



General Overview of the Turkish Energy Sector

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April, 2014

General Directorate for Energy Affairs Overview

- Energy policy based on
 - Good analytics
 - Defined procedures
 - Well-trained personnel
 - Engaging all stakeholders

For a sustainable and institutional energy
sector

GDEA – Overview

→ Weekly Reports

- Dünya Enerji Görünümü (Weekly) – Weekly news letter
- Enerji ve İklim (Weekly) – 10 day and 6 months forecasts of weather events
- Enerji İstatistik Bülteni (Weekly) – Weekly statistics for coal, oil products, natural gas, prices etc.
- Electricity Report
- Natural Gas Report
- Water Report

→ Monthly Reports

- Aylık Enerji İstatistikleri (Monthly Energy Statistics)
- Aylık Elektrik Üretim Yatırım İstatistikleri (Installed capacity progress in detail)

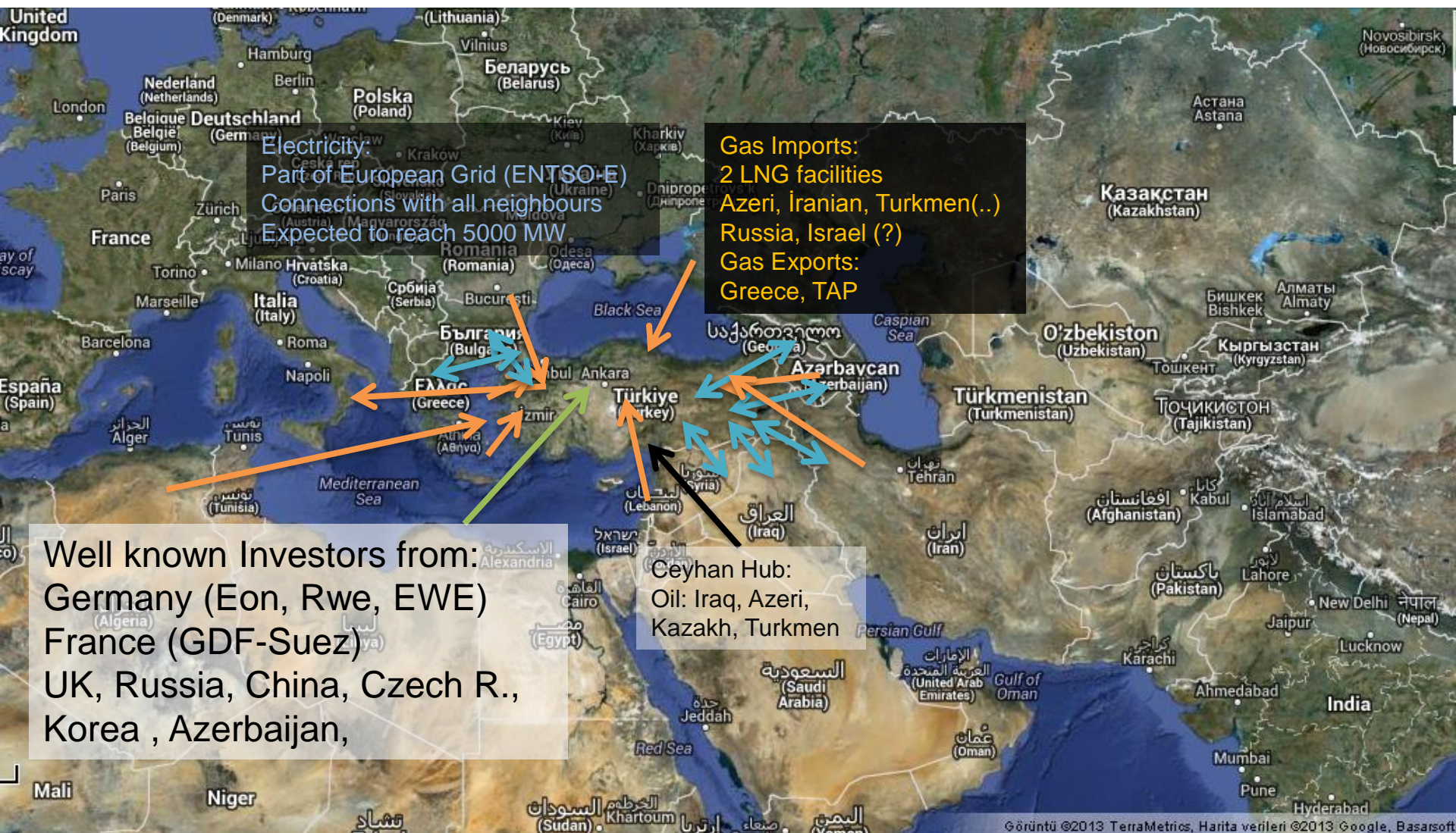
→ Forecasts

- 10 day forecasts (every weekday)
- Long term forecasts (updated every month)
- Price forecasts based on international sources (monthly)

Location



Rule of Law and Trust in Turkish Energy Sector



Energy Sector

“Main Characteristics”

– Rapid growth in demand :

- investment challenges and opportunities
- the role for competitive markets

– High level of import dependency:

- further role for development of indigenous resources, in particular the renewables, and diversification

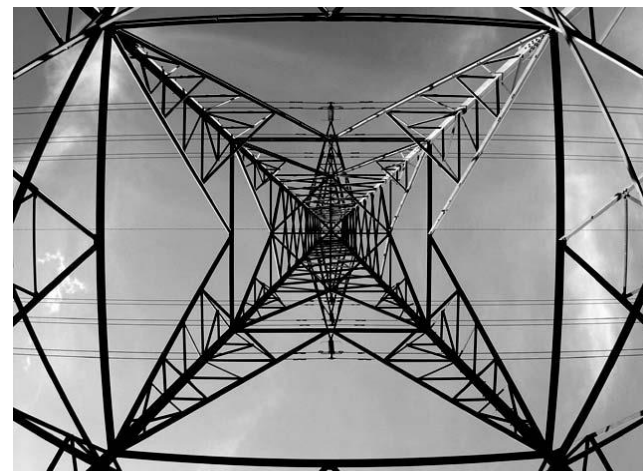
– Relatively high figures for energy intensity :

- potential for improvement of energy efficiency
(but also linked to the structural issues related to economy)

Strategies in the Energy Sector

“Major Aspects”

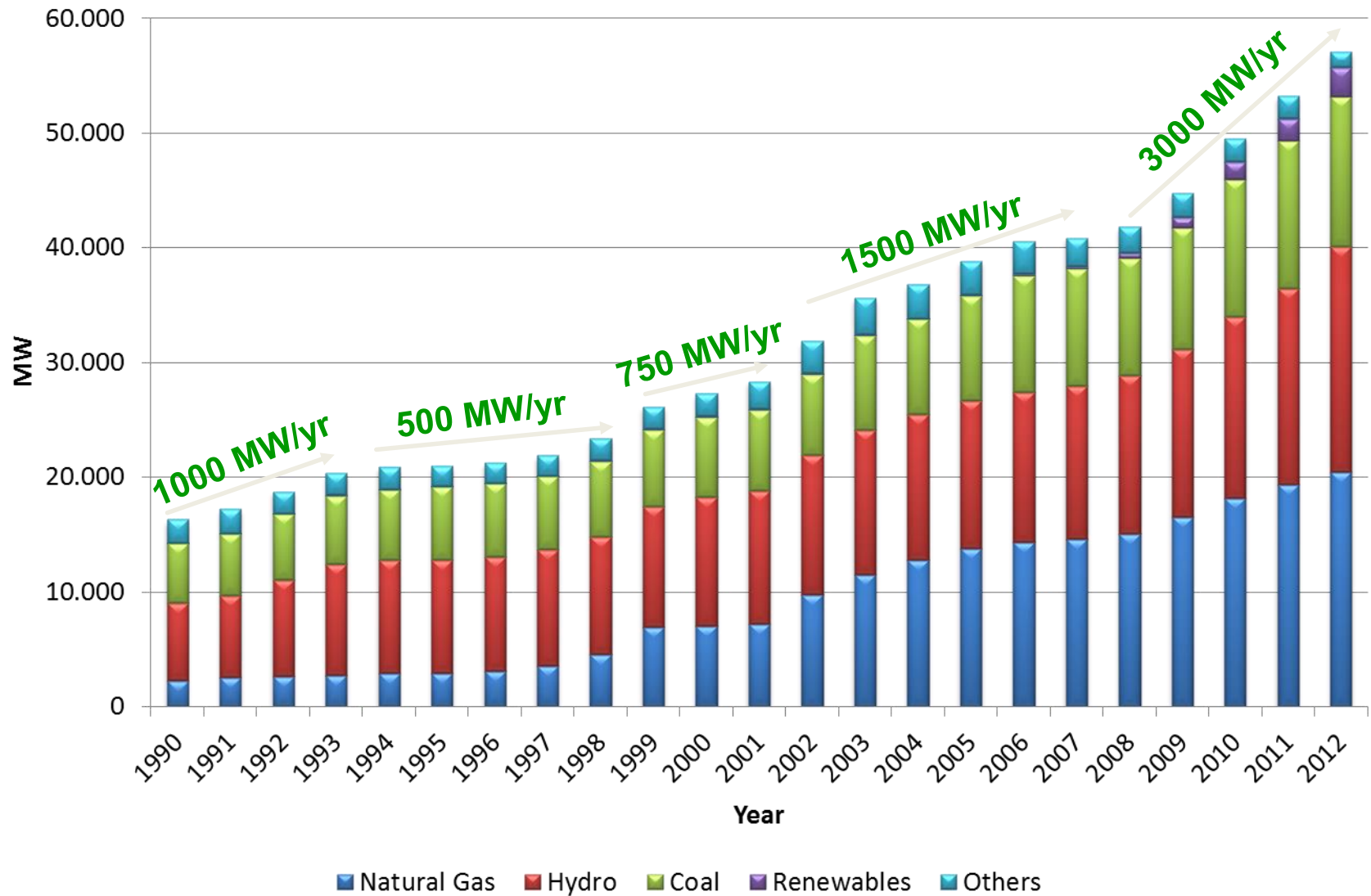
- **Exploration and production activities**
- **Further diversification in primary energy supply, in terms of energy sources, imports, technologies and infrastructures**
- **Development of renewables and introduction of nuclear power**
- **Competition oriented market structures in electricity, natural gas and petroleum sectors**
- **Energy efficiency along the supply-demand chain**
- **Mitigation of GHG emissions from the energy sector**
- **Energy technologies**
- **Oil and gas pipelines (domestic and cross-border) & electricity interconnections**



