



Georgian National Energy and Water Supply Regulatory Commission

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Distribution Grid Code

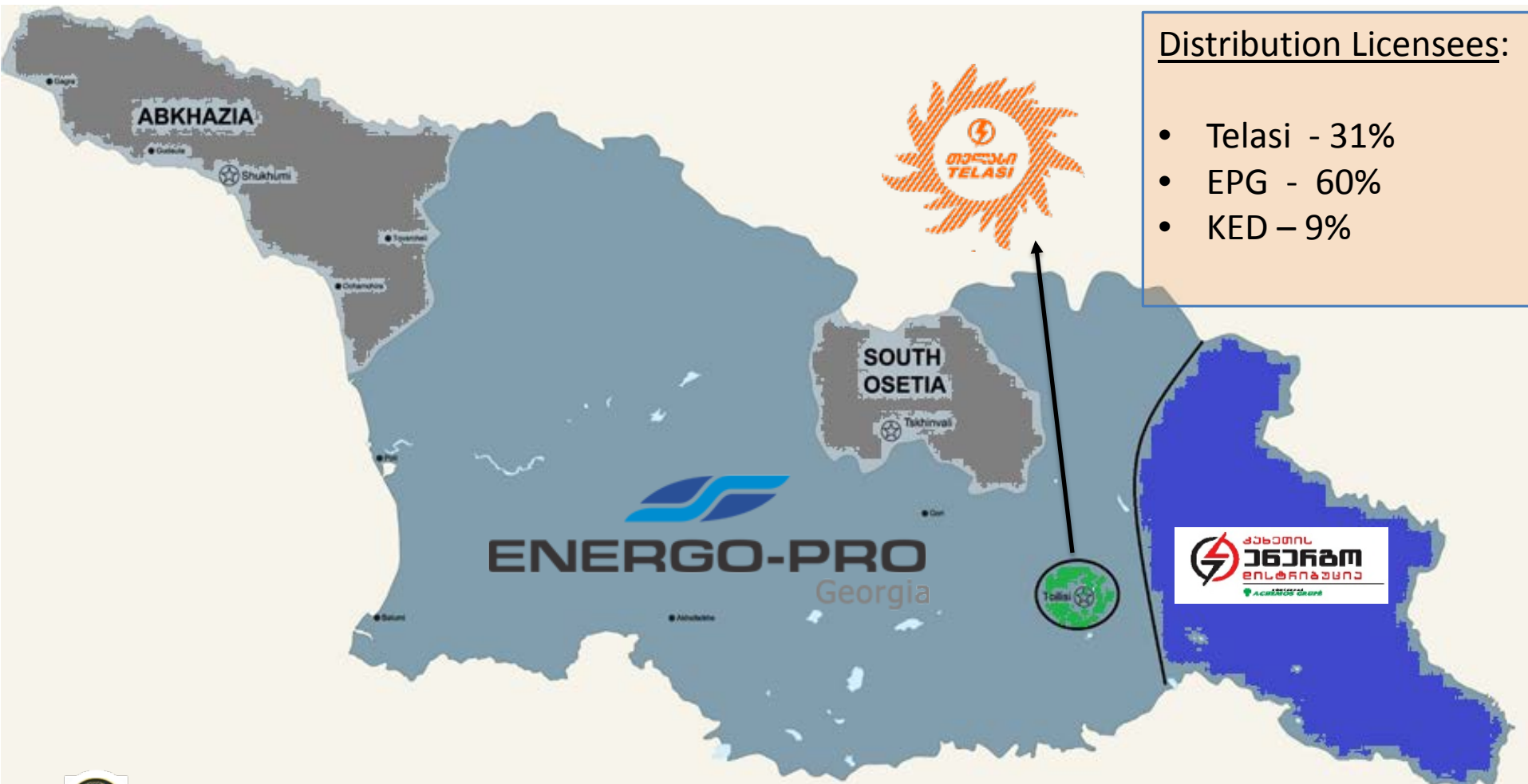


REGULATION FOR DEVELOPMENT

Distribution Functions

- The distribution component is normally unbundled into the following functions:
 - Distribution System Operator
 - Supply
 - Distribution Asset Owner
- Currently in Georgia, the distribution licensee performs all of these functions, although there are also a number of small independent distribution asset owners

