



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



This project is funded by the European Union

## Task 1

# Improvement of Performance-Based Tariff Setting for Transmission and Distribution System Operations at Turkish Electricity and Natural Gas Markets

11 December 2019, EMRA, Ankara





## Task 1 Scope and Specifications

### Natural Gas Transmission Part

General Information About Natural Gas Transmission Tariffs  
Example Country Case: Bulgaria  
Recommendations & Gap Analysis

### Natural Gas Distribution Part

General Information About Natural Gas Distribution Tariffs  
Brief Information About EU and Selected Countries  
Example Country Case: Italy  
Recommendations & Gap Analysis



# Scope and Specifications

## Result(s):

This Activity directly contributes to achievement of project Result 1

## Output(s):

Tariff Structure Assessment and Recommendations Report

## Indicative Step(s):

- Assessment of the current tariff structure and recommendations for improvement;
- Analysis of tariffs: distribution tariffs, transmission tariffs, other regulated prices (distribution and transmission operations such as distribution connection fees, etc.;
- Benchmarking: Analysis of the current structure and identify barriers and gaps through benchmarking the existing performance-based tariff structure: Turkey vs selected EU countries



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## Natural Gas Transmission Part





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# GAS TRANSMISSION TARIFF PRESENTATION

- Identified gaps between Turkish Tariff structure and EU benchmarks
- New/Improved Tariff structure proposal
- Recommendations to implement proposed tariff structure including legislative changes, data requirements and data harmonization procedures





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## Identified gaps between Turkish Tariff structure and EU benchmarks





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### Secondary Legislation published by EMRA related with gas transmission tariff

- Natural Gas Tariff Regulation, dated 13.10.2016;
- Principles and Procedures for Determining the Revenue Caps to be taken as basis to the Tariffs of natural Gas Transmission License Holding Companies, EMRA Board Decision dated 03.10.2010 with the number 4638-1; and
- EMRA Board Decision dated 29.12.2016 with the number 6821 specifying the methodology for the second implementation period for the transmission and shipping tariffs of BOTAŞ during the term 01.01.2017-31.12.2019





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### Main aspects of the Turkish Gas Transmission Tariff

- Entry/Exit model,
- Transmission System Operator may propose different tariffs for **firm, interruptible and reverse flows,**
- Capacity and Commodity split, almost equal share in revenue (45 % and 55 %)
- Revenue Cap regulation,
- Weighted Average Cost of Capital (WACC, pre-tax) methodology in determining the Internal Rate of Return,
- The depreciation period is 22 years,
- 3 years of implementation periods, to be determined through EMRA Board Decisions (may go up to 10 years),





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### Main aspects of the Turkish Gas Transmission Tariff

- Reconciliation of the determined revenue requirements are handled in accordance with inflation effect, investment adjustments, realized flows and/or capacity bookings and unforeseen expenses. The transmission system operator submits relevant data 6 months prior to the beginning of tariff year (calendar year),
- Transmission System Operators are required submit their proposed methodologies for the definition of transmission and shipping control services latest 8 months prior to the commencement of each tariff implementation period. EMRA publishes the applicable Tariff within 2 months upon receipt of the submittal,
- The Regulatory Asset Base (the RAB) for BOTAŞ Transmission Network is determined each year in accordance with new investments and realized depreciations. The RAB figure specified for the 2011 - 2013 implementation period has been taken as the reference.





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Principles and Procedures for Determining the Revenue Caps defines the Revenue Cap applicable for certain year according to the formula:

$$GT_t = GGG_t * (1 - X_t) + GFDB_t$$

- t : Each year of the Tariff Application Period,
- GT<sub>t</sub> : The Revenue Cap for the t Tariff Year,
- GGG<sub>t</sub> : The updated Revenue Requirement for the t tariff Year
- X<sub>t</sub> : **The Efficiency Parameter the t Tariff Year**; specified prior to the commencement of the Tariff Application Period,
- GFDB<sub>t</sub> : The correction factor for the revenue deviation for the t Tariff Year.

***The legislation refers to efficiency involvement in gas transmission tariff. However, no methodology in effect yet for the determination of the “Efficiency Parameter”***





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- The secondary legislation already refers to efficiency based tariff for gas transmission activities
- However no methodology is set by EMRA yet for the determination of “Efficiency Parameter”
- The main issue seem as the establishment of above mentioned methodology by EMRA
- There are other proposed changes which are related with the BOTAŞ Network Code. Those can be classified into three categories:
  - 1- Efficiency in operational costs (Like the reduction of fuel gas burned in the compressors etc)
  - 2- Efficiency in operational success (less supply failures etc)
  - 3- Efficiency in commercial arrangements of TSO to facilitate gas trading and to increase utilization of transmission grid





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## Essential features of the EU Legislation related with the Gas Transmission Tariffs

### The Third Gas Directive

*Introduction Part “The regulatory authorities should also provide information on the market to permit the Commission to exercise its role of observing and monitoring the internal market in natural gas and its short, medium and long-term evolution, including **aspects such as supply and demand, transmission and distribution infrastructure, quality of service, cross-border trade, congestion management, investments, wholesale and consumer prices, market liquidity and environmental and efficiency improvements..”***

*Art. 41 “In fixing or approving the tariffs or methodologies and the balancing services, the regulatory authorities shall ensure that transmission and distribution system operators are granted appropriate incentive, over both the short and long term, **to increase efficiencies, foster market integration and security of supply and support the related research activities.”***





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### Essential features of the EU Legislation related with the Gas Transmission Tariffs

#### The Regulation 715 (conditions for access to the natural gas transmission networks)

*Art. 13 “Tariffs, or the methodologies used to calculate them, applied by the transmission system operators and approved by the regulatory authorities pursuant to Article 41(6) of Directive 2009/73/EC, as well as tariffs published pursuant to Article 32(1) of that Directive, shall be **transparent**, take into account the need for **system integrity and its improvement** and reflect the actual costs incurred, in so far as such costs correspond to those of an **efficient and structurally comparable network operator** and are transparent, whilst including an appropriate return on investments, and, where appropriate, taking account of the **benchmarking of tariffs** by the regulatory authorities*

*“Tariffs for network users shall be non-discriminatory and **set separately for every entry point into or exit point out of the transmission system**. Cost-allocation mechanisms and rate setting methodology regarding entry points and exit points shall be approved by the national regulatory authorities”*





## Essential features of the EU Legislation related with the Gas Transmission Tariffs

### ENTSO Network Codes

- The Network Codes developed by ENTSOG are mainly applicable for cross border gas transmission pipelines
- On the other side, no discrimination must be shown related with domestic and cross border flows in terms of tariff setting and capacity utilisation rights
- Practically, most of the terms of the Network Codes developed by ENTSOG are practically reflected the Network Codes of the individual TSOs



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### Essential features of the EU Legislation related with the Gas Transmission Tariffs

#### ENTSOG Capacity Allocation Methodologies (CAM) Network Code

- The capacity expansion projections for gas transmission systems are often linked with increase of the capacities at the interconnections with the other gas transmission systems (exports or imports).
- The capacity expansions at the interconnections between the gas transmission systems are referred as “incremental capacity” in the CAM Network Code.

*“**incremental capacity**’ means a possible future increase via market-based procedures in technical capacity or possible new capacity created where none currently exists that may be offered based on investment in physical infrastructure or long-term capacity optimization and subsequently allocated subject to the positive outcome of an economic test, in the following cases: (a) at existing interconnection points; (b) by establishing a new interconnection point or points; (c) as physical reverse flow capacity at an interconnection point or points, which has not been offered before;*





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### Essential features of the EU Legislation related with the Gas Transmission Tariffs

#### ENTSOG Tariff Network Code

- The code set outs terms related with harmonised transmission tariff structures for gas, including rules on the application of a **reference price methodology**, the associated consultation and publication requirements as well as the calculation of **reserve prices** for standard capacity products.
- Under **Entry/Exit capacity booking regime**, the TAR NC introduces some provisions applicable for all entry and exit points and some provisions applicable for only the interconnection points between the transmission systems.
- The same “**reference price methodology**” (which means the methodology applied to the part of the transmission services revenue to be recovered from **capacity-based transmission tariffs** with the aim of deriving reference prices) should be applicable at all the interconnection points between the member states and/or transmission systems.





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### Essential features of the EU Legislation related with the Gas Transmission Tariffs

#### ENTSOG Tariff Network Code

- The TAR NC **doesn't require** the regulators to adopt certain regulatory regime from the alternatives as price cap and non-price cap regimes (revenue cap, rate of return and cost plus). The definition of the “allowed revenue” for the non-price cap regimes is stated as follows.

*‘allowed revenue’ means the sum of transmission services revenue and non-transmission services revenue for the provision of services by the transmission system operator for a specific time period within a given regulatory period which such transmission system operator is entitled to obtain under a non-price cap regime and which is set in accordance with Article 41(6)(a) of Directive 2009/73/EC;*

- An important obligation for the National Regulatory Authorities is that the transmission revenues shall be recoverable out of the capacity based tariffs.

*“Article 4.3 The transmission services revenue shall be recovered by capacity-based transmission tariffs.”*





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### Essential features of the EU Legislation related with the Gas Transmission Tariffs

#### ENTSOG Tariff Network Code

- Exceptions for the application of commodity based tariff which would provide minor part of the transmission revenue are allowed under specific conditions defined in the Article 4.3 of the Code, subject to the approval of the national regulatory.
- The Article 13 of the Regulation 715 states that the Tariffs for network users shall be set separately for every entry point into or exit point out of the transmission system. Pursuing this requirement, the TAR NC introduces the methodology; the **“capacity weighted distance”** under the Article 8 and the reference price methodology associated with it.
- According to the methodology, entry points and exit points can be combined in a relevant flow scenario, the shortest distance of the pipeline routes between an entry point or a cluster of entry points and an exit point or a cluster of exit points can be taken as reference and in conjunction with the allocated capital expenditures pertaining to the segment, the unit capacity price for each entry and exit point (or cluster of entry and exit points) is determined.





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### Essential features of the EU Legislation related with the Gas Transmission Tariffs

#### ENTSOG Tariff Network Code

- The application of the “capacity weighted distance” methodology is not obligatory for the NRAs.
- TAR NC brings an obligation for the NRAs (or the TSOs as decided by the NRA) to carry out consultations for the tariff application prior to the beginning of each Tariff Application Period. The description of the proposed reference price methodology, the justification of the parameters used that are related to the technical characteristics of the system, the corresponding information on the respective values of such parameters and the assumptions applied are the requirements among others.
- There is a specific requirement that the consultation document should be published also in the English language.





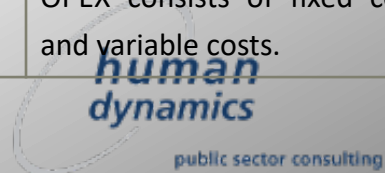
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Key issues	EU Practices	Turkey Practice	Recommendation
<b>NRA's capability in setting tariffs</b>	All the EU Authority set the tariff and exception of Spain (Government only in Spain)	EMRA set the gas tariffs	<ul style="list-style-type: none"> <li>- Clear Political Commitment express by law and enforced by regulation</li> <li>- Procedures for auditing the TSOs</li> <li>- Capability Sanction and inspective role</li> </ul>
<b>Grid ownership</b>	Majority single National TSOs, some countries (like Germany, France and Italy) several TSO's	Single TSO; however, the legislation allows multi TSO structure	No Recommendation, Existing terms are proper
<b>Tariff structure</b>	<ul style="list-style-type: none"> <li>- Revenue Cap (+RIIO)</li> <li>- Building Blocks</li> <li>- Price Cap</li> <li>- Hybrid</li> <li>- TOTEX</li> </ul>	<p>Revenue cap model including an efficiency parameter. However a methodology for the determination of the efficiency parameter (x Factor) is not in place yet</p> <p>Similar to most of the EU countries, Building Blocks model is in use in Turkey. CAPEX consists of return on capital with a set rate of return and amortization. OPEX consists of fixed costs and variable costs.</p>	Development of a methodology for the determination of efficiency parameter (X Factor) and putting it into application.





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Key issues	EU Practices	Turkey Practice	Recommendation
<b>Rate of Return</b>	<ul style="list-style-type: none"> <li>- WACC pre tax</li> <li>- Dynamic WACC</li> </ul>	To be able to draw investors in the distribution market, Rate of Return has been determined more than interest rates of the Central Bank of Turkey. It has recently changed to %14,38.	Dynamic WACC which updates by financial parameters, because it depends heavily on the economic conditions of the Country
<b>Depreciation</b>	Straight Line	Straight Line	Straight Line
<b>Cost Efficiency</b>	<ul style="list-style-type: none"> <li>- Parametric evaluation of CAPEX</li> <li>- X factor for OPEX</li> <li>- Efficiency for TOTEX (sharing factor)</li> </ul>	Not applicable yet (see above); the TSO tenders are subject to Public Procurement Law	Development of a methodology for the determination of efficiency parameter (X Factor) and putting it into application





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Key issues	EU Practices	Turkey Practice	Recommendation
<b>Efficiency OPEX</b>	- X factor (efficiency ratio)	NA	Development of a methodology for the determination of efficiency parameter (X Factor) and putting it into application
<b>Performance Indicators</b>	- Reliability and availability, - Connections, - Customer Service, - Environment, - Safety,	NA, see above.	- Reliability and availability, - Critical Maintenance, - New commercial arrangements to facilitate trading, -Environment, -Safety
<b>Financial incentives for quality of service</b>	- Premiums and penalties	NA, see above	Premiums and penalties set in accordance with specified success indicators (development of a specific methodology for determining Efficiency Parameter as mentioned above)





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Key issues	EU Practices	Turkey Practice	Recommendation
<p><b>Shrinkage (Fuel Gas + Unaccounted for Gas-UAG)</b></p>	<p>Shrinkage is usually part of operational expenditures. In some applications it is provided as in kind by the Shippers.</p> <p>Fuel Gas Part: Usually pass through element (TSO neutral) in gas transmission tariffs. The unit cost of Fuel Gas and the amount are included among efficiency indicators in some countries</p> <p>Unaccounted for Gas: Mostly pass through subject to a certain cap. Some NRA's (like the UK) require the TSOs submit special reports for the track of UAG (ie Measurement Uncertainty factor plus unmeasured losses), regularly.</p>	<p>The cost of shrinkage is included among the allowed expenditures, as pass through. However, TSO is required to purchase Fuel Gas through market based competitive procedures.</p> <p>The UAG is also pass through subject to certain cap.</p>	<p>Unit cost of the Fuel Gas and the amount can be included in success indicators when setting the methodology for the determination of X Factor. A benchmarking can be done by using the Daily Reference Gas Price in the Organized Wholesale Market and similar throughput conditions in past years.</p> <p>The cap for the UAG as specified in the ŞİD may be revised as a lower figure.</p>
<p><b>Capacity/Commodity Split</b></p>	<p>The Revenue of the TSOs should be essentially through capacity bookings.</p>	<p>Revenues out of Capacity booking fees and Commodity fees are close to each other</p>	<p>Adopt similar approach to the EU and set the capacity booking based revenue as at least 80% with a cost allocation methodology.</p>



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## New/Improved Tariff structure proposal





## Proposed Structure for the involvement of “Efficiency Parameter” in Gas Transmission Tariff

- A methodology can be developed by EMRA to determine the “Efficiency Parameter” in the formula for the Revenue cap of the respective year
- The maximum allowance (plus and minus cap) of the Efficiency Parameter can be defined each year
- Certain success factors and performance indicators can be defined together with their dedicated contributions (money wise penalty or awards) for the Efficiency Parameter
- Classification of the success/performance parameters are suggested as:
  - 1- Efficiency in operational costs (Like the reduction of fuel gas burned in compressor stations etc)
  - 2- Efficiency in operational success (less supply failures etc)
  - 3- Efficiency in commercial arrangements of TSO to facilitate gas trading and to increase utilization of transmission grid



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### Proposed Structure for the involvement of “Efficiency Parameter” in Gas Transmission Tariff

- Performance Indicators of the TSO can be specified under the classification stated below
  - Specific Operational Cost Reduction,
  - Reliability and availability,
  - Critical Maintenance,
  - New commercial arrangements to facilitate trading,
  - Environment,
  - Safety.
  