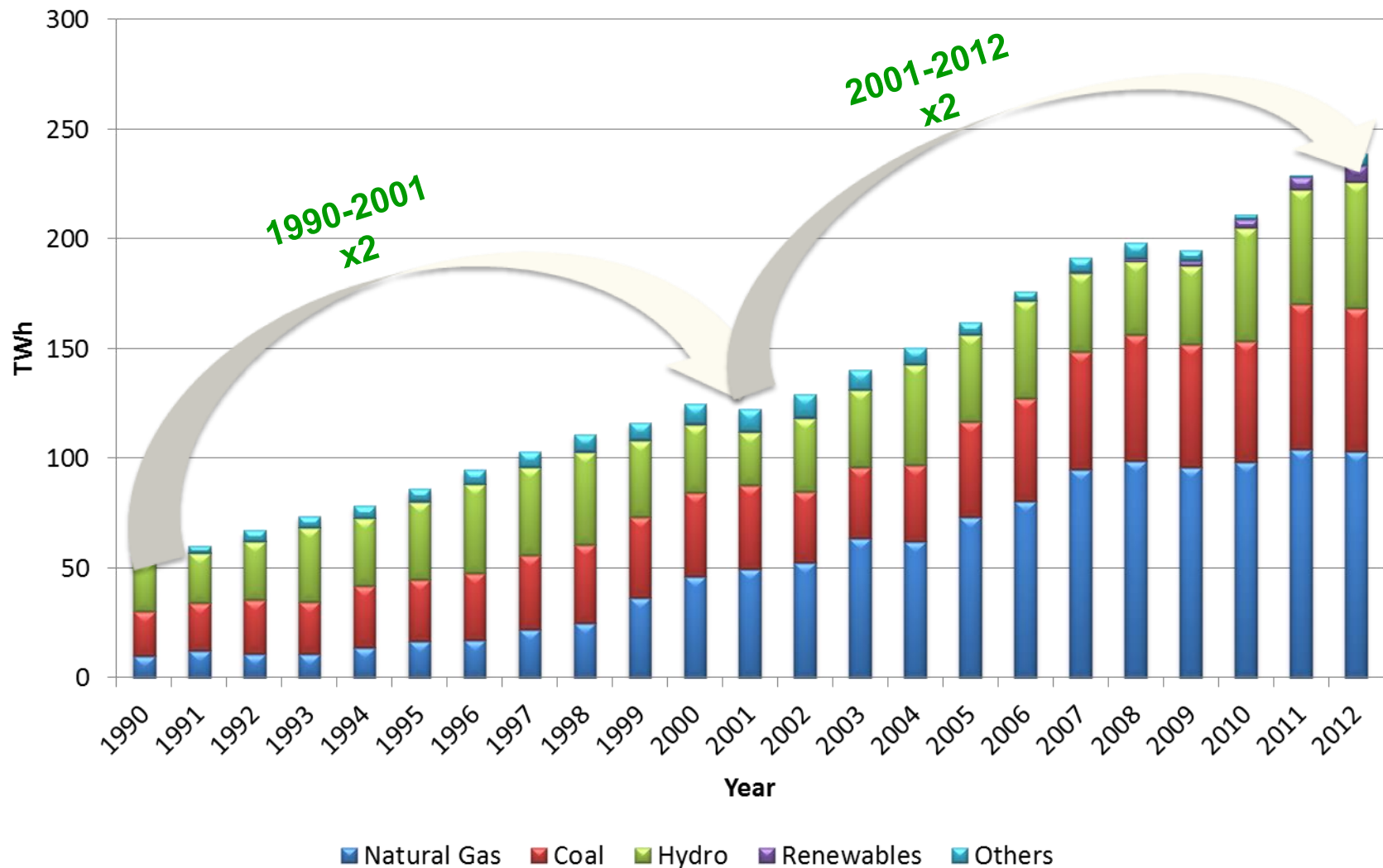
Energy Outlook of Turkey

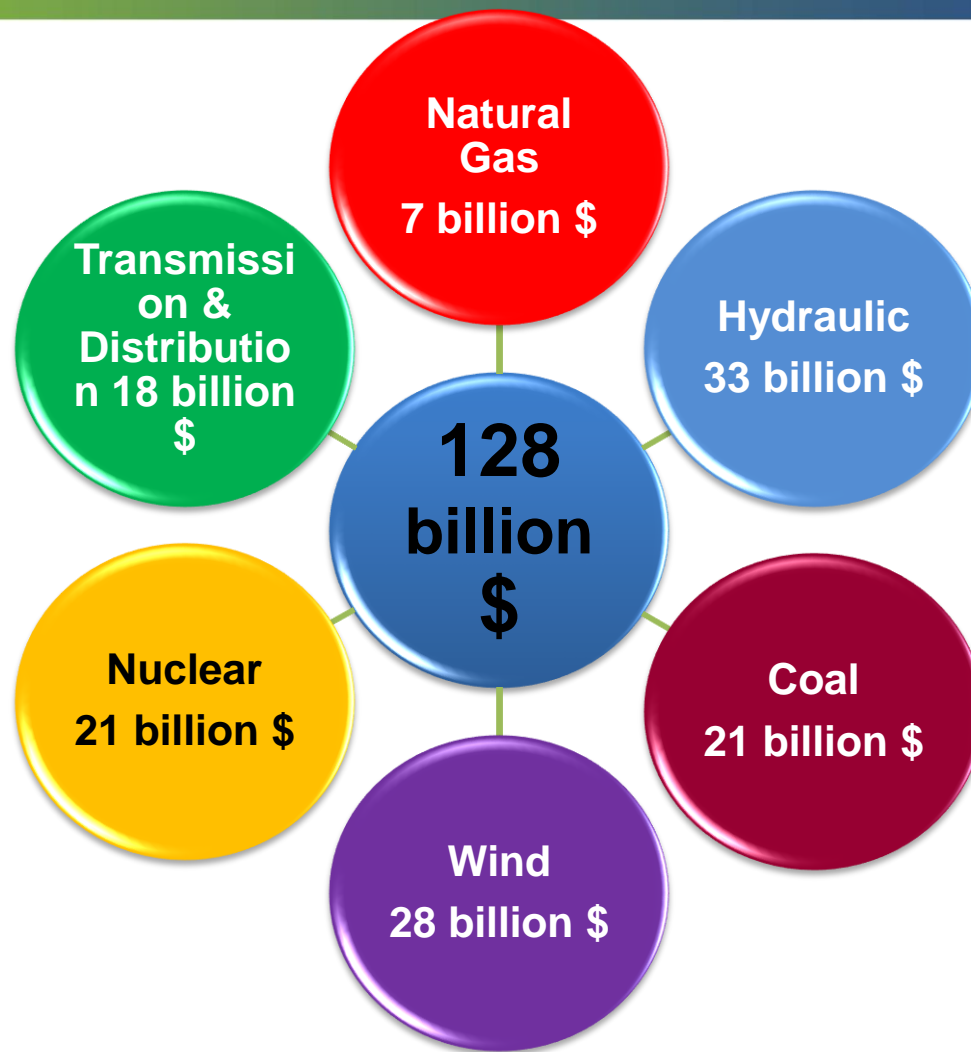
- Sixth biggest economy in Europe.
- Fast recovery after the global financial crisis (8,9% GDP growth in 2010, 8,5% GDP growth in 2011, GDP growth 2,2% in 2012, 4% in 2013)
- Sixth biggest electricity market in Europe.
- Annual demand increase of Turkey : **4,6% since 1990**
(Annual demand increase of the EU: **1,6%**)
- Annual primary energy demand of Turkey is expected to increase around **4%.**
- Electricity demand to increase annually 5,6% until 2020
- Investment required more than **\$ 128 billion** for the next **15** years

Installed Capacity by Resources 1990-2012



Development of Turkey's Annual Electricity Generation by Primary Energy Resources





**Cumulative GDP growth
up to 2023**

%63

**Population growth up to
2023**

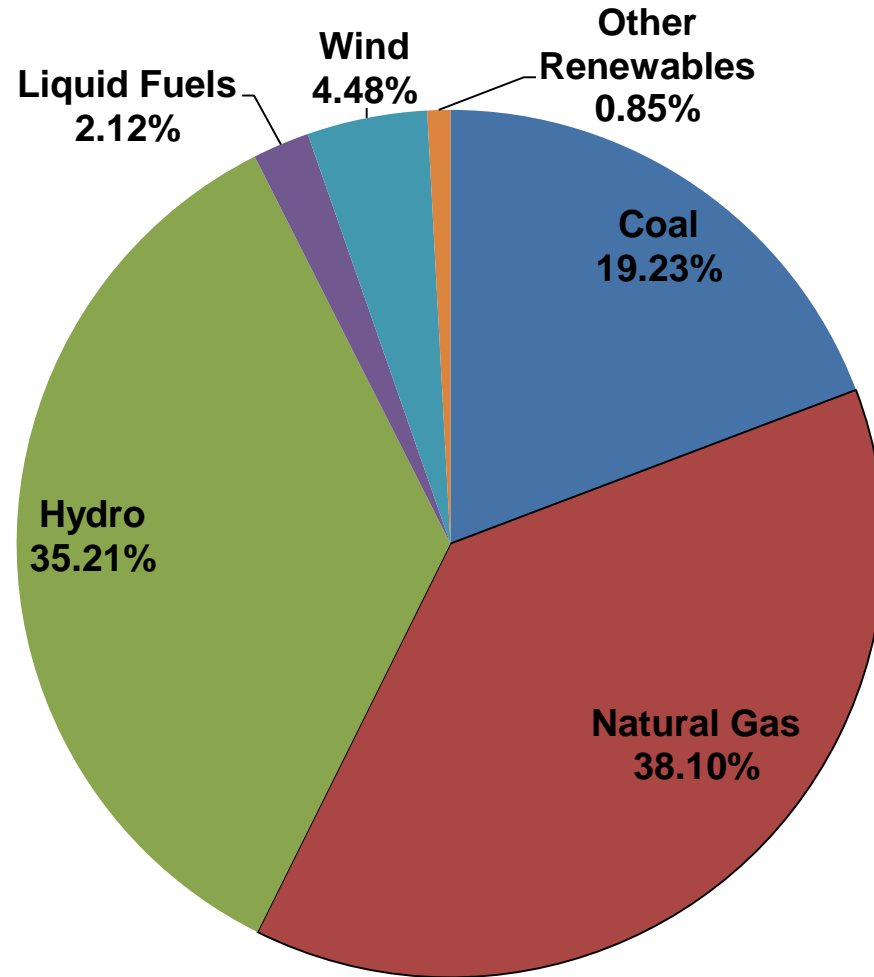
%12

**Electricity demand by 2023
→ 450 TWh**

Breakdown of installed capacity according to sources (31.03.2014)

