

# Vertical Unbundling



## Book for the Course

# POWER SYSTEM ECONOMICS

Designing Markets for Electricity



STEVEN STOFT

**Power System Economics  
Designing Markets for Electricity**

**By  
Steven STOFT**

**IEEE Press  
Wiley Interscience,  
2002**

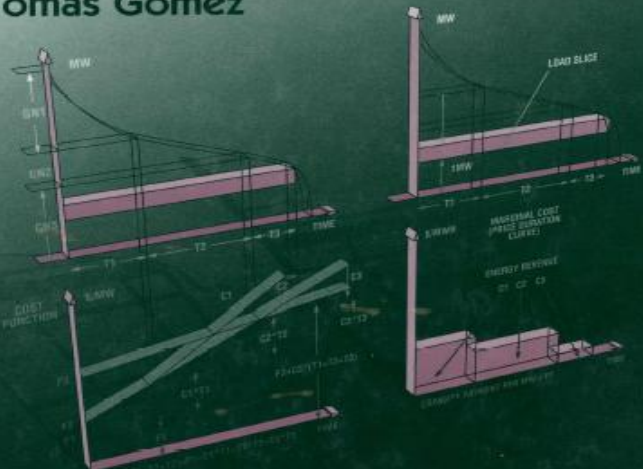
*Available in Reserve Division of the  
Middle East Technical University  
Central Library*

## Supplement Book

### ELECTRICITY ECONOMICS

REGULATION AND DEREGULATION

Edited by  
Geoffrey Rothwell  
Tomás Gómez



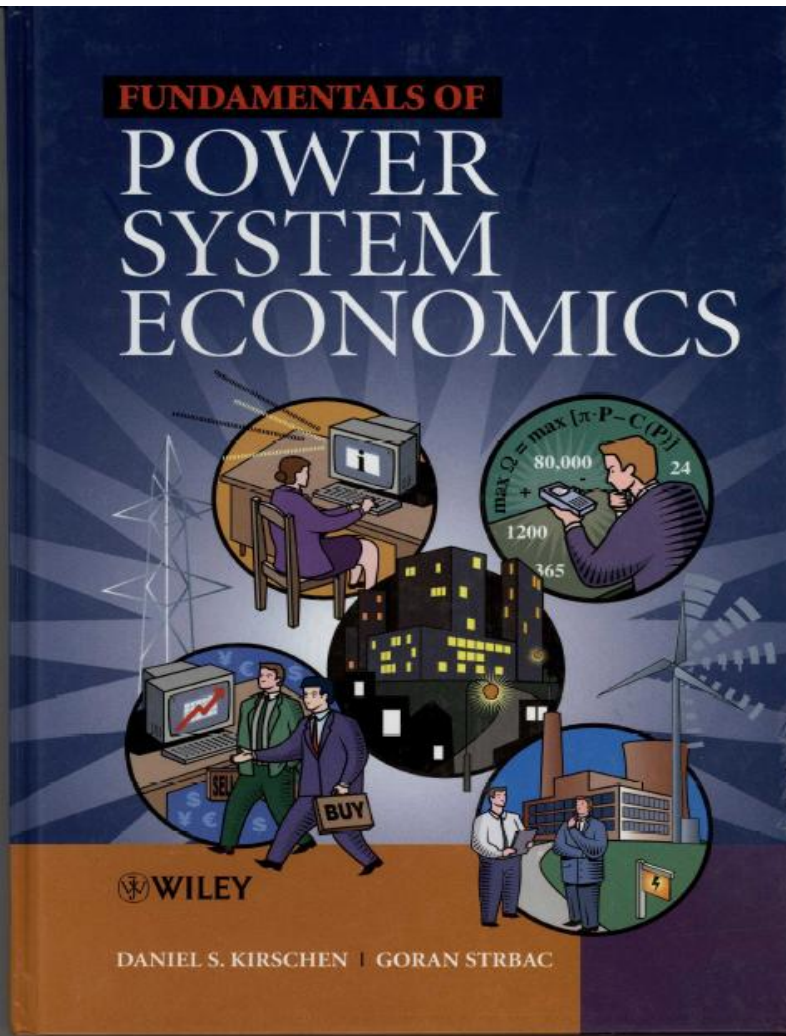
### Electricity Economics Regulation and Deregulation

Edited By  
Geoffrey ROTHWELL  
and  
Tomas GOMEZ

IEEE Press  
Wiley Interscience,  
2003

*Available in Reserve Division of the  
Middle East Technical University  
Central Library*

## Suggested Book



## Fundamentals of Power System Economics Regulation and Deregulation

**Daniel S. KIRSCHEN**  
and  
**Goran STRBAC**

**Wiley**  
**2003**

**Available in Reserve Division of the  
Middle East Technical University  
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## EE710 is a Must Course in Hydropower (Civil) Engineering in METU

### M.Sc. Theses on Hydropower Engineering

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**METU**

**Civil Engineering Department**

#### First term

CE 421 Applied surface hydrology

RE: CE 422/CE 458 Design of diversion weirs/Design of hydraulic structures

CE 571 Hydropower engineering

CE 539 Advanced Fluid Mechanics

#### Second term

EE 710 Electricity trading

CE \*\*\* Elective (at least one course to be taken from the following list)

CE \*\*\* Elective (at least one course to be taken from the following list)

CE 520 Graduate seminar (Non-credit)

#### Third and fourth terms

Master thesis

#### Recommended Electives

CE 413 Introduction to GIS

CE 473 Open channel hydraulics

CE 534 Fluid Transients in Closed Conduits

CE 575 Sediment Transport

CE 535 Water resources systems engineering 1

CE 537 Tunnel design and construction

CE 530 Modeling in hydrology

CE 573 Fundamentals of river engineering

MINE 527 Rock mechanics for civil engineers

#### NOTES:

1) RE: Restricted elective: CE 422 or CE 458

2) Student can take more than two 4\*\* coded courses (extra courses with NI (not included) category)

3) CE 520: Guest speakers from related sector are invited. Students will present their theses topics.

4) Master Thesis will be assigned mainly according to suggestions of Private Sector.

5) Students are recommended to take elective courses from the list shown above.

However, different courses that are supportive to the thesis topic can also be taken with

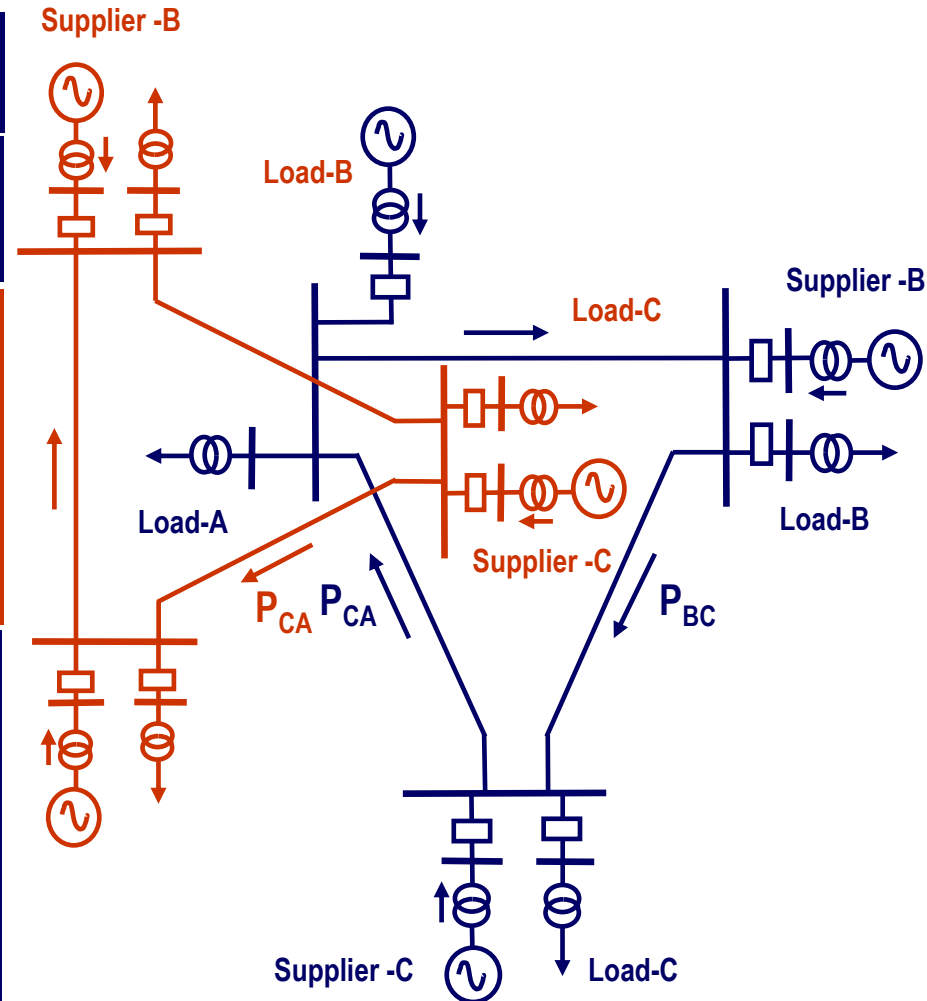
## Natural Monopoly

### The need for Natural Monopoly

In 1887 -1983, 24 power companies were established in Chicago alone

*Most of these companies were vertically integrated (full-service) utilities, i.e. they were carrying out all kinds of services, including; generation, transmission, distribution and sale activities*

- A fierce competition for costumers exists,
- but, the tariffs were high, since the networks were;
  - overlapping,
  - not fully utilized

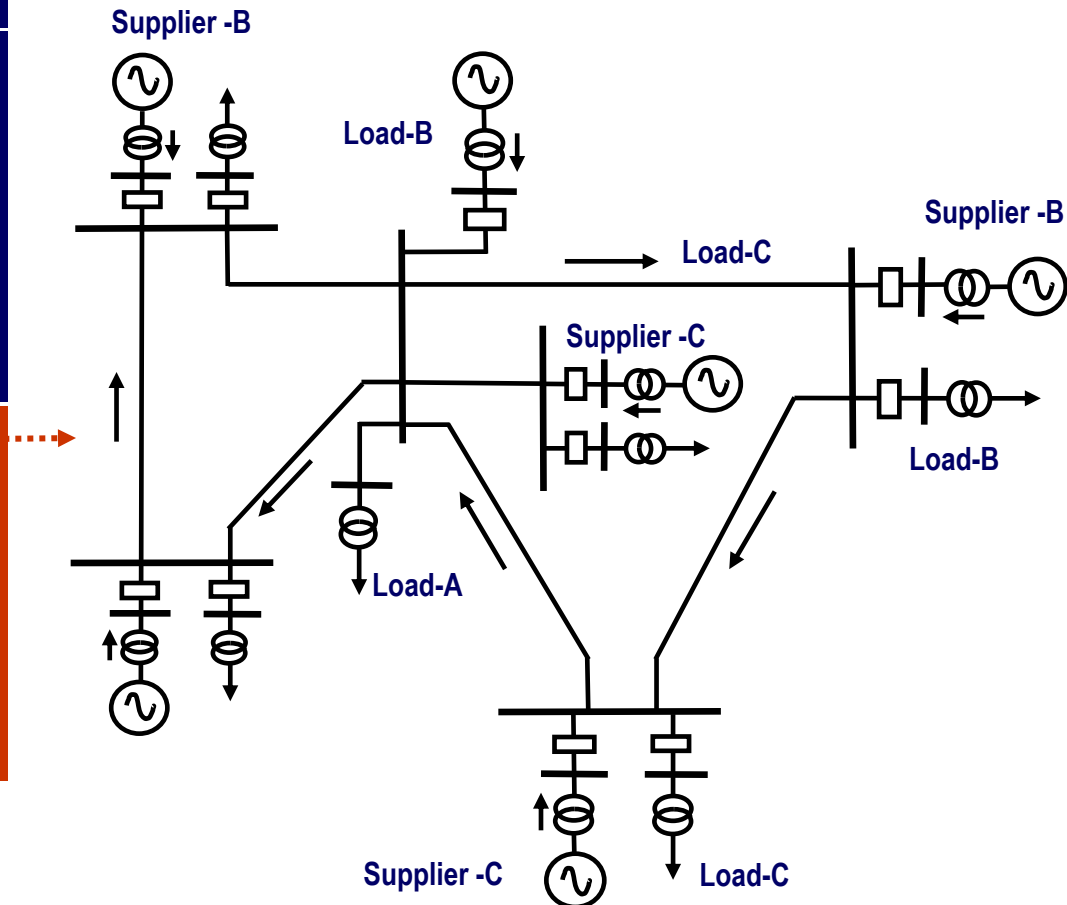


## Natural Monopoly

### The need for Natural Monopoly

Samuel INSULL, the President of National Electric Light Association solved this problem by acquiring a natural monopoly in overall Chigago Region

*Electrical Authority: A single and simple network with generation, transmission and distribution facilities, operated by a single company*



## Advantages of Natural Monopolies

### Main advantages of Monopoly

- Single and simpler management,
- Simpler system operation and deeper expertise in system planning and operation,
- Reduced operation costs, since a large centralized repair and maintenance facility is established,
- Better utilization of equipments,
- less accidents,
- Cheaper production, due to Principle of ***“Economy of Scale”***





## Economy of Scale

### Definition

Many industrial processes have a characteristics that production price sharply falls when the rating is increased

*The above principle, known as “Economy of Scale” is the main justification of natural monopolies*

For instance, a 10 MW plant is always more efficient than a one MW plant using the same type of fuel

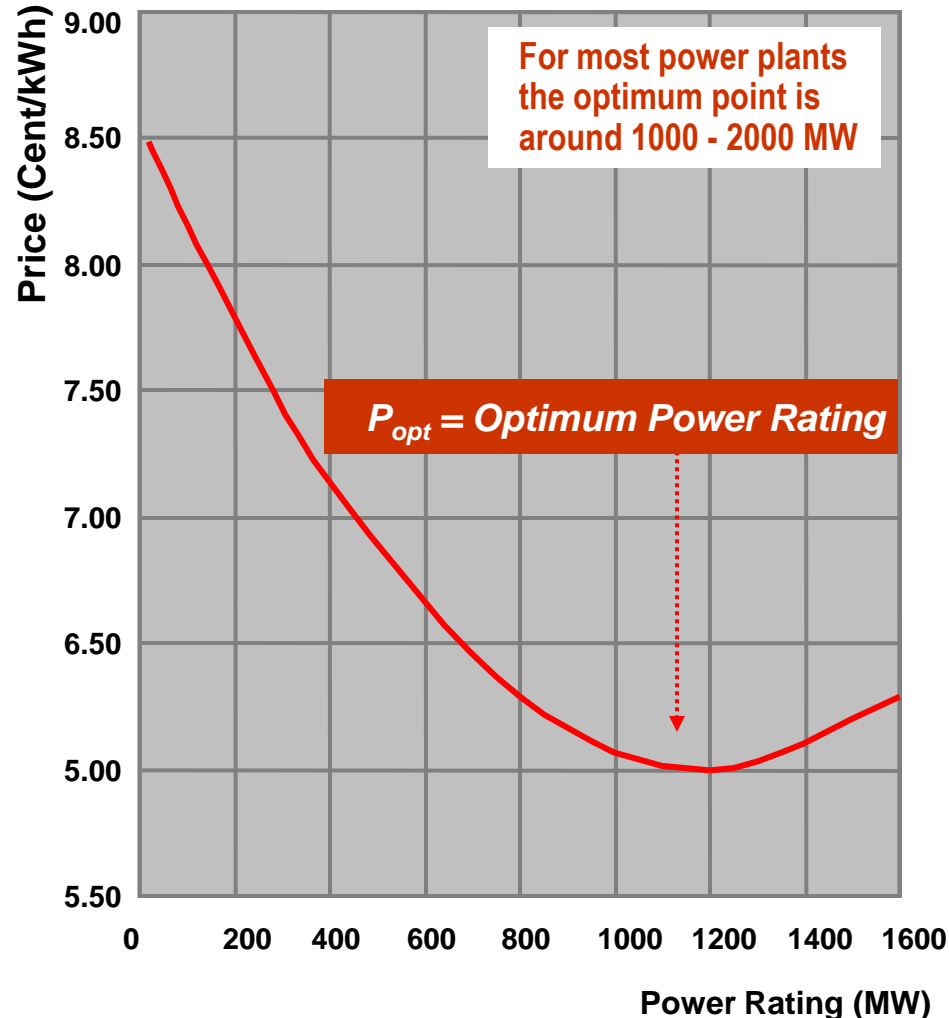
### Karkey Silopi Mobile Plant Stator (10 MW)



## Economy of Scale

### Efficiency Curve

Efficiency of a plant tends to decrease beyond a certain point, called “*optimum point*”, where the expenses for plant operation and maintenance start increasing



## Natural Monopoly vs Competition

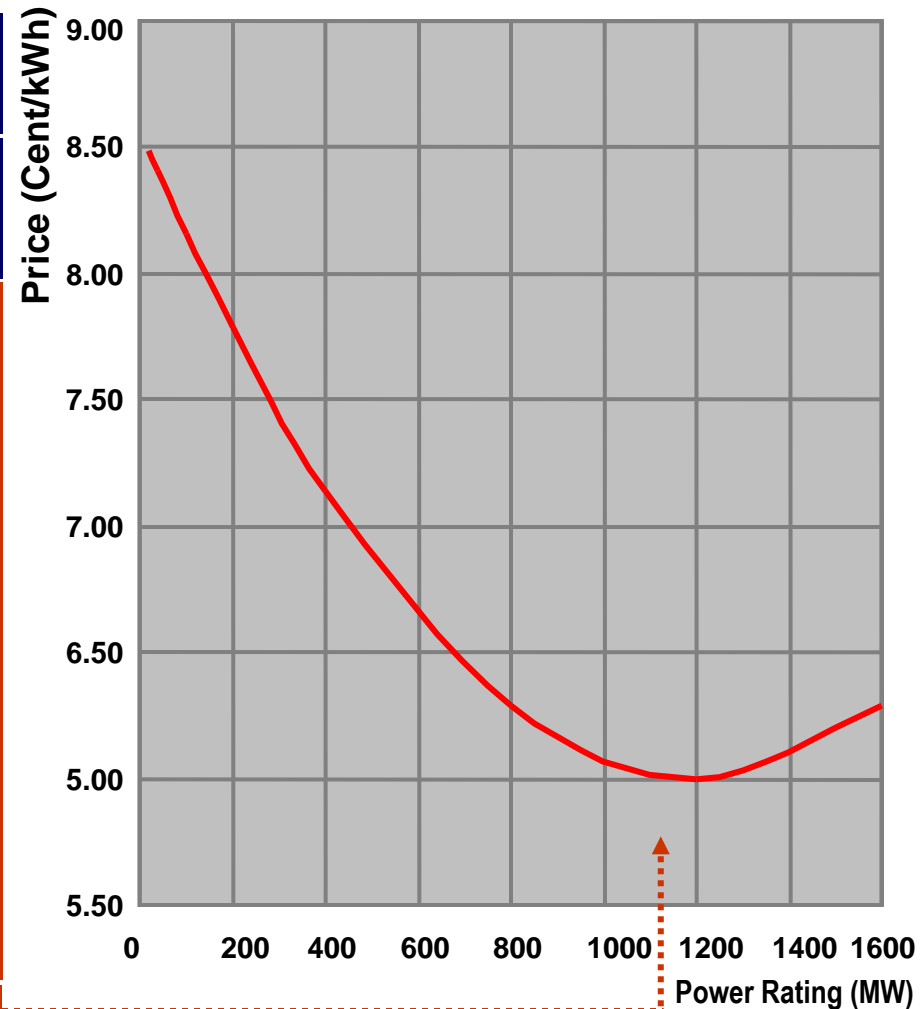
### Efficiency Curve

Optimum point  $P_{opt}$  determines the most efficient operating point of the plant

When optimum point is;

- greater than the total demand, it is better to supply the total demand by a single plant, i.e. by a monopoly, where no competition is possible,
- less than the total demand, it is possible to supply the total demand by two or more plants, operating in a competitive environment, hence competition is possible

$P_{opt}$  = Optimum Power Rating



## Natural Monopoly vs Competition

### Weakening of the Principles for Natural Monopolies

Three important developments that weaken the reasoning for Natural Monopolies are;

- Impressive developments in gas turbine technology, leading to significant improvements in reliability and efficiency of small-size plants,
- Developments in computer, control and telecommunication techniques which makes the implementation of highly complicated transmission system control and power wheeling principles possible,
- Particularly during the peak periods, inefficient small-size plants becomes favorable as prices drive up