Georgian Distribution System Map



Distribution Code Legal Background

- Georgian law about “Electricity and Natural Gas”
- EU-Georgia association agreement annual action plan

Consultancy

- Under a NARUC/USAID contract, technical assistance is being provided to GNERC on the legal framework for the regulation of electricity distribution, and in particular, the distribution network code
- Four chapters were analyzed
- Many meetings/seminars were arranged with Georgian distribution licensees, ministry of energy and TSO
- Consultant made corrections into the text, defined new articles and made recommendations
- Consultant added several topics that are actual in the modern distribution systems:
 - Net-metering
 - Smart- metering
 - Issues regarding assets under the third party ownership and etc

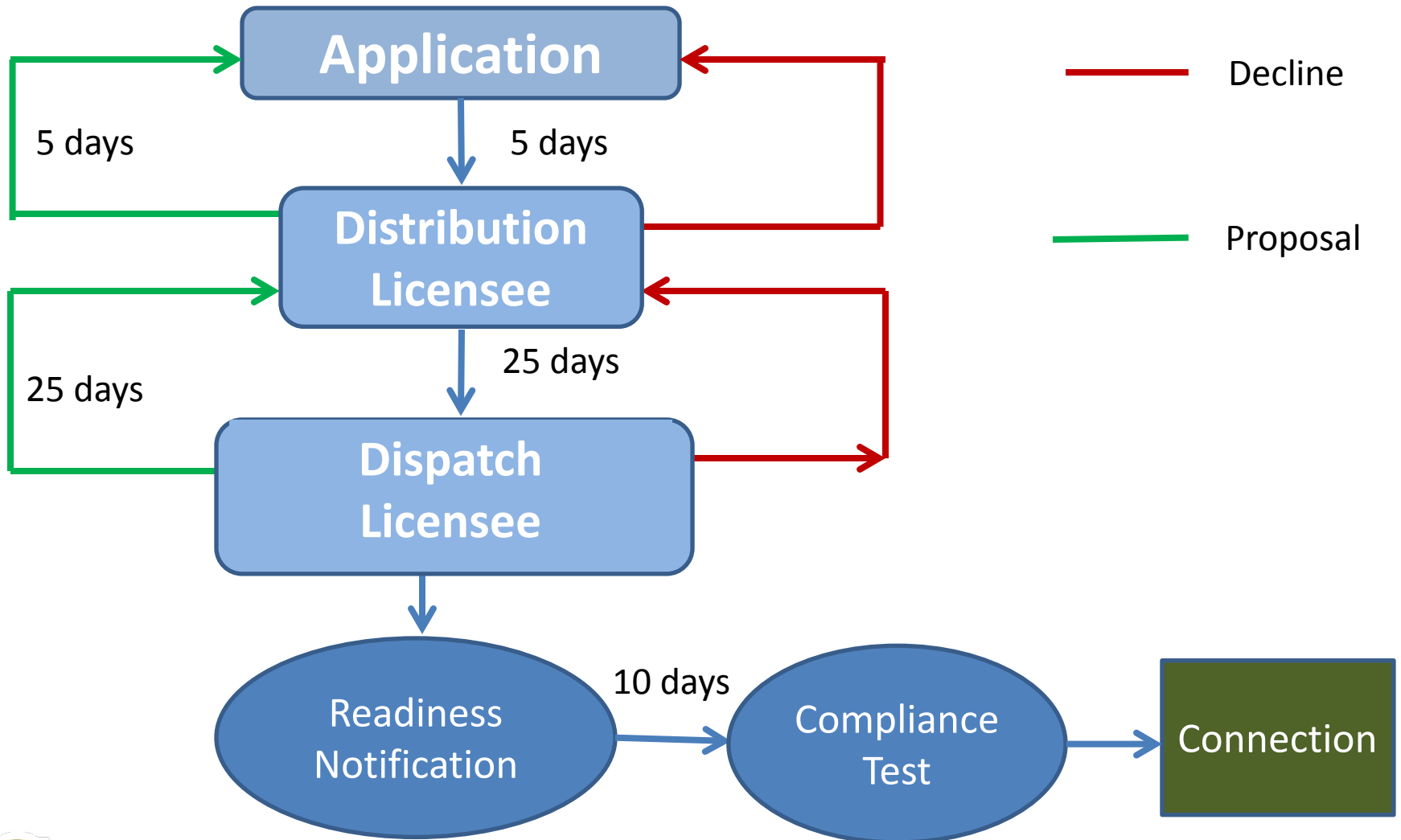
Connection Code

- Connection application
- Connection procedures
- Connection procedures for micro generation
- Technical Requirements
- Connection costs

Scope of Regulation

	Generators	35-110 Kv consumers	0.4-6-10 K consumers
Application for connection and preparation connection offer	+	+	-
Compliance inspection	+	+	-
Technical standards for connection	+	+	+

Connection Procedures



Proposal on Connection

- Technical Conditions
- Detailed description of connection works
- Information about connection point (displacement, connection capacity, transfer capability, voltage level and etc)
- Approximate connection cost

Application

- Information on connection type (new, modification)
- Required connection voltage level
- Connection active capacity
- Planned reactive capacity consumption or power factor
- Designed consumption/generation per year
- Load types of connection facility
- The desirable date of the connection
- Expected daily load schedule
- Documents proving the ownership of connection facility
- Single-line electrical circuit

Examination of connection application (1)

The reason for not issuing or refusing offer of connection to the network by the Distribution Licensee shall not be:

- Existing offer and/or technical condition for connecting to any other applicant to the sub-station network within new connection area
- Insufficient transforming capacity of sub-station(s) in new connection area