MW

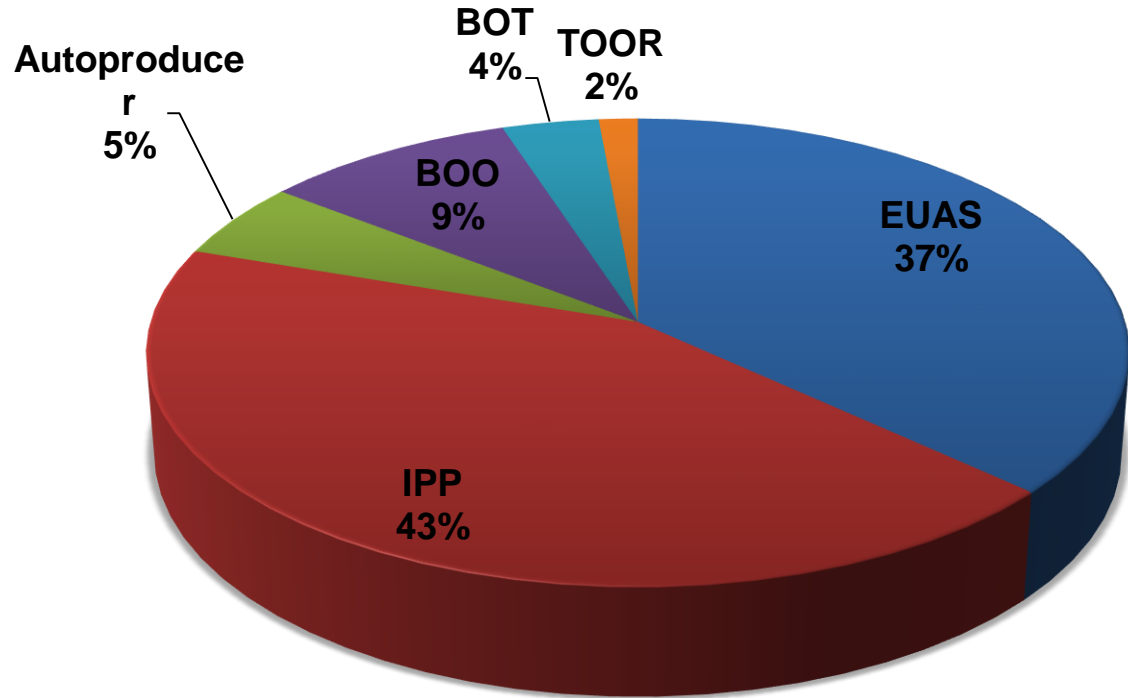
Hydraulic	22.748,9
Natural Gas	24.619,8
Coal	12.427,8
Liquid Fuels	1.367,3
Wind	2.896,1
Other Renewables	551,9
TOTAL	64.611,8



Source: TEİAŞ

Breakdown of installed capacity according to companies (31.03.2014)

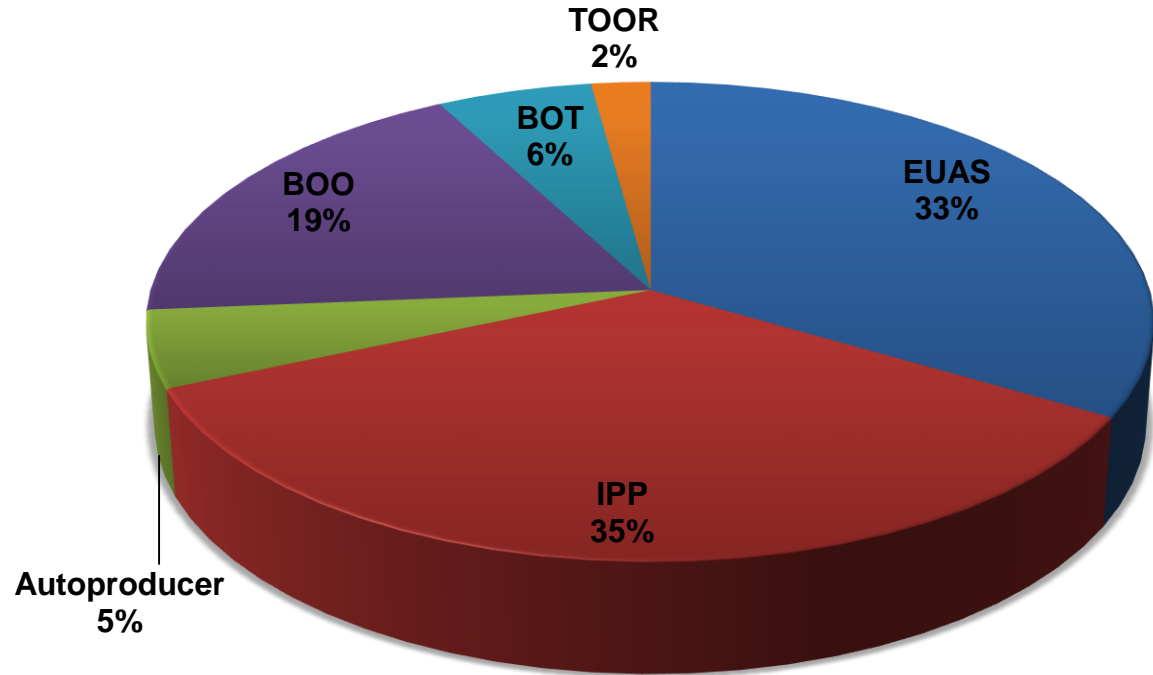
	MW
EUAS	23.781,7
IPP	28.031,2
Autoproducer	3.422,9
BOO	6.101,8
BOT	2.335,8
TOOR	938,3
TOTAL	64.611,8



Source: TEİAŞ

Breakdown of electricity generation by generators in 2013

	TWh
EUAS	80.035,0
IPP	83.885,0
Autoproducer	12.434,8
BOO	44.241,9
BOT	13.528,5
TOOR	5.182,9
TOTAL	239.308,1

