal entities.

4.3.8. The conclusions of the Committee of Electricity Provider shall be approved by the decision of the Executive Director.

4.3.9. Technical conditions shall remain valid for up to 3 years depending on the volume (which volume?) of works to be carried out.

4.3.10. In case of failure to approve the drawings or commence construction works during this time, the period can be prolonged by submitting a request to the Provider of technical conditions 2 months prior to the expiry of the validity period of the technical conditions.

4.3.11. Individuals and legal entities must include the issues reflected in the technical conditions in the drawings/projects.

4.3.12. Prior to commencing construction works individuals and legal entities shall agree upon the prepared drawings with the Provider of Technical conditions and other relevant organizations, and shall arrange for the expertise appointed by the authorities to make review and verify the drawings.

4.3.13. Each time other technical and technology changes and renovations carried out in the electricity transmission network influence the provided technical conditions, then the individuals and legal entities who acquired those technical conditions, as well as organizations maintaining relevant drawings, shall be informed and amendments shall be made to the technical conditions.

4.4. Contents of the Technical Conditions

4.4.1. The following shall be reflected in the financial and technical conditions:

a) connection point, (electricity plant, substation, electricity transmission and distribution network), its voltage, type of lines;
b) requirements for expanding parts of the electricity transmission network where the object is to be connected (increasing cross section of the wire, increasing transformer capacity, installing additional panels etc);
c) maximum electricity load to be transmitted through the connection point;
d) requirements on the voltage size of the short circuit; relay protection; automation, communication, dielectric, and overload protection;
e) regulation of reactive capacity;
f) requirements on electricity meters;
g) need for electricity quality control tools, and for equipment stabilizing quality indicators;
h) recommendations on using standard (one type) drawings of electric equipment;
i) special requirements for objects (protection at the input terminal, reserve supply for automatic transfer of important consumption, independent electric generator for emergency etc.);
j) requirements for operation and safety provision of objects;
k) list of consumers to be connected to the object, their load and electricity forecasts;
l) activities for reducing adverse environmental effects and for environmental rehabilitation.

4.5. Connection of objects to electricity transmission network

4.5.1. Objects that meet the requirements specified in the financial and technical conditions shall be connected to the electricity transmission network.

4.5.2. Individuals and legal entities applying for connection of their objects to the electricity transmission network shall meet the following requirements and shall officially inform Electricity Provider when they are ready to connect their objects:

a) the object ownership boundary must be agreed in detail;
b) provide official documents on drawings, scheme, protocol, measuring, testing and adjusting works on the object's equipment;
c) when connecting the objects of individuals and legal entities the Electricity Provider shall have them make appropriate preparatory works and shall connect them in accordance with the relevant program.

The connection procedure, program should be prepared with cooperation of NDC and the connection itself is allowed by NDC!

Chapter Five. CONTROL INFRASTRUCTURE SYSTEM

5.1 Integrity of communication and information systems of the grid;
5.2 Rights and duties of the National Dispatching Center with regard to providing information and communication integrity;
5.3 Rights and duties of other licensees with regard to information and communication integrity;
5.4 Requirements on relay protection and automation of the grid, and relay protection settings

5.4.1 General Provisions
5.4.2 Rights and duties of the Relay Protection and Automation Unit
5.4.3 Boundaries for the relay protection settings of the grid
5.4.4 Regulation for estimating relay protection, and automation settings

5.5 Protection from overloading and lightning.
To repeat the contents could lead to mistakes. In this case: according to the Contents : "5.1.Compatibility of information and communication equipment of the grid". According to the above written : "5.1 Integrity of communication and information systems of the grid." And according to the below text: "5.1 Purpose and service principle of dispatchers' communication system" In my opinion the last one is the best one. Perhaps without word "service". BE CAREFUL!

5.1. PURPOSE AND SERVICE PRINCIPLES OF DISPATCHERS' COMMUNICATION SYSTEM

5.1.1. The principle of the dispatching communication system is to ensure uninterrupted and reliable operation of dispatching communication and compatibility with the used information and communication technologies.

5.1.2. The reliability of the dispatching communication system (technology control and information system SCADA) and the availability of suitable equipment shall be ensured by the technical management of the Licensees working as components of the grid.

5.1.3. The Communication and Information Unit (hereinafter CIU) of the NDC shall ensure the technical availability of the NDC dispatching communication system. The communication and information technology units of the other Licensees comprising the grid shall work in coordination with the CIU.

5.1.4. The principal types of dispatching communication are high frequency communication and data communication. Satellite and radio communication and common public telephone lines are redundant communication means.

5.1.5. The equipment of the dispatching communication system is determined by the information and communication technology. The equipment of the dispatching communication system shall include the dispatching communication apparatus, cables connecting the organizations, high frequency and communication channels and coupling or intermediary communication equipment.

5.1.6. Failures and interruptions of the dispatching communication system shall be immediately made good and normal operation restored by units or divisions of the relevant Licensees.

5.2. Rights and Duties of the National Dispatching Center with regard to providing information and communication Integrity

5.2.1. The NDC shall control the availability of the dispatching communication system equipment, communication channels, cables and lines, and provide professional management for prompt detection of failures ad rehabilitation of equipment.

5.2.2. Studying, according to a methodology appropriate to information and communications, the needs and requirements of the dispatching communication system, the NDC shall plan and implement, in the framework of the technical policy of the NDC, improvements of the communication system; equipping it with modern, new and high efficiency technology.

5.2.3. The NDC shall develop and control the implementation of technically optimum operating conditions, schedules and network diagrams for the unified operation of the dispatching communication system.

5.2.4. The NDC shall check the technological methodology of information and communication systems and the compatibility of equipment and technology, evaluate the technology to be newly installed or used in expansion and give relevant permission. (Please check: I did not see when and what kind of permission is given by NDC. If it is really missing then remedy it)

5.2.5. The NDC shall involve the relevant units and personnel of the other Licensees in ensuring the consistency of the dispatching communication system, and together with the Licensees shall carry out assignments to implement modification, equipment renovation and to take other necessary measures within the scope of planned measures, and check their implementation.

5.2.6. When it is required to eliminate breakage and failures within the scope of operations NDC has the right to call on the personnel of the relevant units of the Licensees to work in their work places and recover normal operations.

5.2.7. NDC Shall be responsible for the equipment and cable lines from the first indicator(?) of the control and information system (SCADA) to the information processing controller's panel (RTU) and also for their maintenance.

5.2.8. NDC has the right to make the other Licensees provide data and information required for the dispatching communication system and to get the information processed according to the prevailing information and communication technology.

5.2.9. NDC shall plan and organize measures for improving the utilization of the dispatching communication system, and for retraining programs, workshops, meetings and other comparable measures related to the requirements imposed by the information and communication technology.

5.3. Rights and Duties of Other Licensees with regard to Information and Communication Integrity

5.3.1. The Licensees working as components of the grid shall have professional divisions, units and personnel in charge of their dispatching communication systems and for information and communication technology.

5.3.2. Divisions, units and personnel of the Licensees in charge of dispatching communication systems shall provide of dispatching communication systems for which they are responsible and in accordance with provision 10.3.7.

5.3.3. Dispatcher of the NDC shall be informed 2 days prior to carrying out any maintenance or changes to equipment and circuits located between the first indicator of

the control information system (SCADA) and the current, voltage transformer and relay protection panel.

5.3.4. The Licensees shall adhere to the technological regime, diagrams and schedules for the integrated operation of the dispatching communication system and shall reflect them in their activities.

5.3.5. The Licensees shall study the needs and requirements of the dispatchers' communication system, their long term development prospects and expansion and renovation requirements and develop proposals for inclusion in the integrated plan or program and, in agreement with the CIU of the NDC and other associations of the Licensees, information units and divisions, shall take part in regulation activities and shall bear the associated responsibilities.

5.3.6. Issues related to information and communication technology or influencing dispatchers' communication shall be reported to the CIU of the NDC and actions shall be taken on the basis of mutual agreement.

5.3.7. Data and information necessary for information communication technology and dispatchers' communication shall be properly processed in due time and submitted to the CIU of the NDC. The Licensees can obtain necessary data and relevant information from the CIU of the NDC by providing justification for such need.

5.3.8. In accordance with the requirements of the information and communication technology NDC and other Licensees can place equipment required for dispatching work in the working places of other Licensees, and the Licensees in whose premises they are located shall be responsible for the integrity, operation and servicing of such equipment. In case of damage proved to be caused by the fault of an employer or officer of that organization the organization shall reimburse the costs for rehabilitating the communication and information means to the NDC.

5.4. Requirements on Relay protection and Automation of the Grid and Relay Protection Settings

5.4.1. General Provisions

5.4.1.1. The purpose of this chapter is to define the principles of control by the Relay Protection and Automation Unit of the NDC over the relay protection and automation controls of generation, transmission and distribution entities; and for the coordination of relations among the grid entities in estimating the settings for relay protection and automation.

5.4.1.2. Regardless of ownership type, the relevant personnel in the subordinate levels of relay protection and automatic control of the Licensees shall implement the decisions and assignments concerning relay protection and automatic control, give feedback, and work in mutual coordination.

5.4.1.3. The NDC shall provide the Relay Protection and Automation units and divisions working in the components of the grid with unified management; and the power plants, transmission and distribution companies' units shall operate in a co-ordinated vertical hierarchy of dispatching management.

5.4.2. Rights and Duties of the Relay Protection and Automation Unit (of whose? NDC or Licensees? The best would be both of them in separate points like in the Chapter 4)

5.4.2.1. The Relay Protection and Automation Unit shall exercise constant control over the conditions of operation of the relay protection and automation of the main equipment forming the grid, and conduct a comprehensive review of emergency operations.

5.4.2.2. The Relay Protection and Automation Unit shall organize provisions for the normal operation of relay protection and automation and for the rectification of any damage in good time. The Unit shall check the implementation of its decisions / assignments.

5.4.2.3. The Unit shall require the Licensees to report data and information needed in analyzing relay protection and automation, diagrams, instructions and other estimation materials concerning relay protection and automation.

5.4.2.4. The Unit shall review the maintenance orders for the relay protection and automation of the equipment at the disposal of the NDC and give its suggestions on the scheduled maintenance, disengaging the relay protection and automatic controls, or connecting them to operations.

5.4.2.5. The Unit shall review the maintenance schedule of relay protection and automation of the main equipment forming the grid, have it approved by the NDC chief engineer, and control the maintenance.

5.4.2.6. The Unit shall have the right to examine, by visiting the relay protection and automation facilities, the completion and security of diagrams, technical documents, instructions and procedures for relay protection and automation and the condition of operation of the automation.

5.4.2.7. The Unit shall estimate the settings, within fixed boundaries, of relay protection and automation and conduct settings regulation together with relevant organizations.

5.4.2.8. The Unit shall identify the issues related to the operation of relay protection and automation, reflect them in the NDC dispatching work instructions, rules and procedures, and provide operational rules and instructions.

5.4.2.9. The Unit shall organize professional training, seminars and meetings among relay protection and automation engineers of the grid to exchange experiences.

5.4.2.10. The Unit shall control issues such as changes in relay protection and automation circuits of the grid, launching technical renovation, installing additional protection, and shall make appropriate policy level decisions.

5.4.2.11. The Unit as a united team of the relay protection and automation engineers of the main equipment / facilities of the grid shall work at the management level.

5.4.3. Boundaries of Adjustment of Relay Protection and Automation Settings

5.4.3.1. The NDC shall estimate the settings of the relay protection of 6-220 kV voltage network connecting the central region and the thermal power stations that work in parallel with the region, and of 110 and 220 kV lines and equipment, supplied from one side.

5.4.3.2. The estimations of the settings of the main protections of power plant generators and transformers, their internal equipment which is included in the

scope of these main protections, and the relay protection of 110/35kV transformers for internal use should be made.

5.4.3.3. The impedance of 3 phase short circuit at the 35kV and 6kV busbar, required for relay protection and automation settings of the internal use of the plant, and at the 35 and 10/6/ kV busbar of substations that feed electricity distribution companies, should be estimated for maximum and minimum load operating conditions.

5.4.3.4. Power plants shall do estimations of the back-up protections for the 6 kV terminals of the 6/10 kV standby and internal use transformers.

5.4.3.5. Estimations of the settings of the relay protection, automation and melting fuses of the main and back up input terminals and lines of 0.4 kV internal use section supplies, 6 kV sectionalizers, 0.4 kV automatic controls, 6 kV and 0.4 kV engine protections, 6/0.4 kV transformers and other 6-0.4 kV electrical equipment shall be made.

