



CLEANER ELECTRICITY PRODUCTION FROM COAL in TURKEY: Issues and Prospects

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TURKISH COAL ENTERPRISES

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CLEANER ELECTRICITY PRODUCTION FROM COAL in TURKEY - CONTENT

- Policy
- Role of Coal in Power Generation in Turkey
- Restructuring of Coal & Power Sector in Turkey
 - Regulatory & Administrative developments
 - Privatization developments
 - Investment developments
- Future Prospects for Power Generation
- R&D Projects for Cleaner Power Generation from Coal

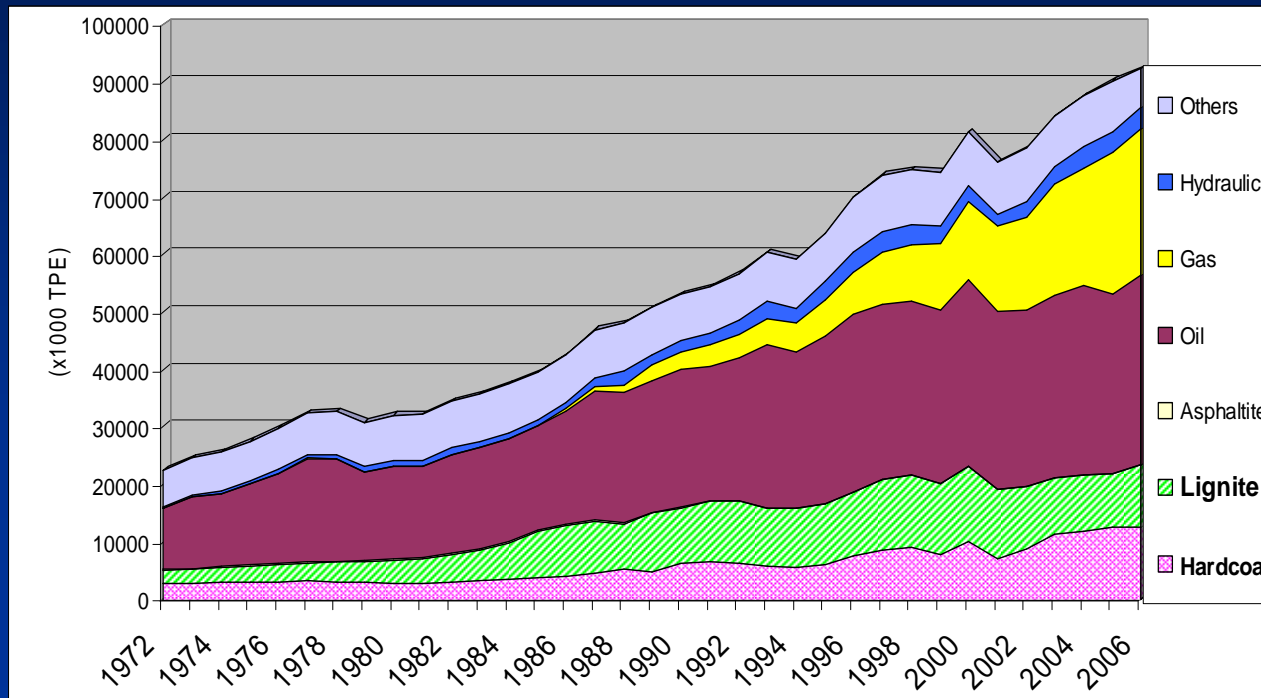
Cleaner Electricity Production from Coal in Turkey

- Policy

- Developing existing indigenous energy resources especially in the coal sector,
- Restructuring of coal mining & electricity sectors
- Privatization of
 - some inefficient and inactive coal mines
 - distribution grids
 - Generation plants
- Promoting the adoption of clean coal technologies in the utilization of coal in thermal power plants
- Since Turkey has a candidate country status for European Union (EU) membership, harmonization of Turkish legislation on coal, electricity and environment with EU legislation is underway.