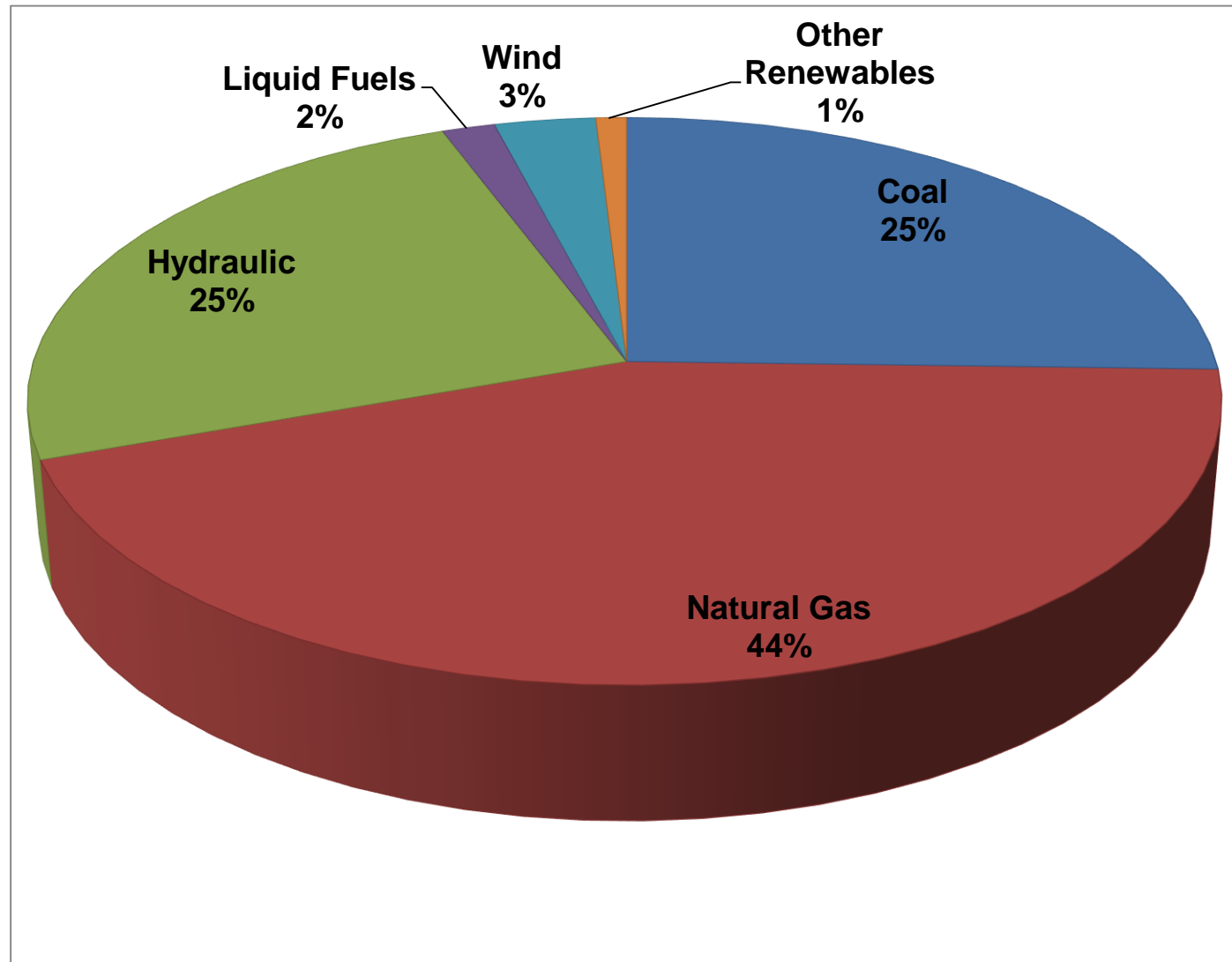


Source: TEİAŞ

Breakdown of electricity generation by resources in 2013

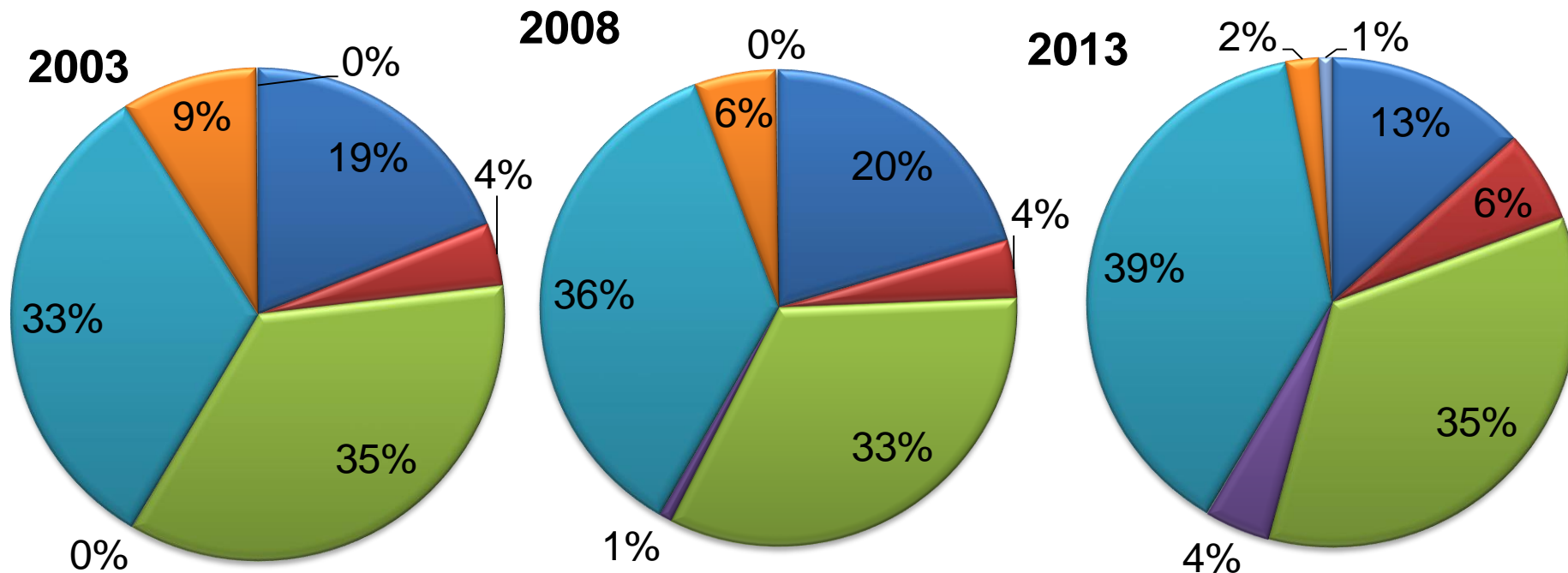
TWh

Coal	60.870,9
Natural Gas	105.496,1
Hydraulic	59.272,2
Liquid Fuels	3.907,2
Wind	7.494,0
Other Renewables	2.267,6
TOTAL	239.308,1



Source: TEİAŞ

Breakdown of Installed Capacity by Resources

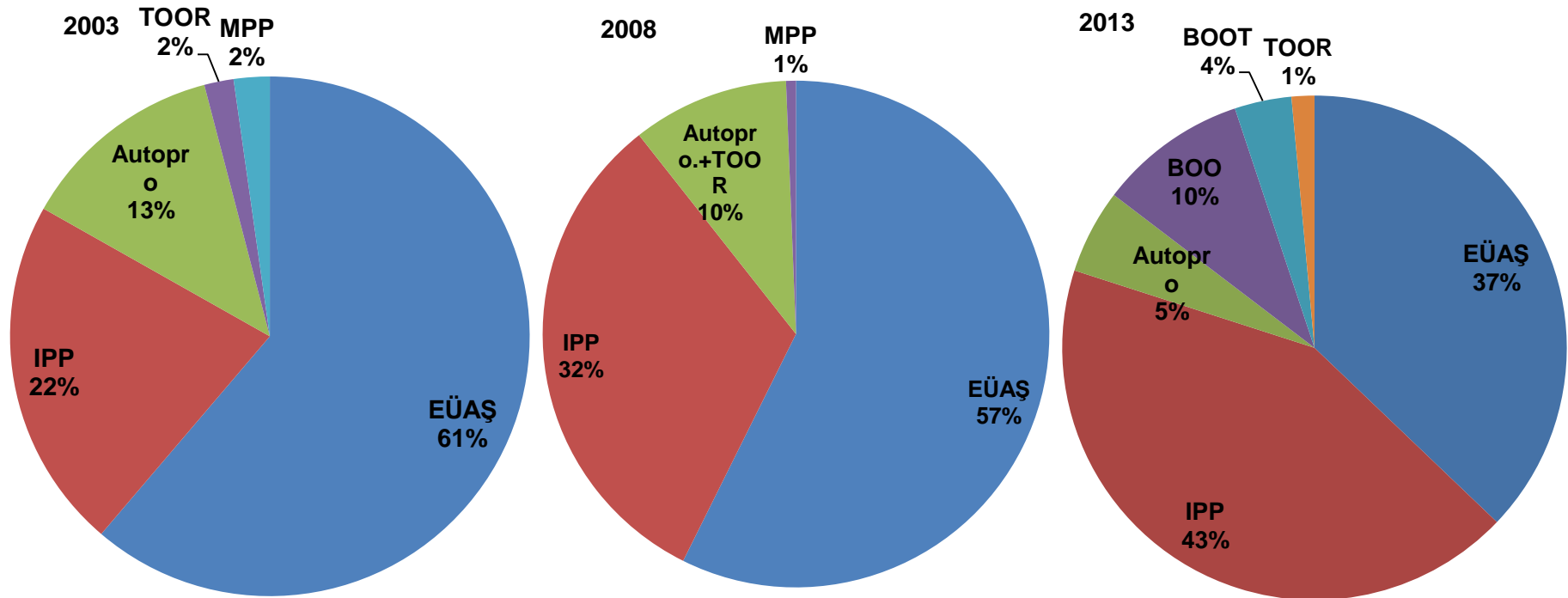


- Hard Coal+Lignite
- Imported Coal
- Hydro
- Wind
- Natural Gas+LNG

SOURCES	2003	2008	2013
Hard Coal+Lignite	6773,9	8540	8515,2
Imported Coal	1465	1651	3912,6
Hydro	12578,9	13828,7	22748,9
Wind	18,9	363,7	2896,1
Natural Gas+LNG	11539,5	15054,8	24619,8
Liquid Fuels	3168,4	2289,6	1367,3
Other Renewables	42,6	89,5	551,9
TOTAL (MW)	35.587,2	41.817,3	64.611,8