5.4.3.6. CRETCo. shall make the estimations of relay protection settings of the internally used equipment of substations.

5.4.3.7. Distribution companies shall make the settings estimations of 6-35kV lines and equipment supplied from one side that originate from power plants and 110-220 kV substations owned by the respective distribution companies; and voltage lines and equipment that are to be newly put into operation.

5.4.3.8. Every time the settings of 6-35kV lines and network going out from the busbars of power plants and 110-220kV substations are newly estimated, the NDC shall be officially notified in accordance with the requirements of settings regulation.

5.4.3.9. When power plants and the transmission company deliver new estimations of the relay protection settings of outgoing 6-35kV lines, they shall reflect the settings regulation that was implemented with the NDC.

5.4.3.10. The 3 phase short circuit impedance of the system at the required busbar shall be estimated in order that customers can estimate the relay protection settings of their own lines and equipment.

5.4.3.11. The NDC shall make estimations for the relay protection settings of lines and equipment owned by outside customers but supplied by either one of the busbars of power plants, CRETCo. or distribution companies.

5.4.4. Regulations for estimating relay protection settings.

5.4.4.1. The following regulation shall be adhered to in estimating the relay protection settings:

5.4.4.2. The relay protection settings estimations shall be made based on the drawings of the equipment in accordance with the officially approved outline that includes normal operating conditions in both summer and winter, and the connection for distribution which provides for the reliable operation of electric equipment used by power plants and CRETCo.

5.4.4.3. Data, diagrams, drawings and other documents, including load etc. required in estimation of relay protection and automation settings, shall be provided by the respective companies and organizations.

5.4.4.4. Shall have relevant companies estimate the emergency peak load of 220, 110 and 35kV lines supplied from two sides (active, reactive load amount, direction, and angles) and use the estimations.

5.4.4.5. Make estimations based on drawings of lines and equipment to be put into operation and on the approved outline for connection time and for normal functioning.

5.4.4.6. Require the organization to place the order to prepare relevant technical documents, data and proposals on the main connection in relation to the object being put into operation.

5.4.4.7. Regulation of the relay protection settings at the ownership boundaries shall be made with relevant organizations from both sides.

In general my opinion is that the point 5.4.2-5.4.4 is much more than it is needed in a Grid Code. These are like internal operational instruction of old central vertical integrated electrical system. It would be much better to write this relay and automatic topic like the communication topic is written in points 5.1-5.3. The aim of this section is to ensure the reliable operation of Relay protection and automation of the Grid with principle and not setting them

5.5. Protection from Overloading and Lightning

5.5.1. Power plants, substations and electricity transmission and distribution organizations shall have overloading protection schedules for each of their distribution facilities. In addition, it is appropriate to have warning and study information available on the parts of the overhead electricity transmission lines that are most prone to lightning; located in areas with poor current conducting soil; with polluted dielectric; where transmission lines cross each other, and where they cross with communication and radio broadcasting lines and with railway automatic protection lines. Outdoor distribution facilities shall each have lightning protection, a pole for lighting, and have sample drawings showing in black the current conducting parts located in areas of high structures which are made of metal and reinforced concrete.

5.5.2. Each year before the season of lightning undertake inspections of distribution facilities and the status of protection of electricity transmission lines from over-voltage; and ensure availability of their protection from lightning and internal over-voltage.

5.5.3. All voltage non-linear resistor type arresters shall be made available for operation. Only for the threat of over-voltage during lightning in the regions with sharp temperature changes due to strong wind and frost, or with strong pollution, may non-linear resistor type arresters be disconnected in outdoor distribution facilities during some months of winter.

5.5.4. It shall be appropriate to undertake the following actions while using non-linear resistor type arresters:

a) connect equipment, where the arrester is connected, into the network and before taking for repair or maintenance check the impedance of the arrester with a megohmmeter;
b) current conducting capacity of electric arc non-linear resistor type arrester with magnetic switch shall be measured by once-through (straight) voltage. Apart from taking this measurement once in 6 years, the measuring shall take place if it is revealed that the impedance change of the arrester is 30% or over.

c) If the changes measured by megohmmeters are 30% or over, the PBC-15-220 type arrester's current conducting capacity shall be measured.

5.5.5. Whether or not it is required to undertake capital repair works on non-linear resistor type arresters shall be determined by test results and inspections.

5.5.6. The space between expulsion type arrester and protection should be inspected during the circulation of electricity in transmission lines. It is appropriate to record in the circulation reporting paper each time an arrester began operating. Taking the expulsion type arrester from the support and its checking shall be carried out once in 3 years. Inspections on the upper side of the expulsion type arrester without taking it down from the support, and additional inspections of expulsion type arresters located in zones with high pollution, shall be conducted in accordance with the organization's instructions.

5.5.7. It is allowed to use overhead and cable lines with grounding in the network with dielectric neutral or facilities for compensating shortages or surpluses in the capacity current (compensation). In order to identify faltering areas operational staff shall urgently enter and eliminate it in the shortest time.

5.5.8. In case of the capacity current during grounding exceeding the following rates it shall be appropriate to reduce it using arc-suppression-coil apparatus:

- Nominal voltage of electricity lines (kV) – 6, 10, 15-20, 35 and over;
– Grounding of the capacity current (A) – 30, 20, 15, 10.

Arc-suppression-coil apparatus must be used, in cases of the capacity current exceeding 5A during grounding of block scheme (generator voltage) of generator transformer. Arc-suppression-coil apparatus shall be used if the capacity current of a 6-35 kV network with overhead lines with reinforced concrete or metal support exceeds 10 A during grounding. After grounding, manual or automatic adjusting grounding arc-suppression-coil reactor (arc-suppression-coil wire) shall be used in the network for the purpose of reducing the capacity current. It is allowed to use unregulated arc-suppression-coil reactor in the block scheme of the generator-transformer.

5.5.9. When an arc-suppression-coil apparatus is put into operation, or substantial changes take place in the operating conditions of the network, the capacity current, arc-suppression-coil reactor's current, grounding current and neutral transient voltage shall be measured. This shall be done at least once in 5 years.

5.5.10. The power of an arc-suppression-coil reactor shall be chosen by the capacity of the current estimated in correspondence with the future development of the network. Grounding arc-suppression-coil reactors must be installed in substations connected to the network of not less than 3 electricity transmission lines with compensation. It shall be prohibited to install arc-suppression-coil reactors in the substation at the end of the line. Arc-suppression-coil reactors shall be connected through switches to the neutral of transformer, generator and synchronous compensator. In order to connect the arc-suppression-coil reactor mostly transformers connected by the star and triangle scheme of wiring shall be used. For connecting arc-suppression-coil reactors to the transformer it shall be prohibited to use melting fuses.

It shall be appropriate to connect dielectric input terminals in the arc-suppression-coil reactors designed for grounding through current transformers within the general confines of grounding.

5.5.11. An arc-suppression-coil apparatus must have a resonance adjuster. After grounding it is possible to adjust with over compensation not exceeding current reactive part of 5A. However the adjustment degree should be 5%. In case of a big difference between currents of parallel branches of arch-suppression-coil apparatus installed in 6-20

kV network, adjustment can be made with the reactive part, and during grounding it is possible to adjust maintaining this current below 10A. In case of the capacity of the current being below 15A in network of 35 or more kV during grounding, it is allowed to have differences of less than 10% in adjusting. If during any accidents (e.g. wire cut, burning of melting fuse), network phasing becomes asymmetrical, and transient voltage at the neutral is not exceeding 70% of the voltage in phases, it shall be allowed to use adjustments with deficit compensation in network cable or overhead lines.

5.5.12. In the network operating with capacity current compensation, asymmetrical voltage shall not exceed 0.75% of phase voltage. When grounding did not take place in the network, transient voltage at neutral shall not exceed the following % of the phase voltage:

- for long periods 15%
- during 1 hour 30%

In order to reduce the asymmetrical voltage and transient voltage at neutral down to the specified levels the capacity of the network phasing shall be equalized (by means of exchanging the places of phase wires, and by placing high frequency communication condensers between line phasing).

5.5.13. In cases using manually adjustable arc-suppression-coil reactor of the current, an adjusting device shall be used for measuring adjustable difference of the current. In cases lacking such, it shall be done considering transient voltage at neutral, based on measuring earthing current, capacity current and compensation current.

5.5.14. In cases of the unintentional occurrence of neutral displacement in 110-220 kV substations, or for prevention of dangerous processes of ferro-resonance, dispatching work shall start by grounding the neutral of the transformer connected to the busbar of the unloaded system with NKF-110 and NKF-220 voltage transformers.

Before separating an unloaded system busbar with NKF-110 and NKF-220 voltage transformers, the neutral of the feeding transfomer must be earthed.

Unintentional displacement of the neutral of 6-35 kV voltage network, and at connections, should be prevented and if required relevant actions must be taken.

5.5.15. Unused low (medium) wires of transformers and auto-transformers shall be connected by star or triangle connection and shall be protected from over-voltage.

It shall be appropriate to protect unused wires of low voltage located between wires of higher voltage by arresters connected to the input terminals of each of its phases. If low voltage wire is permanently connected with cable lines of more than 30 meters protection shall not be needed. In other cases it shall be appropriate to protect unused wires of low and medium voltage by grounding its one phase or neutral, or by connecting an arrester to each input terminal of its phases.

5.5.16. In 110 or more kV voltage network, when disconnecting the neutral of 110-220 kV wires of transformers from earthing, as well as for choosing relay protection and automatic operation of the system, first of all it shall be carried out by not leaving any part of the network isolated with a transformer for which neutral is not grounded during the various actions and automatic disconnection.

Over-voltage protection of the neutral of transformers with dielectric levels being lower than the network input terminal shall be done by a non-linear resistor type arrester.

5.5.17. During switching and emergency operating conditions in the 110-750 kV network, the increase in voltage in generation equipment (50Hz) and its duration shall not exceed the following:

Voltage Rate [equipment]		**Allowed time of over−voltage**			
		1200 sec	20 sec	1 sec	0.1 sec
110-500 110-330 110-500	Production transformers and auto−transformers, reactor, electromagnetic voltage transformers, switching apparatus, capacity transformers of voltage, current transformers, bond compensators, and busbar supports	1.10 1.10 1.15 1.15 1.15 1.15	1.25 1.25 1.35 1.35 1.60 1.60	1.90 1.50 2.00 1.60 2.20 1.60	2.00 1.58 2.10 1.65 2.40 1.80

Note:

- In the numerator - the maximum operational phase voltage in the insulator between phase and ground
- In denominator - the maximum operational phase voltage in the insulator between phases (3-phase structure equipment)

5.5.18. When compared to voltage rate in wire branches by the heated condition of an electromagnetic conductor of power transformer and auto-transformers it shall not exceed 1.15 in 1200 seconds, and 1.3 in 20 seconds.

5.5.19. It shall be appropriate to have a break of not less than 1 hour between voltage increases of 1,200 seconds.

REMARK is the same as it is after the point 5.4 Relay protection and automation. These text is like a standard or operational rules. It is enough to write that the Licensees should follow the technical standards to ensure the reliable operation of grid. Be careful not to copy irrelevant topics (e.g. in point 5. 5.17 "During switching and emergency operating conditions in the 110-750 kV network…." During switching and emergency operating conditions in the 110-750 kV network,

Chapter Six: SYSTEM OPERATION

6.1. Voltage level and reactive power adjustment
6.2. Implementing rehabilitation work when the system is fully shut down
6.3 Plan for Rehabilitating the Grid from a Domestic Source in Case of Blackout of the Central Region Grid
6.4 Developing and implementing the schedule for disconnecting and/or restricting clients

6.4.1 General Provisions
6.4.2 Types of Disconnections and Restrictions
6.4.3 Developing a schedule to disconnect and/or restrict clients
6.4.4 Implementing the schedule of disconnection and/or restriction of customers

Chapter Six: System service

6.1. Adjusting Voltage Level

6.1.1. Based on the grid stabilisation estimations the NDC shall set emergency voltage limits to be maintained at control points of power plants and main substations.

6.1.2. In cases where the voltage limit is not set at control points or at other bus points the permitted minimum emergency limit of voltage shall be considered equal to 90% of busbar voltage.