- Some parameters can be associated with money wise impact (like the amount of curtailed gas attributable to the TSO’s default).
- Many indicators would need to be benchmarked (for ex with the past data, other TSO data or target set by EMRA)



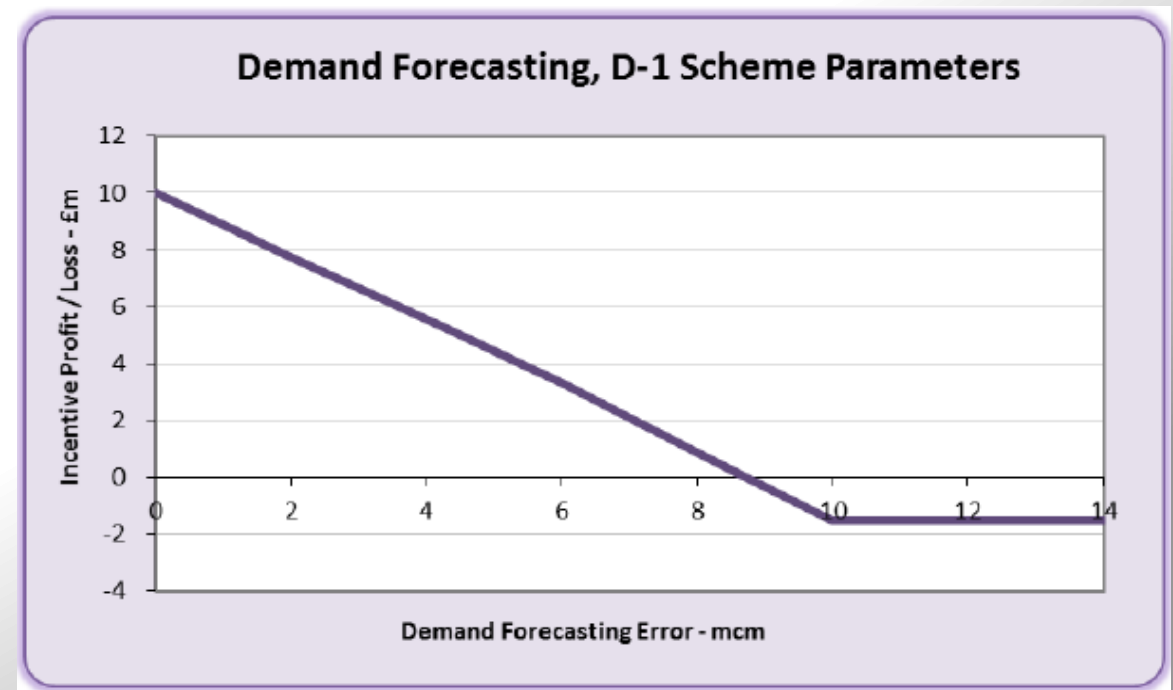
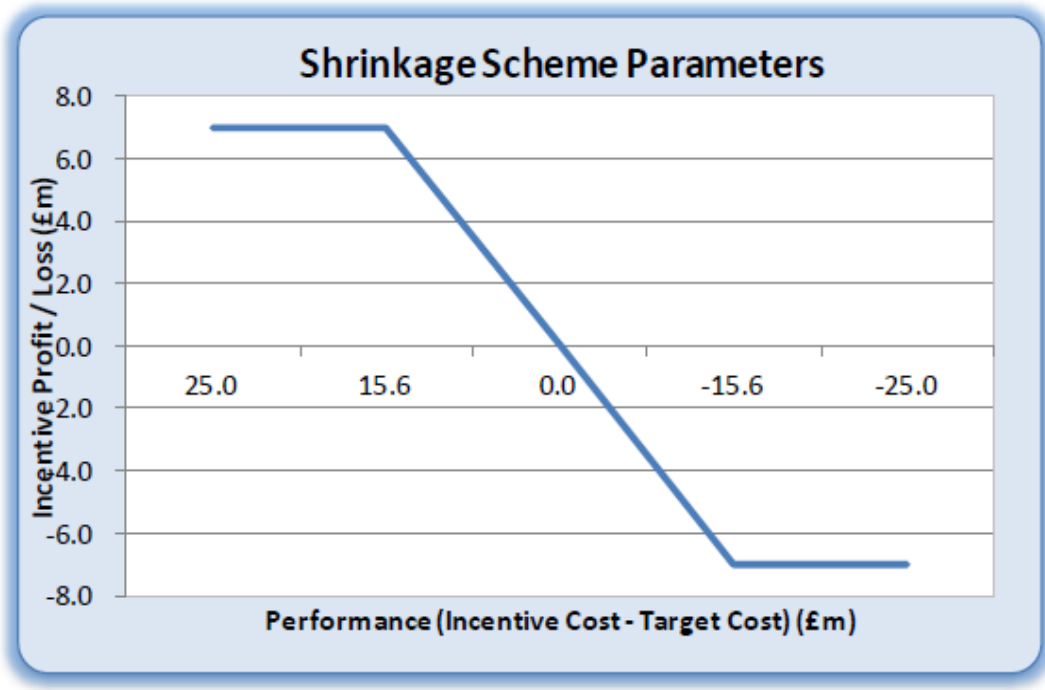


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## Some Examples from UK - RIIO





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Incentive	Performance Criteria (Annual Records)	Performance Evaluation
Own Use Gas	Reducing the amount used by the Transporter	Benchmarking with past data with similar conditions
Unaccounted for Gas	Decreasing the percentage with respect to annual throughput	Cap, typically 0,5 %
Vented Gas	Reducing the vented amount (recorded in the compressor stations)	Benchmarking with past data
Maintenance	Timely implementation of critical maintenance (like smart pigging, compressor overhauls)	Comparing the Planned dates and actual implementation
Maintenance	Reducing the number of planned maintenance works that require capacity reduction	The amount of reduced capacity due to planned maintenance
Service Interruptions (shortfalls)	Shortfalls attributed to TSO defaults	Amount of Service Interruption Fee paid by the Transporter
Compressor Stations Outages	Reducing the outages arising from operational defaults and line pack level reductions	Number of outages recorded
The cost of the OUG	Unit average price of the Own Use Gas paid by the Transporter	Benchmarking with the average Daily Reference Gas price
Demand Forecasts	Successful day ahead demand forecasts by the Transporter	Cap





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# Recommendations to implement proposed tariff structure including legislative changes, data requirements and data harmonization procedures





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- Currently applied the Revenue Cap Regulation for gas transmission tariff is generally adopted as the convenient regulation for incentive/efficiency basis tariff applications
- The Natural Gas Tariff Regulation refers to the concept of the “efficiency target” for gas distribution and there is no clear indication of the requirement for the involvement of efficiency targets in transmission tariff
- A specific methodology (as EMRA Board Decision) for the determination of “efficiency parameter” needs to be developed and published. This methodology should define the maximum level of revenue adjustment out of efficiency parameter and detail all incentives and indicators of the success and select targets for the Transporter for a certain tariff period
- Certain amendments to the BOTAŞ Gas Transmission Network Code are recommended. Those are mostly related with the facilitation of gas trading (both in land and across the borders) and efficient use of the network. Such amendments are also very much related with the alignment with the EU applications.





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### ➤ Amendment subjects related with the ŞİD:

- Introducing Short Term and Long Term Capacity Products
  - Introducing Interruptible Capacity Products
  - Special Terms and Conditions Applicable for the Interconnections at EU Borders
    - Incremental Capacity
    - Bundled Capacity
    - Bidirectional Flows
    - Nomination Procedures
  - Operational Balancing Arrangements
- Some of above stated directly affects the tariff derivation (like short term capacity products) and some can be part of incentives in terms of facilitation of gas trading (like operational balancing arrangements)





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# Workshop in relation with Task 1 – Improvement of performance-based tariff setting for transmission and distribution system operations (Bulgarian Case)

Dimitar Shterev, Senior Gas Expert NKE

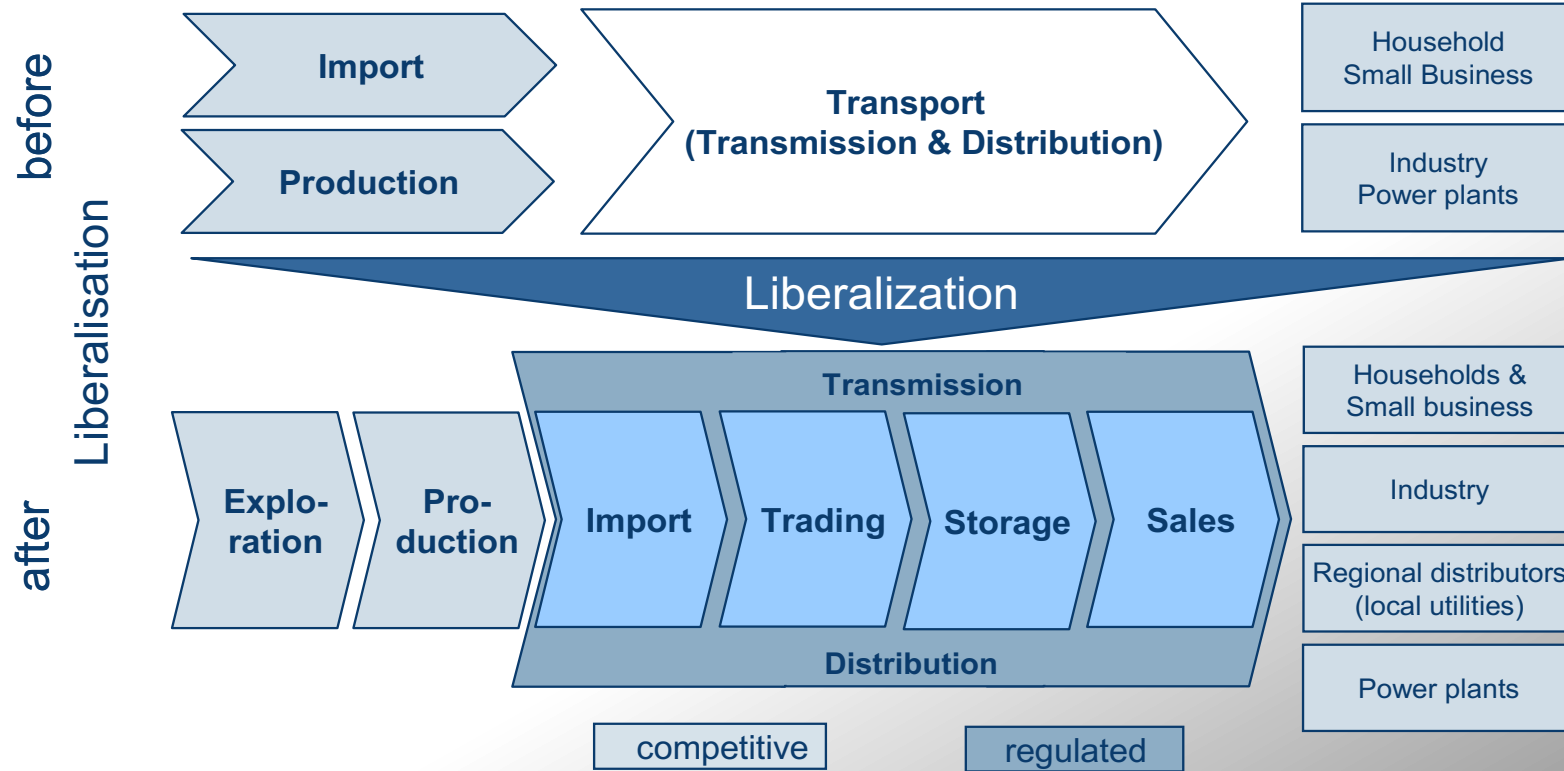
11 December 2019, EMRA, Ankara





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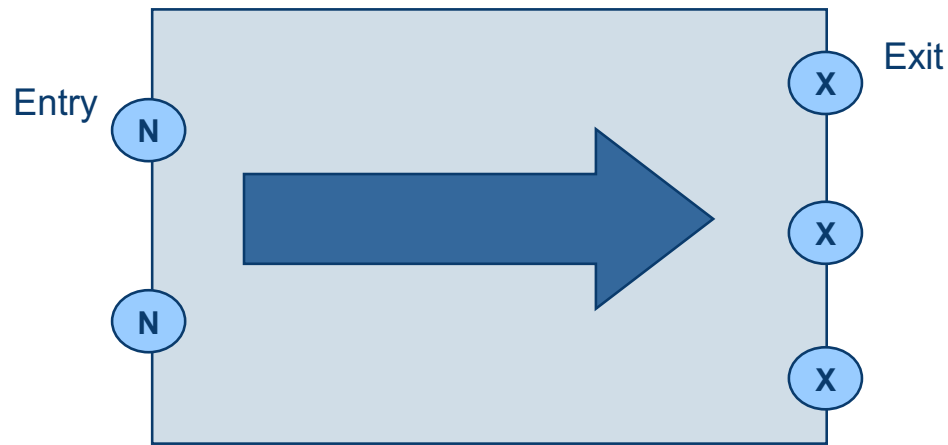
# Gas markets before and after liberalization



# Network access model

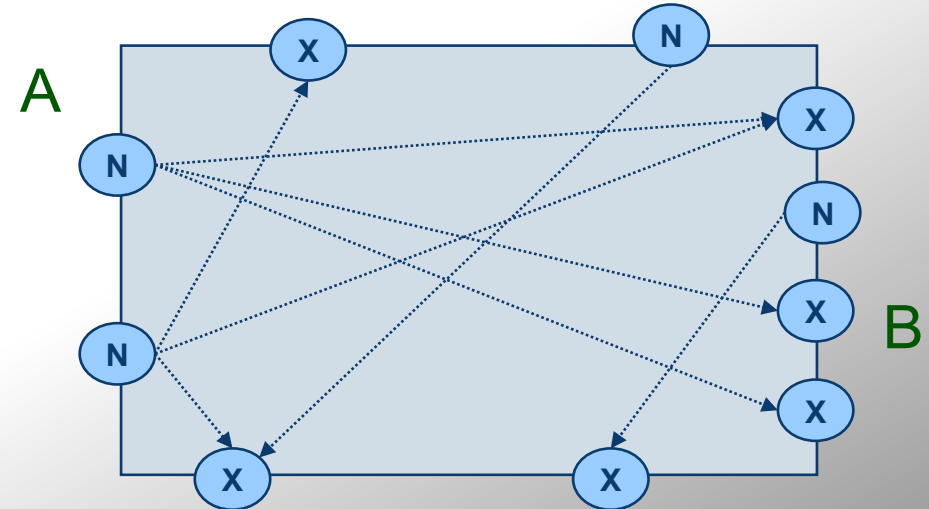
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Previous model (post stamp):



- Uniform tariff model regardless of distance and route;
- The costs of the tariff-setting operator are socialized from all points of the system;
- Easy to calculate by the TSO

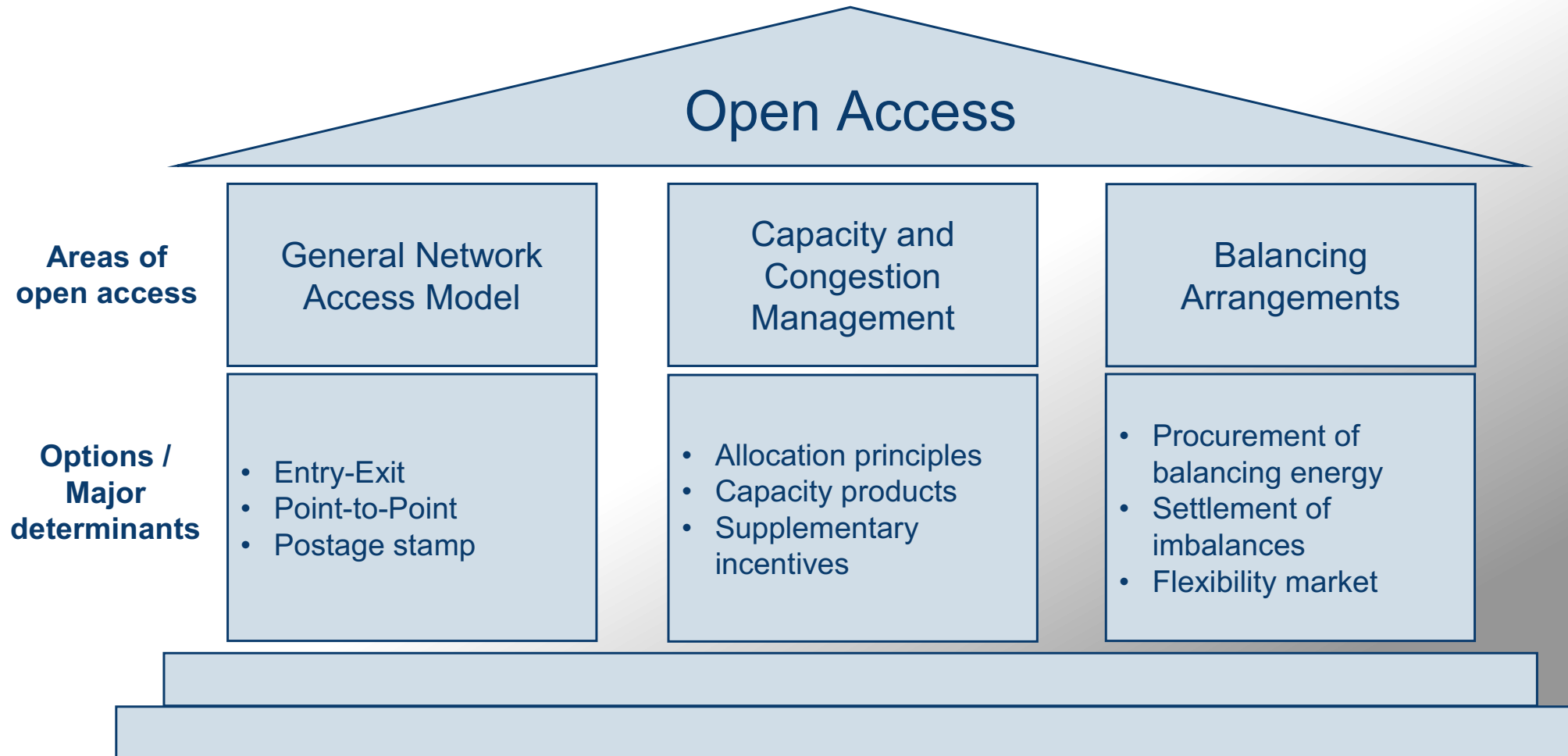
New model (Entry / Exit ):



- Allows reservation of entry and exit, as well as their free combination
- Stimulates higher level of trade between users



# Three-pillar model of open access regimes for gas infrastructure





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# Common model of network access

## FREE ACCESS

### Capacity and congestion management

- Services and products offered
- Capacity allocation
- Overload management

### Prices and fees

#### Entry / Exit tariff:

- Prices for access and transmission
- Excess capacity charge
- Imbalance charge

### Distribution of quantities carried over

#### Balancing

- Quantity allocation rules
- Settlement of imbalances
- Purchase of balancing energy



# Entry / Exit Model for Network access

The entry-exit access model allows network users to reserve capacity at each entry and exit point / zone separately, and network access prices at these points / zones may vary

- A mandatory access model for transmission system operators in the European Union;
- The users do not specify a specific transmission path for gas or distance, but only entry and exit points;
- The agreed capacities for input and output from the transmission system are separated and independent;
- The access service gives the right to introduce gas into the system or to remove gas from the system;
- The virtual outlet ensures the independence of entry and exit points;
- User reserved only entry capacity can sell at the virtual point and vice versa.



