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# Technical Assistance for Improvement of Performance-Based Tariff Regulation of EMRA for Turkish Energy Markets through Introducing an Enhanced Monitoring System

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## Task-2: Improvement of Energy Market Monitoring System that will Enhance Monitoring for Turkish Electricity and Gas Markets

Activity 2.2 Report





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## Table of Contents

|   |                                     |
|---|-------------------------------------|
| Table of Contents .....   | 1                                   |
| Abbreviations .....   | 2                                   |
| 1 Introduction .....  | 2                                   |
| 2 Electricity Distribution .....  | 3                                   |
| 2.1 The Structure of Data Matrix .....  | 3                                   |
| 2.2 Data Matrix .....   | 3                                   |
| 3 Natural Gas Distribution .....  | 3                                   |
| 3.1 The Structure of Data Matrix .....  | 3                                   |
| 3.2 Data Matrix .....   | 3                                   |
| 4 Discussion & Recommendations .....  | 3                                   |
| 4.1 Recommendations on Data Requirement of Electricity Distribution Market in Turkey .....                | 3                                   |
| 4.2 Recommendations on Data Requirement of Turkish Electricity Distribution Market                        | <b>Error! Bookmark not defined.</b> |
| 5 Annexes .....   | 7                                   |
| 5.1 Annex 1: Excel Sheets for the Existing Data Matrix in Electricity Distribution market in Turkey. .... | 7                                   |
| 5.2 Annex 2: Excel Sheets for the Existing Data Matrix in Natural Gas Distribution market in Turkey. .... | 7                                   |





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## Abbreviations

|        |   |
|--------|---|
| ÅF     | Ångpanneföreningen  |
| BOTAS  | Turkish Petroleum and Gas Transmission Pipeline Company                         |
| CAPEX  | Capital Expenditures  |
| CFCU   | Central Finance and Contracts Unit  |
| DSO    | Distribution System Operator  |
| EDVARS | Electricity Distribution Data Storage and Reporting System                      |
| EMRA   | Energy Market Regulatory Authority (for Electricity, Petroleum and Natural Gas) |
| EPIAS  | Market Financial Settlement Centre  |
| EU     | European Union  |
| EUD    | European Union Delegation   |
| EXIST  | Energy Exchange Istanbul  |
| FIT    | Feed-in tariff  |
| HD     | Human Dynamics  |
| MENR   | Ministry of Energy and Natural Resources  |
| OPEX   | Operational Expenses  |
| OSOS   | Automatic Meter Reading System  |
| PM     | Project Management  |
| PSC    | Project Steering Committee  |
| R&D    | Research and Development  |
| SAIDI  | System Average Interruption Duration Index                                      |
| SAIFI  | System Average Interruption Frequency Index                                     |
| SoLR   | Supplier of Last Resort   |
| TAT    | Technical Assistance Team   |
| TEIAS  | Turkish Electricity Transmission Co.  |
| ToR    | Terms of Reference  |
| WACC   | Weighted Average Cost of Capital  |

## 1 Introduction

According to Terms of References and Administrative Order #3 written on 27<sup>th</sup> of August 2019, Task 2.2 report and data matrixes are aiming to deliver analysis of existing data management systems at EMRA in order to implement the data requirements and monitoring procedures. Thus, the Task 2.2 activity is focusing on the overview of existing data flow between EMRA and DNOs. For this purpose, detailed data matrixes that contain data requests of EMRA from Electricity DNOs and Natural Gas DNOs fulfill the main objective of the task.

Task 2.2 report is just targeting to provide a guidance for comprehension of data matrixes summarizing data flow between EMRA and DNOs. As an approach, existing data requirements and requests from EMRA is listed as a matrix and each data requirement is analyzed in line with the topics studied under Task 1.2 & 2.1. Additionally, recommendations per each data set and general suggestions are given in the data matrixes and in report section.



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## 2 Electricity Distribution

### 2.1 The Structure of Data Matrix

Data matrix provided in Annex 1 starts with data concepts studied in Task 1.2 & 2.1 studies in line with the data requirements for tariff and monitoring, respectively. Data concepts are comprising of topic, subject and content columns that were subject of previous studies. “Current Situation” part that is starting with Column D implies the data requirement under the existing legislations. Resolution levels correspond to the depth of data request in current situation part. Finally, the “Recommendation” part starting with Column M states data recommendations per related data topic.