Source: TEİAŞ

Breakdown of Installed Capacity According to Companies



COMPANIES	2003
EÜAŞ	21793,3
IPP	7806,3
Autopro.	4541,8
TOOR	650,1
MPP	795,5
TOTAL (MW)	35.587

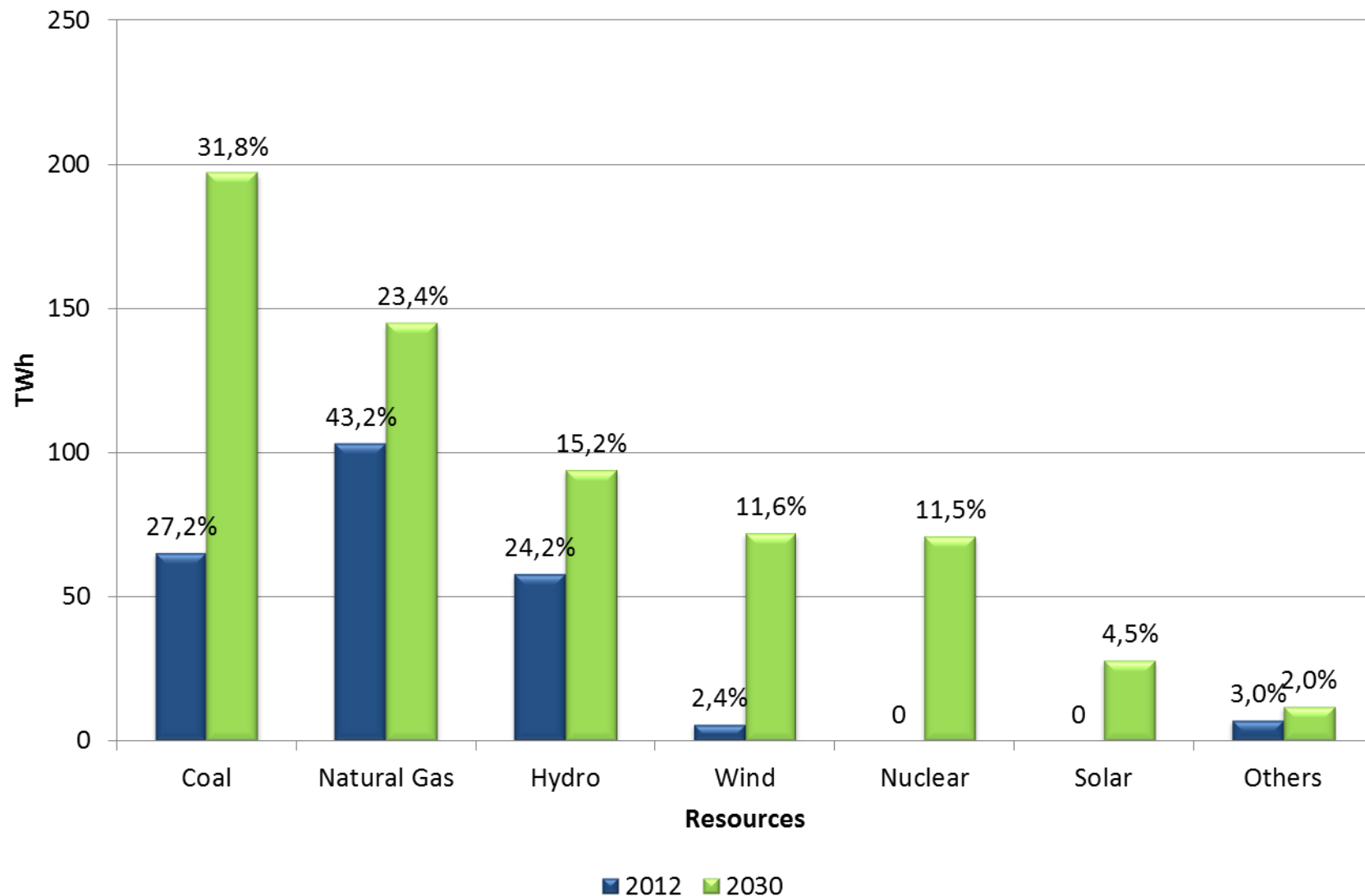
Source: TEİAŞ

COMPANIES	2008
EÜAŞ	23980,8
IPP	13390,4
Autopro.+TOOR	4183,3
MPP	262,7
TOTAL (MW)	41.817,20

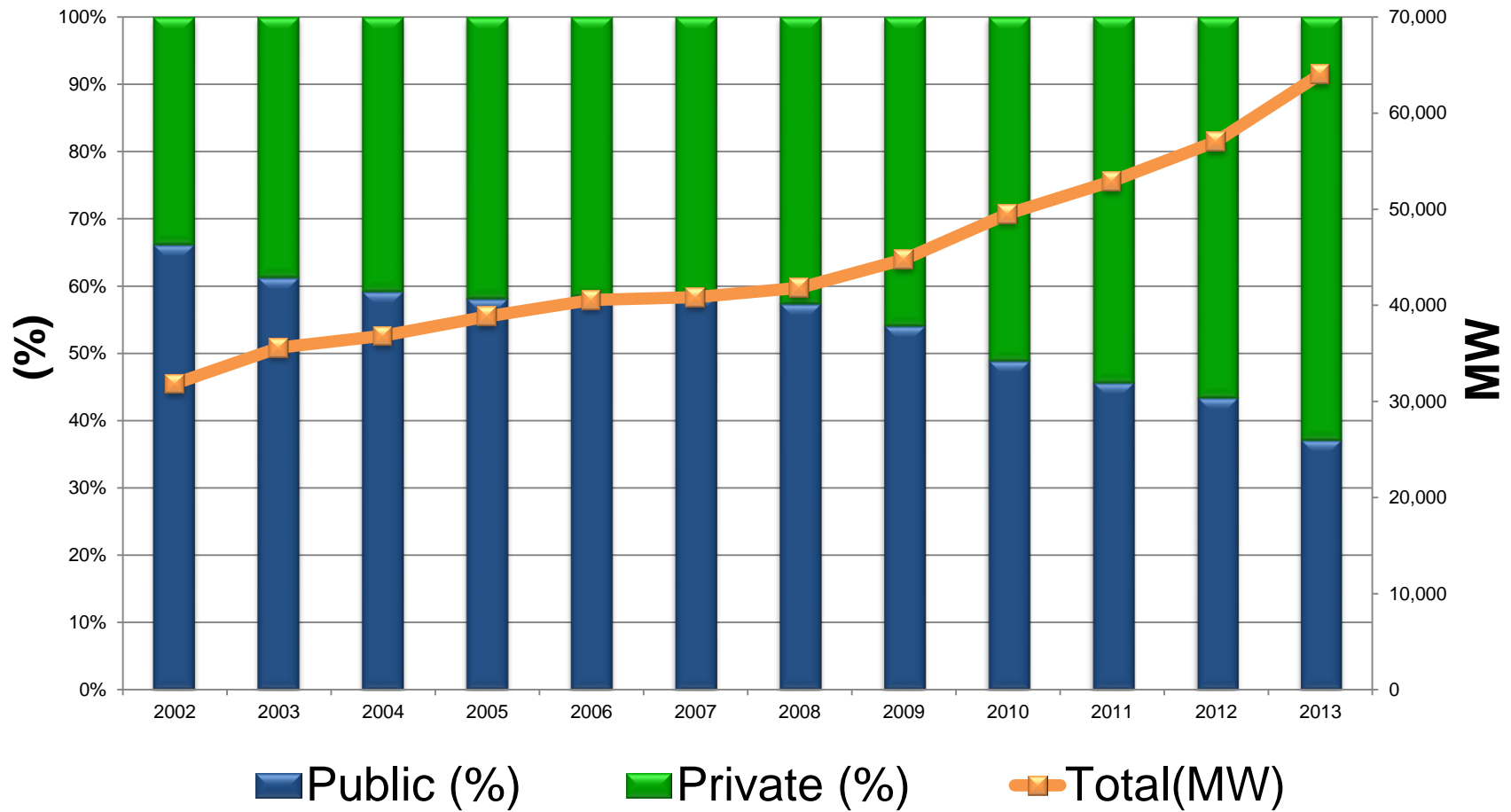
COMPANIES	31.03.2014
EUAS	23.781,70
IPP	28.031,20
Autopro.	3.422,90
BOO	6.101,80
BOOT	2.335,80
TOOR	938,30
TOTAL (MW)	64.611,80

