

The Future Prospects of the Turkish Energy Policy

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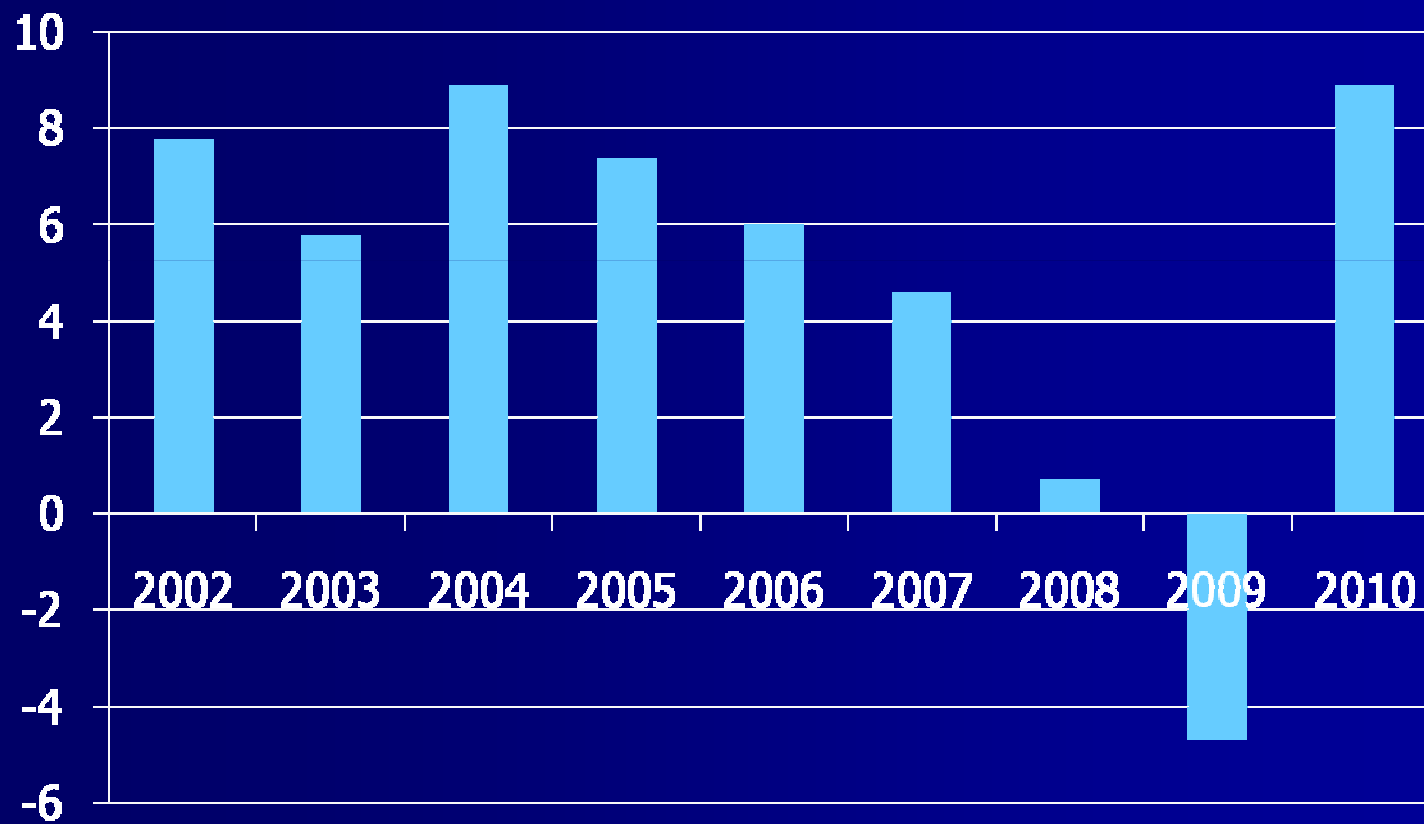
The Future Prospects of the Turkish Energy Policy

