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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

Presentation of Task 1.1 Report – Tariff Structure Assessment and Recommendations Report; discussion of main recommendations – Distribution

12 December 2019, EMRA, Ankara

Main Recommendations on the Electricity Distribution Tariffs

- Revenue Requirement Model
- Regulatory Period
- Regulatory Asset Base
- CAPEX
- Rate of Return
- Depreciation
- Connection Fees
- Performance Indicators
- Efficiency
- Losses
- Network Tariffs
- Retail Tariffs

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Revenue Requirement Model

human dynamics
public sector consulting

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Discussion of Main Recommendations

No		EU Practices	Turkey Practice	Problem Definition and Gap Analysis	Recommendation

1.	Revenue Requirement Model	- Incentive Based Models
		  ○ Revenue Cap (+RIIO)
		  ○ Price Cap
		- Cost Based
			- Revenue Cap (with performance and quality indicators and efficiency parameters)	- Tariff methodology of Turkey is compatible with the performance-based EU practices.	

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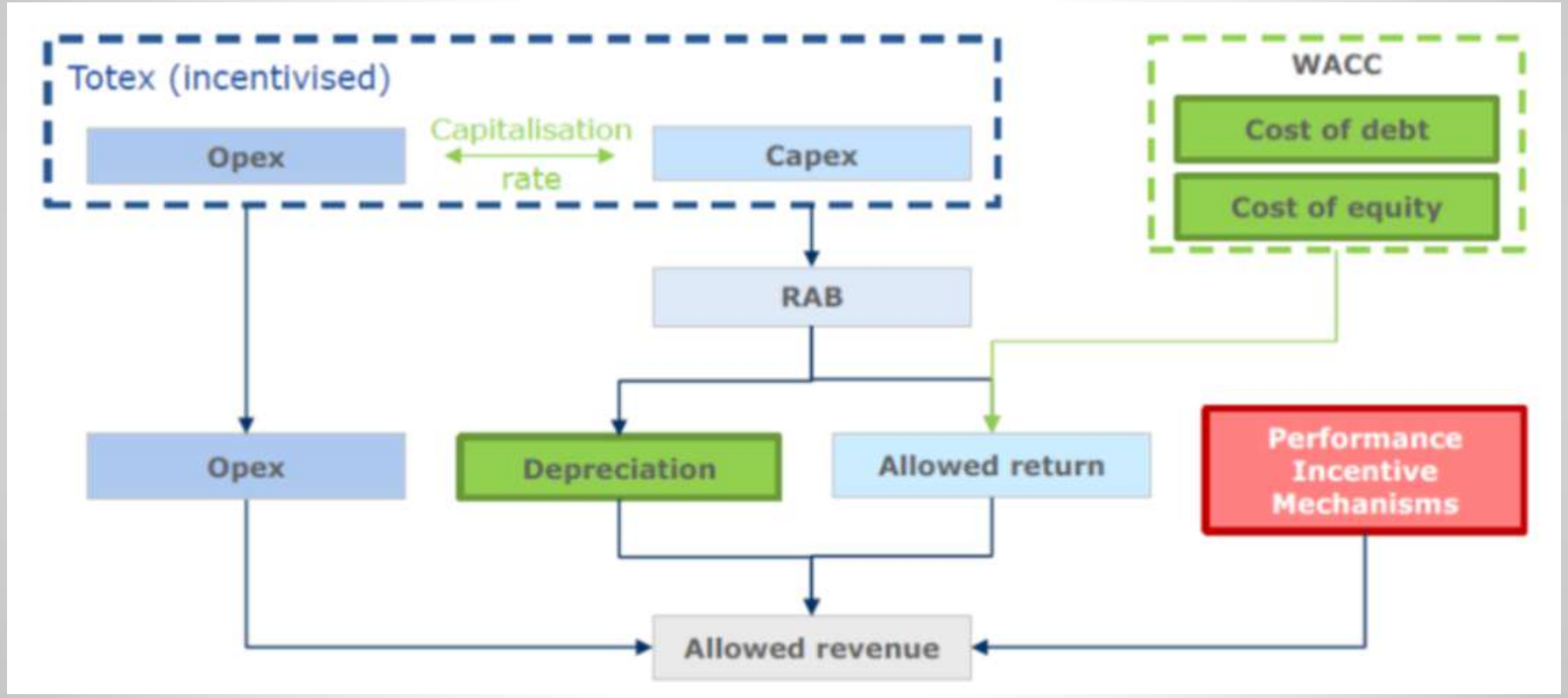
TOTEX Approach



