Regulation and Tariff in Turkish Electric Utilities

March 2018
Q&A

• Regülasyon nedir?
• Doğal tekel nedir? Örnekler nelerdir?
• Türkiye elektrik piyasası nasıl işler? Sistemin işleyişi nasıldır? Oyuncuları kimlerdir rolleri nelerdir?
• Tarife nedir? Bileşenleri nelerdir?
• Dağıtım sektörünün regülasyonunda Türkiye’de benimsenen yöntem nedir?
• Perakende sektörünün regülasyonunda Türkiye’de uygulanan yaklaşım nedir?
• Türkiye’de dağıtım sektörünün düzenlenmesinde uygulama dönemleri nelerdir?
• En son uygulama dönemindeki genel regülasyon yöntemi ve ayrıntıları nelerdir?
• Dağıtım şirketleri nerelerden gelir elde ederler? Geliri oluşturan bileşenlerin en önemlileri hangileridir?
• Türkiye’de kaç dağıtım şirketi vardır, hangi gruplara aittir?
Content

Macroeconomic Approach

Market Structure

Regulation in Monopol Market

Regulation Methodologies

Revenue Requirement Parameters
**Brief History of Political Economics**

- **Adam Smith (1723-1790)**
  - Zero Sum Game
  - The Wealth of Nations: Liberalism of Contracts and Trade
  - Abolishing regulations
  - Invisible Hand in markets

- **Jean Baptiste Say (1767–1832)**
  - Supply creates its own demand
  - Marginal labor yield and decreasing yield law
  - Labor price: supply & demand and employment balance

- **David Ricardo (1772-1823)**
  - Industrial Capitalism
  - Theory of Capital Accumulation

- **Karl Marx (1818-1883)**
  - Industrial Capitalism
  - Theory of Capital Accumulation

- **John Maynard Keynes (1883-1946)**
  - 1929 Great Depression
  - Not every supply creates its own demand
  - Intervention role of Government
  - Money and Finance policies

- **Neo-Liberalism (From 1970s)**
  - Kuznets, Hayek, Friedman
  - Inequality (Bell-Shaped)
  - Friedman: Main role of Government: Control of money supply
  - Natural Monopoly
  - «Homo Economicus»
  - Maurizio Lazzarato: Financial Capitalism and manage by debt
Regulation History
Anglo-Saxon World and Chile

**Chile**

- **1978**
  - Reforms by National Energy Commission in Chile after coup of Pinochet

- **1982**
  - «1982 Electricity Operation» in Chile
  - Neo-liberal politics by Milton Friedman, Al Harberger and other economists in Chicago School are reviewed
    - Government role: Control of money supply,
    - Government presence: Natural Monopoly
      - Special Monopoly, Public Monopoly, Regulation
  - First examples of:
    - Market prices are determined by Independent Power Producers (IPPs)
    - Electricity sales to customer by bilateral contracts
    - Eligible customer definition and their rights
    - Incentive based mechanisms applied in distribution sector

**Great Britain**

- **1989**
  - «White Book» consisting suggestions by parliament about privatizations became Energy Law
  - First examples of:
    - Transmission, Distribution and Sales were separated
    - Spot market for electricity prices was launched
    - Competition started among sales companies
    - Transmission and distribution monopolies were privatized and regulated
Regulation History
Continental Europe

From 1990s

- Electricity and NG markets were monopolized, EU and Member States opened them to competition:
  - Distinguishing clearly between competitive parts of the industry
  - Free up the supply side of the market
  - Remove gradually any restrictions on customers from changing their supplier (reason for liberalization)
  - Introduce independent regulators to monitor the sector
- **First** liberalization directives were adopted in 1996 for electricity market
- EU Commission **benchmarking** reports on the implementation of internal electricity market
- **Second** liberalization directives were adopted in 2003 and were to be transposed into national law by Member States by 2004
  - Full market opening timetable
  - Legal unbundling of networks
  - Regulated Access to networks with published tariff and methodology approved in advance
- **Sector Inquiry** is made, to identify the barriers preventing more competition in these markets. The results were published in 2007.
- **Third** liberalization directives were adopted in 2003 to strengthen competition in electricity market.

Regulator

- New institution
- Committed to liberalization
- Free from need and bargain
- Independent from regulated companies, finance and governmental bodies
- Accountable (annual reports, public and parliament hearings)
How market evolved?
Before liberalization

**Pre TEK Period**
- **Private Sector Domination**
  - Domination by private initiatives including Kayseri Elektrik.

**Pre TEK Period**
- **State Domination**
  - Etibank and Iller Bankası, municipalities and the State Hydraulics Works (DSI)
  - First Private-Public Partnerships (PPPs) by Concession Companies Çukurova Elektrik and Kepez Elektrik

**TEK Period**
- Reorganization in 1970 by the establishment of TEK, which was established as a vertically integrated company excluding municipally-owned transmission and distribution facilities (until 1982) and three regional concession companies.

