GAP ANALYSIS AND CAPACITY BUILDING ACTION PLAN OF GEORGIAN ELECTRICITY MARKET PARTICIPANTS

USAID GOVERNING FOR GROWTH (G4G) IN GEORGIA

19 July, 2019

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DATA

Reviewed By: Giorgi Giorgobiani
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Practice Area: Energy Strategy Reform
Key Words: Human and technical capacity, gap analysis, Georgian electricity market, survey, capacity building action plan
### ACRONYMS

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>AA</td>
<td>Association Agreement</td>
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<tr>
<td>aFRR</td>
<td>Automated frequency restoration reserve</td>
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<tr>
<td>AGC</td>
<td>Automatic Generation Control</td>
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<tr>
<td>AMS</td>
<td>Automated metering system</td>
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<tr>
<td>ASCM</td>
<td>Automated System of Commercial Metering</td>
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<tr>
<td>ASECCM</td>
<td>Automated System of Electricity and Capacity Control and Metering</td>
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<tr>
<td>AYPEG</td>
<td>Association of Young Professionals in Energy of Georgia</td>
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<tr>
<td>DSO</td>
<td>Distribution System Operator</td>
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<tr>
<td>EC</td>
<td>European Commission</td>
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<tr>
<td>EnC</td>
<td>Energy Community</td>
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<tr>
<td>Entso-E</td>
<td>European Network of Transmission System Operators for Electricity</td>
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<td>ESCO</td>
<td>Electricity System Commercial Operator</td>
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<tr>
<td>EU</td>
<td>European Union</td>
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<td>FCR</td>
<td>Frequency containment reserve</td>
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<td>G4G</td>
<td>Governing for Growth in Georgia</td>
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<td>GIG</td>
<td>Georgian Industrial Group LTD</td>
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<td>GNREC</td>
<td>Georgian National Energy and Water Supply Regulatory Commission</td>
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<td>GoG</td>
<td>Government of Georgia</td>
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<td>GSE</td>
<td>Georgian State ElectroSystem</td>
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<td>GWP</td>
<td>Georgian Water and Power LTD</td>
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<td>HPP</td>
<td>Hydro Power Plant</td>
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<tr>
<td>IT</td>
<td>Information Technology</td>
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<td>JSC</td>
<td>Joint Stock Company</td>
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<tr>
<td>KV</td>
<td>Kilovolt</td>
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<tr>
<td>kWh</td>
<td>Kilowatt hour</td>
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<tr>
<td>mFRR</td>
<td>Manual frequency restoration reserves</td>
</tr>
<tr>
<td>MoESD</td>
<td>Ministry of Economy and Sustainable Development of Georgia</td>
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<tr>
<td>MoU</td>
<td>Memorandum of Understanding</td>
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<tr>
<td>MW</td>
<td>Megawatt</td>
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<tr>
<td>NTC</td>
<td>Net Transfer Capacity</td>
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<td>PX</td>
<td>Power Exchange</td>
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<td>RR</td>
<td>Replacement reserves</td>
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<tr>
<td>SCADA</td>
<td>Supervisory Control and Data Acquisition</td>
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<td>USAID</td>
<td>United States Agency for International Development</td>
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1. INTRODUCTION

In September 2014, Georgia signed the European Union (EU) - Georgia Association Agreement (AA) and in October 2016 - the Accession Protocol to the Energy Community Treaty. By becoming a member of the Energy Community, Georgia undertook an obligation to establish an EU compliant, liberalized, competitive electricity market. The main directive, 2009/72/EC, “On common rules for the internal market of electricity,” defines the rules related to the organization and functioning of the electricity sector and open access to the market. As an obligation, all non-household consumers should have become direct consumers by December 31, 2018, and the same should have applied to all consumers by December 31, 2019. Despite the fact that these obligations have not been met yet and there is a delay in market opening, the new energy legislation transposing the Third Energy Package has already been sent to the Parliament of Georgia and is supposed be adopted by the Parliament of Georgia no later than 2019.

Considering the significance of establishing a competitive electricity market, the implementation of the obligations undertaken by the Government of Georgia (GoG) is crucial for the Georgian energy sector’s development. However, this reform represents a challenge for electricity producers and consumers to adapt to new market rules and acquire new skills in order to become efficient market participants. Therefore, Georgian electricity market participants, namely electricity producers and electricity consumers at a wholesale level need to acquire new tools, knowledge, and skills to conduct modern electricity trading and related risk mitigation actions. They must also optimize their decision-making process for selling and buying electricity locally and across borders.

With the financial support from USAID Governing for Growth (G4G) in Georgia project, Association of Young Professionals in Energy of Georgia (AYPEG) conducted a survey, which aimed to identify technical and human capacity gaps among Georgian wholesale electricity market participants, and based on the findings, propose capacity building activities targeted at alleviating the identified gaps. For this purpose, AYPEG conducted face-to-face interviews with the Georgian electricity market participants to assess their current human and technical capacity and their preparedness to adapt to new market conditions.

This report provides information on survey methodology and summarizes the process of its implementation. In addition, it presents the survey results about Georgian electricity market participants’ gaps in human and technical capacity needed for participating in competitive electricity trading mechanism, which is planned to be implemented within the ongoing reforms in the Georgian electricity sector. Apart from gap analysis, the report also provides an assessment of Georgian electricity market participants’ awareness about the ongoing reforms and their expectations. The rest of the report is organized as follows: section two summarizes overall process of the project starting from developing the survey methodology to final results, section three focuses on survey design and methodology, section four provides main findings of survey gleaned from interviews with Georgian wholesale electricity market participants, two focus groups and provides information on European countries’ experience in implementation of similar reforms, and section five provides the capacity building action plan developed based on survey results. And finally, English and Georgian versions of the questionnaire are provided in the annexes.
2. SUMMARY OF PROJECT ACTIVITIES

The project started in November 2018 and completed in six and a half months. The overall process of the project was divided into seven major phases. In the first phase, AYPEG developed the survey methodology and designed the implementation process in collaboration with G4G that ensured reliable and robust survey implementation and guaranteed successful identification of gaps in Georgian electricity market participants’ human and technical capacity in view of the new electricity market legal and regulatory framework. The deliverable of phase one of the implementation was an agreed survey methodology. It should be noted that, apart from Georgian electricity market participants’ interviews, the survey methodology also incorporated conduction of two focus groups and interviews with relevant international organizations with experience in electricity market reforms in their countries. Focus groups were divided into two groups. The first group included power project developers and the second group included governmental institutions, civil society organizations and international organizations active in Georgia. It was deemed that these organizations could make an important contribution toward assessing human and technical capacity gaps of Georgian electricity market participants.

On the second phase, AYPEG developed a list of Georgian electricity market participants for face-to-face interviews, as well as a list of power project developer companies for the focus group 1 and a list of governmental institutions and civil society organizations for the focus group 2. The overall list was also agreed with, and approved by G4G.

On the third phase, a draft questionnaire was developed. Based on the contract requirements, AYPEG team conducted desk research which aimed to analyze the existing Georgian energy legislation, Third Energy Package requirements, European experience, Georgia’s obligations under the Energy Community accession protocol and anticipated changes in the Georgian energy legislation. With the information gathered, new functions and roles for electricity market participants were identified along with the human and technical capacity required for successful operation under the new electricity market structure. Human capacities such as proper planning of electricity generation and consumption schedules on an hourly basis, together with the ability to devise trading, portfolio and risk management strategies will be necessary to meet the new market requirements. On the other hand, technical capacities such as modern meters with remote information delivery capability and installation and utilization of new software and IT tools for trading and planning would also be required. The initial questionnaire was tested by the project team and based on testing feedback, the final questionnaire was developed. The final questionnaire included general questions relevant for all market participants, for example on their awareness of ongoing reforms in the Georgian electricity market, as well as their perceived need for capacity building activities, whereas specific questions were included individually for six separate groups of Georgian electricity market participants.

On the fourth phase of the project, five interviewers for fieldwork (survey) were selected and agreed with G4G. The selection was conducted based on candidates’ resumes with the main criteria for the selection being their background and knowledge of the Third Energy Package requirements and existing and upcoming legal framework of the Georgian electricity market.

On the fifth phase, AYPEG conducted the survey. Within this phase, the project team trained selected interviewers for the fieldwork, provided detailed information about project goals, explained the questionnaire and questions in detail, and allocated companies among individual interviewers. Fieldwork was coordinated by the project team. Based on the fieldwork, AYPEG created an electronic database in Microsoft Excel format and coded, cleaned and weighted the data. Apart from face-to-face interviews with Georgian electricity market participants, 2 focus groups were also organized and international organizations from European countries were interviewed.

On the sixth phase, the project team summarized the survey results, analyzed the main findings and developed the report on gap analysis of the Georgian electricity market participants.

On the final phase, the project team developed the capacity building action plan of electricity market participants.
3. SURVEY DESIGN AND METHODOLOGY

Figure 1 below illustrates the survey process and its main activities:

As the survey population size was small - there are slightly over 100 Georgian electricity market participants (distribution network operators, market operator, transmission system operator, producers, and wholesale (direct) consumers), there was no need to develop a sample and generalize the quantitative results.

Survey methodology was based on a hybrid model where quota sampling - a non-random sampling method together with focus groups was used. Through the fieldwork, 43 interviews were conducted for the existing Georgian electricity market participants at a wholesale level, which are engaged in one or more activities. 7 interviews were canceled because company representatives were not willing to participate in the survey and 8 interviews were not conducted due to the companies no longer being active or because interviewers could not contact them. Additionally, several cases were identified during the interviews, where one individual or organization represented more than one Georgian electricity market participant. In such cases, only one interview was conducted.

Two separate focus groups were organized for power project developers and government institutions and civil society organizations. Furthermore, electricity market stakeholders (market operator, power exchange, national regulatory authority) from European countries were interviewed as well.

Taking the survey objective into consideration, selection of respective respondents for interviews from the list of companies was based on the following criteria:

- Top and/or middle-level manager from technical, financial and commercial areas in the company;
- Understands how the existing market works, participates in market operations and has good knowledge of the company’s human and technical capacity.

Due to the complexity of the survey, as it covered both human and technical aspects, the majority of interviews were conducted with more than one representative of a company. In cases when respondents were not fully open during the interviews and/or tried to avoid answering questions, Interviewers used their training and knowledge of the respective company’s profile to receive the answers. Structure of the questionnaire also ensured that such cases were overcome and interviewers were successful in obtaining the answers.
Currently, electricity trade at a wholesale level is mainly carried out through direct/bilateral contracts. The sellers of electricity on the Georgian market are the producers and importers, whereas the buyers of electricity are the distribution licensees, wholesale (direct) consumers, exporters, electricity generators (in cases of power plant losses) and the dispatch licensee (to ensure electricity (capacity) transit and to cover losses related to the purchase of the electricity). To participate in the wholesale electricity market, registration with the Georgian Electricity Market Operator-ESCO as a qualified enterprise is necessary.

For the purpose of the survey, Georgian electricity market participants were divided into six groups:

- Transmission System Operator;
- Distribution System Operator;
- Electricity producers including large, medium and small producers;
- Importers and Exporters;
- Market operator;
- Wholesale (Direct) customers and/or Suppliers.

The project team used different sampling strategies to identify the interviewees within the groups. All interviewees from network operators, large power plants and market operator were selected based on quota sampling method. Non-random sampling was employed to select interviewees from suppliers, wholesale customers, small power plants, importers and exporters. According to the existing Georgian energy legislation the six groups of the Georgian electricity market participants have the following functions:

1) **Transmission and distribution** system operators: There are two distribution system operators - “Telasi” and “Energo-Pro Georgia”, one dispatch licensee - “Georgian State ElectoSystem” (GSE) and three transmission system operators - GSE, “Sakrusenergo” and “Energotrans” in Georgia. They are responsible for operating, maintaining and developing electricity transmission and distribution networks in the country and cross-border lines with neighboring systems to ensure the long-term ability of the system to meet reasonable demands for electricity.

The transmission system operator (TSO) (the Dispatch Licensee) has signed contracts with the Transmission Licensees on assigning the rights of operating and developing transmission network. The TSO manages the system mainly through Supervisory Control and Data Acquisition System (SCADA) and at the same time uses the upper level Automated System of Electricity and Capacity Control and Metering (upper level ASECCM). The distribution system operators (DSO) carry out network services, including wheeling, through networks under their ownership or under third party ownership. The DSOs provide network services to retail customers that purchase electricity from small power plants via direct contracts, direct customers connected to the distribution network and the so-called distributed generation – small power plants that are connected to the distribution network.

Electricity is sold by the DSOs at the electricity retail market based on household tariffs set by the Commission. At the same time, they provide network and system services to retail customers. According to the current legislation, small power plants can directly sell electricity to retail customers too. However, their participation in the retail market is quite rare, because the small power plants can sell generated electricity at the wholesale market for higher prices than the weighted average price of the household tariffs. In addition, there are a limited number of customers to trade through direct contracts.

2) **Market Operator**: ESCO is a distinct market participant. Currently, ESCO acts as a market operator in Georgia and at the same time, it sells and purchases balancing electricity and carries out electricity import and export activities. ESCO is entitled to purchase and/or sell electricity through direct contracts or through standard balancing electricity contracts, for the purpose of balancing qualified enterprises’ demand. In addition, ESCO organizes guaranteed capacity trading, registers companies as participants of the wholesale market, make amendments to registration data and revokes registrations. The market operator utilizes the Automated System of Commercial Metering (ASCM) that encompasses a unified database and receives metering data from the Automated System of Electricity and Capacity Control and Metering (ASECCM) automatically. It is intended for receiving, checking, grouping and summing up data for wholesale electricity trade.

It is envisaged that ESCO or its successor will become the market operator on the future organized electricity market, therefore ESCO or its successor will need specific skills to support proper market functioning and development.
3) **Electricity Producers:** Besides network and market operators, electricity producers are one of the main groups of market participants. For regulatory purposes electricity producers are classified as follows:

   a) Regulatory power plants to which the Georgian National Energy and Water Supply Regulatory Commission (GNERC) sets fixed tariffs;

   b) Partially deregulated power plants to which the GNERC sets marginal (upper margin) tariffs;

   c) Deregulated power plants constructed after August 1, 2008, that act on the market without any tariffs;

   d) Guaranteed capacity sources (Thermal Power Plants) to whom GNERC sets the guaranteed capacity fee and marginal tariffs (upper margin) of the electricity generation.

For the power plants with installed capacity exceeding 13 MW, GNERC issues electricity generation license, whereas power plants up to 13 MW (small power plants) are exempted from licensing procedures. The list of guaranteed capacity sources is defined by GoG individually, according to the time periods, during which, those guaranteed capacity sources can provide electricity to the system. Guaranteed capacity sources are used for ensuring sustainable, secure and reliable functioning of the integrated electricity system of the country.

Based on the existing Georgian electricity market structure, deregulated power producers are involved in electricity trading on a competitive basis, while power producers with regulated prices sell electricity on a regulated market. At the same time, small power plants can sell electricity at the balancing market with predefined prices. In the future, all power producers have to be involved in competitive trading, and therefore will need to acquire new skills. Currently, there are 69 electricity producer companies registered on the wholesale market, from which 21 are large producers and 48 are small producers. The 69 companies registered on the market own more than 90 power plants in total. It was decided to conduct the interviews with the representatives of holding companies and not the individual power plants since management decisions are made at the holding company level.

4) **Electricity Suppliers:** Since the existing energy legislation does not mandate unbundling of supply and distribution activities, the DSOs - “Telasi” and “Energo-Pro Georgia” also act as suppliers of electricity to retail customers. In the future electricity market, they are expected to unbundle the distribution and supply activities and participate in trading/supply activities on the competitive market. According to Directive 2009/72/EU, in the future, retail electricity market will also be deregulated leading to the emergence of multiple competitive electricity suppliers in the market providing customers with a choice to buy electricity based on their preferences. Therefore, purchasing electricity at competitive market and hedging market risks will represent new challenges for the suppliers.

5) **Wholesale (Direct) customers:** wholesale (direct) customers are also eligible to participate in the wholesale electricity market. Currently, there are 16 direct customers, who are obliged by law to buy electricity at non-regulated prices at a wholesale level. It should be noted, that during the survey period, only 6 direct customers were active on the market, while the new legal changes enforced in May 2019 mandated 10 more companies to become wholesale (direct) customers. Five years ago, there were two-times as many direct wholesale customers on the electricity market of Georgia, but due to increased prices at a wholesale level, and sizeable transmission and distribution charges, some of them preferred to become retail customers and buy electricity from DSOs at regulated prices. In this case, regulated prices were considerably cheaper compared to non-regulated prices on the market. As mentioned above, several steps have already been taken toward the market opening in Georgia, resulting in mandatory participation in the wholesale electricity market for electricity consumers that consume electricity for own needs and are connected to the grid of 35 kV or higher. This process is envisaged to continue in coming years and as the implementation of reforms continues, more customers will be obliged to engage in competitive electricity trading at a wholesale level in order to increase the market size and liquidity.

6) **Electricity importers and Exporters:** Electricity import and export activities in Georgia are deregulated and do not require licensing. The price of the electricity export activities is free (without tariffs), whereas the price for electricity import is set by GNERC according to the marginal tariff formula. While 17 importers and 32 exporters are registered at ESCO as wholesale electricity market participants, only 1 importer and 17 exporters are currently active.

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1 At the time being, 16 direct consumers are registered at ESCO (including 10 newly added consumers from 1st of May, 2019), they constituted around 30% of overall electricity trade in Georgia.
In addition to face-to-face interviews with the wholesale electricity market participants, the project team organized two focus groups to comprehensively analyze human and technical capacity gaps within Georgian electricity market participants. The two focus groups consisted of the following members:

**Focus Group 1: Power Project Developers:**
According to the Ministry of Economy and Sustainable Development of Georgia (MoESD), there are approximately 130 existing power project developers on different stages of implementation. All power project developers have Memoranda of Understanding (MoU) with GoG. Within this group, power projects can be divided into 3 stages of development:

- Construction stage – power projects which have already acquired necessary licenses, conducted feasibility studies and are in the process of construction;
- Licensing stage – power projects which have already conducted feasibility studies and are in the process of acquiring licenses from the Government of Georgia to construct respective power plants;
- Technical and economic evaluation stage – power projects which are currently conducting feasibility studies.

Based on MoESD’s information, 12 participants were selected using a non-random sampling method.

**Focus Group 2: Government Institutions, International organizations active in Georgia and civil society organizations:**
Government institutions such as MoESD, GNERC and civil society organizations working on Georgian electricity market issues were selected using a quota sampling method. 15 organizations participated in this focus group.

Based on open discussions, focus groups determined participants’ expectations and reactions on proposed changes in the Georgian electricity market in accordance with Energy Community Acquis. Focus groups were led by project team members and invited sociologist with practical experience in conducting such focus groups. The focus group meetings were recorded in order to comprehensively analyze vital points of discussion and participants’ reactions.

Lastly, project team interviewed electricity market stakeholders\(^2\) from EU and neighboring countries where liberalization of electricity markets took place, to understand their experience regarding the main gaps in skills and technical capacity of electricity market participants during the market liberalization process in their respective countries. Interviews were organized through electronic communication systems (skype and/or e-mail).

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\(^2\) For the interviews of electricity market stakeholders from EU and neighboring countries, 5 organizations were selected: 1) Borzen – Slovenian electricity market operator; 2) EPIAS – Turkish Power Exchange; 3) E-Control – Austrian energy regulator 4) Montenegro Energy Regulatory Agency and 5) EEX – European Energy Exchange. These organizations were contacted through e-mails, however only 2 organization (Borzen and EPIAS) responded to us.
4. SURVEY FINDINGS

The survey’s main findings are summarized in this section. First of all, the results of the interviews with Georgian wholesale electricity market participants are analyzed and discussed in correspondence to the questionnaire and their activities on the Georgian wholesale electricity market. In addition, the results of focus groups and interviews with international organizations are presented.