Breakdown of Electricity Generation by Resources 2012

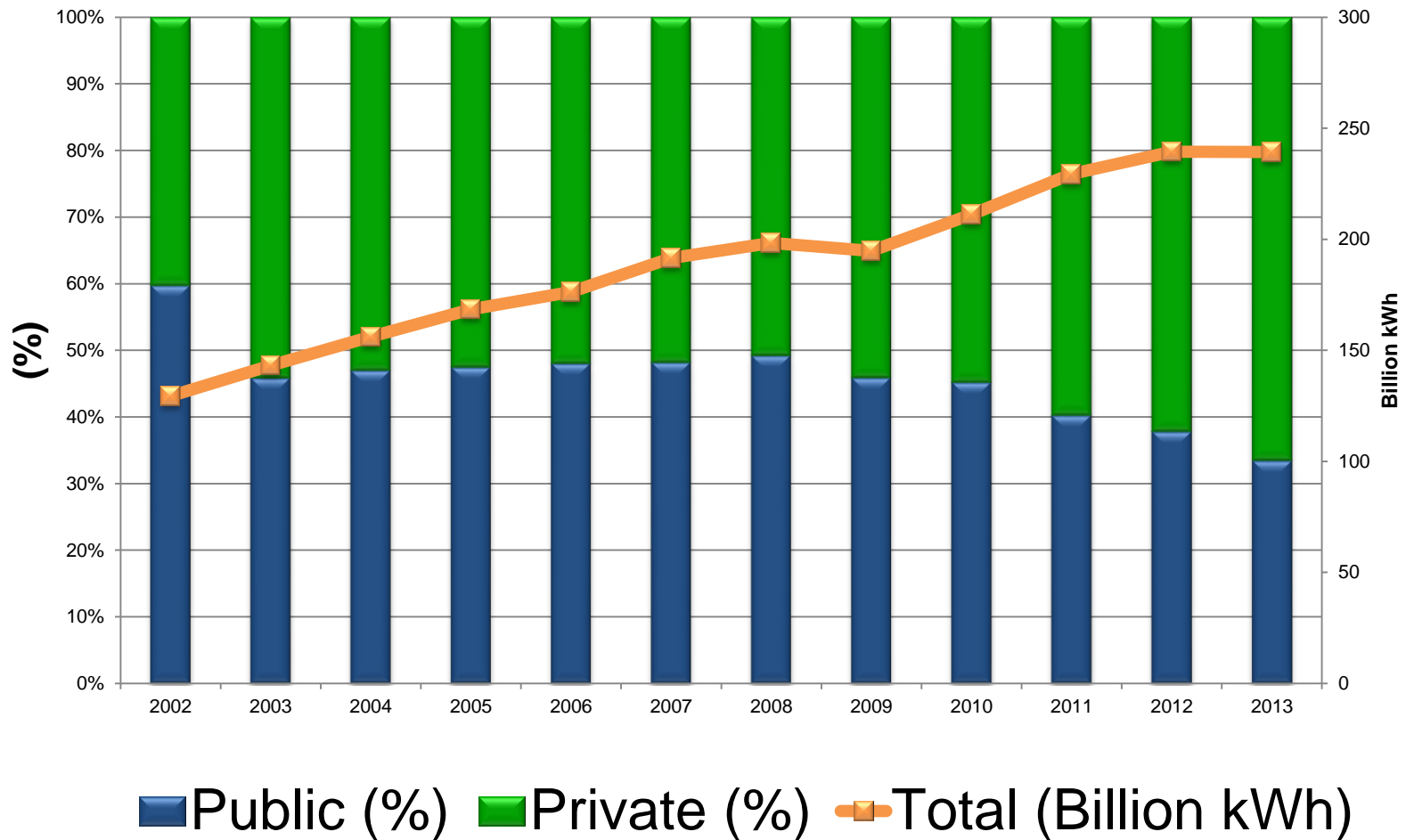
2030



Installed capacity by organizations in 2002-2013



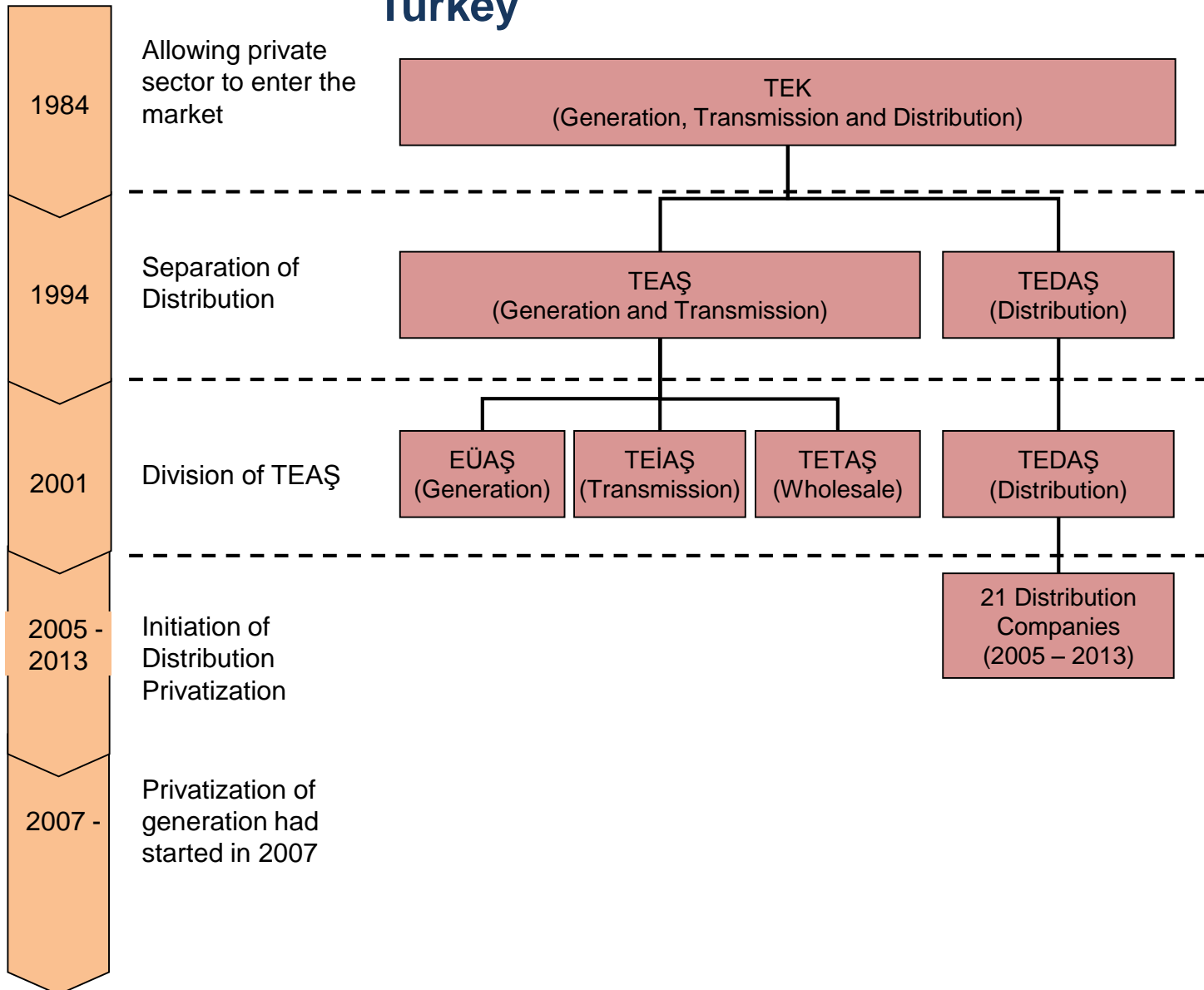
Electricity production according to organizations by 2002-2013



The General Structure of the Existing Electricity Sector in Turkey

Goals of Electricity Market Liberalisation

- Creating a competitive industry structure
- Improving efficiency
- Promoting investments that will ensure security of supply in the long-term
- Shifting public companies from market dominant role to regulatory roles



Electricity Market & Security of Supply Strategy Paper

- **Security of Supply and Market design**
- **Distribution and generation privatisation**
 - Distribution → completed (2013)
 - Generation → commencement in 2009
- **Utilization of *renewable and energy potential* in a cost effective manner**
- **Utilization of the remaining hydro and indigeneous coal reserves**
- introduction of nuclear power by 2023 → at least %10
 - First NPP agreement with Russian Federation (4.800 MW)
 - Second NPP agreement with Japanese + French consortium



TARGETS FOR 2023



The whole economically feasible hydropower potential of Turkey will be provided for generating electrical energy,



20,000 MW capacity of wind power plant will be in operation



Minimum 3000 MW of **solar** energy capacity will be reached



600 MWe geothermal and will be implemented,

Privatization of Generation Assets- 1

- Strategy → to privatize significant portion of state owned generation assets
- Privatization of 9 small power plants (totally 140 MW) & Privatization of 50 small hydro power plants finalized
- 3 big thermal power plants are privatized:
 - Seyitömer Coal Fired Power Plant - 600 MW
 - Kangal Coal Fired Power Plant - 450 MW
 - Hamitabat Gas Fired Power Plant – 1.120 MW
- Studies regarding generation privatization will be finalized soon
 - * 45 power plants (18 thermal & 27 hydro)
 - * total capacity 16,359 MW (around %36 of Turkey's total installed capacity)

Privatization of Generation Assets- 2

- The last bidding date for other 3 big thermal power plants which will be privatized can be seen following Table:

	Installed Capacity (MW)	Last Bidding Date
Kemerköy and Yeniköy Thermal Power Plants and Kemerköy port area	Kemerköy TPP:630 MW Yeniköy TPP:420 MW	10.04.2014 (over 2 billion \$)
Çatalağzı Thermal Power Plant	300MW	21.04.2014
Yatağan Thermal Power Plant	630 MW	30.04.2014

Natural Gas and LNG Sale & Purchase Agreements of Turkey

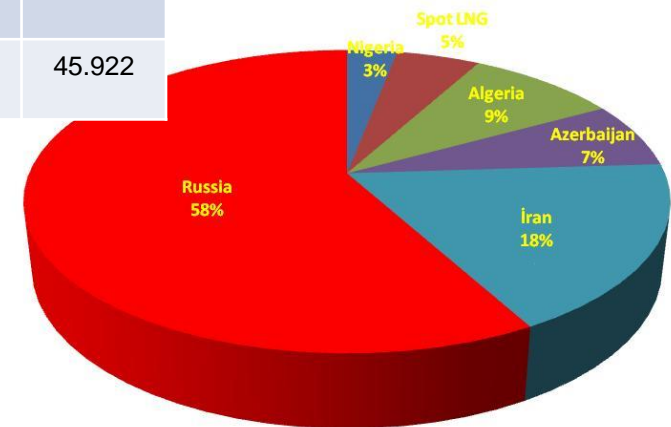
Agreements	Volume bcma (during the plateau period) (billion m ³ /year)	Date of Signature	Duration (years)
Russian Fed. (Westward)	6*	9 August 2012	30
Algeria (LNG)	4	14 April 1988	20
Nigeria (LNG)	1.2	9 November 1995	22
İran	10	8 August 1996	25
Russian Fed. (Black Sea)	16	15 December 1997	25
Russian Fed.(Westward)	8**	18 February 1998	23
Azerbaijan	6.6	12 March 2001	15

* Contract has terminated as of 31.12.2011

** The 4 billion Cm3/year portion of the purchase-sell of BOTAŞ dated 18.02.1998 has been transferred under Temporary Article 2 of the Law No. 4646

Natural Gas and LNG Imports

Years	Russia	Iran	Azerbaijan	Algeria	Nigeria	Spot LNG	Total
2005	17.524	4.248	0	3.786	1.013	0	26.571
2006	19.316	5.594	0	4.132	1.100	79	30.221
2007	22.762	6.054	1.258	4.205	1.396	167	35.842
2008	23.159	4.113	4.580	4.148	1.017	333	37.350
2009	19.473	5.252	4.960	4.487	903	781	35.856
2010	17.576	7.765	4.521	3.906	1.189	3.079	38.036
2011	25.406	8.190	3.806	4.156	1.248	1.069	43.874
2012	26.491	8.215	3.354	4.076	1.322	2.464	45.922





Coal-Fired Electricity Generation Plants

Some EUAS plants

Name	District	Commissioning year	Coal Type	Specifications (MW and units)
Soma A-B	Manisa	1957-1983	Lignite	165*6+22*2 (1.034)
Afşin Elbistan A	K.Maraş	1984	Lignite	3*340+1*335 (1.355)
Afşin Elbistan B	K.Maraş	2004	Lignite	4*360 (1.440)
Tunçbilek	Kütahya	1956-1978	Lignite	1*65+2*150 (365)
Çatalağzı	Zonguldak	1989	Hard Coal	2*150 (300)
Orhaneli	Bursa	1992	Lignite	1*210
Kemerköy	Muğla	1994	Lignite	3*210 (630)
Yeniköy	Muğla	1986	Lignite	2*210 (420)
Yatağan	Muğla	1982	Lignite	3*210 (630)

Private Sector

Reserve	Firm	Bid (krş/kwh)	Capacity (MW)	Bid (\$/MWh) (1\$=1,80TL)	Contract Date
Bingöl Karlıova	Aksa	3,2	150	17,77	2013
Kütahya-Domaniç	Çelikler	5,03	300	27,94	2013
Manisa-Deniş	Kolin	4,69	450	26,06	2012
Adana-Tufanbeyli	Teyo	2,57	600	14,28	2012
Bursa-Keles	Çelikler	5,61	270	31,17	2012
Bolu-Göynük	Aksa	1,62	275	9,00	2007
Tekirdağ-Saray	Başat	1,00	300	5,55	2007

Incentives for Domestic Coal(V)

REGIONAL INVESTMENTS INCENTIVE SCHEME MEASURES

INCENTIVE MEASURES			REGIONS					
			I	II	III	IV	V	VI
VAT Exemption			YES	YES	YES	YES	YES	YES
Customs Duty Exemption			YES	YES	YES	YES	YES	YES
Tax Reduction	Rate of Contribution to Investment (%)	Out of OIZ	15	20	25	30	40	50
		Within OIZ	20	25	30	40	50	55
Social Security Premium Support (Employer's Share)	Support Period	Out of OIZ	2 years	3 years	5 years	6 years	7 years	10 years
		Within OIZ	3 years	5 years	6 years	7 years	10 years	12 years
Land Allocation			YES	YES	YES	YES	YES	YES
Interest Support	Local Loans		N/A	N/A	3 Points	4 Points	5 Points	7 Points
	Foreign Exchange/ FX denominated loans				1 Point	1 Point	2 Points	2 Points
Social Security Premium Support (Employee's Share)			N/A	N/A	N/A	N/A	N/A	10 years
Income Tax Withholding Support			N/A	N/A	N/A	N/A	N/A	10 years

OIZ: Organized Industrial Zones

Afsin-Elbistan:

- ❑ Total Reserve : 4,9 billion ton
- ❑ Approximately 42% of the coal reserves in Turkey
- ❑ Total thermal production plant potential (for the operating life of 30 years): 11,000 MW

The current installed capacity:

- ❑ Afsin A : 1.355 MW
- ❑ Afsin B : 1.440 MW
- ❑ Available Capacity : 8.000 MW

Public-Private Partnership

- ❑ **Project Company** → shareholder from the Turkish Side EUAS
- ❑ Afsin B Thermal Power Plant will be transferred to the Project Company
- ❑ Project Company will both construct and operate Afsin C,D,E power plants.



