



# ENERGY MARKET TRANSITION IN TURKEY

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IENE 11<sup>TH</sup> SOUTH EAST EUROPE ENERGY DIALOGUE – ENERGY MARKET TRANSITION  
AND SECURITY IN SE EUROPE

“THE MET HOTEL”

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# ENERGY MARKET TRANSITION IN TURKEY

- Turkish Economy
- Primary Energy Mix of Turkey
- Turkish Energy Strategy towards 2023
- The National Energy Efficiency Action Plan 2017-2023
- Energy Transition in Electricity Generation
- Renewables: Hydro
- Renewables: Wind
- Renewables: Geothermal
- Renewables: Solar
- Is Nuclear Part of the energy transition?
- No Energy Transition without Functioning Market Development
- Natural Gas – Essential for Energy Transition
- Energy Infrastructure – Transit Pipelines, Underground Storage, LNG Terminals and FSRU
- Energy Transition in Transport
- Is Turkey Ready for Energy Transition?

# TURKISH ECONOMY

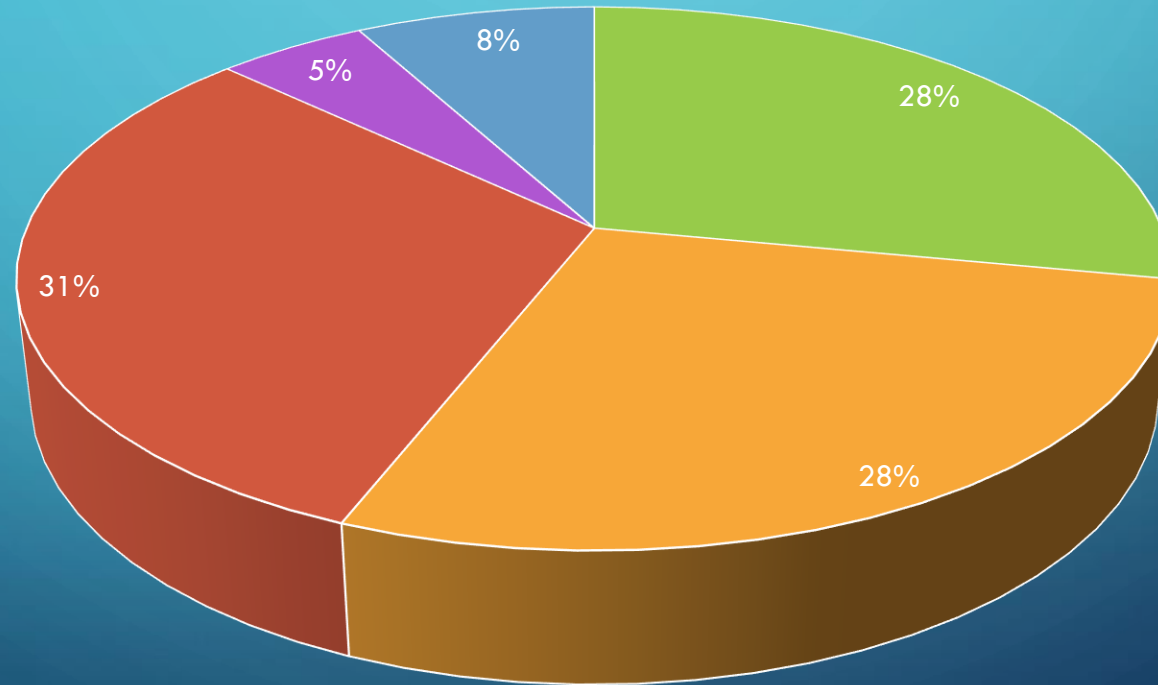
- Population: 80,8 Millions
- GDP(Bill USD): 859.0(2015), 862.7 (2016), 851,0 (2017)
- GDP growth(%): 6.1(2015), 3.2(2016), 7.4(2017)
- Per capita income(USD): 10.807 (2016), 10.597(2017)
- 6. largest economy in Europe
- 17. largest economy of the world
- Trade volume (Bill USD): 400(2014), 351(2015), 341(2016), 391(2017)
- Consumer price index: 8,17(2014), 8,81(2015), 8,53 (2016), 11.9(2017)

# PRIMARY ENERGY MIX OF TURKEY

(2016: 136.2 MIL. TOE)

