

Invest In Turkish Energy Sector



PRESIDENCY OF
THE REPUBLIC OF TÜRKİYE
**INVESTMENT
OFFICE**

Energy Sector Outlook

Remarkable energy actor seeks to enhance its capacity to satisfy growing economy and population.

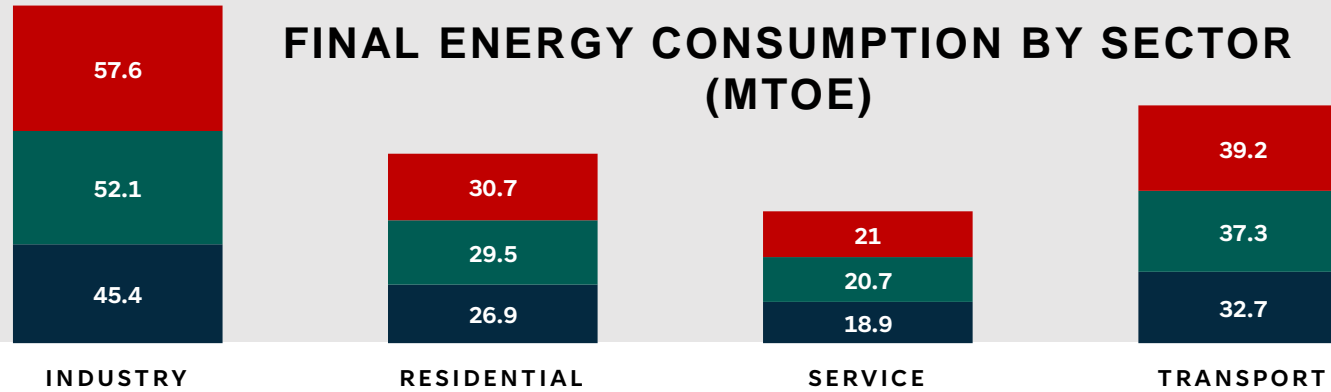


6th largest electricity market in Europe with more than 100 GW

Population: 85,000,000
1st in Europe

7th in the Europe in wind energy capacity

■ 2025 ■ 2030 ■ 2035
FINAL ENERGY CONSUMPTION BY SECTOR (MTOE)



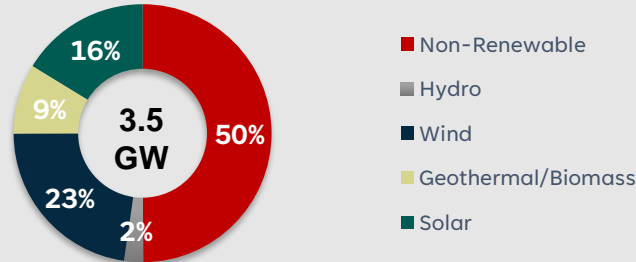
16th in the world in solar energy capacity