6.1.3. In cases when the grid voltage drops below the permitted minimum level, the dispatching personnel of all levels shall, without waiting for the decision of the NDC dispatcher, independently take measures such as increasing the reactive power of electric generators, decreasing the use of reactive power by reactive power compensating equipment (reactor, compensator etc.), and even disconnecting such equipment. If equipment is overloaded the overload period should not be exceeded and the superior dispatching management shall be informed about it.

6.1.4. In case of any generator being disconnected from the grid due to a deep decline in the voltage level, dispatching personnel shall urgently connect the generator back to the grid, and after full loading with reactive load shall connect active load without exceeding the normal current of starters and rotors.

6.1.5. In cases of the voltage level exceeding the permitted level at the control points of the grid as well as at the busbars of the power plants, dispatching personnel shall inform the top dispatching management and at their decision shall reduce it by reducing generator excitation and connecting reactive power compensation equipment. For the purpose of reducing the voltage of the grid, long electricity transmission lines shall be disconnected at the decision of the NDC dispatcher.

6.1.6. In cases of alteration in the voltage level beyond permitted limits at substations other than those specified in 6.1.5 of this chapter, dispatching personnel shall adjust the voltage level using equipment under their management control and use.

6.1.7. The dispatcher of the NDC shall be obliged to undertake constant control of the voltage level at the defined control points and adjust it using the back-up reactive power of the grid and its compensation equipment. The Dispatcher, for the purpose of adjusting the voltage level, can promptly change transformation coefficient of its own transformers.

6.1.8. Apart from managing and organizing the work on adjusting the voltage level to the normal limits by terminating its excessive rise and fall, the dispatcher of the NDC shall identify the causes of deviation and take measures for avoiding its repetition; and when necessary shall cooperate with dispatchers of foreign systems.

6.2. Implementing Rehabilitation Works When System is Fully Shut Down

6.2.1. In case of loss in grid stabilisation of the central region and blackout, voltage shall be obtained from the Russian Federation and a plan for rehabilitating the grid shall be implemented.

6.2.2. The Dispatcher-engineer of the NDC shall inform the relevant management about emergency loss of stable operation of the grid or reaching blackout.

6.2.3. NDC Dispatcher-engineer shall contact the main nodal parts for the purpose of identifying the reason for blackout in the grid, have them carry out inspections, define whether or not any protections worked, lines and equipment were cut off or stations disconnected and review and draw conclusions.

6.2.4. Identify broken equipment and parts, cut them from the grid and take measures for their isolation/separation.

6.2.5. Take measures for eliminating threats to people or equipment.

6.2.6. Disconnect Darkhan sectionalizers of SD-257, and SD-258 lines of 220 kV substation and have them prepare a scheme for receiving voltage.

6.2.7. Inform the dispatcher of the Buryat Energy Station of the Russian Federation about blackout in the grid, receive voltage and agree upon the amount of capacity to be imported.

6.2.8. Thoroughly check scheme connections of the grid at each bus and prepare them for receiving voltage.

6.2.9. Rehabilitate the scheme connection of Darkhan substation.

6.2.10. Rehabilitate the electricity scheme connections of other substations and thermal power plants of the grid and renew electricity supply to customers.

6.2.11. Rehabilitate Thermal power plants and start operating boilers and turbine-generators.

6.2.12. Start operating network pumps of the cities with central heating supply systems and let pressure out.

6.2.13. Fully rehabilitate thermal power plants and restore them to their normal operating conditions as before the emergency.

6.2.14. Bring the grid to the post-emergency reliable scheme situation and optimal operating conditions.

6.2.15. Define the status and whether or not it is possible to connect equipment that was damaged or disconnected during the emergency and have them repaired.

6.2.16. Inform the management about the rehabilitation of the grid and re-commencement to operate under normal optimal operating conditions.

6.2.17. After resolution of the emergency situation submit a statement to the dispatching personnel in charge of the emergency situation on the cause of the emergency, and actions taken to overcome it.

6.2.18. Determine the cause of the emergency, draw conclusions and take relevant measures.

6.3. Plan for Rehabilitating the Grid from a Domestic Source in Case of Blackout of the Central Region Grid

6.3.1. In the extreme situation of complete blackout in the grid of the central region and the impossibility of rehabilitating it by obtaining voltage from the Buryat Energy Station of the Russian Federation (eg. support pole falls), the following rehabilitation activities shall be undertaken:

6.3.2. The minimum capacity required for rehabilitating one boiler and turbine-generator of thermal power plants working as components of the grid shall be newly determined each year.

6.3.3. The NDC shall set the capacity of a source which has the required internal use capacity for rehabilitating boiler turbines of any one thermal power plant, and the authority in charge of energy (Ministry of Infrastructure) shall decide the location of the particular plant.

6.3.4. The plant, where equipment for supplying the internal use and rehabilitating the plant is located, shall be responsible for the availability of schemes for electricity, steam and water required for the limited rehabilitation of the plant's internal use.

No	Plant	Capacity mW
1	Thermal Power Plant II	0.6-1.0
2	Thermal Power Plant III-low/medium pressure	3.1
3	Thermal Power Plant III-high pressure	6.2
4	Thermal Power Plant IV	21.0
5	Darkhan TPP Co.	2.9-4.5
6	Erdenet TPP Co.	1.1-1.7

6.3.5. Technical procedure for rehabilitating medium pressure part of TPP-III:

A) Setting Fire at Boiler
1. Give voltage to internal use section from outdoor generation source with capacity of over 3.1 mW;
2. Start operating one pump in the pumping station;
3. Connect technical water pump, ash sluice pump, black product pumps;
4. Check level of boiler and de-aerator, operate feed pump and supply water to boiler;
5. Set fire in boiler by compressed air.

In order to do this: a) start smoke sucker;
b) start ventilator;
c) provide dust to boiler.

6. In setting fire in the boiler, open all valves of turbine-generator up to its stopor's valve and double heat. Also Reduction Heating Equipment (RHE) can be heated and steam can be provided for internal use and network boiler.

B) Starting turbine-generators
1. Start circulation water pump;
2. Start turbine condensation pump and reach condensation level;
3. Connect ancillary ejector and release vacuum in turbines;
4. Completely warm the steam lines and start circulation in turbines;
5. During specific stages of turbine circulation undertake control of the difference in heat of the top and bottom cylinders as well as tremor; and connect the generator to the network.
6. Give load to generator and adjust and keep the frequency;
7. Take measures for starting other boilers and turbines of the plant.

6.3.6. In winter it is appropriate to pay special attention for maintaining the network pressure by operating the network pump.

6.3.7. After rehabilitating the medium pressure component of TPP-III, provide voltage for internal use of the high pressure component and TPP-II and rehabilitate them; and prepare to provide steam to TPP-IV.

6.3.8. Depending on the electricity load of TPP-III, provide voltage to TPP-IV for internal use and by receiving steam from TPP-II it will be fully possible to restart the TPP-IV.

6.3.9. Rehabilitate and load the plants working in the Ulaanbaatar region, provide voltage to Darkhan and Erdenet regions and thus rehabilitate Darkhan and Erdenet power plants.

6.4. Developing and Implementing the Schedule for Disconnecting and/or Restricting Customers

6.4.1. General Provisions

6.4.1.1. The purpose of this chapter is to determine relations between the NDC, power plants, transmission and distribution network, suppliers and customers during capacity or energy shortages in the grid, their rights and duties, procedures to switch users and the ways to implement the procedures.

6.4.1.2. In the following cases, users shall be switched off or restricted:

- capacity shortage in generator entities of the grid, caused by faltering supply of fuel and water;
- outage of large capacity equipment due to accidents;
- loss of parallel operation with energy system of Russian Federation;
- capacity or energy amount of import from foreign energy systems exceeding the levels agreed upon by contracts;
- grid frequency drops below allowed rate, caused by capacity shortage of the grid;
- situations when it is needed, during accidents to the grid, to provide for the stable operation of the grid, for quick rectification of an emergency without aggravating the condition and situations when human life is threatened or equipment conditions beyond allowable rates are created;
- rapid drop of voltage in the whole of the grid or in parts of it, reaching the minimum allowable rate with no amelioration from measures taken to increase voltage.

6.4.2. Types of Disconnections and Restrictions

6.4.2.1. Electrical energy restriction of users (KWh)

When the power plants working with the grid have faltering fuel and water supplies for a prolonged period of time, an energy capacity shortage is created, or a restriction or complete cutoff of energy import is due to some obvious reason, this type of restriction is implemented according to [restriction] schedules.

6.4.2.2. Capacity restriction of users (MW)

If import energy capacity is about to exceed the contracted level due to capacity shortage of the grid, a restriction is implemented according to [restriction] schedules.

6.4.2.3. Disconnecting the main nodal points of the grid

If a situation of inevitable emergency is created in the grid or a sudden capacity shortage occurs, and a part or the whole of the grid is separated or divided causing the frequency in one of the parts to drop below 49.0 Hz and making it impossible in terms of time to restrict users according to the schedules, then, without notifying

customers in advance, a restriction is directly implemented or takes place through the operation of emergency automatic controls.

6.4.2.4. Automatic offloading equipment driven by frequency change (AchR-1) prevents rapid drop of frequency caused by large shortage of capacity. Once the frequency has dropped due to the system capacity shortage, automatic action (AChR-2) takes place to decrease the frequency drop and stabilize the frequency based on the optimal operating conditions estimates.

6.4.2.5. Schedule for local offloading:

When some part of the grid is disconnected from the rest of it, causing capacity shortage, restrictions are implemented as specified in 6.4.2.1 above.

6.4.3. Developing a Schedule to Disconnect and/or Restrict Clients

6.4.3.1. Based on the estimated emergency optimal operating conditions of likely capacity shortage of the grid, NDC shall develop the schedules mentioned in 6.4.2.1 of this chapter in agreement with other Licensees and have it approved by the Regulatory Authority. However, the schedules of automatic offloading, restriction and disconnection of a local nature shall be developed by the licensed distribution entity of the aimag and approved by the aimag regulators' board.

6.4.3.2. The Distribution Licensees shall develop restriction and disconnection schedules twice a year for winter and summer and submit their proposals to the NDC.

6.4.3.3. The following must be included in the restriction and disconnection program:

- names of users/clients;
- names of lines and feeders serving the users;
- demand amount (MW) and daily electrical energy consumption (kWh) of users;
- the amount of capacity and energy that will be cutoff, the start and finishing time of the restiction or disconnection;
- names of officials who will personally implement the restrictions and disconnections; their contact phone numbers.

6.4.3.4. The customer places where human lives can be threatened or serious damage can be inflicted on their operation due to restriction or disconnection should have their own back up [power] sources. The Energy Regulatory Authority shall approve a list of these customers classified in the order of priority.

6.4.3.5. The licensed distribution entities together with the customer who will undergo restriction and disconnection shall determine the technological and emergency shields of the customer and put their findings in their mutual contracts.

6.4.3.6. In developing schedules of direct disconnection of the electricity distribution lines going out from substations, it is suitable to choose substations with automated control systems or constant duty personnel in the first place.

6.4.4. Implementing the Schedule of Disconnection and/or Restriction of Customers

6.4.4.1. In cases of serious capacity shortage in the grid or conditions leading to complete failure of the grid operation NDC dispatchers shall control and implement a schedule of restriction and disconnection of customers.

6.4.4.2. The NDC's dispatcher's decision shall indicate the continuation period start and end time, capacity and energy of restriction and disconnection.

6.4.4.3. Other detailed provisions related to a schedule of restriction and disconnection shall be included in the contracts made between the Licensees and customers.

6.4.4.4. During accidents of local nature, the dispatching personnel of the Licensee of distribution shall implement the restriction and disconnection schedule according to the approval of the aimag regulators.

Chapter Seven. BALANCE REGULATION AND NETWORK LOSS ESTIMATIONS

7.1. CRETCo. shall submit to the NDC estimations of the monthly kWh balance and loss of its 110-220 kV line network together with the electricity consumed for the internal use of substations before the 10^{th} day of the following month.

7.2. Electricity distribution companies shall estimate the monthly loss of their 0.4-35 kV network, compiling them and submitting to the NDC before the 10^{th} day of the following month. Also 35 kV substations and 6-10 kV distribution facilities shall submit the amount of electricity consumed for internal use.

7.3. TPP, CRETCo., and electricity distribution companies shall balance (?) and process active and reactive capacity measures for winter and summer and within half a month after the measuring took place shall submit the processed materials on measuring of 6-220 kV line network to the NDC.