- Turkish Economy
- Primary Energy Demand of Turkey
- Turkish Energy Strategy towards 2023
- Sectoral Breakdown: Coal & Oil
- Sectoral Breakdown: Electricity
- Sectoral Breakdown: Nat. Gas & Lignit
- Sectoral Breakdown: Renewables
- Sectoral Breakdown: Nuclear
- Critical Evaluation of the Turkish Energy Strategy and Conclusions

Turkish Economy

- Population: 73 Millionen
- GDP(Bill USD): 730 (2008), 615 (2009), 736 (2010)
- Per capita income(USD): 10.440 (2008), 8.590 (2009), 10.079 (2010)
- 6. largest economy in Europe
- 16. largest economy of the world
- Trade volume (Bill USD): 334 (2008), 243 (2009), 299 (2010)
- Consumer price index: 10,06 (2008), 6,53 (2009), 8,57 (2010)

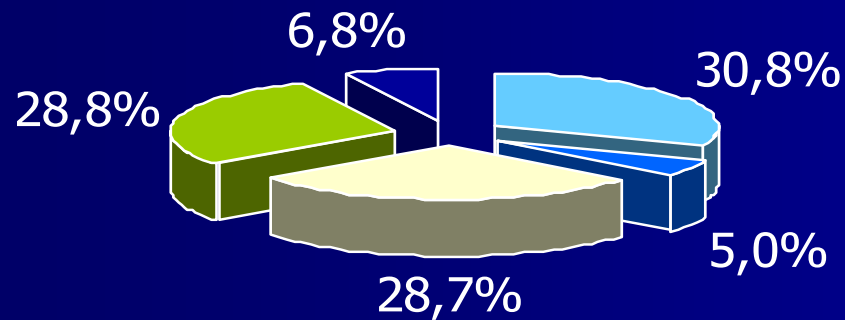
GDP Growth



Primary Energy Mix of Turkey

(2009: 106.1 Mil. toe, 1990-2009 average demand growth 3,7%)