SOURCE: MENR

Resources



■ Nat. Gas ■ Coal ■ oil ■ Hydrolik ■ Other Renewables

# 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 Natural Gas Storage Capacities

# THE NATIONAL ENERGY EFFICIENCY ACTION PLAN 2017-2023

Total Investment Required 2017-2023 (m\$): 10.928

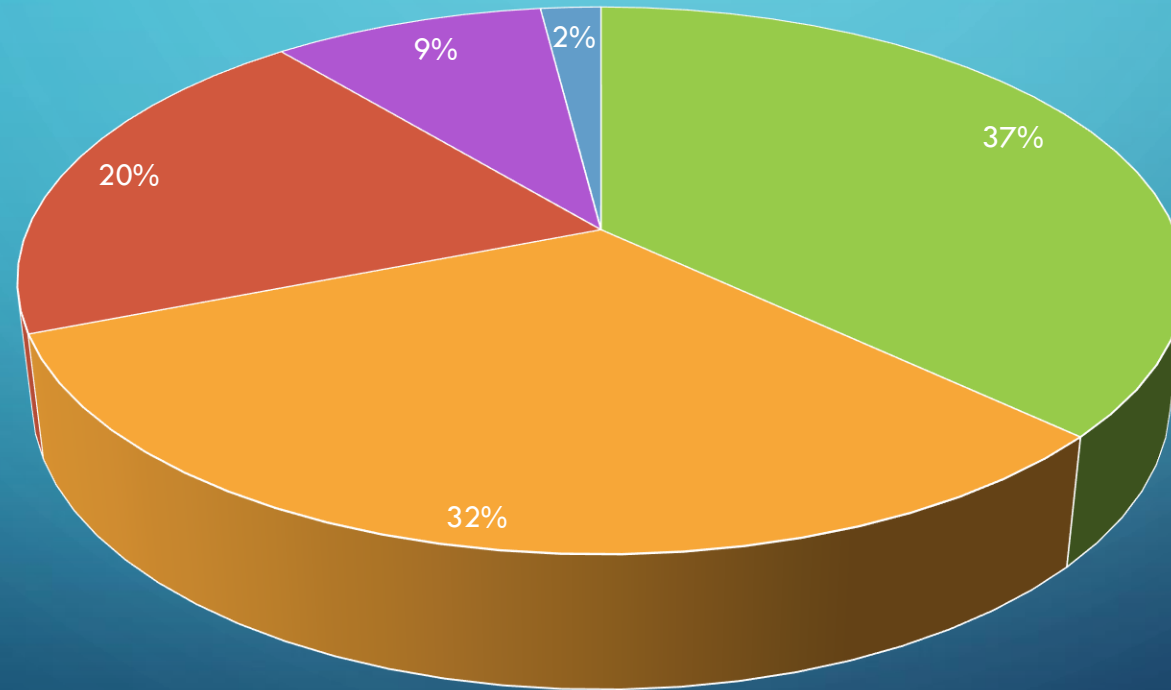
Cumulative Energy Savings 2017-2023 (ktoe/m\$): 23.901/8.365

Cumulative Energy Savings 2017-2033 (ktoe/m\$): 86.369/30.228

# ENERGY TRANSITION IN ELECTRICITY GENERATION

2017: 295.5 TWH (SOURCE:TEİAŞ)

Resources of Electricity Generation



■ Natural Gas ■ Coal ■ Hydro ■ Wind+Solar+Geoth ■ Other

# RENEWABLES: HYDRO

SOURCE:ETKB, EPDK

140 TWh/a potential

Early 2011: **15.835 MW** installed capacity (37% in operation)

2023: 100% utilization target (~40-45.000 MW)