Role of Coal in Turkey

- Shares of coal in primary energy consumption



<u>ALL</u>	<u>1972</u>	<u>2006</u>
Domestic:	68%	29%
Imported:	32%	71%

<u>COAL:</u>	<u>1972</u>	<u>2006</u>
Domestic:	25 %	14%
Imported:	0%	12%
Total:	25%	26%

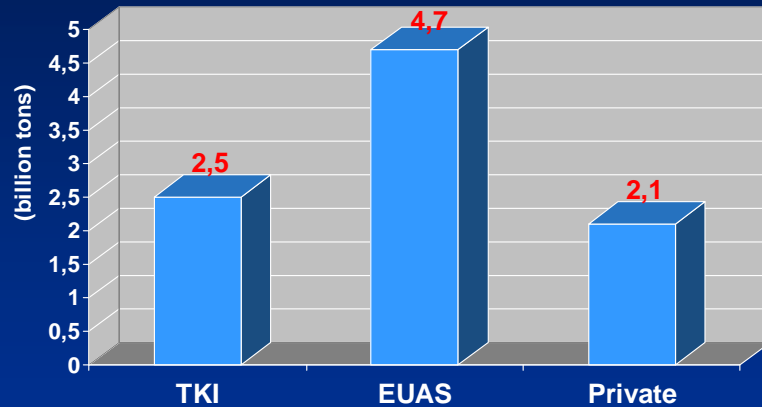
<u>N.GAS</u>	<u>1972</u>	<u>2006</u>
Domestic:	0%	0.8%
Imported:	0%	27%
Total:	0%	27.8%

Source:ETBK

Role of Coal in Turkey

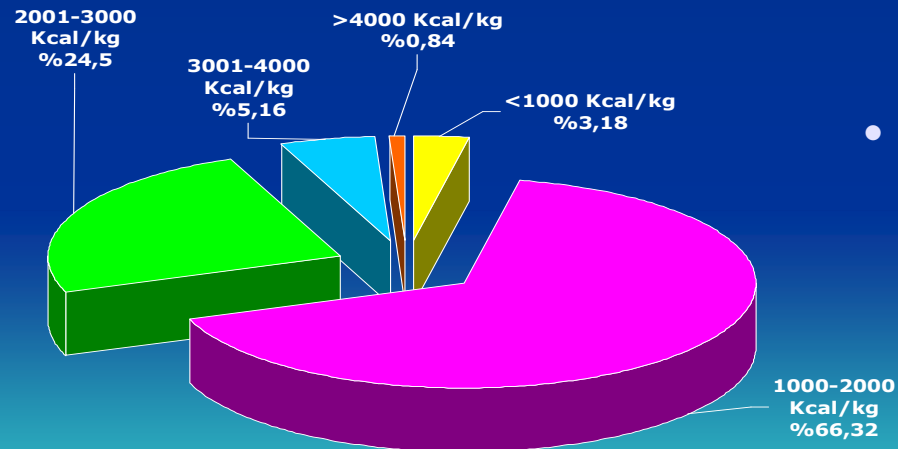
- Coal Reserves

Lignite reserves



Total Coal Reserves:

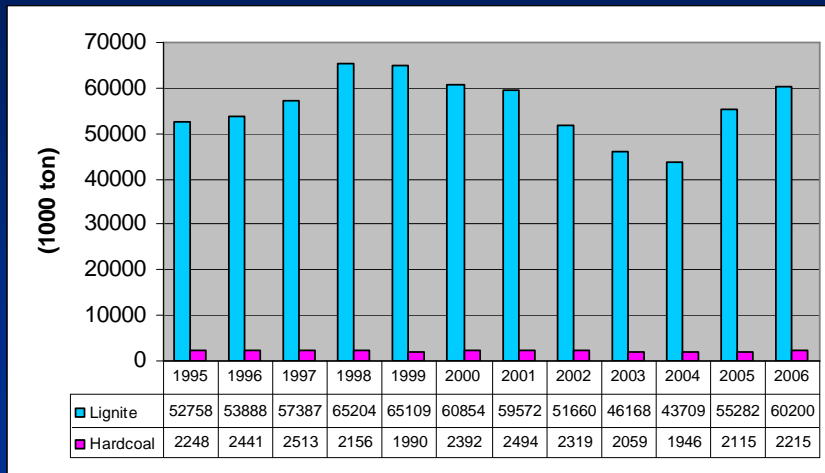
- 1,3 billion tonnes hardcoal (all state)
- 9,3 billion tonnes lignite (77% state)