## Natural Monopoly vs Competition-Turkish Case

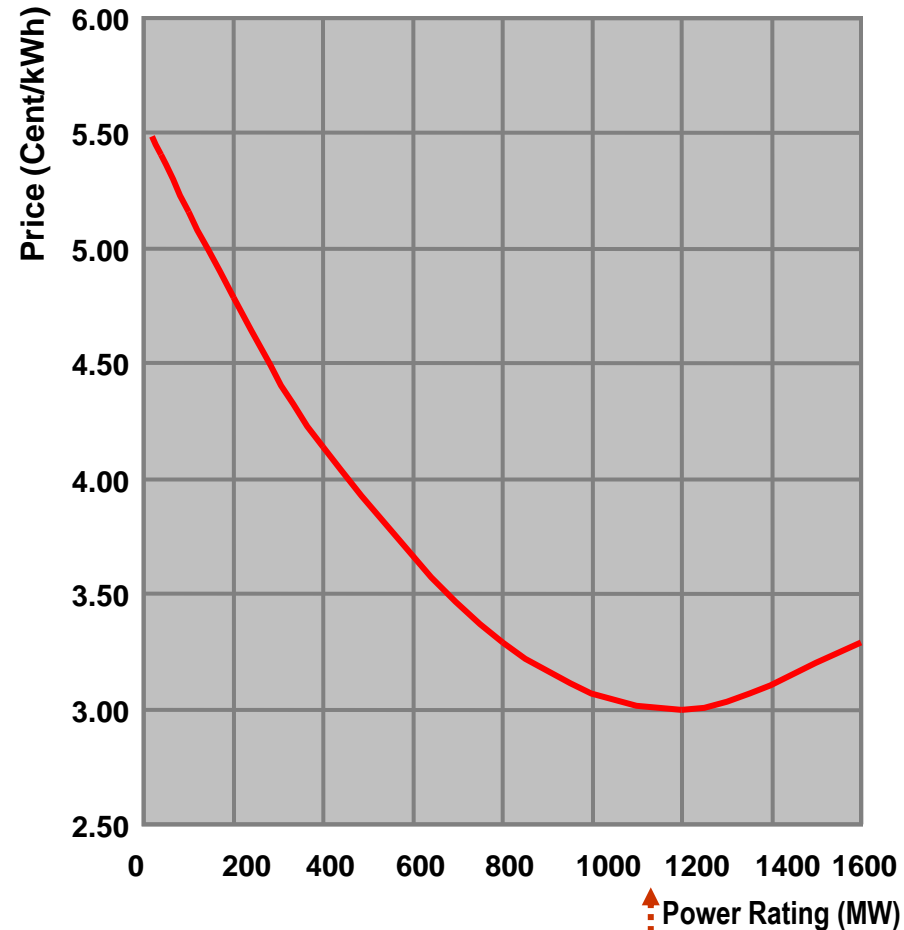
### Turkish Case (2008)

Turkish electrical power system has;

- 41000 MW rated power installed,
- 200 billion kWh / year consumption,
- 29000 MW average power consumption

The above figures are far beyond the optimum operation point, which is about 2000 MW

Hence, Turkish Electrical Power System is suitable to competition in that respect



$P_{opt}$  = Optimum Power Rating

## Technological Improvements in Gas Turbine Technology

### Developments in Gas Turbines

Impressive technological improvements in gas turbine technology;

- increased the reliability of the machines, i.e. the annual availability percent to extremely high levels, such as 99.9 % ,
- increased the efficiency of the machines at very high temperatures to satisfactory levels, such as 50 % for 100 MW small gas turbines,

Hence, the optimum point in the principle of “**Economy of Scale**” has now reduced to very small figures, such as 20-30 MW

*These developments have created a fierce competitive environment in wholesale market*



## Problems in Natural Monopolies

### Problems in Natural Monopolies

- No incentive to reduce costs, since there is no competition, resulting in a comfortable environment, which provides the company opportunity of exercising market power,
- Overemployment,
- Loss of professional enthusiasm and indifference to customer problems and even to interests of the company in the company staff,
- Increase in system losses and illicit utilization,

*Aging of Unused Cables at in a TEDAS Warehouse in Elazığ (1999-2000)*



## Problems in Natural Monopolies

### Problems in Natural Monopolies

- Falling behind the modern technological developments and administration techniques,
- Reflection of all kinds of expenditures and investments simply and directly to tariff without any fear of competition inefficiency, →
- Determination of the tariff by the governing committee of the utility,  
→ unethical

*It is not ethical for a company to have the right of setting its own tariff (i.e. its own interests) by its own governing committee*





## Regulation of Monopolies

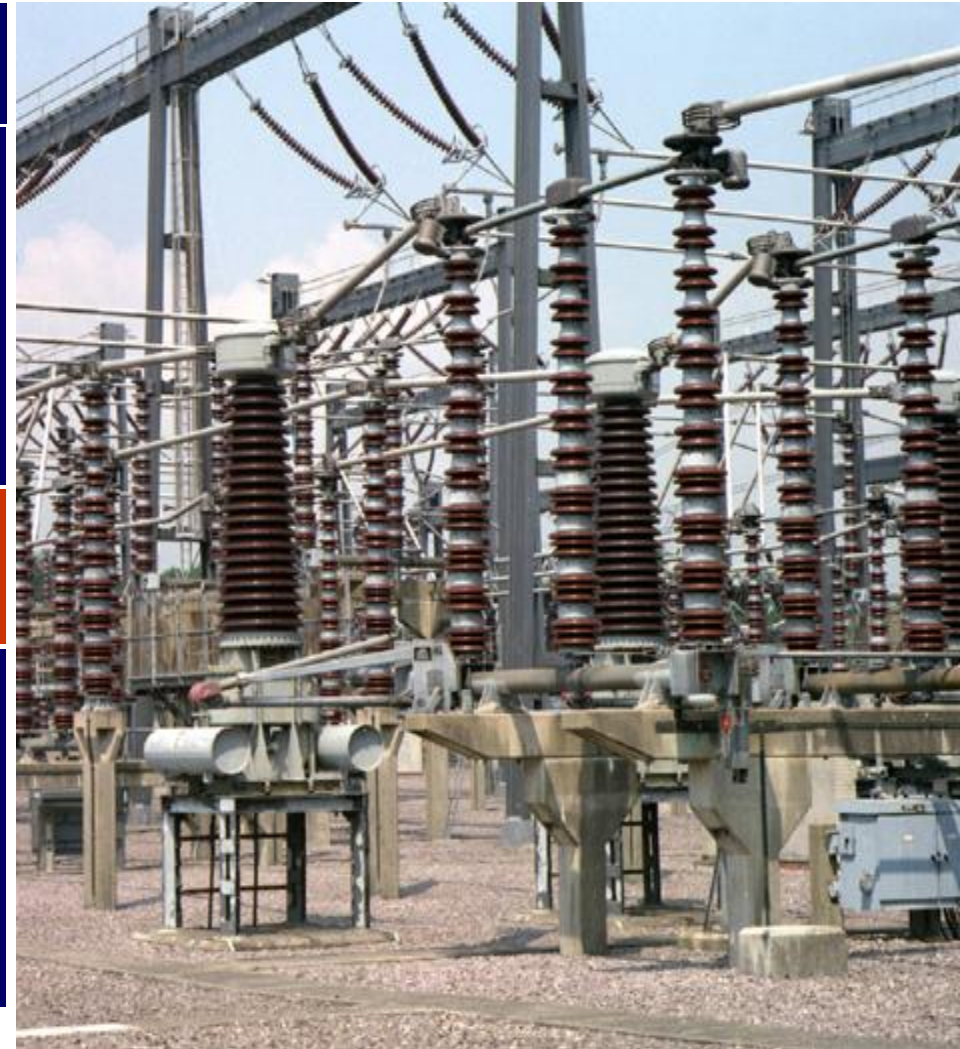
### Problems in Natural Monopolies

A monopoly has always a significant power of driving up prices since;

- it has the market power,
- it has the right of setting its own tariff

*The above problem is the main reason for regulating the natural monopolies*

Thus, the prices, tariffs and investment plans are all regulated for the interests of the public, by an independent body, called the “Regulator”



## Problems in Regulating Monopolies

### Problems in Regulating Monopolies

- Regulating a monopoly cannot itself provide a strong incentive as cheaply as a competitive market,
- Regulatory bodies, themselves may not always have proper incentives for better regulation, due to political influences

*34.5/0.4 Distribution Transformers in an Open TEDAS Warehouse in Bingöl (1999-2000)*



## Vertically-Bundled Structure

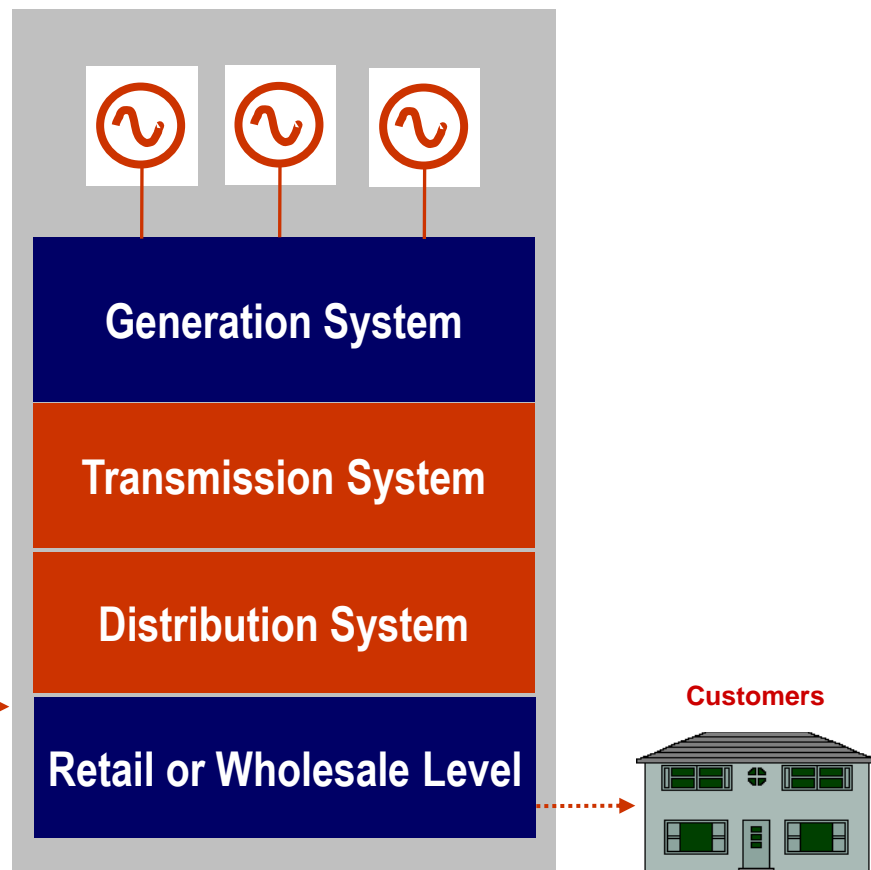
Electricity traditionally generated, transmitted, distributed, and sold by a single Vertically-Bundled (Monopoly Structured) company, called “Electric Utility (Authority)”

In the United States and in some Government Monopoly structures, such as EDF, the structure is still the vertically model as shown in the diagram given on the RHS

### Turkish Electricity Authority (TEK)

Until 1994, Turkish Electricity Authority (TEK) was Vertically-Bundled

### Vertically-Bundled (Monopoly) Model Turkish Electricity Authority (TEK)



## Vertical Unbundling

### Definition

**Vertical Unbundling** is the separation of the services traditionally provided by a single utility into functionally independent parts

**Vertical Unbundling requires utilities;**

- to carry out each component of these services physically and functionally by an independent company,
- to ensure that the price of each service accurately reflects the cost of that service, with some margin for profit,
- Not to make any cross-subsidy in the tariffs and expenditures among these companies

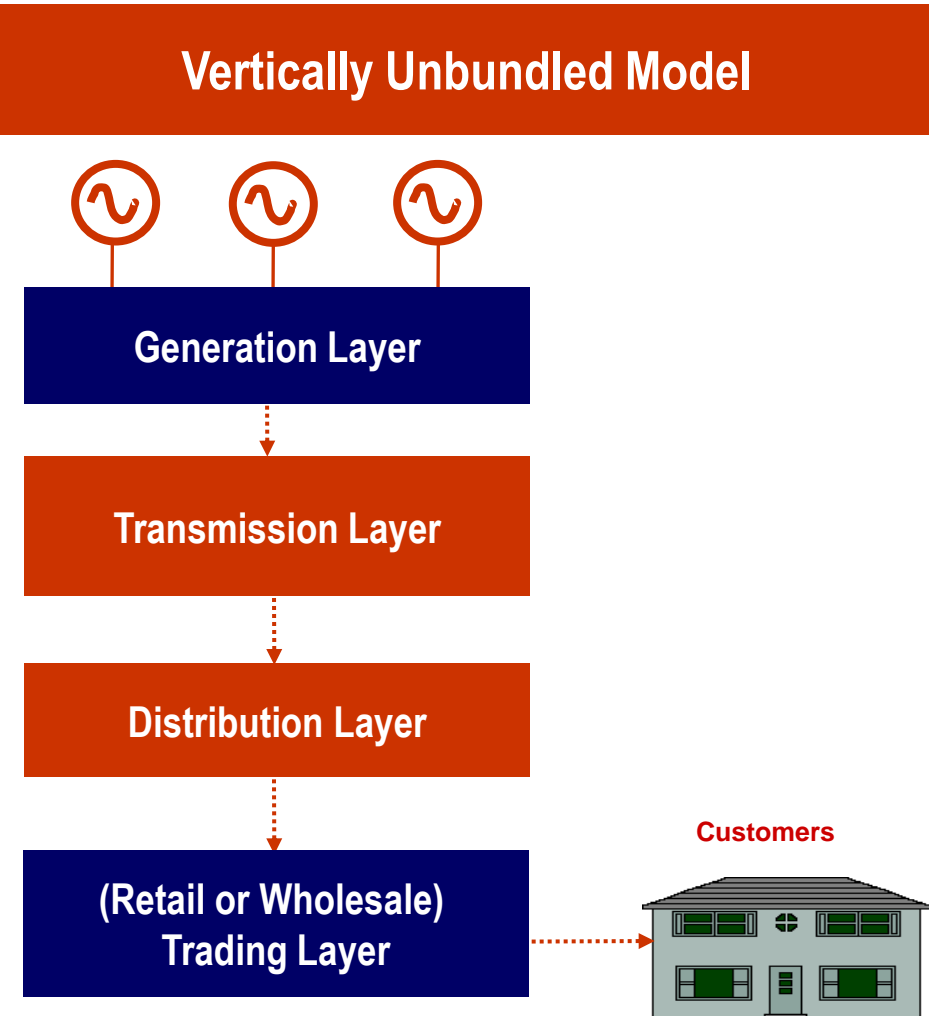
TEIAS, TEDAS, EUAS and TETAS  
General Directorates



## Vertical Unbundling

In Europe, starting from early 1990's the traditionally Vertically-Bundled model is split (unbundled) into four functional layers;

- Generation Layer,
- Transmission Layer,
- Distribution Layer,
- (Retail and Wholesale) Trading Layer

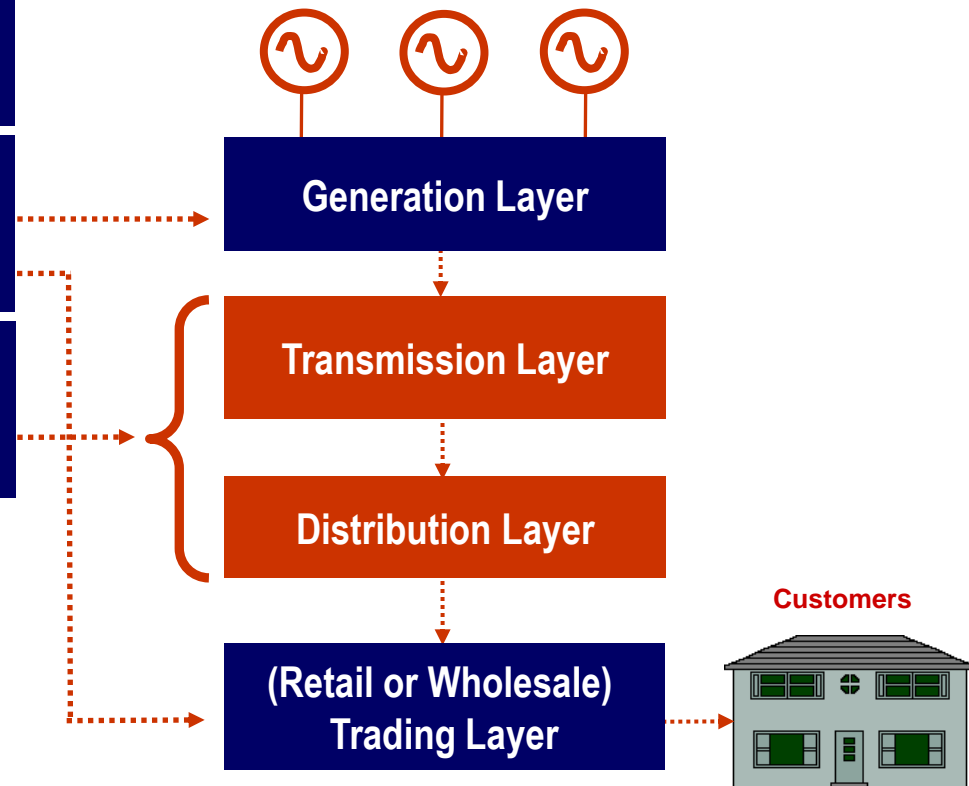


## Vertical Unbundling

As a result of “Vertical Unbundling”, classical structure of an electric utility has been decomposed into two main parts:

- Those layers carrying out: “electricity trading”
- Those layers carrying out: “electricity services”

### Vertically Unbundled Model

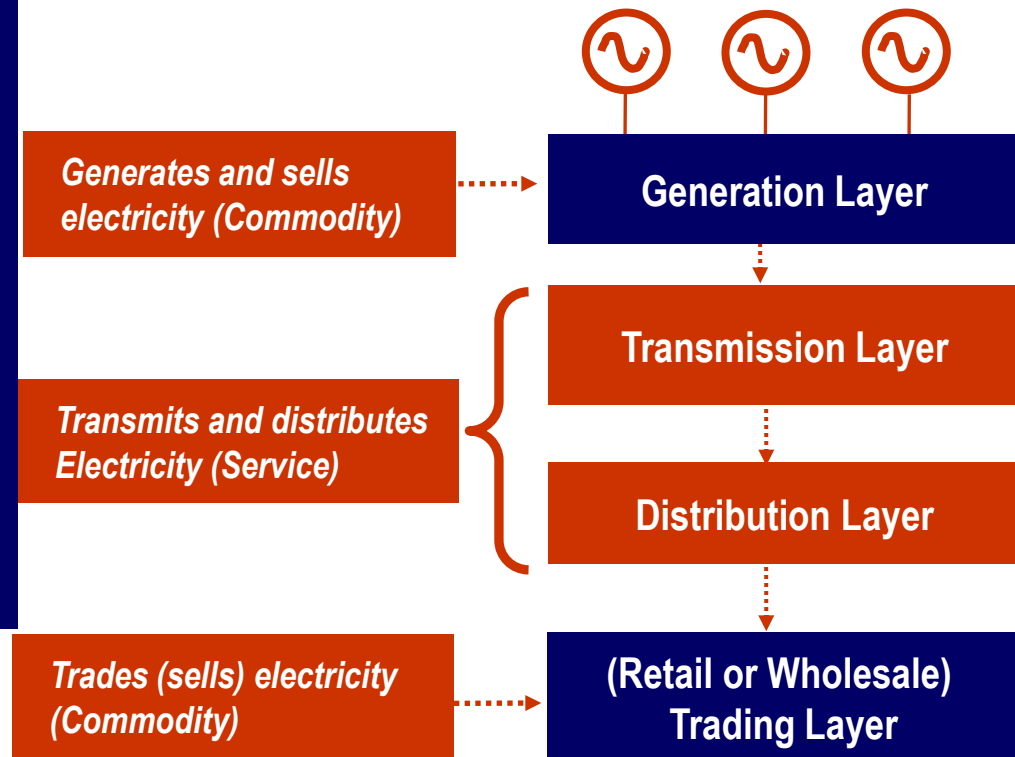


## Vertical Unbundling

Please note that;

- Generation and Trading Layers deal with:  
“electricity”,  
i.e. an “industrial product”,  
or “commodity”,
- Transmission and Distribution Layers deal with:  
“electricity services”

Vertically Unbundled Model



## Vertical Unbundling

In the view of;

- global liberalism,
- deregulation,
- competition, and
- technological developments;

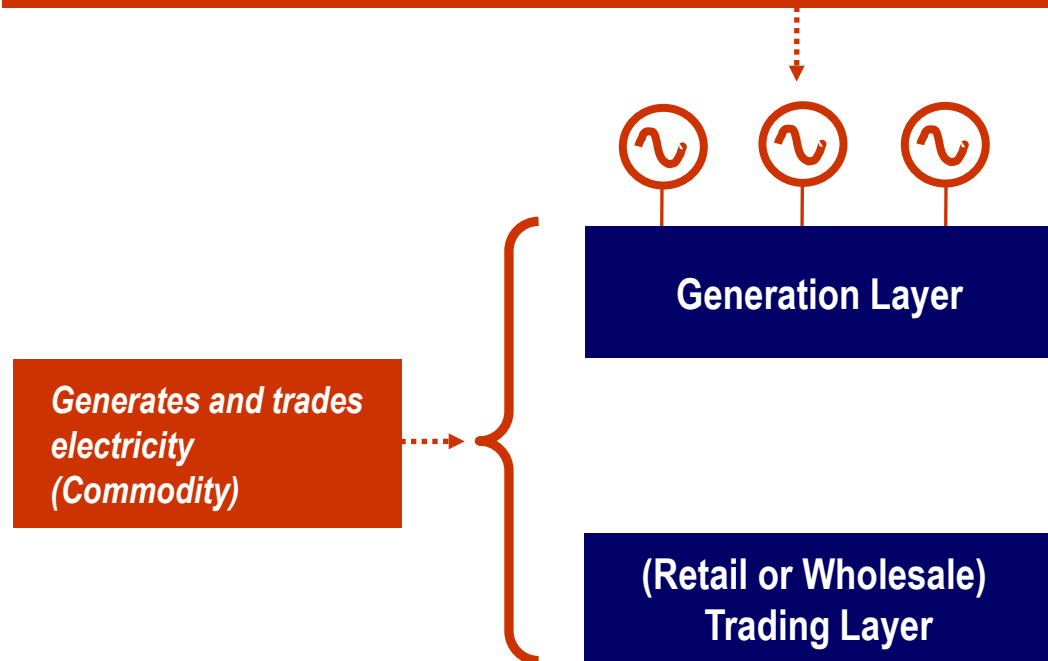
Electricity dealt with the Generation and Trading Layers is regarded as a **“commercial commodity”** traded in a competitive market (\*)

*(\*) Oil and gas are certainly commercial commodities.*

*Thus, electrical energy produced by using these commodities must also be regarded as a commodity*

### Vertically Unbundled Model

Generation and trading layers together are called “market”





## Vertical Unbundling

Activities carried out in the transmission and distribution layers, on the other hand, are not regarded as “commodity”, but “public service”.