**2012: 19.609 MW**

**2013: 22.289 MW**

**2014: 23.643 MW**

**2015: 25.868 MW**

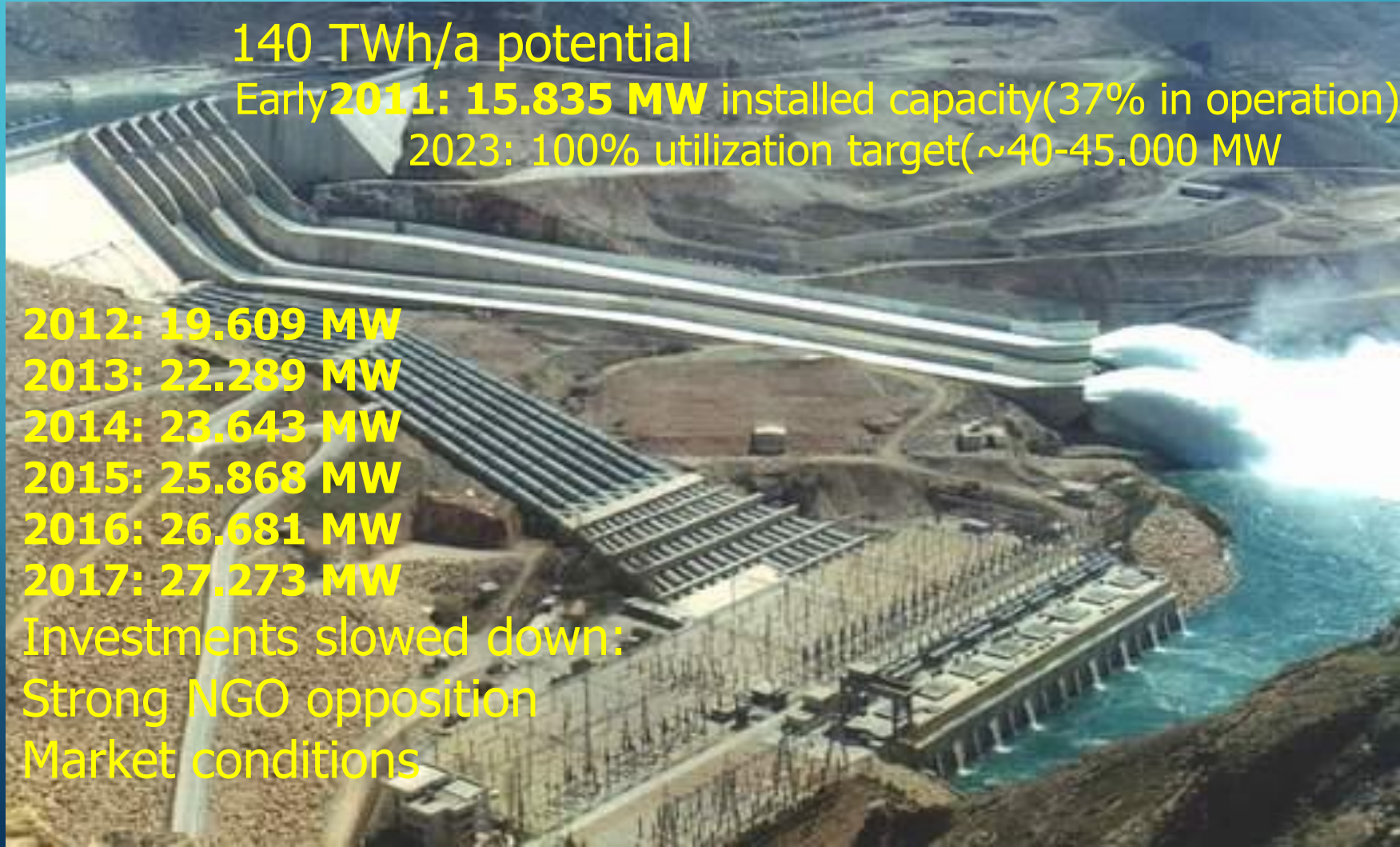
**2016: 26.681 MW**

**2017: 27.273 MW**

Investments slowed down:

Strong NGO opposition

Market conditions





# Renewables: Wind

2007: 27 MW

2008: 433 MW

2009: 800 MW

2010: 1.329 MW

2011: 1.729 MW

2012: 2.261 MW

2013: 2.760 MW

2014: 3630 MW

2015: 4365 MW

2016: 5751 MW

2017: 6516 MW

2023: 20.000 MW ?