Source: MENR



■ N. Gas

■ Hydro+Wind+
Geoth+Solar

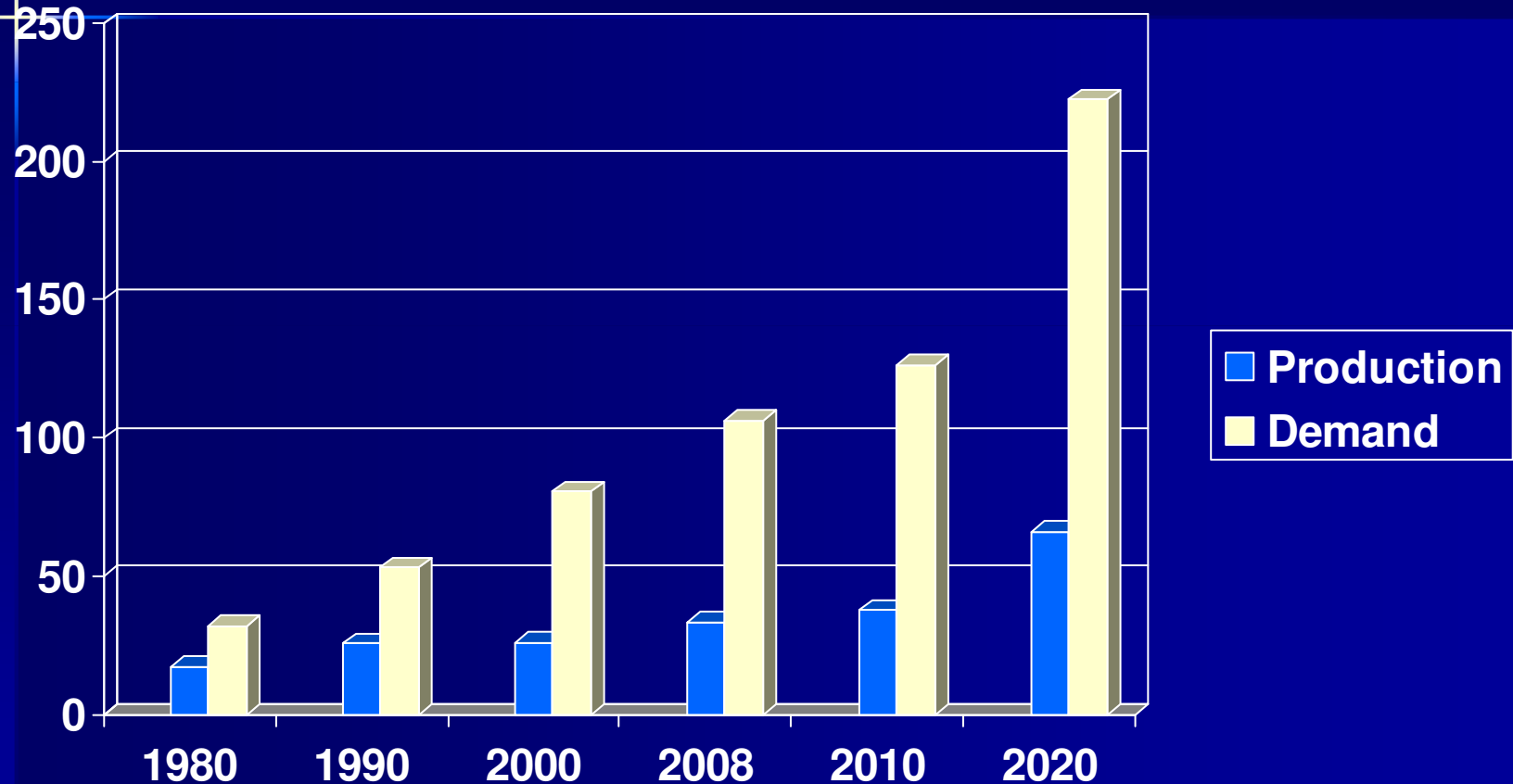
■ Oil

■ Coal

■ Others

Indigenous Energy Production and Primary Energy Demand of Turkey

Source: MENR



Energy Imports

2008: 48.5 bill USD

2011: 50.0 bill USD ?

Turkish Energy Strategy towards 2023

- Utilization of indigenous and renewable energy resources
- Diversification of energy supplying countries
- Reduction of energy intensity by 20%
- Introduction of nuclear energy into the energy mix