7.4. CRETCo and the electricity distribution companies shall, using their own estimation software, submit yearly loss norm-determining estimates based on the results of estimations of electricity losses for each month, and estimations for high load winter and low load summer periods. The estimates should be reported before the 20^{th} of October and be reviewed by the Unit of Optimal Operating Conditions and Estimations of the NDC; and annual electricity loss norms and standards should be determined by the Energy Regulatory Authority.

7.5. The losses of 110-220kV lines shall be allocated according to the approved methodology, adhereing to ownership boundaries among branches of CRETCo.

7.6. Estimation of electricity transferred to the Electricity Distribution Network Co and CRETCo. within the reported month shall adhere to the approved estimation methodology.

7.7. The electricity distribution network companies shall determine their consumption orders by week, month and quarter in kWh, kW units, and within due time, as specified by the NDC, shall submit them to the Unit of Optimal Operating Conditions and Estimations and shall reflect and implement them in daily, monthly and quarterly optimal operating conditions. In case of sudden rise and decline in consumption, it shall be informed in advance and shall have them reflected in estimations for operating contitions and daily load schedule. Orders for the following week shall be placed on Wednesday of the preceeding week, orders for the following month shall be placed by

the 20th day of the preceeding month, and orders for the following month shall be placed by the 20th day of the preceeding month of the start of the quarter.

7.8. CRETCo., and the electricity distribution network companies shall submit to the NDC the draft plan for purchase of electricity for the upcoming year by 10th of August, and the final yearly plan by the 1st of October each year.

7.9. Based on orders, estimations, measurements, study and data provided by the CRETCo. and the electricity distribution network companies, the NDC shall regulate the optimal operating conditions, summarise and develop indicators, make conclusions and provide reports and information to the relevant authorities.

7.10. The NDC shall identify problems in providing accurate data for electricity balancing and improving detailed estimations of electricity network loss; and shall have these resolved.

7.11. The NDC shall make estimations and draw conclusions on the electricity balance and related loss estimations in cases of new construction and/or expansion of the electricity network and/or power plants.

Chapter Eight. PLANNING AND REGULATION OF DAILY OPERATIONS

8.1. Planning of daily operations of the grid
8.2. Dispatching regulation and reliable operation of the grid

8.1. Planning of Daily Operations of the Grid

8.1.1. Based on the actual orders for grid utilisation (daily, monthly, quartely and yearly) and its assumptions the NDC shall analyse different options, and design a final distribution for daily, monthly, and quarterly optimal operating conditions using the final optimum alternative.

8.1.2. Daily control for sustaining the optimal operating conditions of the grid and analysis of the consumption diagrams shall be carried out and in each case when diagrams provided by power plants are being deviated from, conclusions shall be made and responsibilities allocated according to the contract.

8.1.3. Based on the preliminary annual forecasts of the grid consumption the capacity balance shall be estimated, diagrams for annual repair works of the main equipment of the parts forming the grid shall be reviewed and approved by the Central management, and they shall then be reflected and implemented in the optimal operating conditions estimates.

8.1.4. The generation, transmission and distribution companies shall make electricity balances within their own network, estimate their losses and deliver the results to the NDC by 5th of each month. It is not a daily planning: The different planning process should be clearly describe seperately. The NDC shall make general balancing of the grid, check the general balance of the grid and undertake necessary control.

8.1.5. These companies shall use modern metres of the same make and high precision in estimating the electricity in detail and in controlling energy balancing.

8.1.6. At 24:00 of last day of each month, the meters shall be read simultaneously and the amount of energy to be transmitted and distributed shall be estimated. (Be careful: it was mentioned in Chapter 3. Please harmonize them)

8.1.7. Basic indicators of optimal operating conditions of the grid shall be recorded on a regular basis and an information base shall be established.

8.1.8. Other Licensees working as components of the grid shall be obliged to supply the NDC with data, drawings and diagrams required for estimating the optimal operating conditions of the grid, relay protection, and automation settings in due time.

8.1.9. In case of anticipated changes to the principal diagram and operating conditions of the grid, work orders for adjustments to the equipment under the control of and at the disposal of the NDC shall be reviewed and, if necessary, further required measures shall be planned and approved.

8.1.10. The NDC shall Develop optimal diagrams for connecting electricity facilities for different seasons of the year; and for making new connections to the electricity network.

You can make a new point "General planning method" if you wish for all type of plannings.

8.2. Dispatching regulation and reliable operation of the grid

8.2.1. The NDC's dispatcher shall be mainly responsible for the daily stable dispatching and reliable operation of the grid and shall exercise the following rights and duties:

8.2.2. Dispatchers shall control the maintenance of the given optimal operating condition by the entities operating as components of the grid, and provide the dispatching personnel of these entities with a unified management for 24 hours a day.

8.2.3. Dispatchers shall promptly regulate, depending upon the demand of electricity and heat, the load distribution among power plants operating as components of the grid.

8.2.4. Dispatchers shall not exceed the capacity and energy quantity of imported energy beyond the planned level.

8.2.5. During switching of the equipment under the control and at the disposal of the NDC, dispatchers shall provide the relevant dispatching personnel with dispatching management.

8.2.6. Shall make conclusions on the operation of the grid and shall implement the given operating conditions in the most optimal and economical way.

8.2.7. Shall take all measures not to lose the static and dynamic stability of the system.

8.2.8. Shall control the technical operations and required tests to connect new electrical equipment to the grid and provide with dispatching management.

8.2.9. Shall directly manage the rectification of accidents and obstacles occurring in the grid and has the right to mobilize all possible manpower and equipment from the Licensees forming the grid.

8.2.10. Shall make changes in the equipment of the secondary circuit of the grid (?) in accordance with relevant instructions.

8.2.11. Shall conduct emergency excercises involving dispatching personnel of the entities forming the grid, at least twice a year.

8.2.12. Shall check in a timely manner the producing and safekeeping of dispatching work instructions and switch programs by the grid component entities; and require the production of such documents by the entities and their keeping the documents in work places.

8.2.13. Shall record and maintain, according to fxed procedures, the dispatching (hourly, daily, monthly, and yearly) information and the information of national statistical nature.

8.2.14. Shall cooperate with other legal entities in analyzing grid emergencies and interruptions and producing official documents on the emergencies.

8.2.15. Apart from making decision on connecting or disconnecting the equipment under the control and at the disposal of the NDC, shall give the final decision on changing them over to standby or maintenance.

8.2.16. Shall develop dispatching work instructions of parallel operation with the grids of foreign countries and shall have them approved by the Central management and adhere to them in operation.

8.2.17. NDC Dispatchers shall have the right to immediately disconnect relevant parts of the grid without agreeing with other legal entities when conditions are created for static or dynamic instability of the grid, serious damages to equipment of the Licensees running as the grid components, endangered human lives, deliberate violating of the given operating conditions, or loss of normal operation of a foreign country system working in parallel with the grid.

8.2.18. If this code or the dispatching work discipline is violated, NDC dispatchers have the right to dismiss, during the shift, the dispatching personnel working in any part of the grid.

Chapter Nine: RULES FOR CROSS BORDER SYSTEMS OPERATION IN PARALLEL

9.1. In order to provide stable operation of the grid it shall be operated in parallel with the energy system of the Russian Federation.

9.2. The main purpose of parallel operation is higher quality of frequency in the grid, and provide for capacity shortages if they occur.

9.3. NDC shall plan and implement the capacity and energy flow of international lines.

9.4. Technical and commercial conditions related to purchasing electricity from the Russian Federation shall be regulated by a special contract.

Please write the duties of NDC and Licensees – first of all the power stations – to follow the rquirements of cross border parallel operation in harmony with the technical conditions in special contract.

Chapter Ten: REPORTING AND COLLECTING INFORMATION AND DATA

10.1. Within 1 hour into a shift, the dispatching personnel of the other Licensees working as component parts of the grid shall give a specific report to the NDC dispatcher, after thoroughly surveying and analyzing the operation in the entity.

10.2. Dispatchers of the other Licensees working as component parts of the grid shall get comprehensive reports from substations and entities subordinate to them, make clear and brief conclusions on the situation of special customer schemes, disconnected clients, maintenance and ordered works, and report to the Dispatcher of the NDC, including a plan of measures to be taken during a potential accident. You should determine the substations which give report e.g. 35 kV and higher or transmission network (like in the next point) or in anything other way..

10.3. If Dispatchers of power plants, transmission network of UBDHCo. and dispatching personnel of other substations leave the control room to examine equipment or for whatever purpose, even for a very short time, he/she shall notify the dispatcher of the NDC and get permission.

10.4. Dispatching personnel of the Licensees working as component parts of the grid shall report in the following cases without being asked by the dispatchers of the NDC:

- Violation of technical operational rules and operational safety rules, emergency, interruption, loss of normal operating condition of power plants and electricity and heating network;
- Loss of the parallel operation of power plants and electricity and heating network, voltage or frequency change, increase and decrease of the current/flow through the lines, line protection signals, increase in corona effects, change in heating line parametres, faltering supply of water and fuel to power plants, and occurrence of all kinds of failure;
- Current process of works being implemented due to emergency and/or by normal order.

10.5. Depending on operating conditions, the dispatchers of the NDC shall have the right to change the operating conditions of the Licensees and shall notify the dispatching personnel of the Licensees of the reasons for change. The dispatching personnel of the Licensees shall strictly follow the operating conditions given by NDC dispatchers.

10.6. The dispatching personnel of the entities working as component parts of the grid shall report briefly on the condition of their equipment and the works done during the shift 30 minutes before the shift end.

Chapter Eleven: OPERATIONAL ACTIVITIES

11.1 Switching
11.2 Repair of equipment
11.3 Adjusting of optimal operating conditions for daily operation

11.1. Switching

11.1.1. These instructions shall establish the general switching procedure for disconnecting electrical equipment for maintenance and connecting them back to the normal scheme during normal operation of over 1000 V distribution facilities of power plants and substations.

11.1.2. Based on the provisions of this chapter and taking into account the peculiarities and structures, as well as the organizational specificities of the dispatching

services of their own electricity connection scheme and distribution facilities, power plants and substations shall produce and implement their switch instructions.

11.1.3. It is required that DISPATCHING PERSONNEL and MANAGEMENT PEOPLE ON DUTY at power plants, substations, transmission and distribution network know these instructions.

11.1.4. The following shall be included in the DISPATCHING PERSONNEL in direct charge of switching in the distribution (only?) facilities of power plants and substations:

- Power plants' engineers on duty;
- Shift heads of electricity workshops;
- Electricians on duty;
- On duty personnel of substations;
- Duty personnel of mobile teams;
- Operational staff (shift and other people who combine dispatching duties together with technical operational duties of their respective substation);
- Repair staff of dispatching personnel (non shift repair people specially trained for switching).

11.1.5. MANAGEMENT PEOPLE ON DUTY shall comprise the following:

- Dispatchers of the NDC;
- Power plants' engineers on duty (shift heads of electric workshops);
- Dispatchers and heads of duty personnel of transmission and distribution network during their shifts shall manage activities of dispatching personnel responsible for technical operation of electric equipment of plants, transmission and distribution network and for switching in distribution facilities.

11.1.6. By the connected or disconnected position of the electrical equipment (generator, transformer, apparatus, current conducting part, cables, measuring devices, protection apparatus etc.) and switching apparatus (isolator, load isolator, insulator, short circuit, switch etc..) the operational condition of the equipment shall be determined. Electrical equipment can be in the following conditions:

- In operation;
- Under maintenance;
- In stand-by (with or without voltage);
- In automatic switchable standby (with or without voltage).

11.1.7. If there is a closed circuit between equipment and a power source (i.e. generator, busbar) through switching apparatus that are connected, the equipment is considered to be IN OPERATION.

11.1.8. If equipment is disconnected by switching apparatus on all its sides/terminals and prepared for maintenance according to the Safe Operation Rules, the equipment is considered to be UNDER MAINTENANCE.

11.1.9. If equipment has or does not have voltage because it is disconnected by switching apparatus at its terminals and is possible to be quickly switched on with the help of the switching apparatus, the equipment is considered to be IN STAND-BY.

11.1.10. If equipment has or has not got voltage because it is disconnected only by automatically controlled switching apparatus at all or some of its sides/terminals and is possible to be connected by an automatic throw-over circuit breaker (AVR), the

equipment is considered to be IN (use as it was used in point 11.1.6) AUTOMATICALLY SWITCHABLE STANDBY.