# Entry / Exit Model Tariff Model

- The prices are determined for each entry and exit point / area for the typical transmission services offered:
  - Accessibility - provision of capacity
  - Transmission - transmission of real quantities of natural gas
- The basic requirements for the product portfolio of transmission operators are defined in Regulation No 715/2009.
- The capacity products offered in the input-output model depend on the characteristics:
  - Hardness: solid and breakable products
  - Duration: short-term (intraday; daily; monthly; quarterly) and long-term (annual) products
  - Seasonality (for short-term products): summer and winter products
  - Special products: virtual reverse haul capacity; capacitive products for access to / from natural gas storage facilities



# Timeline of tariff model development

Dec. 2012–Jan. 2013: Conducted interviews with the CWER staff for the implementation of an input-output tariff model. Two variants of preparation of Methodology and Guidelines are considered. The Methodology option is selected. Bulgartransgaz EAD has developed a draft Methodology without a cost allocation mechanism submitted for consideration. By decision of CWER returned the draft Methodology with mandatory instructions for processing.

Apr.–Nov. 2013: Bulgartransgaz EAD with hired consultant Kema Consulting, Nederland develops an entry-level tariff model based on the upper income limit adjustment method and the Cost Allocation Matrix method expressed in a letter submitted to the CWER draft methodology for determining prices for access and transmission of natural gas through the gas transmission networks owned by Bulgartransgaz WAD. Meetings and consultations were held with the CWER staff and experts.

Aug. 2014: The Methodology was adopted in Mar. 2016, CWER was requested to prepare a draft for modification of the adopted Methodology. In May 12, 2016, Bulgartransgaz EAD submitted a draft amendment to the Methodology. The amended Methodology was promulgated in 30.09.2016 by SG 76.



# Timeline of tariff model development



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According to the methodology, Bulgartransgaz EAD submits application on 10.11.2016 for approval of a Business plan for the development of the activity of natural gas transmission and application no. to approve revenue requirements for the regulatory period;

In accordance with the binding instructions from the CWER, expressed in letters dated Dec. 2016 submitted by Bulgartransgaz EAD business plan drafts and application for approval of required revenue have been revised and re-submitted;

After reviewing the documents submitted, as well as the requested additional information, Bulgartransgaz EAD has approved the necessary revenues for the period 2017-2019 by decision. The draft Business Plan for the same period was adopted.

On 03.08.2017 Bulgartransgaz EAD announces on its page Public discussion of draft tariff structure and project of prices for access and transmission of natural gas through the gas transmission network owned by Bulgartransgaz EAD for the calendar year 2017.

## Further steps:

- Deciding on tariff setting;
- Entering prices and their implementation;
- Annual update of the current prices for access and transmission



# Basic ideas of the Entry / Exit Model

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- Multi-year pricing model - 'Top of Revenue' method. Regulatory periods of 2-5 years. For the first regulatory period 3 years;
- Reimbursement, by means of access prices and carry-over, of the revenue required for carrying out the carry-over activity, approved by the Commission for each regulatory period;
- Provide incentives to improve operator effectiveness;
- Different conditions for all transmission system users. Users are treated equally regardless of size, ownership or other factors;
- Ensuring price stability, transparency of their formation process;
- Determining the price for access and transmission of natural gas at entry and exit points / zones;
- Application of the Matrix Approach for the allocation of costs by entry and exit points / zones;
- Opportunity to form a single exit national zone;
- Opportunity to reduce access prices for entry and exit points to / from natural gas storage facilities.



# Financial model

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Formation of necessary revenue for each year of the period:

$$NGPt = BNGPt + Ct + Ut$$

$$BNGPt = BNGPt - 1 (1 + It-1) (1-X)$$

Ct - directly transferable costs X - GNP smoothing factor,

Yt - yearly adjustment on the basis of a BVO account - base for return for the base year,

IT - inflation index for the previous period Operating controls. costs for the base year,

HB - rate of return for the reference period Ao - depreciation deductions for the base year

BNGPt - basic required annual revenue

The pricing elements are in line with the approved business plan for the development of the activity for the regulatory period.



# Financial model

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Determination of the factor for smoothing down the basic required income

$$\sum_{t=1}^n \frac{ГИС_t}{(1 + HB)^t} = \sum_{t=1}^n \frac{БНП_o (1 - X)^t}{(1 + HB)^t}$$

HB - rate of return for the regular period;

X - BNP smoothing factor;

At - annual depreciation; BVt - return basis for the year;

GISt - the annual calculated amount of operating controlled costs, depreciation and return on assets; Pt - operational control. expenses for the respective year

$P_t = P_{t-1} \cdot (1 - E)$ ;  $P_1 = P_{cp} \cdot E$  - coefficient of efficiency determined by the regulator Pcp - averaged expl. control. costs for the regulatory period



# Cost Allocation / Matrix Model

1. Determining the required revenue related to access prices
  - Starting point for calculating access prices
  - It is determined by subtracting the necessary revenue attributable to the transmission cost from the total required revenue
2. Distribution of costs by sections
  - Determining unit costs by using the technical capacity of the sections and the cost of asset replacement
3. Determination of input-output tariffs
  - Building a unit cost matrix
  - Calculation of tariffs by minimizing differences between unit costs and input / output. tariffs
4. Additional adjustments
  - Adaptation of tariffs to meet the requirements: coverage of required revenues, competitiveness, sustainability, accessibility for network users



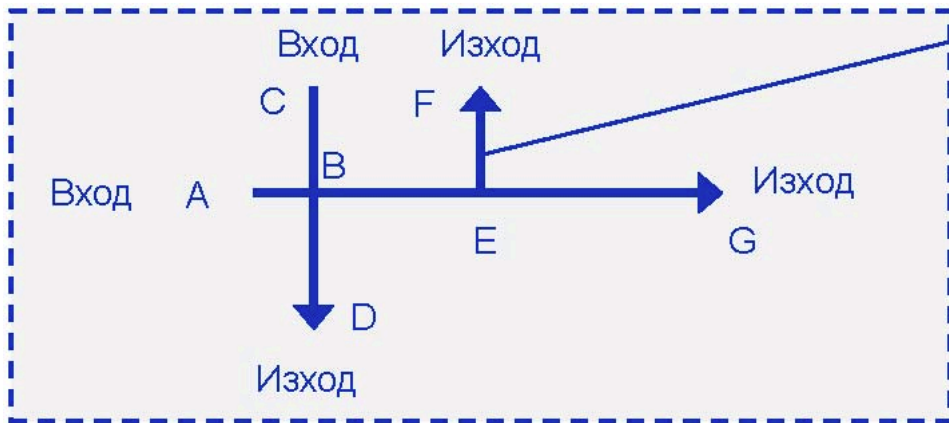
# Cost distribution by gas pipeline sections

- Obtaining cost-oriented tariffs requires the allocation of total costs (revenue required) by individual entry and exit points. Initially, the costs are distributed over gas pipelines;
- A foreign key based on the cost of replacing the respective section is used to allocate the cost of the gas pipeline sections;
- The partition between the allocated costs to the specific section and the peak flow determines the unit costs for each section;
- In the process of gas transmission between the entry and exit points of the system, certain sections are defined, defined by the shortest path between the two points;
- On the basis of the above, a unit cost matrix can be constructed that gives the accumulated costs of transporting one unit of natural gas from each entry point to each exit point.

# Cost distribution by gas pipeline sections

An example of applying replacement cost to determine single cost

Each gas pipeline has its own replacement cost



Section	Length [km]	Diameter [inch]	Replacement costs, [mln. Lv.]
AB	50	36	76,25
CB	100	36	152,50
BD	125	30	153,75
BE	200	30	246,00
<b>Total:</b>			<b>628,50</b>



# Distribution of costs by gas pipeline sections

This can be achieved by solving an optimization problem using the least squares method consisting of the following configuration:

$$\min \sum_i \sum_j (C_{ij} - (T_{Ni} + T_{Xj}))^2 \text{ at } T_{Ni}; T_{Xj} > 0$$

where  $C_{ij}$  is the sum of the unit cost of individual sections from  $i$  to  $j$

$T_{Ni}$  - entry point price  $i$

$T_{Xj}$  - exit point price  $j$

- After receiving unqualified prices, additional settings are required to receive the final tariffs:
  - Scaling to get the revenue you need;
  - Compare prices for points from a predefined area.



# Procedure

- Approval of required revenue from EWRC.
- Approval of basic parameters of the tariff model.
  
- Defining the scope of application of the methodology (gas transmission networks / gas transmission system);
- Separation of necessary revenue, paid through access and transmission charges;
- Distribution of the necessary revenues from the access price paid from entry and exit points;
- Short-term pricing factors;
- Cost factors for special products (backhaul and capacity products to storage facilities);
- Entry and exit points / zones for pricing needs.
  
- Formation of prices for access and transmission of natural gas at entry and exit points / zones - Draft tariff structure and prices for transmission and access.
  
- Public Discussion of the Draft Price.
- Decision to implement specific access and transmission charges
- Entering into force the transmission charges for access and transmission.



# Tariff structure

Network users pay a price for access (capacity) at entry and exit points / zones, depending on the services offered for the right to carry natural gas from / to the respective points / zones

- for annual capacity product;
- for a quarterly product capacity;
- for monthly capacity product;;
- for daily capacity product;
- for daytime product capacity;

The cost of access depends on the volume and type of capacity reserved for the respective point / area  
It is determined in units of capacity (BGN / MWh / day) for the period of service provision

- Network users pay a transmission fee depending on the actual quantities of natural gas transported to the starting point
  - Determined in units of quantity (BGN / MWh);
  - Transport component - accrued at entry and exit points / zones;
  - Community Liabilities component accrues to national exit points to GHG clients
- Price for overcapacity



# 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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## Natural Gas Distribution Part





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- Natural Gas Law No.4646
- Natural Gas Market Tariffs Regulations
- Natural Gas Market Tariffs Methodology
- EMRA Board Decisions





## Main Parameters of Turkish Natural Gas Distribution Tariff

- Natural Gas Distribution Companies are in the second tariff period.
- There are 72 distribution companies in 81 provinces.
- 60 companies completed 8th year, 12 companies have not completed 8 year of their license period.



## Main Parameters of Turkish Natural Gas Distribution Tariff

- Distribution companies are owner of the grid.
- License Length is 30 years
- Distribution Tariffs are valid for 5 years.
- Price Cap regulation
- WACC methodology is used in determining Rate of Return
- Depreciation period is 22 year



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## Main Topics of Task 1.1 – Distribution Part

Stakeholder  
Responsibilities

Revenue  
Requirement  
Model

Regulatory  
Asset Base

Rate of Return

Depreciation

Connection  
Fees

Performance  
Indicators

Efficiency

Shrinkage

Tariff  
Determination  
for Consumers



## Summary Table of DSOs

Country	Distribution Pipeline Length-[Km]	Number of Subscribers – Delivery Points	Numbers of Network Operators	Ownership of the grid	Tariff Validity [Length-Year]
Austria	46.000	1.349.000	21 Distribution Companies	Private and Public	
Croatia	20.310	647.000	36 Distribution Companies. 2 Distribution Companies have over 100.000 subscribers.	Private and local public ownership	5
Denmark	17.924		3 Distribution Companies	Public Ownership	4
Finland	3.229	31.000	25 Distribution Companies	State, local public and private ownership	4
France	232.094	11.268.000	26 Distribution Companies	Private and public ownership (indirect and local)	4
Germany	505.000	20.979.000	728 Distribution Companies	Private and local public ownership	5
Greece	7.392	325.000	3 Distribution Companies	State ownership and private investors	
Hungary	89.004		10 Distribution Companies	2 public, 8 private	4
Ireland	13.685	661.000	1 Distribution Companies		5
Italy	291.038	23.203.000	210	Private and Public, and mixed public-private property	6
Lithuania	10.507	562.000		State owned, private investors	
Luxembourg	3.159	86.000	3 Distribution Companies	Mainly direct and indirect public ownership	3
Netherlands	133.546	7.152.000	There are 9 distribution companies. 2 distribution companies have less than 100.000 subscribers.	Local public ownership (public by law)	3, tariffs are revised yearly
Poland	189.949	6.852.000	While 35 distribution companies operate, 34 of 35 companies operates small distribution regions.	Indirect state-owned, public and private	1
Portugal	18.502	1.382.000	11 Distribution Companies	Private ownership	3
Spain	81.807	7.556.000	A total of 6 Distribution Companies continue their activities. 4 Distribution Companies serve about 7 million subscribers.	Private: utilities and investment funds	
Sweden	3.500	37.000	5 Distribution Companies	Municipality and foreign ownership	4
Turkey	144.000	16.052.567	72 Distribution Companies	Private and Public	5
UK	285.600		31 Distribution Companies	Private and Public	8



## Stakeholder Responsibilities

In this section, Italy, UK, Germany, Portugal, Spain and Turkey is studied.

- Regulatory responsibilities are generally similar in many EU countries and Turkey. In Spain, determining tariffs and its development are done by Ministry.



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- In **Italy**, the Regulatory Authority for Energy Networks and the Environment (**ARERA**) carries out regulation and control activities in the electricity, natural gas, water services and waste cycle.
- In **UK**, the regulatory body is **OFGEM** (United Kingdom Office of Gas and Electricity Markets), governed by the Gas and Electricity Markets Authority. It has initiated the RIIO (revenue = incentives + innovation + outputs) program on 1 April 2013 and has been publishing reports on RIIO Gas Distribution which review the progress made by the relevant DSOs and provide information on how the DSOs are performing against their obligations and incentives.
- In **Germany**, The regulatory body is **Bundesnetzagentur** and is the responsible authority in Germany for both gas and electricity networks in various sectors. Operators with more than 100,000 customers or whose network area covers more than one federal state are regulated by Bundesnetzagentur.



## 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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- In **Portugal**, the regulatory body is **ERSE** (Entidade Reguladora dos Serviços Energéticos, Energy Services Regulatory Authority) and it develops and approves the Tariffs Code in which we find the established tariff calculation methodology and prices for natural gas, and the forms of regulation of allowed revenues.
- The regulatory body is the Ministry for the Ecological Transition and CNMC is proposing and consultation body. There are 19 gas DSOs that are part of 6 groups which are monitored and regulated by CNMC.





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- The regulatory body is the Energy Market Regulatory Authority (EMRA) and it is associated with Ministry of Energy and Natural Resources. EMRA is responsible for calculating all aspects of tariffs including consumer tariffs.
- There are 72 DSOs, and all are regulated by EMRA.





# Revenue Requirement Model

- EU countries' regulatory bodies use different overall approaches to setting allowed revenues such as revenue cap, price cap, cost-plus, and rate of return, hybrid and other approaches that do not fit into former examples.
- The revenue cap model is the most common model with a hybrid model. Regardless of the overall approach, EU countries are using incentive-based schemes to calculate the required revenue for DSOs.

# Revenue Requirement Model

Country	Tariff Methodology	Period	Main Elements for Determining Cap
Austria	Hybrid	2018-2022	Efficiency scores and general productivity offset, network price index and expansion factors, efficiency dependent WACC
Croatia	Revenue Cap	2017-2021	OPEX and CAPEX OPEX is projected for regulatory period based on 1+CPI-X formula, without ex-post adjustment if realized above, but with profit-sharing mechanism if realized below projected level.
Czech Republic	Revenue Cap	2016-2018	Allowed costs, Allowed depreciation, RAB, WACC
Denmark	Revenue Cap	2018-2021	Costs in previous period Fixed interest rates; 4-year period.
Estonia	Rate of Return		Variable costs, Operating costs, Depreciation of RAB, Justified return of RAB
Finland	Revenue Cap	2016-2019	Innovation- and Investment incentive, WACC return on RAB
France	Hybrid	2016-2020	Cost data (detailed OPEX and CAPEX), WACC and its underlying parameters, quality of service scores, regulatory accounts
Germany	Revenue Cap	2018-2022	Non-controllable and controllable costs, TOTEX efficiency benchmark, efficiency bonus, general inflation and sectoral productivity factor, volatile costs
Greece	Revenue Cap	2017-2021	OPEX (Non-controllable and controllable costs) Depreciation, RAB (Assets and approved investment plans, working capital), WACC and WACC premium
Hungary	Incentive Regulation	2017-2020	Hybrid Model
Ireland	Revenue Cap	2017-2022	Review of historic and forecast OPEX, Review of historic and forecast Capex, Value of Assets in TSO's RAB, Rate of Return and Inflation
Italy	Hybrid System	2014-2019	Hybrid system, partly price cap (OPEX) and partly cost of service (CAPEX)
Lithuania	Price Cap	2014-2018	TOTEX, RAB, WACC, technical losses, efficiency benchmark
Luxembourg	Revenue Cap	2017-2020	Remuneration on RAB; depreciation, Controllable OPEX; Non-controllable OPEX
Netherlands	Price Cap	2017-2021	TOTEX, cpi, yardstick, productivity change, WACC, RAB
Norway			Under Development
Poland	Revenue Cap		Depreciation, local taxes, operating costs, cost of gas losses, pass-through costs and return on capital employed
Portugal	Hybrid	2018-2019	Price-cap (OPEX) and rate of return (CAPEX) Non-controllable and controllable costs, RAB, WACC, efficiency benchmark, inflation, mechanism for mitigating volatility of demand
Romania	Revenue Cap	2013-2018	Non-controllable (pass-through) and controllable costs, efficiency factor, general inflation rentability of RAB (RABxROR) depreciation, technological consumption, working capital
Spain	Revenue Cap	2021-2026	The allowed revenue of the preceding year, changes in the number of clients, changes in the volume of gas distributed
Sweden	Revenue Cap	2015-2018	TOTEX (divided into CAPEX, Non-controllable OPEX and Controllable OPEX). General efficiency target of reducing 1 percent of controllable OPEX annually



## Revenue Requirement Model

- In UK, RIIO (Revenue = Incentives + Innovation + Outputs) price control framework has been in use since 1 April 2015, and it will be in use until 31 March 2023, which makes an 8-year regulation period. The RIIO model of network regulation is designed to drive real benefits for consumers.
- RIIO model varies from the building blocks, and common RAB applications, two key components of the model, are RAV and TOTEX The Regulatory Asset Value (RAV) is a key building block of the price control review.