### 2.2 Data Matrix

Details of the data matrix is provided in Annex 1: Excel Sheets for the Existing Data Matrix in Electricity Distribution market in Turkey.

## 3 Natural Gas Distribution

### 3.1 The Structure of Data Matrix

Department of Tariffs, Department of Natural Gas, Department of Strategy Development, Department of IT and Department of Audit request monthly, 6 months, annually, occasionally reports from natural gas distribution companies. Details of these reports as well as data requirements as per tariff recommendations written at Report 1.1, were given in the reports 1.2 and 2.1. Main purpose of this report is to identify the repetitive data requests in the reports that occurred due to the need in time and to review the reporting frequencies.

Based on this, all current data requirements of EMRA were reviewed carefully under 3 major sections. In the first section, excel reports are reviewed and comments were inserted to excel sheet. Second section was dedicated to financials, which is essential to determine tariff of each gas distribution companies. In the third section, customer services data set was reviewed.

Recommendations are prepared in accordance with the methodology explained above.

### 3.2 Data Matrix

Details of the data matrix is provided in Annex 2: Excel Sheets for the Existing Data Matrix in Natural Gas Distribution market in Turkey.

## 4 Discussion & Recommendations

After the current structure of data matrix has been carefully reviewed for both electricity and natural sectors, recommendations are presented as follows.

### 4.1 Recommendations on Data Requirement of Electricity Distribution Market in Turkey

Summary of data recommendations on data requirement of Electricity Distribution market could be listed per topics as below:

**TOTEX Approach:** Currently, EMRA tariff methodology uses separate budgets for OPEX and CAPEX. However, there is transitivity between operational and investment costs. Thus, as a requirement of TOTEX approach, budget



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realization of items included within TOTEX, such as IT/OT hardware and software, vehicle, acquisition of new buildings should be collected from the DSOs, in addition to their regulatory account plans.

**Business Plan:** EMRA requires DSOs to submit their OPEX offers before the related implementation period. However, standard template or minimum requirements for reporting aspects do not exist. Also, DSOs are facing with several challenges when they are managing their operations within a regulatory period. Thus, in line with the benchmarks investigated and ex-ante approach, it is needed to prepare a well-defined business plan by DSOs providing a foresight for managing both challenges, regulated budgets, and financials throughout the upcoming regulatory period.

**Cost Accounting:** Currently, DSOs are providing their total expenditures in line with the account plans required by EMRA. However, the resolution of the expenditures is needed to deepen in order to increase the observability and monitoring. Thus, reporting expenditures with respect to the operation items and implementing the cost accounting principles are required.

**Connection Fees:** Currently, one-time connection charges are applied in Turkey. However, in line with the benchmarks found out, deep or shallow connection charges may differ. In some countries, connection charges do not include network reinforcement costs (shallow pricing), whereas in other countries, new connection customer also shares the burden of these new connection costs. Thus, in case of socialized connection costs, the generation/consumption facility investments cannot be optimally (minimizing total costs) located by the investors. Therefore, separate connection charge approach - i.e. reflecting the real cost of each DSO per each connection method is recommended.

**Network Assets Replacement Costs:** In the current legislation of the asset replacements/refurbishments, in general, if the asset life is above 30 years and the refurbishment is performed for a full group of assets (in this case, refurbishment project should be prepared and approved by TEDAS), the replacement costs are permitted to be covered by CAPEX budget. However, if the assets fail and need to be replaced individually, then this replacement is realized under OPEX budget. Since the failure rates differ each year and with respect to the the asset ages, it is difficult to forecast the asset replacement costs and this causes uncertainty for the OPEX budgets. Due to this reason, asset replacement costs are recommended to be reported and corrected based on the number of replacements.

**Refurbishment Cost Estimation:** Since the replacement/refurbishment costs will be determined ex-ante and corrected after the realizations in the year "t+2", replacement/refurbishment cost estimation methodology is needed to be developed.