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TOTEX Approach

No		EU Practices	Turkey Practice	Problem Definition and Gap Analysis	Recommendation
2.	Revenue Requirement Model	TOTEX approach is used in countries such as United Kingdom, Germany and the Netherlands.	OPEX and CAPEX is used separately.	Network operations may be done by OPEX or CAPEX. For example, meter reading can be done by metering staff or smart meter installations, and network replacement costs may be lowered by maintenance expenditures. Current tariff methodology do not give chance for DSOs to choose the optimal solution, either by OPEX or CAPEX budget.	TOTEX approach could be experienced in certain areas such as IT/OT, vehicles, buildings and network rehabilitation/replacements.

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Regulatory Period

Country	Regulatory Period
Austria	2014-2018 (5yrs)
Czech Republic	Originally set as 3-year (2016-2018), later it was prolonged until 2020
Denmark	5 years, current period: 2018-2022
Estonia	There is no period
Finland	2 regulatory periods (2016-2019 and 2020-2023) set
France	4 years, current period: 2017-2021
Germany	5 years, current period: 2019-2023
Greece	1 year
Hungary	4 years, current period: 2017-2020
Iceland	5 years, current period 2016-2020
Ireland	5 years, current period: 2016 – 2020
Italy	8 years (4+4)

Country	Regulatory Period
Latvia	Not exceeding five years
Lithuania	5 years (2016-2020) and 5 years (for small DSOs, 2015-2019)
Luxemburg	4-year period, current period 2017-2020
Netherlands	3-5 years (currently 2017-2021)
Norway	Data is updated every year, important factors fixed for five years
Poland	2016-2020
Portugal	3 years (current period 2018-2020)
Romania	5 years, current period: January 2014 – December 2018
Sweden	5 years
UK	8 years (4+4) 1 April 2015 to 31 March 2023
Turkey	5 years (current period 2016-2020), next period (2021-2015)

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Regulatory Period

No		EU Practices	Turkey Practice	Problem Definition and Gap Analysis	Recommendation
3.	Regulatory Period	- 8 years in UK and Italy (4+4), - 4 years in Spain, Sweden, France - 5 years in Norway, Germany, Austria, Denmark	5 years		5-year tariff period is compatible with the EU practices.

Shorter periods are not sufficient for efficiency incentives and longer periods are not predictable. Therefore, fixed medium periods or longer periods with parameter updates may be applicable.

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Regulatory Asset Base (RAB)

No		EU Practices	Turkey Practice	Problem Definition and Gap Analysis	Recommendation
4.	Regulatory Asset Base	In all the EU countries, network assets belong to DSOs (state-owned or private).	Assets do not belong to the DSOs. Whole system is 30-year concession.	- Distribution network requires refurbishment and replacement investments. - Most of the current CAPEX budget is used for capacity expansion. - Increase of CAPEX without increasing the end user tariff requires the extension of amortization period. - Extension of amortization period depends on the availability of long-term financing tools. - Availability of long-term financing tools depends on the investments of the long-term equity funds (i.e. pension funds). - Financing of these funds to the investments requires the network to be owned by the DSOs.	Assets are recommended to be transferred to DSOs.

Natural gas distribution network belongs to the DSOs. Transmission assets belong to TEIAS (TSO).

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Capacity Increase Investments

No		EU Practices	Turkey Practice	Problem Definition and Gap Analysis	Recommendation
5.	CAPEX	Investment plans are prepared by DSOs and approved by regulators.	Investment plans are prepared by DSOs and approved by regulators.	- Methodology is compatible with the EU. - However, since the capacity increase investments are larger in Turkey compared to EU countries, most of the CAPEX is used for network expansion rather than replacement and refurbishment.	It might be considered to reclassify capacity increase network investments as uncontrollable item like environment and legal investments.