**TEK Private Participation Period**
- Vertically integrated state company + BO, BOT, TOR, Autoproducers

**Liberalization Period**
- Unbundling of TEK
- Preparation for market liberalization

**Post TEK Period**
- 2018
How market evolved?
Ongoing liberalization

1984
- Electricity Market Law
- Establishment of EMRA (Energy Market Regulatory Authority)
- BOT
- Auto producers
- TOR

1994
- BOT
- Auto producers
- TOR

1997
- Introduction
- BOO

2001
- Balanced and Settlement Regulation (DUY)
- Strategy paper
- Market opening eligible consumers: 30%

2004
- Energy Efficiency Law
- Geothermal Law
- Nuclear Energy Law

2006
- Financial settlement of DUY
- Transition contracts
- First tariff application covering 2006-2010 period

2007
- DisCo privatizations
- Başkent
- Sakarya
- Meram
- Aydem
- Automatic pricing mechanism

2008
- Revised strategy paper
- Further DisCo privatizations
- Day-ahead planning

2009
- GenCo privatizations
- Day-ahead market, Dec. 2011
- Second 5-yr DisCo tariffs approved covering 2011-2015 period.

2010
- Legal unbundling of DisCos per 1.1.2013
- Market openness 82%
- Disco privatization completed

2011
- Further DisCo tenders
- GenCo privatizations to start

2012
- Market openness 75%

2013
- Start of 3rd Imp. period

2014-2015
- Market openness is over 90%
- National Energy Efficiency Plan (2017-2023) is launched

2016
- Drought: lowest hydro generation of the past 30 years
- EPIAŞ established
- Intra-day trade launched

2017
Content

- Macroeconomic Approach
- Market Structure
- Regulation in Monopol Market
- Regulation Methodologies
- Revenue Requirement Parameters
Distribution Regions at a Glance
### Enerjisa Electricity Distribution

Serving to 10.5 million customers on 110 thousand km²

<table>
<thead>
<tr>
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<th>Grid length [1,000 km]</th>
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</table>

*Figures illustrate 2016*
Theft and Loss Rates by Region

High T&L rates compared to European countries especially in 3 regions: Main obstacle before regional distribution tariffs

Source: Energy Market Regulatory Authority (EMRA)
Market Structure

Generation
- State: 40%/35%
- Private: 60%/65%

Transmission
- TEIAS (state owned)

Distribution
- 21 DSO (all private)

Supply
- > 80% of consumption is eligible for bilateral agreement

Markets
- TEIAS
- PMUM
- EPIAŞ
- Borsa İstanbul (BIST)

Note: TEIAS: State-owned transmission company, PMUM: Electricity Markets Financial Settlement Center, EPIAŞ: Newly established market operation company, BIST: Istanbul Stock Exchange;
Content

Macroeconomic Approach

Market Structure

Regulation in Monopol Market

Regulation Methodologies

Revenue Requirement Parameters
What kind of market are we talking about?

**Efficiency Level in Economic Equilibrium**

- **Monopol**
  - Single firm as buyer/seller
  - Profit maximization
  - Price maker
  - Market entrance barriers
  - Reaching to full information
  - Supply curve as market curve

- **Oligopol**
  - Market structure in which limited number of independent firms offer either the same or differentiated product/service
  - *Cournot Duopol Model (Quantity Competition)*
  - *Bertrand Duopol Model (Price Competition)*
  - *Stackelberg Duopol Model (Leading & follower firm)*
  - Cartel

- **Natural Monopol**
  - *Economies of Scale*
  - *Capital Intensity*
  - Storage difficulties & fluctuated demand structure
  - Geographical rent
  - Product/service which is vital for public life
  - Direct contact with customer via network lines

- **Free Market**
  - Negotiable excess supply
  - Uncontinous product/measurable service
  - Number of seller/buyer that can not affect price
  - No entry/sortie barrier
  - Homogene Product
  - Symetric & free information

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*Sectoral Example*

- *Oil Production (TPAO)*
- *Arm Industry (MKE)*
- Old alcoholic beverages & Tobacco production *(TEKEL)*
- *Automotive*
- *Banking*
- *Concrete*
- *Natural Gas Import*
- *Power transmission & distribution*
- *Natural Gas Network*
- *Water Network*
- *Railways*
- *Telecommunication*
- Management of bridges, highways, airways & customs *(bottleneck)*
- *Nutrition*
- *Textile*
- *Construction*
- *Tourism*