- 68% of lignite reserves has low calorific value

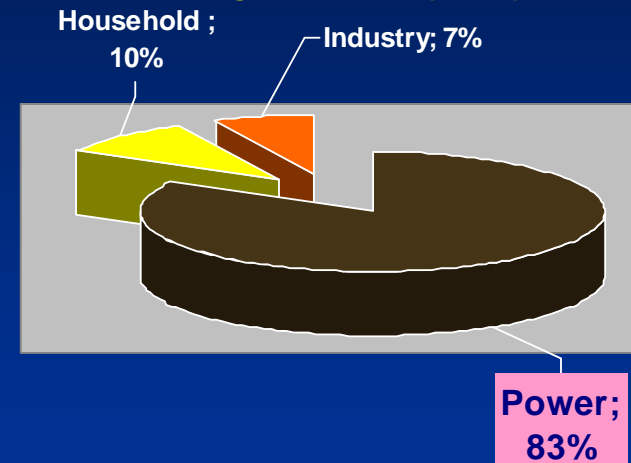
Role of Coal for Power Generation in Turkey

- Coal Production & Consumption

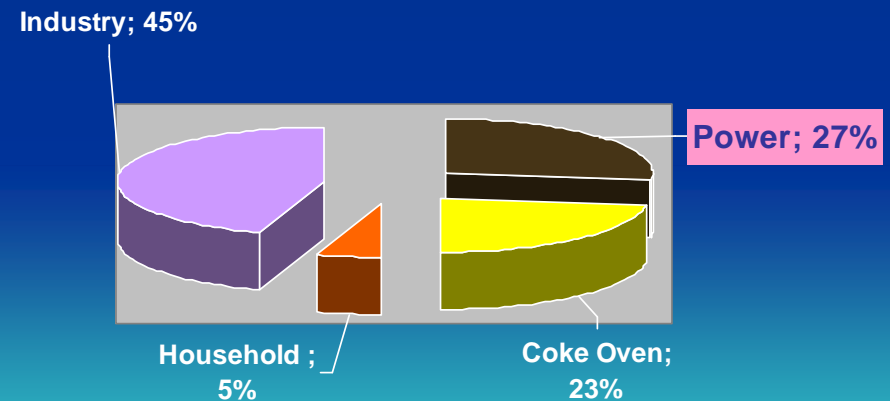


- ~90% of Lignite production state owned (TKİ+EÜAŞ)
- (Shares of private sector within state production by leasing or contract mining 20-25 %)
- Whole hardcoal production state owned (TTK),
- 16 Mt hard coal imported in 2006.

Distribution of Lignite Consumption (60.9 Mt, 2006)