**Supply Continuity:** SAIDI and SAIFI are the most common used indicators throughout the EU benchmarks for supply continuity. Progress of monitoring SAIDI/SAIFI indicators as in previous regulatory periods is recommended. On the other hand, since the current level of SAIDI/SAIFI indices in Turkey is way above the one in average EU figures and due to the lack of sufficient monitoring infrastructure, it is recommended to use SAIDI/SAIFI indices only on medium voltage levels, as prioritized phase.

**Commercial Quality:** In Turkey, commercial quality indicators are defined in the Regulation on the Service Quality of Electricity Distribution and Retail Sales. Standard due dates to response customer requirements and the corresponding penalties in case of exceeding the limits are also determined in the same table which works in negative direction only. There are two reasons behind this principle - i.e. the existence of bonus stemming from the consumer satisfaction points defined in the Procedures and Principles of Quality Factor Application, and the fact that the stated values are worst case limits that DSOs must meet under normal operation conditions.

On the other hand, additional incentives may be defined for the DSOs who increase the level of customer satisfaction ahead of the mandatory due dates. In order to achieve this goal, setting the appropriate consumer satisfaction levels via enhanced survey methodology which currently needs to be improved in the market.



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**Technical Quality:** Currently, voltage quality is measured by the request of customers and power analysers set by EMRA instructions. If the EMRA instructions are completed successfully, there is a bonus for technical quality. In addition, voltage quality parameter could be defined by metering data that will be gathered from the smart meters installed on distribution transformers. To achieve this goal, AMR meters roll out at all DSO-owned distribution transformers should be completed. Operating hours out of the accepted voltage level limits – i.e. to be determined by EMRA - will be registered on AMR meters, and will be proportioned to the total operating hours. Finally, this rated value is desired to be under 5%, and DSOs meeting the 2% rate or below will gather a bonus.

No additional data is required for additional parameters that could be derived from the existing data sheets with simple proportions. On the other hand, AMR meters that will be used to register the operating hours out of the accepted voltage levels should be installed on each DSO-owned distribution transformers. Thus, data requirement for recommended additional voltage quality parameter will correspond to the operating hours of the distribution transformers out of the accepted voltage limits.

**Investment Realization:** Investment expenditures of the DSOs shows the progress of DSOs' future service quality levels and financial stabilities. If the investments decrease below a critical level, then the supply continuity targets may not be met soon. Distribution System Revenue Regulation Article 12/4 states that, investment expenditure of a year should not be below 65% of the approved CAPEX of that year. Also, there is a bonus for DSOs realizing more than 90% of their investment budgets.

EMRA already collects the relevant CAPEX expenditures for this objective and there is no additional data requirement.

**Occupational Health & Safety:** As an important quality parameter, EMRA collects the number of deadly work accidents from the DSOs and uses the "0" death result as a general performance indicator for the DSO. There is no additional required data for this issue. This parameter might be enhanced with additional requirements that could be defined under "Occupational Health and Safety" with introduction of safety standards. Audit of the performance with respect to new standards could be performed by accredited independent institutions.

**Street Lighting Performance:** Street lighting activities are the responsibility of the DSOs in Turkey, unlike the municipalities in benchmarked EU countries. General Lighting Regulation defines the time limits to repair burnt bulbs and Electricity. Market Law Article 16/8 defines the penalty for unrepaired bulbs on time. Therefore, DSOs have to replace the burnt-out bulbs within the defined time limits. Penalties are imposed for each bulb, regardless of the importance of its location or whether there is a single lamp problem or all the lamps in the same region is not working.

This approach causes inefficiencies for the DSO activities. As an alternative, street lighting outages might be grouped by their criticality (single lamp, feeder failure, etc.) and given appropriate due dates for each case. Instead of applying penalties for each case, there should be performance indicator for general lighting. Total reward/penalty of the DSO should be added/subtracted to/from its revenue cap.

**Value of Loss Load (VOLL):** VOLL is the economic value for the absence of 1 kWh energy in a region. It is higher in regions, where electricity is used as an intermediary product to create value (i.e. industry, commercial regions), and lower if it is used only for daily needs. Therefore, improvement of SAIDI in an industrial region creates more value than improvement of SAIDI of a rural region. This relationship can be used for determining bonuses/penalties for these improvements and forms a reasoning between quality improvement and OPEX. In order to achieve this goal, instant load of consumption points that are affected by outages. This data should be measured via surveys for each DSO region. Registering such a data may lead difficulties, instead, use of TIEPI and NIEPI indexes might be more effective since these indexes are based on installed capacity.