Hence, these activities are not traded in a competitive market

These layer are called “Natural Monopolies”

### Vertically Unbundled Model

*Transmits and distributes Electricity (Service)*

Transmission Layer

Distribution Layer

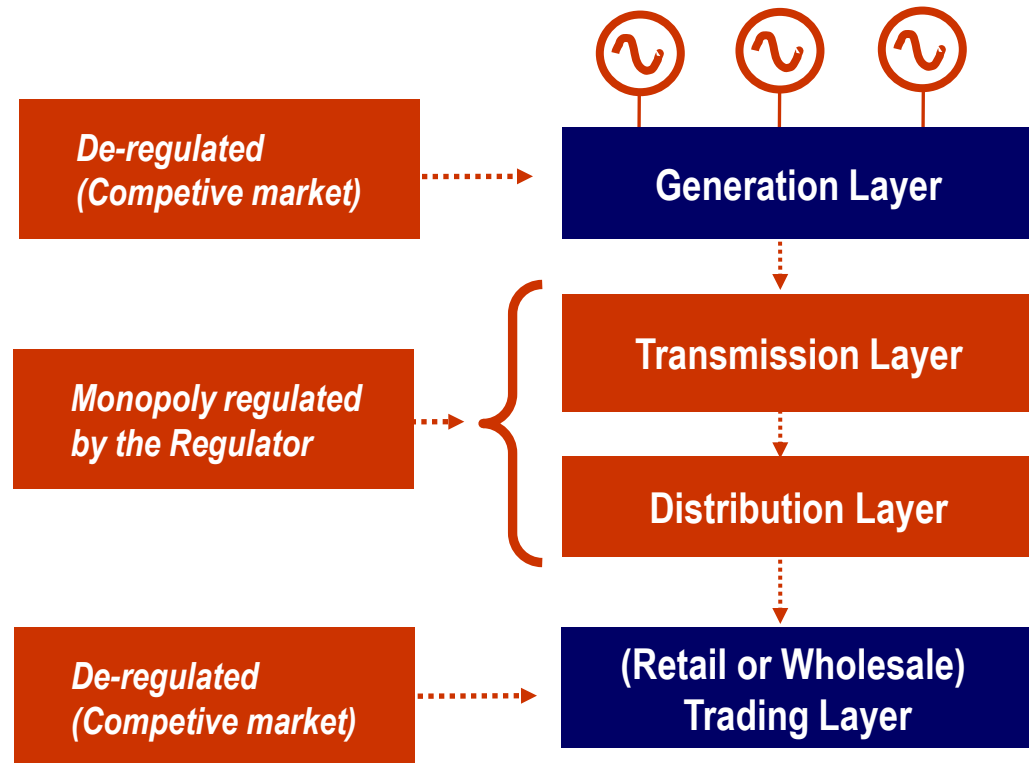
## Basic Rules

### Basic Rules

- Layers dealing with “electrical commodities” are de-regulated,
- Layers dealing with “electrical services” are regulated

Main Purpose of Vertical Unbundling;  
To separate the regulated and de-regulated layer from each other

### Vertically Unbundled Model



# Vertical Unbundling

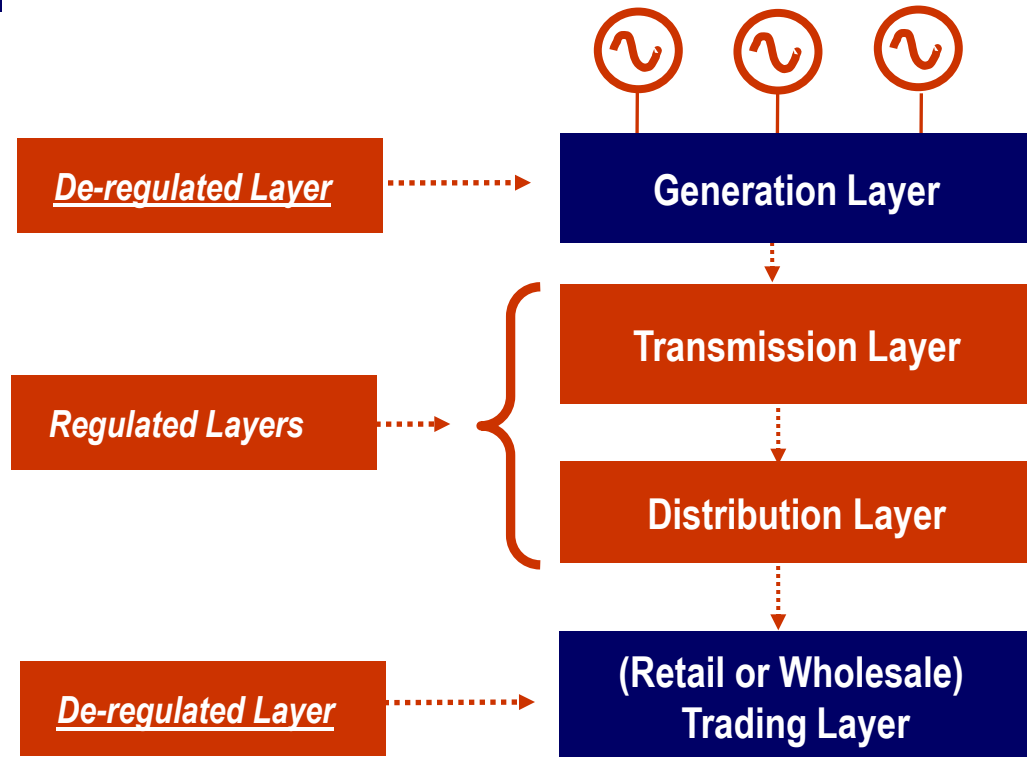
## Major Objective of Vertical Unbundling

### Major Objective of Vertical Unbundling

Major objective of Vertical Unbundling is simply to:

- regulate the layers to be regulated,
- de-regulate the layer to be deregulated

### Vertically Unbundled Model



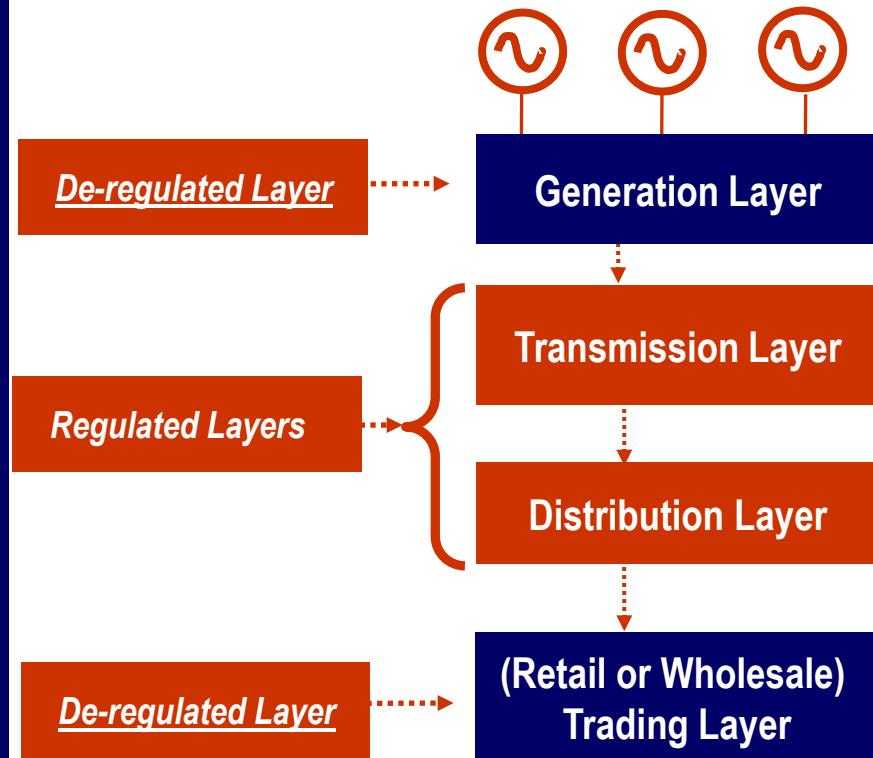
# Vertical Unbundling

## Stages of Vertical Unbundling

### Stages of Vertical Unbundling

- **Account unbundling:** Separation of the accounts and related documents of the companies and assets,
- **Management unbundling:** Separation of management structures, i.e. buildings, staff, commercial institutions of the companies and assets,
- **Functional (Physical) unbundling:** Separation of physical structures and assets, i.e. plants, substations, etc
- **Ownership unbundling:** Separation of the owners of the companies and assets

### Vertically Unbundled Model



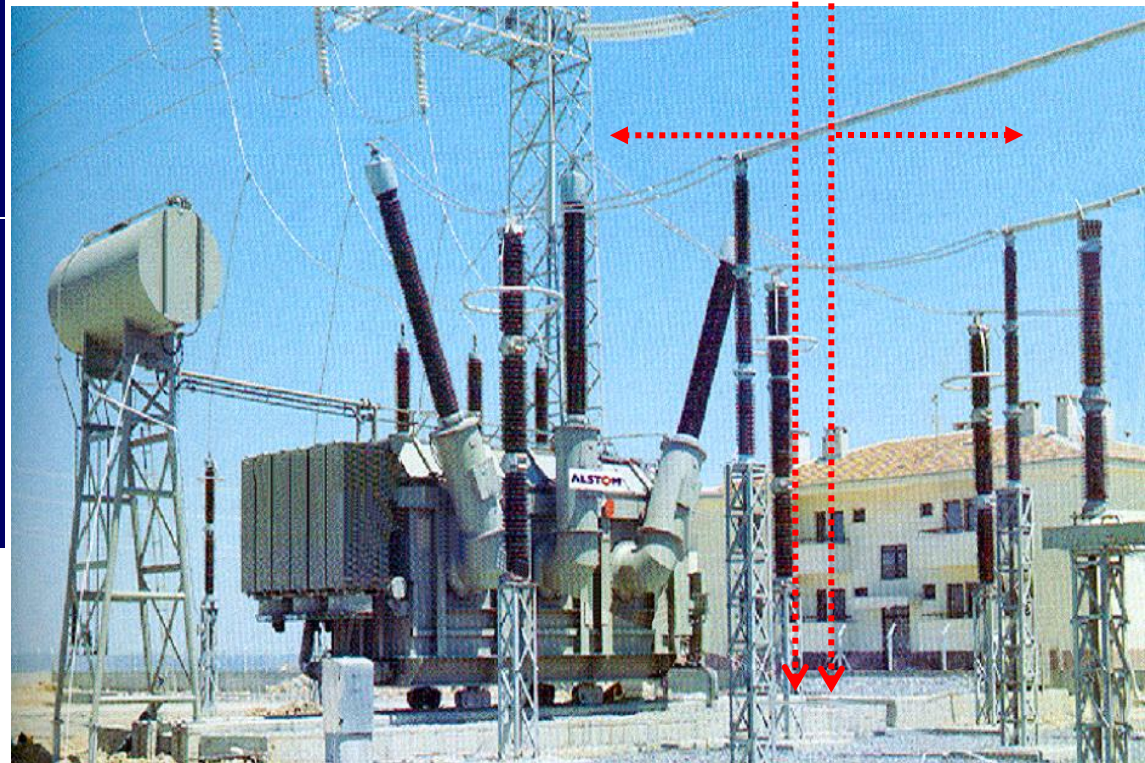
## Difficulties in Physical Unbundling

### Functional (Physical) unbundling

Separation of physical structures and assets, i.e. plants, substations, etc

Physical unbundling is the most important and the most difficult and the most expensive part of the task

*A border (wall, fence) is drawn between the Transmission and Distribution Authorities (TEİAŞ and TEDAS) in order to distinguish the buildings, assets, functions, authorities and responsibilities*



## Practical Difficulties in Physical Unbundling

### Functional (Physical) unbundling

Separation of physical structures and assets, i.e. plants, substations, etc

Physical unbundling is the most important and the most difficult and the most expensive part of the task

*Lines with parts operated at different voltage levels and energized by different authorities are to be redesigned, restructured and reinstalled*

*This part (MV part) is energized by TEIAS*

*This part (LV part) is energized by TEDAS*



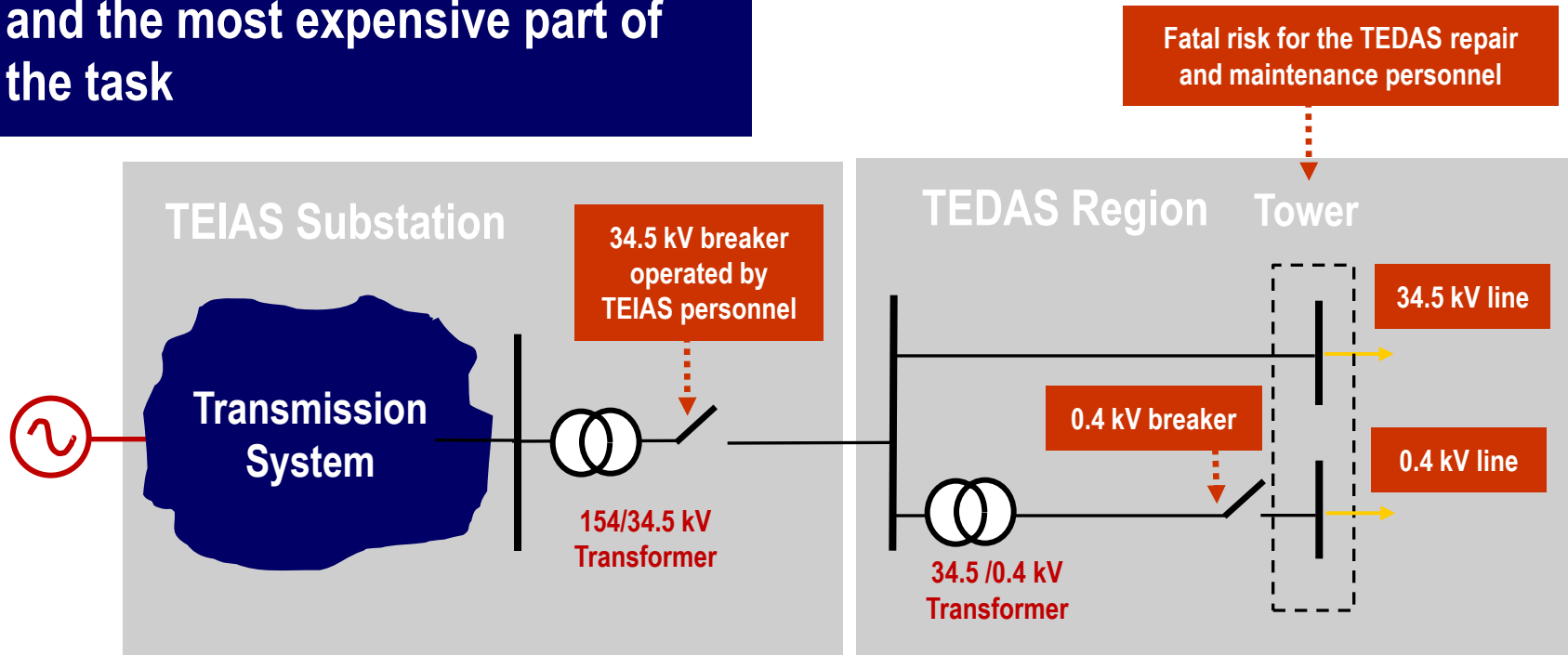
# Vertical Unbundling

## Practical Difficulties in Physical Unbundling

### Functional (Physical) unbundling

Physical unbundling is the most important and the most difficult and the most expensive part of the task

*Lines with parts operated at different voltage levels and energized by different authorities presents fatal risk*



## Price and Tariff

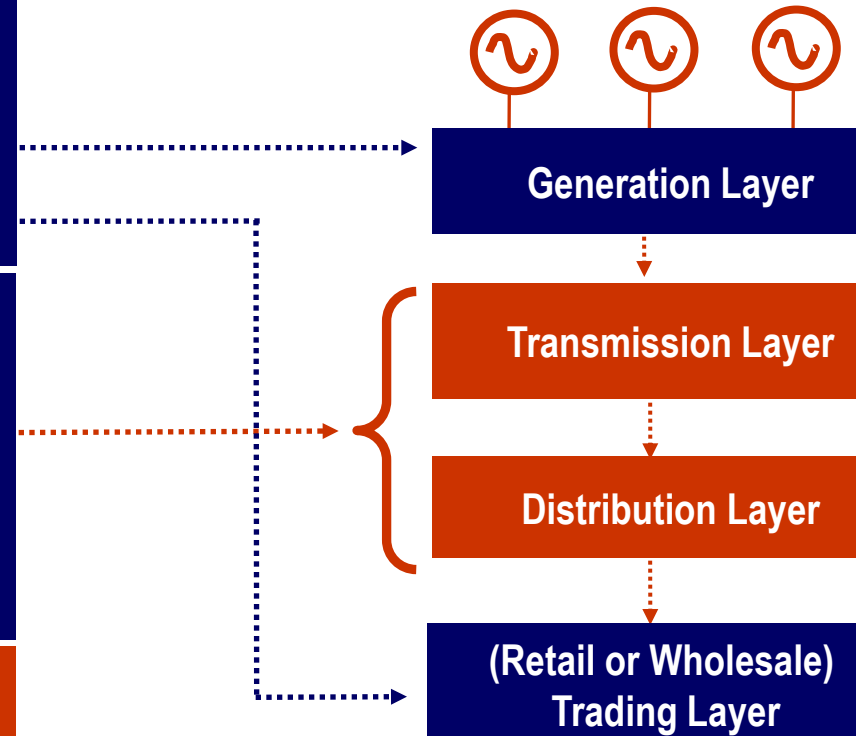
### Definition

- Marginal cost of electricity including all overheads and profits in Generation and Trading Layers is called **“Price”** or **“Electricity Price”**
- Overall cost of service including expenditures and investments expressed in terms of each kWh of electricity transmission or distribution service is called **“Tariff”**

*Please note that;*

- “Prices” are de-regulated, while “Tariffs” are regulated,
- All prices and tariffs are shown in separate items on the customer bills

### Vertically Unbundled Model





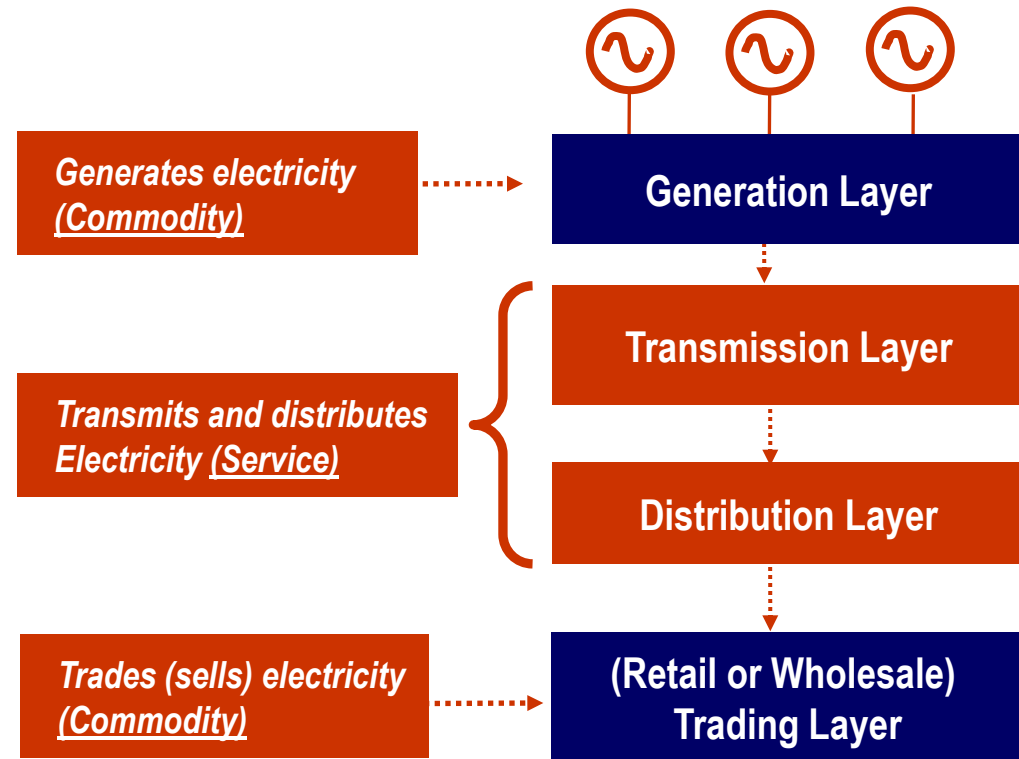
## Is Electricity a Commercial Commodity ?