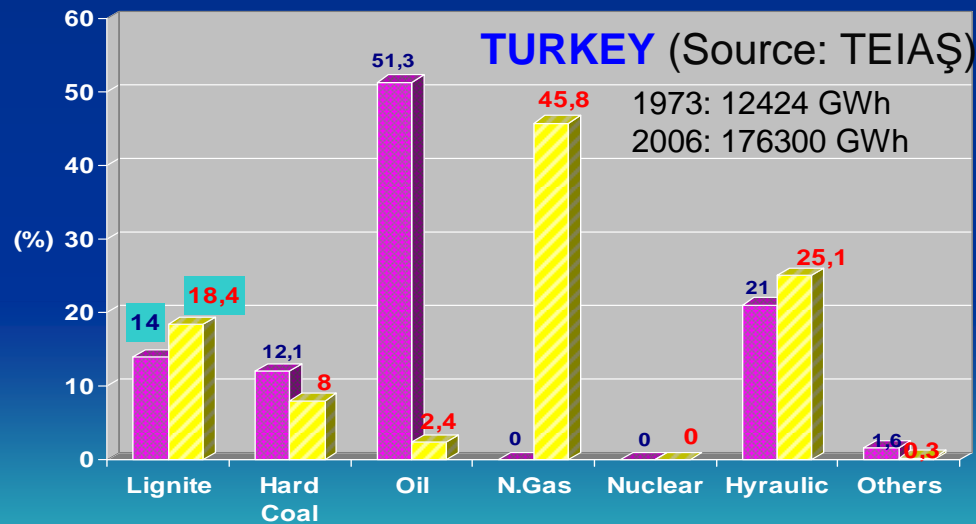
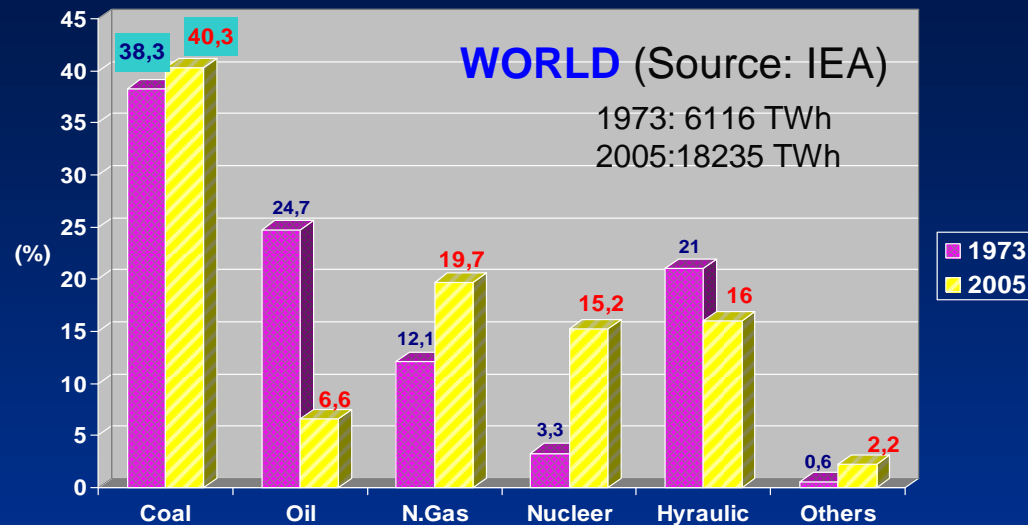


Distribution of Hard Coal consumption (19.5 Mt, 2006)