- Insufficient capacity of electricity network caused by worsening operational conditions of the specific parts of the Distribution Network, its amortization (out dating) or operation at different parameters than envisaged in the project or possible congestion caused by new connection

Examination of connection application (2)

The Distribution Licensee is entitled to offer applicant different connection conditions than it is requested in the Application or additional measures for connecting to the requested voltage level (on the basis of due reasoning) if one of the following circumstances becomes obvious during review of the application:

- Requested connection capacity does not correspond to requested voltage level
- Connection is not possible with capacity requested by the Applicant due to the project capacity of the Distribution Network
- The Distribution does not have nominal voltage level requested by the Applicant at that sub-station to the network of which the connection is requested

Compliance Inspection

- In the process of checking conformity the Distribution Licensee is obliged to:
 - ✓ Check enforcement of draft coordinated in accordance with technical conditions and conformity with current normative acts of Georgia
 - ✓ Inspection of electrical equipment/installations to be connected
- In case if no faults have been observed after conformity check the Distribution Licensee issues document stating compliance (Technical document of connection to the Network) and connects Applicant's Electrical equipment/installation to the network

Voltage Quality

- Flicker

Voltage (kV)	Pst	Plt
Up to 35 Kv	0.7	0.5

- Harmonic distortion

Voltage	IHD (%)	THD (%)
35 kv and below	3.0	5.0
110 kv	1.5	2.5

- Voltage limits: $\pm 7.5\%$
- Power Factor: 0.9 – 1.0
- Voltage unbalance – no more than 1%
- Voltage Fluctuation – no more than 1%

Requirements for Generators:

- Fitted with speed governors and participating in frequency regulation
- Fitted with automatic voltage regulators
- Black start capability
- house load operation capability

Regulation of Connection Costs

- Connection costs bears connection applicant based on the works envisaged by connection condition
- Technical conditions issued by the Distribution Licensee to the Applicant shall not include obligations of construction or strengthening distribution electrical equipment and/or network that require expenditures exceeding minimum expenditures envisaged under technical norms and standards for connecting capacity requested by the Applicant to the network