Answer to this question is both “Yes” or “No” depending upon the definition of the term: “Electricity”

Answer to this question:

Electricity is;

- a commodity for de-regulated (generation and trading) levels,
- A service for the regulated (transmission and distribution) layers

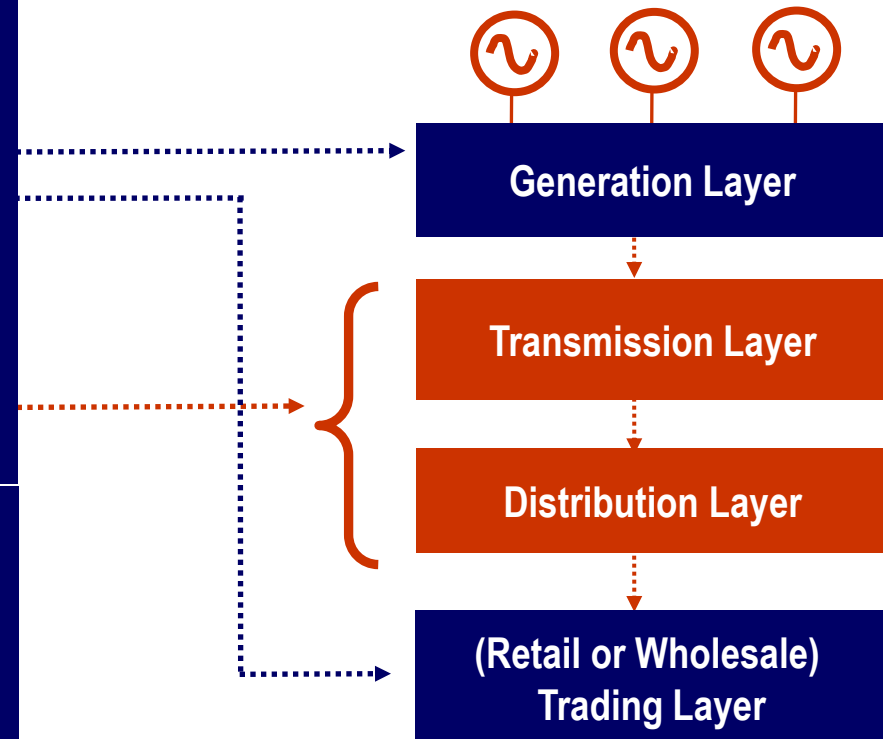


## Regulation and De-regulation

### Definition

- **De-regulation:**  
To liberate the prices in the generation and trading layers.  
These prices are calculated with respect to fuel, investment, and other costs determined by the investment characteristics of the plant
- **Regulation:**  
To impose “cap” called “revenue cap” on the tariffs in the Transmission and Distribution Layers regularly, usually once in a year by the Regulator

### Vertically Unbundled Model



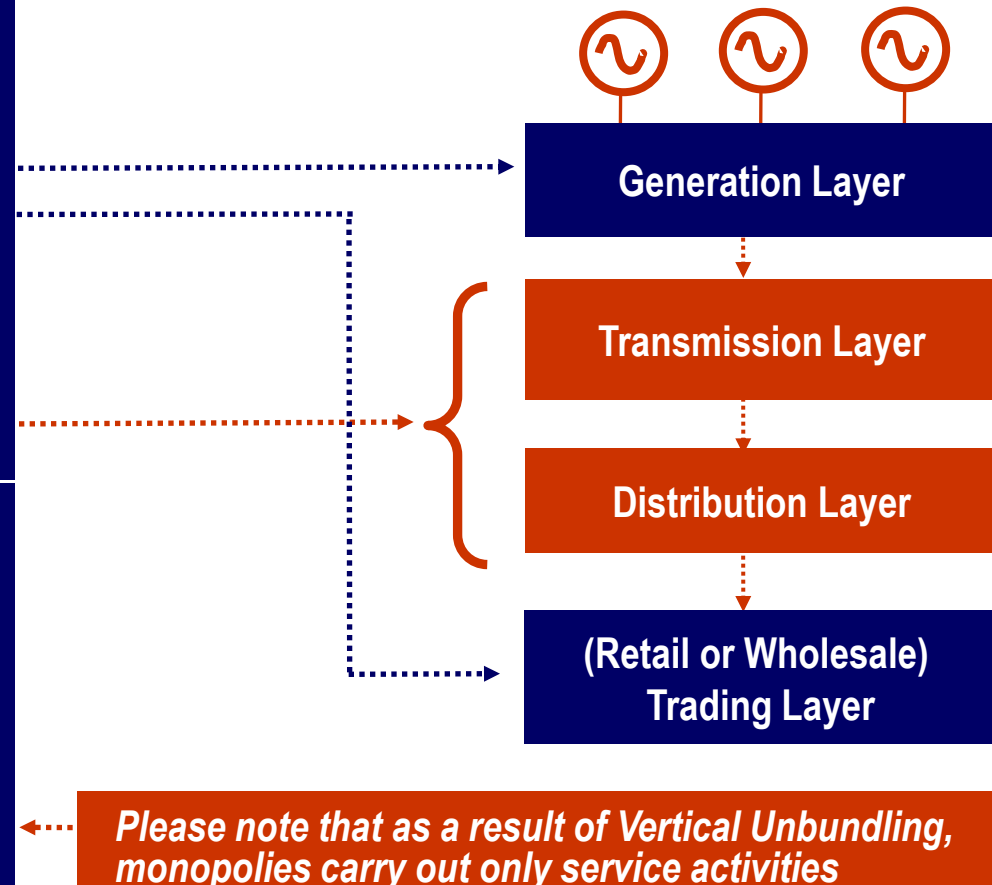
# Vertical Unbundling

## Market and Monopoly

### Definition

- **Market:** is a competitive-based trading environment, where two or more players act on cost based (marginal) prices  
Generation and Trading layer are markets
- **(Service) Monopoly:** is a non-competitive environment, where a single player acts in that region for providing transmission and/or distribution service activities

### Vertically Unbundled Model



# Vertical Unbundling

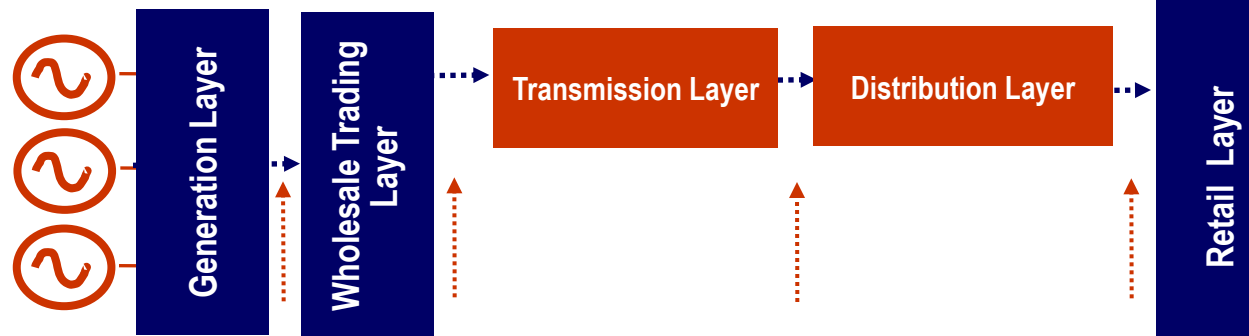
## Payment between Regulated and De-regulated Layers

### Rule

Members of de-regulated layer;

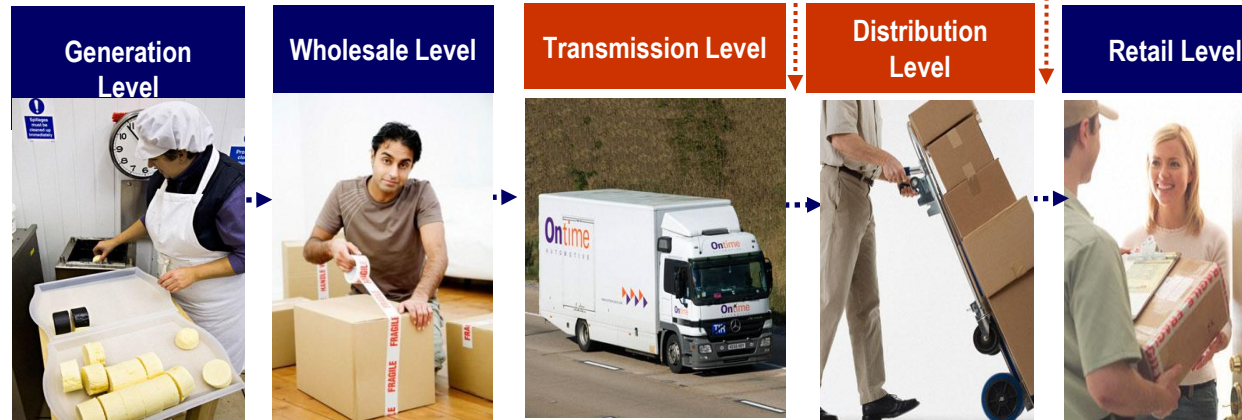
- Receive services (transmission and/or distribution services) from the members of regulated layers,
- Makes payments for the electricity services (transmission and/or distribution services) received from the members of regulated layers

### Vertically Unbundled Model



Commodity Flow

Service Flow



## Turkish Case

### Vertically Integrated Model (until 1993)

Basic Features;

Generation, transmission, distribution and trading facilities are explicitly;

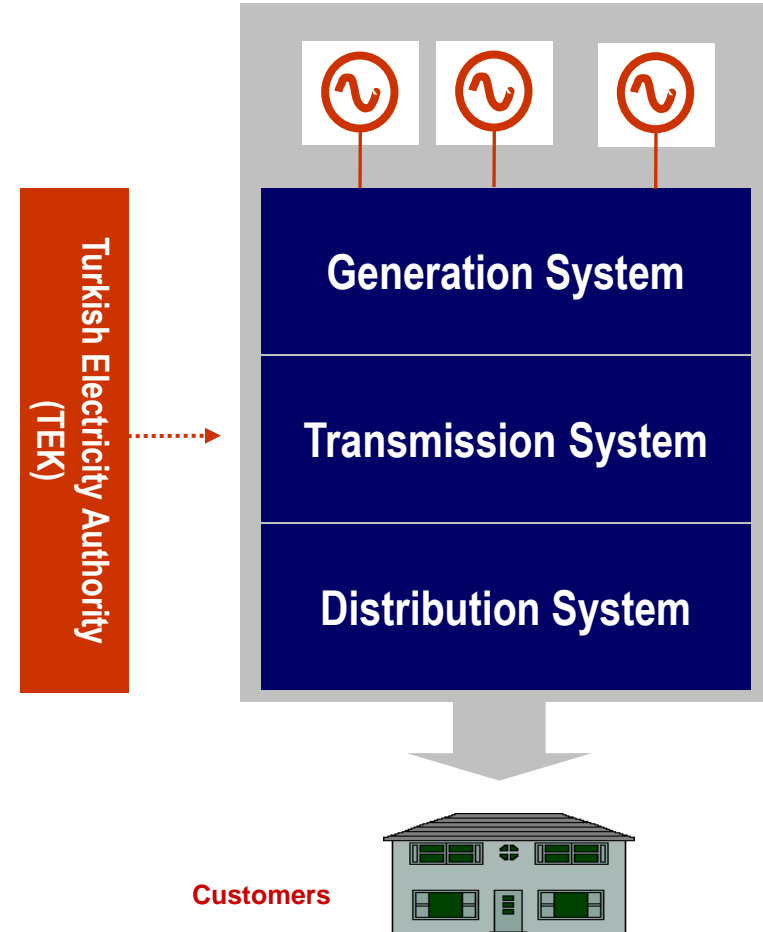
- owned by TEK (public),
- operated by TEK,
- vertically integrated

Other features;

- No eligible customers,
- National tariff everywhere, i.e. no cost-based or retail competition,
- No wholesale activity<sup>(\*)</sup>,
- Electricity is sold only by TEK<sup>(\*)</sup>

**(\*) Except CEAS and Kepez**

### Turkish Electricity Authority (TEK)

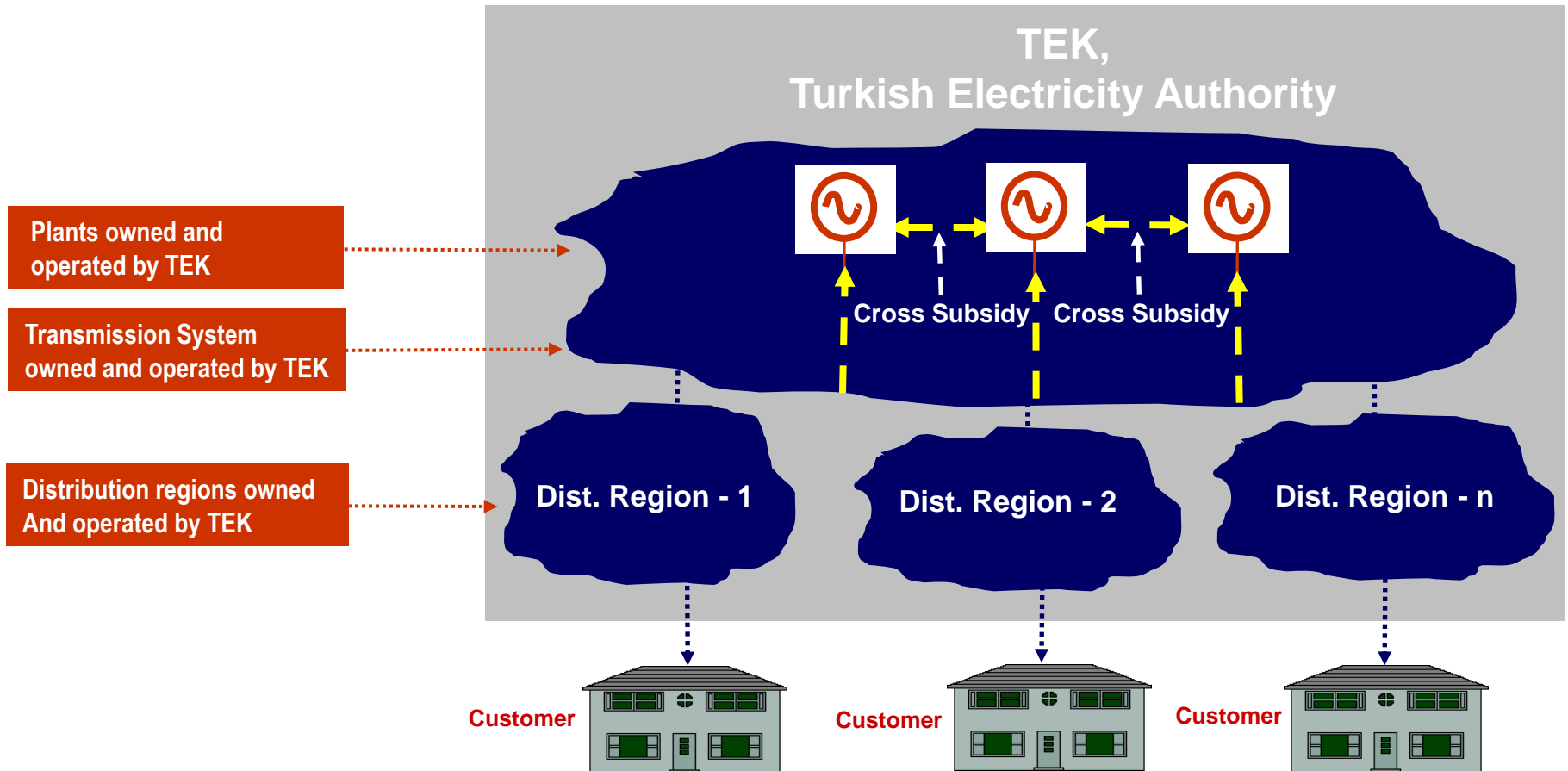


# Vertical Unbundling

## Turkish Case

Vertically Integrated Model (until 1993)

Turkish Electricity Authority (TEK)



# Vertical Unbundling

## Turkish Case

### Adjoint Model (1993-2001)

#### Generation system

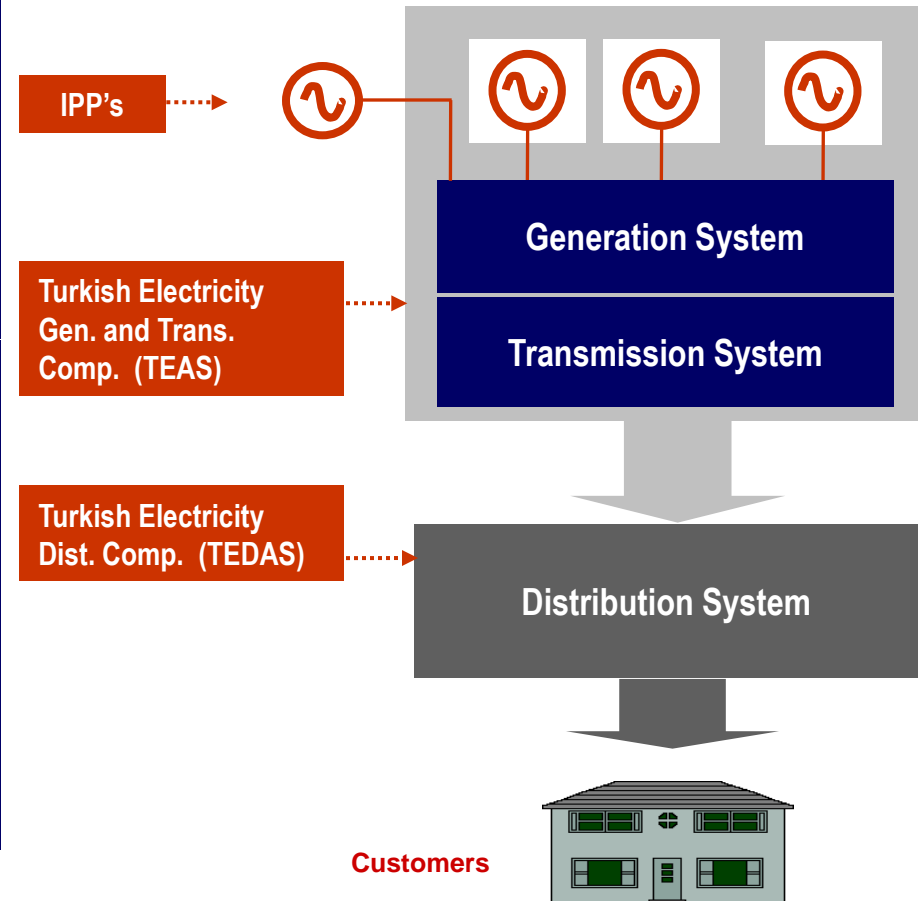
is owned and operated explicitly by TEAS (public), with the exception that independent power production (IPP) is possible

#### Transmission system

is owned and operated explicitly by TEAS (public), with the exception that CEAS and Kepez have their own transmission systems