Role of Coal in Power Generation

- Shares of coal in power generation



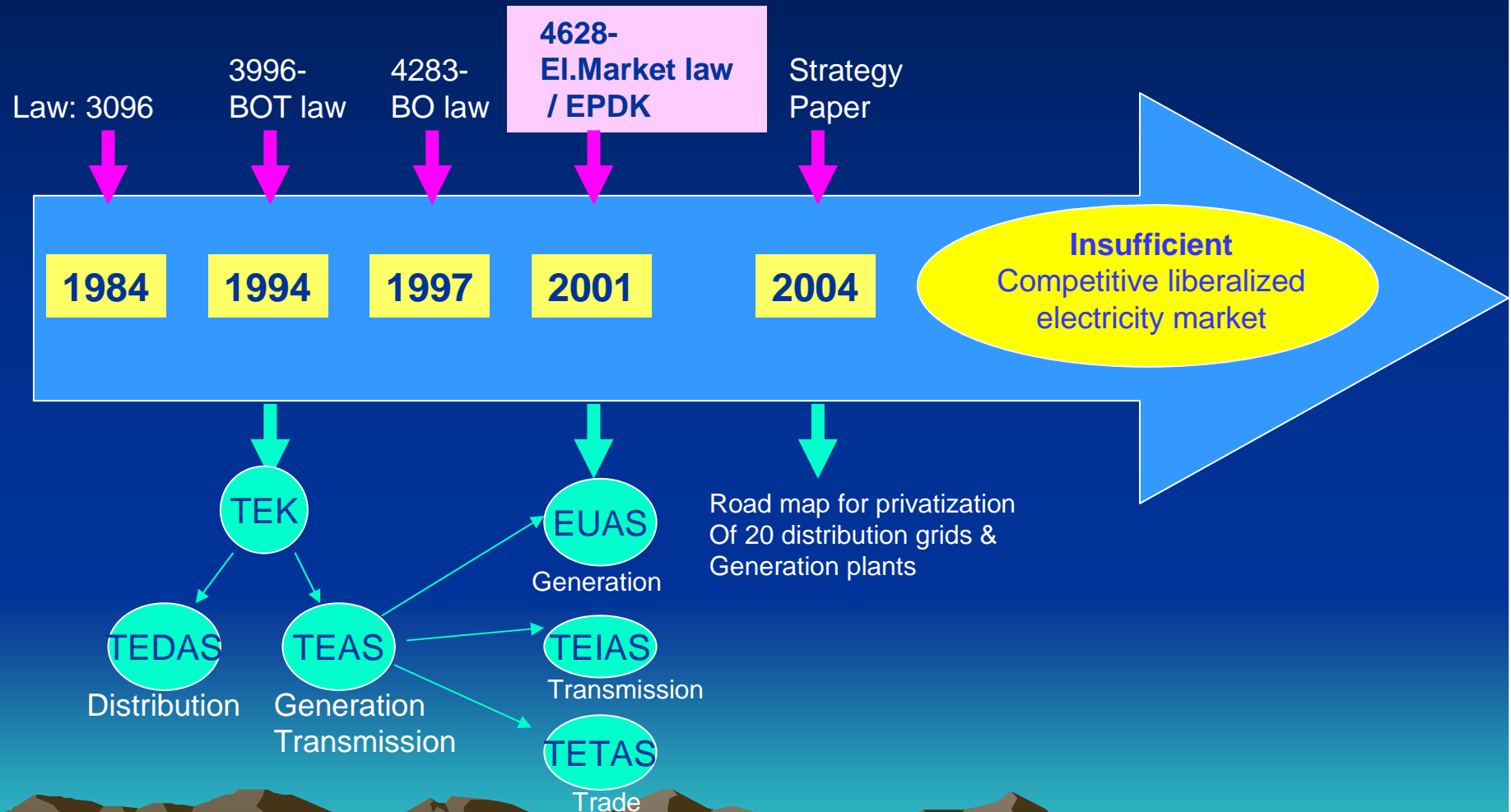
TURKEY

	1973	1986	2006
Coal (%)	26.1	49	26.4
N.Gas(%)	0	6	45

RESTRUCTURING & PRIVATIZATION PERIOD IN TURKISH ELECTRICITY SECTOR