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## Revenue Requirement Model

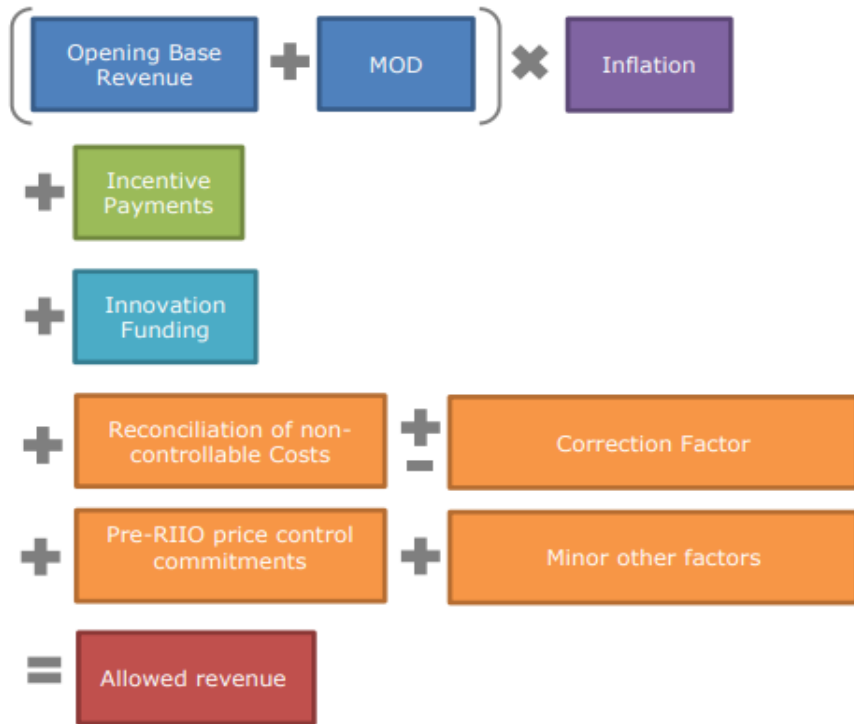


Figure 3.3 – Constituent components of allowed Revenue

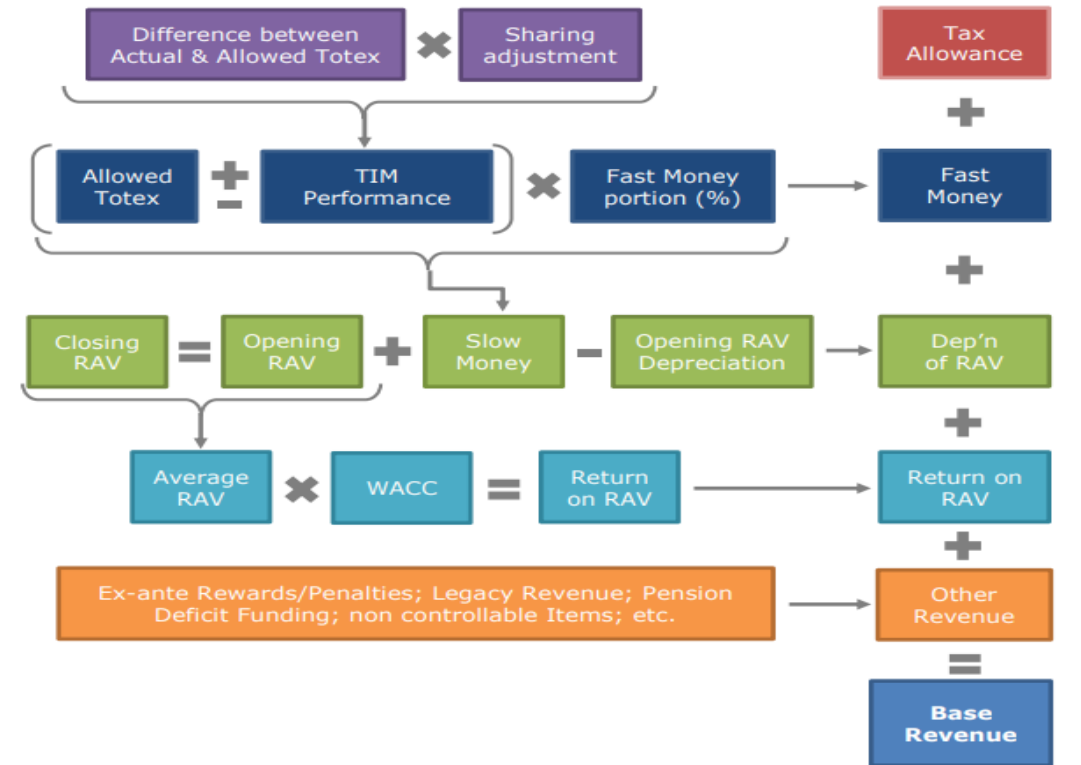


Figure 3.4 – Base Revenue calculation diagram





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# Revenue Requirement Model

- in Germany, **Incentive Regulation** : TOTEX approach.
- Sect. 21a EnWG and Incentive Regulation Ordinance (ARegV) set two regulatory periods with a duration of 5 years each (the first regulatory period for gas operators to last 4 years only) starting in 2009, thus providing for a longer planning horizon for operators: 5 years regulatory period.

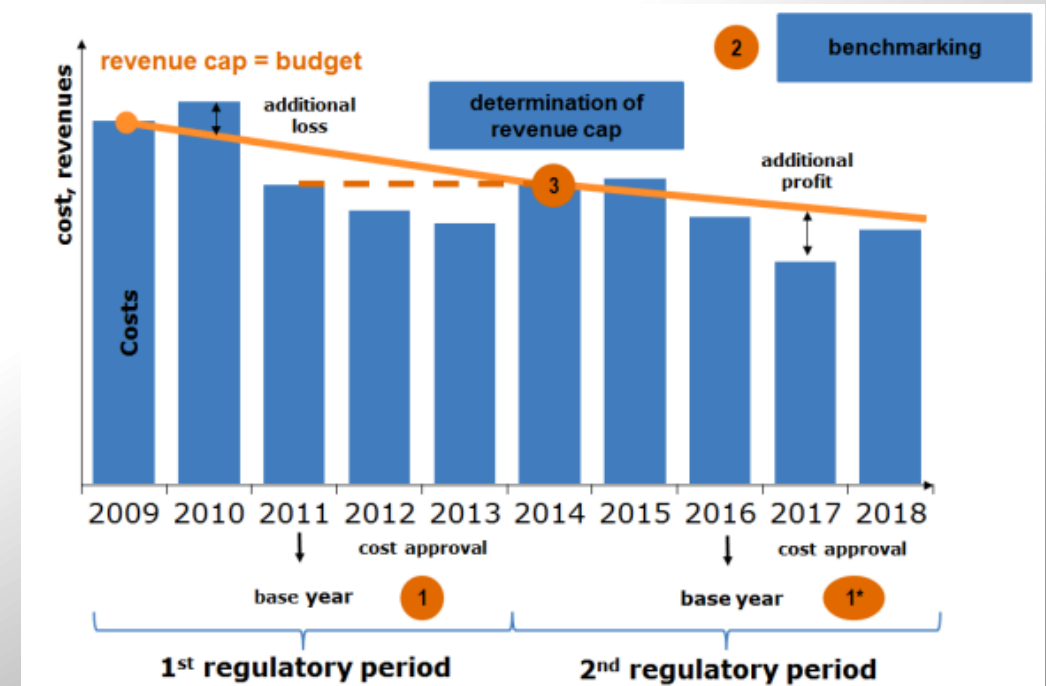


Figure 3.5 – Revenue cap changes



## Revenue Requirement Model

In **Portugal**, Natural Gas Distribution - price cap methodology for OPEX and rate of return methodology for CAPEX; a mechanism to recover authorized revenues associated with the evolution of demand, similar to the one used in Natural Gas Transmission, was also implemented.

A regulation based on incentives for OPEX, using

- a price cap methodology with one portion that is not indexed to the evolution of physical variables and three portions indexed to the evolution of the maximum capacity used in outlets variable;
- a rate of return methodology for CAPEX;
- a mechanism implemented for the regulatory period in force that aims at mitigating the effects associated with the volatility of demand in terms of authorized revenues recoverable via the application of the tariffs.



## Revenue Requirement Model

- Models used to calculate revenue requirement in EU countries are very similar in general, at the same time, can be quite different in detail and in the sense of application.
- Contrary to most of the EU countries, **Price cap model is implemented in Turkey**, however, above and below a certain revenue margin, revenue cap is implicated.
- Similar to most of the EU countries, Building Blocks model is in use in Turkey.
- CAPEX consists of return on capital with a set rate of return and amortization. OPEX consists of fixed costs and variable costs. Variable costs get multiplied by efficiency factor.
- Fixed part of OPEX is calculated by EMRA using the average of OPEX reported for last 3 years before the regulatory period.

Country	RAB Components	Regulatory Asset Value	RAB Adjustment
Austria	Intangible and fixed assets, book values	Historic cost approach	RAB developments during a regulatory period are taken into account and lead to changes of the regulated cost base
Croatia	RAB includes both tangible and intangible assets which is in operation and also planned investments which will be put in operation for each year of the regulatory period.	RAB is calculated as historical cost of the assets such as depreciated book value of the assets.	In the last year of the regulatory period revision of allowed revenues is performed. RAB is revised in way that the revised value of regulated assets at the end of each regulatory year t is equal to the realized value determined on the basis of balance sheet.
Czech Republic	Fixed assets, investments in progress, leased assets, no working capital	The RAB is based on reevaluated values of assets that are recorded in the annual financial statements.	The adjustment is similar to the net book value calculation (investment - depreciation), the formula for RAB adjustment is “investment – depreciation x k”; k is revaluation coefficient which is set annually and calculated as the result of dividing the planned value of the RAB in year “i-1” by the planned residual value of assets in year i-1; k = <0;1>
Denmark	Fixed assets, working capital, assets under construction and historical debt	Historical costs included return on capital	Investments in new assets after the base year lead to an adjustment of the CAPEX.
Estonia	Fixed assets, working capital, leased assets	Historical costs	The fixed assets do not include: 1) long-term financial investments; 2) intangible assets, except for software licenses; 3) fixed assets acquired with grant aid (including targeted funding); 4) fixed assets acquired with funds obtained from connection fees; 5) fixed assets which the undertaking does not use for the purpose of providing network service.
Finland	Fixed assets, working capital, leased assets	Regulatory asset value is calculated from network replacement value by applying network component-specific average age and lifetime selection.	Book values taken to RAB annually from balance sheet
France	Fixed assets	Historical revaluated costs (taking into account inflation and depreciation)	Subsidies and grants are removed from the value of assets before entering the RAB
Germany	Fixed assets, working capital, assets under construction	Net substance preservation for business assets capitalized prior to 1st 2006, real capital preservation for business assets as from 1st 2006	Investments in new assets after the base year lead to an adjustment of the CAPEX. No distinction between replacements and enhancements or expansions
Greece	Fixed assets, working capital, assets under construction	Historical costs	There is no adjustment
Hungary	Tangible assets	Network assets: depreciated replacement value; Non-network assets: historical costs.	The assets of the base year are modified yearly with modified CPI and T-1 year’s investments which were approved by the Authority
Iceland	Fixed operating assets	Book value	
Ireland	Fixed assets, intangible investment, and does not include inventories and assets under construction.	Replacement cost approach: Historic cost indexed to present value using inflation	RAB adjusted for disposals
Italy	Invested capital of localities (fixed assets), centralized capital and public and private contributions received.	<u>Capital of localities</u> : Book values and State of consistence communicated to the ARERA evaluated on the basis of a ‘historical revaluated cost’ approach (RAB). <u>Centralized capital</u> parametrically calculated on the basis of the pdr	RAB annually communicated to the ARERA. Every year the value of the DSOs’ assets is updated by the inflation index of the price of “investment goods”
Latvia	Fixed assets, intangible investment, and does not include inventories and assets under construction.	Book value as per financial reports (taking into account asset revaluations carried out by the operator at replacement cost value)	The RAB is adjusted and set when the operator submits the tariff proposal; during the period the tariff is in force there is no RAB adjustment taking place.
Lithuania	Fixed assets	Historical values. 160 mill Euro (2017)	New investments and depreciation
Luxembourg	Fixed assets containing production costs		
Netherlands	Fixed assets and certain intangible assets (such as software) are included, no working capital.	Indexed historical costs	Annual indexation (with CPI); Also, adjustment for certain specific (replacement) investments



## Regulatory Asset Base-RAB

- In UK, RAV (Regulatory asset value) which is a financial balance representing expenditure by the licensee which has been capitalized under regulatory rules, is in use. The licensee receives a return and depreciation on its RAV in its price control allowed revenues.
- For base revenue calculations a portion of **allowed TOTEX** is directly added to the base revenue (this is known as fast money as the company is allowed to collect revenue equal to this value during the next allowed revenue year). Regulatory asset value which is a financial balance representing expenditure by the licensee which has been capitalized under regulatory rules.



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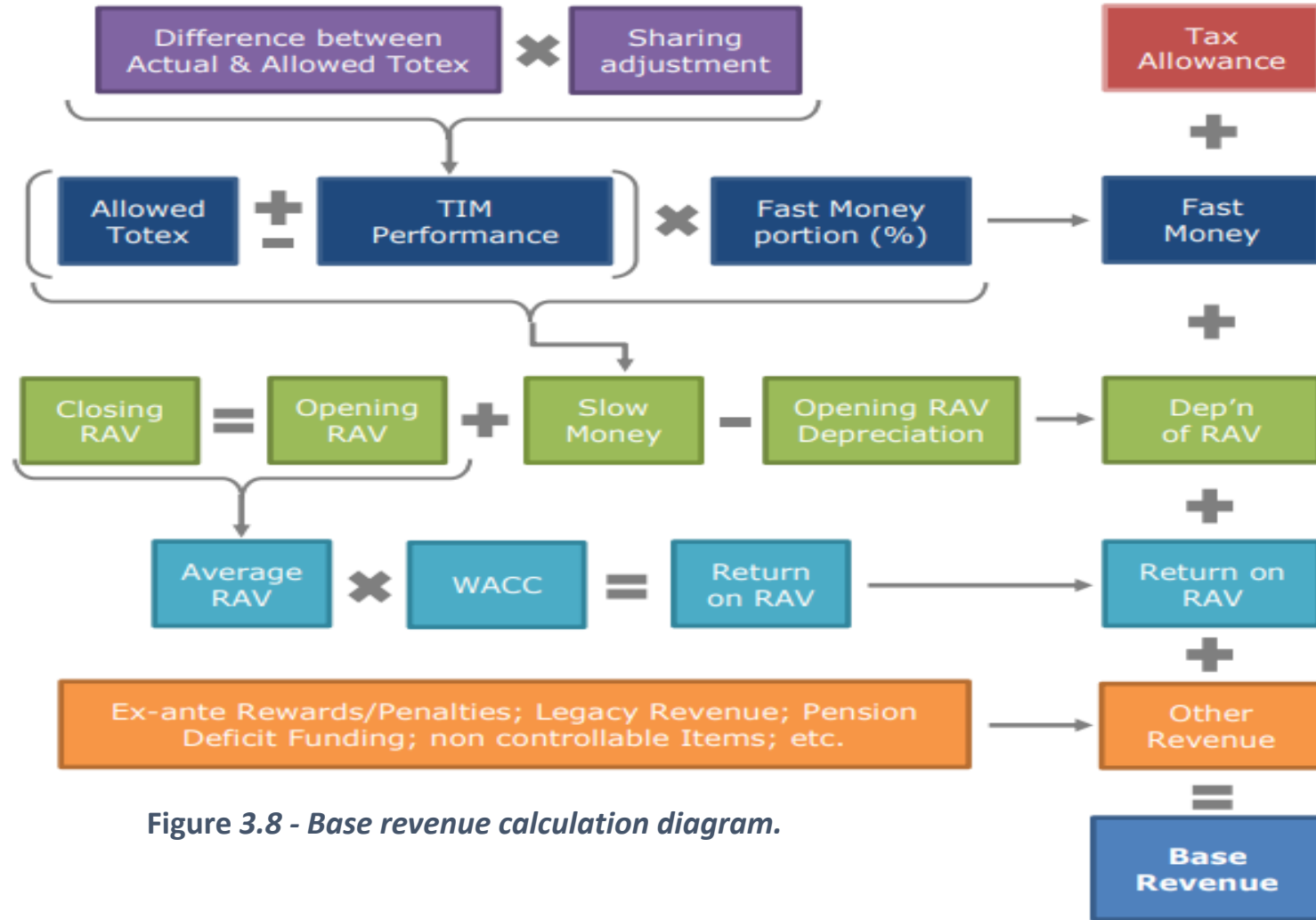


Figure 3.8 - Base revenue calculation diagram.