Basic Principles of Micro Generation Connection

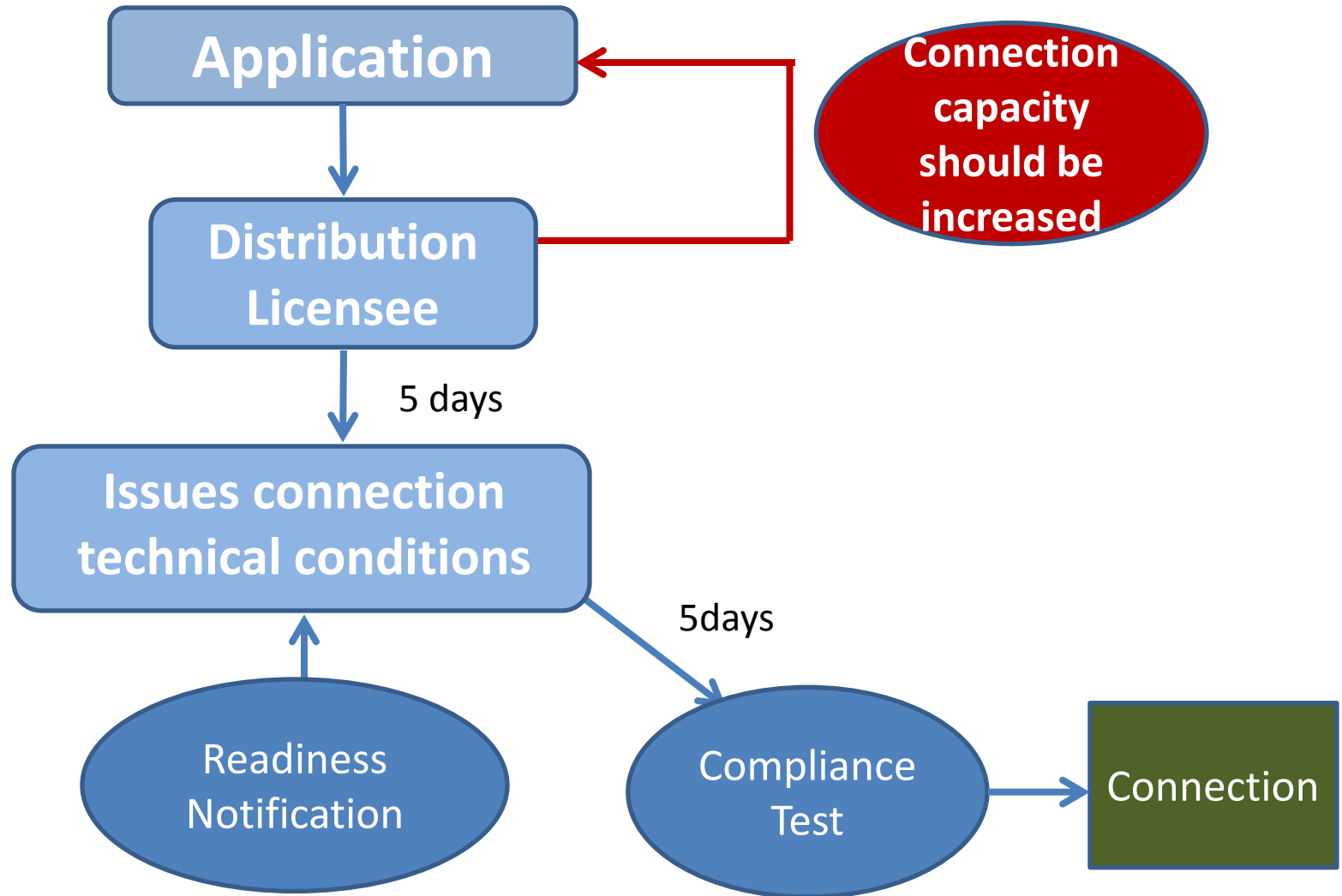
- Micro generators – Retail consumer's on-site generating facility up to 100 Kvt
- Distribution licensee is obliged to facilitate micro generation integration into the network
- Distribution Licensee to issue connection technical conditions freely upon relevant request from retail consumer
- Distribution Licensee is obliged to nominate contact person
- Distribution licensee is responsible for metering point reconstruction (installing bi-directional meter and data exchange equipment)
- Retail consumer who owns micro generator is authorized to request net metering
- Compensation mechanism of excessive energy is based on avoided cost