4th in the world in geothermal energy capacity

New E&P activities both Black Sea and Mediterranean

2022
710 Bm3 Gas Discovery
150 Mbbl Oil Discovery

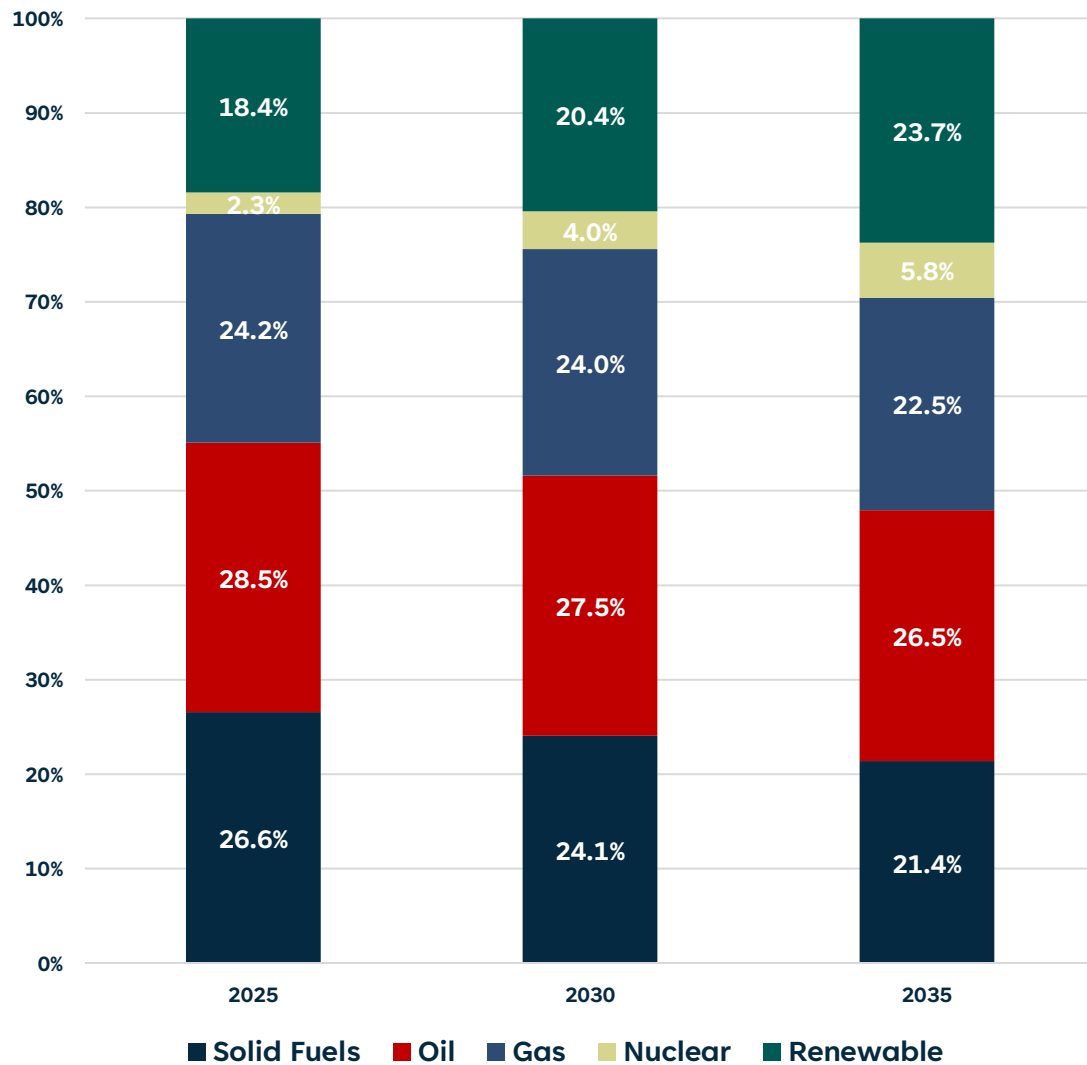
New Capacity Addition - 2022



 **4,800 MW**
First NPP



Primary Energy Consumption by Source (155 Mtoe in 2022)



2022	Renewable Targets	2035
104 GW	Installed Capacity	189.7 GW
%53.9	Share of Renewables	%64.7
10 GW	Solar	52.9 GW
12 GW	Wind	29.6 GW
-	Nuclear	7.2 GW
31.5 GW	Hydro	35.1 GW
2 GW	Geothermal/Biomass	5.1 GW