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WACC - Tail

No		EU Practices	Turkey Practice	Problem Definition and Gap Analysis	Recommendation
6.	**Rate of Return**	- TOTEX for replacement / refurbishment investments	There is no incentive mechanism for older but operational equipment.	Current methodology directs DSOs to replace older equipment (>30 years old) rather than operating them with maintenance, which causes loss in social welfare.	WACC-tail implementation is recommended.

Certain percentage of replacement value of over 30-year assets could be added to the initial 2021 RAB (the fourth implementation period's first year). Following each year, 3.33% of the total network asset replacement value in real terms less replacement/refurbishment CAPEX in the year "t-1"

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Discussion of Main Recommendations

WACC Formula in Turkey

$$NMGO = AOSM = (k_d \times w_d \times (1-v) + k_e * w_e)/(1-v)$$

k_d : Debt ratio,

w_d : Weight of debts in financing,

k_e : Equity ratio,

w_d : Weight of equity in financing,

v : Corporate tax ratio,

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Dynamic WACC

No		EU Practices	Turkey Practice	Problem Definition and Gap Analysis	Recommendation
7.	**Rate of Return**	- Most of EU countries apply dynamic WACC	Static WACC methodology is used for the implementation period.	Issues encountered by static WACC: - Volatile financial environment compared with EU countries. - Long-term financial sustainability. - Long-term foreign currency-based financing.	Dynamic WACC which is updated by financial parameters might be implemented to secure long-term financial sustainability.

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Depreciation Method

No		EU Practices	Turkey Practice	Problem Definition and Gap Analysis	Recommendation
8.	**Depreciation**	- Straight line depreciation is used.	Straight line depreciation is used.	Methods used in EU Countries and Turkey are similar.	

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Depreciation Period

Country	Depreciation Ratio
Austria	Depending on asset type: lines 2-3%, transformers 4-5%, substations 4%
Czech Republic	Buildings 2%, Overhead lines and Cables 2.5%, Transformers VHV 4% Transformers MV, LV 3.3% Metering devices 6.6%
Denmark	Depending on asset type
Estonia	Depending on asset type. For new assets (after year 2003) 2.86%-3.33 from investment cost and for old assets (before year 2003) 7.14% from residual value.
Finland	2,5%
France	Depending on asset type. Ratio between 2% and 4% for network assets (lines, pipes etc.)
Germany	Depending on asset type. Ratio between 1.5% and 4% e.g. lines & cables: ~2%, stations: ~4%
Greece	Most assets are depreciated over a period of 25-50 years.
Hungary	Depending on asset type. Ratio between 2.5 and 7% e.g. lines & cables: ~2.5%, stations: ~3.33%
Iceland	Depending on asset type. Ratio between 2 and 20% e.g. DSO lines & cables:~3%-4%

Country	Depreciation Ratio
Ireland	Depends on asset category
Latvia	Depending on asset type. Ratio between 1% and 20%, gas pipelines 1.7-2.5%, lines 2-5%, transformers 2.5-12.5%
Lithuania	4-70 years
Luxemburg	Depending on the asset type. Useful lifetime 25-50 years for technical assets and constructions, and 3-20 years for IT assets
Netherlands	Most assets are depreciated over a period of 35 – 55 years
Norway	Depending on asset type, must be approved by accountant
Poland	For transformers and substations economic useful life is 30-40 years. For new investments an average depreciation value of all investments (e.g. transformers, substations, IT systems, meters) equalled 4% is allowed
Portugal	5-40 years
Romania	Depending on asset type. Ratio between 2% and 16.6% e.g. lines & cables: 2.5-10% stations: 2%
Turkey	10%

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Depreciation Period

No		EU Practices	Turkey Practice	Problem Definition and Gap Analysis	Recommendation
9.	**Depreciation**	- Depreciation durations are parallel with the average economical lifetime of the network assets (>30 years). - Tendency to assign different depreciation periods for each asset groups.	Single 10-year depreciation for all network assets.	- Depreciation period does not equal to economical lifetime of the assets. - Depending on Nation's financial environment, WACC and RAB considerations, depreciation of such long-life network assets could be extended to reduce CAPEX portion of end-user distribution fee and allow more needed CAPEX for those new items as well as capacity increase and refurbishment investments.	- Depreciation period should be extended. - For IT/OT investment depreciation periods should be set shorter.