Regulatory & Administrative Developments-

➔ **1970-1984 : Turkish Electricity Enterprises (TEK)**
(State owned Monopoly- Generation+Transmission+Distribution)



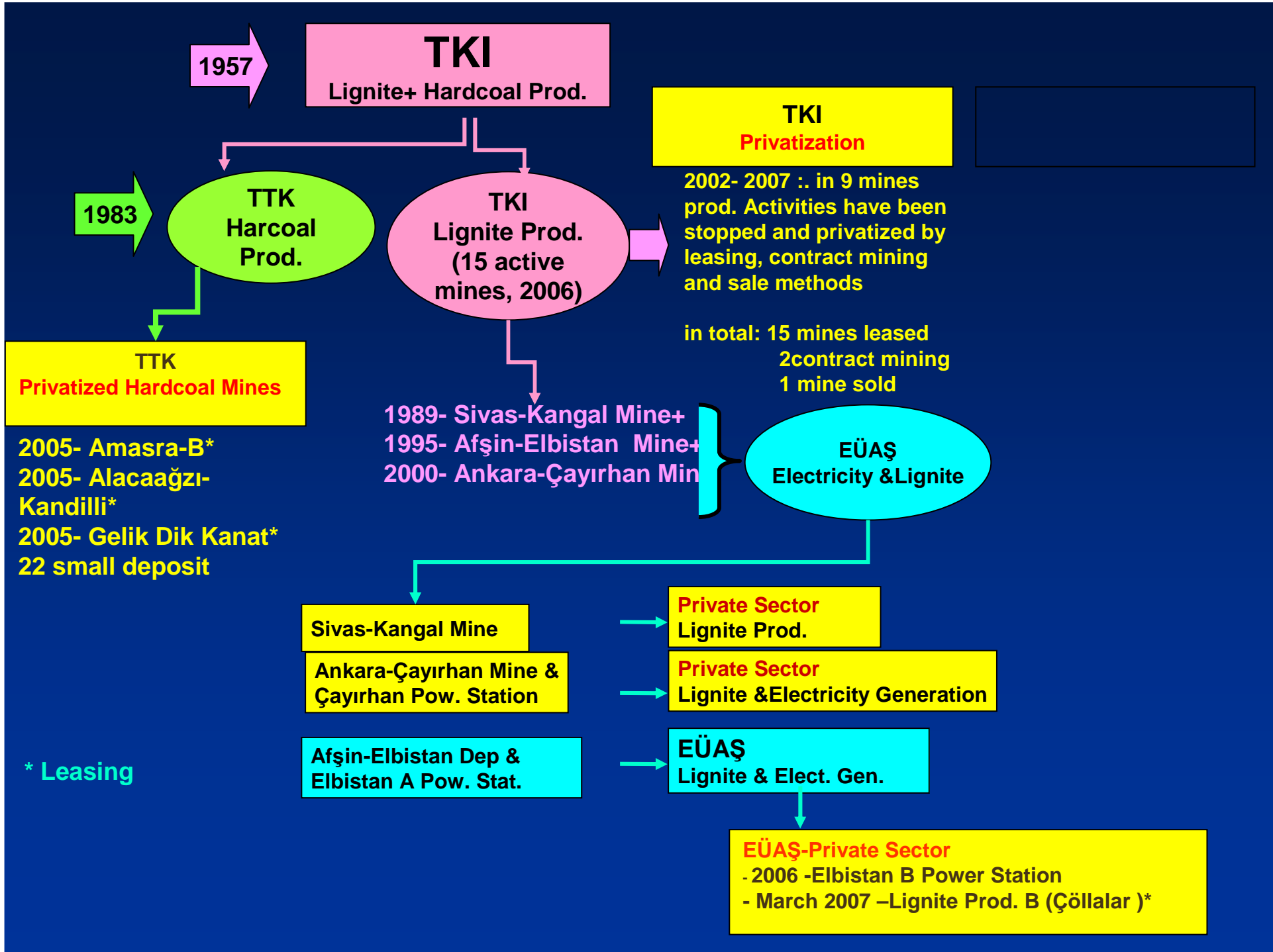
Regulatory Developments (continue)