11.1.11. If stand-by equipment is closely connected with a power source on any of its sides/terminals through current conducting parts or if its switching apparatuses are switched on, the standby EQUIPMENT is considered to HAVE VOLTAGE. (Why is it written with capital letters? It was not mentioned in point 11.1.6)

11.1.12. Changing the availability of equipment or its parts during normal operation shall be implemented in all cases by a decision of the dispatching personnel who are directly responsible for the dispatching control of the equipment, with the exception of cases of obvious threat to human lives and equipment.

11.2. Organization and Sequence of Switching

11.2.1. The following people may implement the dispatching services of distribution (only?) facilities:

- The dispatching personnel of facilities with continuous operation and duty call from home;
- Duty personnel of mobile teams;
- Non shift dispatching personnel or dispatching maintenance personnel.

Considering the peculiarities of their organization, its technical management determines the types of dispatching services, the number of dispatching personnel on shifts and the composition of mobile teams.

11.2.2. The duty personnel shall work in accordance with the approved monthly schedule. The approved work places for the duty personnel are the control rooms of power plants and substations. When leaving the control room, the duty personnel shall notify higher dispatching management where he/she is going and where he/she will be. People who are on duty call from their homes must be in a vicinity where the signals of the substations can be heard.

11.2.3. When operational personnel or operative maintenance people service the substations they are responsible for, the duty personnel may be given their full rights and duties; and during switching, work place preparation and starting up of equipment, the duty personnel may exercise limited rights and duties. In the latter case, the extent of their dispatching work shall be defined by decision of the higher technical management of the specified entity.

11.3. Rights, Duties and Command Hierarchy of Dispatching Personnel

11.3.1. Rights and Duties of Dispatching personnel:

- In operating the equipment of the distribution facility, strictly adhere to the Technical Operational Rules, Safe Operation Rules, this Code, other pursued instructions and manufacturer's instructions and obligations;
- Run equipment in reliable and economical operating conditions;
- Examine and do the inspection rounds in the distribution facilities according to the organisation's instruction; and control the equipment condition;
- Start up and test the standby equipment, examine the emergency and prevention signals according to the approved schedule;
- Carry out switching in the distribution facilities;
- Conduct in due time maintenance, servicing and other works for the equipment that is in operation;

– Strictly adhere to the job position instructions and the relevant parts of other instructions.

11.3.2. The dispatching personnel shall have full responsibility for the operation, actions done in and measures taken with regard to the equipment for which they are responsible during their duty period.

11.3.3. The operational command heirarchy of the duty and non shift personnel who service the distribution facility shall be determined by the instructions for their job positions.

11.4. Switch Decision

11.4.1. The higher management for dispatching work shall give a switch decision to the dispatching personnel who directly reports to them.

11.4.2. In case of the absence of direct communication with the entity to be switched, a decision to switch may be given through the dispatching personnel of a different energy utility organisation.

11.4.3. Those who pass on the decision shall write down the transferred decision in the dispatching journal and record it on tape.

11.4.4. The NDC dispatchers in performing any action on the equipment under the control and at the disposal of him/her, shall have the right to give a decision/command to the shift head of the electrical department or the dispatcher of the transmission company in case of absence of the duty engineer of power plants and transmission line entities from their control rooms. Shift heads and dispatchers are obligated to fulfill the decisions of the NDC dispatchers and to notify their duty engineers of the implemented action.

11.4.5. The sender of a switch decision shall set the content and magnitude of his/her decision, depending on the complexity of the assignment, position of the equipment and knowledge and skills of the dispatching personnel.

11.4.6. A switch decision must indicate the sequence of actions to be taken and the ultimate purpose of the switching. In implementing an action with regard to relay protection and automatic control, the names of protections and magnitudes/sizes of the actions should be indicated.

11.4.7. A decision must be short and understandable. A recipient of a decision must clearly understand the sequence of actions and whether the operating condition and circuit arrangement of the equipment will make the actions possible.

11.4.8. Dispatching personnel shall be PROHIBITED FROM RECEIVING AND IMPLEMENTING decisions that are not understandable to them.

11.4.9. The component entities of the grid shall develop and implement switch programs for the equipment belonging to them as well as for the equipment under the control and at the disposal of the NDC, and the programs approved by the NDC, and shall adhere to them.

11.5. Equipment Maintenance

11.5.1. Equipment can be in operation, under maintenance or under testing.

11.5.2. Equipment maintenance and tests have the following classification from the point of view of operative work:

- Planned maintenance and test;
- Emergency maintenance and test.

11.6. Planned Maintenance and Test

11.6.1. By the 15th of each month, the top technical management of component entities of the grid shall supply the NDC with schedules of the next month's planned maintenance. The NDC shall reflect them in the operating conditions and notify the entities about changes, if any, in the schedules till…..

11.6.2. The maintenance and test schedules of the equipment controlled by the NDC shall be submitted by the entities forming the grid, in the time specified in 11.6.1 of this chapter, to the NDC for approval. Maintenance and tests shall be conducted according to the maintenance orders approved by the NDC till…..

11.6.3. If the entities comprising the grid are to do planned maintenance and tests by completely shutting down their technological process, they shall give the NDC their [maintenance and test] order showing the start, end and elapsed time of the planned maintenance and tests 6 months in advance of the shut down. After receiving this order, the NDC shall aprove the timing of the order after reviewing the generation and demand balance of the grid. When an order is approved it becomes valid. After the approval of an order either the NDC or the entity that placed the order may propose to change the schedule of the order not less than 14 days before the start of the ordered maintenance. Based on mutual agreement, the change can be approved.

11.7. Emergency Maintenance and Test

11.7.1. Emergency maintenance and test orders can be passed to the management of dispatching work at any time of the day. It is possible in the following cases:

- Interruption of operation or abnormal operation of main equipment, significant decrease in reliability and capacity restriction;
- Decrease in quality of products generated, significant drop of economy savings of the operation;
- Extending the time of normal load and operation of main equipment or the object.

11.7.2. Orders for emergency maintenance and testing of ancillary equipment that seriously impacts the equipment controlled by the NDC or its normal operation shall be passed to the NDC dispatchers regardless of time of day.

11.7.3. Even if an emergency situation is created which requires equipment shut down or disconnection, an emergency order should be made before shutting down the equipment if it is possible to run the equipment temporarily until the operating conditions are regulated.

11.7.4. If it is required to immediately stop or disconnect the equipment or if the equipment has stopped anyway, the shift worker responsible for the equipment should shut down the equipment and notify the dispatching management. Then determining the nature of the accident and volume of work, he/she should place an emergency order indicating the required rehabilitation time.

11.8. Adjusting Optimal Operating Conditions for Everyday Operation

11.8.1. Optimal operating conditions of the daily operation of the grid shall be estimated based on specified operating conditions of NDC for the year and for winter and summer, and in relation to generation and consumption orders placed by generation sources, transmission and distribution network, changes in operation of main equipment, actual load operating conditions and historical performance of dispatchers and shall be developed preliminarily one day in advance.

11.8.2. Sources and transmission, as well as distribution network (all distribution network?), shall submit their proposals for operating conditions and generation and consumption orders (in case of normal generation operation) to be reflected in the NDC's daily operating conditions not less than twice a month to the Operating Conditions Unit of the NDC. These shall include the following:

SOURCES:
- Electricity generation and distribution (mWh);
- Number of boilers and turbines to be operated;
- Capacity to close peak load by participating in free competition (mW).

TRANSMISSION AND DISTRIBUTION NETWORK:
- Electricity to be transmitted and distributed (mWh);
- Capacity to be received during peak load and low load night time (mW);
- Transmission and distribution loss (mWh, %).

What does mean twice a month? Which MWh?

11.8.3. Operating conditions of the grid for the following day shall be developed (by whom?) before 14:00 hour of the preceeding day and, based on the approval of the chief dispatcher of the NDC, shall be delivered (by whom?) to the generation sources and transmission and distribution network.

11.8.4. In continuously providing and adjusting the generation and consumption balance between generators and customers connected to the grid, the NDC shall make adjustments to the operating conditions based on specific and clear orders placed in advance (prompt dispatching information) for the changes in the operating conditions by customers and generation sources.

11.8.5. In adjusting daily operating conditions of the grid the NDC shall adhere to the principle of supplying the least cost electricity and shall regulate compliance with technical and technology requirements.

The points "**11.8 Adjusting Optimal Operating Conditions for Everyday Operation"** belongs the point "**8.2** Daily planning of prompt and reliable operation of the Grid**"** as the title refers to it.

Chapter Twelve: CONTROL OF OPERATIONS, ACTIVITIES OF THE LICENSEES

12.1 Right and Duties of the National Dispatching Centre
12.2 Activities of Licensees

12.1. Rights and Duties of the National Dispatching Centre

12.1.1. The NDC shall promptly coordinate the operations of power plants, electricity transmission and distribution network, substations, their relay protection and automation equipment and heat transmission network working with the grid in accordance with the program of operating conditions estimates, and provide unified management for 24 hours a day.

12.1.2. The NDC, based on least cost criteria, shall plan, implement and take control of the generation, transmission, distribution, regulated supply and non-regulated supply

of electricity and/or heat energy and keep the operating conditions consistant with technological and standard requirements.

12.1.3. The NDC shall promptly coordinate the generation, transmission and distribution of electricity and balance the generation with demand.

12.1.4. The NDC shall manage the making-good of accidents occurring in equipment at the disposal of NDC management.

12.1.5. The NDC shall constantly control and operatively coordinate and manage the regulation of the grid frequency (when it is working separately), voltage, the pressure and temperature of industrial steam and water distribution lines, maintenance and control of optimal operating conditions, and maintenance of static and dynamic stability of the system.

12.1.6. The NDC shall monitor relay protection and automation control equipment, calculate and change their settings according to predetermined boundaries, install (? The NDC install not the Licensees?) additional protection or automation instruments/equipment, renew them, diagnose their failures and get the failures rectified by relevant personnel.

12.1.7. The NDC shall develop and implement a plan(s) for cutting or restricting electricity supply without discrimination in case of emergency situations or force majeure.

12.1.8. The NDC shall plan for reserve capacity possible to be supplied to or received from other legal persons or abroad; and provide the operation of central heat supply with dispatching coordination.

12.1.9. The NDC shall anticpate (perhaps: anticipate?) the emergency operational conditions of the grid and implement them when required.

12.1.10. The NDC shall produce long-term forecasts of electricity and heat demand of the grid every year.

12.1.11. The NDC shall plan the electricity import and export volume of the grid and implement it.

12.1.12. To balance the generation and demand of electricity and the heating requirements of the grid, the NDC shall register contracts made between the Licensees and contracts made between Licensees and their users in accordance with the Business Relations Rules; and shall be obligated to provide the Energy Regulatory Authority with accurate information in accordance with the terms, conditions and requirements of the License.

12.1.13. The NDC shall keep confidential all information and data it receives with regard to dispatching regulations from other Licensees and copies of the contracts certified by proper organisations.

12.1.14. The scope of service of the NDC is determined by the equipment under the control and at the disposal of the NDC, such as transmission lines, equipment, relay protection, automation, dispatching communication, information technology, measurement instruments and meters at the component parts of the grid; and is implemented by the dispatching activity of generation, transmission and distribution entities.

12.2. Activities of Other Licensees Operating As Components of the Grid

12.2.1. The Licensees operating as component parts of the grid shall ensure normal and reliable operation of equipment in their ownership.

12.2.2. They shall undertake uninterrupted generation, transmission and distribution of electricity and/or heat.

12.2.3. The Licensees operating as component parts of the grid shall identify and follow the most economically profitable operating conditions of the equipment under their ownership and develop a conservation policy to decrease technical loss.

12.2.4. They shall strictly follow the legal documents such as schemes, diagrams, operating conditions, dispatching instructions and procedures set by the NDC.

12.2.5. A Licensee operating as a component of the grid shall submit disputed issues related to other Licensees of the grid to the Energy Regulatory Authority for resolution.

12.2.6. A Licensee can construct energy facilities in accordance with its rights.

12.2.7. A Licensee operating as a component of the grid shall work with other legal entities by making business contracts.