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Regional Connection Fees

No		EU Practices	Turkey Practice	Problem Definition and Gap Analysis	Recommendation
10.	**Connection Fees**	- One-time connection charges are applied. - Service fees are also included depending to regions.	One-time connection charges are applied.	Single charge causes cross subsidization between the customers and regions.	Each DSO might prepare their own connection fees and submit to EMRA for approval.

Every customer should bear the cost of its own connection fees, both CAPEX and OPEX of the connection. This way connection fees could reflect local economic parameters such as real estate valuation.

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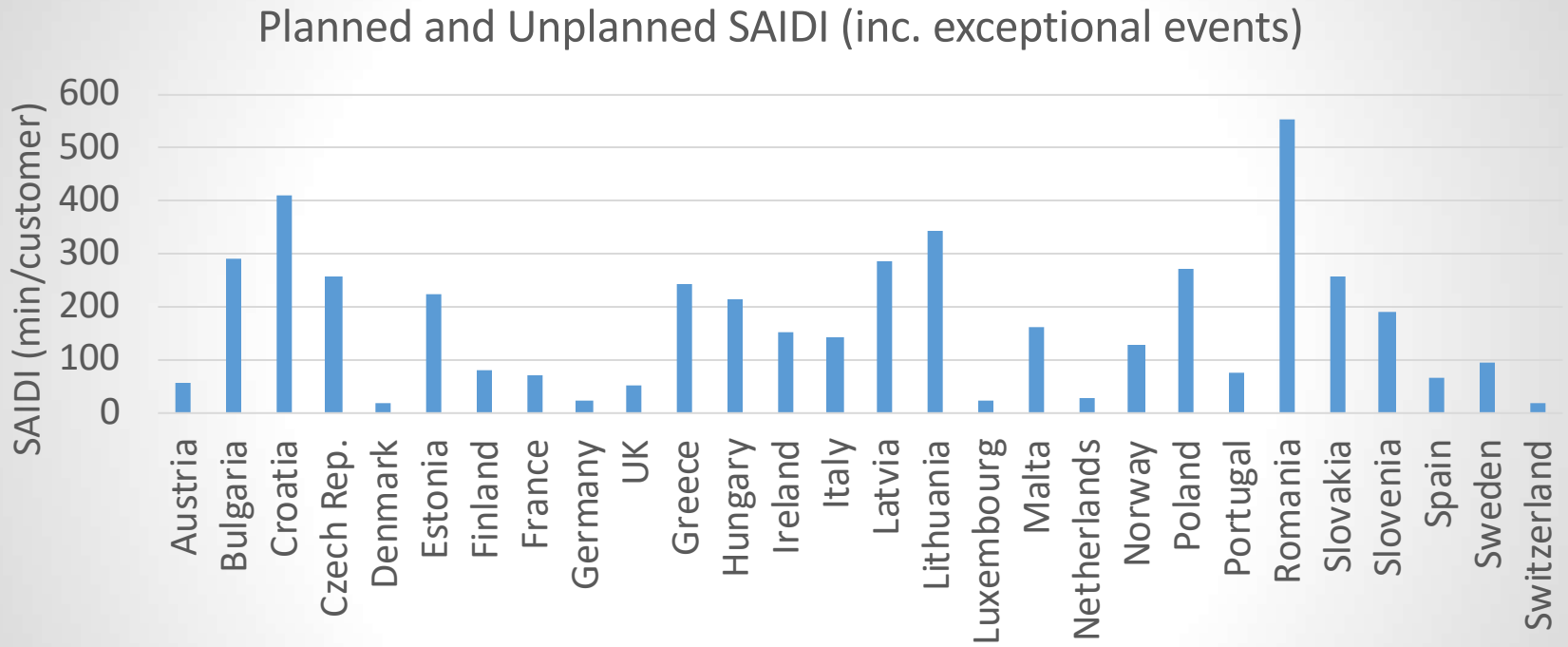
Performance Indicators



Turkey, SAIDI samples (2018):

Boğaziçi EDAŞ : 4.008 min

Başkent EDAŞ : 1.287 min

GDZ EDAŞ : 1.510 min

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Performance Indicators

No		EU Practices	Turkey Practice	Problem Definition and Gap Analysis	Recommendation
11.	**Performance Indicators**	**Supply Continuity Indicators:** In EU, MV indicators are commonly used. Some EU countries also use LV indicators based on the data measurement infrastructure. SAIDI, SAIFI (most common), ASIDI, ASIFI, CAIDI, T-SAIDI, T-SAIFI, AIT, ENS, TIEPI) are used.	SAIDI, SAIFI are used to measure continuity of supply.	Turkey is well below EU average performance KPIs.	- Clustering DSO regions for KPIs. - Implementing VOLL based performance indicators in addition to SAIDI, SAIFI for industrial/commercial regions. - ASIDI, ASIFI (average interruption time weighted by the rated power) and improvement for worst served customers might also be added as indicators.