Sectoral Breakdown: Hardcoal

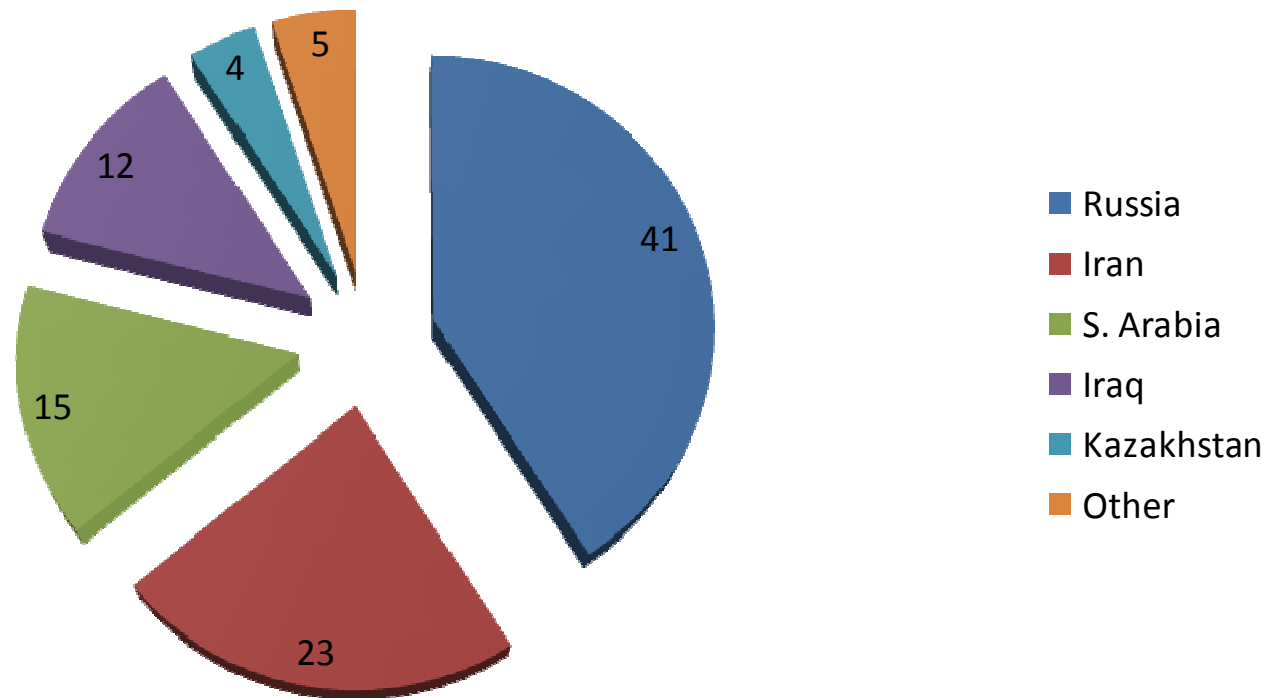
(Source: TTK, Stock changes are not shown, Thousand t)

Year	Production	Import	Demand
2000	2.259	12.990	15.393
2001	2.357	8.028	11.039
2002	2.319	11.693	13.830
2003	2.425	16.166	17.535
2004	2.070	16.427	18.904
2005	1.900	17.360	19.421
2006	2.319	20.286	22.798
2007	2.492	22.946	25.224
2008	2.601	19.489	22.720
2009	2.863	20.364	23.698

- 11 bill kWh/year electricity generation potential, 32% in operation
- Amasra B power plant development stopped by the court

Sectoral Breakdown: Crude Oil Imports of Turkey 2009

(Import: 14,2 Mil.t Production:2,4 Mil.t)



Transportation driven, 2000-2010: 81.4 % increase of the vehicle numbers
Exploration activities focused on off shore areas of the Black Sea,
New refinery projects