(*) Market failures, apart from structure, can also be expressed as follows; public goods, externalities, assymetric information, natural monopolies.
A little bit of economics

**Perfect Competition**
- Homogenous products: Same quality and characteristics
- A large number buyers and sellers
- No barriers of entry and exit
- Perfect factor mobility: Capital, employee, land, enterprise
- Perfect information: Price, utility, quality and production methods.
- Zero transaction costs: No trading opportunity

**Monopol**

**Real World**
Natural Monopoly & Loss of Social Welfare

**MM:** Marjinal Maliyet  **OM:** Ortalama Maliyet  **OG:** Ortalama Gelir  **MH:** Marjinal Hasılat
Current Legal Framework

The legislation

- Electricity Market Law No. 6446
- Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electrical Energy No. 5346
- Energy Efficiency Law No. 5627
- Turkish Commercial Code No. 6102
- Turkish Code of Obligations No. 6098.
- Turkish Tax Procedure Law No. 213
- Turkish Development Law No. 3194
- Expropriation Law No. 2942
- Environment Law No. 2872
- Occupational Health and Safety Law No. 6331
- Time Extension re. National Tariff
- Time Extension re. General Lighting Payment Procedure.
- 23 Regulations (Including tariff-customer services-quality regulations)
- 10 Communiquês (Revenue Requirements of distribution and supply companies)
- 20 Principles & Procedures (Distribution investment and tariff application rules)

>5000 Board Decisions

Source: EMRA
### Tariff & End - User Price Structure

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| Dağıtım Sistemi Kullanıcıları | Alçak Gerilim |                                  |                                |                                |                                |                  |
| Tek Terimli |                                  |                                |                                |                                |                                |                  |
| Sanayi    | 21,9735 | 21,8309 | 38,8700 | 9,5407 | 9,6625 |
| Ticarethane | 23,0995 | 22,9514 | 41,0469 | 9,8783 | 13,3577 |
| Mesken    | 23,0997 | 22,9446 | 41,0400 | 9,8718 | 13,0444 |
| Şehit Aileleri ve Muharip Malul Gaziler | 8,4718 |                                    |                                |                                |                                | 8,8939 |
| Tarımsal Sulama | 21,1108 | 20,9753 | 37,5335 | 9,0140 | 10,561 |
| Aydınlatma | 21,1182 |                                    |                                |                                |                                | 12,8028 |
| Genel Aydınlatma | 21,1182 |                                    |                                |                                |                                | 12,8028 |

|                       | Residential Unit Energy Price | 23,09 | 50,98% |
|                       | Distribution Fee | 13,04 | 28,80% |
|                       | Enegry Fund | 0,28 | 1,00% |
|                       | TRT Share | 0,56 | 2,00% |
|                       | Municipality Share | 1,40 | 5,00% |
|                       | VAT (18%) | 6,91 | 18,00% |
|                       | End User | 45,29 | 100,00% |

- There are (6) main subscriber group (industrial, household, commerce, agricultural irrigation, casualty family, lighting)
- «National Tariff» is instead of regional tariff.
- Cross Subsidy is present.
2018-Q1 Regulated Price Components

Share of Bill Components for Regulated Households

*Energy price & retail service fee are unified

Funds are calculated as of certain percentage of Energy price and distribution fee

Unified as Distribution Fee
Content

- Macroeconomic Approach
- Market Structure
- Regulation in Monopol Market
  - Regulation Methodologies
- Revenue Requirement Parameters
Regulation Methodologies

1. Cost Based Regulation
   - Rate of Return

2. Cap Based
   - Price Cap
   - Revenue Cap

3. Output Based
4. Incentive Based Regulation
   - Reference Model (Yardstick)
Regulation Methodologies
Explanations

1. **Rate of Return (RoR)**
   - Framework:
     - Real cost based revenue requirement calculation methodology (ex-post)
     - Controlling profits of DisCos
     - Preventing high prices
   - Advantages:
     - RoR is added to costs which create net return for DisCos
     - Easy to implement
   - Disadvantages:
     - Huge scope of audit
     - Since return is guaranteed for investments, there may have excessive investments,
     - Base year might be «Abnormal» due to high inflation etc. And might not reflect real world

