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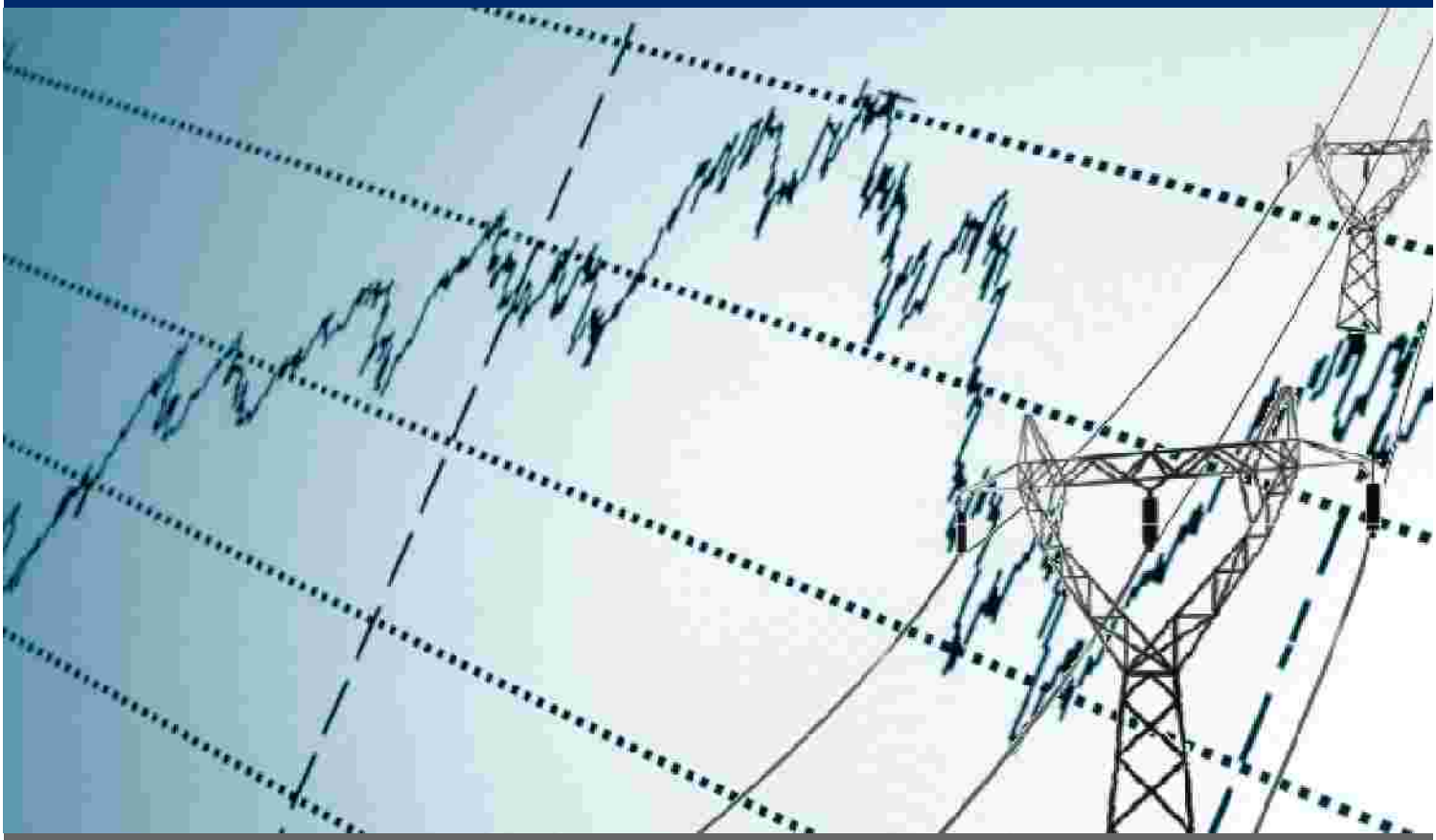
Hydropower Investment Promotion Project (HIPP)

Development of Transmission System Operator in Georgia



Thursday, August 15, 2013

This publication was produced for review by the United States Agency for International Development. It was prepared by Deloitte Consulting.

Development of Transmission System Operator in Georgia

USAID HYDROPOWER INVESTMENT PROMOTION PROJECT (HIPP)

CONTRACT NUMBER: EEM-I-00-07-00005-0

DELOITTE CONSULTING LLP

USAID/CAUCASUS OFFICE OF ENERGY AND ENVIRONMENT

THURSDAY, AUGUST 15, 2013

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Acronyms Used in this Report

ACER	Agency for the Cooperation of Energy Regulators
AMR	Automated Meter Reading
ATC	Available Transmission Capacity
BM	Balancing market
CBETA	Cross-Border Electricity Trading Agreement
DAM	Day-Ahead Market
DSO	Distribution System Operator
ERGEG	European Regulators' Group for Electricity and Gas
ENTSO-E	The European Network of Transmission System Operators for Electricity
ESCO	Electricity System Commercial Operator of Georgia
ETM	Electricity Trading Mechanism
EU	European Union
GEMM 2015	Georgian Electricity Market Model 2015
GNERC	Georgian National Energy and Water Supply Regulatory Commission
GoG	Government of Georgia
GSE	Georgian State Electrosystem
HIPP	Hydropower Investment Promotion Project
JSC	Joint Stock Company
kV	kilovolt
ISO	Independent System Operator
IT	Information Technology
ITO	Independent Transmission Operator
LLC	Limited Liability Company
MO	Market Operator
MoE	Ministry of Energy of Georgia
NA	Not Applicable
NCC	National Control (Dispatch) Center in Georgia
NTC	Net Transmission Capacity
OU	Ownership Unbundling
PX	Power Exchange
SCADA	Supervisory Control and Data Acquisition
TEIAS	Turkish Electricity Transmission Company
TSA	Transmission Service Agreement
TSO	Transmission System Operator
USAID	United States Agency for International Development

Executive Summary

The purpose of the report is to support the interested parties with an analysis on creating a new market entity – Transmission System Operator (TSO) in the Georgian competitive electricity sector.

- Over the past years Georgian Electricity Sector has been transformed d currently it is segmented into generation, transmission and distribution sector. However, there are cases when generation, transmission and distributi n sectors overlap each other.
- The structure of the Georgian Electricity Sector needs further modification and establishment of new institutions in order to be compliant with EU Energy Directives.
- Georgian State Electrosystem (GSE) currently owns the Georgian transmission network. At the same time, GSE is responsible for dispatching the entire Georgian electricity system.
- The National Control (Dispatch) Center (NCC) is contro by GSE. NCC provides control over the operations of Georgian power system and ensures overall system reliability and proper operation of whole network under the normal operational mode as well as in emergencies.
- In the most European countries transmission and dispat ing activities are generally unbundled and administered by different companies.
- According to Georgian Energy Strategy, the electricity market should be 100% opened by 2017. Design and creation of the Georgian Electricity Market Model 2015 (GEMM 2015) and Electricity Trading Mechanism (ETM) by HIPP project is in accordance with GoGs strategy.
- Main objectives of GEMM 2015 is to support GoG to further liberalize Georgian Electricity Market, improve is legal and regulatory fr ework, upgrade the infrastructure, harmonize with the Turkish power marke and create favorable environment for investment and business.
- According to GEMM 2015, certain fundamental steps must be taken in order to implement the objectives of the GoG to create an independent Transmission System Operator.
- Some of the current roles and functions of GSE should gradually change into an independent Transmission System Operator resulting in functional and legal separation of GSE into two companies: Transmission System Operator and Transmission Company.

1. Introduction

The USAID-funded Hydropower Investment Promotion Project (HIPP) described its vision about the electricity market development in Georgia in GEMM 2015. The vision assumes further steps to be taken by the Government of Georgia (GoG) and various market participants in order to develop Georgia's comp itive electricity sector in compliance with the energy strategy of the GoG. It represents the guide for fundamental but gradual legal and functional changes in the Georgian electricity market structure in accordance with the EU competitive electricity market principles. GEMM 2015 underlines the creation of independent Transmission System Operator (TSO) which will be obliged to manage electricity system security in real time and to balance supply and demand in a manner that avoid supply interruptions, freq ency fluctuations and outages.

According to GEMM 2015, development of the Georgian TSO will be accompanied with gradual changes in GSE's existing functions into separate functions and responsibilities related to TSO. Currently, GSE which is state-owned company, performs both Georgian electricity system operations function and owns the transmission network. Steps for TSO's establishment will take several phases. First, TSO unit should be established within GSE in the near term in order to gradually transfer all GSE's functions which are related to TSO's responsibilities and activities. In medium term, TSO unit would become the successor of GSE's dispatch function and be licensed by GNERC. Finally, TSO unit will be legally separated from GSE and transform itself into an independent TSO while GSE will execute its remaining functions as a transmission company.

Development of the TSO in the Georgian electricity market requires not only legal and functional separation from GSE but also preparation and readiness of necessary and sufficient IT systems and communications for reliability and security of the power system and transparent and uninterruptable information exchange among market participants. At the same time, the TSO will be responsible for the determination and provision of reserves in order to cover sudden conting es and imbalances in the system. For this purposes, the TSO should conduct system planning within different time frames. Last but not least, the TSO should also actively coordinate with other institutions such as the Market Operator and GNERC and market participants.

This report represents initial analysis of the development of TSO Georgia. It examines the current structure of GSE and its functions and responsibilities required for the operation of Georgian electricity system and provide key topics and issues which should be considered during the development process based on inter ational experience. The remainder of this report is structured as follows: Section 2 describes European experience regarding TSOs' roles and duties for system operations and current regimes of TSO ownership unbundling according to EU Energy Directives. In addition, Section 2 provides guidelines for sophistica ed system operations and IT

platform requirements based on cooperative institutions of EU countries. Section 3 provides a description of current role of GSE in Georgian electricity market and further steps and evolution path for its restructuring and est lishment of Georgian TSO together with Georgian TSOs functions and its coordination with other institution in electricity market. Section 4 describes necessary and sufficient rules, regulation and contracts while Section 5 provides details of IT platf rms and infrastructure specifications which will be required for Georgian TSOs proper functioning and execution of its responsibilities. As transparency, fair and non-discriminatory treatment of every market participant are essential for competitive electricity market functioning, Sections 6, 7 and 8 provides guidelines for transparency and provision of market information, transparency requirements and detailed data requirements for efficient functioning of the TSO. Finally, data sources and other relevant material are rovided in the Appendix and References.

