

Renewable Energy Opportunities in Turkey

ATA Insights Webinar

November 8, 2018

12:00 CET

SHURA's objectives

- **Mission:** Contributing to the debate on Turkey's energy transition
- **Who we are:** A transparent platform stimulating discussion on Turkey's energy future among all interested stakeholders
- **What we do:** Energy sector think tank providing fact-based, unbiased and independent research and analysis, covering technology, economics and policies

Founding partners of SHURA

- A global policy research institution that specializes in key social and political issues ranging from democratization to climate change, transatlantic relations to conflict resolution and mediation.
- Major philanthropic initiative to help Europe foster the development of a low-carbon society and play an even stronger international leadership role to mitigate climate change.
- A think-tank and policy laboratory, centered around dialogue with energy policy stakeholders. Develops scientifically based and politically feasible approaches for ensuring the success of the Energiewende.



Strategic direction of Turkey

Energy security

- 4-5% per year growth in energy demand
- Import dependence for gas and oil from Russia, Iran, Iraq. Share of coal is also imported
- In 2017, energy imports US\$36 billion out of a current account deficit of >US\$50 billion (TL fell by 74% against US\$ over the past decade)

Economic activity and job creation

- Net importer of energy supply equipment except for wind
- 84,000 people employed in renewables sector out of 767,000 people employed in electricity & gas sector (direct + indirect jobs)

Environment

- Air pollution
 - 6 out of 81 cities meet the air pollution criteria set by the WHO
 - 29,000 premature deaths attributed to PM and O₃
- 20th largest emitter worldwide and fastest growing GHG emissions in Annex I

Fossil fuels represent 88% of primary supply

Resource availability

Hydro in the east and northeast

Wind with significant resources in the northwest and west

Solar across the entire country with significant resources in the south

Geothermal centre and west

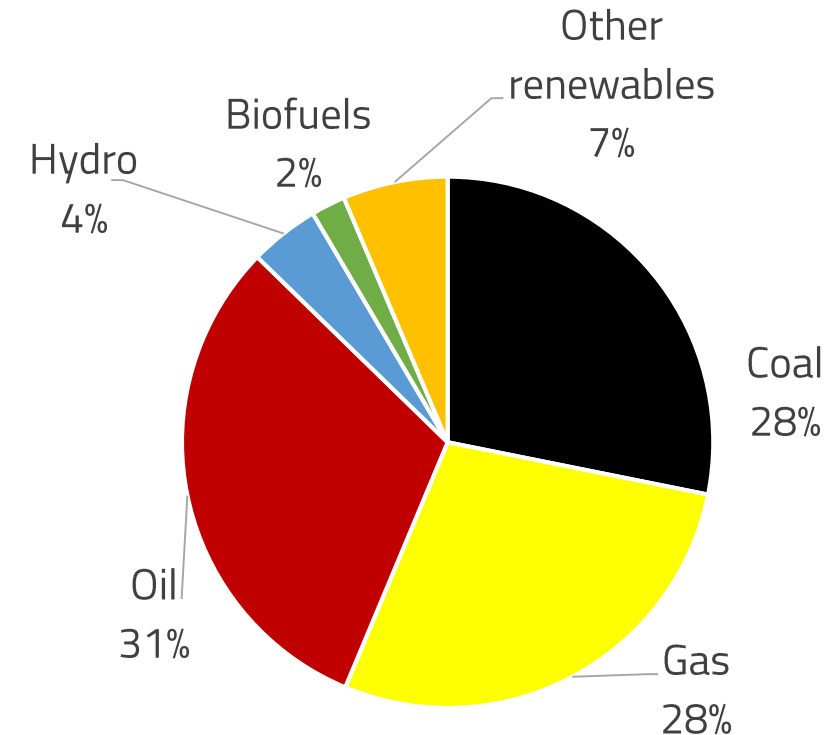
Hard coal in the Black Sea region

Lignite spread across the country

Limited crude oil (southwest, 8% of all supply)