4.1. SURVEY OF GEORGIAN WHOLESALE ELECTRICITY MARKET PARTICIPANTS

The survey findings are based on the results of face-to-face interviews with Georgian wholesale electricity market participants and two focus groups that were convened to gather additional information and cross-check interview results. Focus group 1 consisted of electricity generation project developers - existing and/or potential investors that are involved in negotiations with the government and have to estimate future market prices to make investment decisions. Focus group 2 was held with the participation of government decision-makers, local think tanks, and international donor organizations. Findings from the focus groups are integrated with the survey results and summative conclusions are provided. General picture shows that market participants, particularly those with limited awareness of ongoing reforms, tend to overestimate their ability to efficiently participate in day-ahead (DAM) and intra-day markets (IDM).

4.1.1 GENERAL INFORMATION ON INTERVIEWEES

43 companies were surveyed within the scope of the project. Face-to-face interviews were conducted in most of the cases; however, whenever interviewees could not be reached in Tbilisi, interviews were conducted via telephone. All electricity producers with an installed capacity above 1 MW were contacted. Several smaller ones were also included in the survey. As unbundling distribution and supply activities is currently not mandatory in Georgia, distribution licensees also own power plants and supply electricity to customers. Therefore, these companies were interviewed as both DSOs and suppliers as well. Some other companies interviewed also represent vertically integrated undertakings.

Figure 2 shows the distribution of the 43 surveyed companies by their size (number of employees). As mentioned above, many of the companies represent vertically and horizontally integrated undertakings, therefore it is surprising to see eight companies (19%) with more than 500 employees.

![Figure 2. Number of employees in the surveyed companies](image)
Figure 3 shows the breakdown of the surveyed companies by activity. The majority are power generators, which are either pure generators or part of vertically integrated undertakings.

![Figure 3. Number of companies involved in each of the activities](image)

As mentioned above, the majority of interviewees were electricity generators and according to the survey results, the absolute majority of them plan to continue their activities in the Georgian electricity market in the same role. On the other hand, insignificant changes can be expected in electricity supply activity, where three additional companies are planning to be involved in the future (see Figure 4). About 50% of the companies are planning to expand their business, while the remaining 50% are planning to sustain their current development level.

![Figure 4. Number of companies willing to be involved in each of the activities in the future](image)

### 4.1.2 PAST EXPERIENCE WITH SIMILAR PROJECTS

According to the survey, 36% of companies have conducted capacity-building projects during the last 3 years, while 64% of the companies have not. Such capacity-building projects were conducted mostly by electricity producers with their own funds and were mainly concentrated on technical safety and environmental issues. On the other hand, those companies who have not invested in capacity building activities downplayed their importance due to the existing, relatively simple electricity market structure and energy legislation.
4.1.3 AWARENESS ON ONGOING REFORMS IN GEORGIAN ELECTRICITY SECTOR

In order for any reform to be successfully implemented, especially the kind of reform that brings transformative changes to status quo, it is necessary to acquire new skills, develop technology, and engage experienced, qualified and well-informed personnel. Georgia is currently facing these challenges in its efforts of transforming the electricity sector and creating a market with an entirely new design and structure. New Georgian electricity market structure incorporates modern trading mechanisms, such as DAM and IDM, as well as balancing and ancillary services markets. Introduction of such trading mechanisms will create demand on respective skills and infrastructure. Currently, due to the unsophisticated nature of the existing market model, skills like forecasting, risk assessment, portfolio planning, and negotiations are not the main focus of market participants, nor do they see the need to invest in smart meters. However, implementation of the abovementioned reforms will bring about significant changes in the near future, and it is essential for market participants to have a clear understanding of the forthcoming changes, and the skills and technical resources they will need to be able to adapt well.

The survey results show that market participants can be grouped into four categories:

1) Market participants that are well informed about ongoing reforms, are engaged in the reform process and have an advanced understanding of the requirements under the Third Energy Package. Unfortunately, there are only two market participants in this category: Transmission system operator and electricity producer – Kartli Wind Power Plant;

2) Market participants that are aware of ongoing reforms, have a good understanding of the requirements under the Third Energy Package and are somewhat involved in the reform process. The companies that fall under this category are mainly DSOs, large power plants, importers/exporters and market operator;

3) Market participants that are aware of ongoing reforms and basic principles or the requirements under the Third Energy Package but are not actively involved in the reform process. These companies mainly are electricity producers, importers/exporters, one direct customer, and wholesale suppliers/traders;

4) The fourth category mainly consists of small power plants that are neither well informed about ongoing reforms, nor have an understanding of the future market model and demonstrate a lack of interest to participate in the reform process.

In 2017, Georgia became the Energy Community (EnC) contracting party and this fact was considered as one of the most important developments on the way to implementing Association Agreement. However, 26% [11] of surveyed companies are not aware of this fact. 90% [10] of those who are not aware of Georgia’s joining of the EnC are power generators, while 10% [1] is an electricity exporter/importer.

The situation does not seem promising when trying to analyze participants’ understanding of the requirements under the Third Energy Package. Only 33% of those aware of Georgia’s accession to the EnC have a good understanding of the Third Energy Package. Detailed results are provided in Table 1 below. The most interesting group, which should significantly contribute to future market development and create competition, is electricity producers. Taking only pure producers into consideration, i.e. those that are not involved in any other activity but electricity generation, 58% rank below 3 (out of 5), in their understanding of the third energy package, meaning that their understanding of the third energy package requirements is limited.
Table 1. Market participants’ understanding on Third Energy Package

<table>
<thead>
<tr>
<th>Understanding of the Package</th>
<th>Transmission system operations</th>
<th>Distribution system operations</th>
<th>Electricity Generation</th>
<th>Electricity Export/Import</th>
<th>Market Operation</th>
<th>Direct consumer</th>
<th>Electricity supply/trade</th>
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<tbody>
<tr>
<td>1. I’ve not heard about it</td>
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<td>2. I’ve heard about it but have no clear idea</td>
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<td>3. I know the main principles of the package</td>
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<tr>
<td>4. I have a quite good understanding of the package</td>
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<tr>
<td>5. I have an advanced knowledge in the EU Third Energy Package</td>
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</tbody>
</table>

Information about ongoing reforms is mainly disseminated during policy talks, public discussions and via sharing of draft policy documents. The survey shows that 55% of companies did not participate even in a single meeting on sector reforms. The main reason for not attending is the lack of information about the meetings. The second most popular reason for not attending such meetings is that they feel that they cannot affect the reforms.

As a result, only 37% of participants are aware that the draft energy law is prepared and 77% of those have read the document. So, less than 28% of surveyed companies have read the document. Only 21% knows that electricity market concept was prepared and approved by MoESD but only 57% of those have read the document despite the fact that the document is publicly available. The reason for not being acquainted with the draft law is that the document was not shared. The same was mentioned as the most important reason for not reading the Georgian electricity market concept design. Majority of the companies who named these as the reasons are electricity producers. Hence, even though they have the interest to read draft documents, actively participate in the reform process and increase their understanding of future market development process, lack of communication from government institutions does not facilitate they’re doing so.

The questionnaire also asked the companies to evaluate [with scale 1 to 5, where 1 means the most important and 5 – the least important] which factors are the most challenging on the way to implementation of the Third Energy Package. The results are provided in Table 2 below. Taking into account the importance of increasing awareness among Georgian electricity market participants, it is not surprising that understanding of regulations and engagement in the process is considered as the most important issue by the majority, even more so than human and technical capacity.

<table>
<thead>
<tr>
<th>Factor</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human Capacity</td>
<td>32%</td>
<td>18%</td>
<td>9%</td>
<td>18%</td>
<td>23%</td>
</tr>
<tr>
<td>Technical Capacity</td>
<td>23%</td>
<td>27%</td>
<td>27%</td>
<td>9%</td>
<td>14%</td>
</tr>
<tr>
<td>Implementation deadlines</td>
<td>23%</td>
<td>18%</td>
<td>32%</td>
<td>18%</td>
<td>9%</td>
</tr>
<tr>
<td>Understanding of regulations and involvement of market participants</td>
<td>32%</td>
<td>41%</td>
<td>23%</td>
<td>0%</td>
<td>5%</td>
</tr>
<tr>
<td>No connection with European market</td>
<td>14%</td>
<td>19%</td>
<td>5%</td>
<td>24%</td>
<td>38%</td>
</tr>
</tbody>
</table>

Table 2. The most challenging factors for implementing Third Energy Package
At the same time, companies were asked to evaluate existing electricity market structure and legal framework, taking into consideration electricity price formation, transparency and exit/entry barriers at the wholesale electricity market [with scale 1 to 5, where 1 means strongly disagree and 5 – strongly agree] (see Table 3). Majority of the companies agree and/or strongly agree with the statements from Table 3 below, which again shows their low level of understanding of modern electricity trading practices built on competitive market principles.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>At the wholesale level, prices of bilateral contracts mainly reflect the competitive market expected results</td>
<td>35%</td>
<td>10%</td>
<td>17.5%</td>
<td>20%</td>
<td>17.5%</td>
</tr>
<tr>
<td>Prices on the balancing market mainly reflect the expected outcomes of the competitive market</td>
<td>23.7%</td>
<td>18.4%</td>
<td>26.3%</td>
<td>13.2%</td>
<td>18.4%</td>
</tr>
<tr>
<td>The structure of the current electricity market in Georgia is effective, which allows the market participants to increase profits and/or repay their liabilities</td>
<td>20%</td>
<td>17.5%</td>
<td>42.5%</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>According to the current electricity market structure in Georgia, your access to information and transparency is high, for developing a business strategy</td>
<td>12.2%</td>
<td>7.3%</td>
<td>17.1%</td>
<td>24.4%</td>
<td>39%</td>
</tr>
<tr>
<td>There are no/low barriers in the Georgian wholesale market for new participants</td>
<td>10%</td>
<td>7.5%</td>
<td>20%</td>
<td>20%</td>
<td>42.5%</td>
</tr>
<tr>
<td>Transmission System Operator does not have discriminatory attitude towards market participants (connection, dispatching)</td>
<td>4.9%</td>
<td>12.2%</td>
<td>17.1%</td>
<td>19.5%</td>
<td>46.3%</td>
</tr>
<tr>
<td>Distribution system operator does not have discriminatory attitude towards market participants (connection, dispatching)</td>
<td>10%</td>
<td>2.5%</td>
<td>25%</td>
<td>7.5%</td>
<td>55%</td>
</tr>
</tbody>
</table>

Table 3. Evaluation of existing electricity market issues

Due to a low level of understanding among market participants about the Third Energy Package requirements and lack of knowledge on how organized markets work, market participants, especially electricity producers, underestimate the need for new skills and infrastructure to become efficient participants of the future market. While expected changes will have a significant impact on companies, almost no preparatory actions are being taken due to the abovementioned reasons. This is particularly true for small hydropower plants (HPPs).
4.1.4 TSO, DSO AND MARKET OPERATOR

Technical capacity and infrastructure readiness are crucial factors to successfully launching modern electricity markets; therefore, one of the objectives of the project was to assess technical gaps of the market operator, DSOs and market participants such as generators, wholesale consumers and importer/exporters. Technical capacity encompasses various planning and operational tools, such as computing software, SCADA, IT and technical means for metering, generation/load control, etc.

In order to assess technical capacity gaps of TSO and DSOs, is essential to determine whether they have proper forecasting and scheduling tools, as well as schedule exchange procedures. Another issue that needs to be assessed is the quality and granularity of electricity schedules crucial for fulfilling their future market roles such as balancing responsibility, procurement of reserve capacities of different timeframes, operational management of the system, congestion management and system remedial actions, procurement of system losses at the market, supporting cross border trade and etc.

Interviews showed that transmission and distribution system operators use short term operational scheduling and load forecasting software. On average they dedicate three individuals to the task of forecasting/scheduling. This number is similar across the TSO and the DSOs. However, there is quite an imbalance between TSO and DSOs when it comes to the number of training on forecasting. TSO employees responsible for forecasting, receive regular trainings while DSO employees do not.

Therefore, it is obvious that TSO is relatively ahead in the development of forecasting/scheduling skills. Short term and medium-term scheduling/forecasting is important for market operation purposes, while long term planning is important for system development. TSO developed its own model for forecasting, while at the same time, they use various existing models such as Valaragua, GTmax, Digsilent, etc. TSO gathers real-time water flow data, along with analyzing past statistics as inputs for hydro generation scheduling and preparing electricity balances for up to one year. As for other weather data for short term planning, GSE bases its forecasts on daily values of weather data, whereas they need to use at least hourly and preferably quarter-hourly values, especially for solar radiation and wind, to minimize forecasting errors and be able to react to changing weather conditions. Even in the case of water flow, TSO does not have hourly data on changing conditions on upstream of mountain rivers. In addition, interviews revealed that TSO does not properly take into account load forecasts of DSOs and large consumers. As a consequence, the above mentioned shortcomings make GSE load forecasts less accurate and forecast error is much higher (sometimes reaching and exceeding 10%) than in European TSOs that operate balancing markets. However, GSE is able to produce a load forecast with time granularity down to 1 hour.

Interviews found a gap between TSO and DSOs’ forecasts time granularity. While minimum standards of communication and forecast exchange among network operators are observed, it still is assumed as an important gap due to the DSO forecasts being of low quality, and incompatibility of their granularity with TSO modeling requirements. GSE, as was mentioned earlier, conducts hourly scheduling while DSOs are able to produce only daily schedules.

Unlike shortcomings in the forecasting/scheduling processes described above, GSE has a proper online platform for receiving generation schedules on a daily basis (GCAP), designed to enable them to submit month-ahead and day-ahead readiness declarations and load/generation forecasts. 3

DSOs are less developed in terms of load forecasting and distributed generation scheduling. This might be one of the reasons behind GSE’s lack of full confidence in DSO and large consumer load forecasts. DSOs do not have an appropriate software for load forecasting and one of the DSOs (Energo-Pro Georgia does not even use its own forecasting models and methodology. Energo-Pro Georgia prepares forecasts based on simple mathematical calculations and no weather or other factors are taken into account. None of the DSOs conduct hourly forecasting, but reportedly Telasi is currently developing a forecasting model with such capability. The reasons indicated by the DSOs for the underdevelopment of forecasting/scheduling models were lack of human capacity as well as insufficient funds 4. Apart from the abovementioned factors, DSOs also indicated the

3 http://www.gcap.com.ge
4 In terms of insufficient finances, it is questionable as GNCo’s tariff methodology allows full recovery of necessary and justified costs.
following as some of the main issues: lack of legislation\(^5\), lack of trainings for employees conducting forecasting/planning and lack of methodological harmonization with TSO\(^6\).

Analysis of transmission and distribution losses is also a very important task for network operators to plan appropriate volumes of energy procurement at the organized markets\(^7\). This specific task is also very important for the market as it is viewed as one of the instruments to increase market liquidity, competition, and volume of traded transactions. Currently, neither TSO nor DSOs undertake hourly calculations of system losses and are not able to plan and procure system losses with an acceptable level of accuracy. The reasons for failure to do so, as indicated by DSOs include deficiency in both human and technical capacity:

- Lack of software tools;
- Lack of hourly measuring data (including technical problems of communication to high-level ESKAA system);
- Lack of human capacity;
- Lack of realistic grid model at DSOs.

Appropriate cross-border cooperation is one of the cornerstones for successful national market deployment and a prerequisite for regional market coupling. However, there are various technical capacities required in order to make such cross-border cooperation effective. The starting point is to have the infrastructure, such as interconnectors in place. This issue was not covered during interviews, as it is well known that Georgia has enough physical interconnection capacity, in terms of total transfer capacity (TTC) with neighboring countries. Another issue is to what extent it is available to market participants in terms of net transfer capacity – (NTC, and moreover, how effective are NTC calculations and allocations to the market.

Importers, exporters, wheelers and traders, heavily depend on the availability of physical transfer capacities, as well as appropriate allocation mechanisms. As a rule, regional TSOs agree on available resources, operational regimes and possible scenarios of market outcomes. Usually, NTCs are calculated based on harmonized methodology between TSOs, and network models are exchanged as frequently as NTC calculations are performed. As interviews showed, GSE uses the regionally harmonized methodology for calculation of NTC and exchanges the network model with neighboring TSOs. This is a good starting point for transparent and efficient congestion management, but the exchange of grid models among the regional TSOs only happens annually – which is an issue, as it does not allow for effective exposure of free transfer capacities to the market and hinders efficient congestion management. For hourly market operation and development of balancing products’ exchange, more frequent calculation of NTC, and therefore more frequent exchange of grid models will be required - monthly, weekly and even daily.

Another aspect of cross-border cooperation is TSO to TSO exchange of balancing products. Different types of balancing products are used in practice, among which, most widespread are reserve capacity sharing, reserve capacity and balancing energy exchange, imbalance netting, common dimensioning of reserves and emergency support. As of now, GSE utilizes only emergency support with neighboring TSOs. To operate within the new market model, GSE will need to update cross-border cooperation agreements with neighboring TSOs and agree with them to include the above-mentioned products. It is common knowledge that national balancing markets end up with relatively high costs and less liquidity without proper cross-border cooperation. GSE indicated that among the main reasons for not having fully developed cross-border balancing cooperation are:

- Absence of proper market mechanisms and balancing products in Georgia;
- Absence of technical means (software and hardware);
- Lack of harmonization of rules;

\(^5\) Lack of legislation would imply underdevelopment of primary and secondary legislation, and non-defining obligations and methodological backgrounds of the issues associated to the topic under this study

\(^6\) DSOs employees are not aware about each other’s and TSO forecasting models

\(^7\) It is a common approach that TSOs and DSOs must procure losses at organized markets that support market liquidity and also incentivizes network companies to decrease system losses in order to avoid higher expenditures
- No methodology to calculate reserve capacities for different timeframes, such as FCR, aFRR, mFFR, RR.8

However, GSE does operate its in-house capacity allocation and auctioning web-based tool – GCAT9 that conducts yearly and monthly capacity allocations but is not adapted to hourly market conditions and needs. As per TSO’s point of view, it is possible to update GCAT to be adapted to the hourly market, but would require major improvements to the software, as well as increasing human capacity to work with it.

Operation of balancing the market is one of the core responsibilities of TSO under the Third Energy Package and European Network Codes. GSE claims that its employees have basic knowledge of balancing and ancillary service markets. Approximately 8 people undertook training in these directions with an average of 2 such trainings available to the employees per year. GSE demonstrates fairly high readiness to use balancing and other market platforms in practice, in case of their deployment in the nearest future. Contrary to GSE, Energo-Pro Georgia trained only 3 employees in market fundamentals, but financial limitations and lack of available training locally, hinder DSOs ability to seize upon broader training opportunities.

Despite the abovementioned, GSE has not yet finalized the drafting of hourly imbalance calculation methodology, balancing responsibility concept, prequalification procedures, and balancing market rules that have been discussed and agreed among stakeholders10. Among the reasons for failure to draft and finalize appropriate methodologies, rules and procedures, are inadequate cooperation between stakeholders and deficiencies in human capacity. On the other hand, according to GSE, balancing platform to be used in Georgia has already been selected, but neither GSE employees nor other stakeholders, nor market participants are familiar with the platform. It would take some time until TSO and balancing service providers’ employees are trained to operate on the selected balancing platform.11 Therefore, delay in preparation of balancing related by-laws, failure to open it to public discussions, along with unfamiliarity with the new balancing market platform, lead to technical (lack of software, lack of rules/methodologies) and human capacity (lack of understanding, unreadiness of market participants) gaps.