Sectoral Breakdown: Electricity Sector

Demand increase 1980-1999: ~8,5; 2000-2009: ~5,1

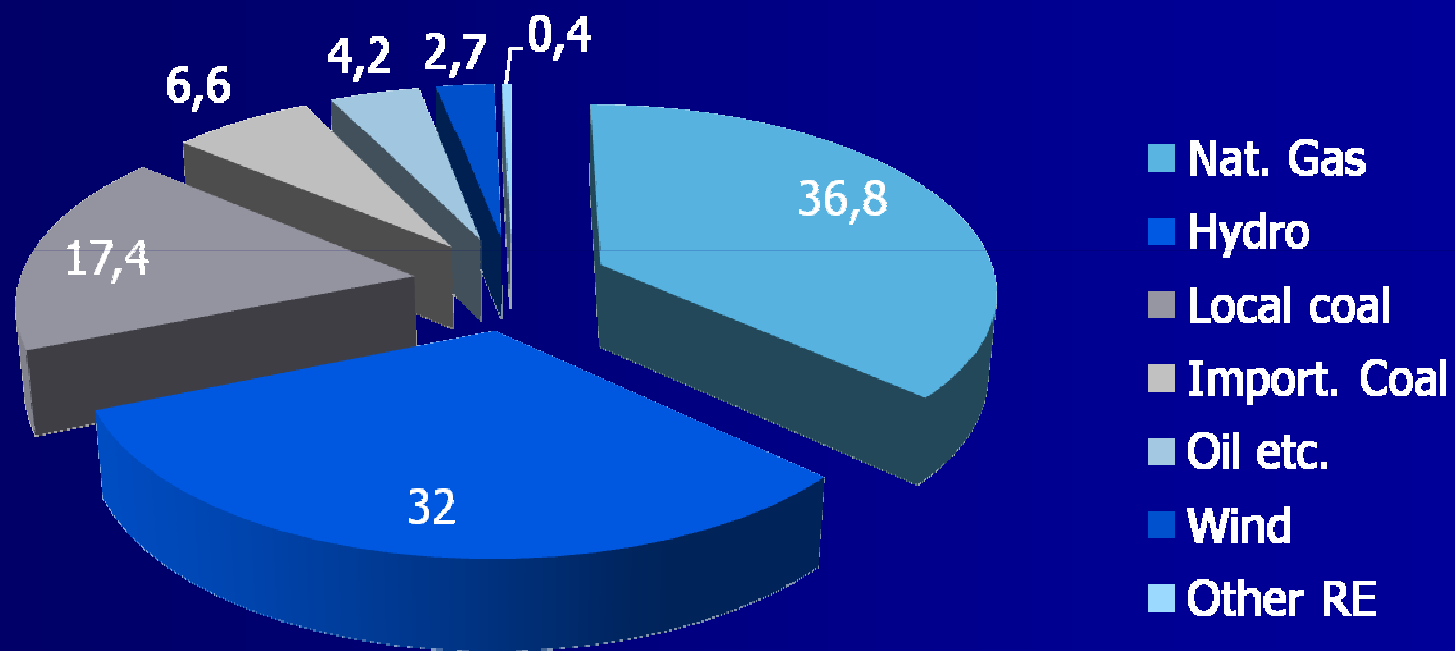
Yıl	Kurulu Güç MW	Artış %	Tüketim GWh	Artış %
2004	36.824	3,5	150,018	6,3
2005	38.844	5,5	160,794	7,2
2006	40.565	4,4	174,637	8,6
2007	40.836	0,7	190,000	8,8
2008	41.817	2,4	198,085	4,3
2009	44.767	7,0	194,079	-2,0
2010	48.590	8,5	209,494	7,9

- ENTSO-E paralel synchron operation since 18 Sept 2010
- 2011: Distribution privatization to be finalized, 16.000 MW generation privatization will start
- Day Ahead Market, Power Exchange
- Cross subsidies