2. European experience

The transmission system operator is one of the main actors in any electricity sector. In 2007, the European Commission enforced the third package of energy directives which provides priorities for further development of European internal electricity market and underlines conditions and mechanism for achieving its energy strategy. According to EU Energy directive 2009/72/EC, "transmission system operator means a natural or legal person responsible for operating, ensuring the mainten nce of and, if necessary, developing the transmission system in a given area and, where applicable, its interconnections with other systems, and for ensuring the long-term ability of the system to meet reasonable demands for the transmission of electricity"[1]. At the same time, 2009/72/EC energy directive in the articles 12, 15, and 16 defines main functions and responsibilities of TSO:

- Ensuring the long-term ability of the system to meet reasonable demands or the transmission of electricity, operating, maintaining and developing under economic conditions secure, reliable and efficient transmission systems with due regard to the environment;
- Ensuring adequate means to meet service obligations;
- Contributing to security of supply through adequate transmission;
- Capacity and system reliability;
- Ensuring non-discrimination as between system users or classes of system users, particularly in favor of its related undertakings;

[1] EU Energy Directive 2009/72/EC

- Providing system users with the information they need for efficient access to the system;
- Ensuring the ability of the transmission system to meet the demand for transmission;
- Contribution to security of supply by adequate transmi ion capacity;
- Technical management of transmission flows;
- Providing sufficient information to any operator of ot er systems which are connected to the transmission system;
- Dispatching of generating installations and balancing electricity);
- Preservation the confidentiality of information;
- Submission to the relevant regulatory authority an updated ten-year network development plan (TYNDP) every year.

Considering EU energy Directive 2009/72/EC and its definitions regarding to TSO's tasks and duties, responsibilities of TSO can be categorized into following way:

- Infrastructure management and grid development: TSO is obliged to constantly maintain and develop the transmission grid based on market participants' needs and requirements in order to ensure real-time balance between supply and demand.
- System operations: Electricity cannot be stored in large quantities. It therefore has to be generated as and when it is needed. It is the job of the system operator to ensure a permanent balance between generation and consumption. This is critical for the efficient operation of the network and to guarantee security of supply. The challenges that the TSO faces in this respect relate to the growing proportion of energy generated from renewable energy s rces (such as wind), which are variable by their very nature, and the increase in flows linked to trading on the international market. These two factors require innovative new methods of system operation as well as heightened vigilance and c ation.
- Market facilitation: Granting access to the grid to all market players in a transparent way and developing coordinated and harmonized. At this context TSO works in close collaboration with the MO in order to enable all stakeholders within society to benefit from free competition.

Requirements in the European electricity-related legislation declared a clear preference for ownership unbundling as the most effective way of eparating transmission from other stages of the value chain, which is regarded as ecessary in order to promote

infrastructure investment, fair network access and market transparency. Reasons for these changes were to address serious shortcomings in the electricity market such as:

- Market concentration which lead to market manipulation;
- Vertical foreclosure and inadequate unbundling of functions in the sector;
- Lack of transparency and poor availability of information to network users;
- Regulated retail tariffs that discouraged entry and competition;
- Poor market integration, arising from major constraints on cross-border trade;
- Discriminatory balancing markets.

According to third package of energy legislation, three models of ownership of transmission system operator are proposed:

- Independent Transmission Operator (ITO) implies the full unbundling of TSO from the rest of the system when TSO owns and operates transmission assets. (Ex. National Grid in the United Kingdom);
- Full Ownership Unbundling (OU) implies the full legal unbundling of TSO from the rest of system. In this model TSO owns and operates transmission assets while these assets cannot be under the same ownership as generation or retail supply. (Ex. France)
- Independent System Operator (ISO) implies the ownership unbundling from the rest of the system but in this model ISO does not own the transmission assets but can operate the PX. (Ex. PJM in the USA).

Table 1 describes the regime of TSO unbundling in European countries according to abovementioned three models of TSO's ownership unbundling.

Table 1. Regime of TSO Unbundling in EU Countries

Country	Number of TSOs	Unbundling Regime of Largest TSO	Number of Certified Ownership Unbundled TSO
Austria	2	ITO	0
Belgium	1	OU	1
Bulgaria	1	Legal and accounting unbundling	0
Cyprus	1	OU	0
Czech Republic	1	OU	0
Denmark	1	OU	1
Estonia	1	OU	0
Finland	1	OU	0
France	1	ITO	0
Germany	4	Legally unbundling	NA
Great Britain and Northern Ireland	7 2	OU NA	2 0
Greece	1	ISO	0
Hungary	1	Legally unbundling	0
Ireland	1	NA	0
Italy	11	OU	0
Latvia	1	ISO	0
Lithuania	1	OU	0
Luxembourg	1	Legally unbundling	NAP
Norway	1	OU	0
Portugal	1	OU	0
Romania	1	OU	0
Slovak Republic	1	OU	0
Slovenia	1	OU	0
Spain	1	OU	1
Sweden	1	OU	0
The Netherlands	2	OU	0

Source: CEER, Annual Report, 2012

2.1 Framework Guidelines on Electricity System Operations

Framework guidelines for electricity system operations are proposed by the Agency for the Cooperation of Energy Regulators (ACER)[2]. The aim of this document is to set clear and objective principles for the development and actions related to electricity system operations within synchronous or cross-border purposes. According to this document, three key challenges for TSO are:

- Determination of harmonized system security principles;
- Clarify TSOs roles, responsibilities and functions;
- Ensure adequate data exchange.

In order to address these challenges TSO should:

- Operate electricity system in a safe, secure, effectiv and efficient way'
- Enable integration of innovative technologies;
- Apply same principles for different electricity systems;
- Make full use of information and communication technologies in secure and safe way.

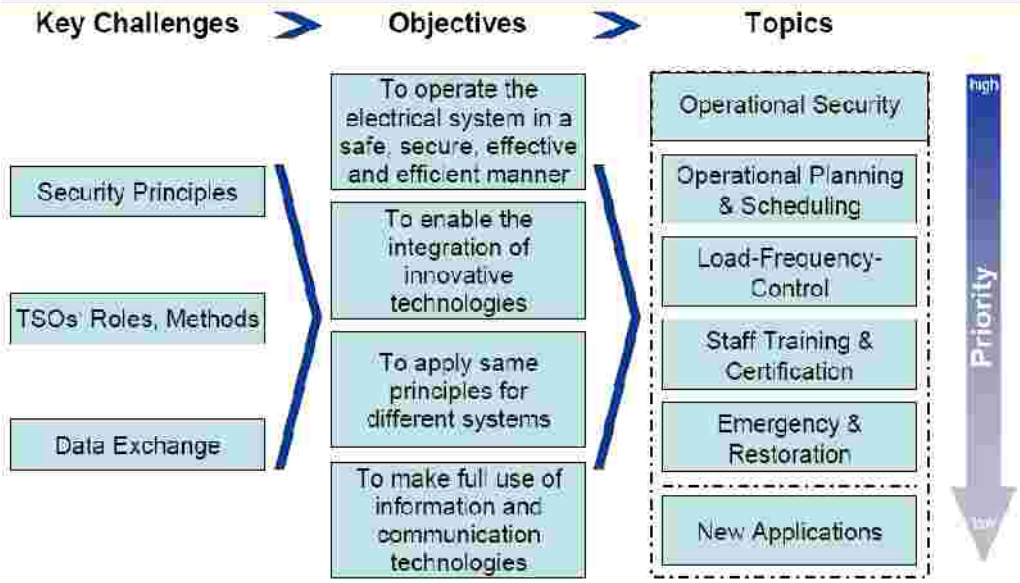
Considering above mentioned challenges and main principles of TSOs functioning, ACER defines the five the most important issues that can impact system operations. They are:

- Operational Security: It includes issues related to system operations such as security principles, voltage and frequency control;
- Operational Planning and Scheduling: It includes TSOs activities conducted prior to real-time and covers outage scheduling, day-ahead congestion management, day-ahead system planning and transmission capacity determination;
- Load Frequency Control: It covers all control aspects such as primary, secondary and tertiary reserve capacities;
- Staff Training and Certification: It implies the specific human resources requirements for the purpose of electricity system operations;
- Emergency and Restoration: It covers defense plans and restoration of the electricity system after disturbances, blackouts or ou es in the system;
- New Applications: It is related to future developments of the electricity system considered in TSOs ten year network development plan.

[2] ACER, 2011

In general, ACER's framework guidelines for electricity system operations can be summarized as it is shown in Figure 1.

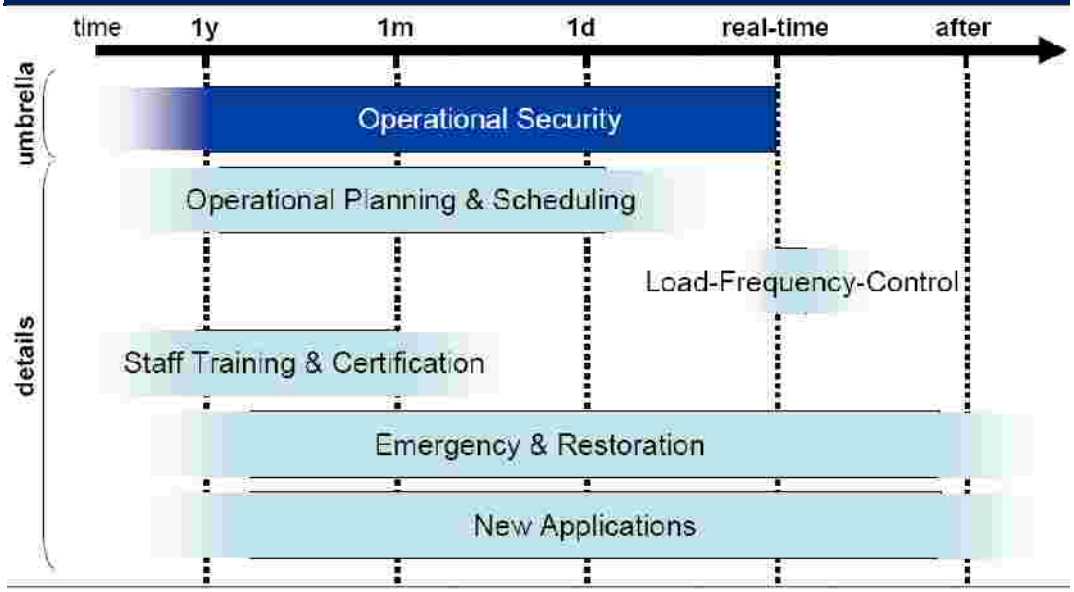
Figure 1. Structure and Development Flow of Framework Guidelines



Source: ACER, 2011

Electricity system operation covers a wide range of activities across different timeframe. Consequently, the TSO's objective is to achieve and maintain well-functioning of the electricity system with a required level of security a quality of supply together with efficient usage of infrastructure and resources. Figure 1 shows key issue of electricity system operations within different time periods which uld be considered by the TSO.