Technical (hardware and software) tools are crucial for the successful launch and development of balancing/ancillary markets. Indicators to measure technical gaps were selected, such as SCADA/EMS/IT, automated metering system, automated generation control (AGC) – in order to deliver aFRR, the readiness of frequency regulators12 and demand response. Automated metering system or so-called high-level ESKAA system is quite developed at GSE, as it collects data from all wholesale metering points on a half-hourly basis. However, according to the best European practice, balancing markets usually operate on a 15-minute basis. Therefore, the metering frequency must be decreased to 15 minutes for the calculation of imbalances. It is advantageous that the existing electronic meters have the capability to collect and transfer data every 15 minutes. Although the automated metering system is not considered a major technical obstacle to launching an hourly market, it still represents a technical challenge to adapt high-level ESKAA and medium/low-level ESKAA systems (transmission and distribution) to hourly market conditions.

Low-level ESKAA system (DSO automated metering system) gathers only hourly measurements from all wholesale connection points (35/110 kV and partially 6/10 kV). Lack of communication software, electronic meters and lack of finances were mentioned as major obstacles to further development of the low-level ESKAA systems. Energo-Pro Georgia currently uses approximately 1,800 old metering points. Taking into consideration the required investment and limited availability of metering service groups13, Energo-Pro Georgia

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8 It is worth to not that GSE doesn’t have methodological background, analytical tools and sufficiently experienced staff to calculate reserve capacities for different timeframes which is a base not only for cross-zonal balancing cooperation but also for internal balancing and ancillary services market. Therefore, this can be related to both, technical and human resource gap.
9 GCAT is name of the online tool. [https://www.gcat.com.ge/](https://www.gcat.com.ge/)
10 It should be mentioned that a draft balancing market rules prepared by a consultancy company – blueberries, is under discussion among market operator, GSE, MOESD and GNERC. Still consensus on which entity is going to conduct imbalance clearing/settlement has not been reached yet.
11 Respondents were unable to specify which balancing platform was selected, who is the provider or which EU TSOs use the same or similar balancing platform.
12 Speed governors needed for the FCR service delivery to TSO (so called primary reserves).
13 Reportedly, Energo-Pro Georgia is able to change only 350-400 meters per annum due to lack of human capacity (metering point service groups are overburdened)
estimates that it would take approximately 3 to 5 years\textsuperscript{14} to replace the old metering points (electronic meters, measuring transformers and communication facilities).

SCADA/EMS and IT are more or less ready for hourly market and/or balancing market operations because GSE is implementing the second phase of SCADA/EMS development project that will bring it to the new high-level architecture\textsuperscript{15}. However, as it relates to AGC, TSO uses it partially, i.e. not every generation facility is ready to participate in AGC. Cause of underdevelopment of AGC is not borne in TSO itself but rather in generation facilities, that are not ready for such cooperation with TSO due to the lack of SCADA, frequency regulators that are out of date or even out of service, and old facilities that cannot respond to TSO signals. The same situation is observed in demand response, where the reasons are both technical - no SCADA - no fast load regulation means, and human capacity - lack of knowledge, as well as the absence of commercial interest and the legal basis. DSOs have a low level of SCADA development, they only use it at mostly 35/110 kV substations, but this cannot be considered as a crucial technical gap in market development. Development of demand response from large consumers or DSOs will be considered as value added to the balancing market.

Transparency is one of the inherent characteristics that can foster equal and level playing field for market participants. Transparency regulation\textsuperscript{16} is part of the Energy Community acquis and obligatory for the TSO to implement in cooperation with relevant network operators and market participants. GNERC made transparency regulation part of national grid code and established standards for data availability and transparency. GSE responded that it has no issues related to creating methodology in collecting respective technical and market data, and publishing it on its own and/or on ENTSO-E transparency platform\textsuperscript{17} and confirmed preparedness of its employees and understanding of main principles of the regulation.

Major indicators for assessing market operator’s technical and human capacity are following: 1) level of development of legislation; 2) IT and trading software development; 3) qualification and knowledge (theoretical and/or practical) of employees how to use such modern trading technologies.

At the time being, as per the current market model and existing market rules of Georgia, imbalance calculation and therefore financial clearing/settlement period equals one month. This can be, by default, assumed as the most severe gap between existing and European market models. Below are several points that summarize underdevelopment of Georgian electricity market. Points are summarized based on ESCO’s interview and on factual circumstances:

- The timeframe of imbalance calculation and clearing/settlement is monthly based;
- ESCO uses an excel model to calculate imbalances;
- There are no balancing responsibilities defined in the market rules;
- No DAM and IDM market platforms are used for trade nor are in operation for testing\textsuperscript{18};
- No software is used in Georgia (or is in the process of testing or procurement) for settlement and clearing purposes compatible with hourly markets;
- Experts of core organizations, such as a regulator, TSO, DSOs, the market operator do not have a clear vision on market operator functions and its roles in different markets (Over-The-Counter (OTC), DAM, IDM, balancing, ancillary);
- Existing legislation on market design does not clearly define future roles of the market operator(s) of different formats and timeframes.

\textsuperscript{14} As per the GNERC decision, DSOs must bring metering points with connection voltage 1 kV and higher in compliance with the grid code no later than 2021.

\textsuperscript{15} The aim of upgrading the SCADA/EMS (Energy Management System) system is to ensure that hardware and software responds to modern system requirements, which implies the integration of new objects obtained as a result of electric network development, and, therefore, the processing of increased number of signals. In addition, the new system will be compatible with ENTSO-E standards.


\textsuperscript{17} https://transparency.entsoe.eu/

\textsuperscript{18} In addition, its worth to mention that, despite the market concept design adopted by MoESD, there is no clarity on final market model outline and Market Management System (MMS) that must unify markets of different timeframes along with imbalance settlement.
ESCO considers existing excel model for balancing as basis for future market platforms and is planning to update it to be compatible with daily and hourly market operations and hourly imbalance calculations with minor changes. Even though there are many examples of market operators starting bid and offer matching and imbalance calculations with complex excel models, it does not correspond to current best practices of using advanced trading platforms by organized markets/power exchanges.

Lack of human capacity is considered higher than lack in a technical capacity at ESCO. It is possible to conclude that the market operator requires serious efforts in building human capacity and technical support in IT development. Both of these challenges, if not addressed, may become barriers to the successful implementation of the future market model in Georgia. However, it is worth mentioning that ESCO has enough number of employees. It gives ESCO possibility to retrain and prepare its employees in order to address new challenges presented by hourly markets.

### 4.1.5 ELECTRICITY PRODUCERS

According to survey results, 79% of electricity producers claim that they use planning/forecasting models in their daily activities. Out of those who use planning/forecasting models, only 33% employ hourly planning. Despite the fact that majority of producers claim that they use forecasting/planning models, the survey revealed that claimed methods of planning/forecasting, the data used, and the aim of forecasting does not support this claim in several instances. Therefore, it can be concluded, that the planning/forecasting activities that are currently exercised by the producers will not be sufficient and efficient for trading activities.

The main reason electricity producers do not use proper planning/forecasting for their schedules is the lack of need and capacity. For example, 80% of electricity producers stated that absence of need was the reason, while 20% considered lack of human capacity as the main obstacle. At the same time, personnel involved in planning/forecasting are not receiving sufficient training. According to the survey, only 20% of electricity producers provide regular training to their employees.

Taking into account their human and technical capacity, only 21% of electricity producers think that they are ready to provide balancing products to the market. The small size of power plants was considered as one of the main reasons for not being able to provide those services.

Trading is done via simple applications (MS Excel, Bank transaction form), or no application is used. So, none of the generators have experience in working with sophisticated trading software.

Electricity producers’ self-assessment of their existing human and technical capacity to trade on DAM and IDM seems to be overestimated taking into account their existing trading and planning/forecasting practices. The results of self-assessment are provided in Table 4 with scale 1 to 5, where 1 means the company is not ready and 5 – the company is ready.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>The readiness of the company’s human capacity to</td>
<td>18.92%</td>
<td>10.81%</td>
<td>29.73%</td>
<td>27.03%</td>
<td>13.51%</td>
</tr>
<tr>
<td>participate in the Day-ahead market</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Readiness of company’s human capacity to</td>
<td>24.33%</td>
<td>18.92%</td>
<td>21.62%</td>
<td>24.32%</td>
<td>10.81%</td>
</tr>
<tr>
<td>participate in intra-day market</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The readiness of the company’s technical capacity</td>
<td>13.52%</td>
<td>10.81%</td>
<td>29.73%</td>
<td>21.62%</td>
<td>24.32%</td>
</tr>
<tr>
<td>(software, IT and communication systems, clearing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>and settlement) to participate in Day-ahead market</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The readiness of the company’s technical capacity</td>
<td>16.22%</td>
<td>18.92%</td>
<td>24.32%</td>
<td>13.51%</td>
<td>27.03%</td>
</tr>
<tr>
<td>(software, IT and communication systems, clearing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>and settlement) to participate in intra-day market</td>
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</tbody>
</table>

Table 4. Electricity producers’ readiness for organized markets

USAID | GOVERNING FOR GROWTH (G4G) IN GEORGIA
Gap Analysis and Capacity Building Action Plan of Georgian Electricity Market Participants
The explanation of high self-assessment might be low awareness about the skills required for efficient trading on day-ahead and intra-day markets. Electricity producers, particularly small power plants have a very limited understanding of the organized market structure and their operations. Not being aware of the new skills and technical capacity required, electricity producers overestimate the efficiency of their existing practice. However, when asking about the areas where they might need support, most of them see the need for significant external support in order to be able to successfully participate in organized markets. The areas for support as indicated by the producers are summarized in Table 5, with scale 1 to 5, where 1 means there is no need for support and 5 means there is a high need for support.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAM and IDM Rules (Rules for bidding, clearing, settlement)</td>
<td>8.3%</td>
<td>2.8%</td>
<td>8.3%</td>
<td>11.1%</td>
<td>69.4%</td>
</tr>
<tr>
<td>Software for Clearing and Settlement</td>
<td>9.4%</td>
<td>3.1%</td>
<td>6.3%</td>
<td>18.8%</td>
<td>62.5%</td>
</tr>
<tr>
<td>IT and Communication systems with market participants</td>
<td>11.4%</td>
<td>2.9%</td>
<td>5.7%</td>
<td>20.0%</td>
<td>60.0%</td>
</tr>
<tr>
<td>IT and Communication systems with TSO</td>
<td>13.9%</td>
<td>11.1%</td>
<td>5.6%</td>
<td>11.1%</td>
<td>58.3%</td>
</tr>
<tr>
<td>IT and Communication systems with MO</td>
<td>13.9%</td>
<td>8.3%</td>
<td>5.6%</td>
<td>8.3%</td>
<td>63.9%</td>
</tr>
</tbody>
</table>

Table 5. Need for supporting electricity producers for implementing organized markets

As new challenges emerge, there is an increased need for experienced personnel to ensure proper operation in the organized markets. Despite the fact that implementing the new market model will not be an easy task, and it will require huge effort from the market participants, majority of electricity producers agree that introduction of the new model is inevitably needed.

### 4.1.6 ELECTRICITY EXPORTER/IMPORTER

The survey covers 10 companies in this category, out of which 9 are solely exporters, while one acts as both exporter and importer. For import and export activities, it is particularly important to have accurate supply and demand forecasts. However, only 60% of importers/exporters use forecasting in their activities. The most popular reason for not using forecasting tools is lack of its need. The main reasons for underestimating the need for forecasting tool, are the existing market rules (not required by legislation to provide accurate hourly forecasts), perception of electricity exporters/importers as well as power plants that forecasting does not affect their profits, and their risk-averse behavior in the market to actively engage in the trading process. They tend to sell to ESCO rather than to customers. Those who do use forecasting in their daily activities, employ the very short term, hourly and daily forecasting.

For export/import activities to work, it is important to have clear rules regarding the access to export/import infrastructure. All the companies have used interconnector with Turkey while only 1 company trades with Azerbaijan, 2 companies with Russia and 3 companies with Armenia. For most companies using interconnector with Turkey, access is viewed as easy (90% of them rank access 1 or 2 on the 5-grade scale, where 1 is easy to access and 5 is difficult to access). Only one company considers access to Turkish interconnector difficult. Access is easy for companies at other interconnectors as well, but two companies, one of which uses Russian interconnector, and another use Armenian interconnector stated that access to their respective interconnectors is difficult. To summarize, access to the interconnectors does not seem to be the main bottleneck for cross-border trade.

Similar to electricity producers’ self-assessment, survey results show that electricity importers/exporters’ self-assessment of their existing human and technical capacity to trade on day-ahead and intra-day markets seems to be overestimated, taking into account their current trading and planning/forecasting practices. The results of self-estimations are provided in Table 5 with scale 1 to 5, where 1 means the company is not ready and 5 – the company is ready.
Table 6. Electricity importers/exporters readiness for organized markets

The explanation for high self-assessment may be a low level of awareness regarding the skills required for efficient trading on day-ahead and intra-day markets. Not being fully aware of the skills and technical capacity required to operate within the new market model, the importers/exporters overestimate efficiency of their existing practices. On the other hand, when asking about the areas where they might need support, most of them see the need for massive external support to be able to successfully participate in organized markets. The areas of needed support are provided in Table 7 with scale 1 to 5, where 1 means there is no need for support and 5 – there is a high need for support.

Table 6. Need for supporting electricity importers/exporters for implementing organized markets

Like electricity producers, electricity exporters and importers also overestimate their existing capacity to participate in the organized markets and underestimate the need for improving their human and technical capacity.

4.1.7 DIRECT (WHOLESALE) CUSTOMER AND/OR ELECTRICITY SUPPLIER

Direct Customers are those who have a short position on the market. They need to forecast their need for electricity and select the best deal based on their prediction of market price development and available options/cost for price and quantity risk management.

Direct (wholesale) customers and electricity supply companies use own models to forecast demand. At the same time, they use their demand forecasts to inform TSO or when contracting for electricity purchase. They devote quite significant human resources (5-6 people) to demand to forecast. However, that personnel is not provided with regular training to improve their skills.
For direct (wholesale) customers it is important to have meters with the adequate capacity of data storage, load profiling and information transmission for shorter time intervals in order to enable them to participate in organized markets. Direct (wholesale) customers covered by this survey are not equipped with necessary meters but claim that minimum time is required to change existing meters and this technical obstacle will not limit their participation in organized markets. Direct customers also consider that they are ready to provide balancing services even today.

Direct (wholesale) customers and electricity supply companies are quite confident that they can efficiently participate in day-ahead and intra-day markets even today. Both rank their human and technical capacity at 3 and 4 out of 5.

To overcome obstacles to trading in day-ahead and intra-day markets, these companies consider that support in understanding and practically applying DAM and IDM market rules (Rules for bidding, clearing, and settlement) is of the highest importance, while developing IT and communication systems are considered less important.

### 4.1.8 NEED FOR CAPACITY BUILDING PROGRAMS IN THE FUTURE

Taking into consideration the need for identifying and removing Georgian electricity market participants’ human and technical capacity gaps, the survey also incorporated questions related to preferred capacity building topics and methods for interviewees. According to survey results, Georgian electricity market participants prioritize the following topics to be incorporated in the future capacity building programs:

- Awareness and engagement in the legal and regulatory framework developed for the new Georgian electricity market;
- Generation and consumption forecasts and modeling;
- Human resource management;
- Technical security and environmental issues, mainly from electricity producers;
- Support the development of new skills necessary for new electricity market structure (Day-ahead market, ancillary services market, balancing market);
- Support in participation in the online platforms for organized markets;
- Development and preparation of Terms of References (ToR) for electricity projects.

Majority of interviewees prefer to take part in the seminar, workshop or training in the country (27%), while 19% prefer seminar, workshop or training abroad, 16% - online courses and 15% - study tours. Figure 5 below, shows a detailed breakdown of preferred capacity building methods.

![Figure 5. Capacity Building Activities preferred by interviewers](image)

Analysis of the survey results shows that it would be most effective to organize seminars, workshops, and training in the country or abroad for capacity building programs. This information together with important capacity building topics is reflected in section 5.
4.2 FOCUS GROUPS

Focus group 1, which was organized with power project developers showed that lack of information was one of the main issues in their view. Project developers, people who are involved in investment decision making and are well-acquainted with future market structure, also underlined the deficit of skilled workforce for electricity production forecasting and planning. Besides human capacity limitations, market size, as an exogenous factor, and level of market development in neighboring countries were mentioned as obstacles to establishing a competitive electricity market in Georgia.

Project developers were concerned that there is big uncertainty about the ongoing reform implementation process and its deadlines and emphasized the need for improved communication from government institutions during power project development and in the reform process in general.

Focus group with project developers also expressed concern about the limited availability of qualified personnel. They agreed that participation in organized markets will require highly qualified personnel since their decisions during the trading process will be directly reflected on companies’ revenues. Therefore, they see the importance of capacity building activities, such as training and/or seminars in order to increase capacity in key areas like forecasting and planning, financial analysis and risk management. The developers also emphasized the importance of having the personnel with necessary skillset ready and available before, or at least in time, with full market opening, so that they can transition smoothly.

Despite the fact that implementing the new market model will not be an easy task and it will require huge effort from market participants, focus group interviewees agree that the introduction of the new model is needed.

Awareness and readiness of market participants were considered as the most important issue by the participants of the focus group 2 consisting of government Institutions, international organizations active in Georgia and civil society organizations. They also underlined the importance of carrying out simulations of the new market model before its actual implementation. Engagement of market participants in such simulations is also very important, as it will help increase their awareness and skills and make the transition less painful and more cost-effective. Focus group participants also underlined that data availability and accessibility, remains a challenge and service providers (TSO, DSO, market operator) often reject requests to provide data, either bound by confidentiality restrictions or sometimes, on undue grounds. Development of online platforms and automatic publication of data will be crucial for establishing fair conditions on the market.

Focus group 2 expressed the same concern as focus group 1 regarding the lack of communication among government institutions and Georgian electricity market participants regarding the ongoing reform process.

Focus group 2 confirmed problems in forecasting skills of market participants and DSOs. In their view, this problem was due to the absence of hourly balancing responsibility in Georgia, leaving the market participants and DSOs without the need to produce accurate forecasts. According to the existing legislation, TSO bears the responsibility to check submitted forecasts/schedules and make corrections where necessary, but as per focus group’s belief, this practice will not continue under the new legislation. This problem stems from technical as well as human capacity gaps among electricity market participants. Under the new electricity market model, the market participants will be required to prepare hourly generation and consumption schedules/forecasts that will require qualified personnel as well as IT tools and software. As a short-term solution, focus group participants offered to introduce outsource services to market participants, namely to small power plants.

4.3 INTERNATIONAL EXPERIENCE

The project team also conducted a review of international experience in order to identify the main gaps in skills and technical capacity of electricity market participants during the market liberalization process in the EU and neighboring countries. The main goal of this activity was to identify challenging areas as well as lessons learned in respective counties and how their experience could be applied to the local context. While the project team contacted five organizations, only two of them responded. The answers received from Turkish energy exchange – EPIAS and Slovenian market operator – Borzen, were also analyzed and incorporated in the development process of capacity building action plan for Georgian electricity market participants.

1. Turkey
Over the last decades, Turkey became one of the fastest-growing economies. The Turkish electricity market has gone through a major restructuring process which was initiated in the early 1990s and later gained pace and stability with issuing of the Electricity Market Law in 2001. The reform was also obviously very crucial for harmonization with EU legislation and energy regulations. The main objective of Electricity Market Law was to ensure the delivery of sufficient, good quality, low cost, and environment-friendly electricity to consumers. In order to reach this objective, the Law points to the development of a financially sound and transparent electricity market operating in a competitive environment under provisions of civil law.