Technical requirements

The customer that owns the Micro Power Plant, shall not cause the worsening of electricity quality at the distribution network connection point above the set limits; in addition, by this period:

- voltage increase shall not exceed +6%
- connection of Micro Power Plant Shall not cause worsening of capacity factor out of the ± 0.8 limits
- Micro Power Plant shall not cause interphase imbalance (asymmetry) for more than 2 % in three phase system
- short circuits caused by the Micro Power Plant shall not exceed established norms for given voltage levels of distribution network

Micro Generation Connection Procedures



Consultant Recommendations regarding Net-metering (1)

- Eligibility:
 - limited to renewable generation sources only with capacity less than 100 kW
 - limited to homeowners and small businesses
- Size limits: individual installations limited to 100% of the capacity of the customer's service entrance
- Subscription limit: suggest no limit initially, but reviewed after 3 years to determine if a subscription limit is desirable
- Alternatively, could establish a subscription limit of 2% of system capacity, with review after 3 years

Consultant Recommendations regarding Net-metering (2)

- Connection requirements:
 - transparent and streamlined connection process defined in distribution grid code with technical review and safety inspection required, and undertaken by distribution licensee to which customer is connected
 - Depending on the Government's net metering policy, a customer might be charged incremental metering costs (i.e., cost of bidirectional metering installation less cost of typical metering installation) and charged for any necessary permitting
 - There would be no additional charges to customer for technical review and safety inspection
 - If installation requires distribution system upgrades (unlikely), distribution company, at its discretion, would be allowed to apply to GNERC for direct recovery of the costs from the net metering applicant.

Consultant Recommendations regarding Net-metering (3)

- Aggregation of metering data for multiple net metering applicants not be allowed except under unusual circumstances as determined on a case-by-case basis by GNERC
- Treatment of credits: Depends of the Government's net metering policy, but recommend that customer retain any renewable energy or carbon credits associated with its generation

Consultant Recommendations regarding Net-metering (4)

- Billing and settlement:
 - Recommend that customer's net consumption be billed at approved tariff for the relevant customer class;
 - If customer delivers more energy to distribution system than consumed in a month (i.e., excess generation), recommend:
 - excess generation be carried over to next month as a credit to the customer's bill
 - Credits tracked over the year, and if at the end of a year there remains a credit balance, it should be settled as follows:
 - 1) re-set credit balance to zero with payment to customer for credit balance according to approved tariff for the relevant customer class, or
 - 2) re-set credit balance to zero with payment to customer for credit balance according to avoided cost

Planning Code

- Purpose
- Five year plan
- Planning criteria
- Procedures
- Reliability Standards
- Development planning facilities
- Load forecasting
- Development planning studies

Purpose

- determine the procedures, technical requirements and responsibilities of the distribution network development (network design, construction, reconstruction and enlargement)
- determine the principles of distribution network planning for ensuring the safe and cost-effective functioning of the network, also for ensuring the adequate level of service quality standards
- determine the procedure of the information exchange for planning purposes
- determine the procedures for cooperation between distribution licensees and dispatch licensee on planning issues
- facilitate the development of network by the distribution licensee based on the economic and reliability principles

Planning Criteria

- Improvement of the safety norms and reliability standards of electricity
- Improvement the quality of electricity
- Reduction of distribution network losses
- Integration of renewable energy sources in distribution network
- Development of the plans related to the forecast of consumption increase
- Activities to be performed according to the strategic plans
- Improvement of ecological condition (development of environmentally friendly technologies)
- Development of smart networks

Cost Benefit Analysis

- Distribution Licensees are obliged to develop the transparent and comprehensible cost-benefit analysis methodology together according to the international best practice using the scoring system based on the planning criteria
- While analyzing the cost and benefits of Distribution Licensees the same methodology shall be used that shall be agreed preliminary with the Commission
- In five-year plans while using the cost-benefit analysis the special activities shall be identified according to the analyses of technical alternatives, environmental issues and costs for life period