Off-shore wind tenders for 3 regions under preparation

Some resistance of the population at the Western coast



# Renewables: Geothermal

Source:EPDK



2002: 15 MWe

2012: 162,2 Mwe

2013: 310,8 MWe

2014: 404.9 Mwe

2015: 623,9 MWe

2016: 820,9 MWe

2017: 1063,7 MWe

Original 2023 Target: 600 Mwe

# Sectoral Breakdown: Solar



2014: 40,2 MW

2015: 248,8 MW

2016: 832,5 MW

2017: 3.420,7 MW

Auction March 2017

1000 MW: 69,9 \$/MWh

New tenders for 3 regions under preparation

# Is Nuclear Part of the Energy Transition?

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

03 Apr 2018 Erdoğan and Putin launched the construction

### 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

# No Energy Transition without Functioning Market

## EXIST Energy Exchange Istanbul

Established in March 2015

### **Electricity market operations:**

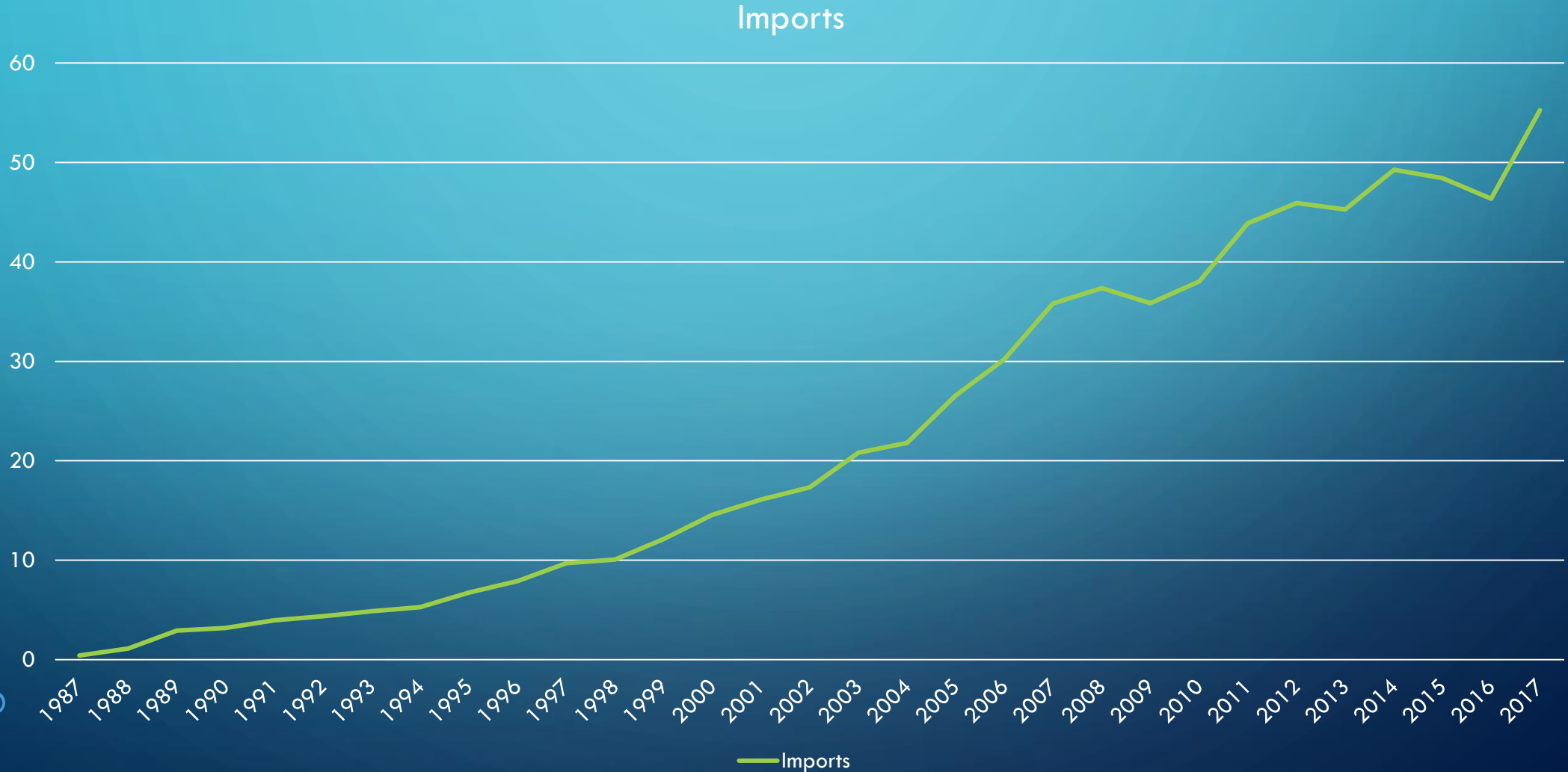
- Day ahead market,
- Intra-day market,
- Balancing market,
- Market registration process,
- Market Settlement