## Rate of Return

- A fundamental element of any revenue determination is the setting of the allowed or target return on capital, which is the return required by debt and equity holders to finance the investment in capital assets.
- Rate of return applies both to the existing asset base and new capital expenditure or assets, both of which are enshrined in the regulatory asset base or RAB.

Country	Type Of WACC	Determination of Rate of return equity	Rate of Return Before Taxes	Use of Rate of Return
Austria	Nominal WACC pre-taxes (equity share 40%, debt share 60%, beta transformation: Modigliani-Miller)	$rE = (\text{nominal risk-free rate} + \text{levered Beta} \times \text{MRP}) / (1 - \text{tax rate})$	8,16% (nominal pre tax, set in 2017, granted for the average efficient DSO) $= (1,87\% + 0,85 \times 5\%) / (1 - 0,25)$	WACC nominal pre-taxes * RAB (book values)
Belgium	No use of WACC	Sum of a nominal risk-free rate and a risk premium (market risk premium multiplied with a risk factor) multiplied with (1+illiquidity premium) multiplied with a corporate tax factor	$5,76\% = (0.90 + 3.5 \times 0.65) \times (1 + 0.20) \times 1,513$	Granted for existing assets to a maximum of 33% of the imputed business assets. Any available equity capital in the capital structure in excess of this will be subject to another equity interest rate
Croatia	Nominal pre-tax WACC	The rate of return on equity (re) is determined by applying the capital asset pricing model (CAPM), according to the formula: $re = rf + \beta \times (rm - rf)$	Rate of return on equity: 6,84% Risk-free rate of return: 4,25% Coefficient $\beta$ : 0,54 Market risk premium: 4,80% Rate of return on diversified market portfolio: 9,05% Share of equity in total capital: 50% Rate of return on debt: 4,88% (maximum value) Share of debt in total capital: 50% Rate of return on profit: 20% Amount of WACC for the regulatory period: 6,72% (maximum value)	The nominal weighted average cost of capital before tax (WACC) is used as the rate of return on regulated assets. As a measure of avoiding systemic risk, the rate of return on equity is calculated using the CAPM model, and the rate of return on debt capital is determined as the average weighted interest rate on investment loans used by the system operator to finance regulated assets. The shares of debt and equity capital are defined as target shares in the amount of 50%, which is theoretically optimal capital distribution and approximates the effect of the financial leverage to a good extent.
Czech Republic	Nominal, pre-tax WACC	Sum of nominal risk-free rate and a risk premium (market risk premium multiplied by beta factor)	$9.66\% = (3.82 + 5.00 \times 0.801) / (1 - 0.19)$	The whole RAB is multiplied by the WACC. When setting the nominal pre-tax WACC the D/E ratio of 38.48/61.52 was used.
Denmark	Nominal WACC pre-tax 4,51 (2017)	Sum of a nominal risk-free rate and a risk premium (market risk premium multiplied with a beta risk factor)	9	A risk-free interest rate calculated as an average of the last three months available daily observations of four-year zero-coupon rates for Danish government bonds.
Estonia	Pre-tax WACC nominal	Germany 10 years average bonds yield, Estonian risk premium, McKinsey market risk premium, Beta	$5,73\% (1,47 + 0,78 + (0,696 \times 5))$	4,58%
Finland	Nominal, pre-tax	Risk-free rate + beta*Market risk premium + Premium for lack of liquidity (+ additional risk premium for natural gas DSOs)	$9,41\% = (2,18 + 0,69 \times 5 + 0,6 + 1,3) / (1 - 0,2)$	Reasonable return is calculated by multiplying the adjusted capital invested in network operations by the reasonable rate of return. Therefore, company receives reasonable return on adjusted equity and interest-bearing debt invested in network operations.
France	Pre-tax, real	Sum of a real risk-free rate and a risk premium (market risk premium multiplied by a beta risk factor) multiplied with a corporate tax factor	$7.5\% = (1.6\% + 5.0\% \times 0.66) / (1 - 34,43\%)$	Multiplied with the whole RAB (except assets that were funded through subsidies or grants)
Germany	No use of WACC	Sum of a nominal risk-free rate and a risk premium (market risk premium multiplied with a beta risk factor) multiplied with a corporate tax factor	$6.91\% = (2.49 + 3.8 \times 0.83) \times 1.225$	Granted for existing assets to a maximum of 40% of the imputed necessary business assets. Any available equity capital in the capital structure in excess of this will be subject to another equity interest rate
Greece	Nominal, pre-tax	WACC: a) CAPM & additional country risk premium for cost of equity; and b) cost of debt based on operators' proposal and actual figures of base year	9.23%	WACC is applied on the value of Regulatory Asset Base (RAB) for each year of the Regulatory Period
Hungary	Real, pre-tax.	Sum of the real risk-free rate and risk premium (equity beta multiplied by market risk premium)	$6.14\% = (0.188 + 1.689 + 4.30 \times 0.72) / (1 - 0.19)$	
		$Re = (rf + (rm - rf) \times \beta + \text{specific risk}) / (1 - t)$ Sum of real		



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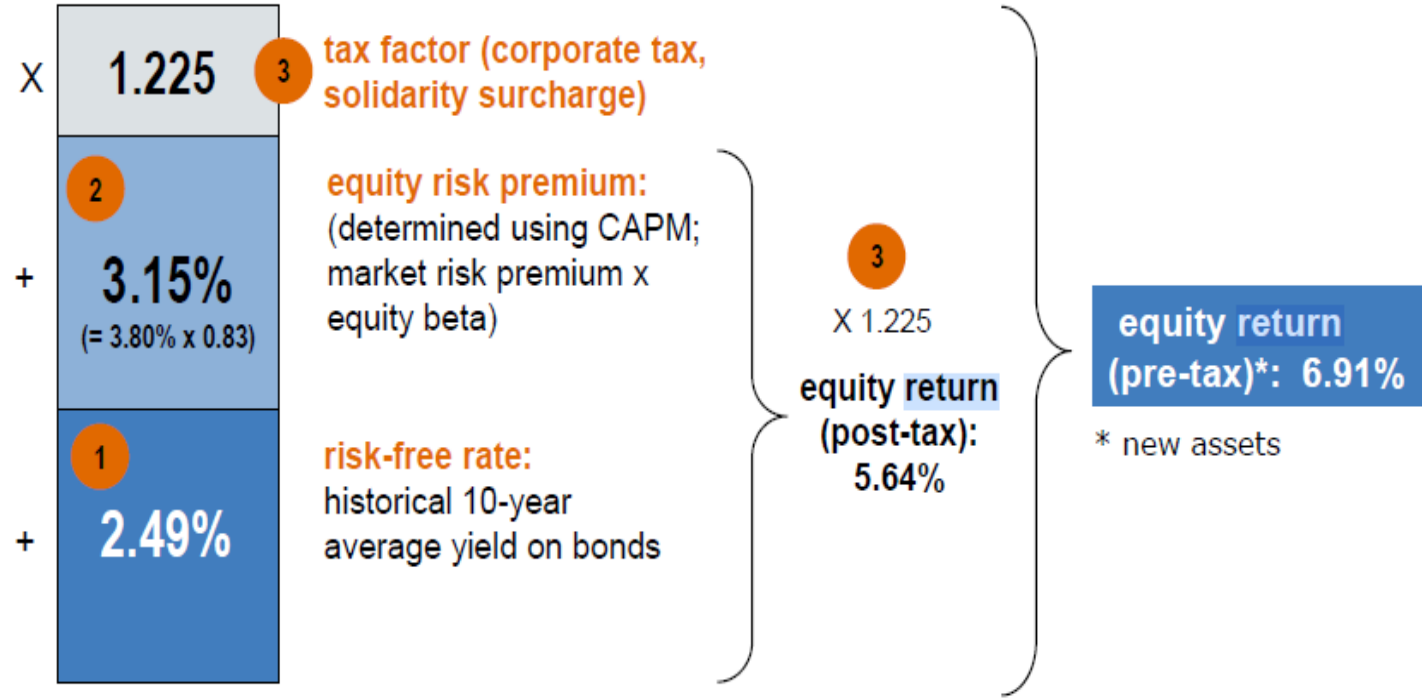


Figure 3.9 –WACC calculation in Germany



## Depreciation

Country	Method	Ratio	Consideration
<b>Austria</b>	Straight line	Depending on asset type: lines 2-3%, transformers 4-5%, substations 4%	Pass through
<b>Belgium</b>	Straight line	Depending on assets: pipes : 2%, compressors : 3%	Non controllable
<b>Croatia</b>	Linear method	2,86 % for gas pipelines, measuring and regulating stations and office buildings, while for other types of assets 5 - 10 %	Amount of annual depreciation of regulated assets is added to the allowed revenue
<b>Czech Republic</b>	Straight line		100% of the depreciation is used to determine the allowed revenue.
<b>Denmark</b>	Straight line	Depending on asset type	
<b>Finland</b>	Straight-line depreciation on replacement value of network. Depreciation is inflation corrected annually with CPI.	2,20%	Depreciation level based on average adjusted straight line based on the selected component lifetimes. Imputed straight-line depreciations are always allowed in full as far as the component is in actual use.
<b>France</b>	Straight line	Depending on asset type. Ratio between 2% and 4% for network assets (lines, pipes etc.)	Integrated directly and with 100% (except assets that were funded through subsidies or grants)
<b>Germany</b>	Straight line	Depending on asset type. Ratio between 1.5% and 4%	Part of the examined controllable costs
<b>Greece</b>	Straight line	Most assets are depreciated over a period of 25-50 years	Depreciation ratio depends on asset type and it is integrated directly into the revenues
<b>Hungary</b>	Straight line	Depending on asset type the useful lifetime (years): pipeline 50, compressor station 20, gas delivery station 30	Based on expected useful lifetime
<b>Iceland</b>	Straight line	Depending on asset type. Ratio between 2 and 20% e.g. TSO lines & cables: ~2%, stations: ~2,5%, DSO lines & cables: ~3%-4%	The regulator regularly inspects the RAB and the depreciations
<b>Ireland</b>	Straight line	Depends on asset category	Part of the examined controllable costs
<b>Italy</b>	Straight line	7-50 years and depends on asset category	Coherent with the CAPEX (centralized and localized)
<b>Latvia</b>	Straight line	Depending on asset type. Ratio between 1% and 20%, gas pipelines 1.7-2.5%,	Depreciation is a part of capital costs in the tariff
<b>Lithuania</b>	Straight line	3-60 years	Depreciation ratio depends on asset type. All depreciation of regulated assets is integrated into revenues.
<b>Luxembourg</b>	Linear method	Depending on the asset type. Useful lifetime 25-50 years for technical assets and constructions, and 3-20 years for IT related fixed assets	Depreciation is fully included in the allowed revenues
<b>Netherlands</b>	Straight-line depreciation, corrected for inflation (CPI) each year.	Most assets are depreciated over a period of 35 – 55 years.	Depreciation is part of the total costs, which are subject to an x-factor over the course of the regulatory period.
<b>Norway</b>	Linear depreciations from financial statements	Depending on asset type, must be approved by accountant	Part of examined controllable costs
<b>Poland</b>	Straight-line	Economic useful life is set according to requirements of accountancy law for adequate groups of fixed assets. Approximate EUL for compressors equals 5 years, measuring stations 15 years, pipelines and buildings 40 years.	A component of allowed revenue
<b>Portugal</b>	Straight-line	5-45 years	Part of CAPEX
<b>Romania</b>	Straight-line	Depending on asset type Buildings: 50 years; Pipes and technical ins.t: 40 years; Other: between 5 and 20 years; Land: no depreciation	Part of regulated revenue. The depreciation calculated for the previous year asset entries is directly and 100% integrated into the regulated revenues. Afterwards, when the tariff adjustments are made, the depreciation already



## Connection Fees

Connection fees, as the name indicates, are (in most cases) a one-off charge paid for the connection to the grid.

In general, three types of connection charges can be distinguished: super-shallow, shallow, and deep connection charges. The degree to which connection charges fully reflect the incremental cost of providing a user with a new or upgraded connection to the network depends on the type of connection charge.

With **super-shallow** connection charges, no costs are charged for the connection.

**Shallow connection charges** imply that grid users pay for the local infrastructure connection costs (the cable between a house and local feeder and other necessary equipment); these costs are easily attributed to a specific user.

**Deep connection charges** consist of the shallow charges all the possibly incurred costs for wider network reinforcements needed to accommodate the connection request. Deep connection charges are designed to fully reflect the incremental cost of providing a user with a new or increased connection to the network.



## Performance Indicators

In United Kingdom, there are many indicators which is regulated by OFGEM.

- Network Safety
- Network Reliability
- Customer Service
- New connections
- Social Obligations
- Protection of Environment



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



This project is funded by the European Union

## Performance Indicators

2017-18 OUTPUT PERFORMANCE							
Company	Network	Environment	Connections / wider works	Customer Satisfaction	Social Obligations	Safety	Reliability / Availability
CADENT	EoE	Meeting	Meeting	Meeting	Meeting	Meeting	Meeting
	Lon	Meeting	Meeting	Missed customer satisfaction target on main gas connections	Off track from FPNES connections 8 year target	Meeting	Challenges in meeting unplanned interruptions duration target
	NW	Meeting	Meeting	Meeting	Meeting	Meeting	Meeting
	WM	Meeting	Meeting	Missed customer satisfaction targets on duration of planned works and main gas connections	Meeting	Meeting	Meeting
NGN	NGN	Meeting	Meeting	Meeting	Meeting	Meeting	Meeting
SGN	Sc	Meeting	Meeting	Meeting	Meeting	Meeting	Meeting
	So	Meeting	Meeting	Meeting	Off track from FPNES connections 8 year target	Meeting	Meeting
WWU	WWU	Meeting	Meeting	Meeting	Meeting	Meeting	Meeting

Figure 3.11 –Output performances of DSOs

Note: Red > DSOs failed to achieve an annual or 8-year outputs  
 Amber > DSOs at risk of not meeting annual or 8-year outputs  
 Green: DSOs met or on-target to meet annual or 8-year outputs





# Efficiency Score Calculation Methods

In Germany, there are two approaches to measure efficiency:

1. Data Envelopment Analysis
2. Stochastic Frontier Analysis

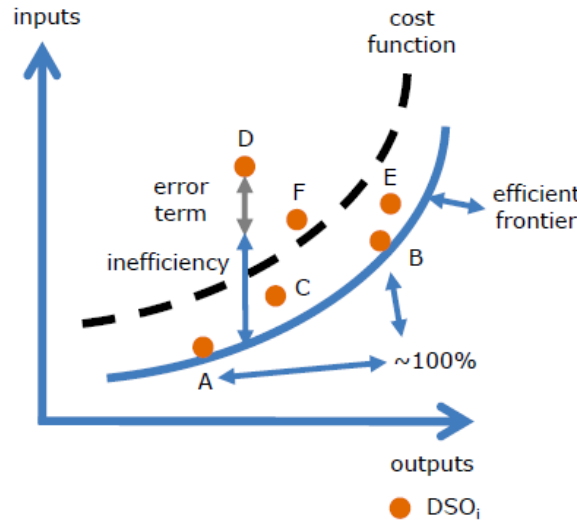


Figure 3.13 – Data Envelopment Analysis

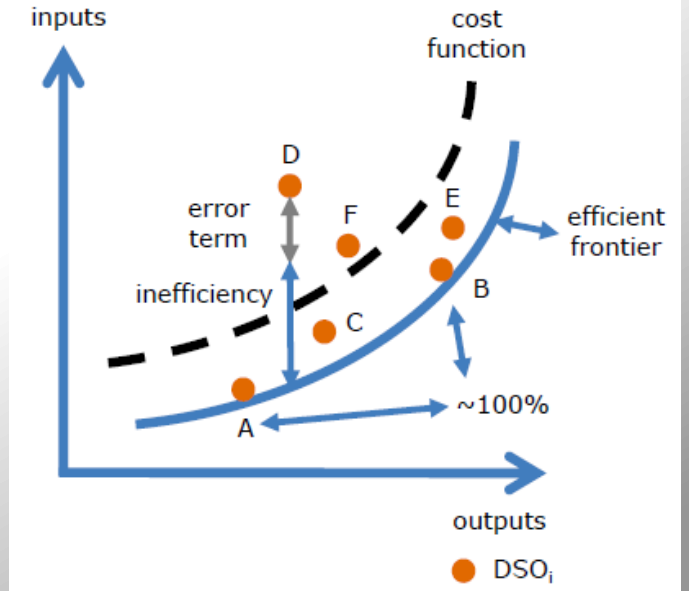


Figure 3.14 – Stochastic Frontier Analysis



## Shrinkage-Loses

- In United Kingdom, Shrinkage is the dominant element of DSOs business carbon footprint and accounts for more than 0.75% of UK's greenhouse gas emissions. Shrinkage is comprised of leakage from pipelines (approximately 95%), theft from the DSO network (approximately 3%) and own-use gas (approximately 2%). DSOs must meet annual leakage targets. There are two incentives for reducing shrinkage (leakage).
- In Turkey, At the moment, since the lines are newer, the leaks on the line can be kept below a certain level, but since the investment period is still progress, the amount of gas thrown into the air are greater than the leakage during commissioning or measurement.



