Turkey and its Role in Enhancing Energy Security in the Region

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Turkey and its Role in Enhancing Energy Security in the Region

- Turkish Economy
- Primary Energy Demand of Turkey
- Turkish Energy Strategy towards 2023
- Sectoral Breakdown: Electricity
- Sectoral Breakdown: Nat. Gas & Lignit
- Sectoral Breakdown: Renewables
- Sectoral Breakdown: Nuclear
- Market Development
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- Energy Infrastructure – NG Storage, LNG
- Conclusions

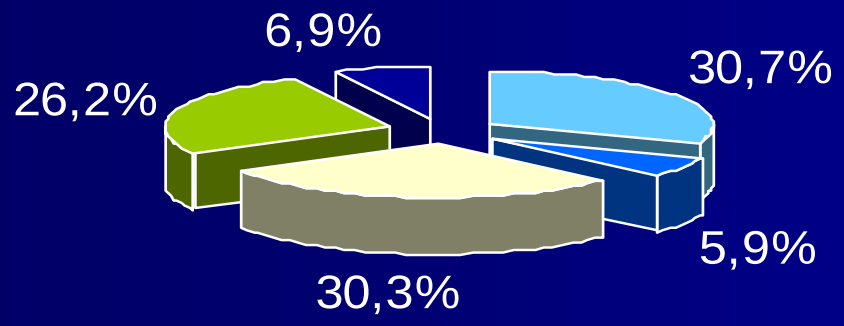
Turkish Economy

- Population: 79,8 Millionen
- GDP(Bill USD): 859.0(2015), 857.3 (2016)
- GDP growth(%): 6.1(2015), 2.9(2016)
- Per capita income(USD): 10.743 (2016),
- 6. largest economy in Europe
- 17. largest economy of the world
- Trade volume (Bill USD): 400(2014), 351(2015), 345(2016)
- Consumer price index: 8,17(2014), 8,81(2015), 8,53 (2016)

Primary Energy Mix of Turkey

(2015: 129.2 Mil. toe)

Source:MENR



- N. Gas
- Hydro + Wind + Solar
- Oil
- Coal
- Others

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
- Increase of Storage Capacities