Reliability Standards

- In substation of 35-110 kV voltage the damage of one power element (transformer, breaker, etc.) shall not cause the outage of 50 % load connected to the substation
- The Distribution Licensee shall decrease the 50% indicator to 30% within 5 years from entering into force of this Rule for all 35-110 kV substations in his ownership
- Within 5 years from entering into force of this Rule the relevant activities of the Distribution Licensee shall result in ± 5 % allowed deviation of distribution network voltage during a week period for 95% of time
- The Distribution Licensee shall ensure to maintain the average load in distribution network (substation transformers, electricity lines) within 70% of nominal capacity
- The electricity supply interruption indicators (SAIDI, SAIFI and ENS) shall be improved according to the target indicators set by the Commission
- Capacity coefficient (cost) in distribution network (except 0.4 kV network) shall be between 0.9-1.0 limits for 95% of time

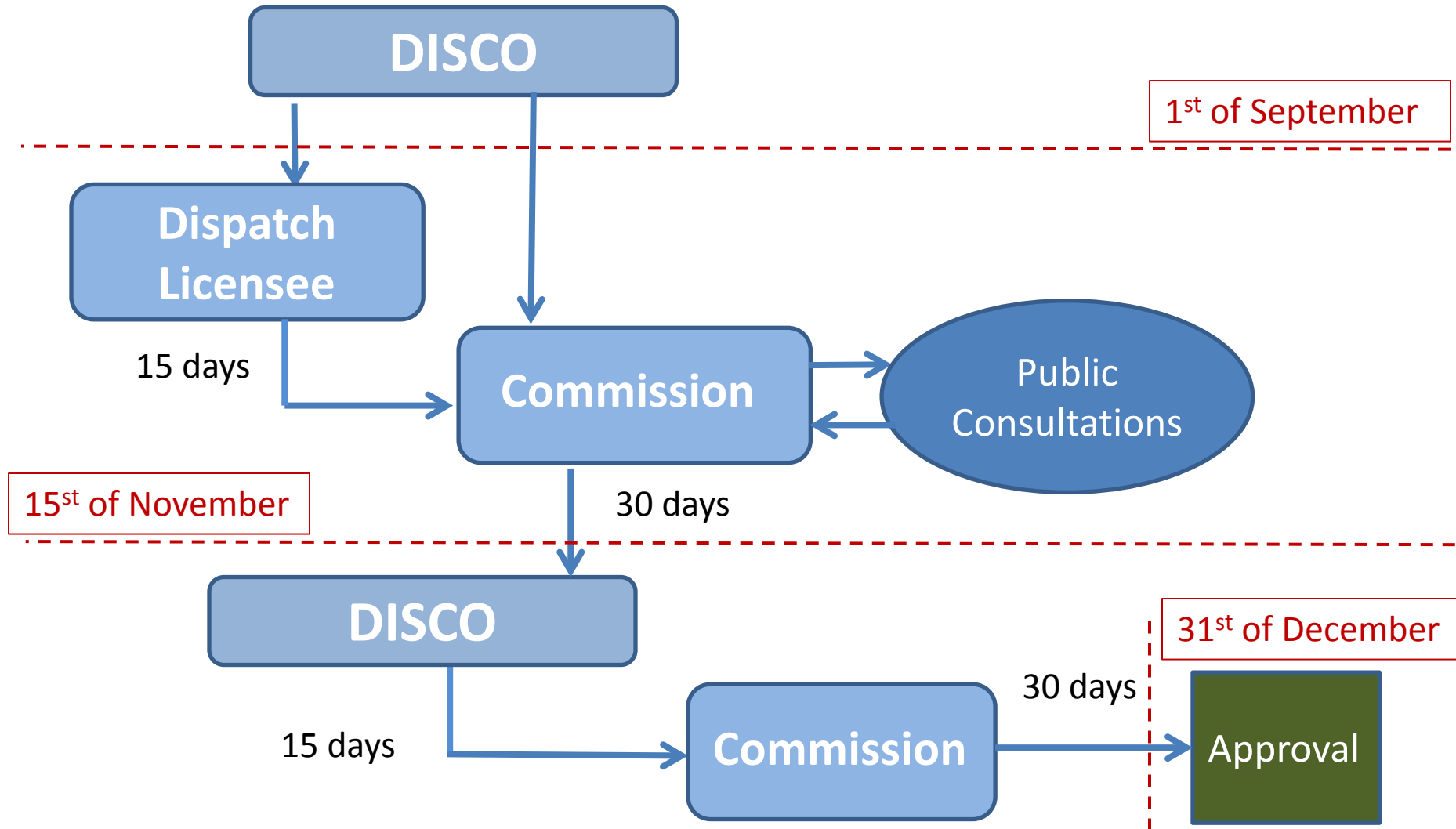
Strategic Plans

- Goals and action plans defined in the Energy Policy
- Energy Strategy
- Ten-Year Network Development Plan
- Electricity Balance of Georgia
- Environmental legislation obligation
- Human health and work safety legislation obligations
- Obligation related to the international agreements

Five-Year Plan Content

- Information about current and forecasted demand (load)
- Electricity generation forecasts
- Information about the infrastructure, which shall be built within the next five years
- Information on the planned project (investment plans agreed with the Commission)
- Information about integration of new generators
- Information about connection of new customers
- Information about the capacity of each network node and its strengthening plans for the purpose of integration of new generators
- Information about service quality
- Information about current problem and relevant plans regarding the compensation of reactive power and electricity losses
- Information about the location of power quality analyzers
- Plans related to the modification of connection points to the distribution network or arrangement of new connection points
- Cost and benefit analysis

Procedure of five-year plan approval



Planning Facilities

- The Distribution Licensee is obliged to implement simulation software(s) for computer simulation and optimization of network studies
- Simulation software shall meet the Distribution Network planning requirements and shall have following capacities (modules):
 - ✓ Analyze stream allocation
 - ✓ Simulate and optimize condensers (reactive compensation devices)
 - ✓ Analyze short-circuit current
 - ✓ Analyze voltage regulation
 - ✓ Analyze current fall during turbine launch