In order to improve the overall performance, 21 regions could be grouped into categories (i.e. high loss, high consumption, other) to differentiate KPI target setting methodology accordingly.

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Performance Indicators (Data Reliability)

No		EU Practices	Turkey Practice	Problem Definition and Gap Analysis	Recommendation
12.	**Performance Indicators**	**Supply Continuity Indicators:** In EU, MV indicators are commonly used. Some EU countries also use LV indicators based on the data measurement infrastructure. SAIDI, SAIFI (most common), ASIDI, ASIFI, CAIDI, T-SAIDI, T-SAIFI, AIT, ENS, TIEPI) are used.	Both LV and MV supply continuity indicators are used.	Outage data reliability in LV network.	Data (GIS MV and LV network and customer connection and outage record data) reliability indices could be introduced as a performance criterion.

Number of customers fed from each transformer and connectivity of each meter and related DTR (distribution transformer) or MV feeder (for MV meters) correctly by DSOs should be recorded and confirmed by DSO's GIS data.

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Performance Indicators (Worst Days)

No		EU Practices	Turkey Practice	Problem Definition and Gap Analysis	Recommendation
13.	**Performance Indicators**	Worst 10 days methodology	- No methodology for worst days - Force majeure exceptions	- Extreme cases may occur out of DSOs ability to satisfy performance indicators. - Climate change results micro disasters (short-term and local)	- Defined period (i.e 5-10 worst days) may not be taken into account for performance indicators. - DSOs may submit to EMRA the action plans to reduce the affects of worst days.

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Street Lighting

No		EU Practices	Turkey Practice	Problem Definition and Gap Analysis	Recommendation
14.	**Performance Indicators**	**Street Lighting** In EU countries, street lighting is generally in the responsibility of municipalities. If the fault is caused by the distribution system, e.g. in UK due time to repair the single unit is 25 days	Street lighting performance is satisfied by penalties for each out-of-order bulb. If a bulb is not repaired within 24 hours in urban area and 48 hours in rural areas, there is a penalty of 707 TL for each bulb.	Inefficiency in operational costs.	Application of street lighting performance criteria, based on the criticality of the failure (such as number of lamps and HSE cases)

The time limit for repair regarding street lighting might be extended. Instead of using a case by case penalty, there should be defined a performance indicator for street lighting. Based on the target performance, DSO revenue cap should be decreased.

Alignment is needed between cost-benefit quality indices of street lighting and penalty calculations.

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Commercial Performance Indicators

No		EU Practices	Turkey Practice	Problem Definition and Gap Analysis	Recommendation
15.	**Performance Indicators**	**Commercial Quality** indicators are: -Time for response to customer claim for network connection -Time for connecting new customers to the network -Time for disconnection upon customer's request -Time for a switching of supplier -Response time to customer complaints -Response time to customer enquiries -Response time to customer voltage and/or current complaints -Response time to customer interruption complaints -Call Centers service level -Waiting time in case of personal visit at client centers -Time for giving information in advance of a planned interruption -Time for cost estimation for simple works	- Response time to customer claims - Call center response time limits - Time for connecting new customers to the network - Time for giving information in advance of a planned interruption	There is no measure for systematic customer satisfaction.	Customer satisfaction surveys could be an indicator for commercial quality.

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DEA Analysis

No		EU Practices	Turkey Practice	Problem Definition and Gap Analysis	Recommendation
16.	**Efficiency**	Methodologies used are: DEA (+ z factor correction) SFA MOLS or COLS General Productivity Index	Data envelopment analysis (DEA) is used in Turkey	Imbalance between award (KF-limited) and penalty (X factor-without limit)	Relation between the average KF factor and average X factor may be established.