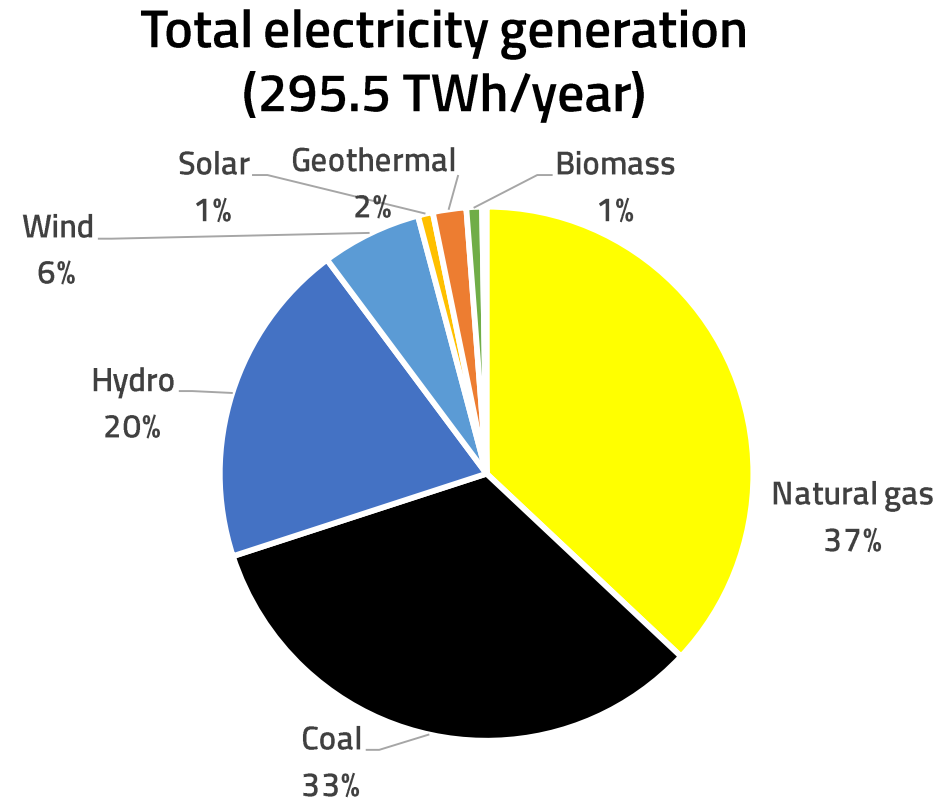
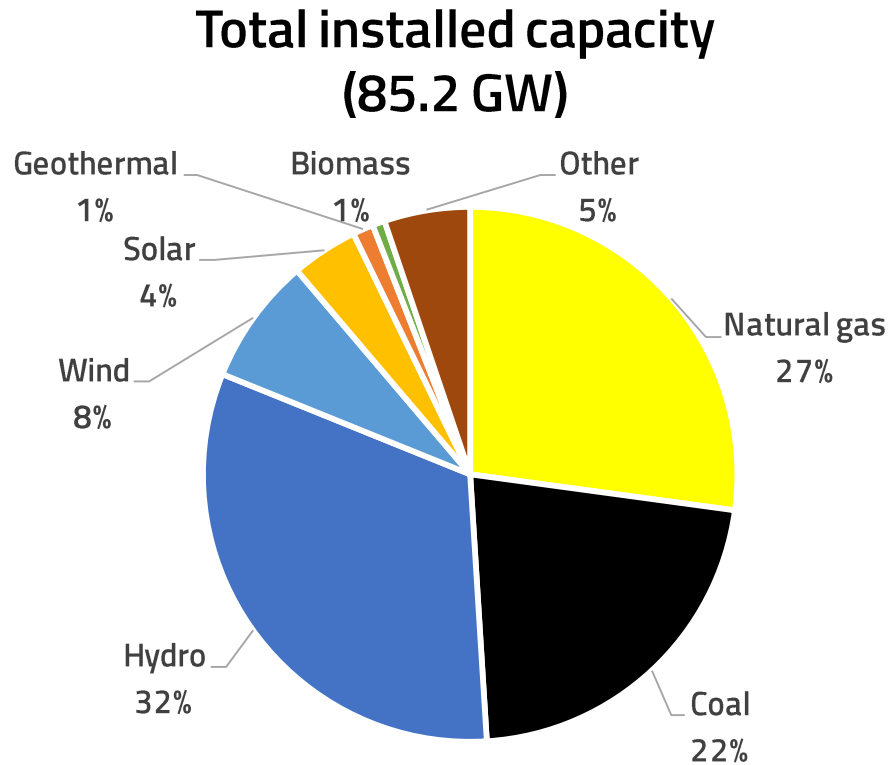
Negligible natural gas

Total primary energy supply (136 Mtoe)



75% of all fossil fuel supply imported (all gas, large share of oil and some coal)

Renewables represent 30% of total generation (end 2017)