Composition of the Installed Power

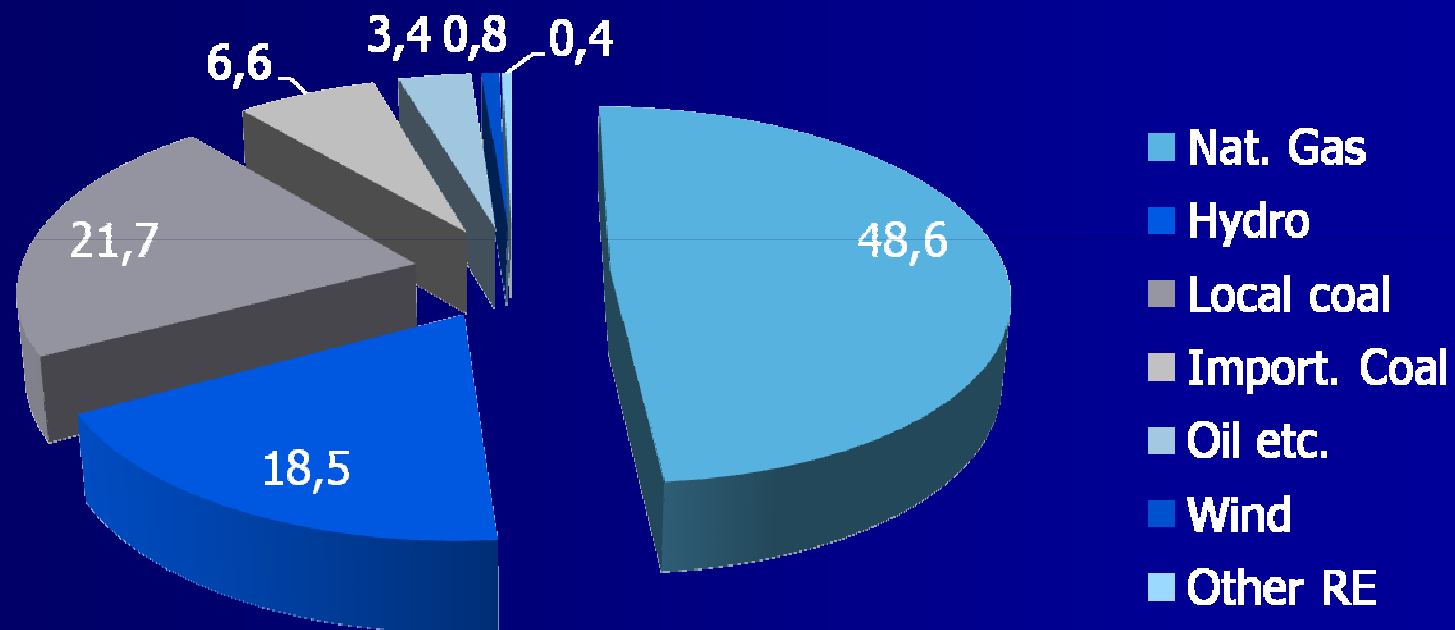
49.523 MW Early 2011

Source: TEİAŞ, EPDK



Breakdown of Electricity Generation by Resources

2010: 210,2 TWh (Source: TEİAŞ, EPDK)



Electricity Sector Gross Demand Scenarios (TWh)

Source: TEİAŞ, EPDK

Growth	2020	2030
High 5%	433,8	886,9
Low 4,2%	405,5	735,3

Per capita consumption: 2800 kWh/a (still too low)

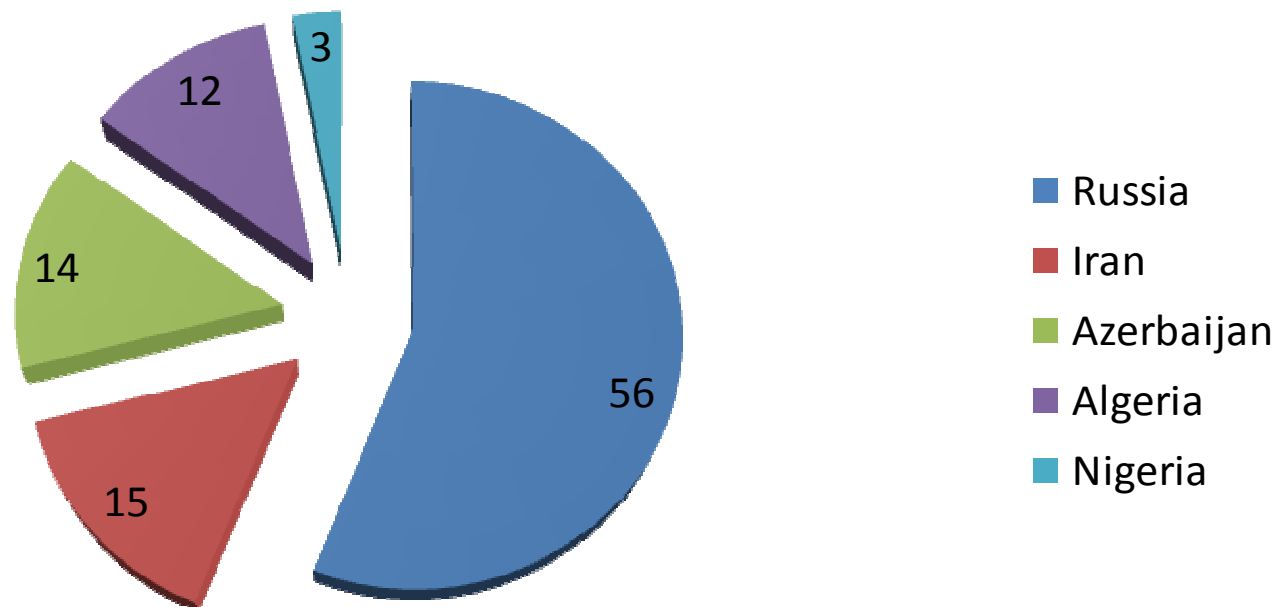
Scenarios are prepared under the influence of the global crisis