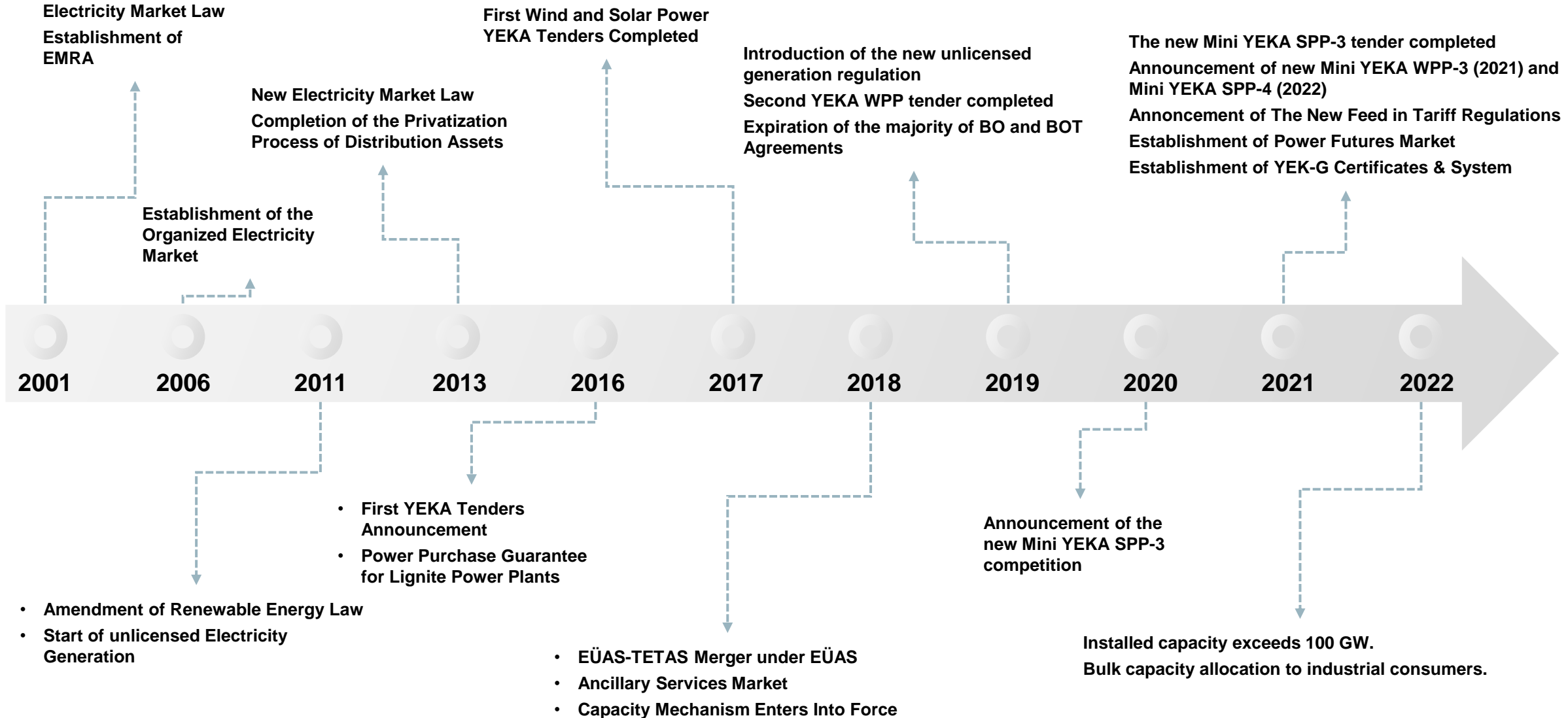
In 2022, the Turkish government, at the COP27 climate summit, announced its strategy to reduce greenhouse gas emissions by 41 percent below business-as-usual levels by 2030 and achieve net-zero emissions by 2053.



Electricity Market

Electricity Market Structure

Turkish electricity market reform began in March 2001 with the enactment of Electricity Market Law.





MENR

Strategy and Policy Maker

The Ministry of Energy and Natural Resources is the main governmental body responsible for carrying out energy policies.

EMRA

Independent Regulator

The Energy Market Regulatory Authority is responsible for regulating and supervising the electricity, natural gas, and oil markets.

TEIAS

Transmission Operator

The Turkish Electricity Transmission Company is the state-owned monopoly that owns and operates electricity transmission market in the country.

EUAS

Public Generation

The Electricity Generation Company owns and operates the state-owned power plants and following July 2018 also took over the wholesale trading responsibilities of TETAŞ (former state-owned wholesale electricity company).

EXIST

Market Operator

The Istanbul Energy Exchange is the market operator responsible for operating the day-ahead, intra-day and balancing markets in the country, and has managed the eligible consumers in the spot markets since 18 March 2015.

Electricity Market Structure

Market value chain



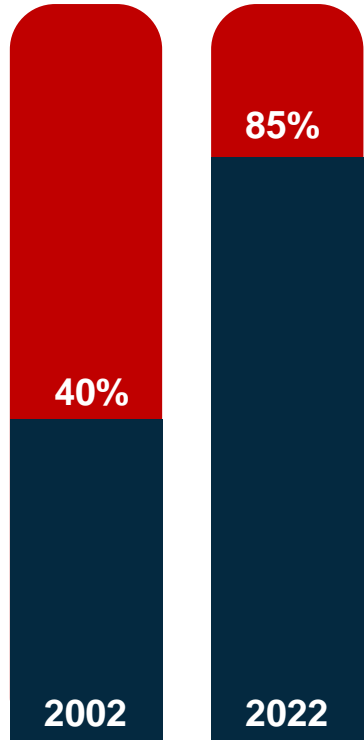
1,888 power plants (EUAS, TOR and IPPs with increasing share)

State-owned monopoly TEIAS is the system operator, runs balancing market and ancillary services.