Generation and transmission systems are vertically integrated

### Two Company Model : TEAS and TEDAS Model



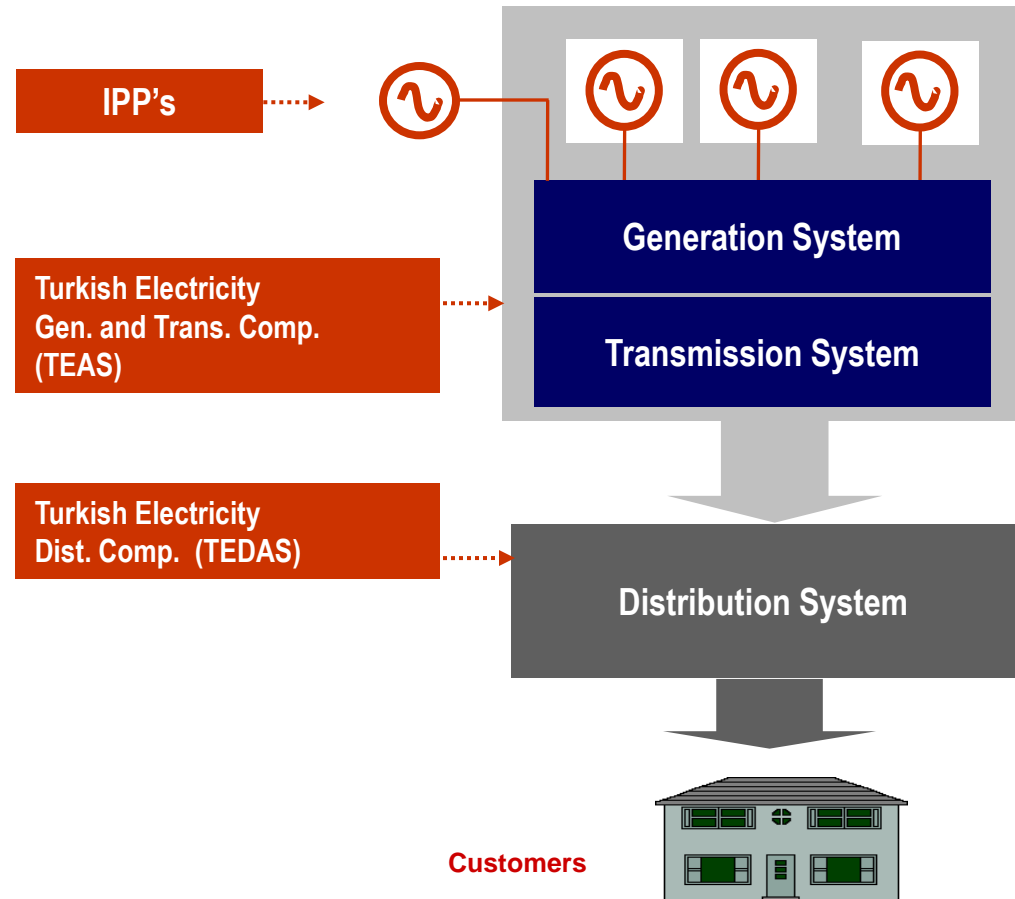
## Turkish Case

### Adjoint Model (1993-2001)

#### Distribution systems are;

- Unbundled,
- owned explicitly by TEDAS (public),
- Operated mostly by TEDAS with the exception that two private companies; AKTAS and Kayseri Electric Distribution A.S. are established on the basis of TOOR (Transfer of Operation Right) Agreements

### Two Company Model : TEAS and TEDAS Model





## Turkish Case

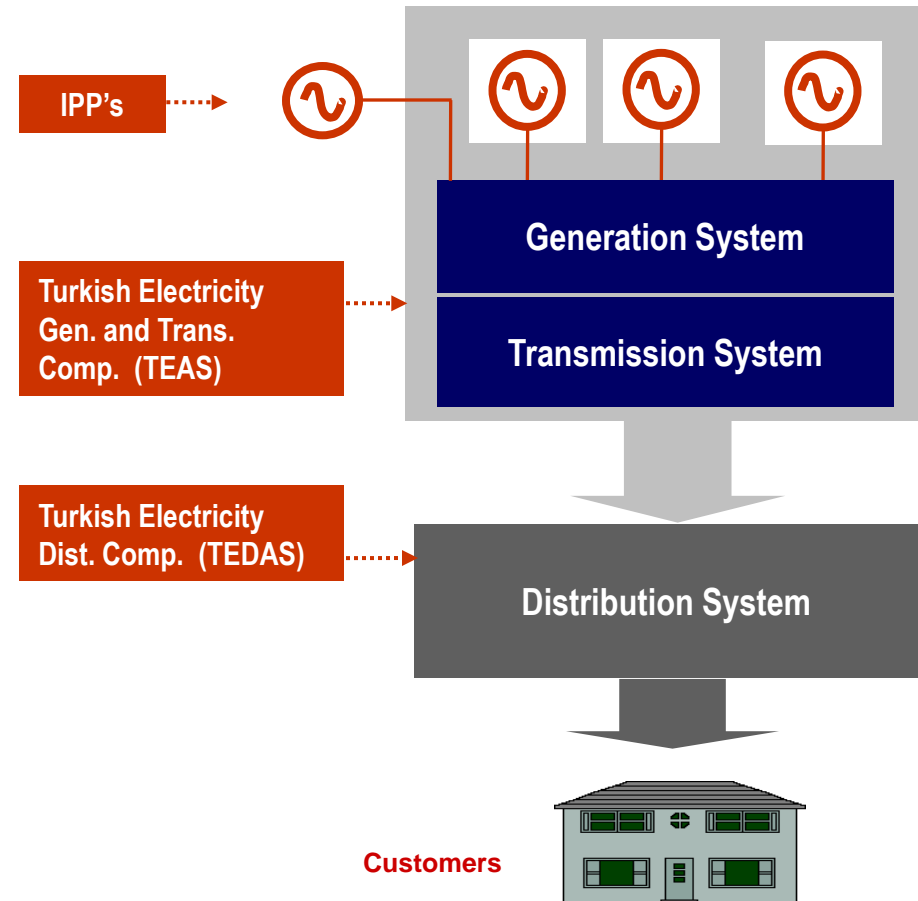
### Adjoint Model (1993-2001)

### Two Company Model : TEAS and TEDAS Model

#### Other features;

- No eligible customers,
- National tariff everywhere, i.e. no cost-based or retail competition,
- No wholesale activity by private companies,
- Generation, transmission systems are owned and operated mostly by TEAS,
- Wholesale activity is carried out mostly by TEAS, except CEAS, Kepez and some IPP's,
- Power generated by IPP's are bought solely by TEAS,
- Electricity is mostly sold by TEDAS(\*)

(\*) Except CEAS, Kepez, Aktas and Kayseri Electric

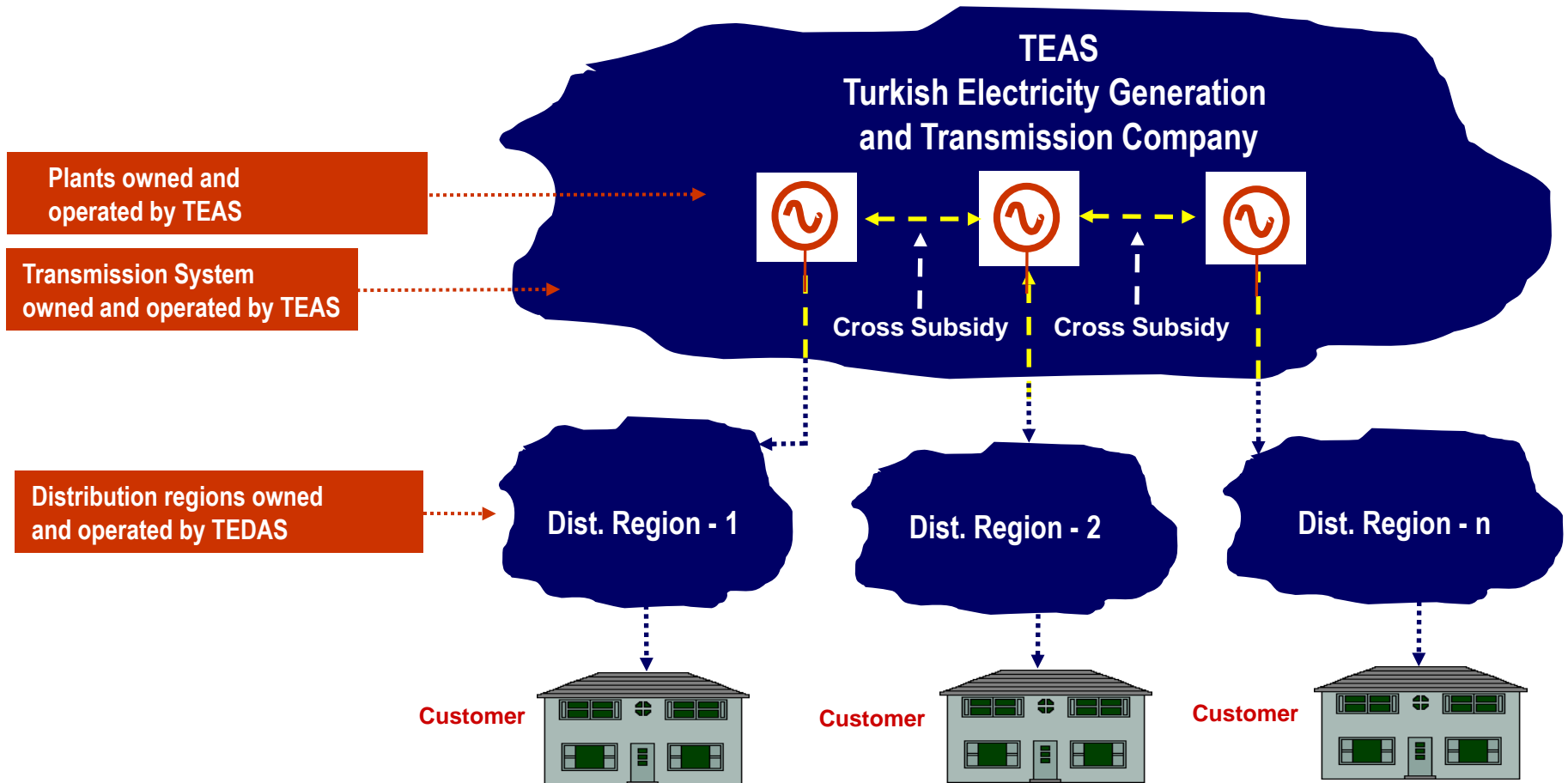


# Vertical Unbundling

## Turkish Case

Adjoint Model (1993-2001)

Two Company Model : TEAS and TEDAS Model



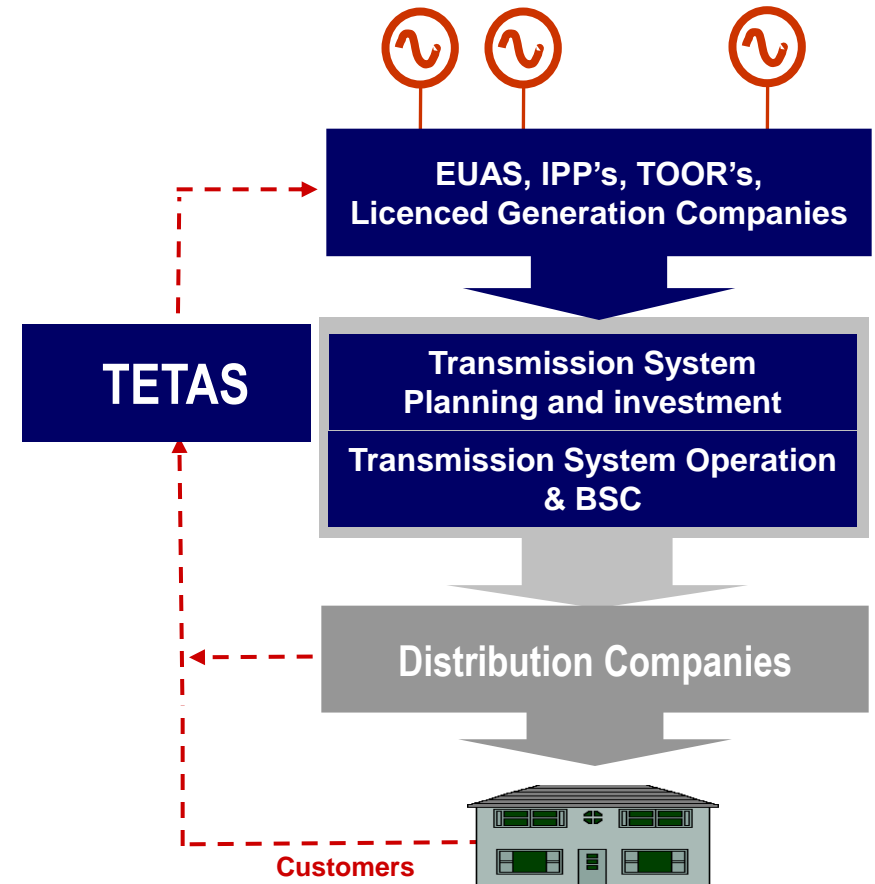
# Vertical Unbundling

## Turkish Case

### Unbundled Model (from 2001)

### Four Company Model : EUAS, TEIAS, TETAS, TEDAS

- Basic Features;
- Generation, transmission, distribution, wholesale and retail activities are completely unbundled,
- Transmission system is owned and operated by an independent public company; TEIAS
- Licenced independent generation company model is established,
- Wholesale and retail models are established,
- Eligible customer model is established with the eligibility limit; 9 million kWh in 2003 and 7800 kWh in 2004



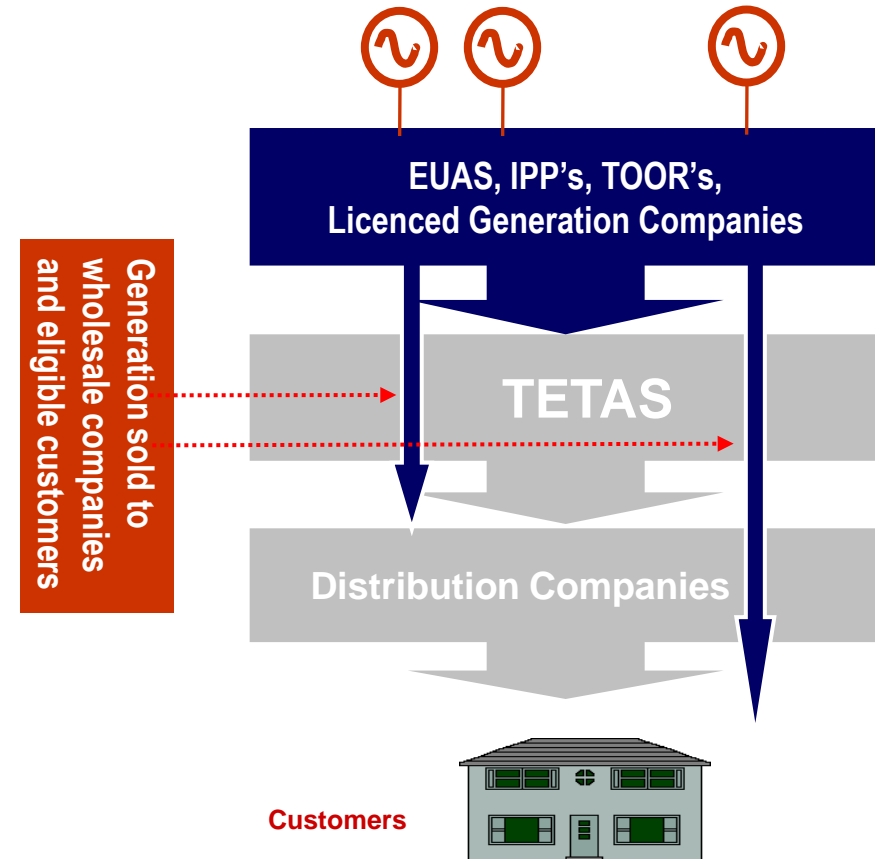
## Turkish Case

### Unbundled Model (from 2001)

### Four Company Model : EUAS, TEIAS, TETAS, TEDAS

#### Basic Features;

- Full competition between EUAS, IPP's and licenced generation companies in the generation market,
- Bilateral agreements with residual balancing between supply and demand,
- Regulation in the transmission and distribution system operation and service charges,
- Competition in wholesale market, except TETAS,
- Regulation on the activities and wholesale prices of TETAS



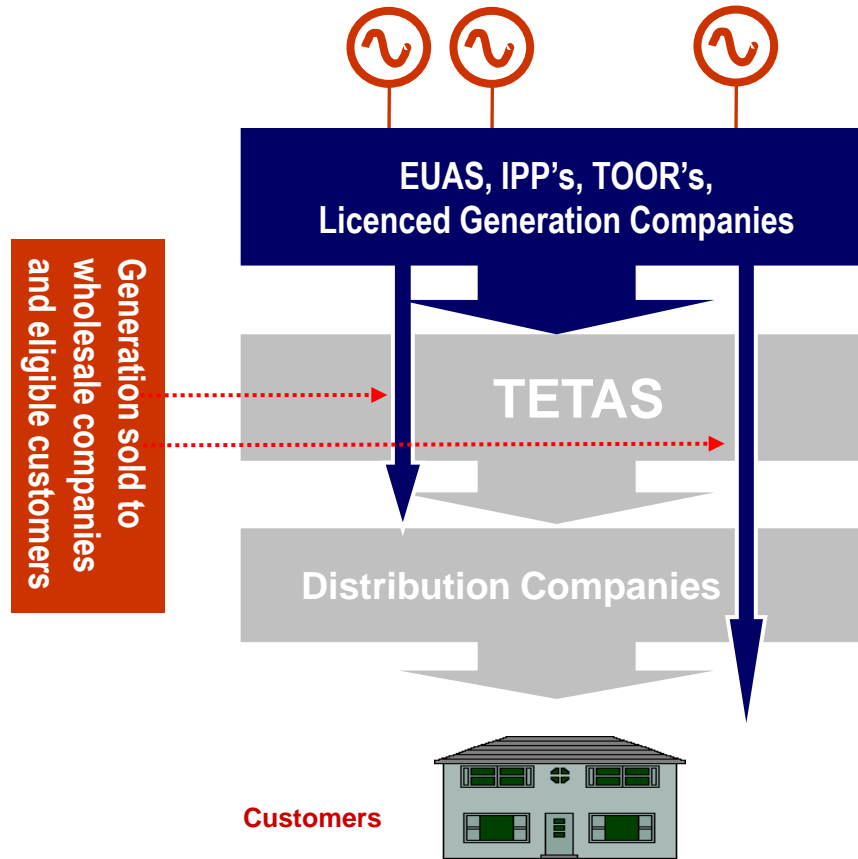
## Turkish Case

### Unbundled Model (from 2001)

#### Basic Features (Continued);

- Balancing and Settlement tasks will be carried out by TEIAS and TETAS, respectively
- Settlement (power supply and absorption) prices will be determined by EMRA and collected by TETAS
- System usage charge will be collected by TETAS