For example, expenditure for network maintenance causes a DSO to lose in X factor calculation while it gains from the KF factor. While another DSO do not spend for maintenance and gains from X factor while losing from the KF factor. Second DSO, should not benefit more from the first DSO in order to incentivize KF.

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DEA Model

No		EU Practices	Turkey Practice	Problem Definition and Gap Analysis	Recommendation
17.	**Efficiency**	Methodologies used are: DEA (+ z factor correction) SFA MOLS or COLS General Productivity Index	Data envelopment analysis (DEA) is used in Turkey	- Lack of reliable input, - Lack of output (real work done) relation, - Lack of regional parameters	-

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Loss Reduction Action Plans

No		EU Practices	Turkey Practice	Problem Definition and Gap Analysis	Recommendation
18.	Losses	**Different Methodologies in EU countries:** - Loss targets are determined, and DSOs are incentivized /penalized - Network losses are a pass-through to consumers - Cost of losses is part of the general revenue cap (meaning that losses are treated like any other cost component) - Project based loss incentives - License obligation, - Loss Strategy, - Annual Reporting, - Losses Discretionary reward (evaluation of process, action plan and achievement)	- License obligation - Loss targets are determined by a predefined formula (based on last 3 years realizations), - DSOs are incentivized /penalized according to the achievements of targets. - CAPEX requirement for loss reduction is approved by EMRA (no ex-post evaluations for realizations).	There is no Loss Strategy, Annual reporting and discretionary reward mechanism.	- Current loss target mechanism may be continued as is. (In addition to the specified other mechanisms stated). - Annual action plans and related CAPEX requirements are recommended to be used for ex-post evaluation. If the stated targets are not achieved, some portion of the used CAPEX may not be accepted in RAB calculations. By this way, relation between cost and benefit may be established more effectively.

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Loss Responsibility

No		EU Practices	Turkey Practice	Problem Definition and Gap Analysis	Recommendation
19.	**Losses**	**Responsibility** - DSOs are responsible for losses - Suppliers are responsible for losses	DSOs are responsible for losses	-	DSOs are responsible for losses and no change is recommended.

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Discussion of Main Recommendations

No		EU Practices	Turkey Practice	Problem Definition and Gap Analysis	Recommendation
20.	**Losses**	-Environmental responsibilities for DSOs (reduction of CO2 emissions and reduced usage of SF_6)	No specific targets for CO2 emissions or SF6 gases.	Introduction of environmental responsibilities.	EMRA might allow DSOs to invest in renewable energy to decrease technical losses with network operation and reduce total cost of electricity purchased by generation.

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Reactive Charges (Hourly)

No		EU Practices	Turkey Practice	Problem Definition and Gap Analysis	Recommendation
21.	**Network Tariffs**	**Reactive Fee:** In EU practice, reactive power fee is commonly applied except for households.	Reactive fee is applied on a monthly measurement for customers above 9kW installed capacity, except for households.	- Turkey and EU are compatible for reactive power measurements and charging. - However, reactive power increases technical losses. - Monthly charges do not incentivize/penalize the customers and DSOs to reduce reactive power optimally.	It is recommended that reactive power shall be measured and charged hourly to reduce technical losses.

During fourth implementation period, TEİAŞ would continue reactive metering with monthly readings. In the fifth implementation period once DSOs improved reactive compensation, TEİAŞ could start measuring and charging reactive power hourly.

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Peak Load Charges

No		EU Practices	Turkey Practice	Problem Definition and Gap Analysis	Recommendation
22.	**Network Tariffs**	In EU, network tariffs consist of the combination of four main components: • Fixed costs, • Capacity charges, • Peak Load charges, • Volume related costs.	- Capacity charges and volume related charges are applied. - Customers who choose the double-term tariff (capacity charge), pays a fee per kW connected capacity and a lower distribution fee per kWh.	- Turkey and EU applications are compatible. - However, to manage congestions and balance the usage of distribution network peak load charges may be applied,	Peak-load charges may be introduced for small and large industrial customers.