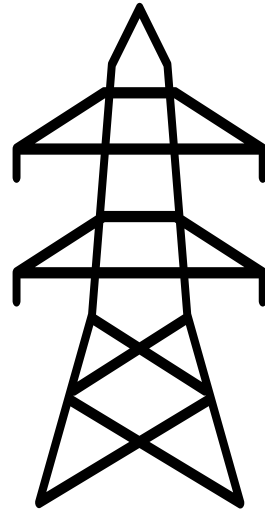
Physical and financial trading exist. Spot market operated by EXIST since 2015. OTC market is run through brokers.

21 distribution regions have been operated by private entities since 2013. These companies operate based on the operational rights contracts signed with TEDAS.

Regulated market for about 48 M consumers.



Private Sector Share in Electricity Generation



Transmission Line Length
73,788 km

Key Players:

- EÜAS
- EXIST
- Private Wholesalers
- OTC Market

Privatization Period 2008-2013, resulting in deals with a total value of USD 13 bn.

In terms of the volume of traded electricity, Türkiye is the 3rd largest spot electricity market in Europe.

Distribution Line Length
1,4 M km

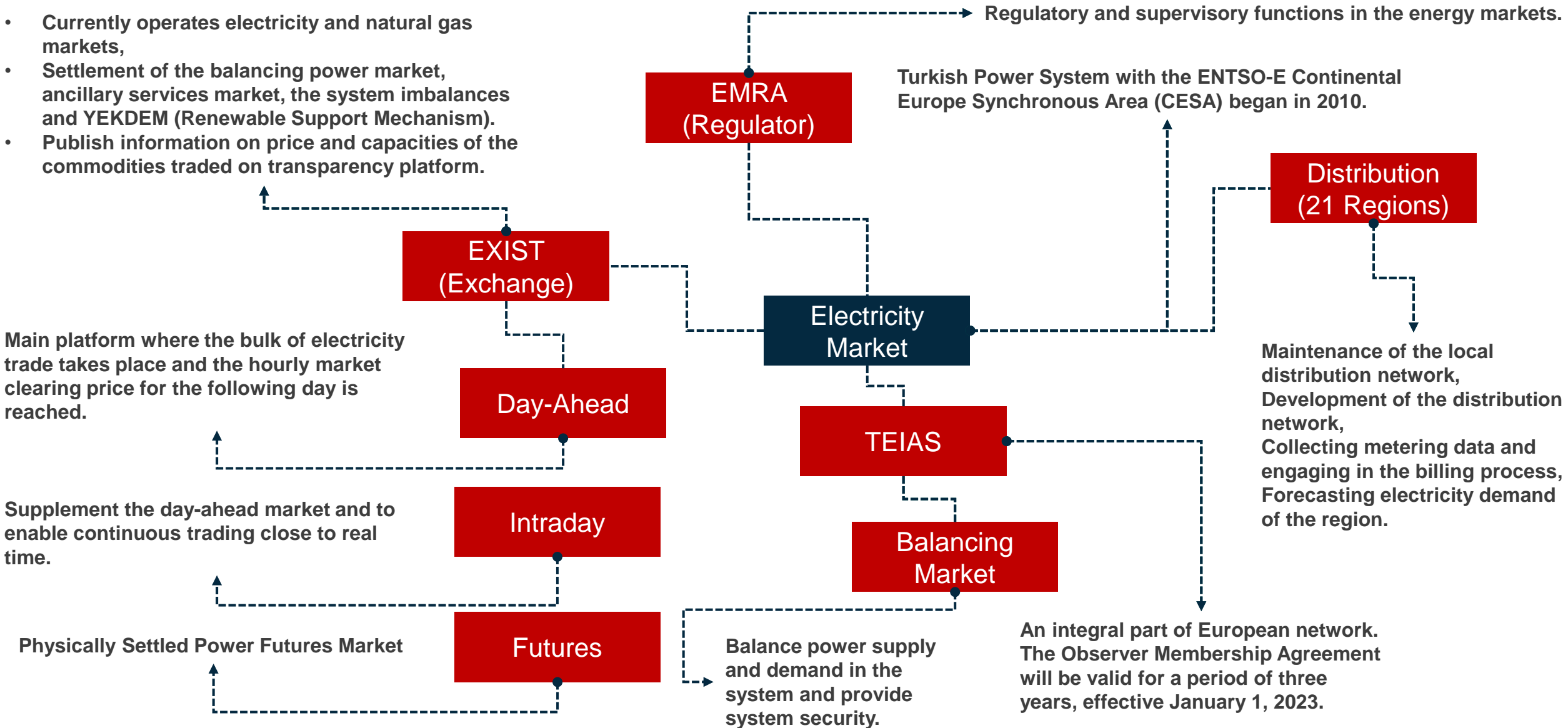
Eligible consumer limit is 1,100 kWh.