![Figure 5. Turkish Electricity Market Reform Milestones](image)

Since the Turkish electricity market liberalization, the concept of the eligible customer was introduced by the Turkish Electricity Market Law which was accompanied by the introduction of Eligible Customer Regulation in 2002. According to regulations, the eligible customer was defined as a customer that is directly connected to the transmission system or consumes more electricity than the limits stated in the legislation. Electricity consumption limits by year were as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>Eligible Consumer Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>9,000,000 kWh/year</td>
</tr>
<tr>
<td>2003</td>
<td>9,000,000 kWh/year</td>
</tr>
<tr>
<td>2004</td>
<td>9,000,000 kWh/year</td>
</tr>
<tr>
<td>2005</td>
<td>7,700,000 kWh/year</td>
</tr>
<tr>
<td>2006</td>
<td>6,000,000 kWh/year</td>
</tr>
<tr>
<td>2007</td>
<td>3,000,000 kWh/year</td>
</tr>
<tr>
<td>2008</td>
<td>1,200,000 kWh/year</td>
</tr>
<tr>
<td>2009</td>
<td>480,000 kWh/year</td>
</tr>
<tr>
<td>2010</td>
<td>100,000 kWh/year</td>
</tr>
<tr>
<td>2011</td>
<td>30,000 kWh/year</td>
</tr>
<tr>
<td>2012</td>
<td>25,000 kWh/year</td>
</tr>
</tbody>
</table>

19 Source: EMRA
In parallel with decreasing the limit, the number of eligible consumers in the market increased rapidly and share of liberal electricity market also increased gradually. Finally, all customers became eligible customers and the electricity retail market was also opened to competition. The reason of this gradual liberalization of eligible customers was due to technical issues in the network, namely metering points, as well as the human capacity of the participants.

One of the major changes in the Turkish electricity market was the introduction of Electricity Market Balancing and Settlement Regulation (BSR) in 2004 accompanied by balancing and settlement mechanism in 2006. During this period, bids and offers from market participants were allowed via Excel forms for three-time intervals in a day. Such a simple model and tool for communication was chosen at that time due to the lack of human capacity within market participants to provide hourly bids and offers, as well as inability by the system to accurately meter electricity generation and consumption on an hourly basis. This stage of reforms lasted three years, and in 2009, hourly settlement and balancing power market were introduced. During this stage, only generation companies were allowed to participate in the market. Such restriction was imposed due to mitigate price increase risk in the market. The full market opening started in 2011, when consumers were allowed to participate in the markets, and when day-ahead market along with imbalance pricing and the efficient collateral mechanism was introduced. Evolution of the Turkish electricity market is provided in Figure 5.

![Figure 5. Evolution of Turkish wholesale electricity market](image)

In general, Turkish electricity market reform was implemented gradually, in stages, in order to avoid significant price increase and address gaps in the human and technical capacity of market participants and network operators. As of 2016, Turkey has a mature electricity market with required marketplaces in place, a regulatory framework aligned with EU legislation, private sector involvements and a very high level of market opening. Existing electricity market structure is provided in Figure 6.


2. Slovenia

The Slovenian electricity market is fully open. Basic milestones regarding Energy law revisions as well as Market rules are presented in Figure 7. Its opening began in 2000 when the task of distribution and transmission system operators were separated. The first step in opening up the national electricity market was taken in 2001 when Slovenia adopted a revised Energy Act to transpose Directive 96/92/EU. Formally, the liberalization of the market in Slovenia began on the 15th of April 2001.

The Energy Act established the rules for electricity market operation. The national borders opened on January 1, 2003, for eligible customers. In July 2004 the electricity market opened for 92,000 eligible consumers, except for households. In 2007, when the Directive 2003/54/EC concerning common rules for the internal market in electricity was implemented through the Energy Act, the electricity market was completely open, meaning that all the consumers, including households, became eligible consumers and were able to choose their electricity supplier.

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20 Source: EPIAS
21 Source: Borzen
The market model was "bilateral+PX" from the beginning. Establishment of power exchange (PX) in Slovenian electricity market was implemented in several phases:

- Organized as day-ahead trading at Borzen in 2002 started with continuous trading, then followed by auctions in 2008;
- Organized Intraday and Balancing including reserve replacement reserve since 2012;
- Organized day-ahead and intraday cross-border auctions in 2016;
- Organized futures products trading since 2019.

Borzen was founded in 2001 and its main responsibility was to organize Slovenian electricity market as a market operator including stimulating the use of renewable sources and the efficient use of energy. Currently, Borzen provides balance scheme management, records closed contracts, imbalance settlement and financial settlement of transactions in the wholesale market.

Activities connected with energy exchange were under the responsibility of Borzen until November 2008, when responsibility was passed to the newly established company BSP Regional Energy Exchange, which was founded by Borzen and Eurex, the international derivatives exchange, in May 2008. Borzen's strategic goal to establish a regional energy exchange in South East Europe has thereby been accomplished.

Slovenian TSO - ELES is responsible for balancing deviations from announced schedules of the electricity power system in Slovenia. When actual volumes of production and consumption in the system deviate from the operation schedule, the TSO must change the ratio between production and consumption. Most often this means to increase or decrease the production of electricity.

Balancing services incur costs to the TSO. These costs are paid by the party responsible for costs. For this purpose, in Slovenia, the balance scheme is established, which consists of balance groups, within which an unlimited number of subgroups are active. Balance group and subgroups are the members of the balance scheme represented by the balance group leader (a balance group responsible party). The rules on the operation of the electricity market determine that balance group leaders are responsible for maintaining marketing plans and operation schedules of their groups in the framework of forecasted values. The accounting period in the Slovenian organized electricity market is one hour.

According to Turkish and Slovenian experience in electricity market reforms, along with electricity market evolution, the capacity of market participants in both human and technical areas was crucial for reform success. In the beginning, simple Microsoft Excel files were used for electricity trading, while price determination was based on peak and off-peak periods during a day. However, step by step development of IT tools and software for electricity trading was introduced at later stages of the reforms. At the same time, the technical capacity of the market participants related to sophisticated (hourly) metering functionality as well as usage of IT tools was taken into account.

4.4. SUMMARY OF MAIN FINDINGS

Trading on the future Georgian electricity market will require new skills and methods to be acquired and deployed by market participants. As an important takeaway from the general information of interviews, companies look forward to market opening and perceive it as an opportunity to increase profits. Some of them (50%) consider expanding their businesses and engaging in supply and trading activities after the wholesale and retail markets are deregulated. However, gap analysis showed that there are several major gaps that, if not addressed, might hinder the market participants' ability to achieve the abovementioned goals and even lead to negative financial outcomes.

Under the existing market model, where balancing is performed on a monthly basis, no electricity trading mechanism exists, there is no balancing responsibility and where ESCO is the main buyer of electricity from small hydro and thermal power plants, producers have little to no incentive to acquire new skills and do not see an opportunity to increase their profits through optimization of their trade practices.

Project team found direct negative correlation between the number of direct (wholesale) customers on the market and wholesale price increases, i.e. the number of market participants reduces when the wholesale prices are increased. Number of participants is essential for the future, liberal market model as it directly results in market liquidity and high levels of competition. Electricity producers and consumers need to develop and acquire new skills and technical infrastructure, such as accurate planning/forecasting, risk management, IT, trading techniques, to be able to take full advantage of the benefits that trading on a liberal market presents. Traders will also have a crucial role in ensuring proper functioning of the market and helping the market participants in navigating the new market complexities.
One of the key topics of the interviews was forecasting skills and incentives to invest in developing more accurate forecasting practices. It is common knowledge, that proper planning and forecasting are essential for successful operation at the markets of different timeframes in terms of increasing profits and minimizing risks and imbalance charges. But, besides this, proper forecasting and planning is equally as important for maintaining the electricity system's operational security and adequacy.

As already mentioned, despite the fact that market participants are currently required to provide forecasts, they oftentimes provide inaccurate figures. This casual attitude toward forecasting is mainly due to the fact that the market participants do not currently have adequate human and technical capacities to operate within the new market model and adapt to self-dispatch model in planning and trade. However, the fact that they currently do provide forecasts, albeit inaccurate ones, gives hope that they will be able to develop their skills and get better at it through targeted capacity-building activities. Another option, which was suggested by the focus group, was an option to outsource this function. Outsourcing will create new opportunities in the market for those individuals and organizations that possess the necessary skills to plan, manage risks and consequently, efficiently trade on organized markets on behalf of their customers and receive commissions/premium for provision of such service. On the other hand, the companies, that decide to keep their trading practices in-house will invest in developing their existing personnel and/or attract new, qualified staff. Some companies, mainly big ones with adequate financial resources, already started investing in the development of relevant skills, but most other companies responded that they don’t possess forecasting tools and their employees do not undergo regular training in forecasting/planning. Wholesale consumers and most of the power producers are not prepared to perform abovementioned tasks and to carry balancing responsibility.

For network operators, such are TSOs and DSOs, well-developed forecasting/scheduling tools and well-prepared employees are important not only for operational and planning purposes but also for market purposes to be able to accurately procure operational balancing and emergency reserves and network losses. Based on the analysis, GSE is currently much more advanced and ready to start fulfilling this task compared to other distribution companies, but issues remain with regards to accurately forecasting variable renewable energy sources (RES) due to the absence of adequate forecasting tools, relevant skills, and accurate and timely data for solar and wind (including weather data). Therefore, underdevelopment of the TSO as it relates to forecasting wind and solar sets obstacles for variable RES integration into the grid. In spite of this, DSOs are making first steps in this direction, i.e. integration of variable RES in their networks, and therefore will need more support to improve their forecasting/scheduling capacity, both in terms of analytical tools and personnel.

- **Awareness of ongoing reforms in the sector and preparedness of human resources for the changes**

New Georgian electricity market structure will incorporate modern trading mechanisms and responsibilities, such as day-ahead and intra-day markets, balancing and ancillary services markets, and more importantly – balancing responsibility and imbalance settlement mechanisms. Introduction of such trading mechanisms will create demand for new skills and renewed infrastructure. Development of skills like planning, negotiations, risk management, portfolio planning, knowledge of new rules, procedures, etc. are not the main focus of market participants currently and as interviews revealed, they do not yet realize the importance of such skills. In many cases, where interviewers encountered high self-assessment by interviewees, cross-check questions revealed that the interviewees were not really ready to tackle the upcoming changes in the market. The high self-assessment might be explained by a lack of awareness and understanding of the skills required for efficient trading on day-ahead and intra-day markets, more so on the balancing market. It is exactly for this reason, why we believe the majority of the surveyed direct consumers and electricity producers, particularly small power plants, overestimated the efficiency of their existing practices. Despite their claimed readiness to tackle new challenges, most of the interviewees stated that they will need external support to be able to successfully participate in organized markets.

As described in section 4.1.3., market participants can be grouped into four categories indicating their level of awareness and understanding of the reforms.

Big companies, mostly network operators (TSO, DSOs), market operator (ESCO) and a few other big companies who are involved in different activities such as power production and import/export, for instance...
Georgian Industrial Group (GIG) and Georgian Water and Power (GWP), fall under categories 1 and 2, indicating their advanced of at least good awareness of ongoing reforms and clear understanding of the challenges these reforms pose to their human and technical capacities. We believe that the main reason why these companies advanced in gaining more information and knowledge and therefore preparedness for the new market model is the following:

- Companies have bigger resources both human and financial; most of them employ 100 people or more;
- Companies which are service providers get more support in terms of capacity building and technical infrastructure;
- They are engaged in market reform processes and participate in drafting and/or discussions of new legislation through working groups, while some of them are involved in decision making directly.

These category 1 and 2 companies will be in more advantageous positions when involved in trading activities on the organized markets as compared to other market participants and may even get market power in wholesale trade and retail supply activities. In contrast, biggest number of market participants - mostly small and medium power producers and most importer/exporters, groups which should be the drivers of future market development in terms of creating competition and liquidity seem to be unprepared for market reforms22. This is mainly due to lack of information and therefore ambiguous outlook on the future market. This problem can be mitigated by constantly inviting these market participants to policy discussions and/or market concept discussions and by arranging wider public hearings by decision-makers such as MoESD and GNERC.

The survey shows that 55% of companies did not participate even in a single meeting on sector reforms23. Not sharing draft policies, laws and regulations with market participant was recognized as the biggest issue by the majority of stakeholders, therefore recommendation to policy and decision-makers such as MoESD, GNERC, GSE, and ESCO, is to start sharing draft documents to all market participants24 to give them the opportunity to get acquainted with upcoming changes and prepare accordingly.

Another useful intervention would be to offer market participants, especially those who fell under the third and fourth categories, capacity building activities such as training/seminars, simulations, market games, etc. to address the second biggest challenge revealed by gap analysis – lack of human capital with appropriate skills to trade on organized markets25. One of the key conclusions of the gap analysis is that awareness is the main issue that needs to be prioritized and addressed immediately, even before addressing human and technical capacity gaps. The main rationale behind this conclusion is that the market participants cannot take the necessary steps toward human and technical capacity development if they are not aware of what will be required and what skillset and technical tools will be precursors to their success within the new market model.

- **Lack of technical capacity (hardware and software)**

Technical (hardware and software) tools are crucial for the successful launch and development of markets of different timeframes, including balancing and ancillary services. There were several crucial weaknesses identified in this regard.

First of all, the metering system is probably the most crucial element in physical electricity trade, as it is impossible to implement hourly markets and calculate imbalances in shorter timeframes without proper functioning of the metering system. Automated metering system - high-level ESKAA system26 is somewhat developed. The system collects data from all existing wholesale metering points and DSOs (low-level ESKAA

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22 More than half of interviewed companies are not aware about third energy package and about Georgia’s accession in Energy Community.
23 The main reason for not attending is lack of information about such meetings and the second most popular reason is the feeling that they will not be listened.
24 As survey revealed, less than 1/4 of market participants had access (had read) to new draft Energy Law and new market concept design, approved by the MoESD in December 2018.
25 As it was discussed above, surprisingly majority of market participants named as first challenge understanding of regulations and involvement in the process is considered as the most important issue, even more so than human and technical capacity
26 According to the Georgian Grid Code, High level ESKAA system is owned and operated by TSO, while low level ESKAA is operated by DSOs and that is connected to high level ESKAA
system) on a half-hourly basis. However, according to best European practice, balancing markets usually operate on a 15-minute basis and therefore imbalance calculation must occur in the same timeframe. Consequently, meter reading frequency must be decreased to 15 minutes. Hypothetically, most of the existing metering points can be re-programmed to 15-minute intervals, but high-level ESKAA system might need major upgrades to be able to accept and process such data.

Another major problem that the energy sector may face after market opening is the metering points of medium and large consumers, who will most likely become wholesale market participants, but do not currently have electronic hourly meters installed. All metering points above 1 kV fall in this category. DSOs estimate that there are approximately 2,000 such instances in total, where replacement or upgrade of metering systems (meters and measuring transformers) would be required. Such upgrades will require multi-million GEL investment and may take three to five years to complete due to the shortage of qualified technical personnel. DSOs assert that it would be extremely challenging to upgrade more than 400-500 metering points per year. **Without hourly metering capacity, it will be tough for market participants to adapt to organized hourly markets and to calculate imbalances accurately.**

The latest stage of market opening, effected on May 1, 2019, when 10 largest industrial and mining consumers were compulsorily exposed to wholesale market, revealed that inadequacy of their metering points was overlooked by policy makers and as a consequence the companies faced severe problems with registration as direct consumers due to incompatibility of the metering points with wholesale market requirements. In order to mitigate this problem, GNERC has to intervene and start derogation processes in order to avoid market failure. If ignored, this issue will become one of the biggest obstacles to introduction of hourly markets.

Balancing an ancillary services market requires a different type of reserves, as well as reserves that can be activated either automatically through system automatics or manually. Automatic reserves need well-functioning speed governors (for FCR type of reserves) and automatic frequency regulators in order to connect to AGC and deliver centralized frequency regulation service (aFRR reserves) to TSO. Despite the fact that AGC is on hand at GSE and several big hydropower plants are already connected to it (Enguri, Khrami HPPs and newly built big HPPs), there are still many big and medium regulated and partially deregulated power plants with annual and seasonal regulation reservoirs that are not ready to participate in frequency regulation. **This will create problems in balancing markets in terms of liquidity and competition.** Main power generating units at these power plants are mostly outdated and their upgrade requires significant investments.

Software (IT and trading platforms) development nowadays is the most important factor for the successful operation of electricity markets. At the time being, Georgia has not yet made a decision on which market software/platform will be deployed. Moreover, the new draft Law on Energy and market concept design do not clearly define which entity will be responsible for balancing market operation.ESCO considers existing excel model for balancing as a basis for future market platforms and is planning to update it to be compatible with daily and hourly market operations and hourly imbalance calculations, and plans to accept bids and offers with excel files through e-mails. In the case of market participants, current electricity trade is done via simple applications as well (MS Excel, Bank transaction form), or as some interviewees reported no application is used at all. Hence, it can be inferred that none of the market participants (generators, consumers, importer/exporters, and even market operator) have experience of working with sophisticated trading software. Gap analysis showed that market participants believe that support in understanding and adapting to new market rules and support and training in adoption of the new market platform and clearing and settlement software, will be most beneficial to them, and will help them effectively access and participate hourly markets.

Even though there are many examples of market operators starting bid and offer matching and imbalance calculations with complex excel models, this practice does not correspond to the challenges and best practices of using advanced trading platforms by organized markets/power exchanges. Delayed deployment of market platform and related software tools, and inadequate efforts to prepare market participants in advance to use these tools will hinder the market participants’ ability to efficiently adapt to the new market model. **In conclusion to this finding, GoG should dedicate time to market simulations and training of market participants.**

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participants well in advance to full market launch to reduce the risk of failure and misunderstanding for market participants.
### 5. CAPACITY BUILDING ACTION PLAN

As described in previous sections of this report, the gap analysis demonstrated that there are inherent gaps that need to be addressed in short, medium and long term. These gaps mostly relate to low awareness of upcoming reforms and anticipated changes, lack in general human and technical capacity, as well as inadequate forecasting/planning capability that is so essential for adjusting to organized hourly markets based on the self-dispatch model and for bearing balancing responsibility.

The capacity building action plan provided below aims to address those gaps identified during the analysis and to target the development of specifically those skills and competences, which would enable the Georgian electricity market participants to smoothly transition to the new market model, take full advantage of the benefits that such model offers and be able to contribute to the market’s and energy sector’s further development.

The action plan addresses capacity issues across all electricity activities on the wholesale level from generation to supply and incorporates the past experience of capacity building activities within market participants individually and in the Georgian electricity sector in general. The action plan provides areas, list of actions and their potential implementation period. However, the cost of the implementation of prescribed actions is not evaluated.