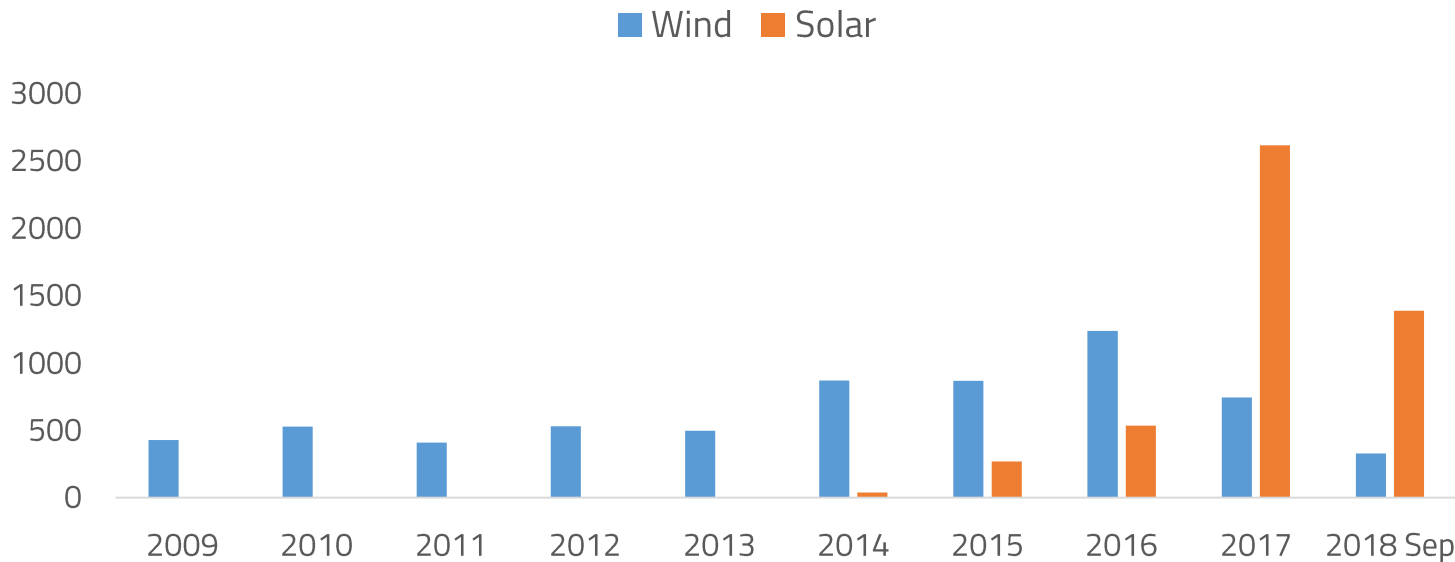


Solar and wind represent 7% of total generation

Geothermal 4th worldwide with 1.1 GW installed capacity

Promising developments in Turkey's power sector in 2017, but slowdown in 2018

Annual Capacity Additions (MW/yr)



Largest European solar market in 2017

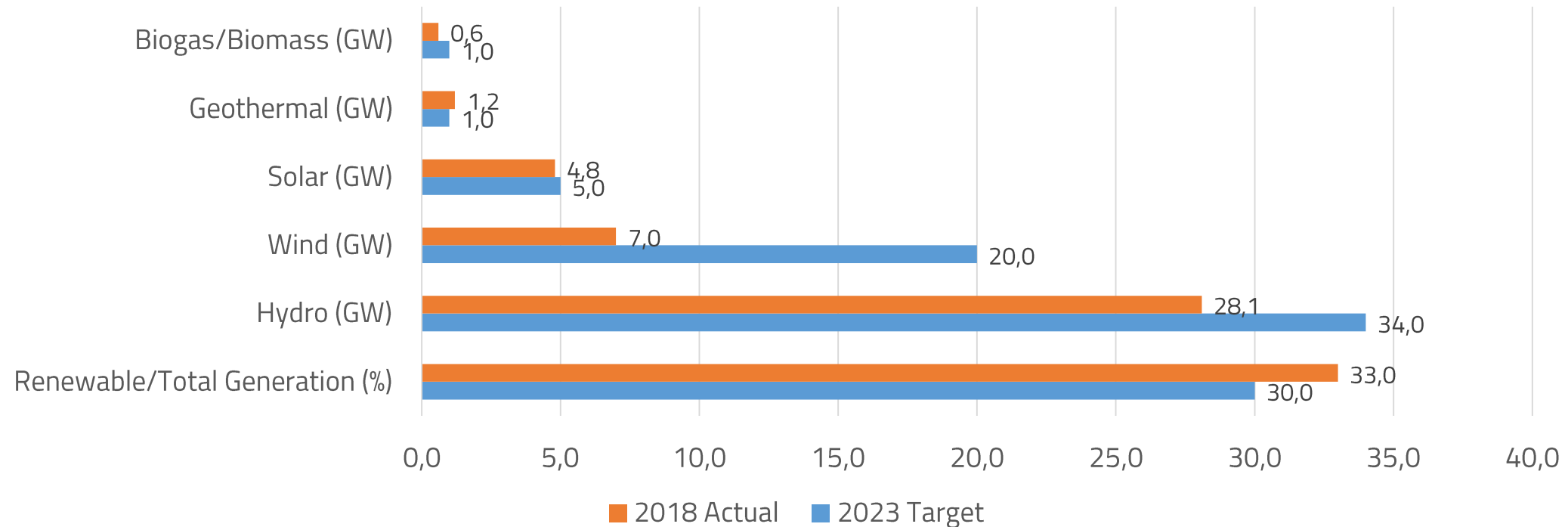
Two-thirds of net capacity additions in 2017 from renewables (mainly wind and solar PV)