Electricity Market Structure

A well-functioning and fully developed electricity market serves all parties.

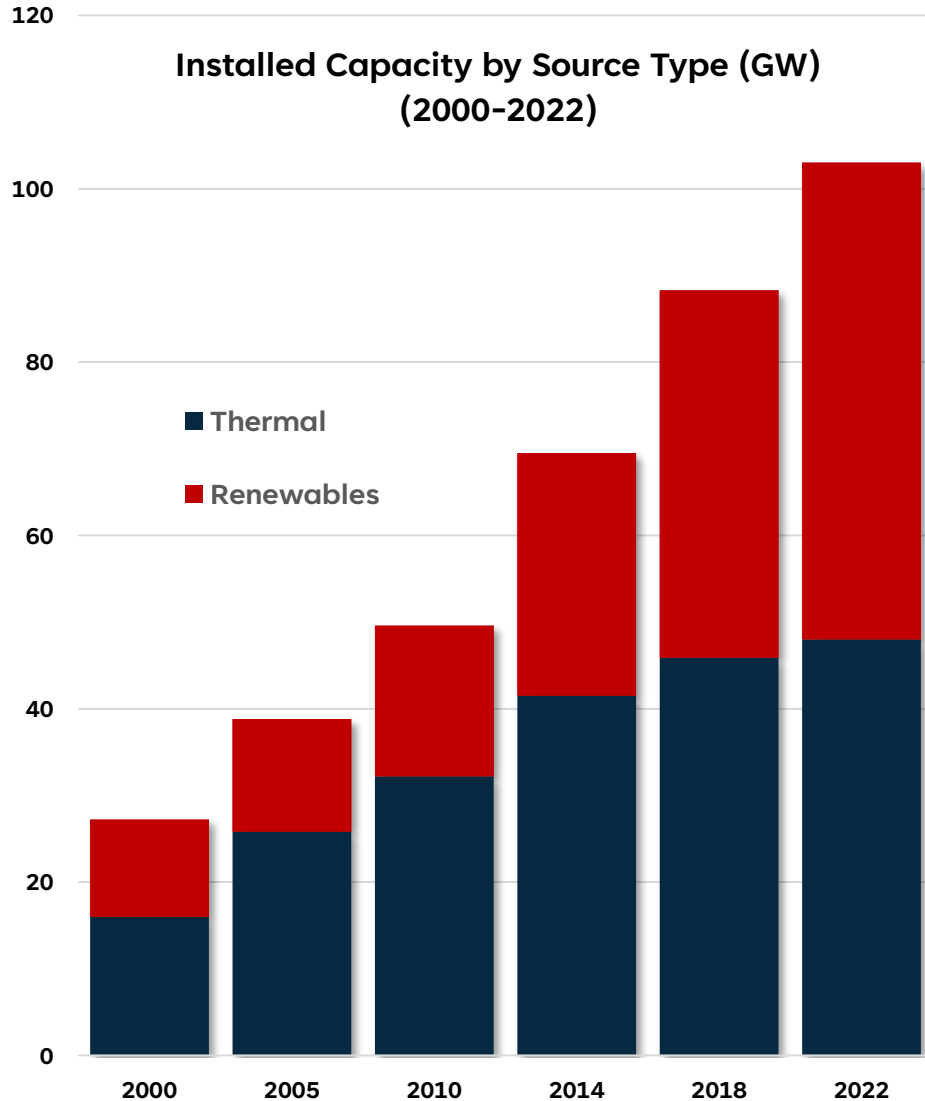


- Currently operates electricity and natural gas markets,
- Settlement of the balancing power market, ancillary services market, the system imbalances and YEKDEM (Renewable Support Mechanism).
- Publish information on price and capacities of the commodities traded on transparency platform.