Chapter Thirteen: RELATIONS AMONGST DISPATCHING PERSONNEL, THEIR RIGHTS AND DUTIES

13.1 Rights and Duties of Dispatching Personnel
13.2 Relations Amongst Dispatching Personnel
13.3 Dispatching Communication with the NDC dispatchers
13.4 Relations of Dispatching Personnel During Emergency Situation

13.1. Rights and Duties of Dispatching Personnel of the NDC (because of "they" or "shall" writen in differanr points later)

13.1.1. Dispatching Personnel of the NDC shall control the maintenance of the given optimal operating conditions by the Licensees operating as components of the grid and provide the opeartive personnel of these entities with dispatching management 24 hours a day.

13.1.2. They shall regulate, depending on available (what does mean?) time, the distribution of electricity and heating load to power plants operating as components of the grid.

13.1.3. They shall not exceed the capacity and energy quantity of imported energy beyond the planned level.

13.1.4. During switching of the equipment under the control and at the disposal of the NDC, they shall provide the dispatching personnel of the Licensees with dispatching management.

13.1.5. Shall make conclusions on the operation of the grid and shall implement the given operating conditions in the most optimal and economical way.

13.1.6. Shall take all technical measures not to lose the static and dynamic stability of the system.

13.1.7. Shall control the technical operations and perform tests required to connect new electrical equipment to the grid and provide it with dispatching management.

13.1.8. Shall directly manage the rectification of accidents and obstacles occurring in the grid and have the right to mobilize all possible manpower and equipment from the Licensees forming the grid.

13.1.9. Shall make changes in the equipment of the secondary circuit of the grid in accordance with relevant instructions.

13.1.10. Shall conduct emergency excercises involving dispatching personnel of the entities forming the grid, at least twice a year.

13.1.11. Shall check in a timely manner the producing and safekeeping of dispatching instructions and switch programs by the grid component entities and require the production of such documents by the entities and their keeping at work places.

13.1.12. Shall record and maintain, according to fxed procedures, the dispatching (hourly, daily, monthly, and yearly) information and the information of a national statistical nature.

13.1.13. Shall cooperate with other legal entities in analyzing grid emergencies and interruptions and producing official documents on the emergencies.

13.1.14. Shall give the final decision on connecting or disconnecting the equipment under the control and at the disposal of the NDC or on changing them over to standby or maintenance.

13.1.15. Shall develop dispatching instructions for parallel operation with grids of foreign countries and shall have them approved by the Central management and adhere to them in operation.

13.1.16. The NDC Dispatchers shall have the right to immediately disconnect relevant parts of the grid without agreeing with other legal entities when conditions are created for static or dynamic instability of the grid, serious damage to the equipment of the Licensees running as grid components, endangered human lives, deliberate violating of the given operating conditions, or loss of normal operation of a foreign country system working in parallel with the grid.

13.1.17. If this code or the dispatching discipline is violated, NDC dispatchers have the right to dismiss, during the shift, the dispatching personnel working in any part of the grid.

13.2. Relations Amongst Dispatching Personnel

13.2.1. The top dispatching management of the units operating as component parts of the grid is the NDC.

13.2.2. The shift dispatchers of the Technology Management Unit of the NDC shall direct the daily dispatching work of the units comprising the grid.

13.2.3. Power plants, transmission and distribution companies of electricity and/or heat operating as component parts of the grid shall develop their own dispatching work structure and agree with the NDC on this matter. The vertical structure of management of dispatching work is shown in Attachment 3.

13.2.4. The duty engineer and shift heads of the electrical departments of thermal power plants, dispatchers of transmission lines and UBDHCo and dispatching personnel of substations having equipment under the control and at the disposal of the NDC shall work under the direct command of the shift dispatchers of the Technology management unit of the NDC.

13.2.5. Equipment of the Licensees comprising the grid shall be in the competence of the following entities in regard to dispatching work dependence:

- Within the scope of own organisation of dispatching personnel of the Licensee operating as a component of the grid;
- Jointly by Licensees operating as component parts of the grid;
- Jointly by the NDC Dispatchers, and other dispatching personnel of other Licensees;
- Solely under control and at the disposal of the Dispatchers of the NDC.

The competance is determined by…….

13.2.6. It is strictly prohibited to disengage the equipment under the control and at the disposal of the NDC, and the relay protection and automation control of that equipment, without the permission of the NDC dispatchers unless human life or equipment integrity is endangered.

13.2.7. Dispatching personnel of the Licensees operating as component parts of the grid shall, promptly and without questioning, execute the decisions of the NDC dispatchers and on each occasion report on their execution.

13.2.8. The NDC dispatchers shall personnaly control all types of switching of equipment under the control and at the disposal of the NDC.

13.2.9. Actions involving equipment under the control and at the disposal of the NDC shall be undertaken by permission or a decision of the NDC dispatchers.

13.2.10. All siwtching of and operative actions for the equipment not under the dispatching control of the NDC but belonging to a Licensee operating as a component part of the grid shall be implemented only with the personal control and decision of a dispatcher of that entity.

13.2.11. Dispatching personnel of the Licensees operating as component parts of the grid shall independently operate the equipment under their management and shall not need to seek permission from the NDC dispatchers. But if such independent operations are to influence the operation of the equipment controlled by the NDC, change the power plant and transmission line main circuits or decrease the selective capability of relay protection, then the permission of the NDC dispatchers is required as an obligation.

13.2.12. The equipment under the control and at the disposal of dispatchers of power plants, transmission lines and UBDHCo may be taken under the direct control of the NDC if the equipment is liable to influence the operating conditions of the grid.

13.2.13. If the dispatching personnel of the Licensees operating as component parts of the grid doubt the accuracy of a decision of a dispatcher of the NDC, they shall briefly and clearly explain it to the NDC dispatcher and write it down in the dispatching journal. If the NDC dispatcher proves the correctness of his/her decision, the decision shall be implemented and in this case the NDC dispatcher shall bear total responsibility.

13.2.14. Dispatching personnel who delay action on a decision of the NDC dispatcher without justification, and any management personnel who influenced this outcome, shall be held responsible.

13.2.15. If directors or chief engineers of power plants, electricity and heat transmission companies are required to give the dispatching personnel of their respective entities decisions touching the realm of dispatching rights and authority of the NDC dispatcher, they shall do so by receiving permission from the NDC dispatcher.

13.2.16. In case of the absence of the dispatching personnel who are under the direct command of the NDC dispatchers, dispatching decisions (to increase or decrease load, control voltage level, connect or disconnect reactors, etc.) shall be handed on to personnel who are not under the direct command of the NDC dispatchers (such as shift fitter, assistant dispatcher, instrument panel supervisor, etc.). These personnel of indirect command shall immediately notify their implementation of the dispatcher's decision to the top management of dispatching work (duty engineer, head of electrical department) of their entities.

13.2.17. The Licensees operating as component parts of the grid shall send a list of the names of people authorized to personally manage dispatching work, and to receive and/or transfer dispatching information, to the NDC in written form before the 1st January of each new year.

13.2.18. The NDC shall notify via telephono-gram or fax the names of people who are authorized to personally manage dispatching work (and to receive, transfer and demand dispatching information) to the Licensees operating as component parts of the grid before the 1st January of each new year.

13.2.19. In cases of changes in the dispatching work people, it shall be communicated through telephonogram.

13.3. Dispatching Communication with the NDC Dispatchers

13.3.1. When communicating with the Dispatcher of the NDC dispatching personnel shall report first of all the name of their entity, then their own name and position, and, when these things are clear, they should start their official conversation.

13.3.2. Dispatching personnel of the Licensees operating as component parts of the grid shall implement decisions/commands received from dispatchers of the NDC, particularly those decision related to complicated switching, only after restating the decision or command verbally and demonstrating that the decision is understood correctly.

13.3.3. The decisions received must be implemented in time. Only after notifying the sender of the decision about its satisfactory implementation shall the decision be regarded implemented.

13.3.4. Opertaive personnel of the Licensees working as component parts of the grid shall immediately write down in the dispatching journals the hour and minutes of receiving the decisions/commands given by dispatchers of the higher management level and put remarks on the implementation in the journal.

13.3.5. In case of failure of direct communication of dispatching personnel of the Licenses working as component parts of the grid, a dispatcher shall give his/her decision/command via the communication means of the other Licensees. The sender and receiver of a decision, after knowing each other's names and position, shall communicate the decision and write it down in their respective dispatching journals.

13.3.6. Personnel using the dispatching communication have the duty to use official terms and to talk according to proper communication instructions.

13.3.7. If the dispatching communication fails, the NDC dispatchers have the right to immediately demand the relevant people to take all necessary measures to make the communication work and the right to get them implement the measures.

13.3.8. Dispatching personnel of the entities comprising the grid shall adhere to the provisions 13.2.1-13.2.19 (and 13.31- 13.3.7 not) of this code, and in their relations shall also adhere to the instructions on relations developed by their own entities.

13.4. Relations of dispatching personnel during emergency situation

Perhaps this subchapter would be better in Chapter 14 INTERRUPTION IN OPERATION, EMERGENCY SITUATIONS AND THEIR CLASSIFICATION

13.4.1. In case of an emergency situation of the grid and of any particular object, people who do not belong to an entity or those who are not the dispatching personnel thereof, can not enter the place of dispatching work.

13.4.2. If an dispatching work employee of a Licensee working as a component part of the grid supplies inaccurate information on changes of operating conditions, situation of circuits, equipment damage, disconnection and/or restriction of clients, accidents, breaches, interruptions or delays, fire and water and sudden natural disaster, he/she shall face administrative and legal redress (in normal situation not?).

13.4.3. During an emergency situation, dispatching personnel shall accurately record the time of equipment signalling, the protection works and their conditions, and write them down accurately in the dispatching journal according to their sequence. (in normal situation not?)

13.4.4. In case of accidents affecting the grid, work shall continue without turning shifts until the normal situation is recovered.

13.4.5. In case of accidents affecting the grid, participation of the [dispatching personnel] in meetings to analyze the emergency situation is obligatory; they must give statements of actions taken during the accident and of their conclusions on the actions.

Chapter Fourteen: INTERRUPTION IN OPERATION, EMERGENCY SITUATIONS AND THEIR CLASSIFICATION

14.1 Classification and Recording of Accidents in the Energy Technology
14.2 Determining Causes of Breaches (see previous remark relating to word Breaches)
14.3 Information related to Breaches (see previous)
14.4 Regulation on Analyzing Breaches (see previous)
14.5 Reporting
14.6 Special Regulation on Emergency Information

Attention! Some of following Subchapter title is not the same as it is written above! E.g. 14.2, 14.3, 14.4, 14.5!

14.1. Classification and Recording of Accidents in the Energy Technology

14.1.1. The purpose of instructions on the classification and recording of accidents in the energy entity is to set procedures for analyzing, classifying and recording technology breaches (what is the difference between Accident – written in title – and technology breaches? If nothing then use the same word in the following points, if yes then make definition) affecting the reliable operation of the energy system, electricity and heat plants, and of the equipment for energy generation, transmission and the distribution network of the grid.

14.1.2. According to the instructions on classification and recording of accidents in the energy entity, the following technology breaches shall be analyzed:

- Disruption of energy equipment during its operation;
- Fluctuation of technical parameters leading to disengagement and disconnection of energy equipment and their parts;
- Complete or partial unplanned disconnection of customers.

14.1.3. The main purpose of analyzing and classifying technology breaches is to:

- Determine the cause;
- Develop organizational and prevention measures;
- Evaluate the reliability of the operation of energy entities;
- Reveal issues on the improvement in organization of the operation and maintenance works; and change, renovation, expansion and replacement of energy equipment.

14.1.4. According to the instructions on classifying (please refer to relevant points) and recording accidents in energy entities, the management of the entity, energy authority, ministry, and the state control organization shall determine whether or not it is required to identify the fault of the entity or person causing the accident and issue guidance materials (decree, technical decision, memorandum etc.).

14.1.5. Planned actions for full recovery from accidents based on analysis of their causes and on prevention of their repetition must be fulfilled as an obligation.

14.1.6. Classification of Accidents:

- Operational breakdowns in energy equipment shall be classified as emergency, I and II grade accidents according to their nature, damage caused (interrupted energy supply, loss of network stability, fluctuation of parameters, environmental influence, normal rates of the equipment, other reasons diminishing the reliable operation);
- In case of failure to supply energy which is caused by the fault of other organizations, or faltering equipment under the customer's ownership, it shall be recorded as customer disconnection regardless of the damages.