**Efficiency:** EMRA uses Data Envelopment Analysis (DEA) for the purpose of comparing DSO efficiencies. It is observed in benchmarking studies that this method is also used EU countries. Alternative options might be listed



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as follows: Usage of SFA, MOLS, COLS, etc. Common point of these methods is the necessity of relevant data usage. Relevant data should be chosen in accordance with the selected method such that they are most relevant with the OPEX costs of the DSOs.

**Technical and non-technical losses:** In EU practises, DSOs or suppliers are responsible from the losses. In Turkey, management of the loss is defined as the responsibility of DSOs. EMRA sets targets for the DSOs, with respect to the loss reduction formula based on the realizations of each DSO generally aiming to decrease the targets by 2%-3% of the average of the previous three years realizations.

**Network Tariff:** In Turkey, network tariffs are applied generally as volume related charges (per kWh). Customers who choose the double-term tariff (capacity charge), pays a fee per kW connected capacity and a lower distribution fee per kWh. However, due to the increase of distributed generation, volumetric charges will not reflect the real cost of the consumers. Therefore, capacity charges should be applied to balance the system and to remove the cross-subsidy for the distributed generators.

## 4.2 Recommendations on Data Requirement of Natural Gas Distribution Market in Turkey

Department of Tariffs, Department of Natural Gas, Department of Strategy Development, Department of IT and Department of Audit request monthly, 6 months, annually, occasionally reports from natural gas distribution companies. Details of these reports as well as data requirements as per tariff recommendations written at Report 1.1, were given in the reports 1.2 and 2.1. Main purpose of this report is to identify the repetitive data requests in the reports that occurred due to the need in time and to review the reporting frequencies. Recommendations are prepared in accordance with this principle and given below.

**Basic Company Data:** Basic information such as company title and company license number is required in each report. This information can be saved in a database and automatically used.

**Basic Consumer Data:** In the reports, supplier information, customer information and industry information are requested. This information can be defined once in a database and then only updated if the information changes.

**Reports DPF-02, DPF-66:** Price information is generally required SCT included but in some other reports price information is required VAT included. This can be standardized.

**Report DPF-44:** Capacity reservations are made annually. Monthly supplier changes cannot be done without approval of BOTAŞ. In the current situation, this transaction is done by signing an allocation protocol with BOTAŞ and if this protocol isn't signed, capacity application cannot be done. As a result, the denial of transfer cannot be followed legislatively. Therefore, "number of consumers whose demand for supplier change was rejected during the period" is not considered to be followed at this stage.

**Reports DTF-01, DTF-09, DTF-15, DTF-16:** In different reports, reports on consumption and consumption estimations are requested at different ranges. If the reports are not automated in distribution companies, it may cause erroneous reports. For this reason, a report can be designed in which the data is staged as desired by EMRA after the data is taken into the database. After customer-based sector definitions are made in the system, desired reports can be generated. EDVARS can be an example for this case.

**Report DPF-62:** Investment information of Distribution Companies is asked. The data is requested on a monthly basis, is a repetitive request for distribution companies completed their investments. For these companies, this data set can be requested once every 6 months or once a year. It can be taken in monthly for companies has not been completed investments.



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**Report DPF-63:** Information regarding Regulator and Measurement stations of the Distribution Companies are requested. The number of customer stations with remote reading system and providing healthy data can be followed.

**Report DPF-76:** The number of commissioned stations is requested in detail in DPF-62 report. For this reason, it would be appropriate to ask only the number of stations that are not put into operation, in this report.

**Report DPF-42:** In the current situation, since contracts are signed annually, gas can only be purchased on an annual basis in the domestic market. Since the amount of gas purchased is monitored monthly, if the difference is seen, it can be requested again.

## 5 Annexes

### 5.1 Annex 1: Excel Sheets for the Existing Data Matrix in Electricity Distribution market in Turkey.



200917-Task  
2.2\_Monitoring\_Electri

### 5.2 Annex 2: Excel Sheets for the Existing Data Matrix in Natural Gas Distribution market in Turkey.



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2.2\_Monitoring\_Natur.