<table>
<thead>
<tr>
<th>No</th>
<th>Area</th>
<th>Action</th>
<th>Goal of the action</th>
<th>Type of activity</th>
<th>Target group</th>
<th>Activity period</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Awareness</td>
<td>Establish cooperation between Georgian electricity market stakeholders and educational/training institutions</td>
<td>Establish educational programs to support ongoing reforms in the electricity sector of Georgia</td>
<td>Educational programs</td>
<td>All market participants, electricity market stakeholders</td>
<td>Short, medium and Long-term</td>
</tr>
<tr>
<td>2</td>
<td>Awareness</td>
<td>Establish information platform for electricity market participants</td>
<td>Increase information dissemination level among Georgian electricity market participants on legal and regulatory changes</td>
<td>Periodical meetings, conferences</td>
<td>All market participants, electricity market stakeholders</td>
<td>Short, medium and Long-term</td>
</tr>
<tr>
<td>3</td>
<td>Human capacity</td>
<td>Economics of electricity markets</td>
<td>Increase market participants capacity</td>
<td>Training, seminars</td>
<td>All market participants, electricity market stakeholders</td>
<td>Short, medium and Long-term</td>
</tr>
<tr>
<td>4</td>
<td>Human capacity</td>
<td>Electricity generation and consumption forecasting on different time horizons</td>
<td>Increase market participants capacity</td>
<td>Training, seminars</td>
<td>Electricity producers, direct customers, and suppliers</td>
<td>Short, medium</td>
</tr>
<tr>
<td>5</td>
<td>Technical capacity</td>
<td>Tools for Electricity generation and consumption forecasting on different time horizons</td>
<td>Provide IT tools and software to respective market participants</td>
<td>IT tools and software</td>
<td>Electricity producers, direct customers, and suppliers</td>
<td>Short, medium</td>
</tr>
<tr>
<td>6</td>
<td>Technical</td>
<td>Installing flow rate</td>
<td>Increase collection</td>
<td>Procurement</td>
<td>Electricity</td>
<td>Short, medium</td>
</tr>
<tr>
<td>№</td>
<td>Area</td>
<td>Action</td>
<td>Goal of the action</td>
<td>Type of activity</td>
<td>Target group</td>
<td>Activity period</td>
</tr>
<tr>
<td>----</td>
<td>-----------------------</td>
<td>--------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------</td>
<td>------------------</td>
<td>----------------------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>1</td>
<td>capacity</td>
<td>sensors on the rivers</td>
<td>of historical and current data on water flows and increase forecasting capacity</td>
<td>of new assets</td>
<td>producers</td>
<td>medium-term</td>
</tr>
<tr>
<td>7</td>
<td>Technical capacity</td>
<td>Installation of new meters compliant with new electricity market model</td>
<td>Support hourly trading in the market</td>
<td>Procurement of new meters</td>
<td>Direct customers, DSOs</td>
<td>Short, medium-term</td>
</tr>
<tr>
<td>8</td>
<td>Technical capacity</td>
<td>Modernization of old assets</td>
<td>Support the efficient operation of electricity producers</td>
<td>Procurement of new assets</td>
<td>Small power plants</td>
<td>Short, medium-term</td>
</tr>
<tr>
<td>9</td>
<td>Human capacity</td>
<td>Human resource management</td>
<td>Support market participant in executing proper HR activities in their companies</td>
<td>Training, seminar</td>
<td>Direct customers, DSOs, electricity producers</td>
<td>Short, medium-term</td>
</tr>
<tr>
<td>10</td>
<td>Human capacity</td>
<td>Development of Terms of References for electricity projects</td>
<td>Develop respective Terms of References for electricity projects in compliance to donor and/or IFIs requirements</td>
<td>Workshop, training</td>
<td>TSO, DSO, Large electricity producers</td>
<td>Short, medium-term</td>
</tr>
<tr>
<td>11</td>
<td>Human capacity</td>
<td>Operation of wholesale electricity markets (OTC, DAM,BM, IDM) in the EU</td>
<td>Provide practical knowledge on principles of organized market operations</td>
<td>Study tours, On the job training</td>
<td>Direct customers, DSOs, electricity producers</td>
<td>Short term</td>
</tr>
<tr>
<td>12</td>
<td>Human capacity</td>
<td>Establish a certified energy trading training program</td>
<td>Acquire skills for modern electricity trading mechanisms</td>
<td>Training</td>
<td>All market participant, electricity market stakeholders</td>
<td>Short, medium and Long-term</td>
</tr>
<tr>
<td>13</td>
<td>Human capacity</td>
<td>Risk management strategies</td>
<td>Acquire skills for risk mitigation strategies for electricity trading</td>
<td>Training, workshop</td>
<td>All market participant</td>
<td>Short, medium and Long-term</td>
</tr>
<tr>
<td>14</td>
<td>Human capacity</td>
<td>Third Energy Package</td>
<td>Introduction of third energy package requirements and Georgia’s obligations towards Energy Community</td>
<td>Training, workshop</td>
<td>All market participant</td>
<td>Short term</td>
</tr>
<tr>
<td>15</td>
<td>Human capacity</td>
<td>Technical security and environmental issues</td>
<td>Update Georgian electricity producers on modern approaches</td>
<td>Training, workshops</td>
<td>Electricity producers</td>
<td>Short, medium-term</td>
</tr>
<tr>
<td>16</td>
<td>Technical capacity</td>
<td>Establishment of organized electricity market online platforms</td>
<td>Support relevant electricity stakeholders (TSO, MO) to international experts short-term placement in</td>
<td>International experts short-term placement in</td>
<td>TSO, MO</td>
<td>Medium, long term</td>
</tr>
<tr>
<td>№</td>
<td>Area</td>
<td>Action</td>
<td>Goal of the action</td>
<td>Type of activity</td>
<td>Target group</td>
<td>Activity period</td>
</tr>
<tr>
<td>---</td>
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<td>--------------</td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>establish</td>
<td>the respective organization, procurement or development of organized electricity market online platforms</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
ANNEX 1: QUESTIONNAIRE IN ENGLISH

Assessment of Human and Technical Capacity Needs for Georgian Electricity Market Players

Questionnaire

Z1. Name of an interviewer: ____________________________ ____________________________

Z2. Acceptance of the interview:

<table>
<thead>
<tr>
<th>Interview Accepted</th>
<th>Interview disqualified</th>
</tr>
</thead>
</table>

Z3. Date of interview: ___ /___ / 2019 (Day/Month/Year)

Z4. Interview started at: ___ : ____ (hour : minute)

Z5. Interview ended at: ___ : ____ (hour : minute)

For interviewer:

Hello, my name is /last name and first name/ and I represent the Association of Young Professionals in Energy of Georgia. We are conducting a survey to evaluate human and technical capacity of electricity market participants. The study is conducted under USAID G4G project activity. The aim of the survey is to understand awareness level about ongoing reforms in electricity sector and identify gaps between existing capacity (human and technical) and the one needed for foreseen electricity market as determined by the EU electricity market principles. It is very important to get accurate and honest answers as the result of the survey will be used to develop the gap analysis report and may affect preparation of the recommendations on the future policy measures and capacity building programs.

Participation in our survey is voluntary and will be confidential and completely anonymous. This interview will take approximately 45 minutes. The report prepared based on the survey will provide only aggregate results and no answers of individual interview will be published. The report and key takeaways will be shared with you.

Content

1. Section Y: Information about interviewee(s)
2. Section A: Information about Company
3. Section B: Past Experience about similar projects
4. Section C: Awareness on Ongoing Reforms in Georgian Electricity Sector
5. Section D: Transmission System Operator
6. Section E: Distribution System Operator
7. Section F: Generators
8. Section G: Exporter/Importer
9. Section H: Market Operator
10. Section I: Direct (Wholesale) Customer or Electricity Suppliers
11. Section J: Need for Future Capacity Building Programs
12.
### Section Y: Information about interviewee(s):

[Interviewer! Fill in table for each interviewee]

#### Y.1. Interviewee 1

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Y.1.1 Name Surname</td>
<td></td>
</tr>
<tr>
<td>Y.1.2 Position</td>
<td></td>
</tr>
<tr>
<td>Y.1.3 Year at the position</td>
<td></td>
</tr>
<tr>
<td>Y.1.4 Years of experience in the field</td>
<td></td>
</tr>
<tr>
<td>Y.1.5 Email address</td>
<td></td>
</tr>
<tr>
<td>Y.1.6 Tel number</td>
<td></td>
</tr>
</tbody>
</table>

#### Y.2. Interviewee 2

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Y.2.1 Name Surname</td>
<td></td>
</tr>
<tr>
<td>Y.2.2 Position</td>
<td></td>
</tr>
<tr>
<td>Y.2.3 Year at the position</td>
<td></td>
</tr>
<tr>
<td>Y.2.4 Years of experience in the field</td>
<td></td>
</tr>
<tr>
<td>Y.2.5 Email address</td>
<td></td>
</tr>
<tr>
<td>Y.2.6 Tel number</td>
<td></td>
</tr>
</tbody>
</table>

#### Y.3. Interviewee 3

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Y.3.1 Name Surname</td>
<td></td>
</tr>
<tr>
<td>Y.3.2 Position</td>
<td></td>
</tr>
<tr>
<td>Y.3.3 Year at the position</td>
<td></td>
</tr>
<tr>
<td>Y.3.4 Years of experience in the field</td>
<td></td>
</tr>
<tr>
<td>Y.3.5 Email address</td>
<td></td>
</tr>
<tr>
<td>Y.3.6 Tel number</td>
<td></td>
</tr>
</tbody>
</table>
### Y.4. Interviewee 4

<table>
<thead>
<tr>
<th>Y.4.1 Name Surname</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y.4.2 Position</td>
</tr>
<tr>
<td>Y.4.3 Year at the position</td>
</tr>
<tr>
<td>Y.4.4 Years of experience in the field</td>
</tr>
<tr>
<td>Y.4.5. Email address</td>
</tr>
<tr>
<td>Y.4.6. Tel number</td>
</tr>
</tbody>
</table>

### Y.5. Interviewee 5

<table>
<thead>
<tr>
<th>Y.5.1 Name Surname</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y.5.2 Position</td>
</tr>
<tr>
<td>Y.5.3 Year at the position</td>
</tr>
<tr>
<td>Y.5.4 Years of experience in the field</td>
</tr>
<tr>
<td>Y.5.5. Email address</td>
</tr>
<tr>
<td>Y.5.6. Tel number</td>
</tr>
</tbody>
</table>
Section A: Information about Company

A.1. Name of a company [______________________________________________________]

A.2. How many employees does your company have? [______]

[Interviewer! If interviewee cannot say exact number, ask to select from the ranges below]

1. 1-5
2. 6-20
3. 21-50
4. 51-100
5. 101 – 500
6. More than 500

[Interviewer! Ask separately about each activity and fill in the table below for questions A.3, A.4 and A.5]

A.3. What are the activities your company is involved in?

A.4. What are the activities your company is intended to be involved in the future?

A.5. Approximately, how many of your employees are involved in each activity? [Interviewer! Prompt all activities from A.3. with positive answer]

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Electricity Transmission System Operation</td>
<td>1. Yes</td>
<td>0. No</td>
<td>1. Yes</td>
</tr>
<tr>
<td>2. Electricity Distribution</td>
<td>1. Yes</td>
<td>0. No</td>
<td>1. Yes</td>
</tr>
<tr>
<td>3. Electricity Export/Import</td>
<td>1. Yes</td>
<td>0. No</td>
<td>1. Yes</td>
</tr>
<tr>
<td>4. Electricity Generation</td>
<td>1. Yes</td>
<td>0. No</td>
<td>1. Yes</td>
</tr>
<tr>
<td>5. Company is a direct (wholesale) customer</td>
<td>1. Yes</td>
<td>0. No</td>
<td>1. Yes</td>
</tr>
<tr>
<td>6. Electricity Supply/Trade</td>
<td>1. Yes</td>
<td>0. No</td>
<td>1. Yes</td>
</tr>
<tr>
<td>7. Market Operator</td>
<td>1. Yes</td>
<td>0. No</td>
<td>1. Yes</td>
</tr>
</tbody>
</table>

A.6. What is the most appropriate direction for your company’s business development strategy over the next three years?

1. Expansion
2. Status quo
3. Downsizing
4. Other ___________________

-98. Do not know
-99. Refused to answer
Section B: Past Experience about similar projects

B.1. Has a capacity building needs assessment been performed for your company during the past 3 years?
   1. Yes [Move to question B.3]
   2. No [Move to question B.2]
      - 98. Do not know [Move to the next section]
      - 99. Refused to answer [Move to the next section]

B.2. In your opinion what was the reason for not performing such assessments? [Multiple answers are possible]

   B.2.1 Financial
       1. Yes       0. No
   B.2.2 Lack of human capacity
       1. Yes       0. No
   B.2.3 Lack of relevant trainings
       1. Yes       0. No
   B.2.4 Low priority
       1. Yes       0. No
   B.2.5 Lack of Interest
       1. Yes       0. No
   B.2.6 Other 1
       ____________________________
   B.2.7 Other 2
       ____________________________
   - 99. Refused to answer
      [Move to the next section]

B.3. In what year was the most recent one completed? [ _______ ] Year

B.4. What was the full name of the program or project from B.3?

   ____________________________________________________________

   - 98. Do not know
   - 99. Refused to answer

B.5. Under what funding was it performed? [Only one answer is possible]

   1. Own funds
   2. Loan/Part of Loan
   3. Grant
   - 98. Do not know
   - 99. Refused to answer
B.6. Who were the executing agents (Name of company or expert(s))?
____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________
-98. Do not know
-99. Refused to answer

B.7. How do you think, are the results of survey/report still relevant to the existing situation?
   1. Yes
   0. No
-98. Do not know
-99. Refused to answer

B.8. Will you kindly provide a copy of the document to the AYPEG?
   1. Yes
   0. No

B.9. Please list capacity building projects implemented in your organization during the past 3 years, if any

<table>
<thead>
<tr>
<th>No</th>
<th>Project Name and Objectives</th>
<th>Form of Capacity Building Activity</th>
<th>Venue and Year</th>
<th># of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
B.10. Which capacity building activities will you classify as most successful for your company and why?

1. __________________________________________________________________________
   __________________________________________________________________________
   __________________________________________________________________________
   __________________________________________________________________________

2. __________________________________________________________________________
   __________________________________________________________________________
   __________________________________________________________________________
   __________________________________________________________________________
   __________________________________________________________________________

3. __________________________________________________________________________
   __________________________________________________________________________
   __________________________________________________________________________
   _________________________________________________
   _________________________________________________

Section C: Awareness on Ongoing Reforms in Georgian Electricity Sector

C.1. Are you aware about Georgia’s accession to the EU Energy Community and respective obligations of the country?

   1. Yes
   0. No [move to C.6]

C.2. How would you estimate your awareness of the EU Third Energy Package?

   1. I’ve not heard about it [Move to C.6]
   2. I’ve heard about it but have no clear idea [Move to C.6]
   3. I know the main principle of the package
   4. I have quite good understanding of the package
5. I have advance knowledge in EU Third Energy Package

C.3. In your opinion, what are the most challenging requirements from the Third Energy Package to be implemented in Georgia?

[Interviewer! do not prompt the possible answers, just record opinion of the interviewee(s)]

C.4.1. Unbundling 1. Yes 0. No
C.4.2. Third party access 1. Yes 0. No
C.4.3. Market opening 1. Yes 0. No
C.4.4. Other 1
C.4.5. Other 2
C.4.6. Other 3
-98. Do not know

C.4. How do you think, what are the most challenging issues in the process of implementing the Third Energy Package? Please rank from the most important (score 1) to the least important (score 5)

[Interviewer! First let interviewee to answer without prompting possible answers and fill options “other” if not listed. Add options from the list below if interviewee(s) does not mention them and ask to rank]

C.5.1. Human Capacity [ ____ ] score
C.5.2. Technical Capacity [ ____ ] score
C.5.3. Time for implementation [ ____ ] score
C.5.4. Awareness about upcoming regulations among market participants [ ____ ] score
C.5.5. No connection with EU market [ ____ ] score
C.5.6. Other 1 ________________________________ [ ____ ] score
C.5.7. Other 2 ________________________________ [ ____ ] score
C.5.8. Other 3 ________________________________ [ ____ ] score

C.5. How do you think, what is the most important change to affect your company as a result of the reform?

-98. Do not know

C.6. Did you, or representative(s) of your company, participate in policy discussions about the ongoing reform in electricity sector?

1. Yes, participated once [Move to C.8]
2. Yes, participate regularly [Move to C.8]
0. No
C.7. What are the reasons you did not participate in policy discussions about ongoing reform in electricity sector?

[Interviewer! First let interviewee to answer without prompting possible answers]

<table>
<thead>
<tr>
<th>Reason</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>C.8.1. Did not have information/was never invited</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>C.8.2. Not interested</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>C.8.3. I do not think that I can affect the reform</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>C.8.4. I do not think the reform will affect my business</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C.8.5. Other 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C.8.6. Other 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C.8.7. Other 3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

C.8. Do you know that in a scope of the reforms The Third Energy Package compliant Law on Energy and Water Supply was drafted?

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>Move to C.10</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td></td>
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</tbody>
</table>

C.9. Have you had a chance to read the document from [C.8]?

<table>
<thead>
<tr>
<th>Yes</th>
<th>Move to C.11</th>
<th>No</th>
</tr>
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<tbody>
<tr>
<td>1</td>
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<td>0</td>
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</table>

C.10. What are the reasons you are not familiarized with this document from [C.8]?

<table>
<thead>
<tr>
<th>Reason</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>C.11.1. I do not have access (do not know where to find)</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>C.11.2. I'm not interested</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>C.11.3. I did not have time but will read in the near future</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>C.11.4. The document was not provided in Georgian</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>C.11.5. Other 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C.11.6. Other 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C.11.7. Other 3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

C.11. Do you know that as part of the scope of reforms Electricity Market Concept Design was adopted by MoESD in December 2018?