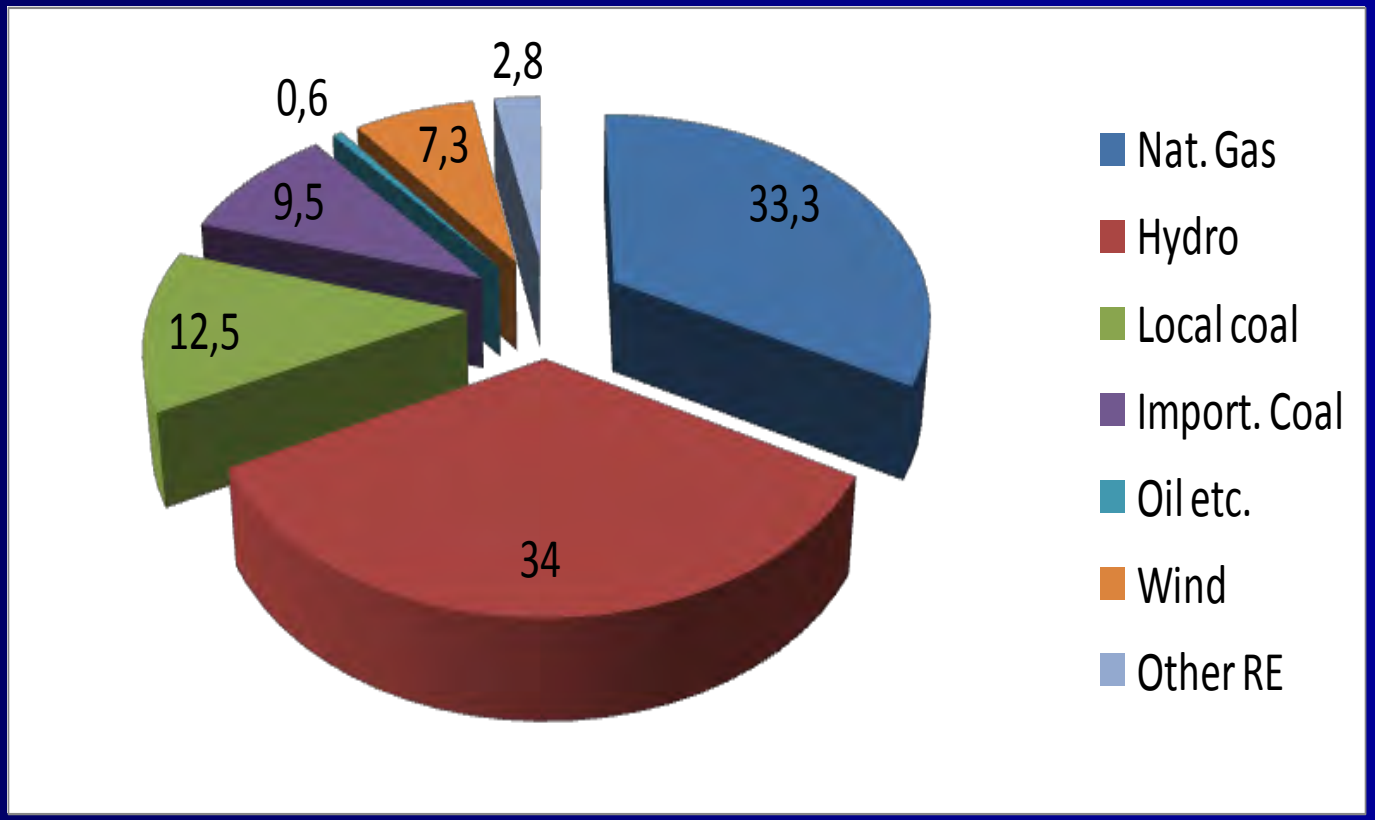
Sectoral Breakdown: Electricity Sector

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

Year	Installed Capacity MW	Growth %	Demand GWh	Growth %
2005	38.844	5,5	160,794	7,2
2010	48.590	8,5	209,494	7,9
2014	69.520	4,4	257.220	4,4
2015	73.147	5,2	265.724	3,3
2016	78.497	7,3	278.346	4,8

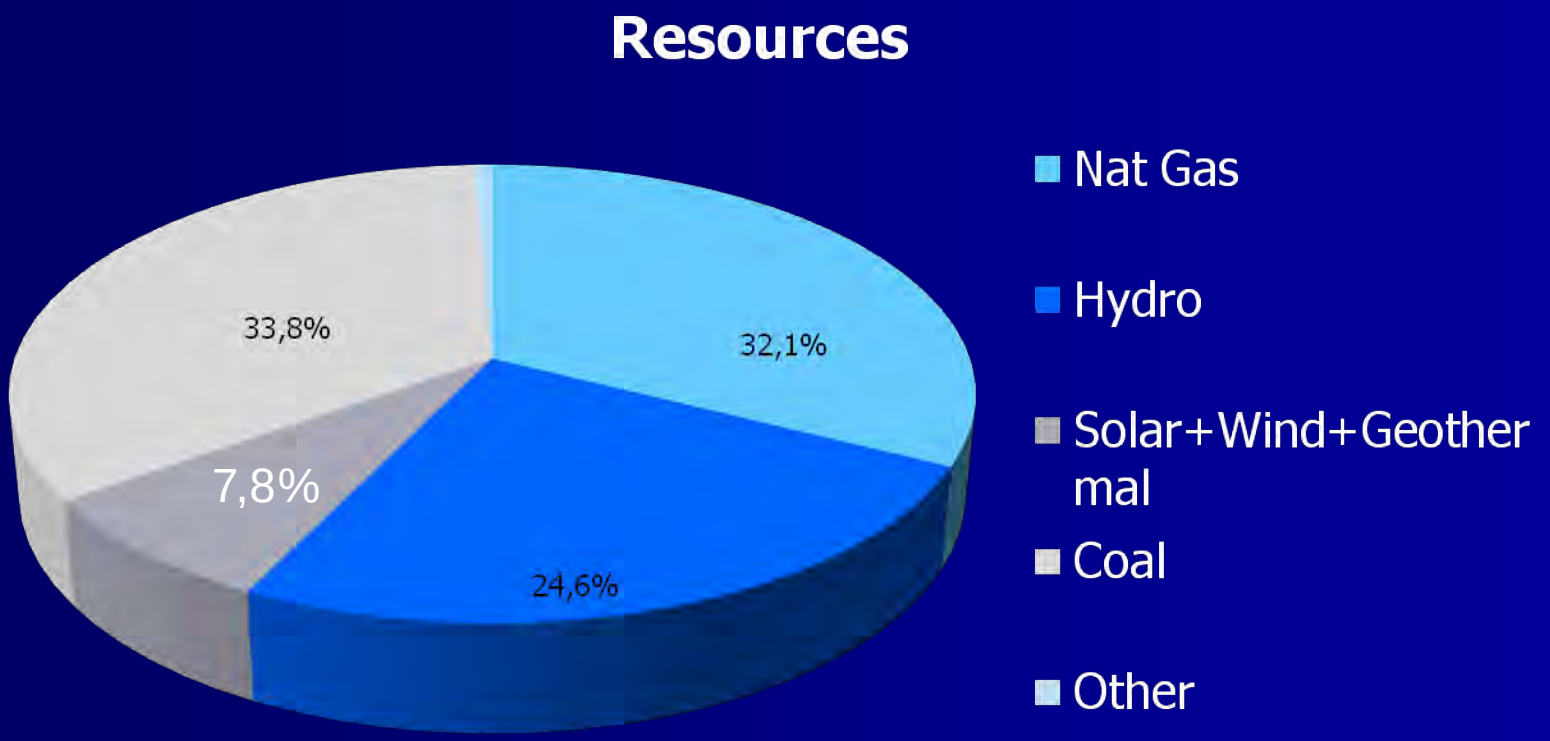
Composition of the Installed Power 78.497 MW End of 2016