### **Natural gas market:**

- Regulation on Wholesale natural gas market published March 2017
- 1 April 2018: Online testing of the spot natural gas trade system on the energy stock exchange started

# NATURAL GAS – ESSENTIAL FOR ENERGY TRANSITION

(2017 IMPORT: 55,25 BCM, EXPORT: 0,63 BCM PRODUCTION: 0,35 BCM)



# MAIN NATURAL GAS INFRASTRUCTURE

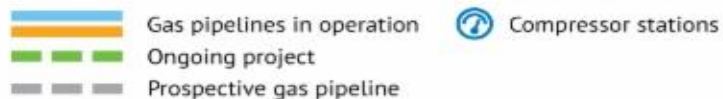
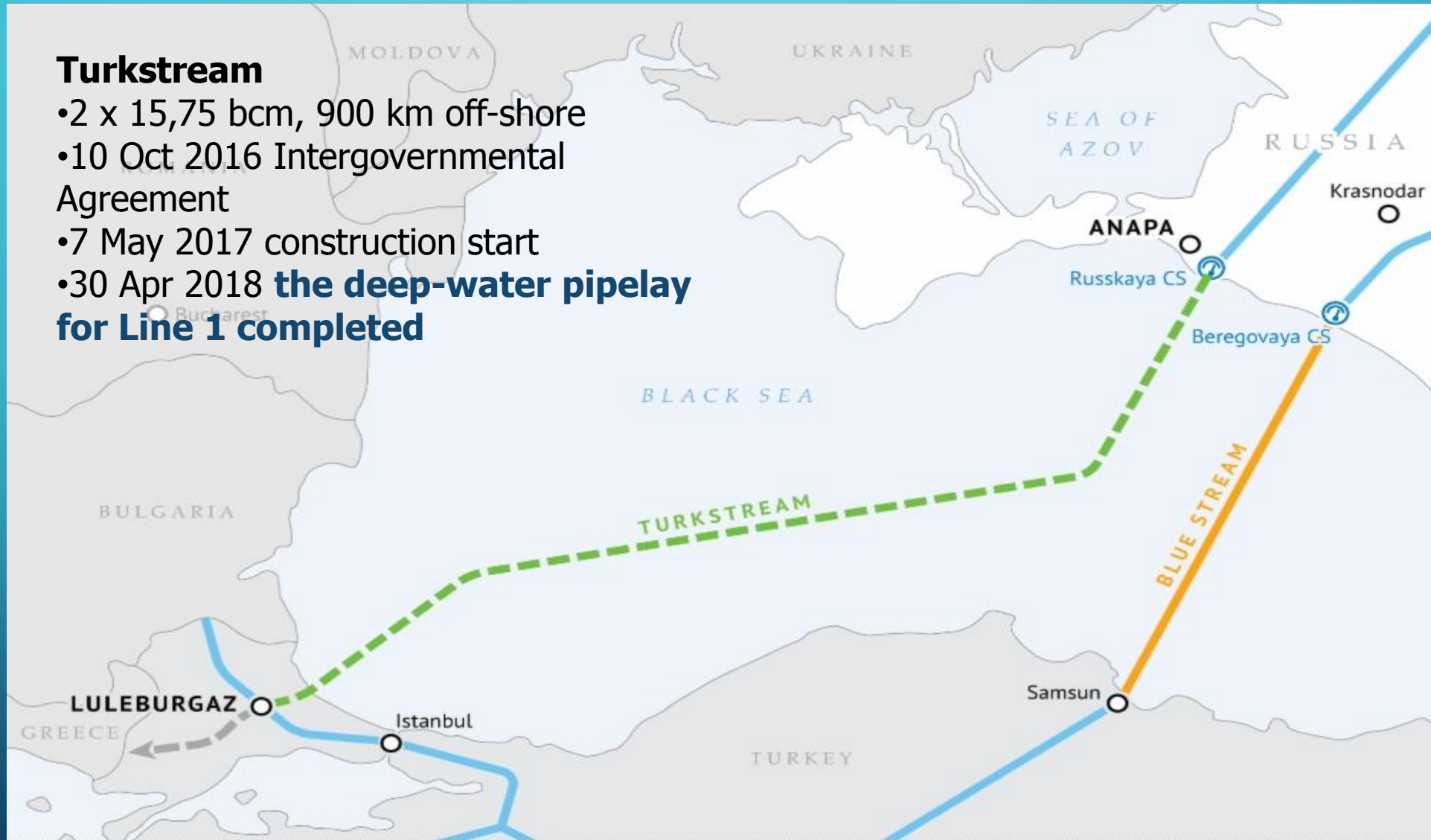
Source: ETKB