### Four Company Model : EUAS, TEIAS, TETAS, TEDAS

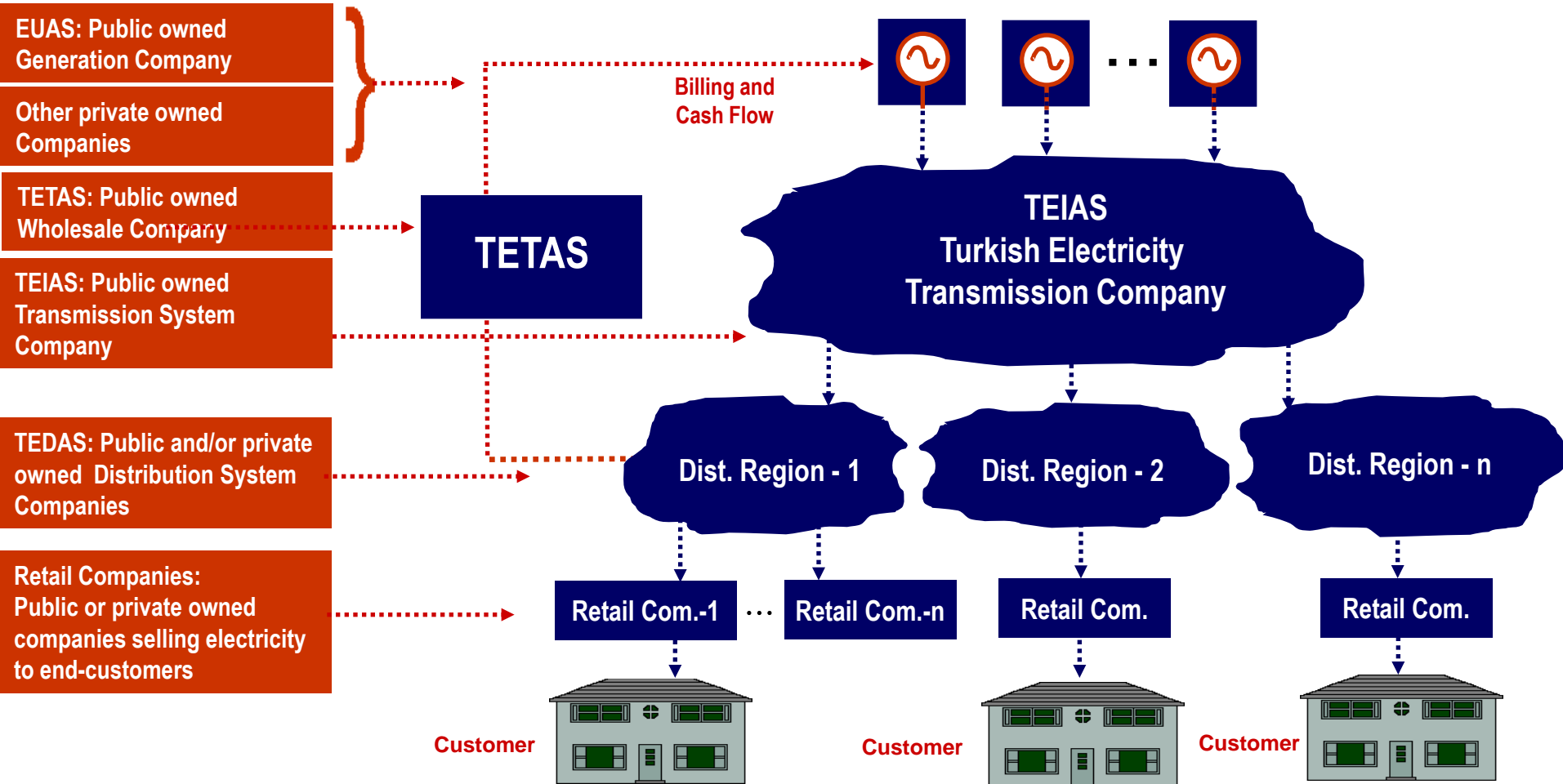


# Vertical Unbundling







## Turkish Case

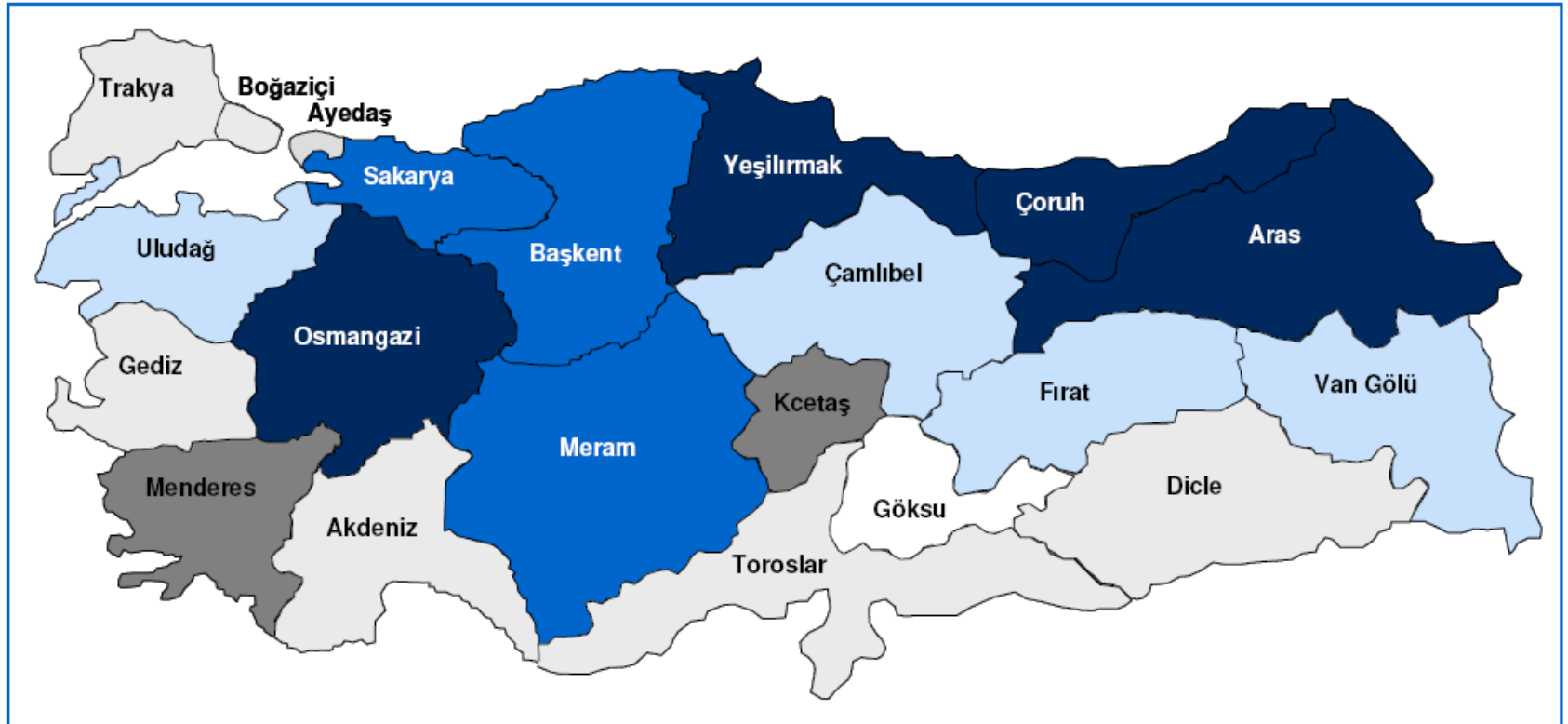
Unbundled Model (from 2001)

Four Company Model : EUAS, TEIAS, TETAS, TEDAS



## Regions in the Turkish Distribution System

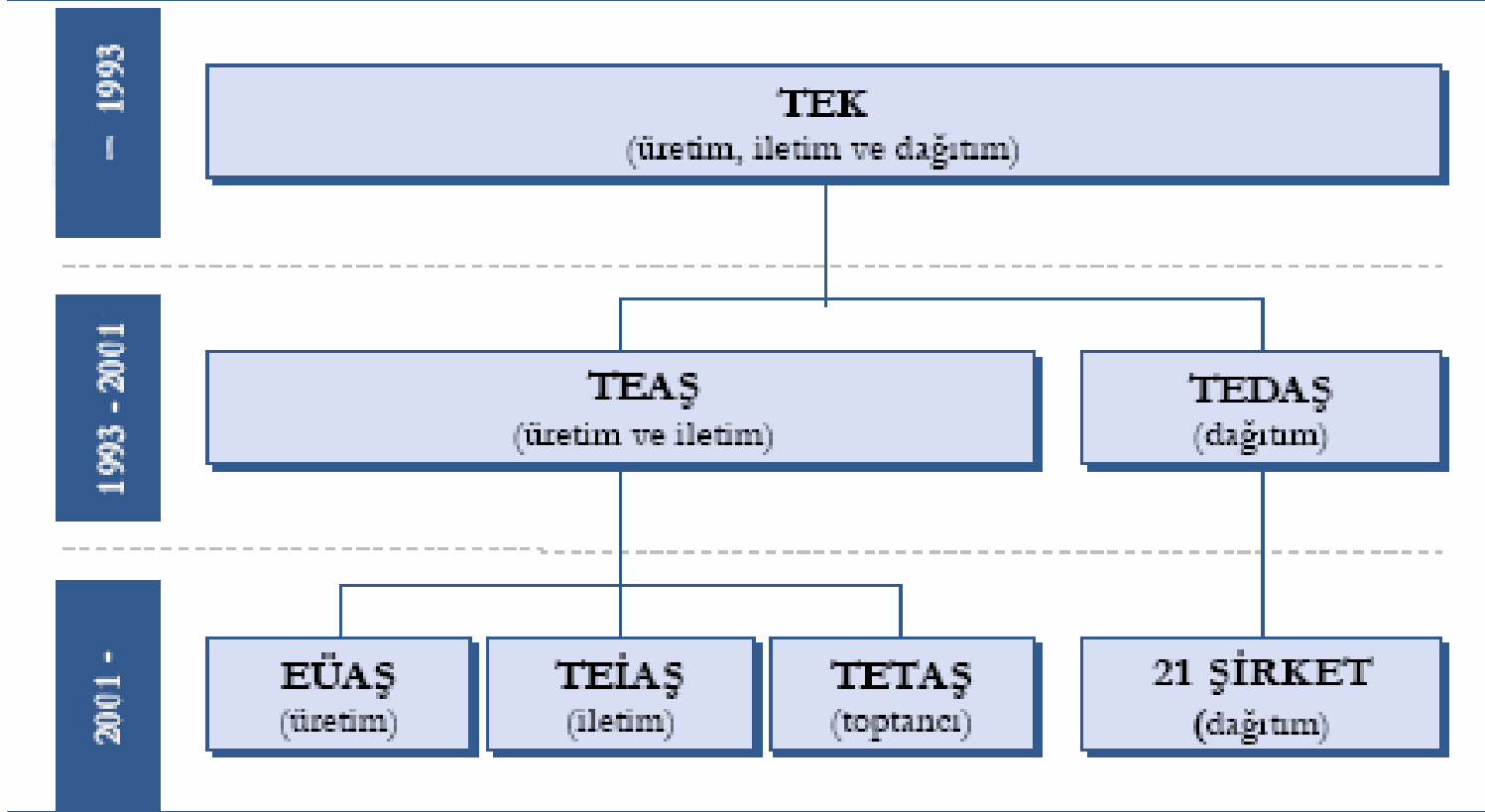
- |   |  |   |
|---|--|---|
|  4046 sayılı Özelleştirme Kanunu kapsamında Özelleştirme İdaresi Başkanlığı tarafından özelleştirilen bölgeler |  Onay işlemleri devam etmekte olan bölgeler |  Özelleştirme programından çıkarılan bölgeler  |
|  3096 sayılı kanun çerçevesinde özel şirketler tarafından işletilmekte olan bölgeler                           |  ihale ilanı yapılmış bölgeler              |  Özelleştirme sürecine henüz girmemiş bölgeler |



## Development of the Turkish Market

### Four Company Model : EUAS, TEIAS, TETAS, TEDAS Model (2001 -)

#### PİYASA YAPISININ GELİŞİMİ



Kaynak: ÖİB



## Advantages of Competitive Market

**A truly competitive market provides full-powered incentives;**

- to hold the prices down to marginal cost level,
- to minimize the cost



## Major Objectives of Deregulation

### Major Objective of Deregulation

Major objective of deregulation of the generation and trading layers; is simply to eliminate the drawbacks of natural monopolies by

- creating a competitive environment in the generation, trading layers, where market power cannot be exercised,
- creating a professional environment, where staff have professional enthusiasm and strong interest in customer problems as well as the interests of the company,



## Major Objectives of Deregulation

### Objectives of Deregulation (2/3)

- to establish a competition-based (unregulated) pricing environment (market) for the generation and trading sectors,
- to regulate, all expenditures, investments and hence tariffs of the transmission and distribution layers on the behalf of the interests of public, by an independent body, "Regulator"
- to reduce the system losses and illicit utilization,



## Major Objectives of Deregulation

### Objectives of Deregulation (3/3)

- to follow the modern technological developments and equipments,
- to establish and cost-based (regulated) tariff structure for the transmission, distribution and retail activities,
- to reduce the overemployment by imposing the cost-based tariff structure and regulation on tariff

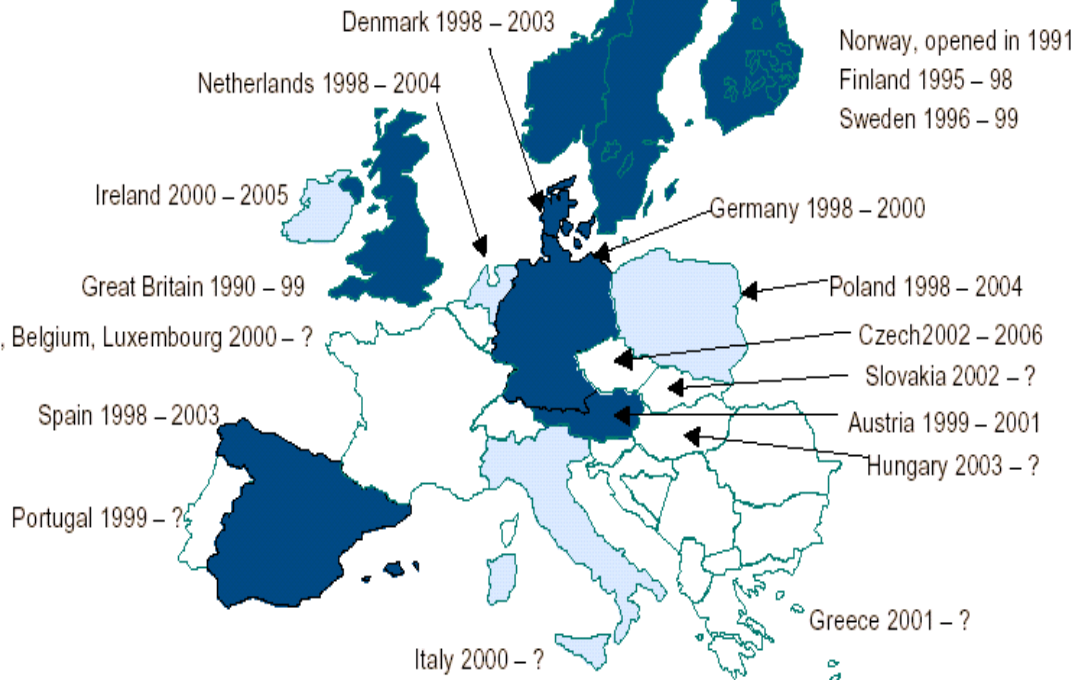


## Liberation of Electricity Markets in EU (2003)

### Electricity Markets in EU(\*) (\*) EU Commission and UCTE

*Four New 58-MW Rolls-Royce Trent GTGs Available for Rapid Delivery*

- Market liberated completely
- Liberated partly
- Liberating slowly



# Vertical Unbundling

## Market Openings in EU Countries

Electricity Market Openings in EU,  
April 2003

Market Opening Index is defined as;

$$MO = CEC / OC$$

where, *MO* is the market opening index,  
*CEC* is the total annual  
consumption of Eligible  
Customers,  
*OC* is the overall annual  
consumption

Country	Market Opening
Austria	100%
England	100%
Finland	100%
Germany	100%
Sweden	100%
Denmark	100%
Spain	100%
Italy	70%
Holland	63%
Ireland	56%
Belgium	52%
Portugal	45%
France	34%
Greece	30%
Turkey	23%



## Liberation of Electricity Markets in EU Countries

April 2003 Source: [www.europa.eu.int](http://www.europa.eu.int)

Access to transmission and distribution systems are regulated in these countries

*TOOR: Transfer of Operation Right*



Country	Market Opening	Limit for Eligible Customers	Transmission System
England	100 %	-	Private
Germany	100 %	-	Public
Denmark	100 %	-	Public
Finland	100 %	-	Private
Spain	100 %	-	Private
Sweden	100 %	-	Private
Austria	100 %	-	Public
Italy	70 %	0,1 GWh	Public / Private
Holland	63 %	3*80 A	Private
Luxemburg	57 %	20 GWh	TOOR
Ireland	56 %	0,1 GWh	Public / TOOR
Belgium	52 %	1/10 GWh	Public
Portugal	45 %	Above 1kV	Public
France	37 %	7 GWh	TOOR
Greece	34 %	Above 1 kV	Public / TOOR

# Vertical Unbundling

## Liberation of Electricity Markets in EU Candidate Countries

April 2003 Source: [www.europa.eu.int](http://www.europa.eu.int)

Access to transmission and distribution systems are regulated in these countries



Country	Market Opening	Limit for Eligible Customers	Transmission System
Slovenia	64%	41 kW	Public
Poland	51%	10 Gwh	Public
Slovakia	41%	40 Gwh	Public
Hungary	30-35%	6.5 Gwh	Sep. of accounts
Romania	33%	40 Gwh	Public
Czech. Rep.	30%	40 Gwh	Public
Litvania	26%	20 Gwh	Public
Turkey	23%	9 Gwh	Public
Bulgaria	15%	100 Gwh	Sep. of accounts
Letonia	11%	40 Gwh	Public
Estonia	10%	40 Gwh	TOOR

*TOOR: Transfer of Operation Right*



## Market Opening Schedule in EU

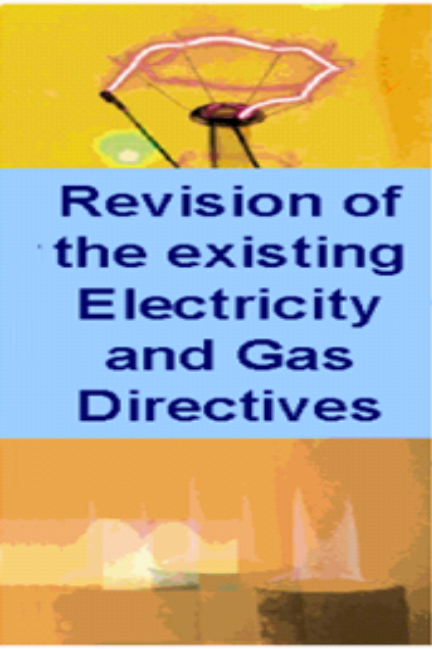
Electricity Prices in EU

Source: [www.europe.eu.int](http://www.europe.eu.int)



### *Quantitative* *Full opening of the energy market*

#### A new timetable for market opening



Revision of  
the existing  
Electricity  
and Gas  
Directives

**2003**

All EU companies free to choose electricity supplier

**2004**

All EU companies free to choose gas supplier

**2005**

All EU consumers free to choose electricity and gas suppliers

## Deregulation Schedules in EU Countries



Source: [www.europa.eu.int](http://www.europa.eu.int)

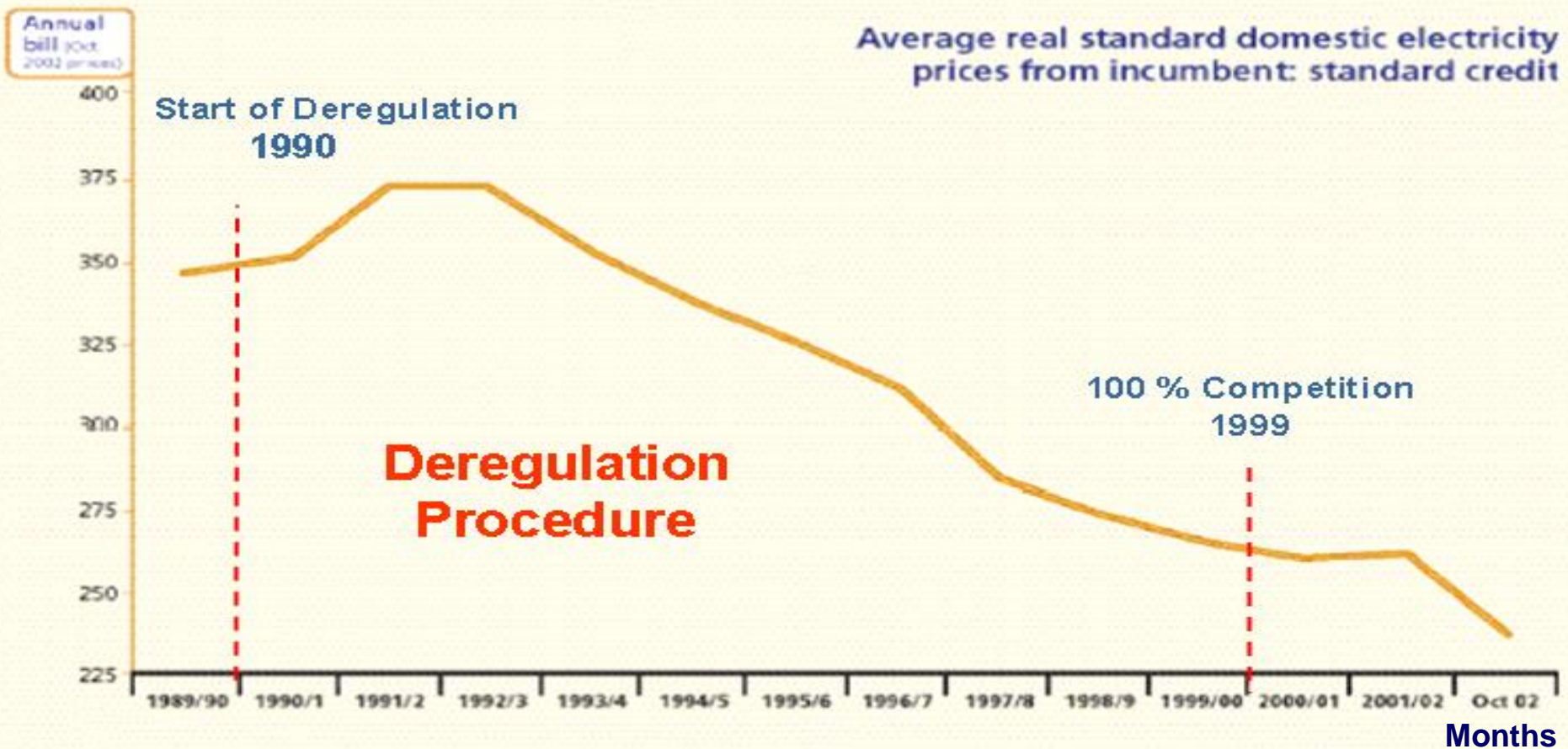
Australia	1991 - 1998
Finland	1995 - 1998
England	1990 - 1999
Sweden	1996 - 1999
Germany	1998 - 2000
Austria	1999 - 2001
Argentina	1992 - 2001
Denmark	1998 - 2003
Spain	1998 - 2003
Holland	1998 - 2004
Poland	1998 - 2004
Ireland	2000 - 2005
Czech Rep.	2002 - 2006
Turkey	2002 - 2007