Source: TEİAŞ, EPDK



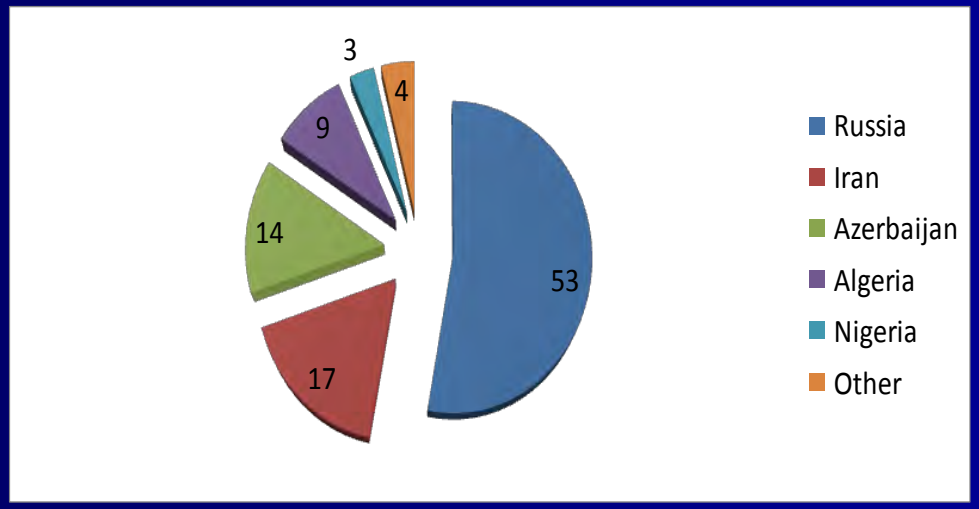
Breakdown of Electricity Generation

2016: 273,4 TWh **(Source:TEİAŞ, EPDK)**



Sectoral Breakdown: Natural Gas Imports of Turkey 2016

(Import: 46,4 bcm, Export: 0,7 bcm Production: 0,4 bcm)



- Demand growth 1990-2009: 13,5% in average
- Imports 2014: 49,3 bcm, 2015: 48,4 bcm
- Under current market conditions only pipe gas from Iraq may be competitive
- LNG imports will increase (US. Qatar, etc.)

Sectoral Breakdown: Lignit

(Source: ETKB, Thousend t/year)

- 120 TWh/a electricity generation potential , utilization until 2023
- 2010: 8079 MW installed capacity(37% in operation
- 2016: 9055 MW installed capacity

- 11,5 bill t rezerve
- Support for the private sector needed
- An "Afşin-Elbistan basin law" needed

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

Sectoral Breakdown: Hydro

Source:ETKB, EPDK

140 TWh/a potential
Early2011: 15.835 MW installed capacity(37% in operation
End of 2016: 26.681 MW installed capacity
2023: 100% utilization target(~40-45.000 MW) until 2023 is not realistic; up to 110 TWh/a in total may be utilized
Strong NGO opposition

Sectoral Breakdown: Wind

2007: 27 MW
2008: 433 MW
2009: 800 MW
2010: 1.329 MW
2011: 1.729 MW
2012: 2.261
2013: 2.760 MW
2014: 3630 MW
2015: 4365 MW
2016: 5751 MW

2023: 20.000 MW ?