- United Nations Framework Convention on Climate Change in Turkey (16 Oct 2003 4990 numbered law)
 - First National Declaration has been prepared.
- Harmonisation of Turkish regulation with EU coal, electricity and environment related regulation is underway.
 - Harmonisation with EU Electricity Liberalisation Directive (2001)
 - Amendment in Mining Law (2004)
 - to promote foreign investment & privatization
 - Amendment in Environment Law (2006)

RESTRUCTURING OF COAL SECTOR in TURKEY

- Privatization of coal deposits

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Current Capacity for Lignite-Based Electricity Generation

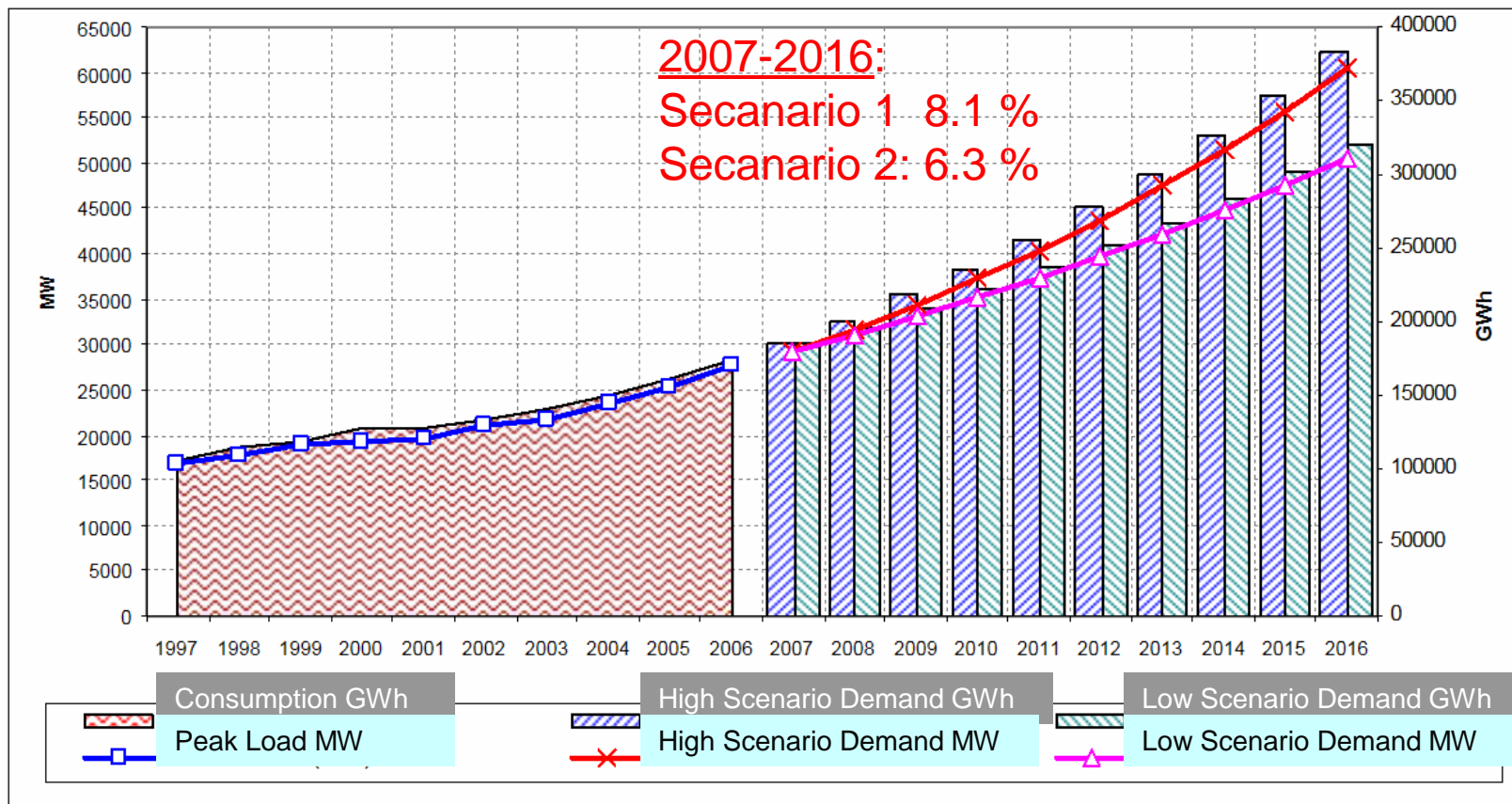
Project Name	Consumption Capacity(x1000 t/y)	Installed Capacity (MW)
Afsin-Elbistan A	18.000	1356
Afsin Elbistan B	(17.000)*	1376
Ankara-Cayirhan	4.300	620
Bursa-Orhaneli	1.500	210
Canakkale-Can	1.800	320
Kütahya-Seyitomer	5.500	600
Kutahya- Tuncbilek	2.300	366
Manisa-Soma B	8.200	1032
Mugla-Husamlar (Kemer koy)	5.000	630
Mugla-Milas-Sekkoy (Yenikoy)	3.750	420
Mugla-Yatagan	5.350	630
Sivas-Kangal	5.400	456
TOTAL(Lignite)	61.100	8.016**

* Mine to feed Elbistan B power plant was leased to private sector in March 2007.

** Except autoproducers

What are the future prospects for coal in electricity production in Turkey?

High Growth of Demand Expected



Source: TEIAS, 2007

Available Additional Capacity for Electricity

Generation- Expected Reliazed by PRIVATE SECTOR

LIGNITE/ ASPHALTITE PROJECTS:

Project Name	Reserve (1000 ton)	Prod. Capacity (1000 t/y)	Installed Capacity (MW)	Planned Power Pl. Technology	Description
TKİ-Leasing					
Silopi(Asphaltite)	50000	300	135	Fluidized Bed	investment period for pow.pl.construction
Bolu- Göynük	39000	1200	150	Fluidized Bed	leased by TKI, applied for el.prod.licence
Bursa-Davutlar	39000	1200	160	Fluidized Bed	leased to private sector by TKI
Tekirdağ-Saray	129000	2500	300	Fluidized Bed	leased to private sector by TKI
Total I	257000	5200	745		
TKİ-Others					
Bingöl-Karlıova	26000	1115	100		Evaluation phase
Adana-Tufanbeyli	214000	7200	600		Negotiation phase
Manisa-Eynez	100000	3400	600		Evaluation phase
Kütahya-Derin Sahalar	100000	3000	300		Evaluation phase
Total II	440000	14715	1600		
TKİ TOTAL	697000	19915	2345		