Average Period of Deregulation 5 years

## Reduction in Domestic Electricity Rates in UK

Domestic Electricity Rates in UK (1989-2002)

Source: OFGEM



## Reduction in Electricity Rates after Deregulation

### Reduction in Electricity Rates

England	(1990-2001)	% 37
Germany	(1995 – 2000)	% 15
Austria	(1993-1999)	% 38
Argentina	(1992-1998)	% 57

Source: DOE - EIA

### Enka Gebze Gas Fired PP (2400 MW)



# Vertical Unbundling

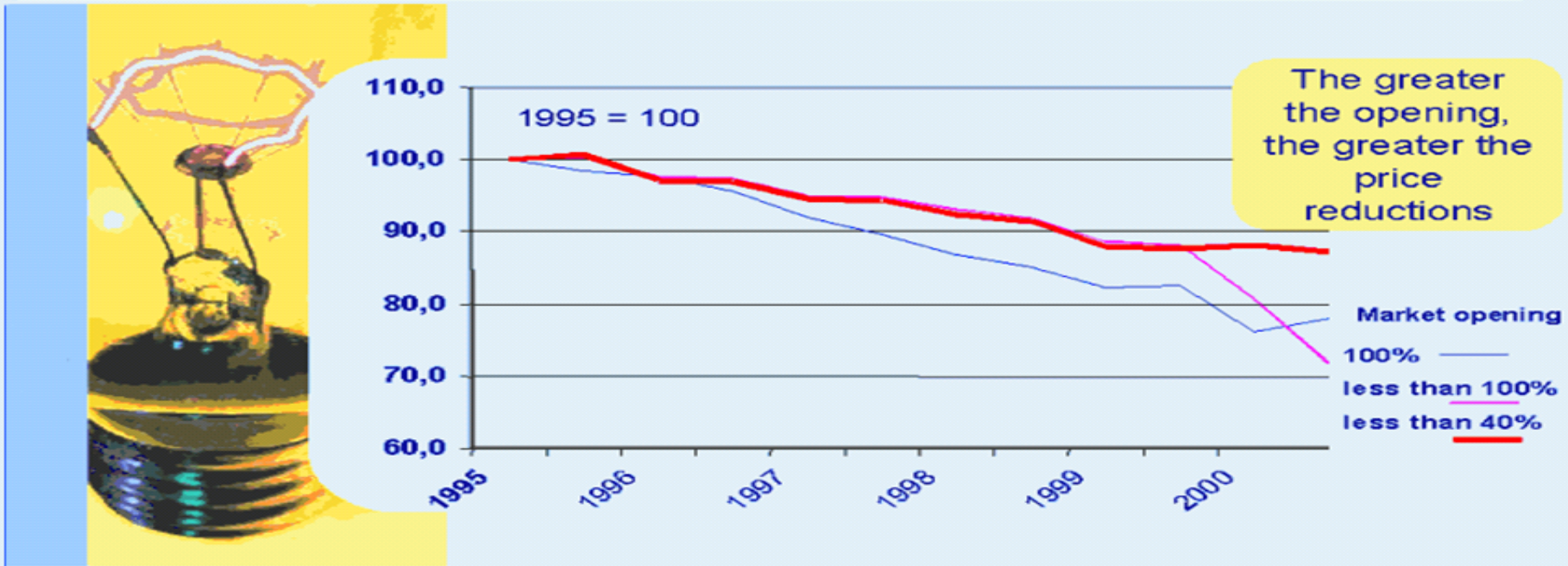
## Reduction in Electricity Rates in EU (1995-2000)

Electricity Prices in EU

Source: [www.europe.eu.int](http://www.europe.eu.int)



### Electricity Price Development for Industry 1995 - 2000



Directorate General for Energy and Transport

Source: [www.europa.eu.int](http://www.europa.eu.int)

## Transmission and Distribution Losses in the World

Source: OFGEM and TEDAS Annual Reports



Nation	1980	1990	1999	2000
Finland	6.2	4.8	3.6	3.7
Holland	4.7	4.2	4.2	4.2
Belgium	6.5	6	5.5	4.8
Germany	5.3	5.2	5	5.1
Italy	10.4	7.5	7.1	7
Denmark	9.3	8.8	5.9	7.1
USA	10.5	10.5	7.1	7.1
Switzerland	9.1	7	7.5	7.4
France	6.9	9	8	7.8
Austria	7.9	6.9	7.9	7.8
Sweden	9.8	7.6	8.4	9.1
Australia	11.6	8.4	9.2	9.1
England	9.2	8.9	9.2	9.4
Portugal	13.3	9.8	10	9.4
Norway	9.5	7.1	8.2	9.8
Ireland	12.8	10.9	9.6	9.9
Canada	10.6	8.2	9.2	9.9
Spain	11.1	11.1	11.2	10.6
New Zealand	14.4	13.3	13.1	11.5
Average	9.4	8.1	7.9	7.9
EU	7.9	7.3	7.3	7.3
Turkey	12.2	12.3	24.2	24.2

## Loss and Illicit Utilization in some Countries

### Revenue Loss (Turkey)

Total Loss: 24.2 %  
 Target Loss : 10.0 %  
 Difference: 14.2 %

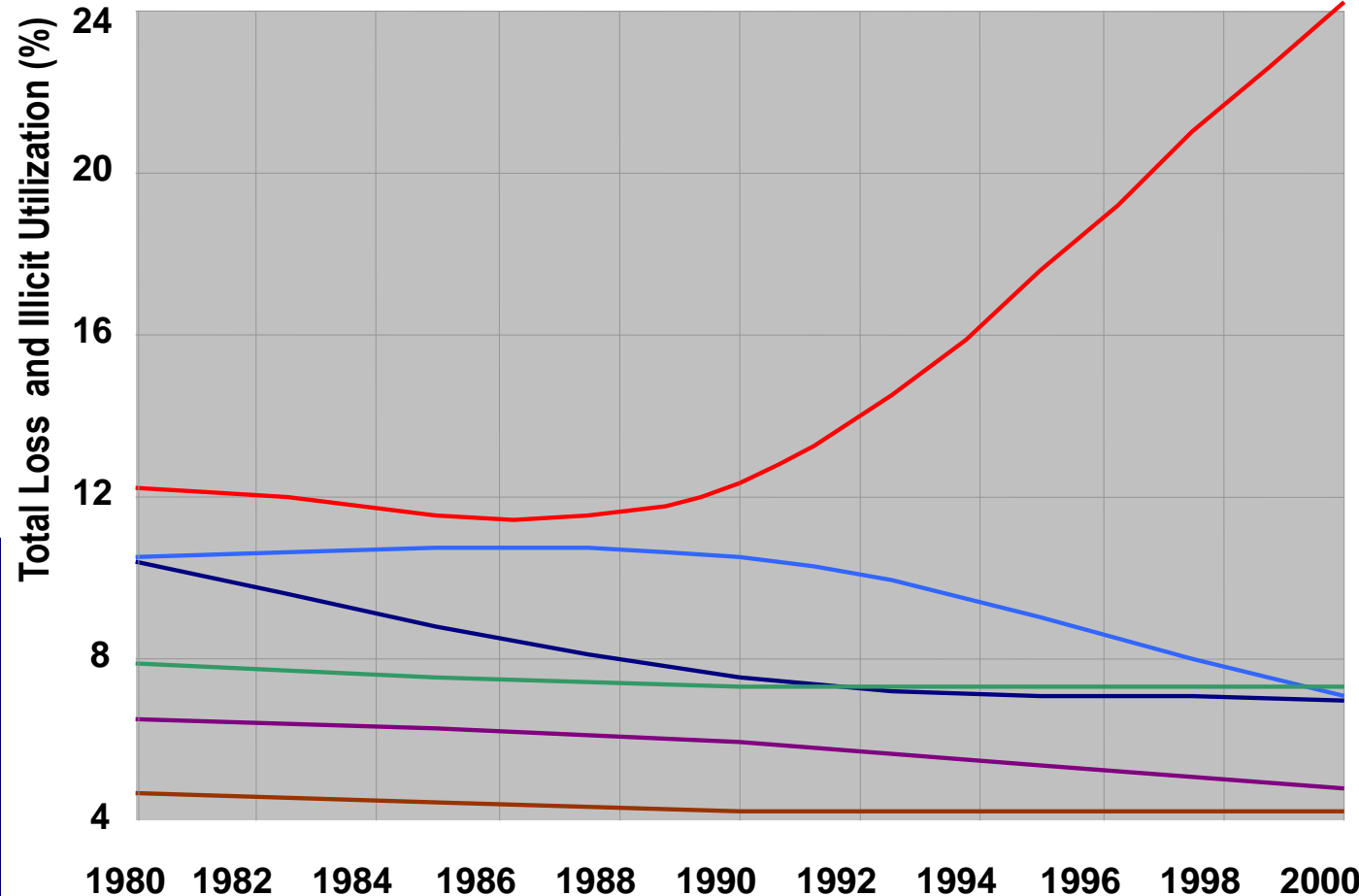
### Effective Loss

= 142 000 000 000 kWh x 0.142  
 = 20 164 000 000 kWh  
 = 20.164 x 10<sup>9</sup> \* 8 Cent/kWh  
 = **1.613 billion USD**

Holland  
 Belgium  
 Italy  
 USA  
 EU  
 Turkey



Source: OFGEM, TEDAŞ Annual Reports



# Vertical Unbundling

## Views from Turkey: “Buca Meydan Savaşı”

Hürriyet: June 27, 2001, Effort of TEDAS Personnel in Buca, İzmir

June 27, 2001

TEDAS Personnel  
trying to prevent  
illicit utilization in  
Buca, İzmir





# Vertical Unbundling

## Views from Turkey : “Buca Meydan Savaşı”

Hürriyet: June 27, 2001, Effort of TEDAS Personnel in Buca, İzmir

June 27, 2001

Resistance of residents in  
Buca, İzmir against TEDAS  
Personnel



# Vertical Unbundling

## One Year Later, Views from Turkey: “Buca Meydan Savaşı”

Hürriyet: January 30, 2002, Effort of TEDAS Staff in Buca, İzmir

January 30, 2002

- Same personnel,
- Same people,
- Same place,
- Same event,  
but
- One year later



# Vertical Unbundling

**Views from Turkey: “Elektrik bir kamu Hizmetidir, Yiyin !”**

**İllicit Utilization View from a City in the Southern-Eastern Region**



T.C.  
ÇORUM  
ASLİYE 1. CEZA MAHKEMESİ

K A R A R

Esas No. : 2002/1127  
Karar No. : 2004/238  
C.S.E.No. : 2002/1677

Hakim : Gül PAK 35268  
C. Savcısı : Bülent EKER 34440  
Z. Katibi : Leyla DALGIÇ 57601

Davacı : K.H.  
Katılan : TEDAŞ ELEKTRİK DAĞITIM MÜESSESE MÜDÜRLÜĞÜ  
Vekili : Av. Yakup Alar - Av. İbrahim Özyılmaz - Tedaş ÇORUM  
Sanık : .lu, Çorum mrk.

Vekili : Av. Ahmet ÖZDEL - Çorum barosu avukatı.  
S U Ç : RESMİ MÜHRÜ SÖKMEK SURETİYLE ELEKTRİK HIRSIZLIĞI  
Suç Tarihi : 12.05.2002  
Karar Tarihi : 11.03.2004

Çorum C. Başsavcılığının 14.06.2002 gün ve 1677-993 esas sayılı iddianamesiyle;  
Sanık hakkında açılan kamu davasının yapılan ve sonuçlandırılan açık yargılaması sonunda;

GEREĞİ DÜŞÜNÜLDÜ :

İDDİA :

Sanık hakkında ikamet ettiği adreste 31428 abone nolu elektrik abonesi olduğu, 12.5.2002 günü yapılan tespitte sanığın resmi mühür altına alınmış sayaçta mühür sökmek ve direnç kancasını düşürmek suretiyle sayaca tespit yaptırmadan elektrik kullanarak atılı suçu işlediği iddiasıyla TCK.nun 492/2, 522/1 maddeleri gereğince cezalandırılması istemiyle kamu davası açılmıştır.

SAVUNMA :

Sanık savunmasında; adreste 16 yıldır oturduğunu, kendine ait evi olduğunu, apartmandaki bütün sayaçlarda bakanlık mühür bulunmadığını, Tedaş görevlilerinin sonradan gelerek bu sayaçları mühürlenmek için söktüklerini, bunların yerine geçici sayaç taktıklarını, evin sürekli kullandığı bir ev olmadığını, kış aylarında annesinin evinde, yazları ise İzmir'de kardeşinin yazlığında kaldığını, bu nedenle sarfiyat miktarının düşük olduğunu bildirmiştir.

KANITLAR :

sanık savunması, tutanak tanıklarının beyanları, Tedaş'tan gelen belgeler, kaçak elektrik tutanağı, keşif zaptı, bilirkişi raporları, doğum ve sabıka kayıtları...

KANITLARIN DEĞERLENDİRİLMESİ VE GEREKÇE :

Dosyadaki tüm delillerin birlikte değerlendirilmesi sonucunda; iddia, sanık savunması, tanık beyanı, bilirkişi raporları, keşif ve tüm dosya kapsamına göre; sanığın olay tarihinde gerilim kancasını düşürmek suretiyle 6.3.1996 tarihinde Tedaş tarafından 24132 nolu tutanak ile mühürlenmiş olan sayaç mühürünü ihlal ederek kaçak elektrik kullandığı, bu şekilde atılı suçu işlediği, sanık vekilince sanığın aynı suçtan açılan 2002/1060 esas ve 2002/1126 esas sayılı kamu davalarının lehine sonuçlandığı iddia edilmiş ise de; bahsi geçen dosyaların incelenmesinde sanığın farklı adreslerde farklı aboneliklerinden kaynaklanan eylemler ile ilgili tutulan tutanaklara göre kamu davası

Esas No. : 2002/1127  
Karar No. : 2004/238  
C.S.E.No. : 2002/1677

Sayfa 2



... açılmış olduğu, dosyamızdaki abonesi olduğu sayacın başka adreste bulunduğu, sanığın kullandığı kaçak tüketim bedelinin suç tarihine göre mahkememizce normal kabul edildiği, böylelikle sanığın atılı suçtan TCK.nun 492/2 maddesi gereğince; sanığın geçmişteki hali, tekerrüre esas sabıkasının olmayışı, kişiliği, kişisel ve sosyal durumu, cezanın kişiselliği ve etkinliği hususları dikkate alınarak alt sınırdan ve aşağıdaki cezalandırılmasına dair aşağıdaki şekilde hüküm kurulmuştur.

**H Ü K Ü M** : Açıklanan nedenlerle,

Sanığın sübut bulan kaçak elektrik kullanmak suretiyle hırsızlık suçundan eylemine uyan TCK 492/2 maddesi gereğince taktiren 2 YIL HAPİS CEZASIYLA CEZALANDIRILMASINA;

Suçta konu kaçak tüketim bedelinin değeri mahkememizce normal kabul edildiğinden TCK 522/1 maddesi gereğince artırım yada indirim yapılmasına taktiren yer olmadığına;

Sanığın duruşmadaki tutum ve davranışları lehine indirim nedeni sayılarak TCK 59/2 maddesi gereğince taktiren 1/6 oranında indirim yapılarak sanığın 1 YIL 8 AY HAPİS CEZASIYLA CEZALANDIRILMASINA;

Sanık hakkına başkaca artırım ve indirim yapılmasına taktiren yer olmadığına;

Sanığa verilen özgürlüğü bağlayıcı cezanın sanığın geçmişteki hali, tekerrüre esas sabıkası olmayışı, suç işleme eğilimi dikkate alınarak ertelenmesi halinde ilerde suç işlemekten çekineceğine dair mahkememizde oluşan kanaate göre 647 S.Y.6. maddesi gereğince ERTELENMESİNE;

Sanığa TCK 94 maddesi gereğince ihtarata yapılmasına; (yapılmadı)

Katılan vekilinin aynen iade ve tazmin konusunda isteminin reddine;

Katılan vekili için tayin ve takdir olunan 300.000.000.TL maktu vekalet ücretinin sanıktan alınarak katılan vekiline verilmesine;

Yargılama için yapılan 69.332.000.TL giderin sanıktan alınmasına;

Sanık ve vekilinin yokluğunda, Katılan vekilinin yüzüne karşı, iddia makamı huzuru ile kısmen isteme uygun, Yargıtay yolu açık olmak üzere verilen karar açıkça okunup, usulen anlatıldı. 11.03.2004

Katip

Hakim 35268

Masraf Beyanı

Keşif gideri : 64.332.000.TL  
2 tebligat gideri : 5.000.000.TL  
TOPLAM : 69.332.000.TL

## Results of Deregulation Programs

### England (1990-1999)

- Reduction in interruptions (hours): % 63,
- Service availability reached: % 100,
- Reduction in environmental pollution (CO<sub>2</sub> and particles): % 23 - 72

### Germany (1998-2000)

- Total reduction in prices: 7 billion Euro

### Argentina (1994-2001)

- Privatization revenue: 10 billion USD,
- Investment realized by private sector: 7 billion USD

Source: USA DOE - EIA



## Objectives of Deregulation Programs

Establishment of a competition based market environment for generation, transmission, distribution and retail services, where;

- cheap, reliable, high-quality, pollution-free energy is provided,
- customers above a certain level of consumption, classified as “eligible”, are given the right of choosing their suppliers

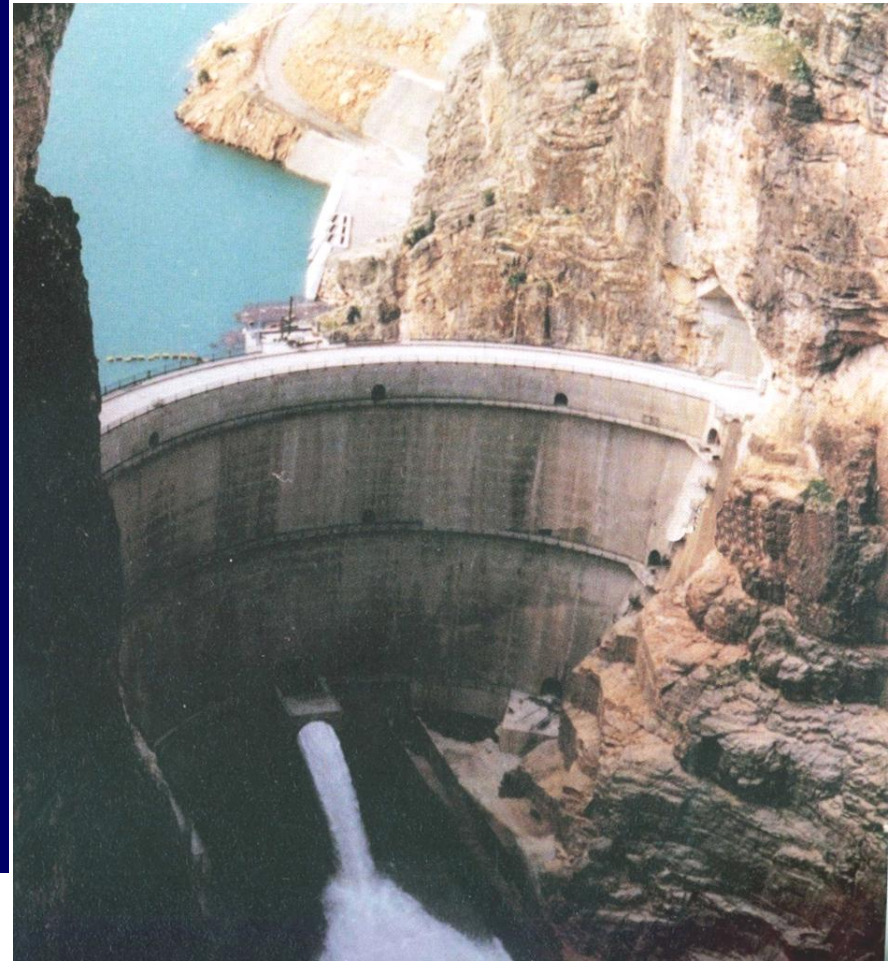


*Ideal Objectives*

## Stages of Deregulation Programs

- Development of the legal framework for deregulation,
- Establishment of an Independent Energy Regulatory Authority,
- Unbundling of the activities and accounts of the resulting companies,
- Implementation of a cost-based tariff for transmission and distribution services,
- Development and implementation of market management (balancing and settlement) software, related hardware and infrastructure,
- Reduction of the dominance of the public owned monopolies by privatization