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

## Tariff Determinators for Consumers



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Country	DSO	Government	The NRA	Main Responsibility
<b>Austria</b>	Providing opinions	Providing opinions	Sets principles, methodology, values and approves tariffs	NRA
<b>Belgium</b>	Main responsibility	Defines main principles	Approves DSO proposals	NRA/DSO
<b>Croatia</b>			Sets tariff structure after public consultation	NRA
<b>Czechia</b>			Main Responsibility	NRA
<b>Denmark</b>	Main Responsibility	Sets rules	Set rules and approved tariff	NRA/DSO
<b>Estonia</b>	Main Responsibility	Defines main principles		NRA/DSO
<b>Finland</b>	Sets the tariff levels			NRA/DSO
<b>France</b>		Defines main principles	sets rules and monitors ex-post	NRA
<b>Germany</b>	Implements	Issues tariff structure rules	Main Responsibility	NRA
<b>Greece</b>			The tariff is defined by the maximum allowed revenues	NRA
<b>Hungary</b>		Defines main principles	Main Responsibility	NRA
<b>Ireland</b>	Calculates for NRA Approval		Main Responsibility	NRA
<b>Italy</b>	Provides the regulator with data on its cost and quality levels	Defines main principles	Issues tariff structure	NRA
<b>Lithuania</b>	Proposes after consultation	Defines main principles	Sets principles, methodology, values and approves tariffs	NRA
<b>Luxembourg</b>			Main Responsibility	NRA
<b>Poland</b>	Proposes tariff structure to NRA	Sets general rules	Takes decision on tariff structure based on DSO proposal	NRA/DSO
<b>Portugal</b>		Defines main principles	Main Responsibility	NRA
<b>Slovakia</b>	Calculates for NRA Approval	Defines main principles	Sets principles, methodology, values and approves tariffs	NRA/DSO
<b>Slovenia</b>		Issues primary law	Sets a general act with methodologies and charges	NRA
<b>Spain</b>			Sets tariff structure	NRA
<b>Sweden</b>	Decides on the tariff structure		May take decisions on tariff structures in individual cases, according to non-discriminating requirements	NRA/DSO
<b>Netherlands</b>	Proposes tariffs to the NRA	Sets the principal of the tariff structure	Makes final decision on proposed tariffs	NRA/DSO
<b>United Kingdom</b>	Proposes tariffs to the NRA		Takes decision on tariff structure based on DSO proposal	NRA/DSO





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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# Tariff Structure Assessment and Recommendations Report

## Gas Distribution Italian Case

G. Caponigro Senior Gas Expert NKE

11 December 2019, EMRA, Ankara





# Introduction - Content & Objects

## Italian Gas Market

- Supply chain
- Regulatory timeline
- Regulator
- The regulatory process

## Tariff mechanism and structure

- Scheme
- Methodologie
- Tariff timeline

## Key issues

- OPEX
- CAPEX
- RAB
- WACC
- Depreciation

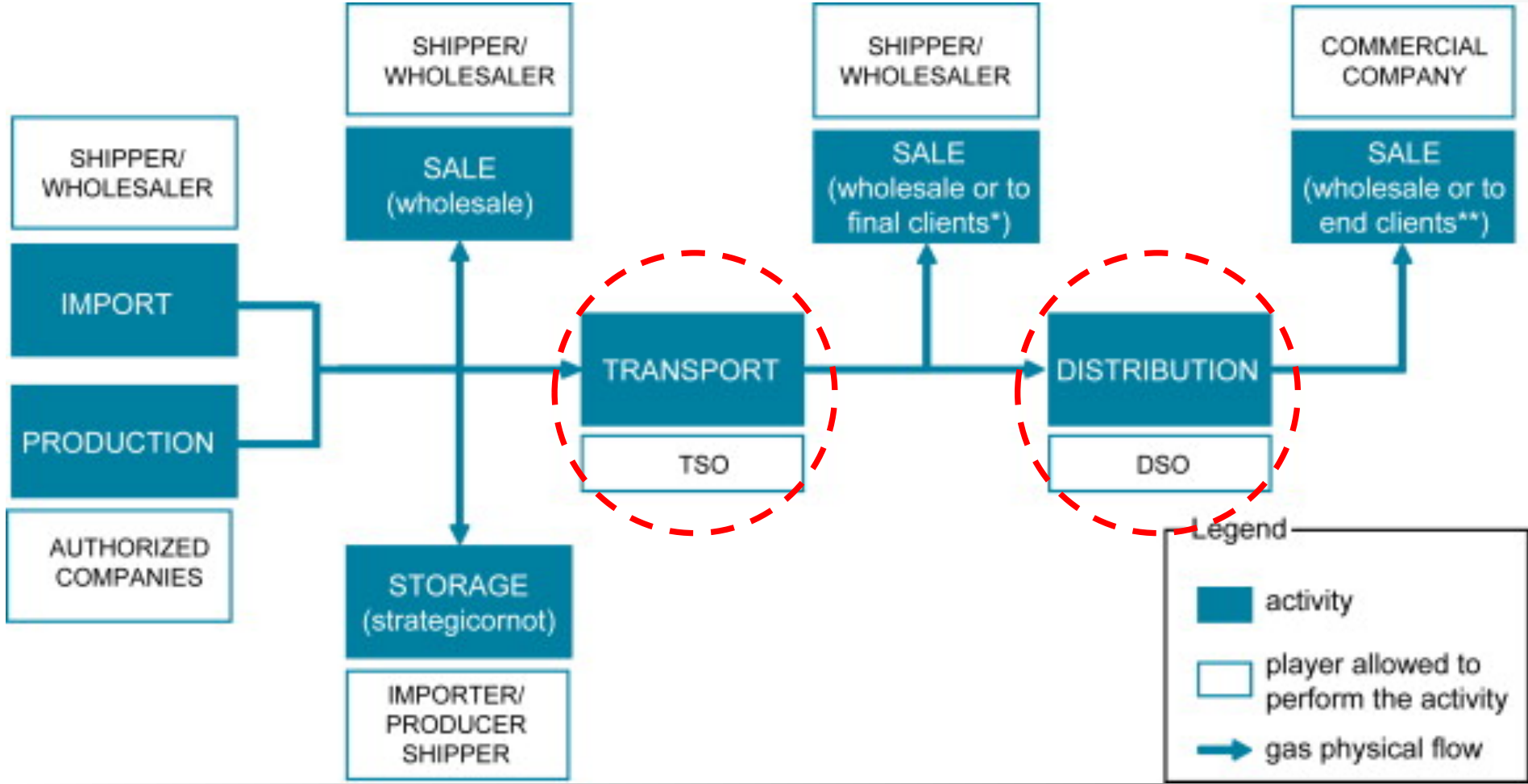
## Conclusion

- Results of this tariff scheme



# Gas Supply Chain – Market Structure

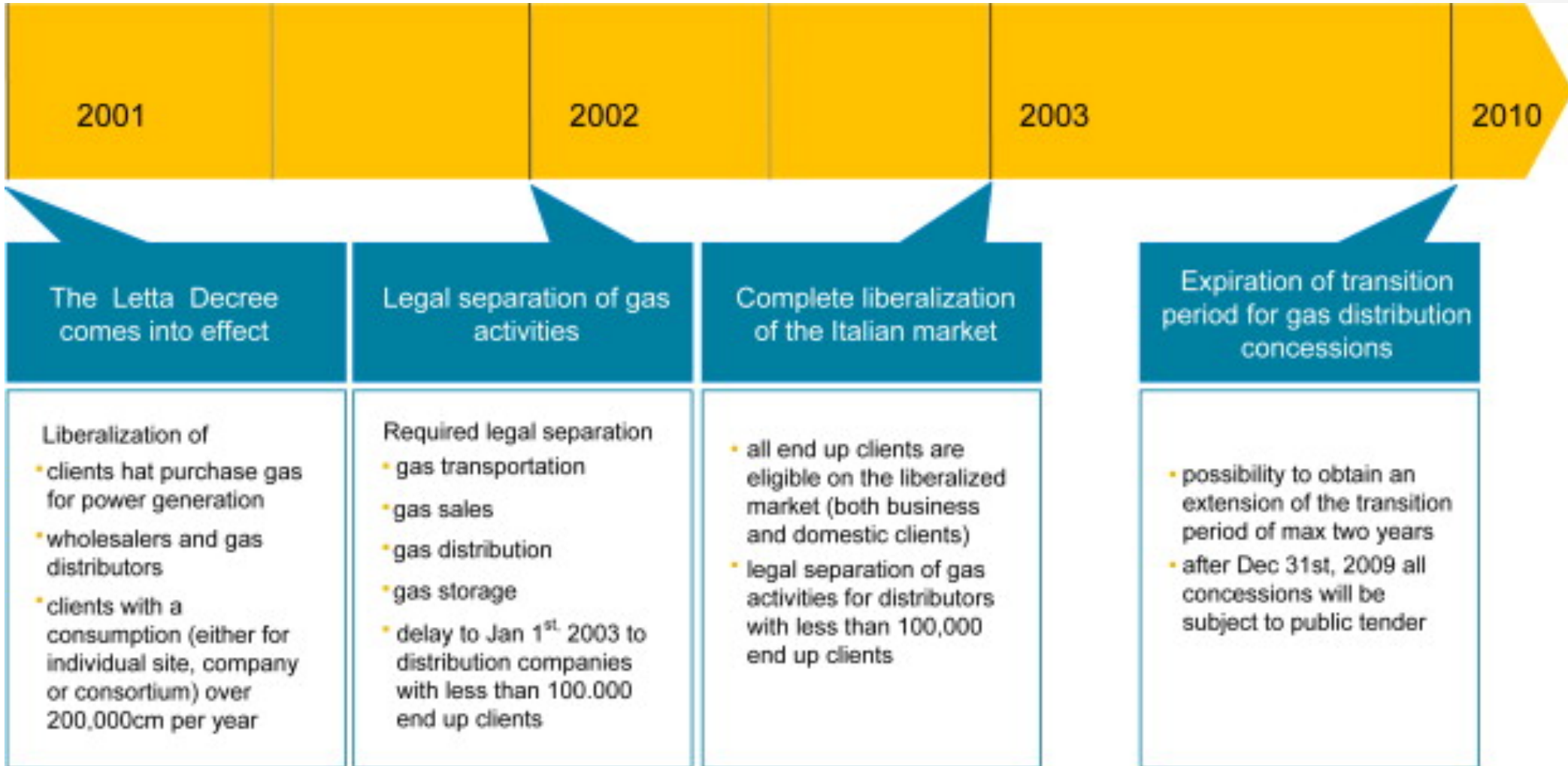
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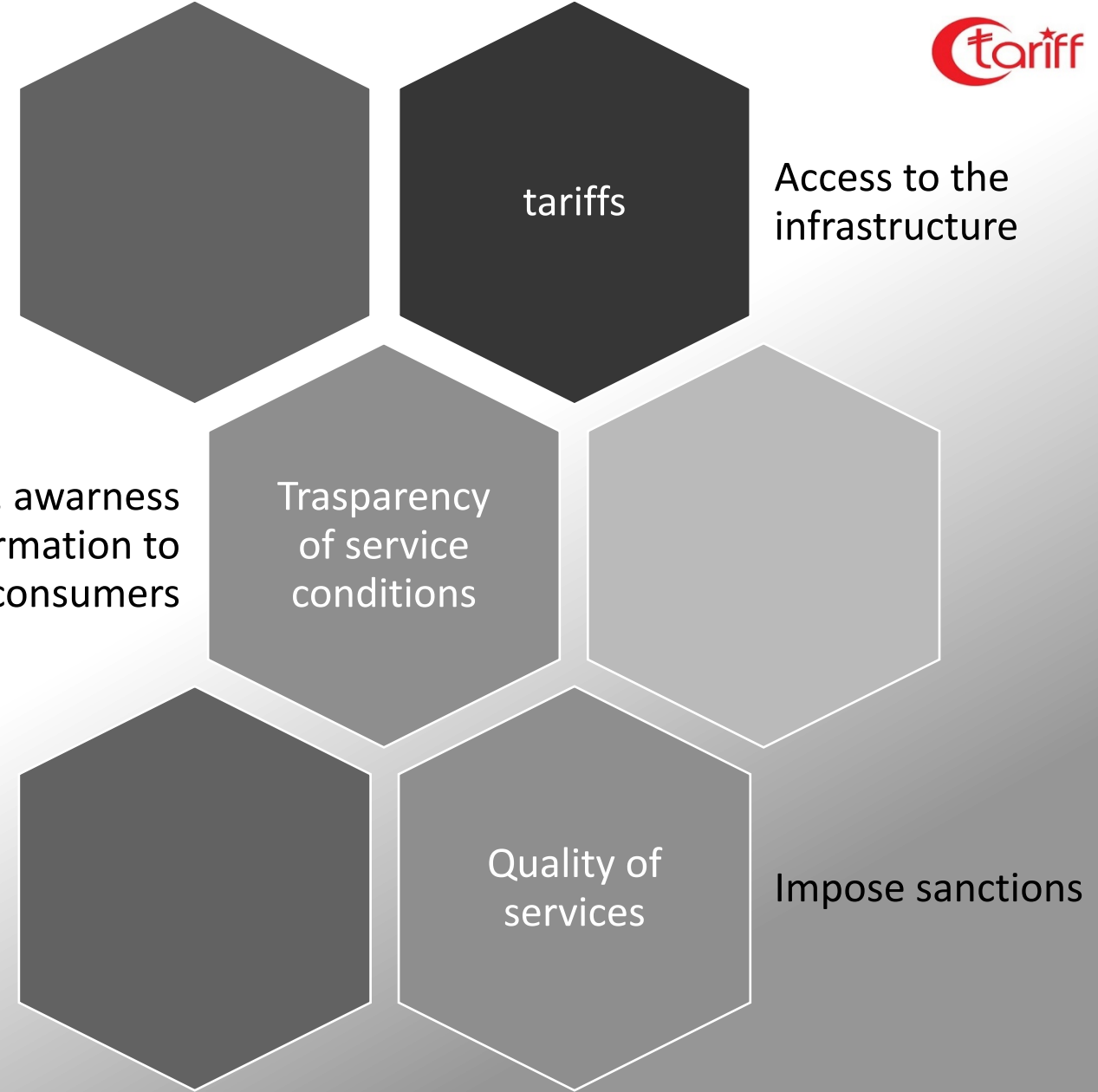
# Italian Gas Market overview – Timeline Regulation





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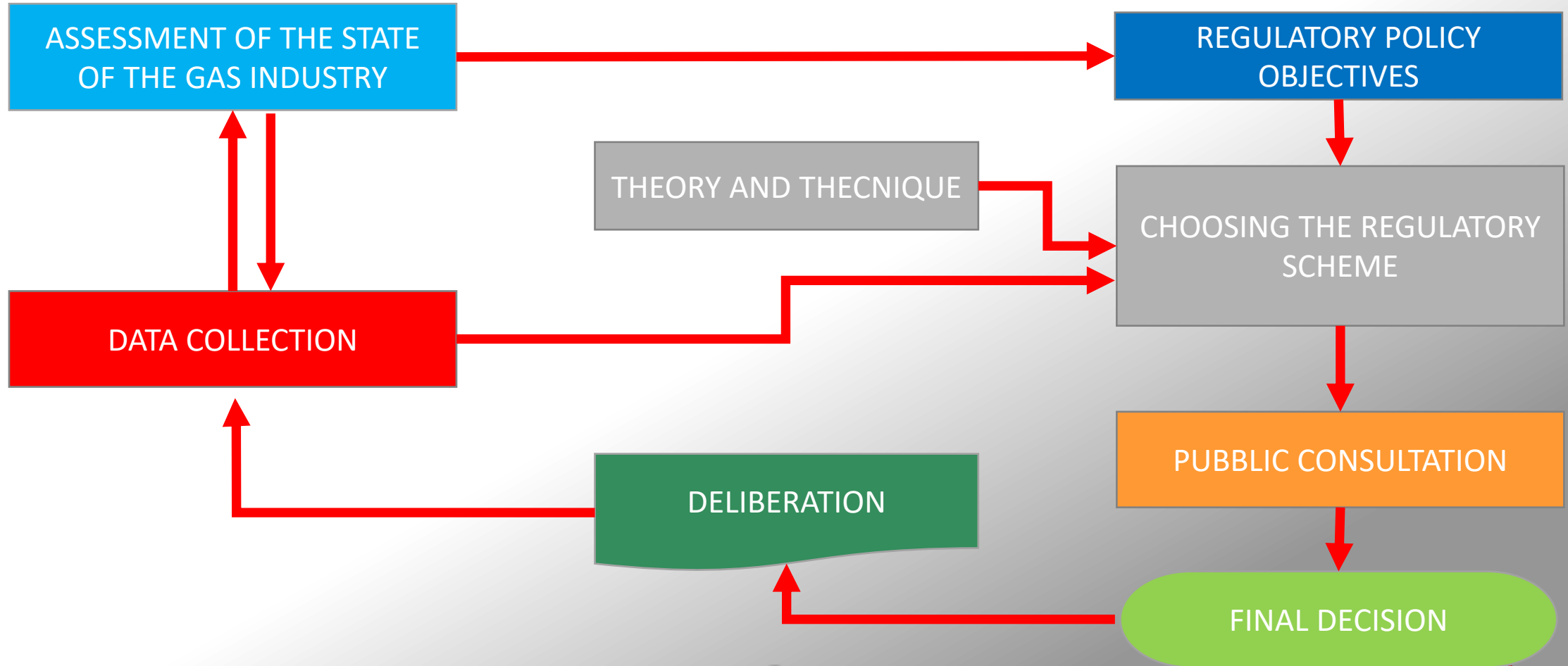
# The Regulator