Figure 2. Key System Operations Issues in Time

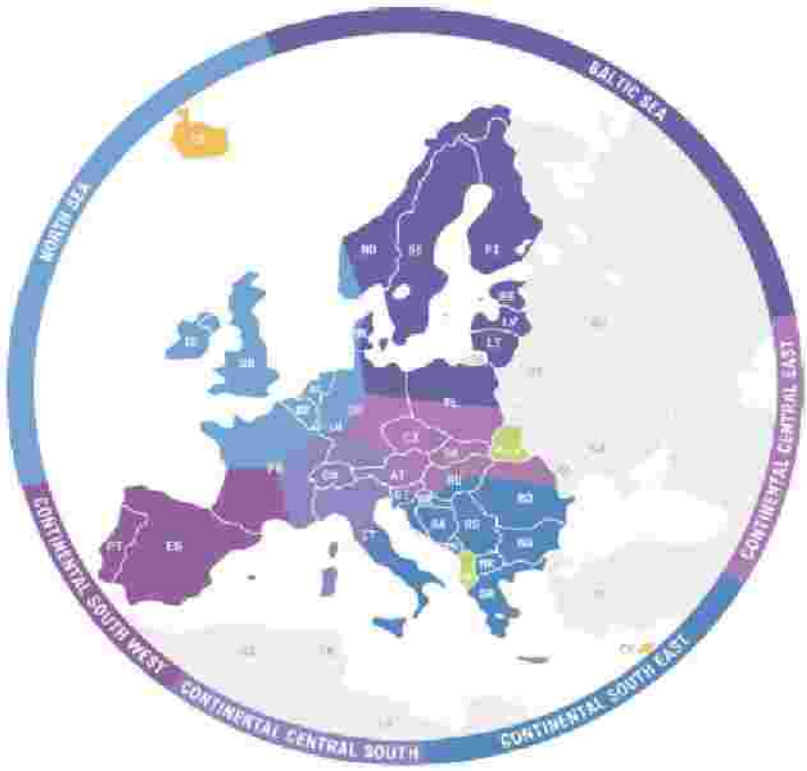


Source: ACER, 2011

2.2 European Network of Transmission System Operators for Electricity

The European Network of Transmission System Operators r Electricity (ENTSO-E) is an association of Europe's transmission system operators (TSOs) for electricity. Establishment of the ENTSO-E was initiated by the third package of EU Energy Directives in order to improve the integration of the European electricity markets and to guarantee the secure, reliable operation of the European electricity transmission networks. In this context, ENTSO-E ensures better collaboration between the TSOs in a number of key areas, such as the development of technical and market-based grid codes and the coordination of system operation and gri development. Currently, there are 41 TSOs from 34 European countries in ENTSO-E. Distribution of ENTSO-E members based on their geographical locations is shown in Figure 3.

Figure 3. ENTSO-E Member Countries



Source: European Electricity Grid Initiative, 2013

Based on its priorities, ENTSO-E is one of the major actors in European electricity market while it promotes important aspects of energy policy in the face of sign icant challenges such as security of supply implying reliable and secure operations of the electricity transmission network, adequacy implying development of the interconnected European grid and investments for a sustainable power system, market facilitation to

offer a IT platform in order to support market integration and transparency frameworks that facilitate competitive and truly integrated continental-scale wholesale and retail markets. For this purpose, ENTSO-E created its transparency platform which aims to facilitate access to information by all market participants and stakeholders in promoting the transparency goals of the internal electricity mar et. This platform provides all necessary information to European electricity market participants within different timeframes related to[3]:

- Congestion management
    - Cross border physical flow
    - Cross-Border Commercial Schedules
    - Planned schedule evolution
    - Final Cross-Border Schedules
    - Physical Cross-Border Flows vs. Final Cross-Border Schedules
    - Explicit and implicit auctions
- Balance area profile
    - System load
    - Balancing market
    - Total load
- Network capacity
    - Net transfer capacity
    - Outages
- Publications related to transmission activities

3. Organizational Restructuring of GSE into TSO

GSE was formed in 2002 from the merger of JSC "Electrogadatsema" and JSC "Electrodispetcherizatsia". These two entities were themselves established in 1999 and 2000 respectively to own the transmission assets of the state utility Sakenergo and to manage the national dispatch center. At this moment, GSE is a 100% state-owned joint stock company providing transmission and exclusive dispatch services to about 50 eligible companies in Georgia. It operates under perpetual electricity transmission

[3] For more detailed information on ENTSO-E's transparency platform and information provision visit its website www.entsoe.net

license No.12-004 and dispatching license No.13-004 obtained from the GNERC on December 20, 2002. Regarding to Georgian electricity system dispatching, SE controls the national dispatch center and provides control over the operations of Georgian power system and ensures overall system reliability. The NCC is equipped with modern technologies and software such as SCADA and Alpha Center which enables GSE to receive system information online, ensure remote control and efficient restoration after incidents. The dispatch is able to get accurate information from substations and, as a result of upgraded data base, operatively re to any system faults or emergencies. In case of transmission network, GSE operates 500 kV, 330 kV, 220kV, 110kV and 35 kV transmission lines. Summary of GSE' transmission network assets are shown in Figure 4.

Figure 4. GSE's Transmission Network Assets and Capacity

Lines		Substations		
Voltage	**Length (km)**	**Voltage**	**Number**	**Capacity**
220 kV	1583	500 kV	3	3439
110 kV	893	220 kV	17	4371
35 kV	462	110 kV	24	411
		35 kV	47	179

Besides GSE, there is a second transmission licensee, Sakrusenergo, operating in Georgian electricity market. SRE is a joint transmission company established by the Georgian Government in cooperation with "Russian United Energy System" with a 50-50% ownership basis. The company arranges electricity transmission through the intersystem 500 kV electricity transmission lines together with mainten ce of lines providing the interconnection between national and neighbor country`s energy systems. At the same time, Energotrans LLC which is owned by GSE is a new transmission company which will responsible for operation and rehab ation operation of 500/400 kV interconnection line with Turkey.

After development of Georgian TSO in Georgian electric market there will be three transmission companies which will be responsible for the physical operation of the transmission system, that is, maintaining and expanding the system as necessary to meet forecasts through long-term development and investment. These transmission companies have the following obligations:

- To connect generating plant to the transmission system;
- To connect DSOs to the transmission system; and
- To decide on matters of new investment and rehabilitati n required to support forecast loads on the transmission system.

According to GEMM 2015, GSE will be separated to Transmission System Operator and Transmission System Owner. For this milestone, GSE should actively work together with MoE and develop its new organizational structure and draft implementation plan. At the same time, GSE is responsible for developing Grid Code and various contracts which are necessary for TSO's op ons. Potential contracts and regulations which will be required for the future Georgian TSO's functioning are:

- Georgian TSO and Foreign TSO contract
- TSO and MO contract
- TSO and Generator transmission losses contract
- TSO and Generator ancillary services contract
- TSO and traders contract
- Grid Code
- Balancing and Settlement Rules

According to these contracts and regulations, coordination of Georgian TSO and other market participants and entities is shown in the Figure 8.

Establishment of Georgian TSO will require gradual changes in GSE's current organizational structure and separation of system oper tions and transmission network asset into different companies with separate roles and functions. Figure 5 describes current organizational structure of GSE while Figure 6 proposes the organizational structure of the future Georgian TSO based on international experience. Furthermore, Figure 7 provides the transitional phase for organizational restructuring of GSE into TSO. During the transitional phase TSO unit should be established within GSE which will gradually acquire functions and duties related to TSO's activities currently executed by GSE.

Figure 5. Current Organizational Structure of GSE/TSO

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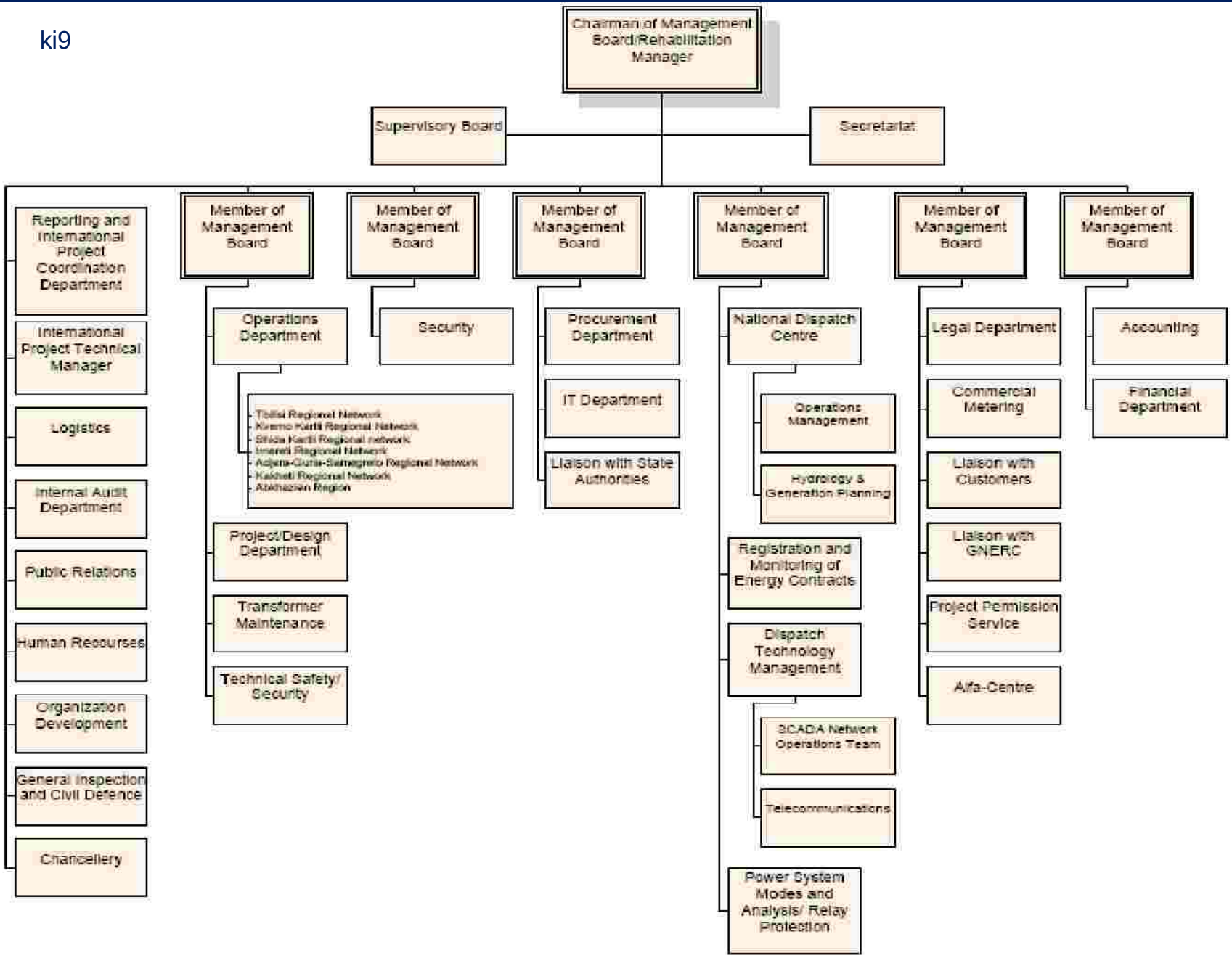