<table>
<thead>
<tr>
<th>Yes</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

C.12. Have you had a chance to read the document from [C.11]?
1. Yes [Move to C.14]
0. No

C.13. What are the reasons you are not familiarized with this document from [C.11]?
C.14.1. I do not have access (do not know where to find) 1. Yes 0. No
C.14.2. I'm not interested 1. Yes 0. No
C.14.3. I did not have time but will read in the near future 1. Yes 0. No
C.14.4. The document was not provided in Georgian 1. Yes 0. No
C.14.5. Other 1
C.14.6. Other 2
C.14.7. Other 3

C.15. Did you participate in the training/capability building programs about the issues related to the Third Energy Package during the last 3 years?
1. Yes, once
2. Yes, more than once
0. No

C.16. Please indicate your views on the following statements:
[Using a scale of 1 to 5 where 1 means strongly disagree, 3 means neutral and 5 means strongly agree; If you do not have an opinion, please use “-98”]

<table>
<thead>
<tr>
<th>Statement</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prices in the bilateral contracts at wholesale level generally reflect the outcomes expected in the competitive market</td>
<td></td>
</tr>
<tr>
<td>Prices in the balancing market generally reflect the outcomes expected in the competitive market</td>
<td></td>
</tr>
<tr>
<td>Current Georgian electricity market structure is efficient to allow market participants maximize profits and/or cover investment costs</td>
<td></td>
</tr>
<tr>
<td>Under the existing Georgian electricity market structure information availability and transparency for framing your business strategy is at high level</td>
<td></td>
</tr>
<tr>
<td>Under the existing Georgian electricity market structure there is no/low entry barriers for new market participants at wholesale level</td>
<td></td>
</tr>
</tbody>
</table>
There is non-discriminatory treatment of market participants from TSO (dispatch, connection)

There is non-discriminatory treatment of market participants from DSO (dispatch, connection)

C.17. Please list what are the advantages and disadvantages of the existing Georgian electricity market taking into consideration your activities

C.17.1. Advantages

____________________________________________________________________________

____________________________________________________________________________

C.17.2. Disadvantages

____________________________________________________________________________

____________________________________________________________________________

____________________________________________________________________________

C.18. Please list what will be the advantages and disadvantages of future Georgian electricity market in compliant with Third Energy Package

C.18.1. Advantages

____________________________________________________________________________

____________________________________________________________________________

____________________________________________________________________________

____________________________________________________________________________

C.18.2. Disadvantages

____________________________________________________________________________

____________________________________________________________________________

____________________________________________________________________________

____________________________________________________________________________

Section D: Transmission System Operator

D.1. Is there a structural unit or a person(s) in the company responsible for demand forecasting and system operational planning?
1. Yes [Move to D.3]
0. No

D.2. Why there is no unit or person(s) [from D.1] in the company responsible for demand forecasting? [Multiple answers are possible]

D.2.1. Lack of data 1. Yes 0. No
D.2.2. Lack of forecasting models/tools 1. Yes 0. No
D.2.3. Lack of human capacity 1. Yes 0. No
D.2.4. Other 1
D.2.5. Other 2
D.2.6. Other 3

[Move to D.13]

D.3. What type of forecast/planning do you apply? [Multiple answers are possible]

D.3.1. yearly 1. Yes 0. No
D.3.2. monthly 1. Yes 0. No
D.3.3. daily 1. Yes 0. No
D.3.4. hourly 1. Yes 0. No
D.2.5. Other 1
D.2.6. Other 2

D.5. Does TSO have own model in demand forecast?
1. Yes [please, tell us a name ____________________________] [Move to D.7]
0. No

D.6. Why Does not TSO have own model in demand forecast? [Multiple answers are possible]

D.6.1. Lack of human capacity 1. Yes 0. No
D.6.2. Lack of finances 1. Yes 0. No
D.3.3. Lack of necessity 1. Yes 0. No
D.6.4. TSO uses outsourcing 1. Yes 0. No
D.6.5. Other 1
D.7. How many employees work on demand forecasting/operational planning? [______]
   -1. Do not know

D.8. Do your employees working on demand forecasting/operational planning get regular trainings?
   1. Yes
   0. No

D.9. Are the market participants and other system operators aware of the forecast model TSO uses?
   1. Yes
   0. No
   -98. Do not know

D.10. Does TSO use weather data as an input in forecasting/planning?
   1. Yes
   0. No [Move to D.13]

D.12. What is the source of weather data you use?
   1. Respective state agencies
   2. Other external resources
   3. Own measurements
   4. Hybrid

D.13. Has TSO established short-term generation readiness declaration system?
   1. Yes [please, tell us a name__________________________]
   0. No [Move to D.15]

D.14. Short term demand forecast and generation readiness declaration system:
   1. is based on online software
   2. nominations done via mails
   3. nominations used for short term demand forecast/system operational planning
   4. Other 1 ______________
   5. Other 2 ______________

[Move to D.16]

D.15. Why TSO has not established short-term demand forecast and generation readiness declaration system? [Multiple answers are possible]
D.15.1. Lack of IT/Software   1. Yes  0. No
D.15.2. Lack of such functions in TSO   1. Yes  0. No
D.15.3. Lack of human resources   1. Yes  0. No
D.15.4. Not necessary   1. Yes  0. No
D.15.5. Other 1
D.15.6. Other 2

D.16. Does TSO analyze system losses on at least hourly timeframe?
   1. Yes [Move to D.18]
   0. No

D.17. Why does not TSO analyze system losses on at least hourly time frame? [Multiple answers are possible]
   D.17.1. Lack of data   1. Yes  0. No
   D.17.2. Lack of computing software   1. Yes  0. No
   D.17.3. Lack of appropriate grid model   1. Yes  0. No
   D.17.4. Lack of human capacity (lack of knowledge)   1. Yes  0. No
   D.17.5. Other 1
   D.17.6. Other 2
   -98. Do not know

D.18. Does TSO use regionally harmonized methodology on calculation of cross-border transfer capacities?
   1. Yes
   0. No [Move to Question D.21]

D.19. Does TSO communicate network model from [D.20] with neighboring TSOs?
   1. Yes
   0. No

D.20. What is the timeframe of network model from [D.20] exchange (update) with neighboring TSO(s)?
1. Daily
2. Weekly
3. Monthly
4. Annual

D.21 What are the reasons TSO not using regionally harmonized methodology on calculation of cross-border transfer capacities (NTC)? [Multiple answers are possible]

D.21.1. There is no such cross border legal agreement with neighboring TSO(s) 1. Yes 0. No

D.21.2. Cross border legal agreement envisages such provision but it is not applied in real practice 1. Yes 0. No

D.21.3. Neighboring TSO(s) and/or Georgian TSO are/is not ready for such cooperation 1. Yes 0. No

D.21.4. Other 1

D.21.5. Other 2

D.22. Does TSO exchange (share) balancing products with neighboring TSO(s) of:

D.22.1. Turkey 1. Yes 0. No

D.22.2. Russia 1. Yes 0. No

D.22.3. Armenia 1. Yes 0. No

D.22.4. Azerbaijan 1. Yes 0. No

[Interviewer! If all answers in Question D.24 are “No” move to Question D.24]

D.23. What are the products exchanged (shared) with neighboring TSO(s)? [Multiple answers are possible]

D.23.1. Common dimensioning of reserves 1. Yes 0. No

D.23.2. Balancing capacity 1. Yes 0. No

D.23.3. Balancing energy 1. Yes 0. No

D.23.4. Imbalance netting 1. Yes 0. No

D.23.5. Support with energy in case of emergency 1. Yes 0. No

D.23.6. Other 1

D.23.6. Other 2
D.24. Why does not TSO exchange (share) balancing products with neighboring TSO(s)? [Multiple answers are possible]

D.24.1. Lack of market (regional cooperation) that may also mean lack of balancing product development
1. Yes 0. No

D.24.2. Lack of cross border framework
1. Yes 0. No

D.24.3. Lack of harmonized rules
1. Yes 0. No

D.24.4. Lack of technical means
1. Yes 0. No

D.24.5. Lack of cross-border transfer capacity
1. Yes 0. No

D.24.6. Lack of cooperation at management level
1. Yes 0. No

D.24.7. Other 1
__________________________

D.24.8. Other 2
__________________________

D.25. Does TSO use online tool for congestion management?
1. Yes
0. No [Move to D.27]

D.26. Is online tool for congestion management adapted to hourly market operation/hourly regional trade?
1. Yes
0. No [Move to D.27]

D.27. Development of online tool for congestion management:

D.27.1. Requires major updates or procurement of new software after introducing hourly market (either on national or regional trade)
1. Yes
0. No
-98. Do not know

D.27.2. Requires significant efforts in human capacity improvement
1. Yes
0. No
-98. Do not know

D.28. Do TSO employees working on system planning calculate system needs for reserve capacities (FCR, aFRR, mFRR, RR) of different timeframes?
1. Yes [Move to D.30]
2. No
D.29. Could you name the reasons for not calculating system needs for reserve capacities? [Multiple answers are possible]

D.29.1 Lack of methodology in TSO 1. Yes 0. No
D.29.2 Lack of analytical tools 1. Yes 0. No
D.29.3 Lack of system data 1. Yes 0. No
D.29.4 Lack of human capacity/preparedness 1. Yes 0. No
D.29.5 Lack of legislation 1. Yes 0. No
D.29.6 Other 1
D.29.7 Other 2
-1. Do not know

D.30. Do TSO employees (technical, dispatchers, market and IT specialists) have basic training/knowledge in balancing & ancillary services market operations?

1. Yes
0. No [Move to D.32]

D.31. Approximately how many employees receive trainings on balancing & ancillary services market operations? [_____] -1. Do not know

D.32. How many trainings on balancing & ancillary services market operations are provided per person per annum? [_____] -1. Do not know
[Move to D.34]

D.33. What are reasons for not providing trainings on balancing & ancillary services market operations? [Multiple answers are possible]

D.33.1 Financial 1. Yes 0. No
D.33.2 Lack of human capacity 1. Yes 0. No
D.33.3 Lack of relevant trainings 1. Yes 0. No
D.33.4 Low priority 1. Yes 0. No
D.33.5 Lack of Interest 1. Yes 0. No
D.33.6 Other 1
D.33.7 Other 2

D.34. If balancing market/ancillary service market starts this year, would you be ready to use/operate the balancing/ancillary platforms?

[Interviewer! Ask interviewee to rank readiness on the scale below]
D.35. If Day Ahead market starts this year, would you be ready to use/operate the balancing/ancillary platforms?

[Interviewer! Ask interviewee to rank readiness on the scale below]

<table>
<thead>
<tr>
<th>Not ready</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Fully ready</th>
</tr>
</thead>
</table>

-98. Do not know

D.36. Does TSO have draft and/or pre-agreed methodology on hourly imbalance calculations with stakeholders?

1. Yes

0. No [Move to D.38]

D.37. Thinking of methodology on hourly imbalance calculation: [Multiple answers are possible]

D.39.1 Do IT and metering systems are adapted already or ready to be adapted to that methodology? 1. Yes 0. No

D.39.2. Does TSO have prepared staff for applying such methodology? 1. Yes 0. No

D.39.3. Is such methodology communicated with market participants (BRPs) 1. Yes 0. No

[Move to D.39]

D.38. Why does TSO not have draft/pre-agreed methodology on hourly imbalance calculations with stakeholders? [Multiple answers are possible]

D.38.1 Lack of support 1. Yes 0. No

D.38.2. Lack of awareness/human resources 1. Yes 0. No

D.38.3. Lack of interest 1. Yes 0. No

D.38.4. Lack of cooperation 1. Yes 0. No

D.38.5. Lack of legislative development 1. Yes 0. No

D.38.6. Other 1

____________________________
D.39. Does TSO have draft and/or pre-agreed methodology on Balancing Responsibility (that contains - Pre-qualifications requirements and procedures to become BRP) a with stakeholders?
   1. Yes [Move to D.40]
   0. No

D.40. Why does TSO have not draft/pre-agreed methodology on Balancing Responsibility calculations with stakeholders? [Multiple answers are possible]
   D.40.1 Lack of support
   1. Yes 0. No
   D.40.2. Lack of awareness/human resources
   1. Yes 0. No
   D.40.3. Lack of interest
   1. Yes 0. No
   D.40.4. Lack of cooperation
   1. Yes 0. No
   D.40.5. Lack of legislative development
   1. Yes 0. No
   D.40.6. Other 1 ___________________________
   D.40.7. Other 2 ___________________________

D.41. Does central automated metering system (high level ESKAA system) cover (receives measurements) all potential wholesale metering points (on at least hourly metering timeframe)?
   1. Yes [Move to D.43]
   0. No

D.42. What are reasons for high level ESKAA system not covering all potential wholesale metering points? [Multiple answers are possible]
   D.44.1 Lack of software (its outdated)
   1. Yes 0. No
   D.44.2. Lack of physical metering systems
   1. Yes 0. No
   D.44.3. lack of human capacity
   1. Yes 0. No
   D.44.4. Other 1 ___________________________
   D.44.5. Other 2 ___________________________

43. Are you aware about electricity data transparency obligation stemming from 543/2013 Regulation

---

28 The Regulation on “Submission and publication of data in electricity markets” lays down the minimum common set of data relating to generation, transportation and consumption of electricity to be made available to market participants.
1. Yes 0. No [Move to D.46]

D.44. Is TSO ready to start publishing market transparency data as per regulation 543/2013/EU?
   1. Yes [Move to D.46]
   0. No

D.45. Why TSO is not ready to start publishing market transparency data as per regulation 543/2010/EU? [Multiple answers are possible]
   D.45.1 Lack of methodology
   1. Yes 0. No
   D.45.2 Lack of IT and information collection from market participants
   1. Yes 0. No
   D.45.3 Lack of human resources/employee preparedness to collect and analyze the data in defined format
   1. Yes 0. No
   D.45.4 Other 1 ___________________________
   D.45.5 Other 2 ___________________________

D.46. Is balancing market software selected?
   1. Yes [Move to D.48]
   0. No

D.47. What are reasons balancing market software not being selected? [Multiple answers are possible]
   D.47.1 Lack of support
   1. Yes 0. No
   D.47.2 Lack of awareness/human resources
   1. Yes 0. No
   D.47.3 Lack of interest
   1. Yes 0. No
   D.47.4 Lack of cooperation
   1. Yes 0. No
   D.47.5 Lack of legislative development
   1. Yes 0. No
   D.47.6 Other 1 ___________________________
   D.47.7 Other 2 ___________________________

D.48. Thinking of a selected balancing market software: [Multiple answers are possible]
   D.48.1 Is SCADA and metering ready for introducing balancing/ancillary service market?
   1. Yes 0. No
   D.48.1 Are TSO staff trained in balancing platform operation?
   1. Yes 0. No
<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>D.48.1. Are balancing service providers trained in balancing platform operation?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D.49. Does TSO use automatic generation control (AGC)?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes, for all generators that are deemed appropriate [Move to D.52]</td>
<td></td>
<td></td>
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<tr>
<td>Partially</td>
<td></td>
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<tr>
<td>D.50. What are the reasons for not using automatic generation control (AGC) for all generators that are deemed appropriate? [Multiple answers are possible]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lack of finances</td>
<td></td>
<td></td>
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<tr>
<td>Lack of AGC development</td>
<td></td>
<td></td>
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<tr>
<td>Lack of generators’ readiness</td>
<td></td>
<td></td>
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<tr>
<td>Lack of TSO readiness (including technical and human capacity)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other 1</td>
<td></td>
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<tr>
<td>Other 2</td>
<td></td>
<td></td>
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<tr>
<td>D.51. Are demand facilities (including DSOs) providing/ready to provide balancing service in terms of demand response?</td>
<td></td>
<td></td>
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<tr>
<td>Yes</td>
<td></td>
<td></td>
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<tr>
<td>Only in emergency (against their will)</td>
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<tr>
<td>D.52. Has TSO conducted consultation with major demand facilities on their willingness/readiness and or potential limitations in providing demand response?</td>
<td></td>
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<tr>
<td>Yes</td>
<td></td>
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<tr>
<td>D.53. What are the potential reason for unreadiness of demand response in providing balancing services? [Multiple answers are possible]</td>
<td></td>
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<tr>
<td>Technical limitations of demand facilities in fast load change</td>
<td></td>
<td></td>
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<tr>
<td>Lack of SCADA</td>
<td></td>
<td></td>
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<tr>
<td>Lack of awareness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lack of commercial interest</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
D.55.5. Lack of legislative development 1. Yes 0. No
D.55.6. Other 1 __________________________
D.55.7. Other 2 __________________________

D.54. Does TSO receives hourly forecast data from DSOs?
   D.56.1 Yes [move to the next section]
   D.56.2 No

D.55. Why does TSO not receives hourly forecasts data from DSO? [Multiple answers are possible]
   D.55.1. Lack of communication 1. Yes 0. No
   D.55.2. Lack of human resources 1. Yes 0. No
   D.55.3. Lack of legislation 1. Yes 0. No
   D.55.4. Lack of interest from TSO 1. Yes 0. No
   D.55.5. Poor quality of forecast 1. Yes 0. No
   D.55.6. Other 1 __________________________
   D.55.7. Other 2 __________________________

Section E: Distribution System Operator

E.1. Is there a structural unit or a person(s) in the company responsible for demand forecasting and system operational planning?
   1. Yes [Move to E.3]
   0. No

E.2. Why there is no unit or person(s) [from E.1.] in the company responsible for demand forecasting? [Multiple answers are possible]
   E.2.1. Lack of data 1. Yes 0. No
   E.2.2. Lack of forecasting model tools 1. Yes 0. No
   E.2.3. Lack of human capacity 1. Yes 0. No
   E.2.4. Other 1 __________________________
   E.2.5. Other 2 __________________________
   E.2.6. Other 3 __________________________
   -98. Do not know

[Move to E.13]
E.3. What type of forecast/planning do you apply? [Multiple answers are possible]

E.3.1. yearly
1. Yes 0. No
E.3.2. monthly
1. Yes 0. No
E.3.3. daily
1. Yes 0. No
E.3.4. hourly

E.2.5. Other 1

E.2.6. Other 2

98. Do not know

E.4. How many employees work for demand forecasting/operational planning? [ ______ ]
1. Do not know

E.5. Do your employees working on system planning get regular trainings in demand forecast software?
1. Yes
0. No

E.6. Does DSO have own model in demand forecast?
1. Yes [please, tell us a name __________________________ ] [Move to Question E.8]
0. No

E.7. Why does DSO not have own model in demand forecast? [Multiple answers are possible]

E.7.1. Lack of human capacity
1. Yes 0. No

E.7.2. Lack of finances
1. Yes 0. No

D.3.3. Lack of necessity
1. Yes 0. No

E.7.4. TSO uses outsourcing
1. Yes 0. No

E.7.5. Other 1

E.7.6. Other 2

98. Do not know

E.8. Do you regularly submit hourly forecast data to TSO?
1. Yes [Move to E.10]
0. No
E.9. Why does DSO not submit hourly forecasts data to TSO? [Multiple answers are possible]

- E.9.1 Lack of communication
  - 1. Yes 0. No
- E.9.2 Lack of human resources
  - 1. Yes 0. No
- E.9.3 Lack of legislation
  - 1. Yes 0. No
- E.9.4 Lack of interest from TSO
  - 1. Yes 0. No
- E.9.5 Poor quality of forecast
  - 1. Yes 0. No
- E.9.6 Other 1
- E.9.7 Other 2

E.10. Are you aware of the forecast model TSO uses?

- 1. Yes
- 0. No
- -98. Do not know

E.11. Does DSO analyze system losses on at least hourly time frame?

- 1. Yes [Move to E.13]
- 0. No

E.12. Why does DSO not analyze system losses on at least hourly time frame? [Multiple answers are possible]

- E.12.1 Lack of data
  - 1. Yes 0. No
- E.12.2 Lack of computing software
  - 1. Yes 0. No
- E.12.3 Lack of appropriate grid model
  - 1. Yes 0. No
- E.12.4 Lack of human capacity (lack of knowledge)
  - 1. Yes 0. No
- E.12.5 Other 1
- E.12.6 Other 2
- -98. Do not know

E.13. Does DSO receive consumption data (load profiles) from large and medium final customers connected to distribution network?

- 1. Yes
- 0. No [Move to Question E.15.]
### E.14. What kind of consumption data does DSO receive? [Multiple answers are possible]

<table>
<thead>
<tr>
<th>E.14.1. Real time metering data</th>
<th>1. Yes</th>
<th>0. No</th>
</tr>
</thead>
<tbody>
<tr>
<td>E.14.2. Consumer forecasts</td>
<td>1. Yes</td>
<td>0. No</td>
</tr>
<tr>
<td>E.14.3. SCADA measurements</td>
<td>1. Yes</td>
<td>0. No</td>
</tr>
<tr>
<td>E.14.4. Other 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E.14.5. Other 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-98. Do not know</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### E.15. Does DSO receive hourly data from Micro generators (consumers included in net-metering)?

1. Yes
0. No [Move to Question E.17]

### E.16. What kind of Micro generators data DSO receives?

<table>
<thead>
<tr>
<th>E.16.1. Real time metering data</th>
<th>1. Yes</th>
<th>0. No</th>
</tr>
</thead>
<tbody>
<tr>
<td>E.16.2. Monthly metering data</td>
<td>1. Yes</td>
<td>0. No</td>
</tr>
<tr>
<td>E.16.3. Other 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E.16.4. Other 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-98. Do not know</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

[Move to E.18]

### E.17. What are the reasons DSO not receiving data from microgenerators (consumers included in net-metering)? [Multiple answers are possible]

<table>
<thead>
<tr>
<th>E.17.1. Lack of communication software</th>
<th>1. Yes</th>
<th>0. No</th>
</tr>
</thead>
<tbody>
<tr>
<td>E.17.2. Lack of bi-directional electronic meters</td>
<td>1. Yes</td>
<td>0. No</td>
</tr>
<tr>
<td>E.17.3. Lack of legislation</td>
<td>1. Yes</td>
<td>0. No</td>
</tr>
<tr>
<td>E.17.4. Other 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E.17.5. Other 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-98. Do not know</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
E.18. Do DSO employees (technical, dispatchers, market and IT specialists) has basic trainings/knowledge in market operations?