Gezende HPP, K. Maras





## Results of Deregulation Programs

**Increase in foreign and national private sector investments and trade**

**Improvement in;**

- service efficiency,
- service quality,
- system availability and reliability,

**Reduction in;**

- financial burden resulting from energy investments on public accounts,
- environmental pollution,
- energy prices,
- system losses and illicit utilization

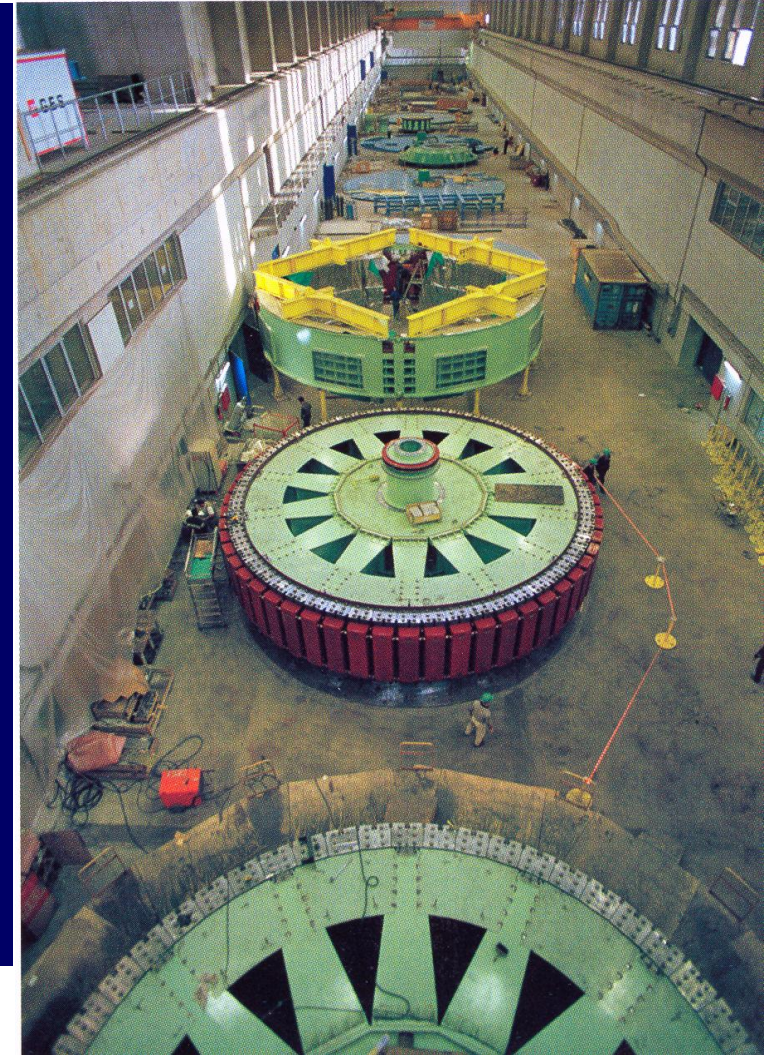


- Political support and determination,
- Development of the legal and institutional framework,
- Establishing an Independent Regulatory Authority (EMRA),
- Design of the market structure,
- Enlightening the market participants about rules and developments regularly and by correct information,
- Social remedies needed for the implementation of the deregulation program,
- Unbundling of the activities and accounts,
- Designing the regulations, not as a supervisor but as a participant

Bozcaada RES, 10.2 MW



- Restructuring of the generation and distribution companies,
- Development and implementation of market management (balancing and settlement) software, related hardware and infrastructure,
- Development of a market governance mechanism,
- Implementation of a cost-based tariff for transmission and distribution services,
- Establishing an effective market structure for Eastern-Western Energy Trading Corridor (Between Middle East, Caspian Sea and Europe),
- Finalizing the privatization program



## Legal and Institutional Framework

### Legal and Institutional Framework

- Development of legal framework conformable to EU directives,
- Establishing an Independent Regulatory Authority (EMRA),
- Design of market,
- Unbundling of activities and accounts,
- Adaptation of public owned energy companies to market rules,



## Political Commitment and Support

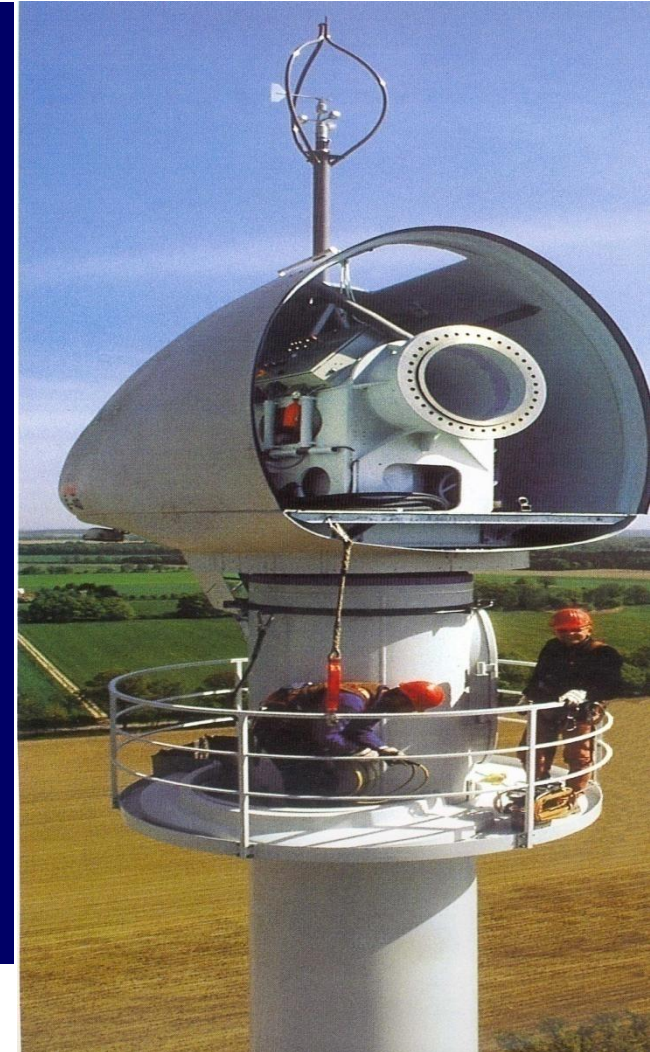
### Political Commitment and Support

- Urgent Action Plan,
- Government Program,
- National Development Program,
- EU Commitments,
- Commitments to international financial institutions (World Bank, IMF etc.)



## Major Tasks of Deregulation Program

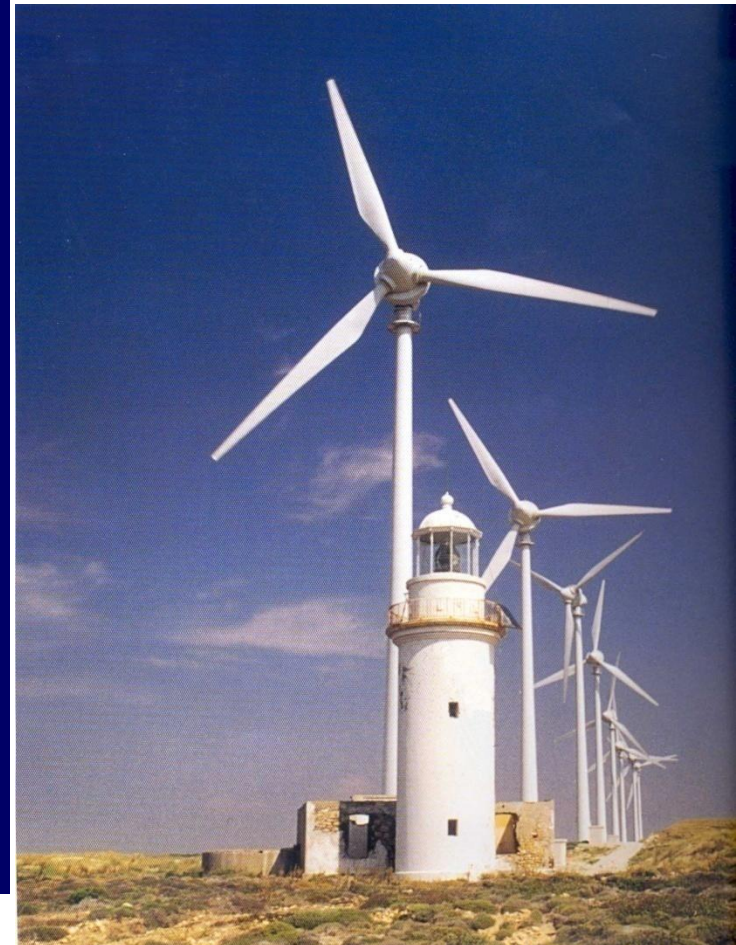
- Resolution of the TOP (Take or Pay) Commitments in BO, BOT and TOOR Agreements,
- Reducing the system losses and illicit utilization,
- Transfer of hydroelectric plants from State Hydrolic Works to EUAS (Turkish Electricity generaion Company),
- Adaptatiton of public owned energy companies to market rules,
- Determination of the borders for operation and authority among generation, transmission and distribution companies,
- to establish and cost-based (regulated) tariff structure for the transmission,
- Privatizaton of the generation and distribution assets



## Main Objectives

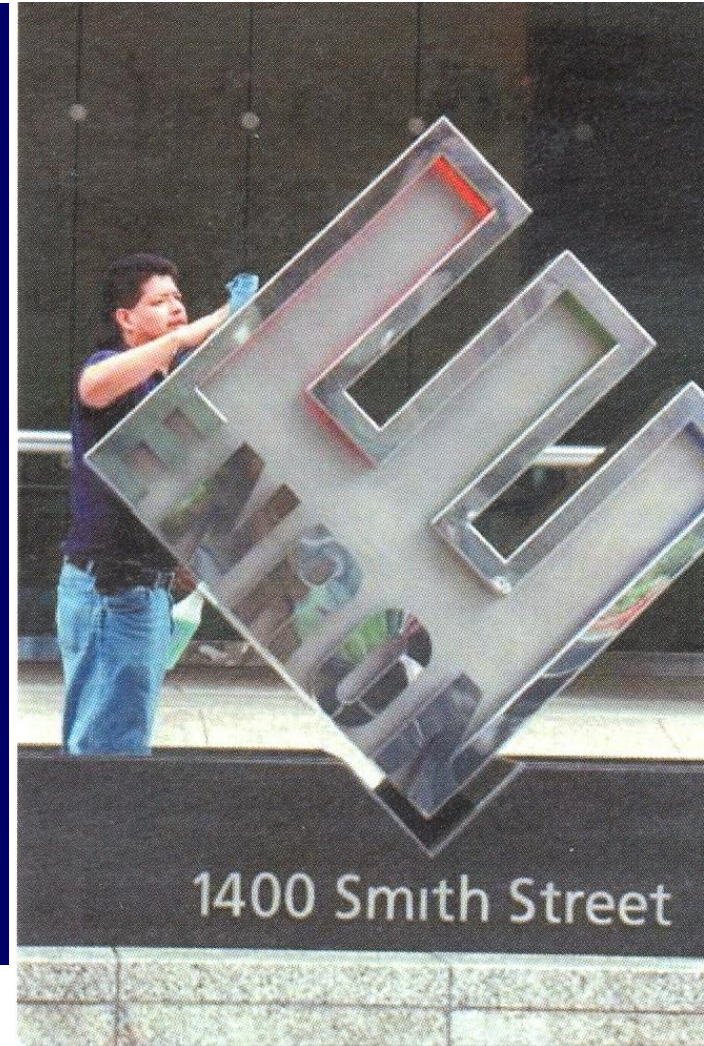
- Reduction of the dominance of the public owned monopolies by privatization,
- Reduction of financial burden resulting from energy investments on public accounts,
- Establishment of competitive based market structure,
- Improvement in service quality, efficiency and availability,
- Reduction in transmission and distribution service costs,
- Reduction in system losses and illicit utilization,
- Increase in foreign and national private sector investments and trade,
- Conforming EU Directives by implementing Law No. 4628

Bozcaada RES, 10.2 MW



## Conditions for Deregulation Programs

- Political commitment and support,
- Elimination of the risks arising from regulation,
- Implementation of regulations to public and private participants in a non-discriminative manner,
- Restructuring of the privatized companies,
- Creation of a suitable environment for investment,
- Implementation of a cost-based tariff for transmission and distribution services,
- Determination of the priorities in deregulating the generation and distribution sectors,
- Design of regulated tariffs,
- Enlightening the market participants about rules and developments regularly and by correct information





# Vertical Unbundling

## Privatization Model

### Privatization model should;

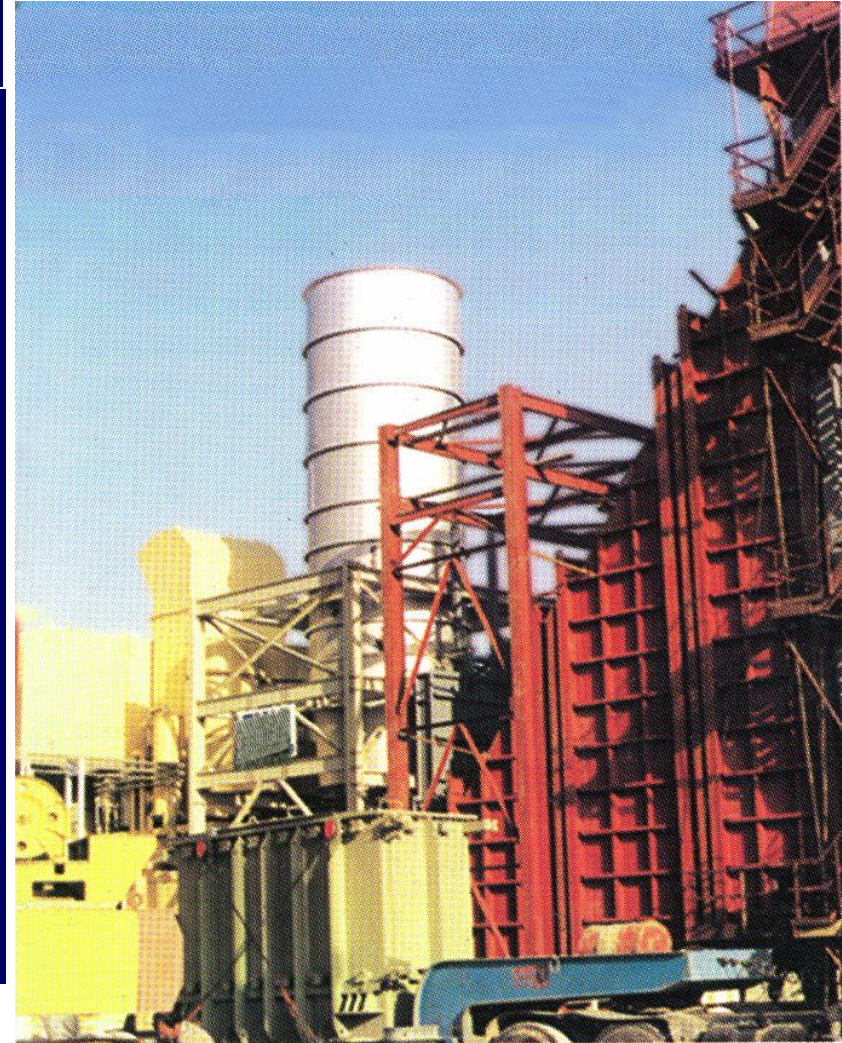
- assist the implementation of the legislation concerning electricity market,
- not conflict with existing legislations (3096, 4046, 4628,4501, 4686 etc.),
- be easy and practical to implement,
- not introduce extra terms that will increase the tariff



## Objectives of Privatization Program

### Privatization Program should;

- transfer all the operational and financial risks to investors,
- reduce the distribution costs,
- establish a competitive market in generation,
- improve efficiency and service quality,
- improve and spread public welfare to overall community,
- induce new investments,
- reduce the regional differences in system operation cost,
- increase tax income and assist to reduce the financial burden resulting from energy investments on public accounts



## Medium Term Objectives

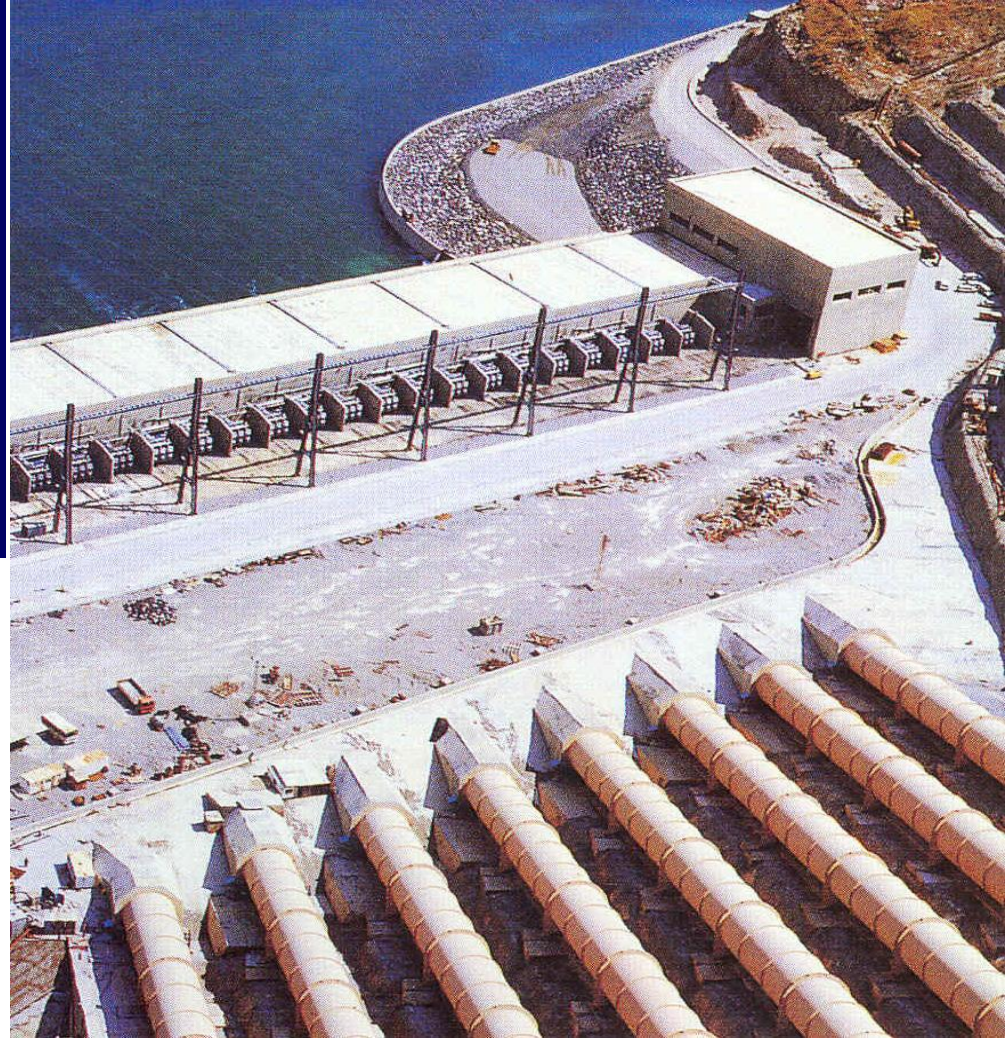
- Development and implementation of market management (balancing and settlement) software, related hardware and infrastructure,
- Establishment of an independent management in TEIAS (National Transmission Company),
- Development of “**Electricity Market Index**”, a primary tool in electricity pricing



# Vertical Unbundling

## Long Term Objectives

- Finalizing the privatization program,
- Complete liberalization of the market,
- Unbundling of the system and market operation services and centers,
- Elimination of the stranded costs in prices



## National Objectives

- Elimination of the risks arising from regulation,
- Increase in foreign and national private sector investments and trade,
- Establishment of competitive based market structure,
- Improvement in service quality, efficiency and availability,
- Reduction in tariffs,
- Improvement of the international competitive power of the industry,
- Improvement in employment capacity,
- Reduction of financial burden resulting from energy investments on public accounts,
- Reduction in regional differences in development



# Vertical Unbundling

## International Objectives

- Establishing an effective market structure for Eastern-Western Energy Trading Corridor (Between Middle East, Caspian Sea and Europe),
- Establishing an energy market dealing with foreign stock exchange in the Middle East and Mediterranean Region,
- Conversion of the geostrategical superiorities of the Country to commercial income and revenue