2x1 GW auctions in 2017 (3.48 wind and 6.99 solar US\$ cents per kWh)

New auctions for onshore and offshore wind and solar PV are planned for 2019

Local content requirements are priority in auctions




Renewable Energy Targets



2023 target already achieved in renewables' share in total generation (fluctuates depending on hydro), and in geothermal and solar PV capacity.

New vision announced in the 2019 national budget: 10 GW each additional capacity for solar and wind by 2027.

Feed in tariff was a major motivator of growth

Plant Type	Guaranteed Feed In Tariff (US\$cent/kWh)	Premium for local production (US\$cent/kWh)
		
<input type="checkbox"/> Hydroelectric	<input type="checkbox"/> 7.3	<input type="checkbox"/> 1.0-1.3
<input type="checkbox"/> Wind	<input type="checkbox"/> 7.3	<input type="checkbox"/> 0.6-1.3
<input type="checkbox"/> Geothermal	<input type="checkbox"/> 10.5	<input type="checkbox"/> 0.7-1.3
<input type="checkbox"/> Biogas / Biomass	<input type="checkbox"/> 13.3	<input type="checkbox"/> 0.4-2.0
<input type="checkbox"/> Solar (Photovoltaic)	<input type="checkbox"/> 13.3	<input type="checkbox"/> 0.5-6.7
<input type="checkbox"/> Solar (Concentrated)	<input type="checkbox"/> 13.3	<input type="checkbox"/> 0.6-6.8

Plants that start operations by end-2020 are eligible for the guaranteed feed-in tariff.

Eligibility is for 10 years after the plant becomes operational for the guaranteed tariff and 5 years for the premium.

New regulatory framework

Large scale renewable energy projects

Land, infrastructure and transmission capacity integration

Development of local equipment manufacturing capacity and R&D

Technology transfer

Competitive auctions based on per kWh price for selection of projects

Current market assessment

- **Demand:** Growing at around 4-5% but slowdown compared to earlier years due to market maturing and increased energy efficiency
- **Supply:** Overcapacity after rapid growth in new additions since liberalization, pushing out older, inefficient fossil fuel plants.
- **Market Prices:** Wholesale electricity market prices eroding due to excess supply, slower demand growth and currency devaluation.
- **Renewable Energy Prices:** Feed-in tariff for wind and solar 2 and 3 times the average market price while recent auction prices are revealing actual generation costs.
- **Finance:** Uncertainty about tariffs and incentives after 2020 and economic uncertainties reducing access to finance.

Turkey's energy transition already underway



- The prospect of increased electrification in heating, cooling and transportation, especially electric vehicles, indicate sustained annual consumption growth of 4%-5% over the next 10 years.
- Renewables will continue to be the first choice in new capacity additions by the private sector.
- Resilience and adaptability of the T&D grids will be key. SHURA study shows that the transmission can accommodate up to 3x currently planned wind and solar capacity (60 GW).
- Solar PV rooftop legislation in place to utilize the country's significant resource potential.
- Storage, digitalization, innovative finance and legislation will be major catalysts for change.



Turkey's energy transition presenting new business opportunities

Rooftop Solar Generation

Distributed Generation Financing/Management/Consultancy

Energy Efficiency Financing/Management/Consultancy

Smart Grid-Digital Solutions

Sustainability Management/Corporate Sourcing/Certification

Distributed Generation Financing/Management/Consultancy

Utility Scale Solar/Wind Generation

Local Equipment Manufacturing Solar/Wind

Microgrid, Off Grid, Scalability- Digital Solutions

Electricity Storage Equipment/Systems Supply/Management

Imminent

Emerging

Continuing

Exploratory

Increasing renewable integration will generate a range of cross-sector opportunities.

Thank you!
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