Figure 6. Final Organizational Structure of Georgian T O

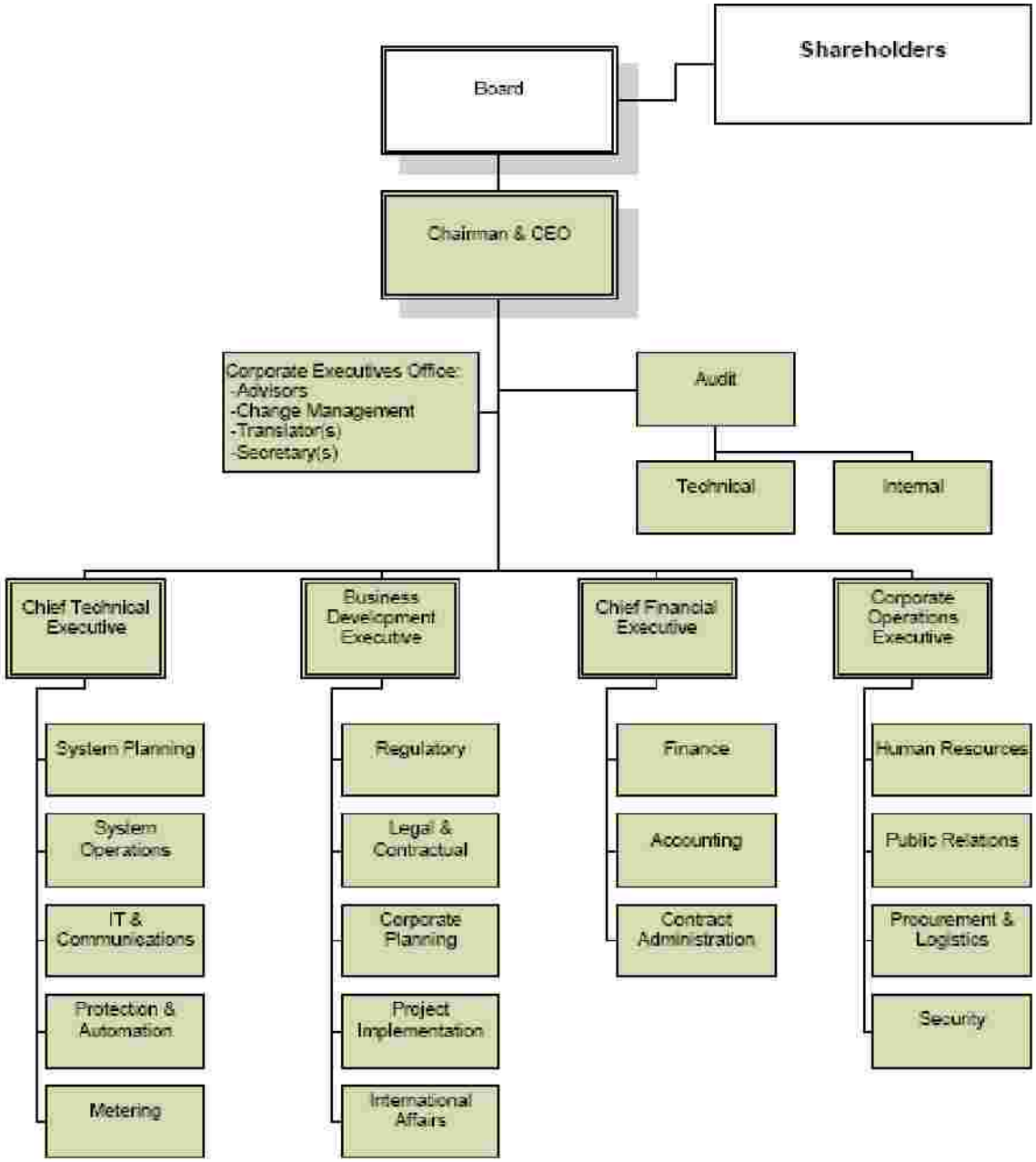


Figure 7. Transitional Phase for Organizational Structure of Georgian GSE/TSO

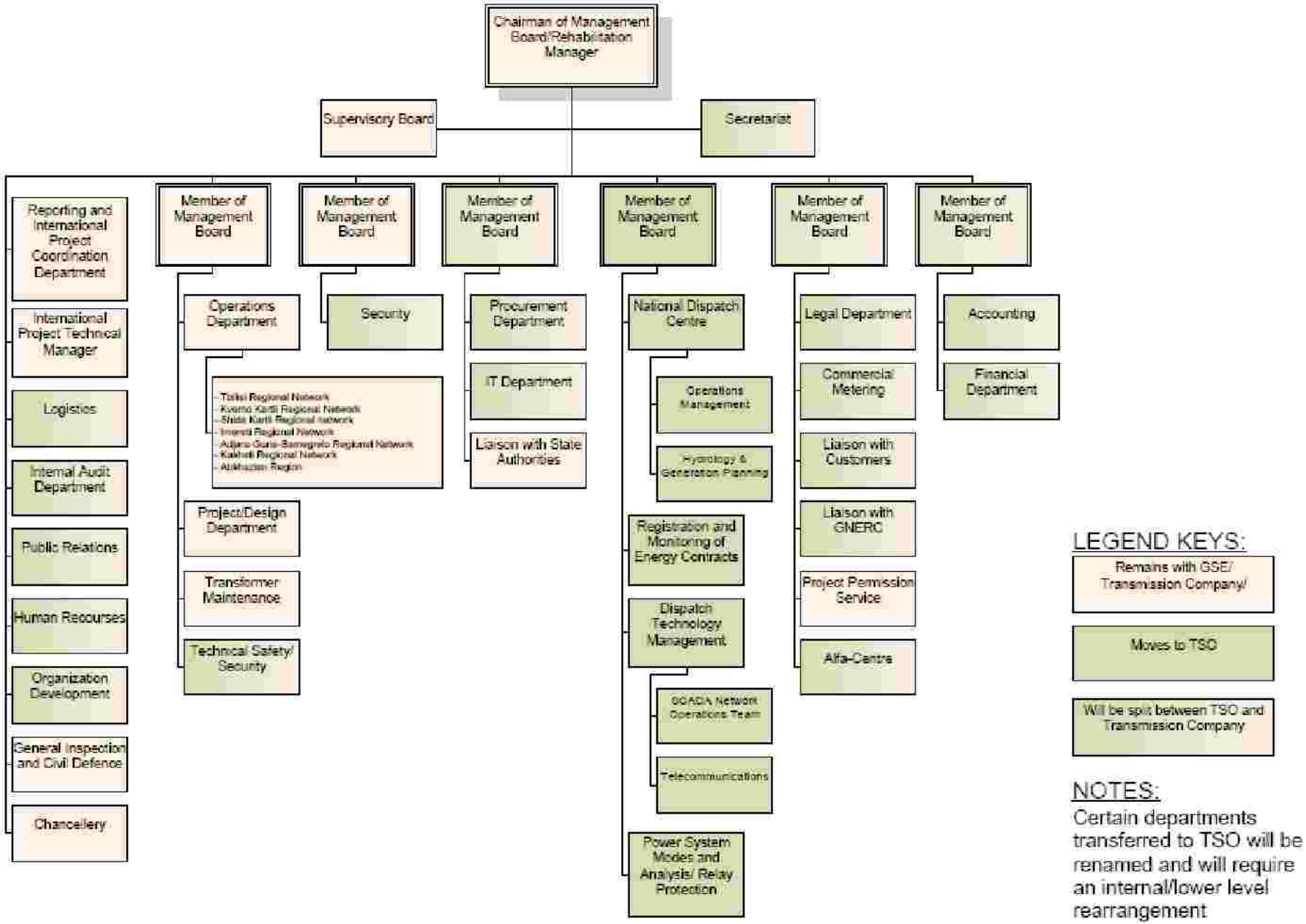
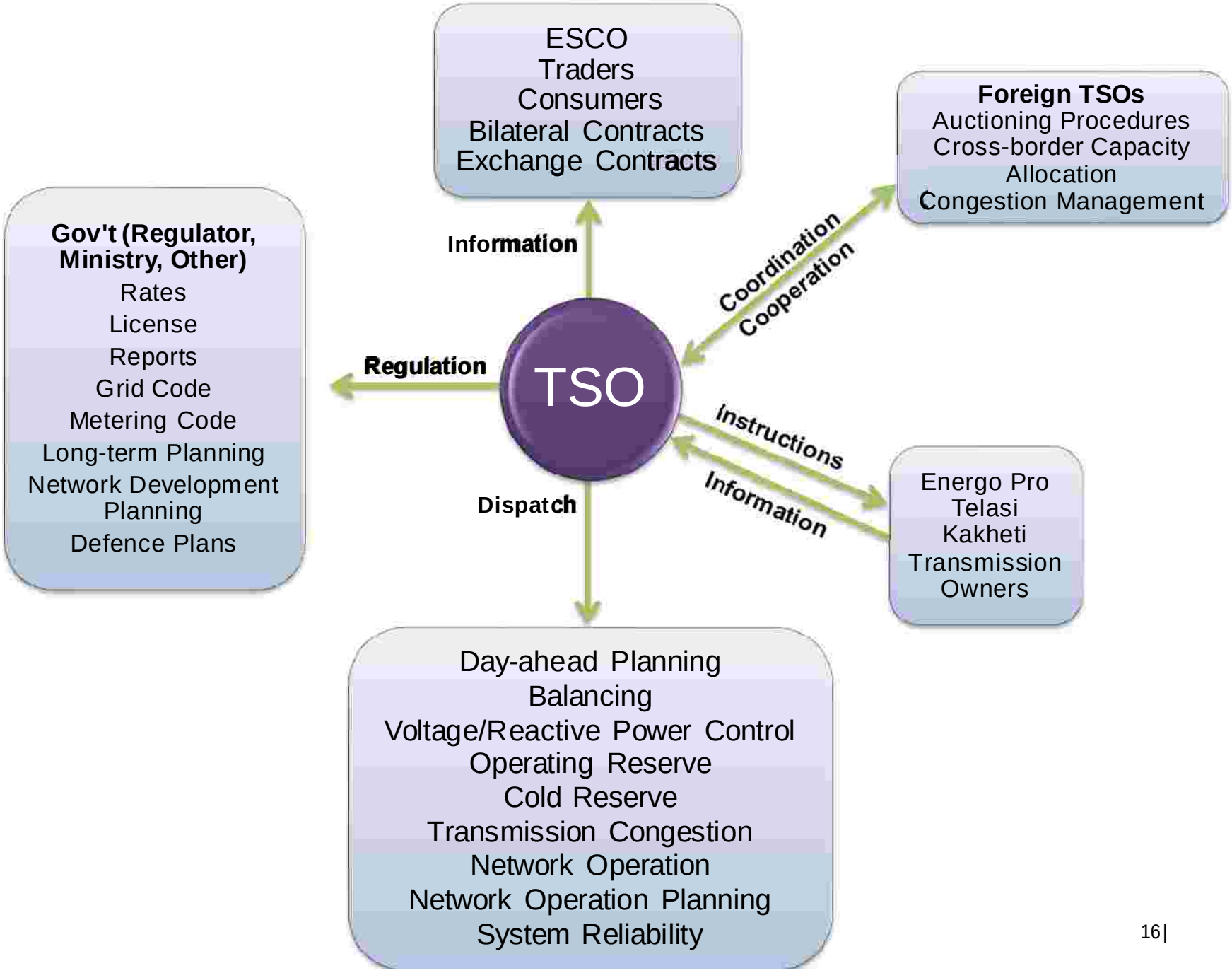