Available Additional Capacity for Electricity Generation- - Expected to be Reliazed by PRIVATE SECTOR

Project Name	Reserve (1000 ton)	Prod. Capacity (1000 t/y)	Installed Capacity (MW)	Planned Power Plant Technology	Description
EÜAŞ					
Elbistan A(5,6),B,C,D,E,F	2818000	86400	6650		Increase in reserve +high tech.: 8600 MW (100 million t/y)
(Elbistan B)		(17000)	(1440)	Pulverized	Power St.in operation, Çöllolar Deposit leased to Ciner Group
★ (Elbistan C,D)		(29000)	(2400)	Pulverized	Power St+Mining Leasing Bids: New tender specs. will be prepared
Cayirhan B	n.a.	n.a.	450		
Private Sector					
Adana-Tufanbeyli	236000	6200	450		Ciner Group sold mining licence to EnerjiSa, el.prod.licence was received
Çankırı-Orta	51000	1500	165	Fluidized Bed	TKI sold mining licence to Calık NTF. Elect.prod. licence was received.
Konya-Ilgın	152000	3100	500		
Adıyaman-Gölbaşı	49000	1400	150		
Total	488000	12200	1265		
GENERAL TOTAL	4003000	118515	10710		

Total Capacity for Electricity Generation

Project Name	Power St. Cap. (1000 t/y)	Installed Cap (MW)
Lignite (current)		
TKİ	33400	4208
EÜAŞ + Private	27700	3808
Total (current)	61.100	8016
Lignite(additional)	118515	10710
TOTAL	179.615	18726

Required Investment for Additional Power Plant installation

2007-2016 Government Electricity Demand Prospects

Additional capacity:

- 17570 MW low scenario, 6,3%
- 29921 MW high scenario, 8.1%
(TEIAS, 2007)

Share of Coal in Total Additional Capacity
based on TEIAS, Electricity Generation Prospects, 2004

	2007- 2016	2017-2020	2007-2020
Lignite	5880	4480	10360
Hard Coal	0	1200	1200
Imported Coal	0	4500	4500

Received Electricity prod. Licences (November 2007)

Lignite: 920 MW

Hard Coal: 960 MW

Applied for Elec.Prod.Licences (November 2007):

Lignite:570 MW

Impoted Hardcoal: 7055 MW

Investments done to install coal washing plants

Hard Coal Washing Plants

- Capacity (50-750 t/h) 12 plants to wash all produced hardcoal.

Lignite Washing Plants:

- Capacity (50-800 t/h) 15 plants to wash 30% of produced lignite.

Source: G.Özbayoğlu, 2007

Investments done to reduce CO₂, SO₂, and other emissions from existing power plants

SOX Control Tekn.

FGD Plants (Çayırhan I-II, Kemerköy, Orhaneli, Yatağan Yeniköy)

After 1986 FGD plant is compulsory (Kangal III, Çayırhan III-IV, Elbistan B)

Particulate Matter

ESP –all existing power plants

CO₂ ↓

High efficiency technology

-Atmospheric Fluidized Bed Combustion

-Çan 18 Mart Power Plant (42%)

R&D Projects for Cleaner Electricity Production from Coal

- Pilot-scaled CTL project in cooperation with Universities, 2007
- CBM projects, for both hardcoal & lignite
(Electricity licences were received by EPDK for installing 2 Power Plants based on hardcoal +Methane having capacity 650 MW and 50 MW)
- Project on desulphurization of lignite by washing lignite within a special solvent, 2007
- Benefication of Turkish Lignite Coals to produce clean fuel by shaking table, Multi Gravire Separator and Flotation Methods

CONCLUSION

- Increasing of energy demand and dependency to foreign energy resources(71%) are the main issues of Turkey.
- Coal is the the most important energy resource.
- To increase in usage of domestic coal for electricity generation is government policy
- Selection of clean coal technologies for new coal-based power plants to reduce harmful emissions
- restructuring of coal and electircity sectors and modernisation activities to be survived,
- More importance to be given to R&D Projects in cooperation with Research Institions and Universities



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Thank You for Your Attention

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