 - ✓ Dynamic optimization of feeders through simulation of load switching. Analyze of effective decisions and emergency situations shall be possible through such function
 - ✓ Consumption (loading) forecast
 - ✓ Analyze of harmonics and other characteristics of voltage

Network Studies

Research conducted by the Distribution Licensee shall comprise:

- Analyze of stream allocation
- Optimization of transmission lines feeding customers
- Drafting optimum plans of reactive capacity compensation
- Designing measures for reducing losses taking issues of reliability of electricity supply into consideration
- Research on voltage losses
- Reports on short-circuit current
- Research on Reliability of the Distribution Network

Operating Code

- Operating Code normally covers:
 - Short-term forecasting of load and generation
 - Planning of Retail Customer load interruptions
 - Operations management of the Distribution Network
 - Establishes procedures to enable collection of data from Distribution Network Users.

Metering Code

- The objective of the Retail Metering Code is to:
 - Form procedures for organizing metering of retail customers
 - Form technical requirements (including accuracy requirements)
 - Defining conditions for developing smart metering
- The Retail Metering Code covers:
 - Duties and responsibilities of the Distribution Licensees relating to metering organization and operation
 - Technical and operational requirements of metering equipment
 - Developing smart metering systems

Other Governance Documentation Requirements

- Other technical regulatory agreements at Distribution level include:
 - Licenses for DSO, Suppliers, and Distribution Asset Owners
 - Operating agreements between:
 - TSO and DSO
 - DSO and DSO
 - DSO and DO (Distribution Asset Owner)

Additional Recommendation from Consultant (2)

- The DSO to DO agreement - considerations and what it might cover:
 - One agreement between the DSO and all of the Distribution Owners (a multi-party agreement) or individual agreements
 - The terms used in the agreement
 - A description and listing of the facilities turned over to DSO authority
 - The separate rights and responsibilities of the DSO and the Distribution Owners

Additional Recommendation from Consultant (3)

- Maintenance coordination obligations and maintenance standards, including rights of the DSO to access and use Distribution Owner equipment
- The responsibilities of the parties during a system emergency
- Provisions for distribution planning and expansion, including the relative roles of the DSO and the Distribution Owners
- The terms and conditions for the DSO to pay for the cost of distribution facilities
- Establishment of any coordination committees



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Thank You!