Figure 8. Interaction of Georgian TSO and Other Market Participants and Entities

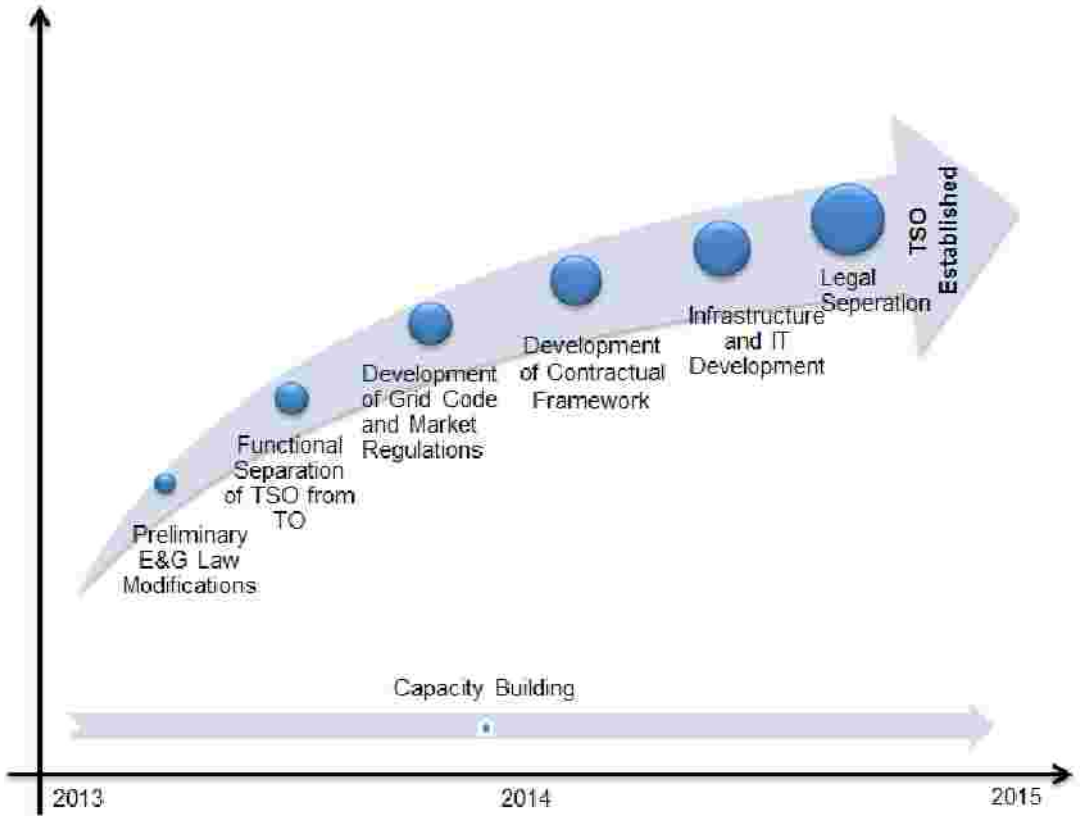


Overall, development of the Georgian TSO will require several actions which will b related to improvement/modifications of legal, organiz tional and infrastructure issues such as:

- Preliminary Electricity and Gas Law modifications:
- Functional separation of TSO from TO
- Development of Grid Code and Market Regulations
- Development of Contractual Framework
- Infrastructure and IT Development
- Legal Separation of GSE and TSO unit

The proposed TSO's development path is shown in the Figure 9 while more detailed activities which should be carried out are describes in the Table 7 in Appendix II.

Figure 9. Evolution Paths of TSO Development Activities



4. Rules, regulations and contracts required for TSO's establishment

4.1 Georgian Transmission Grid code

The Georgian Transmission Grid Code has been developed by the HIPP project. It defines the rules and regulations for various Georgian electricity market participants for accessing and using the transmission network of Georgia.

The aim of the Georgian Transmission Grid Code is to establish the obligations of the Georgian TSO, transmission companies and grid users such as generators, distribution entities, directly-connected customers and other users for accessing and using the Transmission Grid. More specifically, the Georgian Transmission Grid Code:

- Defines obligations, responsibilities, and accountabilities of all the parties towards ensuring open, transparent, non-discriminatory, and economic access and use of the Transmission Grid while maintaining its safe, reliable, and efficient operation;
- Defines minimum technical requirements for the Participants;
- Sets out the information exchange obligations of the Partic ants.

This Georgian Transmission Grid Code does not replace r substitute the existing Dispatch Rules, Procedures and Manuals but rather provides a general framework for their revision to ensure the Safe, Secure and Reliable Operation of Georgian National Transmission Grid under the Competitive Electricity Market Environment. It is supposed to work in conjunction with other Legal and Regulatory documents, including but not limited to the Georgian Law on Electricity and Natural Gas; Electricity Market Rules (to be developed and approved by GNERC); Regulatory Guidelines issued by the GNERC; Interconnection Capacity Auctioning and Allocation Procedures, and so forth.

Table 2. Description of Grid Code's Content

Chapter	Description
Chapter 1	Describes and sets general conditions and provisions which apply to all sections of the Georgian Transmission Grid Code. Generally, Chapter 1 ensures that the various sections of the Grid Code work collec vely and in harmony with each other for the benefit of all Participants.
Chapter 2	Describes transmission network connection procedures. It specifies basic principles and establishes a set of technical, design, and operational conditions for the Users for connecting to and using the Transmission Grid. It also contains information about the performance characteristics of the Transmission Grid at the Connection Point to enable the Users to design their own facilities and schemes accordingly.

Chapter 3	Describes transmission network planning procedures. It provides a framework for enabling the TSO, Transmission Companies and Transmission Grid Users to interact in relation to planning and development of the Transmission Grid and also specifies the data and information that they have to exchange with each other for this purpose.
Chapter 4	Describes transmission network operational procedures. It covers a host of topics relating to proper operation of the Transmission Grid such as operational demand forecasting, Generation and Transmi ion maintenance planning, providing and managing of system support services, operational liaison between the TSO, Transmission Companies and Transmission Grid Users and coordination of Safety, planning for and dealing with system contingencies, and organizing and conducting of various tests.
Chapter 5	Describes transmission network scheduling and dispatching procedures. It specifies the responsibilities and obligations of the Transmission Companies and Transmission Grid Users with respect to cheduling and Dispatch of Generating Units and demand resources and sets out the procedure for supplying of timely and accurate information by the Users to the TSO, the TSO's preparing and issuing of Generation Schedules, and issuing of Dispatch Instructions.
Chapter 6	Describes data and information exchange rules and procedures. It sets the obligations and responsibilities of the TSO, Transmission Companies and Transmission Grid Users in relation to the supply of d a and information to each other, and also lists the various categories of data and information to be exchanged between the TSO and the Transmission Grid Users.
Chapter 7	Defines metering rules and procedures. This chapter deals with metering and recording requirements for Participants and clarifies on their obligations relating to such installations. It also sets the minimum technical, design and operational criteria to be complied with by Transmission Grid Participants relating to metering and data collection equipment and installations

4.2 Interconnection Operation Agreement

The Interconnection Operation Agreement between TEIAS and GSE/Energotrans is legally binding document and it aims to provide technical parameters for the operation and maintenance of the Borcka-Akhaltsikhe Interconnection Line and ensure implementation of transfers of quantities of electricity allocated pursuant to the CBETA and based on quantities anticipated in commercial electricity sale and purchase agreements signed between counterparts.

5. IT Platforms and Infrastructure Needed for the TSO

There are several IT platforms and infrastructure that should be in place to support Georgian TSO's operation in the electricity market. Below is described main IT related issues that require development along with functional development of Georgian TSO.

5.1 Automated Meter Reporting System (AMR)

The automated meter reporting system (AMR) was partially started by GSE. GSE created the Alpha Center and connected several commercial meters to the Alpha Center. Unfortunately there are still many commercial eters that are not connected to the Alpha Center and for many commercial points, monthly readings are taken for the monthly balancing market. There are many types and quality of meters and many do not have storage capabilities and are not communication capable. Further development of Georgian electricity market underlined in GoG's strategy considers establishment of one hour as a market unit of time. At this same time, the new grid code covers specific requirements for meters/meter installations and communications equipment to connect to a central depository for commercial information. That commercial information must be analyzed in preparation for settlement calculations. Thus, existing system design is incapable of providing the information required for the developing competitive electricity market. The information from the AMR will be used for the balancing market, for the power exchange, for the bilateral market, for network erformance based rated, for ancillary services and other activities within the competitive power market. The system must be accurate, comprehensive, automatic, and expandable.

5.2 Asset Management System

GSE requested USAID to support development of an asset management system. GSE has some information on its assets but the information is neither complete nor properly logged. GSE has transmission assets, TSO assets and even distribution ssets. The TSO is scheduled to be legally separated by 2015 so the asset registry will need to be bifurcated. GSE also owns distribution facilities in service jurisdiction of Kakheti Distribution Company. A database that is accessible by several GSE officials for different tasks is requested. The asset management system should provide ready information about the existing GSE assets, new assets they added, sorting and reporting on categories of assets and support to GSE's management in properly managing its assets. In order to comply with GNERC's equest for benchmarking and separately priced ancillary services, some of the assets will need to be separated into components, such as a substation into transformer, breakers, relay controls, bus bar, system controls and other components that support the cillary services tariff calculations. At the same time, it is necessary to create the utility assets database with technical condition of equipment to interface it with accounting and investment databases. Updating data in all databases should be conducted on an ongoing basis.