Expected growth may be higher (2020 ~500 TWh)

If the strategy fails, up to 60 bcm additional gas may be needed

Sectoral Breakdown: Natural Gas Imports of Turkey 2009

(Import: 35,8 bcm Production: 0,7 bcm)



- Demand growth 1990-2009: 13,5% in average
- Underground storage
- Diversification of suppliers & additional volumes
- Market liberalization

Sectoral Breakdown: Lignite

(Source: ETKB, Thousand t/year)




- 120 milyar TWh/a electricity generation potential , utilization until 2023
- 37% in operation, 8079 MW installed capacity
- 11,5 bill t rezerve
- ~40% in Afşin-Elbistan basin
- ~60% <1500 kcal/kg
- ~6%'sı >3000 kcal/kg
- Support for the private sector needed
- An "Afşin-Elbistan basin low" needed

Year	Production (t)
2005	57.708
2006	61.484
2007	72.121
2008	76.171
2009	75.577

Sectoral Breakdown: Hydro

Source:ETKB, EPDK



140 TWh/a potential
2011: 37% in operation, 15% under construction
15.835 MW installed capacity
2023: 100% utilization target
Strong NGO opposition
Water penny, financing

Sectoral Breakdown: Wind


2007: 27 MW

2008: 433 MW

2009: 800 MW

2010: 1.329 MW

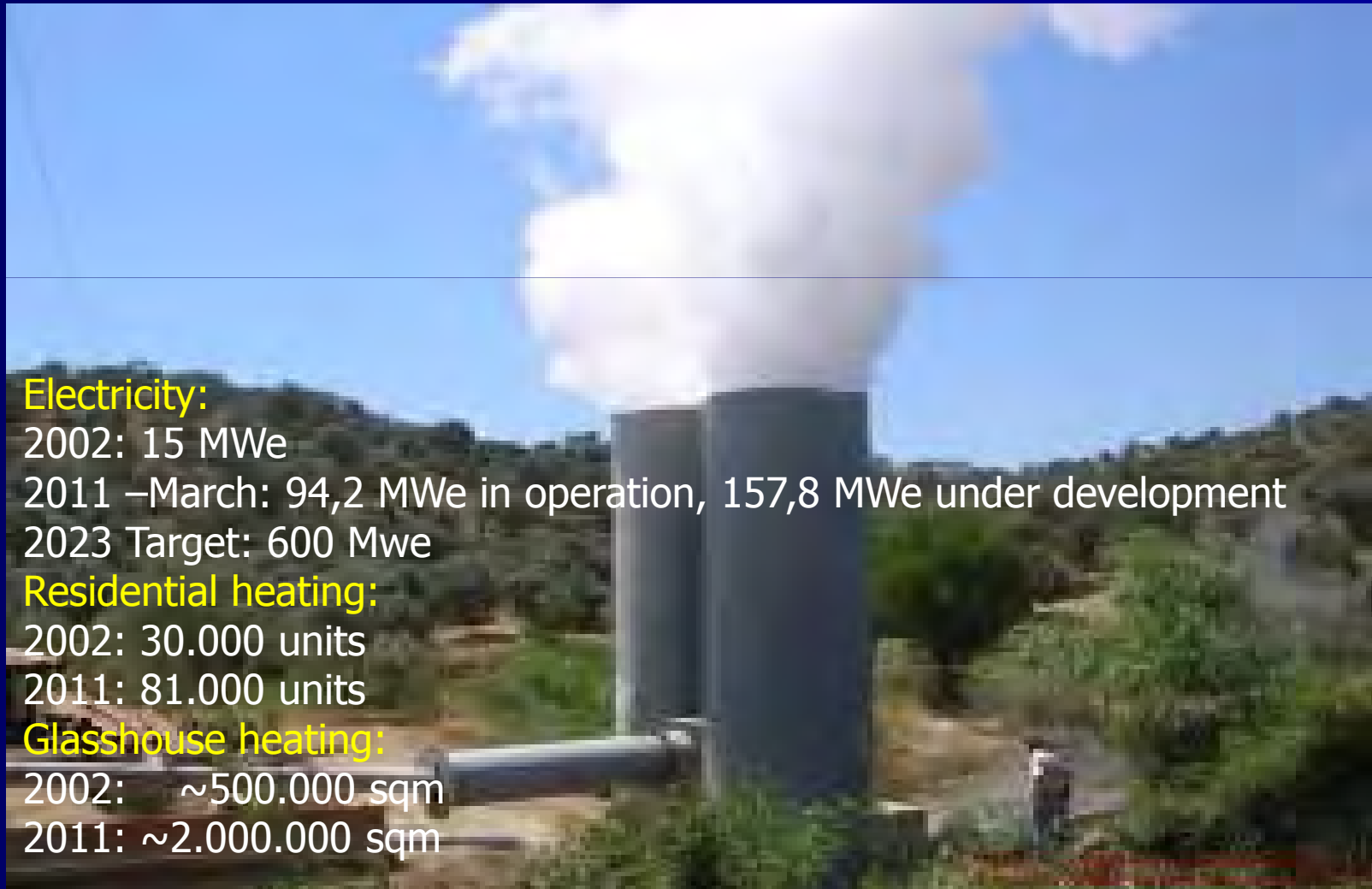
2023: 20.000 MW ?



Apr 2011: 1386 MW in operation, 447 MW in construction, 4536 MW licensed
Grid connection, Wind penny, financing
System stability

Sectoral Breakdown: Geothermal

Source:EPDK



Electricity:

2002: 15 MWe

2011 –March: 94,2 MWe in operation, 157,8 MWe under development