2. **Price Cap**
   - Framework:
     - Max price that DisCo can charge to customers is identified before impl. period (ex-ante)
     - Advantages:
       - Cutting cost is utmost significant to gain more profit
       - Efficiency can be incentivized continuously
     - Disadvantages:
       - If max price cannot cover costs, high risk for DisCos to have loss
       - DisCos may show their costs high in order to get higher max price in the next period (asymmetric information – principal agent problem)
   - Advantages:
     - Cutting cost and increasing efficiency are significant
     - Since X-Factor is identified ex-ante, cost improvements made by DisCo directly affect profitability
   - Disadvantages:
     - If cap is identified low, companies may have risk of bankruptcy
     - Not output/quality based
Incentive Based Regulation

Output Based

- Framework
  - Taken outputs into account besides inputs
  - Outputs may be supply continuity and service quality

- Advantages:
  - Direct impact of increasing quality and customer satisfaction
  - Prevent inequality between companies

- Disadvantages:
  - May create extra costs
  - May have risk in predictability, if DisCo cannot satisfy output targets, it may not earn money

- Applied in UK by OFGEM:
  - RIIO: Revenue=Incentives + Innovation + Output
  - Incentives that reward/penalize distributors based on actual performance and expenditure outcomes

Reference Model (Yardstick)

- Framework
  - Identifying reference (similar-comparable) company and compare all DisCos with respect to that
  - Independent from past data of DisCos, minimum return is guaranteed
  - Regional differences and company characteristics are trying to be taken into account

- Advantages:
  - Social welfare is optimized
  - Regulator has access to all data of DisCos thus easy to identify falsified data

- Disadvantages:
  - Regional differences and company characteristics may create inequalities
  - Effort to decrease costs may result in decrease in service quality
Evolution of Utility Regulation

**Generic Expression of Methods**

- Revenue/Price Cap
- Yardstick Regulation

**Countries**

- **Electricity Sector**
- **Comprehensive Specific**
- **Comparative Specific**

- Performance Based Regulation
- Cost Based Regulation

- Prospective
- Retrospective
Relevant Revenue Requirement Implementation in Turkey
Content

- Macroeconomic Approach
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- Revenue Requirement Parameters
Overview of Distribution Revenue
Revenue cap decided upfront in 5-year periods

### OPEX
- **%50** Fixed OPEX
- **%50** Variable OPEX
  - Efficiency Applied OPEX
  - Non-Controllable Costs
    - Transmission (pass thr.) incl.
  - R&D OPEX
    - % 1 of OPEX

### CAPEX
- Regulatory Asset Base (RAB)
  - Capex Reimbursement
  - Return on RAB 13.61%
  - Tax Adj. from Depreciation

### Other
- **Add. Revenues**
  - Maintenance income
  - Punishment warrant and compensation income
  - Advertisement and renting
  - Consultancy
  - Provisions no longer required
  - AMR incomes
- **S Parameter**
  - 75%
  - Electricity theft accrual
- **S Parameter**
  - 40%

(* Revenue requirement is indexed with June CPI of each year. Quality parameter will be applied on total revenue requirement in 2018.

### Theft & Loss Margin
- Loss & Theft Target (set acc. to actuals)
  - T&L Performance (%)
  - Distributed Electricity
  - Average Procurement Cost
  - T&L Performance (mTL)
Scope of the Distribution Business

**Business Activity**
- Investments Planning
  - 5-year master plans
  - Yearly investment plans
  - Quarterly revisions
- Investments Execution
  - Capex plan execution
  - Construction works
- Supply Chain Management
  - Procurement
  - Warehouse, stock and fleet management
- Technical Customer Operations
  - New connections
  - Meter operations
  - Theft & Loss
- Network Operations
  - SCADA system
  - Quality enhancements
  - Lighting
  - Customer satisfaction
- Other
  - Rental and advertisement
  - Theft accruals

**Associated Regulatory Item**
- Capex Allowance
- Capex Unit Prices

**Regulatory Remuneration**
- Financial Income
- Capex Reimbursement
- Capex Outperformance
- Opex Outperformance
- T&L Allowance
- T&L Outperformance
- Quality Parameters
- Quality Outperformance
- Other Revenues
The sector is simply more than only B2C

- Ministry of Energy and Natural Resources (MENR)
- EMRA
- TEDAŞ
- Competition Authority
- Privatization Institution
- Municipalities
- TEIAŞ, TETAŞ
- Other Ministry Undersecretariat of Treasury
- Ministries and Public Institutions

- Distribution Companies
- Electricity Distribution Services Association (ELDER)
- Organized Industry Parks (OSB)
- Material Suppliers
- Contractors
- Consulting Companies
- Non-Governmental Organizations (NGOs)

- Distribution Customers
- Free Consumers
- Producers embedded in Distribution
- Unlicensed Electricity Producers
- All customers to whom lighting service is reaching
- VIP Demands
Thank You...