5.3. Forecasting and Planning Software

There are two specific issues that will be addressed by developing load forecasts – operational planning – from inter-day planning to annual forecast of system demand and energy and long-term system planning that looks to macro-economic indicators to provide a various future scenarios of system growth and expansion.

Short term load forecast is required for day ahead planning and scheduling, intra-day trading, balancing market forecast, hydropower cascade planning, energy trading strategies, transmission interconnection capacity calc tions and a host of other requirements. These forecasts should be readily available for power sector players and service providers. Forecasting is also required in lon er periods up to one year ahead for developing maintenance schedules, management hydropower dam water levels, and other system requirements.

Longer term forecasts are used for both internal GSE a ivities (business planning, investment planning) and for external reasons such as a r on long-term system expansion (5-10 years forecast).

5.4 TSO's Auctioning IT Platform

Georgia will soon be connected to Turkey and perhaps Armenia via asynchronous connections where traders will vie for interconnection capacity. Rules are needed for capacity allocation and congestion management for these connections and possibly will be located within the transmission grid code which is rrently under development.

The auctioning of transmission capacity will be done on a yearly, monthly and daily basis. An IT platform is needed to provide a transpar nt process for 1) collecting and analyzing system information on ATC, NTC, and other similar information; 2) for obtaining and registering bids for interconnection capacity; 3) to ensure proper margins are in place; 4) for determining the price on the product offered, 4) f r announcing winners and 5) for sending information for settlements.

Capacity allocation is the essential part of the overa process of Congestion Management, which also considers load flow analyses such as Day Ahead Congestion Forecast, Intra-Day Congestion Forecast as well as real-time operational measures. These results are needed in planning for the balancing market.

5.5 TSO and MO surveillance system

Information must be collected in real time and histori ally by the TSO and MO for electricity market activity. The information and various reports must be provided by system operator, market operator and GNERC at different intervals (real-time, daily, weekly, monthly). The rules for market surveillance w be part of the electricity market rules. An IT system connected to the dispatch system and another system the d y ahead markets (BM, DAM, PX, ancillary services, transmission interconnection auction

and other) will provide the basic data for collecting, analyzin and reporting on competitive electricity market activity.

5.6 Security system

It is necessary to create a security system for commercial information exchange between TSO and market participants, especially bearing in mind the us of Internet technologies in the construction of market operation systems.

6. Guidelines for Transparency and Provision of Market Information

Liberalization of the Georgian electricity market will significantly increas competition in the sector. One of the key prerequisites for an efficient functioning of the Georgian competitive electricity market is the transparency of market related information. It is important that all market participants be treated on a fair, transparent and non-discriminatory terms because poor access or lack of information released in the market will harm existing market participants' operations and raise bar iers to the entry of new market participants. Overall it will undermine develop ent of an efficient and transparent Georgian electricity market.

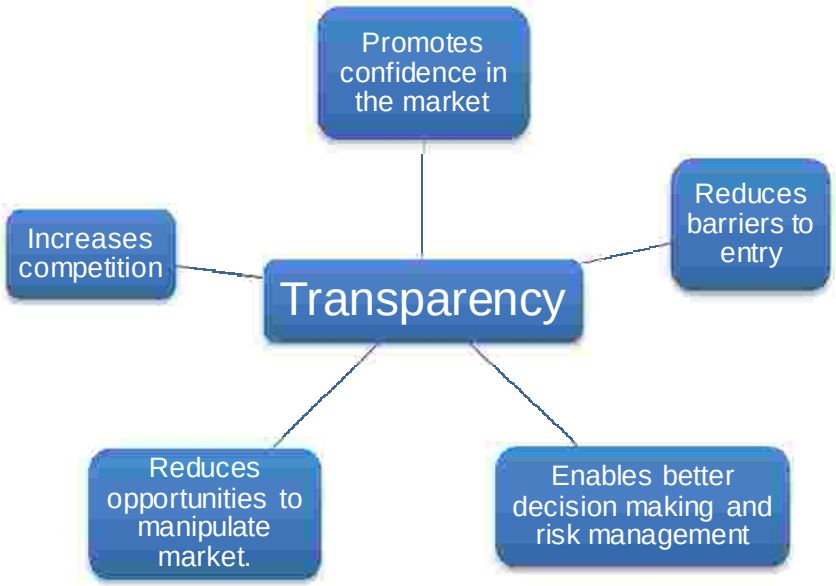
Electricity market data transparency is a fundamental requirement for a well-functioning competitive electricity market. Furthermore, information must be available in a timely manner and released simultaneously to all market participants. Reliable and timely released market data will help market participants to analyze past events and forecast their potential generation, consumption or transmission capacities which in turn affect electricity price formation on competitive bases. On the other hand, availability of market information will enable regulatory body and other third parties to effectively monitor electricity market operations and detect abuse of market power, collusion or other misbehaviors from market participants. Crucial aspect of market data transparency is that it allows big or small market participants to access all relevant information of market operations on fair and non-discriminatory principles thus reducing risk and uncertainties to engage in electricity market operations. Overall tr nsparency encourages more cost-effective investments in the sector, increases confidence and trust of market participants, reduces barriers to entry, improves electricity market liquidity and efficiency and more importantly contributes to lower cost of electricity to end-consumers.

Transparency is essential to achieve well-functioning, efficient, reliable and competitive electricity markets. While high level of transparency and information disclosure is greatly welcomed from the market participants, there are considerable arguments that maximum level of information transparency may not be necessarily the best policy. Particularly, some level of confidentiality and information provision must be introduced in order to avoid manipulations and collusions in the market. Consequently, it is useful to understand and examine different types of costs and benefits of transparency in the

electricity market from economic theory and determine sic level of benchmarking for information disclosure for market actors. Benefits from the transparency in the electricity sector are shown in the Figure 10.

One of the main activities in the competitive electric y market operations is conducted by the TSO. It is responsible for providing information on transmission network operations as well as protecting confidentiality for the reasons of commercial secrets of market participants, system security and stability. Information can be disclosed in a various ways and formats. However, the most effective way of its publication is the Internet due to the necessity for timely and simultaneous information release in the market. The requirements for information publication can be country specific and depend on legal arrangements in the electricity sector. However this subchapter will outline general requirements for information disclosur by the TSO as well as costs and benefits of transparency.

Figure 10. Benefits from Increased Transparency in the Electricity Sector



6.1 Definition of Transparency

Transparency is a general term which can be used in an business processes. However, definition of transparency applied for the electricity sector requires satisfying sector specific conditions and requirements. ERGEG in its paper[4] defines the transparency of information and states that:

[4] Comitology Guidelines for Fundamental Electricity Data Transparency: Initial Impact Assessment, ERGEG, 2010, E10-ENM-05-01

“Transparency refers to the public availability and disclosure of all relevant information. A prerequisite for a market to function properly is to have all the relevant information available to all market participants including potential and prospective market entrants. The more information is disclosed about an economic activity the better. Also in economic theory, one of the characteristics assigned to perfect competition assumes perfect information being available to buyers and sellers of a commodity... For the electricity transmission infrastructure, these data include e.g. available and reserved transmission capacities, information on the actual use of the infrastructure, long-term forecasts of available capacities, forecasts of grid developm nt through investments and effect to transfer capacities and information on m intenance periods. For market fundamentals, the data includes, among other things, forecasts on aggregated demand, planned and unplanned generation outages and the realized values for the forecasted data.... Pre-trade transparency includes information accurately indicating the size and price of prospective trading interest whereas post-trade transparency refers to the dissemination of trade price and volume of completed transactions from all markets trading that commodity.”

According to ERGEG’s paper, transparency can be divided into fundamental data and trading transparency. Fundamental data transparency implies factors that are related to network infrastructure, supply and demand while trading transparency indicates the information related to ex-ante and ex-post trading activities. Pre-trade transparency includes information regarding size and price of potential trading interest whereas post-trade transparency refers to the dissemination of trade price and volume of completed transactions from all markets trading that commodity. At the same time, market data transparency for market participants is supplemented w market monitoring by the energy regulatory entity and its interventions aiming to eliminate potential distortions of the market.

European electricity markets still vary in terms of degree of competition and transparency. Information transparency is an important tool to increase competition in the electricity market. The combined result of the transparency is that it primarily benefits end-consumers by lowering retail prices. While transparency has positive effects not only for operations in electricity market but also on retail prices, whereas poor transparency can negatively affect the retail prices. For example:

- Imperfect information can negatively affect market participants’ decisions that will increase their risks and operational cost which in turn leads to increased retail prices to cover these increased costs.
- Lack of information that is available to regulatory entity can lead to ineffective monitoring of the market resulting in possible market buse and manipulations. For example, in this case market participants hide abuse from the regulatory

entity and with poor information keep higher prices on their services and higher profits.

- Information asymmetry among market participants and potential competitors can raise barriers to market entry, which decrease competition in the market and possible increases in wholesale and/or retail electricity prices.
- Poor coordination in operational timescales among market participants such as generators, TSO or suppliers can reduce security of supply, or increase the cost of maintaining a given level of security of supply.

Analyzing all factors affecting electricity market through transparency introduction requires a deeper consideration to all costs and benefits of transparency in order to design proper principles for transparency. There are certain types of data that definitely enhance competition in the electricity market. However potential risks for market abuse, manipulation or collusion require certain level of market data provision and confidentiality.

6.2 Benefits of Transparency

There are wide ranges of research papers that analyze advantages of transparency on market operations. Economic theory has largely contributed to the analysi on impact of information asymmetries and role of information. Enhan ing transparency is beneficial to the well-functioning of the electricity market while it improves efficiency and liquidity. According to European Commission, transparency can lead to following benefits[5]:

- Increased probability of the detection of market misconduct;
- Reduced incidence of misconduct as a result of effecti oversight;
- Reduced risk premiums;
- Higher liquidity levels as a result of greater market confidence;
- Reduced bid-offer spreads as a result of greater market confidence.