# NG Infrastructure – Transit Pipelines

## Turkstream

- 2 x 15,75 bcm, 900 km off-shore
- 10 Oct 2016 Intergovernmental Agreement
- 7 May 2017 construction start
- 30 Apr 2018 **the deep-water pipelay for Line 1 completed**





# NG Infrastructure – Transit Pipelines

## **TANAP**

1850 km; 16 bcm/a; 56,48,2x36 inch

June 2012 HGA, IGA, May 2014 HGA amendment

March 2015 Ground breaking ,

14 Jun 2018 inauguration ceremony at Eskişehir Metering station

Apr 2019 first gas to TAP



Source: Botaş

# NG Infrastructure - Underground Storage

<i>Location</i>	<i>Capacity (bcm)</i>	<i>Injection rate (mcm/d)</i>	<i>Withdrawal rate (mcm/d)</i>
<b>Operational</b>			
Botaş Silivri	2.8	16	25
Botaş Tuz Gölü	1.2	30	40
<b>Projects</b>			
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

# NG Infrastructure - LNG Terminals

1. Botaş Marmara Ereğlisi Terminal near Istanbul: 6bcm/a regasification capacity,  
18 mcm/d sendout capacity(increase to 27 mcm/d in 2019)
2. Egegaz Aliağa Terminal near Izmir: 6 bcm/a regasification capacity  
16.5 mcm/d send out capacity



# NG Infrastructure - Floating Storage and Regasification Units

**Etki -Aliğa** (operational since Dec 2016)

5,3 bcm/a regasification capacity, 20 mcm/d sendout capacity

**Botaş -Dörtyol** (operational since Feb 2018)

5.3 bcm/a regasification; 20 mcm/d sendout capacity

**Botaş -Saroz** (planning)

**Maks- Izmit Altınova** (planning)



# ENERGY TRANSITION IN TRANSPORT

RAILWAY TRANSPORT		
Year	Freight (Mill. T)	Passenger (Mill.)
2003	15.9	76.9
2014	28.7	153.6
2017	28.5	176.1

Source: UDHB

MODAL SPLIT 2014 (%)				
	Freight		Passenger	
	Railway	Road	Railway	Road
Turkey	4.5	89.6	1.6	98.4
Germany	24.9	58.2	8.3	91.7

Source: EU Transport in Figures Statistical Pocketbook 2016  
Air and Maritime transportation are excluded.