1. Yes
0. No [Move to E.21]
-98. Do not know [Move to E.21]

E.19. Approximately how many employees receive trainings on market operations?

[ _____ ] -1. Do not know

E.20. How many trainings on market operations are provided per person per annum?

[ _____ ] -1. Do not know

[Move to E.22.]

E.21. What are the reasons not providing trainings on market operations for your employees? [Multiple answers are possible]

E.21.1 Financial 1. Yes 0. No
E.21.2 Lack of human capacity 1. Yes 0. No
E.21.3 Lack of relevant trainings 1. Yes 0. No
E.21.4 Low priority 1. Yes 0. No
E.21.5 Lack of Interest 1. Yes 0. No
E.21.6 Other 1 _________________________________
E.21.7 Other 2 _________________________________

E.22. Does DSO have hourly automatic metering systems (AMR) for consumers (A low level ESKAA system) at:

E.22.1 110/35 Kv 1. Yes 0. No
E.22.2. above 1 kv up to 35 Kv 1. Yes 0. No
E.22.3. Bellow 1 Kw 1. Yes 0. No

[If all answers are “Yes” move to E.26]

E.23. Please name the reasons for underdeveloped AMR [Multiple answers are possible]

E.23.1 Lack of finances 1. Yes 0. No
E.23.2. Lack of legislation 1. Yes 0. No
E.23.3. Lack of enough human resources  1. Yes  0. No

E.23.4. Lack of necessity  1. Yes  0. No

E.23.5. Other 1

E.23.6. Other 2

E.24. How many old meters above 1 KV voltage level (not compatible with Georgian grid code requirements) do you have?  [ __________ ]

[Interviewer! Ask exact number. If cannot said ask to choose from ranges below]

1. 0 – 100
2. 100 – 500
3. 500 – 1000
4. 1000 – 2000
5. 2000 – 4000
6. More than 4000

E.25. Please estimate time that will be needed to arrange hourly AMR for all consumers connected to at more than 1 kv voltage level:

1. up to 1 year
2. from 1 to 3 years
3. from 3 to 5 years
4. more than 5 years

E.26. Is DSO ready to provide demand response service to TSO on balancing & ancillary service market?

1. Yes [Move to E.28]
2. Only in emergency (against their will) [Move to E.28]
0. No

E.27. Why is DSO not ready to provide demand response service to TSO on balancing & ancillary service market? [Multiple answers are possible]

E.27.1 lack of technical possibilities  1. Yes  0. No

E.27.2 Lack of SCADA  1. Yes  0. No

E.27.3. Lack of interest (including commercial)  1. Yes  0. No

E.27.5. Other 1

E.27.6. Other 2

E.28. Are demand facilities (large customers) providing/ready to provide balancing service in terms of demand response?

1. Yes [Move to E.30]
2. Only in emergency (against their will) [Move to E.30]
0. No
E.29. what are the potential reasons for unreadiness of demand response in providing balancing services? [Multiple answers are possible]

<table>
<thead>
<tr>
<th>Reason</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>E.29.1 Technical limitations of demand facilities in fast load change</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>E.29.2 Lack of SCADA</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>E.29.3 Lack of awareness</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>E.29.4 Lack of commercial interest</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>E.29.5 Lack of legislative development</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>E.29.6 Other 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E.29.7 Other 2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

E.30. Do you send hourly forecast data to TSO?

1. Yes
2. No

E.31. Why do you not submit forecasts to TSO? [Multiple answers are possible]

<table>
<thead>
<tr>
<th>Reason</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>E.31.1 Lack of communication</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>E.31.2 Lack of human resources</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>E.31.3 Lack of legislation</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>E.31.4 Lack of interest from TSO</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>E.31.5 Poor quality of forecast</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>E.31.6 Other 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E.31.7 Other 2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Section F: Generators

F.1. Is there a structural unit or person(s) responsible for generation forecasting/planning?

1. Yes [Move to F.3]
2. No

F.2. Why there is no unit or person(s) [from F.1] responsible for generation forecasting/planning? [Multiple answers are possible]

<table>
<thead>
<tr>
<th>Reason</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>F.2.1 Lack of data</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>F.2.2 Lack of forecasting model tools</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>F.2.3 Lack of human capacity</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>
F.2.4. No need to conduct generation forecast/planning 1. Yes 0. No

F.2.6. Other 2

F.3. Do you use generation forecast/planning in the process of your company’s operations?

1. Yes [Move to Question F.5] 0. No

F.4. Why do not you use generation forecast/planning in the process of your company’s operations? [Multiple answers are possible]

F.4.1. Lack of data 1. Yes 0. No

F.4.4. Lack of forecasting model tools 1. Yes 0. No

F.4.3. Lack of human capacity 1. Yes 0. No

F.4.4. No need to conduct generation forecast/planning 1. Yes 0. No

F.4.5. Other 1

F.4.6. Other 2

F.5. Does your company have own generation forecasting model?

1. Yes [please, tell us a name __________________________] 2. We use outsource service [Move to F.15] 0. No [Move to F.15]

F.6. What type of forecast/planning do you apply?

F.6.1. yearly 1. Yes 0. No

F.6.2. monthly 1. Yes 0. No

F.6.6. daily 1. Yes 0. No

F.6.4. hourly 1. Yes 0. No

F.6.5. Other 1

F.6.6. Other 2
F.7. For which purposes do you use forecast/planning? [Multiple answers are possible]

F.7.1. Submit to TSO  
1. Yes 0. No

F.7.2. Use for trading purposes  
1. Yes 0. No

F.7.3. Other 1

F.7.7. Other 2

F.7.5. Other 3

F.8. Do you regularly submit generation forecasts/plans to TSO?

1. Yes [Move to F.10]

0. No

F.9. Why does your company not submit forecasts to TSO? [Multiple answers are possible]

F.9.1  Lack of communication  
1. Yes 0. No

F.9.2. Lack of human resources  
1. Yes 0. No

F.9.3. Lack of legislation  
1. Yes 0. No

F.9.4. Lack of interest from TSO  
1. Yes 0. No

F.9.5. Poor quality of forecast  
1. Yes 0. No

F.9.9. Other 1

F.9.7. Other 2

F.10. How frequently are forecasts submitted to TSO?

F.10.1. yearly  
1. Yes 0. No

F.10.2. Once in a several month  
1. Yes 0. No

F.10.3. monthly  
1. Yes 0. No

F.10.4. daily  
1. Yes 0. No

F.10.5. hourly  
1. Yes 0. No

F.10.6. Other 1

F.10.10. Other 2

F.11. Does your company use primary energy data as an input for generation forecasting/planning?
1. Yes
0. No [Move to F.15]
-98 Do not Know

F.12. What is the timeframe of this data?
F.12.1. yearly 1. Yes 0. No
F.12.2. monthly 1. Yes 0. No
F.12.3. daily 1. Yes 0. No
F.12.4. hourly 1. Yes 0. No
-1. Do not know

F.13. How long is the series of primary energy data you use? [Multiple answers are possible]
F.13.1. Historical, before year of 2000 1. Yes 0. No
F.13.2. Historical, between 2000-2018 years 1. Yes 0. No
F.13.3. Other 1
F.13.4. Other 2
-1. Do not know

F.14. How do you evaluate availability of primary energy data
[Interviewer! Ask interviewee to rank data availability on the scale below]

<table>
<thead>
<tr>
<th>Easy</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>Difficult</th>
<th>5</th>
</tr>
</thead>
</table>

F.15. Why does your company not have own generation forecasting/planning model? [Multiple answers are possible]
F.15.1. Lack of human capacity 1. Yes 0. No
F.15.2. Lack of finances 1. Yes 0. No
F.15.3. Lack of necessity 1. Yes 0. No
F.15.4. We use outsources 1. Yes 0. No
-1. Do not know

F.16. Are you aware of the forecast model TSO uses?
1. Yes
0. No
-98. Do not know

F.17. How many employees work for generation forecasting/planning?
[ ______ ] -1. Do not know

F.18. Do your employees working on generation forecasting/planning get regular trainings in working with the software?
1. Yes
0. No

F.19. What type of trading options do you use to sell your electricity in the local market? [Multiple answers are possible]

F.19.1 Bilateral contracts with direct (wholesale) customer 1. Yes 0. No
F.19.2 Bilateral contracts with DSO as a supplier 1. Yes 0. No
F.19.3 Bilateral contracts with retail customer 1. Yes 0. No
F.19.4 Balancing market with ESCO 1. Yes 0. No
F.19.5 Guaranteed capacity market 1. Yes 0. No
F.19.6 Export 1. Yes 0. No

F.20. In general what are the challenges to sell your electricity with bilateral contracts on wholesale level? [Multiple answers are possible]

F.20.1 Lack of demand 1. Yes 0. No
F.20.2 Low prices (as a product) on the market 1. Yes 0. No
F.20.3 Lack of forecasting/planning 1. Yes 0. No
F.20.4 Lack of creditworthiness of buyer 1. Yes 0. No
F.20.5 Small number of buyers 1. Yes 0. No
F.20.6 Other 1
F.20.7 Other 2

F.21. If there will be restriction to sell electricity to ESCO as a electricity will your company be able to find alternative buyer?
1. Yes
2. I'm not sure
0. No

F.22. Does your power plant(s) participate in automatic generation control (AGC)?

1. Yes [go to F.24]
0. No

F.23. Why does your power plant not participate in AGC? [Multiple answers are possible]

<table>
<thead>
<tr>
<th>Reason</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>F.23.1 Too small</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F.23.2 Technical constraint</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F.23.3 Lack of SCADA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F.23.4 Lack of request from TSO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F.23.5 Lack of commercial interest</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-1 Do not know</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

F.24. If balancing market were starting this year, would your power plant be ready to sell balancing product (balancing energy and reserve capacities) on balancing market/ancillary service market?

1. Yes [Move to F.26]
0. No

F.25. Why would your power plant not be ready to participate at balancing/ancillary service market? [Multiple answers are possible]

<table>
<thead>
<tr>
<th>Reason</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>F.25.1 Too small</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F.25.2 Technical constraint</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F.25.3 Lack of SCADA and IT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F.25.4 Lack of commercial interest</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F.25.5 Other 1 ________________</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F.25.6 Other 1 ________________</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-98 Do not know</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

F.26. Do you use any software for electricity trading? [Multiple answers are possible]

<table>
<thead>
<tr>
<th>Software</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>F.26.1 Simple software (excel file, simple bank transactions sheet)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F.26.2 Complex software</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
F.26.3. There is not a dedicated software [Move to Question F.27] 1. Yes 0. No
F.26.4. Other 1
F.26.5. Other 2

F.27. Do you use automatic generation control (AGC)?
1. Yes, [Move to F.29]
2. Partially
0. No

F.28. What are the reason for not using automatic generation control (AGC)? [Multiple answers are possible]
F.28.1. Lack of finances 1. Yes 0. No
F.28.2. Lack of AGC development 1. Yes 0. No
F.28.3. Lack of generators’ readiness 1. Yes 0. No
F.28.4. Lack of TSO readiness (including technical and human capacity) 1. Yes 0. No
F.28.5. Other 1
F.28.6. Other 2

F.29. Does central automated metering system (high level ESKAA system) cover (receives measurements) all your metering points (on at least hourly metering timeframe)?
1. Yes [Move to F.31]
0. No

F.30. What are the reason for high level ESKAA system not covering all you metering points? [Multiple answers are possible]
F.30.1. Lack of software (its outdated) 1. Yes 0. No
F.30.2. Lack of physical metering systems 1. Yes 0. No
F.30.3. lack of human capacity 1. Yes 0. No
F.30.4. Other 1
F.30.5. Other 2

F.31. Have you established short-term generation readiness declaration system?
1. Yes [please, tell us a name ____________________________] [Move to F.33]
0. No

F.32. Why did not you establish short-term demand forecast and generation readiness declaration system? [Multiple answers are possible]

F.31.1. Lack of IT/Software
1. Yes 0. No

F.31.2. Lack of such functions in TSO
1. Yes 0. No

F.31.3. Lack of human resources
1. Yes 0. No

F.31.4. Not necessary

F.31.5. Other 1

F.31.6. Other 2

F.33 If Day Ahead market starts this year, how would you estimate readiness of the human capacity of your company to operate on the market? (Note: without external support)

[Interviewer! Ask interviewee to rank readiness on the scale below]

<table>
<thead>
<tr>
<th>No ready</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Fully ready</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

-98. Do not know

F.34. If Day Ahead market starts this year, how would you estimate readiness of the technical capacity (software, IT and communication systems, clearing and settlement) of your company to operate on the market? (Note: without external support)

[Interviewer! Ask interviewee to rank readiness on the scale below]

<table>
<thead>
<tr>
<th>No ready</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Fully ready</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

-98. Do not know

F.35. If Intra Day market starts this year, how would you estimate readiness of the human capacity of your company to operate on the market? (Note: without external support)

[Interviewer! Ask interviewee to rank on the scale below]

<table>
<thead>
<tr>
<th>No ready</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Fully ready</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

-98. Do not know
F.36. If Intra Day market starts this year, how would you estimate readiness of the technical capacity (software, IT and communication systems, clearing and settlement) of your company to operate on the market? (Note: without external support)

[Interviewer! Ask interviewee to rank on the scale below]

<table>
<thead>
<tr>
<th>No ready</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Fully ready</th>
</tr>
</thead>
</table>

-98. Do not know

F.37. Please indicate areas that your company needs external support to implement Day Ahead and Intraday Markets:

[Interviewer! Ask interviewee to rank on the scale below]

<table>
<thead>
<tr>
<th>No Need</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Extremely needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>F.37.1 DAM and Intraday Market Rules (Rules for bidding, clearing, settlement)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>F.37.2. Software for Clearing and Settlement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F.37.3. IT and Communication systems with market participants</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F.37.4. IT and Communication systems with TSO</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

F.38. In case DAM and Intraday Market implementation what type of changes do you anticipate with regarding data sharing and acquisition with TSO (for example, cross-border transmission capacity for import-export capacity)?

1. Communication systems are already in place
2. Minor changes will be needed
3. Major changes will be needed
-1. Do not know

F.39. It is well known that market opening (deregulation) bring additional risks. How do you think, what are the risks coming from the market opening?

[Interviewer! First let interviewee to answer without prompting possible answers and fill options “other” if not listed. Add options from the list below if interviewee(s) does not mention them and ask to rank. After ranking ask to elaborate further]
1. No new risks are foreseen 1. Yes 0. No
2. Market risks (prices, quantity risk) 1. Yes 0. No
3. Counterparty risk 1. Yes 0. No
4. credit risk 1. Yes 0. No
5. Other 1 _______________________________
6. Other 2 _______________________________
7. Other 3 _______________________________

Please elaborate further (if any)
____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________

F.40. Do you or colleagues in your organization, have understanding of risk management strategies?
1. Yes
0. No

F.41. Has your organization practiced any risk management measures during you operations on the market?
1. Yes
0. No

F.42. What risk management measures has your company used?
K.4.1. ______________________________________________
K.4.2. ______________________________________________
K.4.3. ______________________________________________

Section G: Exporter/Importer

G.1. Which of the activities did you perform during the last three years?
1. Electricity Import
2. Electricity Export
3. Both

G.2. Do you have commercial unit or responsible person(s) in your organization responsible for electricity import or export activities?
1. Yes
0. No [Move to G.4]
G.3. How many people are involved in the commercial activities of your organization?

1. Up to 3
2. 3 - 6
3. More than 6

G.4. Do you use any trading software or does your organization use any computer program for forecasting/determining import/export volumes?

1. Yes [Move to G.6.]
0. No

G.5. Why do you not use export/import planning software in the process of your company’s operations? [Multiple answers are possible]

<table>
<thead>
<tr>
<th>Reason</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of data</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Expensive relative to its benefit to company</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Lack of human capacity</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>No need to conduct export/import planning</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Other 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other 2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

[Move to G.11]

G.6. What is the time frame of forecasting/planning? (For Interviewer: circle as many answers as applicable!) [Multiple answers are possible]

<table>
<thead>
<tr>
<th>Time Frame</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operational (hour, daily)</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Monthly</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Quarterly</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Yearly</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Longer Term</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

G.7. For which purposes do you use export-import forecast/planning? [Multiple answers are possible]

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Submit to TSO</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Use for trading purposes</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Other 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other 3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
G.8. Do you regularly submit export-import forecast/planning to TSO?
1. Yes [Move to G.10]
0. No

G.9. Why does your company not submit forecasts to TSO? [Multiple answers are possible]
- G.9.1. Lack of communication 1. Yes 0. No
- G.9.2. Lack of human resources 1. Yes 0. No
- G.9.3. Lack of legislation 1. Yes 0. No
- G.9.4. Lack of interest from TSO 1. Yes 0. No
- G.9.5. Poor quality of forecast 1. Yes 0. No
- G.9.6. Other 1 ____________________________ 1. Yes 0. No
- G.9.7. Other 2 ____________________________

G.10. What type of forecasts are submitted to TSO? [Multiple answers are possible]
- G.10.1. Operational (hour, daily) 1. Yes 0. No
- G.10.2. Monthly 1. Yes 0. No
- G.10.3. Quarterly 1. Yes 0. No
- G.10.4. Yearly 1. Yes 0. No
- G.10.5. Longer Term 1. Yes 0. No

G.11. How do you evaluate access to interconnection for export/import purposes?
[Interviewer! Ask interviewee to rank on the scale below]

<table>
<thead>
<tr>
<th>IPs with neighbouring countries</th>
<th>Applicability 29</th>
<th>Easy</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>Difficult</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interconnection with Turkey</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Interconnection with Azerbaijan</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Interconnection with Russia</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Interconnection with Armenia</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

-1. Do not know

G.12. Why access to interconnection do you rank at that level from [G.11]? [Multiple answers are possible]

<table>
<thead>
<tr>
<th>Turkey</th>
<th>Azerbaijan</th>
<th>Russia</th>
<th>Armenia</th>
</tr>
</thead>
<tbody>
<tr>
<td>G.12.1. Legislation is not clear (detailed rules and procedures are not set)</td>
<td>1. Yes 0. No</td>
<td>1. Yes 0. No</td>
<td>1. Yes 0. No</td>
</tr>
<tr>
<td>G.12.2. Difficulties with</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

29 Put N/A if interconnection was not used during past three years.
communications to TSO 1. Yes 0. No 1. Yes 0. No 1. Yes 0. No 1. Yes 0. No
G.12.3. Non-transparent process 1. Yes 0. No 1. Yes 0. No 1. Yes 0. No 1. Yes 0. No
G.12.4. Other 1 ________________

G.12.5. Other 2 ________________

G.13. Are you aware of Congestion Management and/or Capacity Allocation concepts?
1. Yes, well aware
2. I have heard about it but do not know the details
0. No

G.14. Do you use GSE’s GCAT application (Capacity Auction Tool)?
1. Yes, Regularly [Move to G.15]
2. Yes, sometimes [Move to G.15]
3. Used only once
4. Never used
5. Never heard about it [Move to G.15]

G.14. What are the reasons for not using GSE’s GCAT application? [Multiple answers are possible]
G.14.1. Did not really needed 1. Yes 0. No
G.14.2. Complicated 1. Yes 0. No
G.14.4. Other 1 ________________
G.14.5. Other 2 ________________

G.15. If Day Ahead market starts this year, how would you estimate readiness of the human capacity of your company to operate on the market? (Note: without external support)
[Interviewer! Ask interviewee to rank readiness on the scale below]

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>No ready</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fully ready</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