Installed Capacity

Installed capacity has expanded and diversified in the last decade, especially through the expansion of renewable energy sources between 2014 and 2022.



1

Non-hydro renewable capacity in Türkiye has increased significantly following the introduction of YEKDEM.

2

Installed capacity additions from thermal energy sources in the last twelve years came primarily from natural gas and coal.

Electricity Market

Share of state-owned installed capacity has been shrinking since the early 2000s due to the increase of investments by IPPs as well as large scale privatizations.

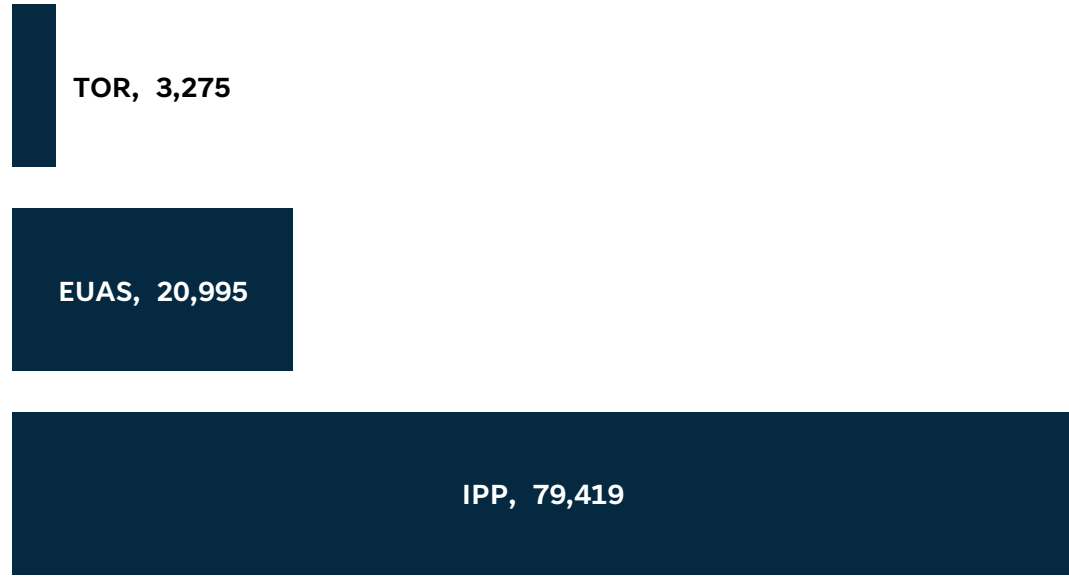


Total Installed Capacity = 104 GW



2022

3.5 GW new capacity

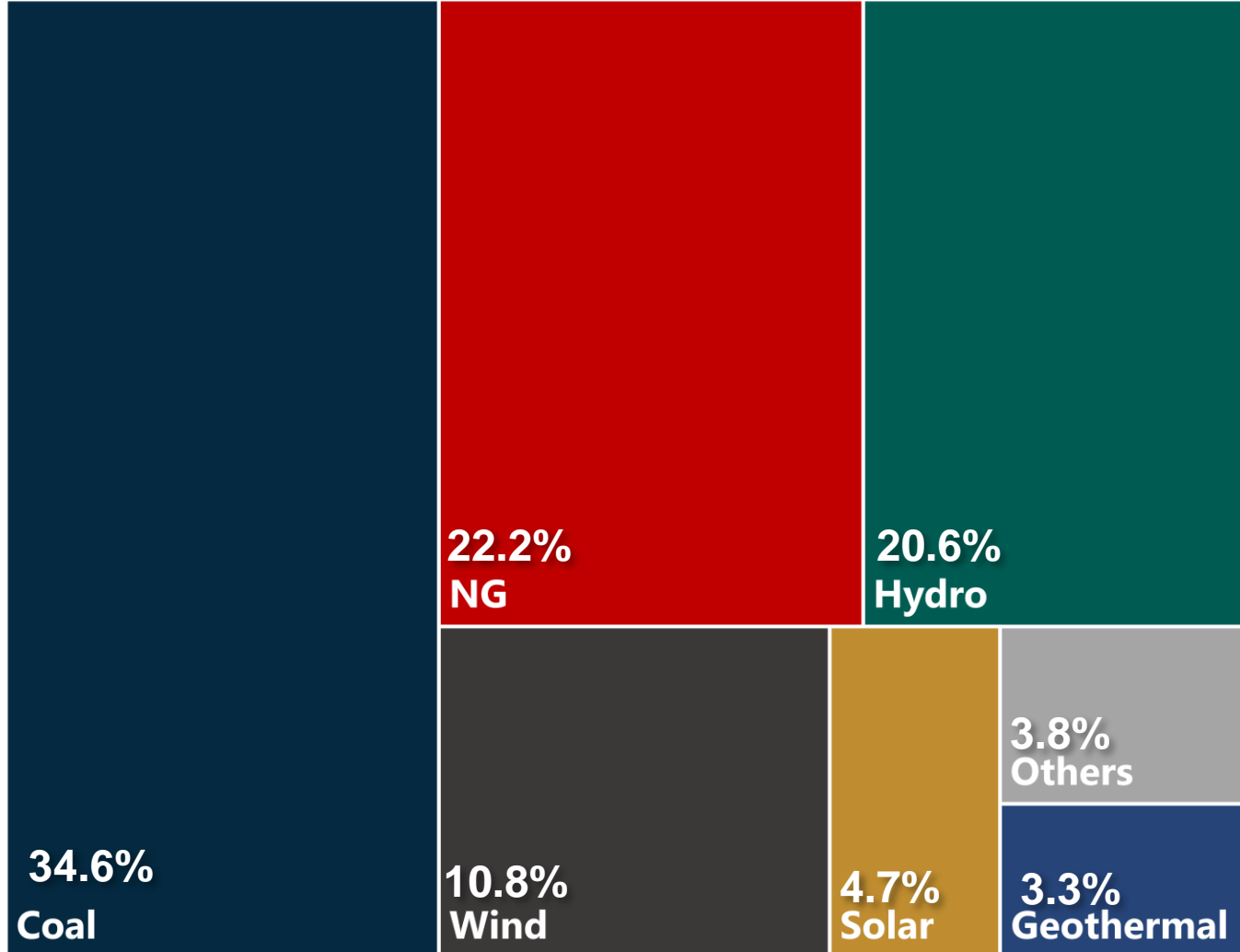


Installed Capacity by Company Type (MW)