14.1.7. The following shall be considered as emergency cases:

- Breakdown and collapse of premises and facilities leading to inevitable cessation of energy equipment and keeping it under maintenance for 25 or more days;
- Breakdowns in heating boilers, turbines, generators, transformers of 315 or more kW, and their repair being not profitable or possible;
- Restriction of total capacity of customers by 100 mW or more, in cases other than disengagement or rehabilitation initiated by emergency protection automatic devices;

- Frequency drop below 49.0 Hz for 1 hour or more or total duration during the day exceeding 3 hours, due to sudden failure of equipment;
- Complete loss of load when more than one generator was operating in the power plant;
- When the energy system is separated into several parts, restriction of customers by more than 40 % of the total load;
- Cutting off 20% or more of the total load, due to breaking of 6 kV or more voltage electricity transmission lines caused by natural disaster, or due to other restrictions;
- Cessation of heating source, central heating line or its part for 5 or more hours during the heating season;
- Disconnection of customers or urban settlements for 12 or more hours caused by violations in operating conditions or damage to the electricity and heating network.

14.1.8. Ist grade accidents:

- Accidents leading to inevitable disengagement of the equipment and keeping it under repair for the period of 3 to 25 days;
- Frequency drop below 49.0 Hz caused by sudden failure of equipment in energy entities;
- Complete loss of load in electricity plant;
- Separation of energy system into several parts and restriction of customers;
- Cutting off up to 20% of the total load, due to breaking of 6 kV or more voltage electricity transmission lines caused by natural disaster, or due to other restrictions;
- Cessation of heating source or central heating line for 2 – 5 hours during heating season;
- Disconnection of customers or urban settlements for 4-12 hours caused by violations in operating conditions of or accidents in electricity and heating network.

14.1.9. IInd grade accidents:

- Temporary cut of energy supply to customers in cases other than those specified in various automatic or protection actions;
- Temporary disengagement in an inevitable situation or erroneous disconnection of equipment or parts of energy sources and electricity and heating network;
- Cessation of heating sources or central heating lines for up to 2 hours during the heating season;
- Disconnection of customers or urban settlements for up to 4 hours caused by violations in operating conditions of or accidents in electricity and heating network;
- Complete disengagement of technology equipment (communication, signaling etc.) of dispatchers or dispatching management for more than one hour;
- Energy supply cut to customers caused by wrong actions not detected by relay protection or emergency protection automatic equipment.
- **<u>Remark</u>: the point 14.1.7 speaks about emergency cases, the points 14.1.8 and 14.1.9 about Ist and IInd grade accidents . They are not in harmony.** E.g. "Frequency drop below 49.0 Hz for 1 hour or more or total duration during the day exceeding 3 hours, due to sudden failure of equipment;" is emergency case and "Frequency drop below 49.0 Hz caused by sudden failure of equipment in energy entities" is Ist grade accident.
  I advise to make unambiguous classification and naming.

14.2. Determining and Classifying Accidents by Their Causes and Reasons for Their Aggravation

14.2.1. In analyzing technology accidents and their reasons, the following analysis and conclusions must be made:

- Whether or not activities of operational staff, equipment and their operational organization are in compliance with the rules and instructions in force;
- Whether or not prevention inspections, maintenance and service of equipment and control on determining their technical availability was carried out in due time with proper quality, and whether or not repair works were done in accordance with rules;
- Whether or not equipment failures or emergency sources were eliminated in due time, checking fulfillment of actions for improving reliable operation of equipment, guidance materials, emergency prevention memorandum and other official requirements;
- Quality of structure of equipment and their parts, performance of projects (drawings) and other construction and adjustment works;
- Measurement of natural phenomenon (thickness of frost, wind speed etc.);
- The compliance with the drawings of the particular entity or equipment.

14.2.2. Classification of Accidents by Technical Reasons:

- Equipment parts, structural changes in node materials;
- Welding defect;
- Mechanical connection defect;
- Mechanically worn out;
- Worn out by ash and dust;
- Worn out by corrosion;
- Worn out by surface interference;
- Excessive tremor (shaking);
- Explosion;
- Heating defects such as overheating, burning;
- Electric arc defect;
- Electric contact defect;
- Mechanical defect;
- Dielectric defect;
- Glowing of embers and fire;
- Loss of stability in electricity network;
- Unrevealed or unclear reason.

14.2.3. Classification of Accidents by Organizational Reasons:

- Wrong activities of dispatching personnel;
- Wrong activities of non-dispatching personnel;
- Insufficient quality of guidance materials;
- Insufficient quality of technical service;
- Other operational faults;
- Defects and faults in drawings/projects;
- Structure and manufacturing defects;
- Assembling defects;
- Repair defects;
- Construction defects;
- Influence of natural disaster;
- Influence of outside organization or people;
- Unrevealed or unclear reasons.

14.3. Reporting about Accidents

14.3.1. The Energy Authority, Ministry and State control organizations and Energy Regulatory Agency shall be promptly informed each time a Ist grade accident takes place.

14.3.2. The following information shall be contained in the dispatching records of accidents: time, brief description of the accident, content, nature of damage, customer disconnection situation, actions taken to eliminate the accident and the working committee.

14.4. Procedures for Analyzing Damage

14.4.1. Depending on the nature of the accident a special committee shall be appointed to analyze emergency and 1st grade accidents.

14.4.2. IInd grade accidents shall be analyzed by the professionals in charge of the issue (who decides the professional in charge?) or by the appointed committee. This committee shall be appointed by decree of the Director of each energy entity.
If the accident did not have any effect on other entities then OK. But what about if two or more entities are effected. Who appointed the committee if a system blackout occurred? It would be useful to regulate them too.

14.4.3. In analyzing accidents in equipment under state control, the committee shall include inspectors of the state control organization.

14.4.4. In analyzing faults in all works related to defects in drawing/project, structure, construction, assembling or repair works, it shall be appropriate to ensure the presence of authorized professionals of these organizations and representatives of the manufacturer.

14.4.5. In determining the damage caused to customers due to technical accidents, it shall be appropriate to undertake investigations in the presence of a representative of the state control organization.

14.4.6. Analyses of accidents in energy entities equipment under state control shall be carried out based on the requirements of the rules and instructions in force set by the state control organization.

14.4.7. The normal parameters (load) for the difference between the start and end time of accident shall be used in estimating the shortage of energy distributed to customers (and not distributed to customers (I feel contradiction: distributed or not distributed or I do not understand the sentence)). The shortage of energy shall be estimated separately for energy disconnection and restriction.

14.4.8. The working load reduction in electricity plants for the appropriate period of time shall be used in estimating not-fully-processed energy.

14.4.9. As soon as an accident takes place it shall be appropriate to start urgently analyzing it and complete this work within 7 days.

14.4.10. The appointed committee shall undertake its activities in accordance with the regulations set by the head of the committee.

14.4.11. Taking into consideration comments from the head of the committee, the period for analysis can be prolonged by the higher management of the organization.

14.4.12. Only at the decision, or the relevant provision of the committee head, shall it be appropriate to open and dismantle the damaged equipment in the presence of representatives of the manufacturing organization and other entities that are included in the committee composition.

14.4.13. In case the above mentioned representatives fail to attend in time, the head of the committee shall have the right to postpone the inspection and dismantling of the damaged equipment for up to 3 days. The analysis of the accidents and rehabilitation works shall be delayed by this period of time.

14.4.14. Results of the accident analysis shall become valid at the accurate determination of the cause of the accident and its process, and it shall be comprised of the following:

- Picture showing the post-accident situation and clear description of damage to the scheme and equipment;
- Tape of the conversation between the dispatching personnel, copy of the dispatching journal, other statements from people on what happened;
- Clear writing down of post accident protection settings;
- Other required technical estimations, laboratory tests, documents related to testing and other activities.

14.4.15. The energy entity causing the accident shall have the following duties:

- Take the picture of the damaged object, provide other required materials;
- Provide with transportation and communication means during analysis of the accident;
- In case of necessity shall bear costs for hiring experts and specialists of other organizations;
- Provide temporary offices for the committee analyzing the accident and for keeping technical materials;
- Provide copy and print of the specially analyzed materials in required amounts.

14.4.16. In addition to recording the accident in the special journal a special document on analysis shall be produced. It shall be appropriate to include the following in this:

- Read-out diagrams;
- Ocsilloscope;
- Copy of the dispatching journal;
- Statements of dispatching personnel;
- Interviews from people (questions, answers);
- Required technical sketch, scheme and picture showing the damage/accident;
- Test results and inspection protocol;
- Document on dismantling of the damaged equipment.

14.4.17. Copy materials and documents must be verified by the signature and stamp of the authorized managing staff. Documents shall be produced for the 2nd grade and all 1st grade accidents taking place in equipment that failed to fully operate during the guarantee period due to manufacturing fault.

All 2nd grade accidents other than those above mentioned shall be recorded in the special journal.

14.4.18. Documents of accident analysis shall become valid by the signing of all members of the committee. Those members of the committee disagreeing with the

conclusions of the document, shall produce "special comments" reflecting their opinion, sign them and enclose them with the document.

14.4.19. Entities and individuals disagreeing and not accepting the documents produced by the committee shall produce their justification and submit to the state control organization and the state control organization shall review and make a final decision within 14 days.

14.5. Regulation on Reporting and Recording

14.5.1. Starting from the end of the complete testing of energy equipment under the operation load, any technology defects shall be recorded during equipment operation.

14.5.2. Accidents taking place in any of the energy entities shall be recorded in these entities. However, accidents covering the power plant and network forming the grid shall be recorded as system accidents.

14.5.3. Disconnection caused by customer faults shall not be included in the recording.

14.5.4. Energy entities shall submit monthly information to the system before the 5^{th} day of the following month, and the system information shall be submitted to the Ministry before the 10^{th} day of the following month (In the Hungarian market economy the Ministry does not deal with breakdowns – breaches – but a yearly rreport is submitted to the Regulatory Energy Authority. The Authority envisages the fulfillment of the requirements written in Licensee). Fulfillment of all required actions identified in the documents of accidents that occurred in the previous month (yearly) shall be reported in detail.

14.5.5. It shall be appropriate that the total number of technology breaches in power plants within a month be not less than the total number of dispatchers' recorded deviations from the schedule; and the amount of shortage in distributed energy due to technology accidents be equal to the not-fully-distributed (processed) energy of the dispatcher's schedule. Each technology accident must be recorded.

14.6. Special Regulation on Emergency Information

14.6.1. In cases of serious accidents, breakdowns, interruptions in energy sector entities, and changes and difficulties occurring in the operating conditions, this regulation shall be based upon and pursued by dispatching personnel of all levels.

14.6.2. The purpose of this special regulation is to inform the management staff about accidents, interruptions breakdowns, existence of situations of natural disaster and force majeure leading to disconnection and interruption of energy supply and based on that to implement without any delay technical prevention actions and prompt organizational measures for prompt rectification, and prevention from aggravation of such cases.

14.6.3. Dispatching personnel of all levels shall undertake activities on the rectification of accidents and breakdowns without any delays, and give clear information to higher technical management staff during any time of the day or night according to their scheme of providing information. These shall include the following:

a) to organization and company management:
– accidents causing damage to human lives and health caused by activities of the energy sector entities;

- in case of serious explosion, disconnection, violation, and fire emergency in energy sector entities;
- in case of partial or full disconnecting of customers for over 2 hours in winter, and over 4 hours in other seasons due to serious breakdown in main equipment and loss of the reliable activity of the grid;
- in case of disconnection in electricity and heat transmission, and distribution lines influencing energy supply of customers of a whole microdistrict, district, aimag center, city, and urban settlement;
- in case of energy supply cut off for "special" customers.

b) To technical management:

- In all above cases;
- In case of blackout in TPP;
- Breakdown in main equipment, and serious violations in operating conditions and parameters;
- In case of failures in electricity and heat transmission and distribution network;
- In case of failures in supply of coal, black product, and water, which are not possible to be resolved by them;
- Excess of amount over the contracted import capacity;
- Other abnormal changes taking place in operating conditions;
- In cases of natural disaster, and cases of force majeure.

c) To the management of dispatching work:

- In all above cases;
- In case of grid separation into two or more parts;
- In case of asynchronous process in the grid and of its prolonging without rectification;
- In case of disconnection of the power plant from the grid;
- In case of lack of voltage in substation or pumping station;
- Loss of stability of the grid;
- Isolation/separation of the grid from the energy system of the Russian Federation;
- Blackout in the grid.

14.6.4. Upon receiving the information from the Licensee the Dispatcher-engineer of the NDC, if he/she deems necessary, shall inform and give warning to dispatching personnel of other Licensees and the dispatcher of the Buryat energy system.