-98. Do not know

G.16. If Day Ahead market starts this year, how would you estimate readiness of the technical capacity (software, IT and communication systems, clearing and settlement) of your company to operate on the market? (Note: without external support)
[Interviewer! Ask interviewee to rank readiness on the scale below]
G.17. If Intra-day market starts this year, how would you estimate readiness of the human capacity of your company to operate on the market? (Note: without external support)

[Interviewer! Ask interviewee to rank readiness on the scale below]

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<td>No ready</td>
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<td>Fully ready</td>
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-98. Do not know

G.18. If Intra-day market starts this year, how would you estimate readiness of the technical capacity (software, IT and communication systems, clearing and settlement) of your company to operate on the market? (Note: without external support)

[Interviewer! Ask interviewee to rank readiness on the scale below]

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-98. Do not know

G.19. Please indicate areas that your company needs external support to implement DAM and Intraday Market: [Multiple answers are possible]

[Interviewer! Ask interviewee to rank on the scale below]

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<tr>
<th></th>
<th>No Need</th>
<th>Extremely needed</th>
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<tr>
<td>G.19.1 DAM and Intraday Market Rules</td>
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<tr>
<td>(Rules for bidding, clearing, settlement)</td>
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<td>G.19.2. Software for Clearing and</td>
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<td>Settlement</td>
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<td>G.19.3. IT and Communication systems</td>
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<td>with market participants</td>
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<td>G.19.4. IT and Communication systems</td>
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<td>G.19.5. Other</td>
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<tr>
<td>G.19.6. Other</td>
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</table>
G.20. In case of DAM and Intraday Market implementation what type of changes do you anticipate with regard to data sharing and acquisition with and from TSO (for example, cross-border transmission capacity for import-export capacity) [Only one answer is possible]

1. No changes. Communication systems are already in place
2. Minor changes will be needed
3. Major changes will be needed
4. In case the answer is item 2 and item 3 above, what are the changes you anticipate?
   4.1. Change 1 ______________________
   4.2 Change 2 ______________________
   -98. Do not know

G.21. Can the existing electricity trading settlement system (procedures, relations with clients, bank and etc.) developed for daily settlement? [Only one answer is possible]

1. Yes, with simple changes
2. Yes, with major upgrade
3. No. It is better to create new system rather change existing one.
4. No. Other reason __________________

G.22. It is well known that market opening (deregulation) is associated with benefits and some challenges. Can you please elaborate up to three benefits it can bring for your company and associated challenges

Potential benefits:
____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________

Potential Challenges:
____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________

Please elaborate further (if any)
____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________

G.22. It is well known that market opening (deregulation) can bring some risks. How do you think, what are the risks coming from the market opening? [Multiple answers are possible]
[Interviewer! First let interviewee to answer without prompting possible answers and fill options “other” if not listed. Add options from the list below if interviewee(s) does not mention them and ask to rank. After ranking ask to elaborate further]

1. No new risks are foreseen 1. Yes 0. No
2. Market risks (prices, quantity risk) 1. Yes 0. No
3. Counterparty risk 1. Yes 0. No
4. credit risk 1. Yes 0. No
5. Other 1 ______________________________
6. Other 2 ______________________________
7. Other 3 ______________________________

Please elaborate further (if any)
____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________

G.23. Do you or your colleagues in your organization, have understanding of risk management strategies?
1. Yes
0. No

G.24. Has your organization used any risk management measures during your operations on the market?
1 _____________________
2 _____________________
3 _____________________
Section H: Market Operator

H.1. What type of special dedicated software do you use for current “electricity monthly balancing”?  
1. Simple excel model  
2. Complex model  
3. There is not a dedicated software [Move to H.4]  
4. Other 1 ______________  
5. Other 2 ______________

H.2. Can the existing software be used for “electricity monthly balancing” converted to daily balancing dimension?  
1. Yes, with simple changes  
2. Yes, with major upgrade  
0. No.

H.3. Can the existing software be used for “electricity monthly balancing” converted to hourly balancing dimension?  
1. Yes, with simple changes  
2. Yes, with major upgrade  
0. No.

H.4. For existing electricity trading clearing do you use any software?  
1. Simple software (excel file, simple bank transactions sheet)  
2. Complex software  
3. There is not a dedicated software [Move to H.6]  
4. Other 1 ______________  
5. Other 2 ______________

H.5. Can the existing electricity trading settlement system (procedures, relations with clients, bank and etc.) developed for daily dimension?  
1. Yes, with simple changes  
2. Yes, with major upgrade  
3. No. It is better to create new system rather change existing one.  
4. No. Other reason ______________

H.6. If Day Ahead market starts this year, how would you estimate readiness of the human capacity of your company to operate on the market? (Note: without external support)  
[Interviewer! Ask interviewee to rank readiness on the scale below]
- 1. Do not know

H.7. If Day Ahead market starts this year, how would you estimate readiness of the technical capacity (software, IT and communication systems, clearing and settlement) of your company to operate on the market? (Note: without external support)

[Interviewer! Ask interviewee to rank readiness on the scale below]

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</table>

- 1. Do not know

H.8. What are your thoughts on developing DAM market software:

1. In-house development
2. Procuring Software, install and train staff
3. Procuring Software and services as well
4. Other _______________

H.9. If Intra-day market starts this year, how would you estimate readiness of the human capacity of your company to operate on the market? (Note: without external support)

[Interviewer! Ask interviewee to rank readiness on the scale below]

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</table>

- 1. Do not know

H.10. If Intra-day market starts this year, how would you estimate readiness of the technical capacity (software, IT and communication systems, clearing and settlement) of your company to operate on the market? (Note: without external support)

[Interviewer! Ask interviewee to rank readiness on the scale below]

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<th>No ready</th>
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<th>5</th>
<th>Fully ready</th>
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</table>

- 1. Do not know

H.11. What are your thoughts on Developing Intraday Market Software:

1. In-house development
2. Procuring Software, install and train stuff  
3. Procuring Software and services as well  
4. Other __________________________

H.12. Please indicate areas that MO needs external support to implement DAM and Intraday Market:  
[Multiple answers are possible]  
[Interviewer! Ask interviewee to rank on the scale below]

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<thead>
<tr>
<th>Area</th>
<th>No Need</th>
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<td>H.12.2. Software for Clearing and Settlement</td>
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<td>H.12.3. IT and Communication systems with market participants</td>
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<td>H.12.4. IT and Communication systems with TSO</td>
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<td>H.12.5. Other</td>
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<td>H.12.6. Other</td>
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H.13. Are you aware of Transparency Requirements (REMIT) under EU energy acquis?  
1. Yes  
2. No [Move to H.16]

H.14. Please evaluate MO's human capacity improvement needs to satisfy Transparency Requirements according to the following categories:  
[Interviewer! Ask interviewee to choose from the answers and after ask to elaborate further]

1. No Need  
2. Moderate Need  
3. Major changes in skills or in personal  
   - 1. Do not know  

Please elaborate further (if any)
H.15. Please, evaluate MO’s technical (IT, Web, Data Publishing) capacity improvement needs to satisfy Transparency Requirements according to the following categories:

[Interviewer! Ask interviewee to choose from the answers and after ask to elaborate further]

1. No Need
2. Moderate Need
3. Major changes in skills or in personal
   -1. Do not know

Please elaborate further (if any)

____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________

H.16. In case DAM and Intraday Market implementation what type of changes do you anticipate with regarding data sharing and acquisition with TSO (for example, cross-border transmission capacity for import-export capacity? [Only one answer is possible]

[Interviewer! Ask interviewee to choose from the answers and after ask to elaborate further]

1. Communication systems are already in place
2. Minor changes will be needed
3. Major changes will be needed
   -1. Do not know

Please elaborate further (if any)

____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________
Section I: Direct (Wholesale) Customer or Electricity Suppliers

I.1. Do you use consumption forecast/planning in the process of your company’s operations?
   1. Yes [Move to Question I.3]
   2. No

I.2. Why do you not use consumption forecast/planning in the process of your company’s operations? [Multiple answers are possible]

[Interviewer! Ask interviewee to choose from the answers and after ask to elaborate further]

I.2.1. Lack of data
   1. Yes 0. No

I.2.2. Lack of forecasting model tools
   1. Yes 0. No

I.2.3. Lack of human capacity
   1. Yes 0. No

I.2.4. No need to conduct consumption forecast/planning
   1. Yes 0. No

I.2.5. Other 1

I.2.6. Other 2

Please elaborate further (if any)

____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________

I.3. What type of forecast/planning do you apply? [Multiple answers are possible]

I.3.1. Yearly
   1. Yes 0. No

I.3.2. Monthly
   1. Yes 0. No

I.3.3. Daily
   1. Yes 0. No

I.3.4. Hourly
   1. Yes 0. No

I.3.5. Other 1

I.3.6. Other 2

I.4. For which purposes do you use forecast/planning? [Multiple answers are possible]
I.4.1. Submit to TSO  1. Yes  0. No
I.4.2. Use for trading purposes [Move to I.7]  1. Yes  0. No
I.4.3. Other 1 [Move to I.7] ____________________
I.4.4. Other 2 [Move to I.7] ____________________
I.4.5. Other 3 [Move to I.7] ____________________

I.5. Do you regularly submit consumption forecasts/plans to TSO?
   1. Yes
   0. No [Move to I.7]

I.6. In what timeframe forecasts are submitted to TSO?
   1. Hourly
   2. Daily
   3. weekly
   4. monthly
   5. Once in a several months
   6. yearly

   [Move to I.8.]

I.7. Why does your company not submit forecasts to TSO? [Multiple answers are possible]

I.7.1. Lack of communication  1. Yes  0. No
I.7.2. Lack of human resources  1. Yes  0. No
I.7.3. Lack of legislation  1. Yes  0. No
I.7.4. Lack of interest from TSO  1. Yes  0. No
I.7.5. Poor quality of forecast  1. Yes  0. No
I.7.6. Other 1 ____________________  1. Yes  0. No
I.7.7. Other 2 ____________________

I.8. Is there a structural unit or person(s) responsible for consumption forecasting/planning?
   1. Yes [Move to I.10]
   0. No

I.9. Why there is no structural unit [from I.8] responsible for consumption forecasting/planning? [Multiple answers are possible]
I.9.1 Lack of data 1. Yes 0. No
I.9.2 Lack of forecasting model tools 1. Yes 0. No
I.9.3 Lack of human capacity 1. Yes 0. No
I.9.4 No need to conduct demand forecast/planning 1. Yes 0. No
I.9.5 Other 1
I.9.6 Other 2

I.10. Does your company have own demand forecasting model?
1. Yes [please, tell us a name __________________________ ]
2. we use outsource service [Move to I.14]
0. No. [Move to I.14]

I.11. Does your company use weather data as an input in forecasting/planning?
1. Yes
0. No

I.12. What is the timeframe of weather data?
1. Annual
2. Monthly
3. Daily
4. Hourly
-1. Do not know

I.13. For the purpose of forecasting, weather data in your company [only one answer is possible]
1. Is received from respective state agencies
2. Is received from other external resources
3. is based on its own measurements?
4. Hybrid

I.14. Why does your company not have own demand forecasting/planning model? [Multiple answers are possible]
1. Lack of human capacity
2. Lack of finances
3. Lack of necessity
4. We use outsources
- 1. Do not know

**I.15. How many employees work for demand forecasting/planning?**

[______]  - 1. Do not know

**I.16. Do your employees working on demand forecasting/planning get regular trainings in working with the software?**

1. Yes
0. No

**I.17. If there will be restriction to buy electricity from ESCO as a balancing electricity will your company be able to find alternative seller?**

1. Yes
0. No
- 98. Do not know

**I.18. Does central automated metering system (high level ESKAA system) cover (receives measurements) all your metering points (on at least hourly metering timeframe)?**

1. Yes [Move to I.19]
0. No

**I.19. What are the reasons for high level ESKAA system not covering all your metering points? [Multiple answers are possible]**

- I.19.1 Lack of software (its outdated) 1. Yes 0. No
- I.19.2 Lack of physical metering systems 1. Yes 0. No
- I.19.3 Lack of human capacity 1. Yes 0. No
- I.19.4 Other 1 ____________________
- I.19.5 Other 2 ____________________

**I.20. Have you developed short-term demand forecasting model?**

1. Yes [please, tell us a name ________________________]
0. No [Move to D.17]

**I.21. Why did not you developed short-term demand forecasting model? [Multiple answers are possible]**
### I.21. Lack of IT/Software

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### I.22. Do you use any software for electricity trading?

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### I.23. What type of trading options do you use to buy your electricity on the local market? [Multiple answers are possible]

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### I.24. In general what are the challenges to buy electricity with bilateral contracts on wholesale level? [Multiple answers are possible]

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### I.25. Not necessary

### I.26. Other 1

### I.27. Other 2
I.25. If there will be restriction to sell electricity to ESCO as a balancing electricity will your company be able to find alternative buyer?

1. Yes
2. I’m not sure
0. No

I.26. Are you aware of the forecast model TSO uses?

1. Yes
0. No

Please elaborate further for both answer:

____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________

I.27. How many old meters above 1 KV voltage level (not compatible with Georgian grid code requirements) do you have? [_________]

[Interviewer! Ask exact number. If cannot said ask to choose from ranges below]

1. 0 – 100
2. 100 – 500
3. 500 – 1000
4. 1000 – 2000
5. 2000 – 4000
6. More than 4000

I.28. Is your company ready to provide demand response service to TSO on balancing & ancillary service market?

1. Yes [Move to I.30]
0. No

I.29. Why are you not ready to provide demand response service to TSO on balancing & ancillary service market? [Multiple answers are possible]

I.29.1 lack of technical possibilities
1. Yes
0. No

I.29.2 Lack of SCADA
1. Yes
0. No

I.29.3. Lack of interest (including commercial)
1. Yes
0. No

I.29.5. Other 1

____________________________________________________________________________
I.30. Has TSO conducted consultation with you for your willingness/readiness and or potential limitations in providing demand response?

1. Yes
0. No

I.31. what are the potential reasons for unreadiness of demand response in providing balancing services? [Multiple answers are possible]

I.31.1 Technical limitations of demand facilities in fast load change  1. Yes  0. No

I.31.2 Lack of SCADA  1. Yes  0. No

I.31.3 Lack of awareness  1. Yes  0. No

I.31.4. Lack of commercial interest  1. Yes  0. No

I.31.5. Lack of legislative development  1. Yes  0. No

I.31.6. Other 1  _______________________

I.31.7. Other 2  _______________________

I.32. Do you send hourly forecast data to TSO?

1 Yes [Move to I.34]
2 No

I.33. Why do you not submit forecasts to TSO? [Multiple answers are possible]

I.33.1. Lack of communication  1. Yes  0. No

I.33.2. Lack of human resources  1. Yes  0. No

I.33.3. Lack of legislation  1. Yes  0. No

I.33.4. Lack of interest from TSO  1. Yes  0. No

I.33.5. Poor quality of forecast  1. Yes  0. No

I.33.6. Other 1  _______________________

I.33.7. Other 2  _______________________

I.34. If balancing market were starting this year, would your company be ready to buy balancing product (balancing energy and reserve capacities) on balancing market/ancillary service market?

1. Yes [Move to I.36]
0. No

-98. Do not know [Move to I.36]
I.35. Why would your company not be ready to participate in balancing service market? [Multiple answers are possible]

I.35.1 Too small 1. Yes 0. No
I.35.2 Technical constraint 1. Yes 0. No
I.35.3 Lack of SCADA 1. Yes 0. No
I.35.4 Lack of commercial interest 1. Yes 0. No
-1 Do not know 1. Yes 0. No

I.36. If Day Ahead market starts this year, how would you evaluate readiness of the human capacity of your company to operate on the market? (Note: without external support)

[Interviewer! Ask interviewee to rank readiness on the scale below]

<table>
<thead>
<tr>
<th>No ready</th>
<th></th>
<th>Fully ready</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

-98. Do not know

I.37. If Day Ahead market starts this year, how would you evaluate readiness of the technical capacity (software, IT and communication systems, clearing and settlement) of your company to operate on the market? (Note: without external support)

[Interviewer! Ask interviewee to rank readiness on the scale below]

<table>
<thead>
<tr>
<th>No ready</th>
<th></th>
<th>Fully ready</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
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</tr>
</tbody>
</table>

-98. Do not know

I.38. If Intra-day market starts this year, how would you evaluate readiness of the human capacity of your company to operate on the market? (Note: without external support)

[Interviewer! Ask interviewee to rank readiness on the scale below]

<table>
<thead>
<tr>
<th>No ready</th>
<th></th>
<th>Fully ready</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
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<td>4</td>
<td>5</td>
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</tbody>
</table>

-98. Do not know

I.39. If Intra-day market starts this year, how would you evaluate readiness of the technical capacity (software, IT and communication systems, clearing and settlement) of your company to operate on the market? (Note: without external support)
[Interviewer! Ask interviewee to rank readiness on the scale below]

<table>
<thead>
<tr>
<th></th>
<th>No ready</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>Fully ready</th>
</tr>
</thead>
</table>

- 98. Do not know

I.40. Please indicate areas that your company needs external support to implement DAM and Intraday Market: [Multiple answers are possible]

[Interviewer! Ask interviewee to rank on the scale below]

<table>
<thead>
<tr>
<th></th>
<th>No Need</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>Extremely needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.40.1 DAM and Intraday Market Rules (Rules for bidding, clearing, settlement)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>I.40.2. Software for Clearing and Settlement</td>
<td></td>
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<tr>
<td>I.40.3. IT and Communication systems with market participants</td>
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<tr>
<td>I.40.4. IT and Communication systems with TSO</td>
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<tr>
<td>I.40.5. Other</td>
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<tr>
<td>I.40.6. Other</td>
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</table>

I.41. In case DAM and Intraday Market implementation what type of changes do you anticipate with regarding data sharing and acquisition with TSO? [Only one answer possible]

1. Communication systems are already in place
2. Minor changes will be needed
3. Major changes will be needed
4. Do not know

Please elaborate further (if any)

____________________________________________________________________________
____________________________________________________________________________
____________________________________________________________________________
Section J: Needs for Future Capacity Building Programs

J.1. To your mind, what are the additional issues, you think is important for your company in terms of technical and human capacity assessment that we did not covered in our questionnaire?

Item 1.______________________________
Item 2. ______________________________
Item 3. ______________________________
-98. Do not know

J.2. Please list up to 5 most important capacity building areas necessary for your company

<table>
<thead>
<tr>
<th>Project Name and Objectives</th>
<th>Form of Capacity Building Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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J.3. Thinking of a future capacity building programs, please indicate preferred Forms of Capacity Building (please circle as many as needed) [Multiple answers are possible]

J.3.1. Seminars, workshops or training of officials' abroad 1. Yes 0. No
J.3.2. Seminars, workshops or training of officials' in country (in-house training programs) 1. Yes 0. No
J.3.3. Availability of long-term resident international experts 1. Yes 0. No
J.3.4. Short-term international advisors 1. Yes 0. No
J.3.5. Study tours abroad 1. Yes 0. No
J.3.6. Internships to other organizations 1. Yes 0. No
J.3.7. On-Job training (e-Learning) 1. Yes 0. No
J.3.8. Other 1
J.3.9. Other 2

J.4. Do you have in mind any specific capacity building program or technical capacity improvement activities that you need to implement?
Option 1
Option 2
Option 3
0. No
-98. Do not know

J.5. If there will be respective capacity building training program will you be willing to allow your staff to participate in?
1. Yes [Move to J.6]
0. No

J.6. Can you provide information on potential attendees from your company?

<table>
<thead>
<tr>
<th>Name, Surname</th>
<th>Department</th>
<th>position</th>
<th>E-mail</th>
<th>Tel</th>
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</table>
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