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Time of Use (ToU) for Network Tariffs

No		EU Practices	Turkey Practice	Problem Definition and Gap Analysis	Recommendation
23.	**Network Tariffs**	Fixed network tariffs or ToU tariffs are applied	Fixed network tariffs are applied	- Turkey and EU applications are compatible. - However, to manage congestions and balance the usage of distribution network Time of Use (ToU) tariffs may be applied.	- Distribution fee component of the end user tariff could have time of use (ToU) consideration. - Depending on roll out of high speed EV charging infrastructure, a stand-alone charging tariff is recommended.

If the difference of electricity prices between peak and off-peak hours do not represent network congestions, ToU for network tariffs may be used to balance the system.

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Price Equalization

No		EU Practices	Turkey Practice	Problem Definition and Gap Analysis	Recommendation
24.	**Network Tariffs**	Regional End User Tariffs	- Regional end user tariffs are determined. - Price equalization mechanism is operated. - Unique End User Tariffs	End user tariffs do not account for the regional cost differences	Due to high loss ratios in three DSOs, price equalization mechanism or a similar methodology is needed to socialize these costs.

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Last Resort Tariffs

No		EU Practices	Turkey Practice	Problem Definition and Gap Analysis	Recommendation
25.	**Network Tariffs**	In EU, regulated or last resort tariffs are generally under the responsibility of DSOs.	- Regulated and last resort tariff customers are in the portfolio of the Incumbent (Assigned) Retailer Companies, which are unbundled from the DSOs. - Incumbent Retail Companies have also the right for sales to eligible customers.	Double role of the Incumbent Retailer Companies give them advantage in the eligible customers market over other suppliers.	It is recommended that all household customers including social tariff ones, shall be return to DSOs customer base unless household clients chose to stay as eligible. This way resource utilization would be optimized serving consumers. National tariff would be applicable only for DSO customers (households). All industrial, commercial, eligible customers would stay under incumbent retailers if they chose LRT tariffs. Once the incumbent retail licenses are over, there could be LRT tenders among suppliers with certain period of time.

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Regulated Tariffs

No		EU Practices	Turkey Practice	Problem Definition and Gap Analysis	Recommendation
26.	**Regulated Tariffs**	In EU, price regulation is being phased out. There are no regulated customers in Sweden, UK, Sweden, Finland, Germany, Austria, Italy, Croatia, Denmark, Estonia, Greece, Ireland. While other countries still have regulated tariffs.	- Regulated tariffs exist. - Last resort tariff is in place.	- For competition and evolving of the retail market, effects of regulated tariffs should be reduced. - Regulated tariffs and Last resort tariffs for small consumers still cover high ratio of customers.	Regulated tariff segment together with the low-consumption last resort customers may be reduced to serve only as a social tariff.

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Social Tariffs

No		EU Practices	Turkey Practice	Problem Definition and Gap Analysis	Recommendation
27.	**Social Tariffs**	Social Tariff: Directive 2019/944 Article 58: "*Member States should take the necessary measures to protect vulnerable and energy poor customers in the context of the internal market for electricity.*" In Italy and Greece there is social tariff but no regulated tariffs. In Belgium and Latvia social tariff is applied in the form of regulated prices. Some other countries have social tariffs with a policy of price regulation.	- Regulated tariffs exist. - Last resort tariffs are differentiated for small (vulnerable) and large customers - Lower energy prices for specified customer groups (martyr and veteran families)	- Vulnerable customers should be supported. - Support of the vulnerable customers should not harm the competitiveness of the retail market.	- Within the regulated National tariff, a sub tariff group may be introduced as social tariff or - Coverage of the last resort tariff may be reduced to target only for vulnerable customers. and/or - Vulnerable customers may be supported out of tariff mechanism by other social institutions.

This subject will be further detailed In Task 5.

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YEKDEM Fluctuation

No		Turkey Practice	Problem Definition and Gap Analysis	Recommendation
28.	**Retail Tariffs**	- YEKDEM fee is charged as is. - Supply companies do not know the affect of YEKDEM fee at the time of contract signature.	- Increase in price volatility due to fluctuating exchange rates and generation volume. - This volatility increases price risks for suppliers. - Retail market is still maturing and requires stability and predictability for bilateral contracts.	- YEKDEM tariff could be announced in TL at the beginning of each quarter and this may be taken as fixed through the period. - Adjustments may be done in the next quarter.

This way eligibility usage will increase by lowering the price risks.

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THANK YOU / Teşekkürler

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