Renewable Energy Opportunities for Investment

Renewable potential of Turkey

- Turkey has substantial amount of renewable energy potential and the utilization rates are growing. Hydro, wind and solar energy resources are the major portions of our renewable portfolio.
- Turkey has at least;
160,000 GWh/a. economic hydro,
48,000 MW wind capacity
1,500 kWh/m²-year of average Global Solar Radiation
31,500 MWt geothermal capacity
8.6 MTOE biomass
1.5-2 MTOE biogas

Wind Energy Potential

Resource potential	Wind class	Annual wind power density (W/m ²)	Annual wind speed (m/s)	Total capacity (MW)
Good	4	400 – 500	7.0 – 7.5	29,259.36
Excellent	5	500 – 600	7.5 – 8.0	12,994.32
Outstanding	6	600 – 800	8.0 – 9.0	5,399.92
Superb	7	> 800	> 9.0	195.84
TOTAL CAPACITY				47,849.44

Wind energy potential (annual average wind speed > 7 m/s), 50 m a.g.l.

Calculated for the places located at altitudes of lower than 1500 m.

Renewables-Incentive Scheme



- Feed-in-Tariffs
- Purchase guarantees
- Connection priorities
- Lower license fees
- License exemptions in exceptional circumstances
- Various practical conveniences in project preparation and land acquisition.

Feed In Tariffs

Tariffs in \$cents/kWh;

Wind and Hydroelectric power plants :	7.3
Geothermal power plants :	10.5
Solar and Biomass power plants:	13.3

- Licensed facilities producing electricity from renewables which will be in operation before December 31, 2015 and also
- These prices will be given for a maximum term of 10 years from its operation date.



Amendment to Renewable Law (No:6094)

(Official Gazette: January 08 , 2011, No.27809)

- By-Law includes regulations regarding the promotion of renewable based electricity generation. In addition, it covers the procedures and principles for the conservation of the renewable energy resource areas, certification of the energy generated from these resources and utilization of these resources.

- Amendment to Law in 2011;

A new support scheme is introduced. Different feed-in prices for different renewable based electricity generation:

- **7.3 US cents per kWh for hydro and wind**
- **10.5 US cents per kWh for geothermal**
- **13.3 US cents per kWh for solar and biomass (including waste gases)**

- In addition, a certain support of 0.4 to 3.5 US cents per kWh is also given to the plants for the utilisation of domestically manufactured technical equipments.

- The implementation period of the incentive mechanism covers the power plants to be commissioned before 31.12.2015 with the Law (previously: 31.12.2011).

Incentives For Local Content

- The prices between 0.4 and 3.5 USD Cent/kWh will be added to the existing tariff in the case of usage of **local content** in the production of the electricity generated from renewables.
- The production facilities in the renewable energy sector, which are in operation **before December 2015**, can benefit from this application.
- This additional tariff is provided for a term of **five years from the operation** starting date of the production facility.
- A draft regulation is being prepared to extend the period for the above mentioned incentives.

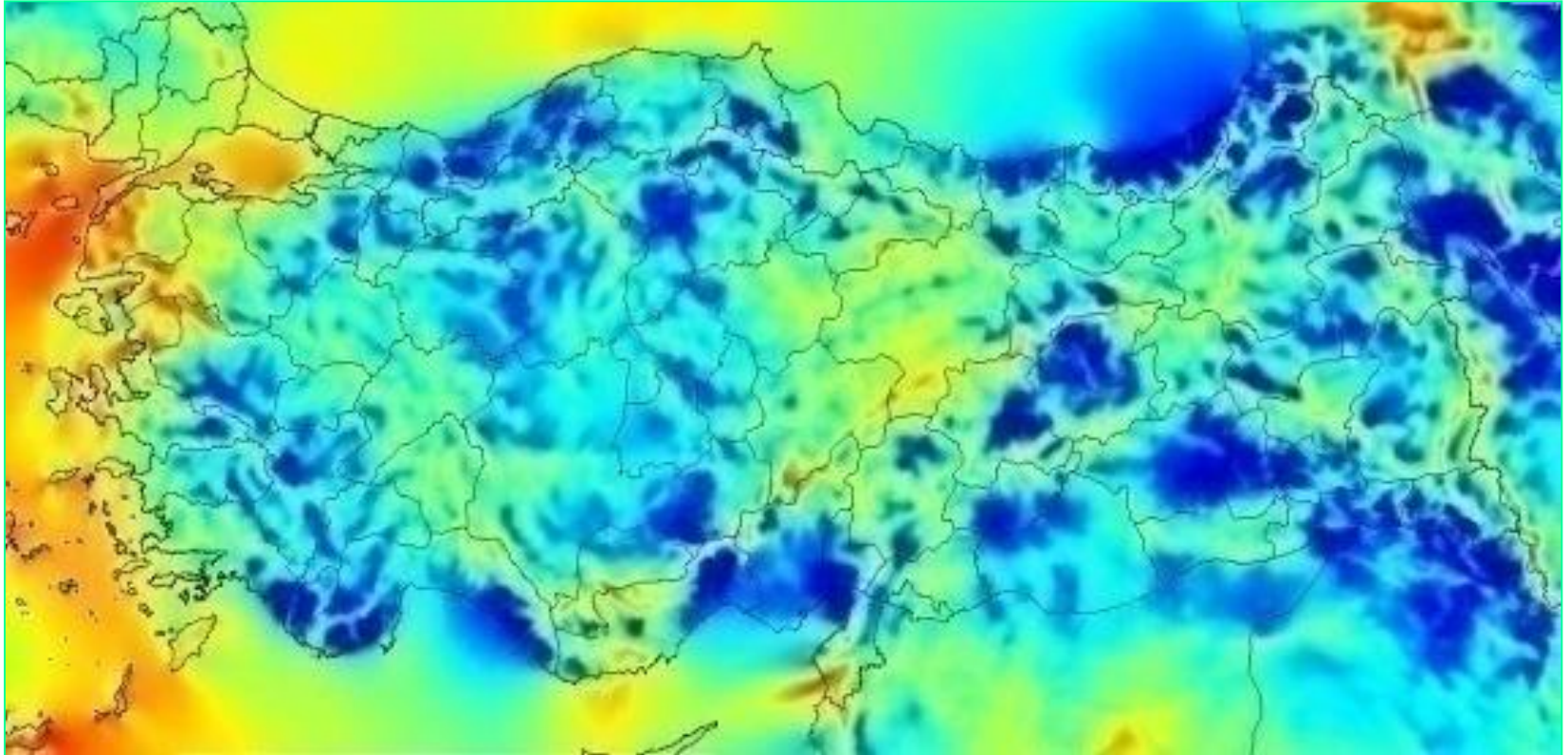
Local content (1)

Table II (provision of Law No. 6094 dated 29/12/2010)		
Type of Facility	Domestic Manufacture	Addition for Domestic Manufacture (US Cent/kWh)
A- Hydroelectric generation facility	1- Turbine	1,3
	2- Generator and power electronics	1,0
B- Generation facility based on wind energy	1- Wing	0,8
	2- Generator and power electronics	1,0
	3- Turbine tower	0,6
	4- All of the mechanical equipment in the rotor and nacelle groups (excluding the payments made for wing group and generator and power electronics.)	1,3
C- Generation facility based on photovoltaic solar energy	1- PV panel integration solar structural mechanics	0,8
	2- PV modules	1,3
	3- Cells making up the PV module	3,5
	4- Inverter	0,6
	5- Material focusing the solar rays on the PV module	0,5

Local content (2)

D- Generation facility based on intensified solar energy	1- Radiation collection tube	2,4
	2- Reflective surface plate	0,6
	3- Solar tracking system	0,6
	4- Mechanical equipment of the heat energy storage system	1,3
	5- Mechanical equipment of the steam production system collecting solar rays on the tower	2,4
	6- Stirling engine	1,3
	7- Panel integration and solar panel structural mechanics	0,6
E- Generation facility based on biomass	1- Fluidized bed steam boiler	0,8
	2- Liquid or gas-fired steam boiler	0,4
	3- Gasification and gas cleaning boiler	0,6
	4- Steam and gas turbine	2,0
	5- Internal combustion engine or stirling engine	0,9
	6- Generator and power electronics	0,5
	7- Cogeneration system	0,4
F- Generation facility based on geothermal energy	1- Steam or gas turbine	1,3
	2- Generator and power electronics	0,7
	3- Steam injector or vacuum compressor	0,7