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# Regulatory Process





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# DSOs

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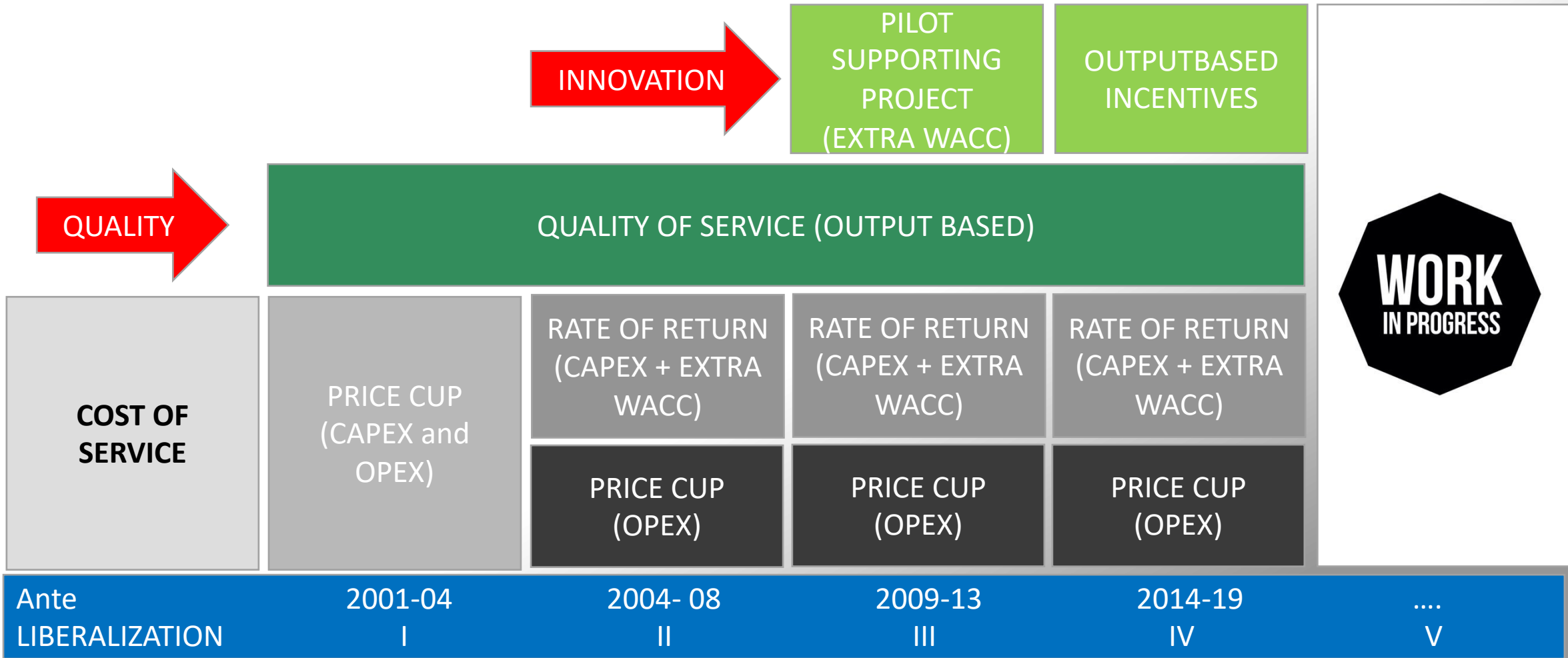
number of companies	<b>210</b>
smallest company	<5.000 POD
largest company	>5.000.000 POD
Volume distributed	32 billion m3
Big five companies	Italgas Spa 2i Rete Gas A2A Spa Hera Spa Iren Spa

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# Tariff Evolution







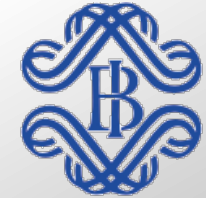
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# Data Source

## DATI FROM DSO:

- RAB
- TECHNICAL DATA
- QUALITY & SAFETY

## NATIONAL FINANCIAL & ECONOMICAL DATA



BANCA D'ITALIA

DATA COLLECTION



TARIFF SETTING

ASSESSMENT  
REAL REVENUES VS ALLOWED  
REVENUES

## DATI FROM DSO:

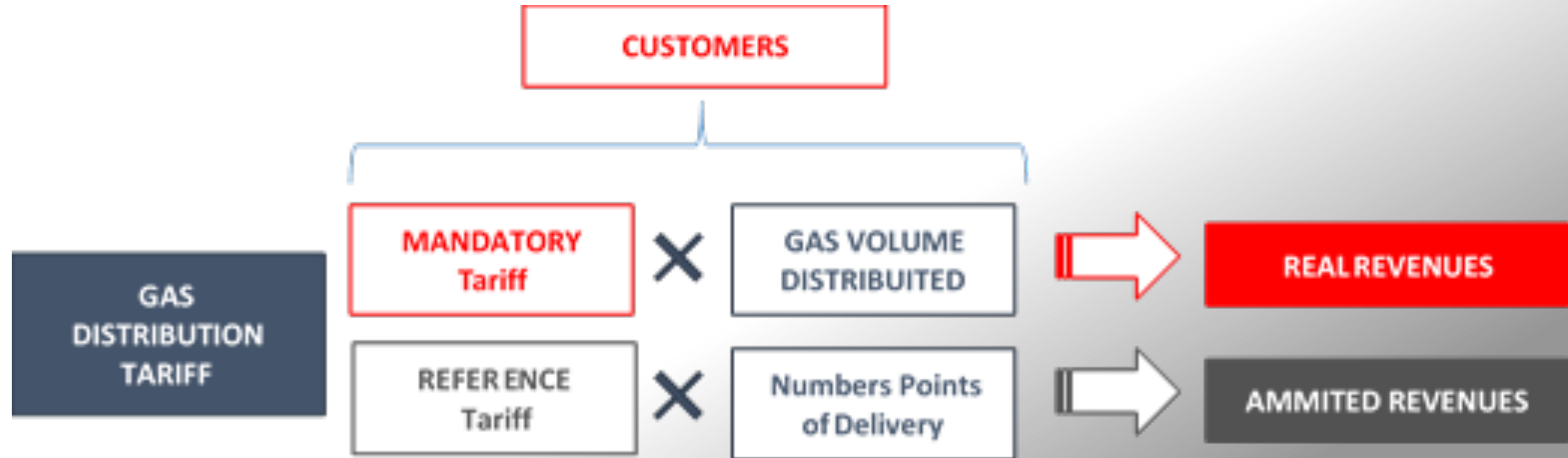
- DISTRIBUTION REVENUES
- MEASUREMENT COSTS





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# Tariff mechanisms - details





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# Revenues





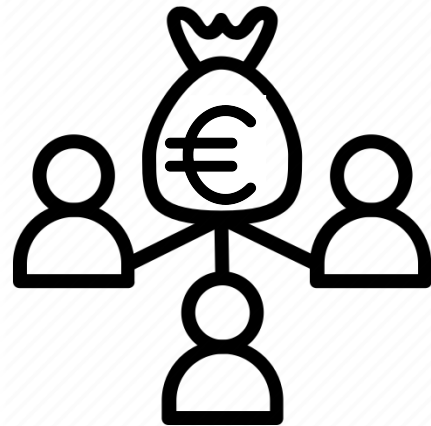
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# Reference Tariff



# Operative Cost - OPEX

$$\text{OPEX year } i = \text{OPEX year } i-n + \text{RPI}i - X+Y$$



## IV regulation period

### Distribution cost reduction rate:

- 2,5% until 50,000 pod
- 2,5% from 50,000 to 300,000 pod
- 1,7% > 300,000 pod (1,4% for the V period)

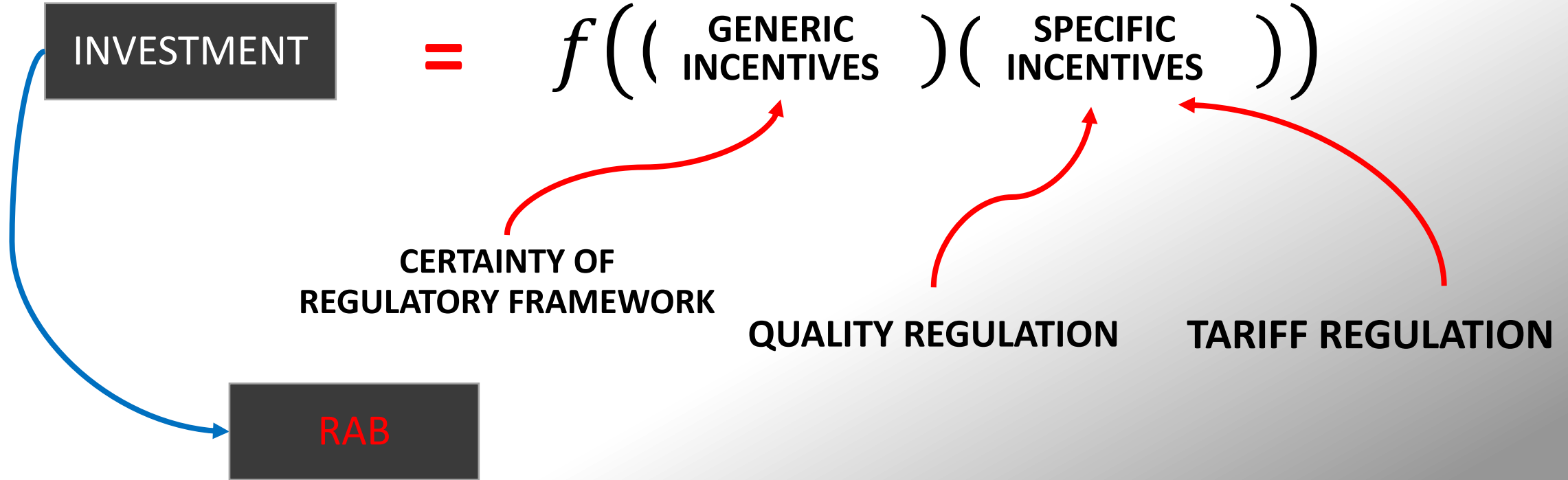
### Measurement and commercialization cost reduction rate

0%



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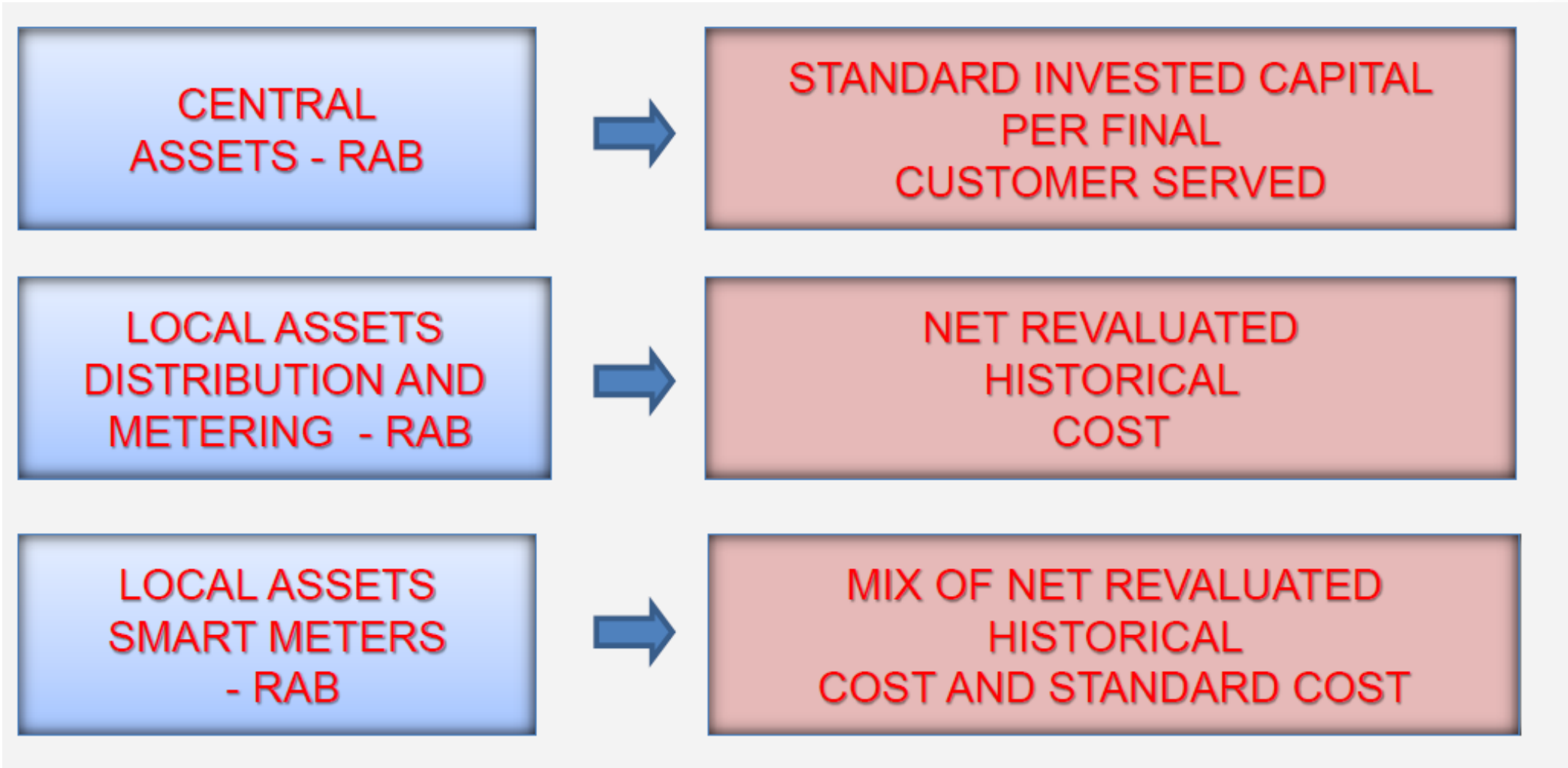
# Capital Cost - CAPEX





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# Method of evaluation





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# Depreciation

DEPRECIATION

LOCAL ASSET

CENTRALIZED ASSET

HISTORICAL COST / REGULATORY LIFE

PARIMETRICALLY PER CUSTOMER SERVED

ASSET	REGULATORY LIFE (years)	
	Municipal concessions	New concessions
Buildings	40	60
Mains	50	60
Customer connections	40	50
Citygates	20	25
Other tangible assets and intangible assets	7	7
Remote meters	15	15
Concentrators	15	15
Electronic meters	15	15
Traditional meters (>G6)	20	20
Traditional meters (<=G6)	15	15
Volumes converter with a data transmission system	15	15

# Rate Of Return On Invested Capital - WACC

**IV Regulatory Period**

**Tabella 4 – Valori del WACC per i diversi servizi infrastrutturali dei settori elettrico e gas**

<i>Servizio</i>	<i>2016</i>	<i>2017</i>	<i>2018</i>	<i>2019</i>	<i>2020</i>	<i>2021</i>
Trasmissione elettrica	5,3%	5,3%	5,3%	5,6%	5,6%	5,6%
Distribuzione e misura energia elettrica	5,6%	5,6%	5,6%	5,9%	5,9%	5,9%
Stoccaggio	6,5%	6,5%	6,5%	6,7%	(*)	(*)
Rigassificazione	6,6%	6,6%	6,6%	6,8%	(*)	(*)
Trasporto gas	5,4%	5,4%	5,4%	5,7%	5,7%	5,7%
Distribuzione gas	6,1%	6,1%	6,1%	6,3%	(*)	(*)
Misura gas	6,6%	6,6%	6,6%	6,8%	(*)	(*)

Gearing (D/(D+E))

$$W_{pre-tax,p,s}^{real} = \dots$$

Return on equity

Cost of debt

Tax adjustment factor



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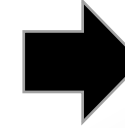
# Quality, Safety And Innovation



# SAFETY

# innovation

**FIXED STANDARDS**  
(GENERAL AND SPECIFIC)



PAID DIRECTLY TO THE CUSTOMER IF THE DSO DOESN'T RESPECT



PENALTIES AND INCENTIVES  
(ADDED OR DEDUCTED TO CAPEX)

**PILOT PROJECTS OUTPUTBASED**



EXTRA WACC



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# Mandatory Tariff For Final Clients