These benefits can be attributed to increasing welfare of the country and income among electricity market participants. According to economics literature on electricity markets, studies identified several important benefits of information release which are consistent with EU competitive electricity market principles. For example, Hooper, Twoney and Newbery[6] in their paper analyzed five means by which information release is beneficial to the functioning of the market. Their findings can be formulated as follows:

Reduction of risk and uncertainty: This is related to the information on electricity market fundamentals such as determination of price, demand and production of electricity for the short and long period of time. Economically rational operation of the electricity sector requires information release on market fundam tals because market

[5] Comitology Guidelines for Fundamental Electricity Data Transparency: Initial Impact Assessment. ERGEG, 2010, E10-ENM-05-01

[6] Transparency and Confidentiality in Competitive Electricity Markets. Liz Hooper, Paul Twomey and David Newbery, 2009

participants need to understand processes and developm nt of the market in order to make rescannable decisions on production and consumpti n and investments. Lack of such information may incur business processes in the market to increased risk and uncertainty. This can lead market participants to wrong decisions, increased costs, and inefficient market operations. For example, market participants may be forced to undertake costly actions to secure their business, subject to these risks and uncertainties.

Removal of information asymmetries: This is related to fair and non-discriminatory access to the market information. Unequal access to market data can create competitive disadvantage, discourage participation in the market, facilitate market manipulation and reduce entry and new investment. Particularly, if the electricity market is concentrated by big companies, they may have information advantage over small companies by knowing their production, demand and costs. Thus, big companies are reluctant to share their information because informati n advantage they have can be used for collusion or market manipulations in order to keep prices high and prevent new entry in the market. Equal access to the market information and elimination of information asymmetries in the market can create trust in the market participation which in turn increases market efficiency and liquidity.

Facilitation of better market monitoring: This is related to electricity market monitoring and surveillance by regulator entity and third parties to reveal potential market abuse or misbehavior from market participants. reased level of transparency in electricity market allows the regulator to monitor operations and determine degree o competition in the market. In case of inefficient outcomes and abuses of market p er, transparency enables the regulator to intervene in the market, detect and eliminate them. At the same time, it allows the regulator and other parties to develop and amend market rules, plan for infrastructure investments and rease confidence of market participants.

Providing reassurance to end-consumers: This is related to trust and confidence in end-consumers regarding to electricity price changes. Transparency in electricity market provides information to end-consumers as well implying that they can understand circumstances of prices changes. It reduces risks of suspicion that the electricity industry is involved in speculative actions and increases trust in end-consumers on market functioning.

Ensuring system security: This is related to simultaneous balance of supply and demand in real time, long-term capacity planning and congestion management of transmission lines which is administered by the TSO. W ile electricity market differs from other commodity markets, TSO needs to have timely and accurate information on supply and demand in order to dispatch and plan power system operations efficiently. For a daily balancing and reliability of the system and coordination with neighboring

electricity markets, TSO should ensure long-term security of the system and determine sufficient capacity in order to maintain system requir ts. Consequently, increased level of transparency in the market will help TSO to m ke better decisions for maintaining system security both in short-run and long-run.

Considering above-mentioned benefits incurred from greater transparency in the electricity market, it will increase demand-side participation in the market, enhance market liquidity and efficiency and confidence for pri ation benchmarking.

6.3 Costs of Transparency

Transparency in the electricity markets encourages competition and fair treatment of all market participants. However, maximum level of information openness may lead to market participants to bear additional costs. While transparency is one of the key fundamentals of competitive electricity market, confidentiality and information provision must be also established. There are few potential risks that may be induced by maximum level of transparency and harm effective competition[7]:

Reduction in incentives for innovation: This is related to certain type of data that must be remained private and confidential. Such information may allow other market participants to reap additional benefits and improve their competitive position. Thus, commercial confidentiality is necessary to be maintained in order to protect market participants' incentives to make investments for the innovations in their activities (technical, operational, administrative, etc.).

Facilitation of collusion: High level of transparency can lead to tacit collusion specifically if the electricity market structure is characterized as an ol opolistic market. The electricity market, where cost structure and cost of entry is commonly known, product is homogenous and demand generally inelastic, can a source of tacit collusion in case of small number of market participants. On the other hand, tacit collusion by market participants on price strategies may increase electricity prince higher than competitive price and harm electricity market functioning. Collusion will be more difficult if the number of participants in the electricity market is large. Consequently, the issue of transparency is highly related to increasing level of competition in the electricity market. Thus, actions to lower entry cost are very important w ile transparency also reduces information asymmetries and barriers to entry.

Information infrastructure costs: Information provision by regulatory body may not be significant in terms of fixed and operational costs of companies. Generally, regulatory bodies provide standard format which has to be filled t by the companies. In case of high level transparency information is complex and includes many components. Thus, rather modifying standard formats for information provision at the different stages of

[7] Transparency and Confidentiality in Competitive Electricity Markets. Liz Hooper, Paul Twomey and David Newbery, 2009

electricity market development, it is more appropriate to develop standard format for complete information provision that can be used by software developers.

7. Transparency Requirements for Effective TSO

Different electricity market structure, design and other characteristics across countries also makes transparency requirements different in the context of the type and amount of data for proper information provision procedures. Howe er, there are several factors that must be considered in the development process of propriate market monitoring and transparency policies:

- Specific market design characteristics. This applies to existence of different market types and trading opportunities in the electric ty market. For example, bilateral or centralized trading, balancing, day-ahead or intraday markets.
- Degree of market concentration. This considers shares in the market and fraction of time market participants' are dominants.
- Fuel and technology used in power generation. This is related to mix of generation sources in the electricity market which affects ability to vary electricity production and set different prices but also considered as a source of manipulations if case of non-transparent market structure.
- Nature of transmission constraints. This is related to electricity market export-import and internal system operation capabilities in the country. Transmission constraints may cause electricity market fragmentation which in turn increases concentration in the constrained area.

These factors may not apply to every electricity marke structure. However, as more competitive is the market structure, higher levels of transparency will result in lower chances for the manipulation by market participants.

For the development of an effective TSO, there are main data categories where transparency is required. According to EU legislation n Congestion Management Guidelines and ERGEG's Guidelines for Good Practice on Information Management and Transparency in Electricity Markets, the categories of data needed are:

- System load;
- Transmission and Access to Interconnectors;
    - Network Investment and Planning
    - Capacity Allocation and Management
    - Network Operations
- Generation
- Balancing
- Information on Wholesale Markets

For these data categories there are several formats that can be us d for data release depending on the nature of the information and also on the existing market structure. Consequently, format is also important factor for transparency while it should secure for possible collusion and ensure confidentiality in the electricity market. In general data formats may include:

- **Level of aggregation**: It is important to publish data such as prices, volumes, import-export flows and contract coverage at the aggregate le el.
- **Masking**: It is crucial for proper electricity market functionin to secure identity of market participants.
- **Time of data publication**: Different type of data must be disclosed in appropriate time without delay in order to support well-functioning of the market. Timing of data publication will vary whether it is provided on ex-ante or ex-post basis and also whether such information is released immediately or release is subject to some delay. However, it is essential to balance between timing of data publication and effort and quality of data. Provision of data and publication close to real time can lead to poor data quality, i.e. less ccurate data compared to the information that was published later.
- **Timeframe**: The timeframe (the period when trades are measured) for different market scheduling varies. Thus, data disclosure should be conducted according to the market time unit (typically 15 minutes to 1 hour).

In the electricity market, information providers are all type of market participa s and institutions such as generators, retailers, consumers, TSOs, MOs and regulatory bodies. While TSOs, MOs or regulatory bodies are not subjective of information dissemination and publication, many market participants have own interests to influence data release procedures and timeframes. In general, electricity market transparency policy must contain specific mechanism which will be a ceptable and required for every market participants.

8. Detailed Data Requirements

According to ERGEG's guidelines, data categories should satisfy the following five key characteristics:

Table 3. Benefits from Increased Transparency in the Electricity Sector

Data Characteristics	Description
Required Information	Description of the information that is required for publication purposes
Timing of publication	Timescale in which the information needs to be made available
Timeframe	Per market unit time period of time to which the required information refers must

	be available
Key benefits	Potential benefits and reasons why information is needed for and whom it is needed
Information provider	Responsible party which is required to provide the information to the market
Information source	Responsible party which is the source and owner of specific information

8.1 System Load

Information on system loads both ex-ante and ex-post values are required to be available to the market in different timeframes. In general, potential users of this information can be retail suppliers, distribution comp ies, traders, generation facilities and balance responsible parties. On the other hand, the responsible party for system load information is TSO. Detailed requirements for system load data can be found in the Table 4 of Appendix I.

8.2 Transmission and Access to Interconnectors

Information regarding to transmission and access to interconnectors is needed for actual and future requirements of entire energy system, cross-border trading and capacity allocation. This is related to transmission grid infrastructure and operational development for the security of the system. Therefore, the information must be transparent network investment and planning, capacity llocation and management and network operations. Network investment and planning in ormation is related to transmission grid expansion plans for the future and planned works and outages at least for a minimum one year period. Capacity allocation and management information refers to forecasts of transmission line capacity, its congestion management d capacity allocation. And lastly, network operation is related to ex-post information on outages and actual physical flows of electricity within per ma nit of time.

This information has to be provided by the TSO while u ers of this information can be generators, regulatory body and traders engaged in both internal and cross-border activities. Detailed transparency requirements for transmission an access to interconnectors can be found in the Table 5 of the Appendix I.

8.3 Generation

Information related to electricity generation is very ortant to achieve competitive and transparent electricity market where each generation f cility is treated on a non-discriminatory basis. This generally refers to generation capacities and electricity prices which may affect wholesale electricity trading for short-term and long-term perspective. Generation data has to be provided by every generation facilities and potential users of this information are generation facilities, large customers, distribution and retail

companies, traders and regulatory body. Detailed requirements for generation data can be found in the Table 6 of Appendix I.