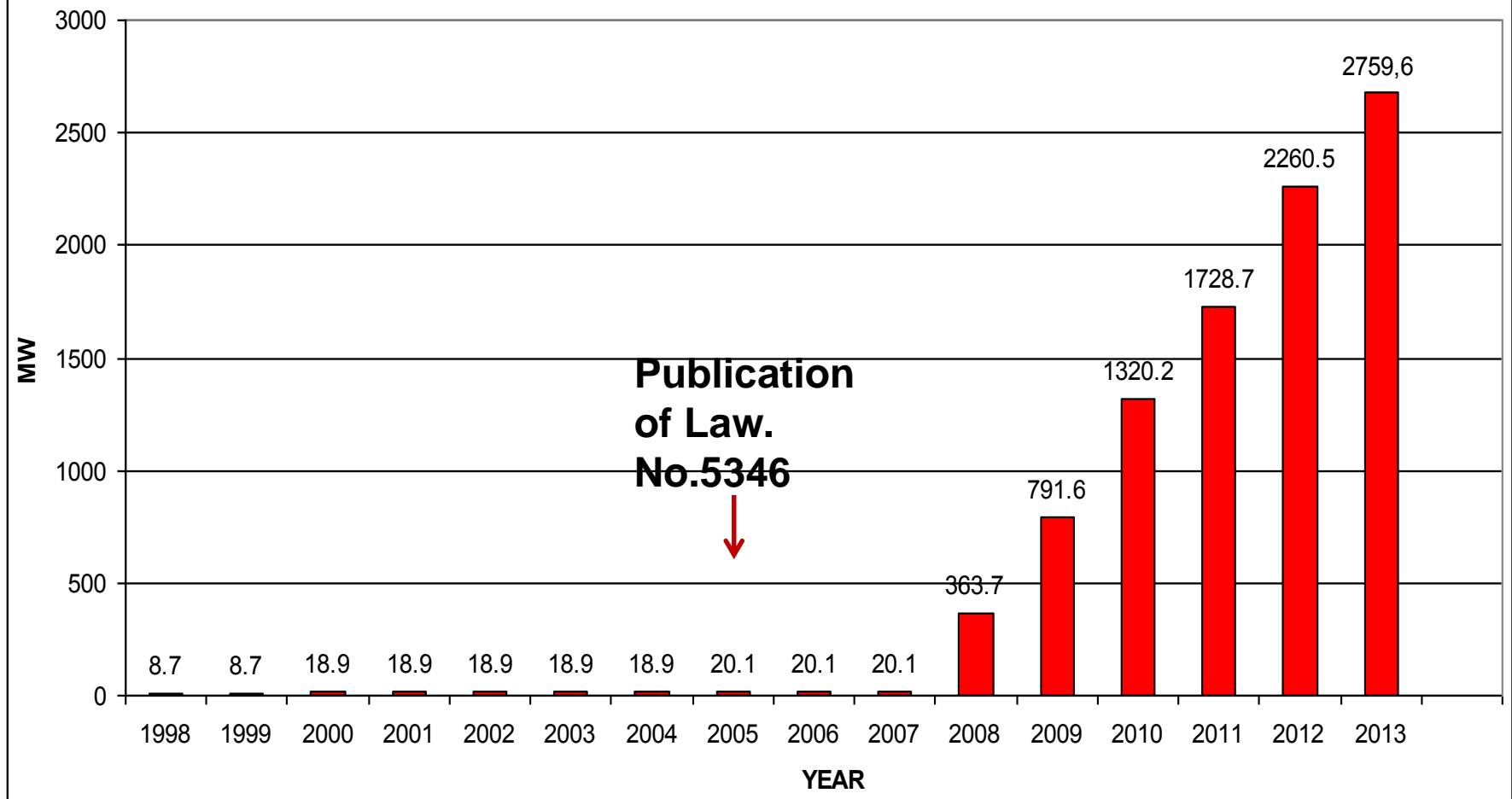
Wind Energy Potential



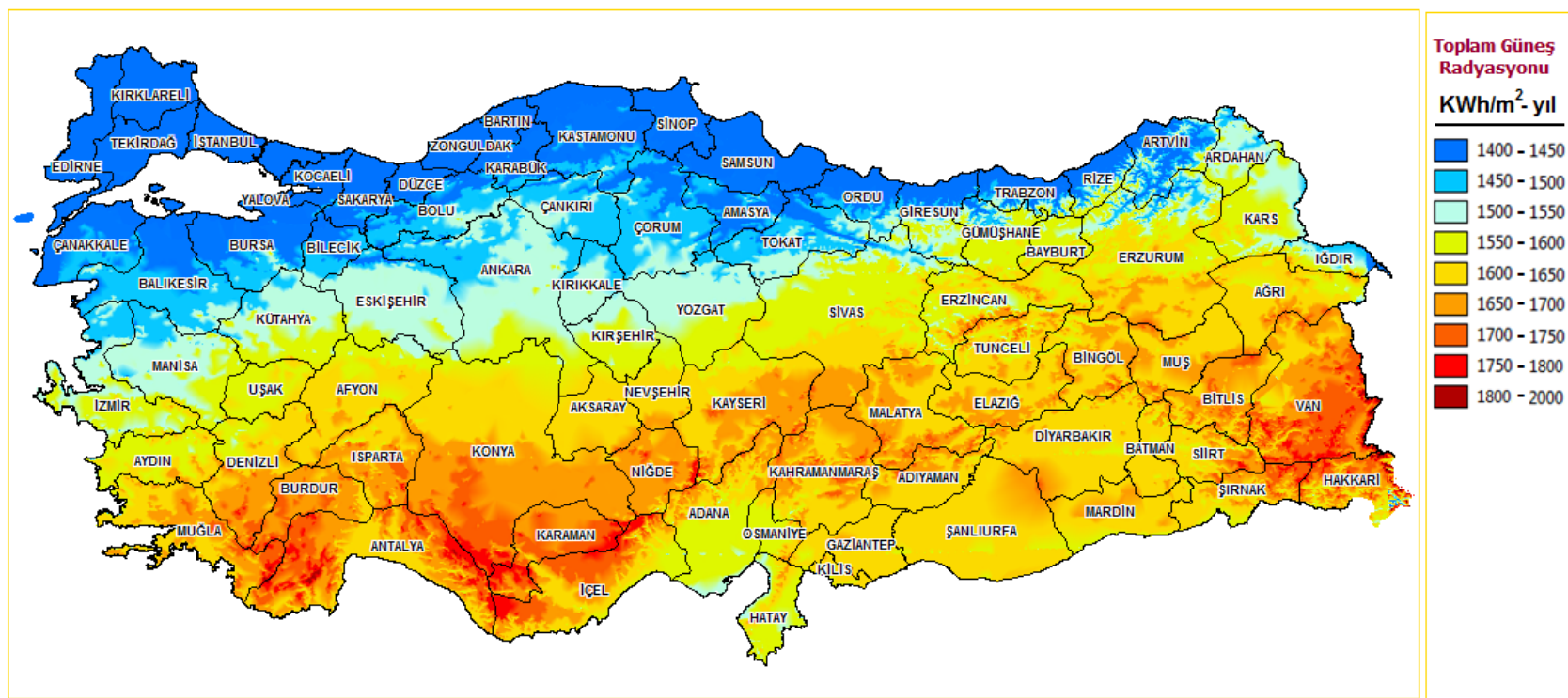
ON-SHORE (MW)	OFF-SHORE (MW)
37,836	10,013

Wind Energy Development

TOTAL INSTALLED WIND POWER (MW)



Global Solar Radiation In Turkey



Source :www.eie.gov.tr

International Interconnection Lines (2013)



4646 Changing in the Natural Gas Market Law

- The release of all imports to the private sector → Increasing the market share of the private sector
- Re-structuring of BOTAS → better functioning and dynamic BOTAS

Trans-Anatolian Natural Gas Pipeline Project

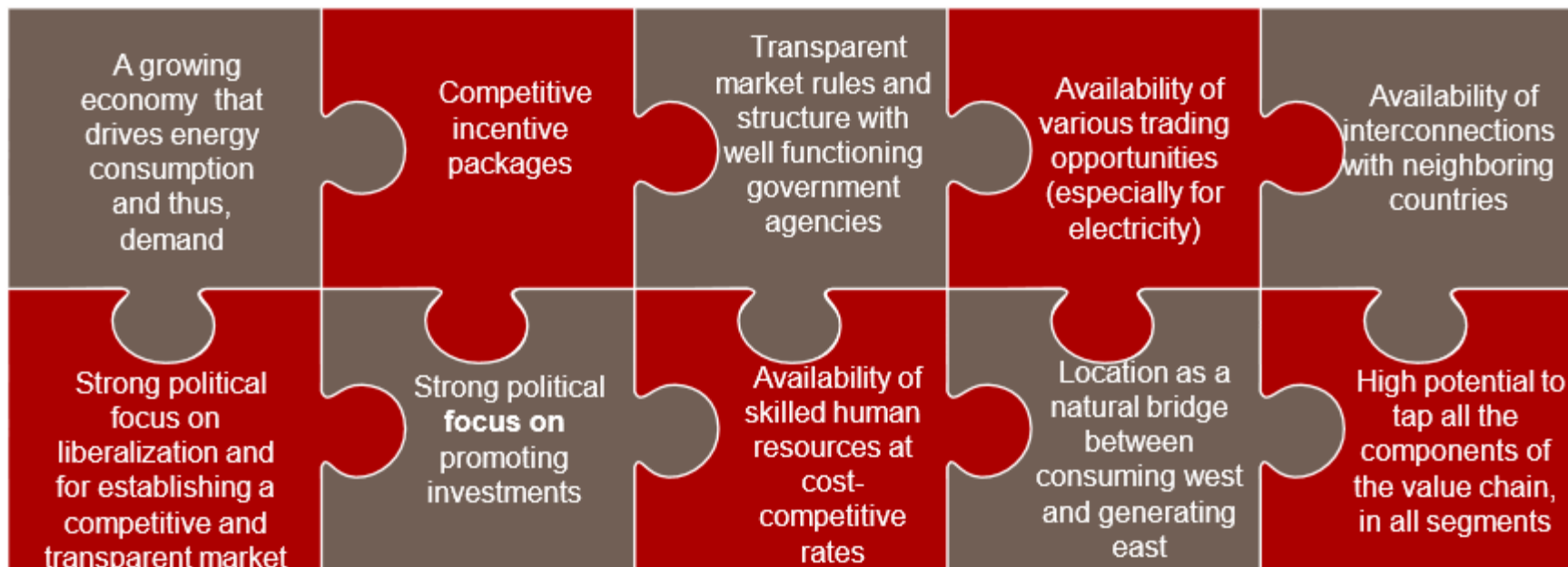
- The first gas stream → 2018
- 2020 → 16 billion m3
- 2023 → 23 billion m3
- 2026 → 31 billion m3



Some Details for the Electricity Market

- EPIAŞ – Energy Markets Operator
 - PMUM
 - TCAT.TEIAS.GOV.TR (Monthly transparent auctions to sell/buy from BG or Greece)
- Demand side management
- Unlicensed generation

Why Invest in Turkish Energy Market?



Source :www.invest.gov.tr

Thank you...