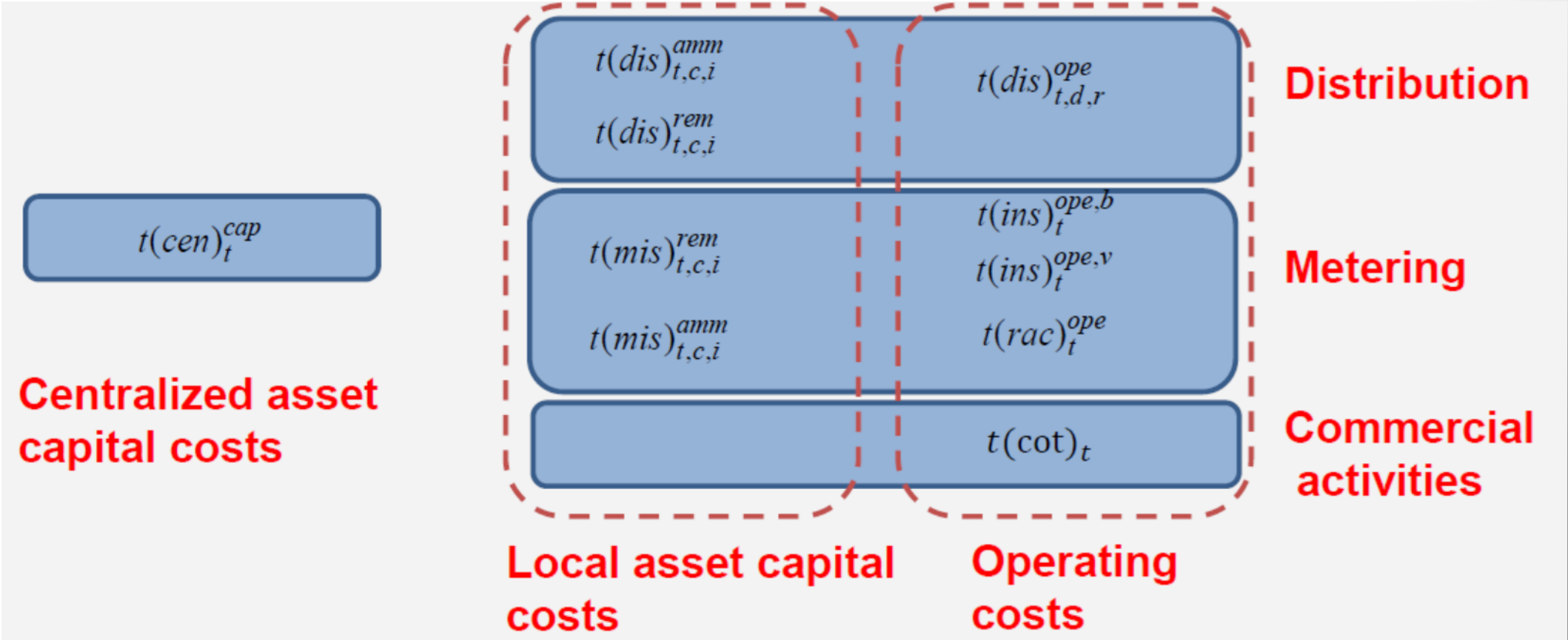
Consumption band (scm/year)	eurocent/scm
0-120	0,00
121-480	7,79
481-1,560	7,13
1,561-5,000	7,16
5,001-80,000	5,35
80,001-200,000	2,71
200,001-1,000,000	1,33
More than 1,000,000	0,37

**SOCIAL REASON**



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# Mandatory Tariff Structure





# Best Practices – Final Consideration

- Reduction of the players → from 1000 to 210
- Uniformity of tariff → from 1000 to 6
- Data Management → ITC, ERP System, GIS, Telecontrol, smart meter...
- Quality of the service → Monitoring and standardization
- Safety and Continuity of the service → high standards of the network





# Reccomandations

## Importance and complexity:

The most revelant and complex duty for a Regulator is setting tariffs



Between the contrapost interest of the distributors and the finals customers



Key issues	EU Practices	Turkey Practice	Recommendations
<p><b>Revenue Requirement Model</b></p>	<p>Various methods are utilized in the EU countries for the calculation of the revenue requirement method. Revenue cap and price cap models are the most preferred methods after the hybrid model</p>	<p>Price Cap</p>	<p>Various methods are utilized in the EU countries for distribution tariffs. Revenue cap and price cap models are the most preferred methods after the hybrid model.</p> <p>Turkey's distribution tariff methodology is based on a <b>revised price cap model</b> in a way that a price cap for the tariff implementation period is determined but it is revised if there is a big difference in revenue as a result of higher or lower consumption level compared to the forecast. In addition to that, after the end of implementation period, there are very limited correction mechanisms for CAPEX and OPEX.</p> <p>The <b>price cap model applied in Turkey</b> is considered as a successful investment model for erecting greenfield networks. This model has enabled an investment rate above the global average rates, and thanks to this model, Turkey has achieved a significant growth rate for nearly every distribution region. With the inclusion of new districts into the distribution regions, the investments accelerated again, and an ongoing process started. The ability of distribution companies to generate additional revenues through the price cap mechanism is considered to be a mechanism that increases the investment appetite. Application of price cap is considered to be beneficial for the sustainability of the enterprise quality and the access of consumers to the service until the investments reach the plateau and continue in a balanced manner.</p>

Key issues	EU Practices	Turkey Practice	Recommendations
<p><b>Revenue Requirement Model</b></p>	<p>Various methods are utilized in the EU countries for the calculation of the revenue requirement method. Revenue cap and price cap models are the most preferred methods after the hybrid model</p>	<p>Price Cap</p>	<p>However, the expansion period for distribution networks is getting closer to the end. Distribution networks have been extended to almost all large cities and towns. Therefore, high growth in network investment will not be possible in the following periods.</p> <p>We think it is time to change the structure of distribution tariffs in a way that we propose to use <b>pure revenue cap</b> as the distribution tariff in electricity sector. With a large amount of RAB, revenue cap method will decrease the risk of the financial sustainability of the distribution companies. The bigger portion of the required revenue is CAPEX, the amount of fixed cost is high, whereas natural gas consumption is fluctuated a lot. To decrease that risk EMRA should revise the methodology in the following tariff period.</p> <p>Another important issue is the approach of cost components realized in tariff implementation periods.</p>

Key issues	EU Practices	Turkey Practice	Recommendations
<p><b>Revenue Requirement Model</b></p>	<p>Various methods are utilized in the EU countries for the calculation of the revenue requirement method. Revenue cap and price cap models are the most preferred methods after the hybrid model</p>	<p>Price Cap</p>	<p>We propose to use <b>TOTEX approach</b> in the following period and allocate total allowed revenue into two parts as CAPEX and OPEX.</p> <p>TOTEX approach will incentivize companies to spend wisely in a way that they will allocate allowed revenue between network investment and operation expenditure without focusing to maximize tariff by inflating inefficient investments. In addition to that, the right allocation between OPEX and CAPEX will provide sustainable revenue inflow. TOTEX approach will also eliminate the risk of low level of RAB for some companies with a low opportunity to expand the network. Thus, some portion of OPEX will be accepted as CAPEX and the companies will have a chance to get return. Currently, in tariff methodology of EMRA there are some regulations to eliminate the risk of low return by calculating return from OPEX. TOTEX approach will be much fairer to increase return portion of the required return.</p> <p>EMRA currently take historic operation expenditure and network investment costs and analyze them by benchmarking with historic values of the company itself and unit costs of other companies in the same period. This approach can be used also in TOTEX approach. EMRA can determine accepted operation expenditure and investment costs in a similar way, then calculate total of those two components and allocate that total accepted costs between OPEX and CAPEX based on predetermined shares for each of them. OPEX and CAPEX share can be determined as the fixed single ratios for the whole sector or can be determined different ratios for different categories of companies. For the calculation of expenses of the DSOs, the EU countries Sweden, Netherlands, and Germany uses TOTEX, whereas the remaining countries including Turkey mostly prefer building blocks method. In addition to revenue cap and TOTEX, another important issue is the integration of quality factor into the tariff structure. The Quality Factor has not been applied yet, although it is defined in the tariff regulations. The Quality Factor can be implemented as a component of the price cap model by establishing common service quality standards.</p>

Key issues	EU Practices	Turkey Practice	Recommendations
<b>Rate of Return</b>	WACC (pre-tax) and Dynamic WACC	WACC	<p>In Turkey, WACC is calculated by the regulator EMRA based on the various economic parameters. An increase in the overall rate of return in Turkey is expected to strengthen the sustainability of the DSOs and sustain further financial steps such as IPOs.</p> <p>The dynamic WACC model is not considered as a useful method at this stage because it will decrease the predictability, which will make it harder for distribution companies to forecast cash flows. If there are extraordinary fluctuations, EMRA can recalculate WACC.</p> <p>The depreciation term in Turkey is 22 years, while the EU countries mostly set depreciation terms longer, even up to 50 years.</p>
<b>Depreciation</b>	Straight-Line	Straight-Line (22 years)	<p>Expanding the depreciation term may reduce cash flows in the short term but would offer a more financially sustainable revenue structure in the mid and long term. The longevity of finance is another factor in the determination of depreciation period because distribution companies need loan to finance network investments.</p> <p>In Turkey loan payment period is lower compared to European countries, so lower depreciation period is needed. Therefore, we suggest continuing with the current depreciation term of 22 years.</p>

**Connection  
Fee**One-time  
connection  
feeOne-  
time  
connect  
ion fee

The connection fee model applied in Turkey may be diversified by considering below parameters as a premium of the fixed one-time fee:

- Subscriber status
- Delivery pressure
- Capacity booking
- Load factor

The connection fees collected by the DSOs do not generate revenue for the DSOs as the connection fee revenues are extracted from the value of realized investments during RAB calculations. The connection fees only support the cash balance of the companies.

Allowing DSOs to determine their own connection fees within certain limits would increase the rate of subscriber penetration. Diversifying connection fees would also contribute to the policies for expanding natural gas distribution grids to rural areas and sustain DSOs activities in these regions.

**Connection  
Fee**One-time  
connection  
feeOne-  
time  
connect  
ion fee

Diversifying the connection fees may also be used as a concrete instrument for incentivizing subscriber penetrations in distribution regions of which the DSOs feed the network by LNG and/or LNG. This instrument may be used as a catalyst to favor this intermediate period without making any other significant amendments in the overall tariff methodology. Remaining a certain amount of the collected connection fee as revenue to the DSOs may support sustainable implementation for DSOs and the potential subscribers.

Diversifying connection fees by allowing the DSOs to set it separately for each region under certain limits would also reduce the carbon emissions in cities where coal is used as alternative heating fuel.

But on the other hand, the number of natural gas subscribers in the country is around 16 million, according to November 2019 data. With the ongoing investments of natural gas distribution companies, this number is expected to increase up to 20 million and remain flat but annual growth in the number of subscribers is expected to decrease. At this stage, it is considered that major changes in the connection fee calculation method will not coincide with the previous applications and may provide limited benefit.

Key issues	EU Practices	Turkey Practice	Recommendations
<b>Performance Indicators</b>	Various	Various	<p>In Turkey, currently quality factor is not implemented in distribution tariffs.</p> <p>Distribution sector is very young in Turkey, so EMRA has focused on the expansion of network so far. However, we think that the sector is mature enough to apply quality factor.</p> <p>Therefore, we suggest EMRA to use quality factor in the next tariff implementation period. For that purpose, we suggest to use performance indicators used by the UK as explained in detail above. With the application of quality factor the level of service quality can be increased in the sector.</p>
<b>Shrinkage</b>	-	-	<p>The DSOs in Turkey are responsible for the technical losses, leakages, and shrinkage, unlike the practices in most of the EU countries. Some EU countries reflect the cost of shrinkage and losses to the consumers. However, the shrinkage volumes in Turkey are at reasonable levels at the moment due to concrete network construction quality and the relatively new grid. But in the mid and long term, the shrinkage volumes are expected to exceed reasonable levels due to the nature of gas distribution activity. By taking this fact into account, the shrinkage losses would be implemented into the tariff methodology as a partial cost for maintaining sustainability.</p> <p>For promoting precautions to reduce shrinkage, the shrinkage rate would be set as one of the performance indicators for the DSOs.</p>

**Efficiency**

Various

Factors including change in number of city gate stations, towns, consumers and network length during a tariff period

Indicators used in efficiency analysis in the gas distribution sector are mostly set by taking the general characteristics of each country or region into account.

In Turkey efficiency indicators are network length, number of city gate stations build in tariff period, consumption and number of consumers. Those parameters mostly effect the level of OPEX, so they are right choice for that purpose.

EMRA has already applied efficiency factor to the tariff, but so far only used efficiency scores resulted from DEA analysis. We suggest to use alternative methods like SFA and use a combination of the results of those methods. It will eliminate the shortcoming of one method.

## Social Tariff Determinations for Consumers

Tax  
exemptions

Discounts in  
invoices

Direct  
support  
(contribution)

NA

Most of the EU countries and Turkey apply different pricing mechanisms for each consumer segment based on the fixed and variables costs.

Social tariffs are implemented in Europe in different ways. In some countries, this consumer group is protected by providing tax exemptions, discounts in invoices, and in others by direct support.

In general, it would be appropriate to provide natural gas support to households to be determined by the Ministry of Family and Social Policies or the Governorships instead of applying a discounted natural gas sales tariff method to the low-income citizens by natural gas distribution companies.

The application of a discounted price to a certain group of consumers by natural gas distribution companies will create difficulties in the pursuit of the group determined in the medium term, in managing and implementing the similar demands of the new concession consumer groups.

For implementing social tariff in Turkey, the annual support requirement for an average household can be calculated, and the length of support period can be identified by the consensus of relevant central and local authorities. And the amount of natural gas, that will be supplied to households under the social tariff application, would be given as a credit to be used in their pre-paid metering counters.

**Tariffs For  
Distribution  
Region  
Expansions  
and CNG /  
LNG  
Applications**

- NA -

Natural gas is supplied to regional distribution grids in the form of CNG or LNG, where pipeline investments are not feasible, or transmission lines have not yet been constructed by the TSOs. Turkey utilizes CNG and LNG for supplying gas to regions, mostly in districts, located far from the city centers. The number of settlements or compounds, where natural gas is supplied in the form of CNG and LNG, is around 73 as of December 2019, and preparations are carried to supply 14 more settlements in the short term.

However, the sales price of CNG is significantly higher than the pipe gas due to Turkey's pricing mechanism, and the cost of CNG is relatively higher for a DSO when the transportation, handling, and storage costs are taken into account. CNG purchase price cannot be directly reflected in the natural gas sales price of the customers in the regions, although the purchase price of pipe gas is directly reflected in the sales as a legislative obligation.

It is considered as an appropriate method to add the difference between pipe gas price and CNG purchase price to the operating expenses of DSOs in the current tariff period. Another method can be updating the price difference by considering the length of the implementation period and reflected the DSOs next tariff period.

For the gas supplies in LNG or CNG forms, after these conditions are met, the DSOs tariff may be updated by calculating the additional load to be brought to the tariff for the relevant period. The relevant tariff is proposed to be updated at the end of each period so as to keep DSOs away from the profit or loss of the gas trade, which is contrary to the existing regulations.

Key issues	EU Practices	Turkey Practic e	Recommendations
<p><b>Reliability of Demand Forecasting for the Industrial Consumers in Distribution Regions</b></p>	<p>Most of the EU countries, such as Germany and Czechia, have broader consumption levels, as Germany has three levels for low load, high load, and residential. Even Czechia has residential, industry, and others. But it is necessary to emphasize that the consumption in many of the EU countries is nearly flat with less fluctuations.</p>	<p>-</p>	<p>The Price Cap methodology makes the annual and level-based consumption forecasts important for the DSOs. Since the Price Cap method does not apply the retrospective correction of revenue realizations, deviations in consumption forecasts may have a serious impact on the financial structure of the companies. Besides, the System Utilization Fee set separately for each of the 5 consumption levels, and in-term switches between levels may lead to deviations in the revenues of DSOs.</p> <p>Most of the EU countries, such as Germany and Czechia, have broader consumption levels, as Germany has three levels for low load, high load, and residential. Even Czechia has residential, industry, and others. But it is necessary to emphasize that the consumption in many of the EU countries is nearly flat with less fluctuations.</p> <p>For having a more precise demand forecast in Turkey, the forecast of the DSOs based on the below variables may be considered as the main component of the estimates, conducted by EMRA.</p> <ul style="list-style-type: none"> <li>• Annual grid expansion expansions</li> <li>• Gas consumption profiles of the industrial facilities</li> <li>• Seasonal effects on consumptions</li> </ul> <p>Consumption forecast for residential consumers is made more predictable than estimations for industry and power plants. For industrial consumers, considering the 5-year tariff period, it is difficult to make a predictable consumption estimate. Therefore, reducing the share of industry and power plant’s consumption in the revenue requirements may lower the deviations in the revenue realizations of DSOs.</p> <p>Since the industrial consumers, which has regular consumption, has a high network usage rate and a low load, the revenue requirement allocated to this group may be lower than the revenue requirement of the residential segment, which has seasonal and variable consumption pattern.</p> <p>As a result of this improvement, the impact of the forecasting deviations may be reduced.</p>

## Last resort tariff practices in natural gas distribution

In the EU countries, gas trading companies act as the last-resort supplier, particularly in the fully liberalized markets.

DSOs in Turkey are the last-resort suppliers as they are authorized for retail sales in their regions. In the EU countries, gas trading companies act as the last-resort supplier, particularly in the fully liberalized markets.

The DSOs in Turkey procure their annual natural gas demand by bilateral contracts, and all of them are obliged to purchase gas from the 'cheapest' source available in the market. Since BOTAŞ is the dominant player in the market, DSOs can supply gas either from other suppliers or directly from BOTAS by setting the BOTAS's sales as the cap for fulfilling the cheapest gas procurement of the Natural Gas Market Law.

The cheapest gas procurement obligation of the Law does not define a specific term such as a month or a quarter and covers the whole year. However, BOTAS has the right to change its sales price every month. Therefore, DSO's gas procurements from the private suppliers compulsorily follow a price formula based on BOTAS's tariffs.

Since the last-resort tariff is not defined and included in the existing legislation and regulations, DSOs mostly supply gas from the main supplier BOTAS with the price that BOTAS releases every month, to meet the demand of an instant request.

By considering the market structure and development pattern of Turkey, DSOs may be allowed to make intraday, day-ahead, and futures transactions for securing their last-resort demand, when the liquidity of the market is increased to a certain level by progressing towards a liberalized market structure.

Allowing DSOs to benefit from a reasonable margin from the compulsory last-resort sales may improve the sustainability of the companies.



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



This project is funded by the European Union

# THANK YOU