Appendix I

Table 4. Required Information for System Load Data

#	Information	Publication	Timeframe	Key Benefits of Information	Provider	Source
1	Actual load	Just after real time	- Per market time unit (e.g. per hour) - Minimum 2 years historical data	- To monitor and analyze market prices vs. system load and generation - To validate load forecast and load forecasting models -To estimate prices	TSO	TSO and DSO
2	Day-ahead load forecast	Day D-1 for day D and until day D+7 (next week)	Per market time unit	-To evaluate and adapt requests for interconnection capacities -To ensure the adequacy of generation purchases and energy sales with market needs	TSO	TSO
3	Week-ahead forecast (if weak ahead operations take place)	one to eight weeks in advance in a rolling mode	Per market time unit	In case there is significant new load or some load that was out of operation (e.g. damaged) is repaired, it must be included here too	TSO	TSO
4	Year-ahead forecast	Year Y-1 for at least next year (up to a max of 10 years)	Per year	-To forecast long-term price evolution -To have a better visibility on the profitability of investment projects for generation capacities	TSO (or competent authority)	TSO (or competent authority)

5	Forecast margin, i.e. the difference between scheduled available generation and the forecast withdrawals on the grid	Y-1, M-1, D-1	Per relevant market time unit	-To allow market participants to judge better investment and production decisions	TSO (or competent authority)	TSO (or competent authority)

Table 5. Detailed Requirements on Transmission and Access to Interconnections Data

#	Information	Publication	Timeframe	Key benefits of Information	Provider	Source
1	Review of the transmission line expansion projects (investments) and impact of these projects on the transmission capacities and at the interconnections	Year Y-1 for the next minimum three following years (up to a max of 10 years)	Per year	-To evaluate future development of transmission grids and interconnection capacities and congestions in the years to come (proposed 5 and 10 years period) - To evaluate future generation investment opportunity	TSO	TSO
2	Planned outages in the transmission line and on interconnections with dates and their impact on the capacity of the grid and each interconnection	Year Y-1 for year Y (updated with changes)	Per year	-To guarantee efficient use of transmission networks and interconnection -To enable existing players to plan their position -To facilitate the access of new players to markets where competition is still under development	TSO	TSO

3	Year-ahead forecasts of interconnection capacity	Year Y-1 for year Y	Per year	-To guarantee efficient use of interconnection -To enable existing players to plan their position -To facilitate the access of new players to markets where competition is still under development	TSO	TSO
4	Month-ahead forecasts of the interconnection capacity	Month M-1 for next 12 months	Per week segregating Peak and Off-peak hours	-To guarantee efficient use of interconnection -To enable existing players to plan their position -To facilitate the access of new players to markets where competition is still under development	TSO	TSO
5	Week-ahead forecasts of the interconnection capacity (e.g. possible changes in maintenance plans) at the time of calculation	Week W-1 for week W	Per market time unit	-To guarantee efficient use of interconnection -To enable existing players to plan their position -To facilitate the access of new players to markets where competition is still under development	TSO	TSO
6	Day-ahead values of interconnection capacity	Day D-1 for day D	Per market time unit	-To guarantee efficient use of interconnection -To enable existing players to plan their positions	TSO	TSO

				-To facilitate the access of new players to markets where competition is still under development -To foster introduction and usage of the flow-based capacity calculation methods in order to raise compatibility between the commercial and		
7	Intra-day allocations of available transmission capacity	Day D–1 for day D	Successive after issuing of indicated/ actual day ahead production schedules	-To guarantee efficient use of interconnection -To enable existing players to plan their position -To facilitate the access of new players to markets where competition is still under development -To foster introduction and usage of the flow-based capacity calculation methods in order to raise compatibility between the commercial and actual physical flows between the different control areas	TSO	TSO
8	Details on planned and unplanned outages in the transmission grid	After occurrence	Time of occurrence	-To guarantee efficient use of interconnection and transmission grids -To build trust in the market -To evaluate security criteria	TSO	TSO

				-To facilitate the access of new players to markets where competition is still under development		
9	Capacity requested by market participants and capacity offered and assigned by TSO	After each capacity allocation session	Per market time unit	- To guarantee efficient use of interconnection - To facilitate the access of new players to markets where competition is still under development -To foster introduction and usage of the flow-based capacity calculation methods	TSO	TSO and market players
10	Capacity requested as priority rights by market participants and offered as priority rights by TSOs	After each capacity allocation session	Per market time unit	- To guarantee efficient use of interconnection - To facilitate the access of new players to markets where competition is still under development -To foster introduction and usage of the flow-based capacity calculation methods	TSO	TSO and market players
11	Capacity reserved for balancing	After each capacity allocation session	Per market time unit	- To guarantee efficient use of interconnection - To facilitate the access of new players to markets where competition is still under development	TSO	TSO and market players

12	Total capacity nominated by market players on interconnections (commercial transactions)	After each session	Per market time unit	- To guarantee efficient use of interconnection - To facilitate the access of new players to markets where competition is still under development -To foster introduction and usage of the flow-based capacity calculation methods	TSO	TSO and market players
13	Congestion income and volumes and prices in case of auction for regulated assets	After each session	Per market time unit	- To guarantee efficient use of interconnection - To facilitate the access of new players to markets where competition is still under development	TSO/MO	TSO/MO
14	A description of reasons and effects of any actions taken by TSOs that have impact on cross border trade, including reductions of previously allocated transmission capacity rights	Flows and effects just after occurrence, other information D+1	Per market time unit	- To guarantee efficient use of interconnection - To facilitate the access of new players to markets where competition is still under development -To foster introduction and usage of the flow-based capacity calculation methods	TSO	TSO

15	Hourly average physical flows vs. thermal ratings of the lines and transformers in the transmission grid	Week W+1 for week W	Per hour	- To evaluate existing congestions on the interconnections - To evaluate how security criteria are met - To increase the benefit of this information, it would be useful to visualize it in terms of actual line rating	TSO	TSO

Table 6. Detailed requirements on Generation Data

#	Information	Publication	Timeframe	Key benefits of Information	Provider	Source
1	Total and available installed generation capacity per single generator unit and foreseeable aggregated evolution in the next 3 to 10 years (including information on the type of generation from new projects, planned mothballing or dismantling)	Year Y-1 for the next min 3 following years and up to a max of 10 years	Per year	-To explain historic and forecast future prices -To have a better understanding of historic price developments and possible outlook on the profitability of investment projects for generation capacities	TSO or another authority	Generators
2	Ex-ante information on the scheduled unavailable generation units (start and stop dates of the outages, unavailable capacity)	Year Y-1 for year Y and regular updates	Per year and as soon as possible	To be able to forecast future prices better	TSO/MO	Generators

3	Ex-ante information on the scheduled unavailability of significant consumption units	Year Y-1 for year Y and regular updates	Per year and as soon as possible	To be able to forecast future prices better	TSO/MO	Large customers, distribution companies, retail suppliers
4	Ex-ante aggregated information on the scheduled generation	Day D-1	Per market time unit	- To be able to forecast future prices better -To be able to consider influence on available transmission capacity	TSO (based on day-ahead planning procedures)	Generator
5	Ex-post information on the planned and unplanned unavailability of actually running generation units (start and stop dates of the outages, unavailable capacity and maintenance).	Close to real time	Per market time unit	-To analyze the impact of past events on prices formation -To give the possibility to react on longer unplanned outages	TSO/MO	Generator
6	Ex-post information on the scheduled unavailability of significant consumption units	Close to real time	Per market time unit	-To analyze the impact of past events on prices formation -To give the possibility to react on longer unplanned outages	TSO/MO	Generator
7	Ex-post data on the actual generation	Close to real time	Per market time unit	-To analyze the impact of past events on prices formation -To be able to forecast future prices better	TSO/MO	Generator

Appendix II

Table 7. Proposed Milestones and Activities for Georgian TSO's velopment

#	Milestones	Activity	Responsible Party
1	Functional establishment of Transmission System Operator	1.1 Develop a proposal for the Organizational Design of the TSO and a draft implementation plan	GSE/TSO
		1.2 Review and approval of the proposal and draft implementation plan	Grid Code Working Group
		1.3 Implementation of the approved proposal and implementation plan for organizational changes within GSE	GSE/TSO
2	Legal separation of the TSO from GSE	2.1 Preparation of separated company charters and accounts	GSE/TSO
		2.2 Allocation of assets and liabilities	GSE/TSO
		2.3 Registration of the companies at State Authorities	GSE/TSO
		2.4 License applications to GNERC from TSO and GSE	GSE/TSO
3	Development of Grid Code	3.1 Revise and Complete 2nd draft	GSE/TSO
		3.2 Translate 2nd draft	GSE/TSO
		3.3 Collect comments and suggestions on each chapter of 2nd draft of the Grid Code by stakeholders	Grid Code Working Group
		3.4 Develop 3rd draft	GSE/TSO
		3.5 Translate 3rd draft	GSE/TSO
		3.6 Collect comments and suggestions on each chapter of 3rd draft of the Grid Code by stakeholders	Grid Code Working Group
		3.7 Develop final draft	GSE/TSO
		3.8 Translate final draft	GSE/TSO
		3.9 Collect comments and suggestions on each chapter of final draft of the Grid Code by stakeholders	Grid Code Working Group
		3.10 Finalize final draft of the Grid Code	GSE/TSO
4	Development of TSO-Trancos contract	4.1 Development of draft TSO-Trancos contract	GSE/TSO
		4.2 Collect comments and suggestions on the contract by stakeholders	Legislative Working Group
		4.3 Finalize TSO-Trancos contract	GSE/TSO and MO/ESCO
5	Develop a template MO-TSO agreement between MO (ESCO) and TSO (GSE)	5.1 Development of draft MO-TSO agreement	GSE/TSO and MO/ESCO
		5.2 Collect comments and suggestions on the agreement by stakeholders	Legislative Working Group

		5.3 Finalize MO-TSO agreement	GSE/TSO and MO/ESCO
6	Develop a template TSO-TSO agreement between Georgian TSO and foreign TSO	6.1 Development of draft TSO-TSO agreement	GSE/TSO
		6.2 Collect comments and suggestions on the agreement by stakeholders	Legislative Working Group
		6.3 Finalize TSO-TSO agreement	GSE/TSO
7	IT platforms and system requirements: Agreement with the World Bank on assessment for IT platforms for GEMM 2015 implementation	7.1 Analysis of existing IT Platforms for GSE/TSO	GSE/TSO
		7.2 Define system requirements and new IT tools for TSO	GSE/TSO
		7.3 Tender procedures for new IT tools and software	GSE/TSO/WB
		7.4 Purchase, installation and test new IT tools and software	GSE/TSO
		7.5 IT tools and platforms is ready for operations	GSE/TSO/WB
8	Development of Distribution Grid Code	8.1 Draft Table of Content	Grid Code Working Group
		8.2 Development of the draft Distribution Grid Code	Grid Code Working Group
		8.3. Collect comments and suggestions by stakeholders	Grid Code Working Group
		8.4 Final draft of Distribution Grid Code is developed	Grid Code Working Group
9	Development of Transmission Service Agreement (TSA)	9.1 Development of draft TSA	GSE/TSO
		9.2 Collect comments and suggestions on the contract by stakeholders	GSE/TSO
		9.3 Finalize TSA	GSE/TSO
10	Development of Asset Management Program	10.1 Conduct analysis for current asset management processes inside GSE/TSO	GSE/TSO
		10.2 Define Company requirements	GSE/TSO
		10.3 Review and selection of Asset Management Software	GSE/TSO
		10.4 Data collection and storage for asset management	GSE/TSO
		10.5 Tender procedures for new IT tools and software	GSE/TSO
		10.6 Purchase, installation and test new IT tools and software	GSE/TSO
		10.7 Training for company staff for program	GSE/TSO
		10.8 Asset Management Program is ready for Operations	GSE/TSO

References

Source materials used in this report can be found at t following locations.

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