New wind auctions in June / August 2017
1710 MW

Sectoral Breakdown: Geothermal

Source:EPDK

Sectoral Breakdown: Solar

2014: 40,2 MW

2015: 248,8 MW

2016: 832,5 MW

Auction March 2017

1000 MW, 69,9 $/MWh

Sectoral Breakdown: Nuclear

Source: Rosatom, MENR

Akkuyu Nuclear Power Plant

Technical

Reactor design: NPP 2006 (WER-1200), 4 x 1200 MW

Construction period: 2012-2022 ?

Legal steps

12 May 2010: IGA has been signed

IGA has been ratified in both parliaments

13 Dec 2010: Project company has been formed

12 Dec 2013: Updated site report approved

01 Jan 2014 Environmental impact assesment approved

25 Jun 2015 Preliminary Generation license issued

29 Jun 2015 Contract for off-shore structures signed

09 Feb 2017 Design parameters approved

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

Sectoral Breakdown: Nuclear

Source: MENR

Sinop Nuclear Power Plant Project

Reactor Design: ATMEA-1 (4x1120)
Installed capacity: 4480 MW
Operational period: 60 years
CAPEX: 20 bill US $
Project sponsors: Mitsubishi Heavy Ind, Itochu, Engie, EÜAŞ
Oct 2013: IGA agreement with Japan signed
Project site review to be ready Dec 2017
Feasibility studies to be ready Mar 2018
Construction start: 2023 ?

Iğneada (?) Nuclear Power Plant Project

Reactor Design: 2 x AP 1000, 2 x CAP 1400
Project sponsors: SNPTC, Westinghouse

Market Development

EXIST Energy Exchange Istanbul

Establiished in March 2015

Electricity market operations:

- Day ahead market,
- Intra-day market,
- Balancing market,
- Market registration process,
- Market Settlement

Natural gas market:

- Regulation on Wholesale natural gas market published March 2017
- Preparations for the organized wholesale natural market advancing
- Market operation April 2018

Energy Infrastructure – NG Pipelines

Turkstream
- 2 x 15,75 bcm, 900 km off-shore
- 10 Oct 2016 Intergovernmental Agreement
- 7 May 2017 construction start
- 2 x 430 have been laid

Energy Infrastructure – NG Pipelines

TANAP
1850 km; 16 bcm/a; 56,48,2x36 inch
June 2012 HGA, IGA, May 2014 HGA amendment
March 2015 Ground breaking , Phase 0 by93%
Jul 2018 first gas to Turk. Consumer
Apr 2019 first gas to TAP

Energy Infrastructure
NG Underground Storage

Location	*Capacity (bcm)*	*Injection rate (mcm/d)*	*Withdrawal rate (mcm/d)*
Operational			
Botaş Silivri	2.8	16	25
Botaş Tuz Gölü	1.2	30	40
Projects			
Botaş Silivri Phase III (under implementation)	4.6	40	75
Botaş Tuz Gölü Expansion (tender)	5.4	60	80
Toren Tarsus Phase I	0.5		24
Çalık Tuz Gölü	1.0	10	20

Energy Infrastructure
LNG Terminals

Botaş Marmara Ereğlisi Terminal:
6bcm/a regasification capacity,
18 mcm/d sendout capacity(increase to 27 mcm/d in 2019)

Egegaz Aliağa Terminal
6 bcm/a regasification capacity
16.5 mcm/d send out capacity

Energy Infrastructure
Floating Storage and Regasification Units

Etki -**Aliağa** (operational since Dec 2016)
5,3 bcm/a regasification capacity, 20 mcm/d sendout capacity

Botaş -**Dörtyol** (start up December 2017)
5.3 bcm/a regasification; 20 mcm/d sendout capacity

Botaş -Saroz (planning)

Maks- **Izmit Altınova** (planning)

Conclusions

With
- diversified natural gas resources,
- undeground storage capacities,
- LNG & FSRU terminals and
- functioning natural gas market

Turkey can substantially contribute to energy security in SEE

Thank you

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