# ENERGY TRANSITION IN TRANSPORT – HIGH SPEED RAILWAYS

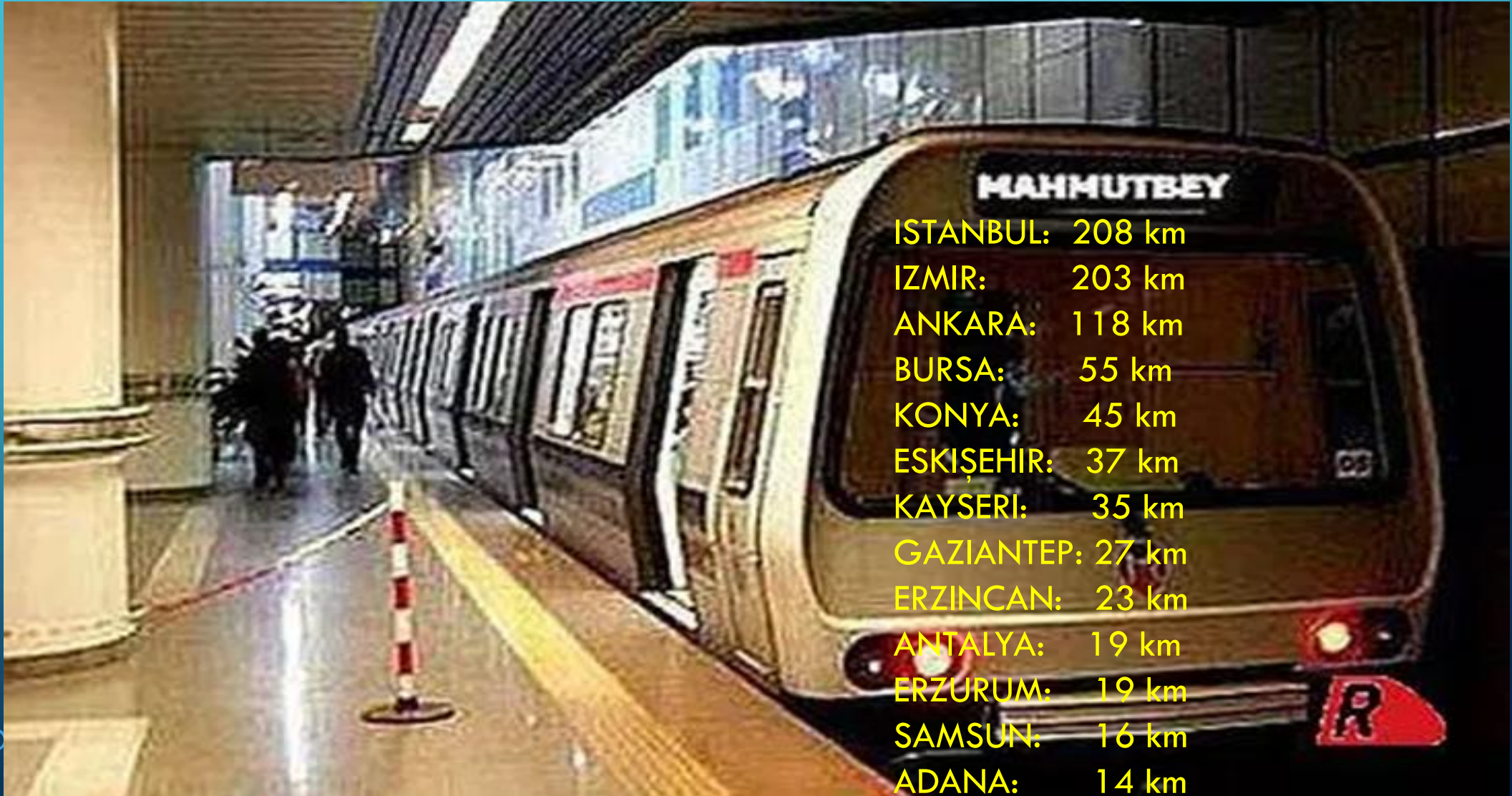
2009: 397 km  
2010: 888 km  
2014: 1213 km

Construction: 1675 km  
Project&Planning: 2182 km



Share of Railway in Passenger Transport  
between Ankara and Eskişehir  
Before High Speed Train: 8%  
High Speed Train Service: 72%

# ENERGY TRANSITION IN TRANSPORT – RAILBOUND TRANSPORT IN METROPOLITAN AREAS



# ENERGY TRANSITION IN TRANSPORT – BUSES IN METROPOLITAN AREAS

CNG Buses: since 2007

ANKARA: 1289 CNG Buses in use:  
ISTANBUL, KOCAELI, BURSA, KONYA,  
KAYSERI.....

ELECTRIC BUSES: IZMIR, MANISA, ELAZIĞ,  
ISTANBUL, AYDIN, KONYA, ESKİŞEHİR....

ISTANBUL plans a fleet of 30% CNG and  
25% electric  
in 2020





# IS TURKEY READY FOR ENERGY TRANSITION?

Renewables: Good investment performance in the last 6-7 years, the potential not utilized

Energy Efficiency: More Investments needed

Electricity Market: Abolish tariffs, more market transparency needed

Natural Infrastructure: More underground storage capacity needed

Natural Gas Market: Still a long way to “Gas to gas competition”

Transport Sector needs a special focus

In conclusion: A lot is done but still a long way to go.



THANK YOU

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