14.6.5. Dispatching personnel providing information shall be obligated to write down in the dispatching journal the information they gave, as well as recipient's name, position and time. Information that is not entered into the journal shall not be considered official.

14.6.6. Management people receiving information shall transfer the information to their top level management, and in the case of their absence to their higher level management and other relevant people and shall provide professional, material and technical assistance and undertake necessary actions without any delay. Asking many things on one's own whim from the dispatcher-engineer in charge of rectifying accidents and participating in the dispatching work would place obstacles in the process of rectifying accidents, and management people should take this into consideration.

Chapter Fifteen: RECTIFYING ACCIDENTS IN THE GRID

15.1. Purpose and Scope
15.2. Frequency Drop
15.3. Creation of Asyncronous Operating Conditions of the Grid
15.4. Separation of the Grid

15.1. Purpose and Scope

15.1.1. The emergency rectification instructions for the grid should specify the duties of dispatching personnel of various levels during emergency rectification and show the main principle of emergency rectification during both a parallel operation of the grid with a foreign system and independent operation of the grid.

15.1.2. Rectification of an emergency is the act of prevention of an accident from aggravating after disengaging from the grid the equipment that has been damaged, canceling the danger for humans and equipment, taking immediate measures to recover the indicators of energy supply and the quality of energy supply of customers, bringing the grid and its parts to stable and reliable circuits after the accident, making clear the condition of equipment disconnected during emergency and the possibility to switch it on, and deciding whether to switch the equipment.

15.1.3. Based on this chapter, generation, transmission, distribution and supply Licensees shall develop their own internal instructions to implement the relevant parts of the general instructions suitable to their situations.

15.2. Frequency Drop

15.2.1. In case of frequency drop in the grid due to capacity and energy shortage, and in order to provide for the stability of parallel operation of power plants and prevent the occurrence of non-permitted conditions in the equipment operation, the NDC shall develop the following:

- Schedule of reducing load by frequency;
- Schedule on customer restrictions by capacity;
- Schedule of disconnecting customers without prior warning of power plants and substations of the grid.

Who approves the schedules? In Hungary the Energy Regulatory Authority. Beside it there is a procedure how to prepare the schedule with the interested sides (entities, authorities). At is a separate decree.

15.2.2. The top technical management of the power plant shall approve instructions on insulation of internal use supply by the asynchronized operation of some generators in the power plant.

15.2.3. The frequency of the grid shall be maintained at 50 Hz with +-0.1.Hz. fluctuation. However for temporary operation it shall be allowed to have +- 0.2 Hz fluctuation. (It was written in Quality Chapter!! Here is not necessary repeat it. If want to write something you can refer to it)

15.2.4. In the case of parallel operation of the grid with the grids of foreign countries, the frequency shall be set in accordance with technical instructions of their cooperation.

15.2.5. In case of a sudden drop in the frequency, dispatching personnel of power plants shall be obliged to fully use all reserve capacity in circulation without waiting for the decision of the NDC dispatcher.

15.2.6. The main principle to be pursued shall be to cut off the load equal to 1.5% of the time's consumption in order to increase frequency by 1%. (It is a general princip depending on the composition of consumer loads. But it is unevitable to regulate the compulsory activities of NDC dispatchers as he/she has the best overview on the situation.)

15.2.7. Disconnection of power plants working in parallel in the grid by reducing frequency until the automatic device of disconnection by frequency in power plants operates delays or prolongs accidents, and therefore the dispatcher of the NDC shall take all measures to stop dropping of the frequency, if possible without having to operate this automatic device. (The sentence is not clear at least in English version)

15.3. Creation of Asyncronous Operating Conditions of the Grid

15.3.1. The dispatcher of the NDC shall be obligated to prevent the occurrence of asynchronous operating conditions and processes in the grid, and if such conditions take place shall promptly organize the restoring of normal operating conditions.

15.3.2. Relevant dispatching personnel must know the reasons that might possibly create asynchronous operating conditions and the signs indicating prospective occurrence; and as soon as these signs are noticed the dispatcher of the NDC must immediately be informed about the emerging preconditions (overloading of electricity transmission lines, loss of generator excitation, occurrence of asynchronous connection etc,) for asynchronous service and operating conditions.

15.3.3. Automatic devices designed for stopping asynchronous service and asynchronous operating conditions must be placed at appropriate points of the grid based on the estimations made by the NDC dispatcher, and in case of operational failure of these automatic devices, the dispatcher of the NDC shall be obligated to urgently, within 2-3 minutes, disconnect the parts which operate asynchronously in the grid.

15.3.4. After eliminating the asynchronous service and asynchronous operating conditions of the grid, the dispatcher of the NDC shall manage re-connection of the disconnected parts of the grid and establishing normal operation.

15.4. Separation of the Grid

15.4.1. In case of an accident separating the grid into several parts dispatching personnel of the power plants, transmission and distribution network shall have the following duties:

15.4.2. Diagnose the objects for which they are responsible regarding disconnection, size of frequency and voltage, overloaded lines and breakdowns in transformers and inform the dispatcher of the NDC about it. During this time dispatching personnel shall not waste any time or delay rectification of the accident by identifying equipment and disconnections not significant to the grid.

15.4.3. Take all measures to restore normal frequency and voltage.

15.4.4. In case of a sudden drop of frequency below 47 Hz, and in order to prevent the complete stopping of equipment operation for the internal use of the power plants where frequency isolation automatic device have not been installed or are not working, actions including even manual isolation of power plant and generator can be taken.

15.4.5. Once voltage is received from the grid, establish conditions for synchronization of power plants and generators that were disconnected during emergency, and make them synchronized and connected.

15.4.6. Based on the accident analysis, the NDC dispatcher of the grid shall quickly manage and organize works on the synchronized re-connection of disconnected parts, including parts in which the frequency dropped to the extent as to jeopardize the internal use of the power plant and parts that are over loaded beyond allowed rates, and restore normal frequency and voltage.

15.4.7. The NDC dispatcher shall identify which power plant is to adjust frequency in the isolated parts of the grid. The NDC dispatcher shall have the following rights in order to make synchronized connection of disconnected parts of the grid and to disconnect customers for as little time as possible:

- Reduce the frequency of parts with surplus capacity down to 49.5 Hz, with the aim of making synchronized connection to parts with reserve capacity where frequency has significantly dropped;
- Make temporary disconnection of parts with one or several substations that are supplied from parts of the grid with shortage of capacity, and transfer and reconnect them to those parts with surplus capacity or reserve capacity;
- Fully isolate some generators and power plants from parts of the grid, and make their synchronized connection to parts of the grid with shortage of capacity;
- For the purpose of synchronized connection disconnect customers from any part of the grid regardless of their classes (category).

15.4.8. If it is not deemed necessary for the synchronized connection to be personally managed by the dispatcher of the NDC, the dispatching personnel in charge of the parts with surplus capacity, where synchronized connection is to be made, shall manage and undertake it and shall each time inform the dispatcher of the NDC about such execution.

15.4.9. During emergency, the frequency of parts where synchronized connection is being made shall not exceed 0.3 Hz (better to say : exceed 50.3 Hz) and it shall be appropriate for the frequency of parts with surplus capacity where synchronized connection is being made to be high. (The sentence is not clear in English at least)

15.4.10. After connecting the grid which was separated into parts, the dispatching personnel of all levels under the management of the NDC dispatcher shall, without any delay, organize the resumption of normal loads to power plants and resume power supply to disconnected customers.

15.4.11. During rectification of accidents the dispatcher of the NDC shall coordinate his operation with activities of authorized dispatching personnel of the foreign energy system which was left operating in parallel or which was cut off.

New Chapter

Modification of Grid Code

Any entity has the right to propose modification in any part of the Grid Code. In this case the entity shall make a proposal with grounds for modification. The NDC is obliged to envisage it and try to make agreement if necessary involving other entities interested in the modification.

In the case of agreement the NDC shall submit it for approval.

In the case of disagreement the NDC shall submit the reasons of refusal of proposal with the proposal and its grounds for approval of the refusal.

Attachment One.

Regulation on Naming Electricity Equipment of the Grid and General Terms and Addresses

Remark:It is the same as in the Code (see point 1.3**.** General terms and definitions of the electrical equipment in component parts of the grid and development of the scheme

1.1. Regulation on naming and writing electricity substations

1.1.1. Name of substations of 35 or over kV voltage shall be determined in agreement with the NDC.

1.1.2. Although substations shall be named depending on their geographical location and customer peculiarities, the following shall be prohibited:

- For more than one substations to have the same name;
- Use natural directions for naming;
- Have very long names;
- Naming customers related to state security by their name.

1.1.3. In writing down the name of substations, first the voltage and then the name shall be entered.

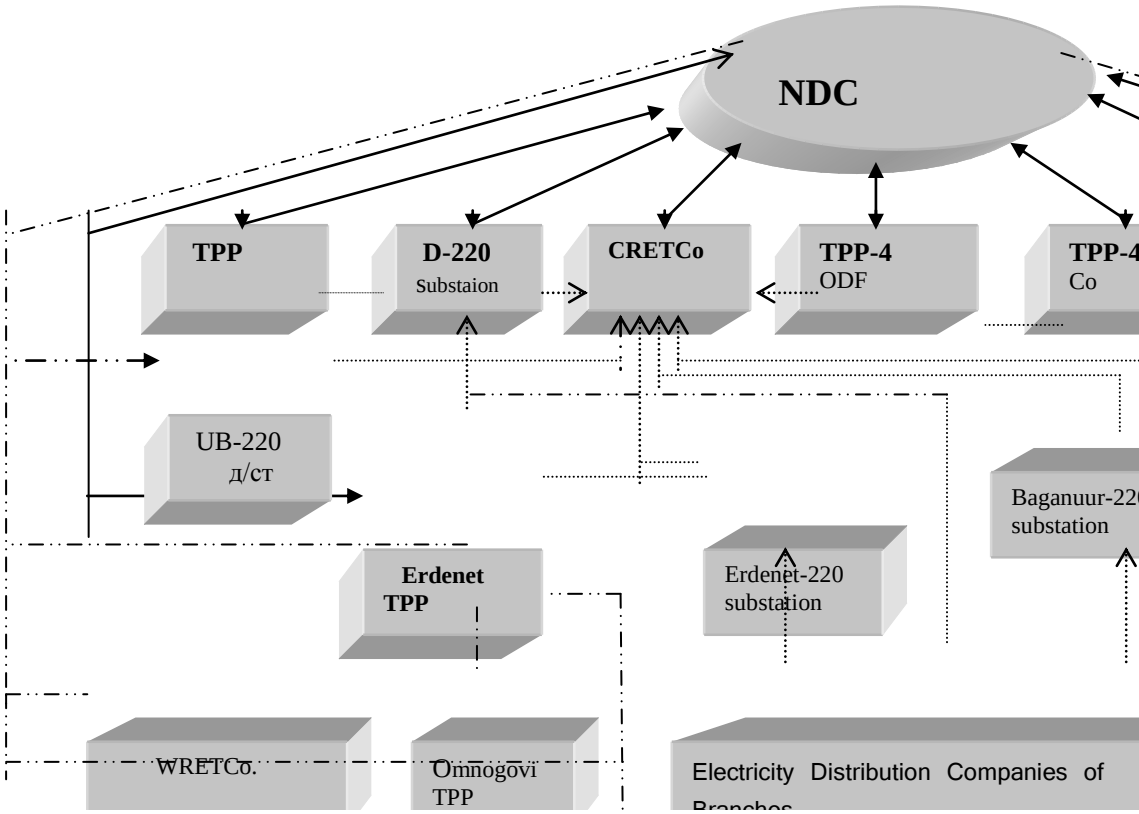
1.1.4. The dispatching personnel can write down names without mentioning the voltage only when maintaining the dispatching journal. For instance, Tuul substation.

Some abbreviations that are allowed to be used in keeping dispatching records, documents.

[list of Mongolian abbreviations follows here]

Attachment №2 Reporting and Exchage of Information Between the Dispatching Personnel of the Grid Entities

Scheme of Reporting and Exchange of Information Between the Dispatching Personnel of the Grid Entities



Note:
- decision of the NDC dispatcher
- Information from dispatchers to the NDC dispatcher
- Information between Licensees
- Special Information of Licensees to be reported to the NDC

Attachment №3 Vertical Structure of Dispatching Activities of the Grid Components