2023 Target: 600 Mwe

Residential heating:

2002: 30.000 units

2011: 81.000 units

Glasshouse heating:

2002: ~500.000 sqm

2011: ~2.000.000 sqm

Sectoral Breakdown: Nuclear

Source: Rosatom

Akkuyu Nuclear Power Plant

Technical

Reactor design: NPP 2006 (WER-1200)

Capacity: 4 x 1200 MW

Construction period: 2012-2022

Decommissioning start: 2080

Legal steps

12 May 2010: IGA has been signed

IGA has been ratified in both parliaments

13 Dec 2010: Project company has been formed

Commercial terms

Operating period: 60 years

CAPEX: 20 bill USD

Payback period: 18 years

Contract period: 15 years for 50% of the generated electricity

Fixed price: 12.35 US cents/kWh

Critical Evaluation of the Turkish Energy Strategy and Conclusions

Under current conditions:

Lignite: utilization of 120 TWh/a generation capacity (13.000 MW additional) until 2023 is not realistic; up to 4.000 MW may be realized

Hydro: utilization of 140 TWh/a generation capacity (~40-45.000 MW) until 2023 is not realistic; up to 110 TWh/a in total may be utilized

Wind: 20.000 MW until 2023 is not realistic; up to 15.000 MW may be realized

Nuclear: 5% of the electricity generation from nuclear in 2020 is not realistic; up to 3% may be realized

Energy Efficiency: Legislation in place, but incentives are not sufficient

Turkey will need additional gas supplies to meet the demand in 2023.

Thank you

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