Source: EMRA



Electricity Production by Source - 2022



Generated 326 TWh

Electricity Consumption Projections

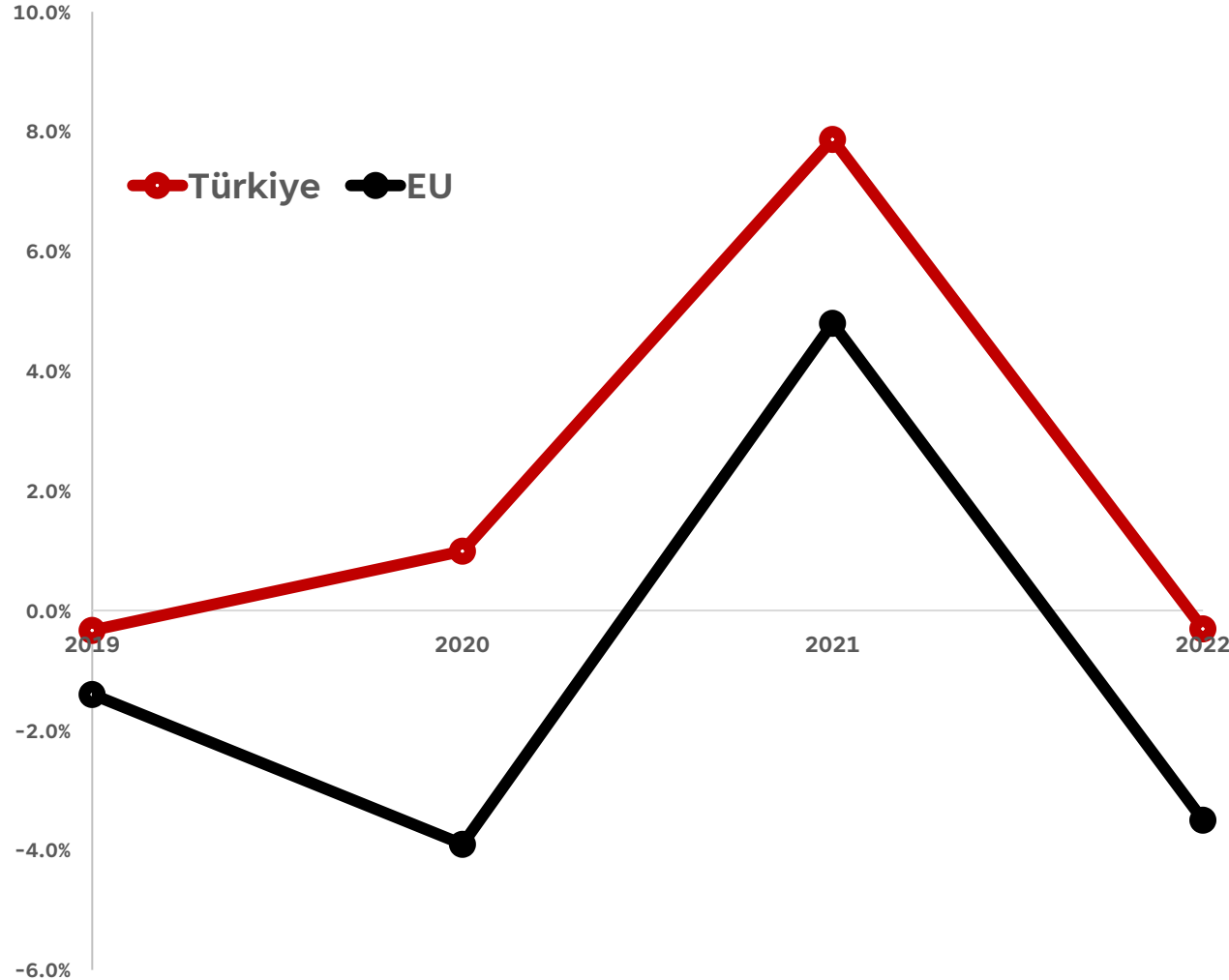
2025: 380,2 TWh

2030: 455,3 TWh

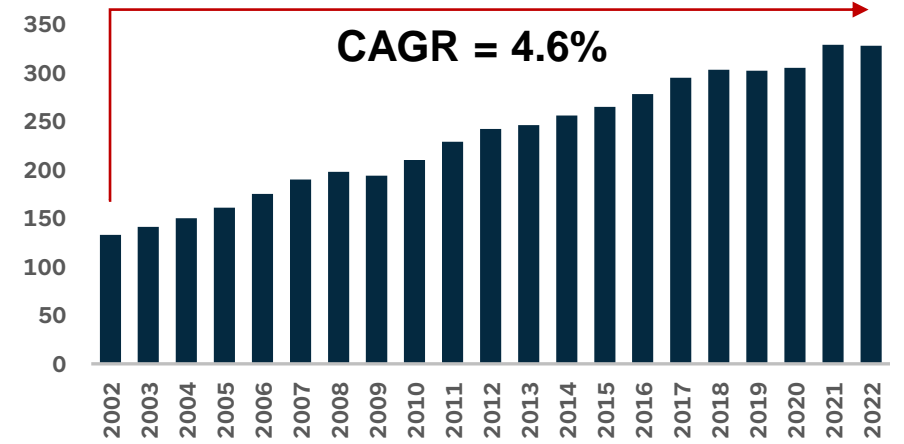
2035: 510,5 TWh



Electricity Demand Change Comparison (%)



Historical Electricity Demand (TWh)



Number of consumers

2020 → 46,077,742

2021 → 47,311,976

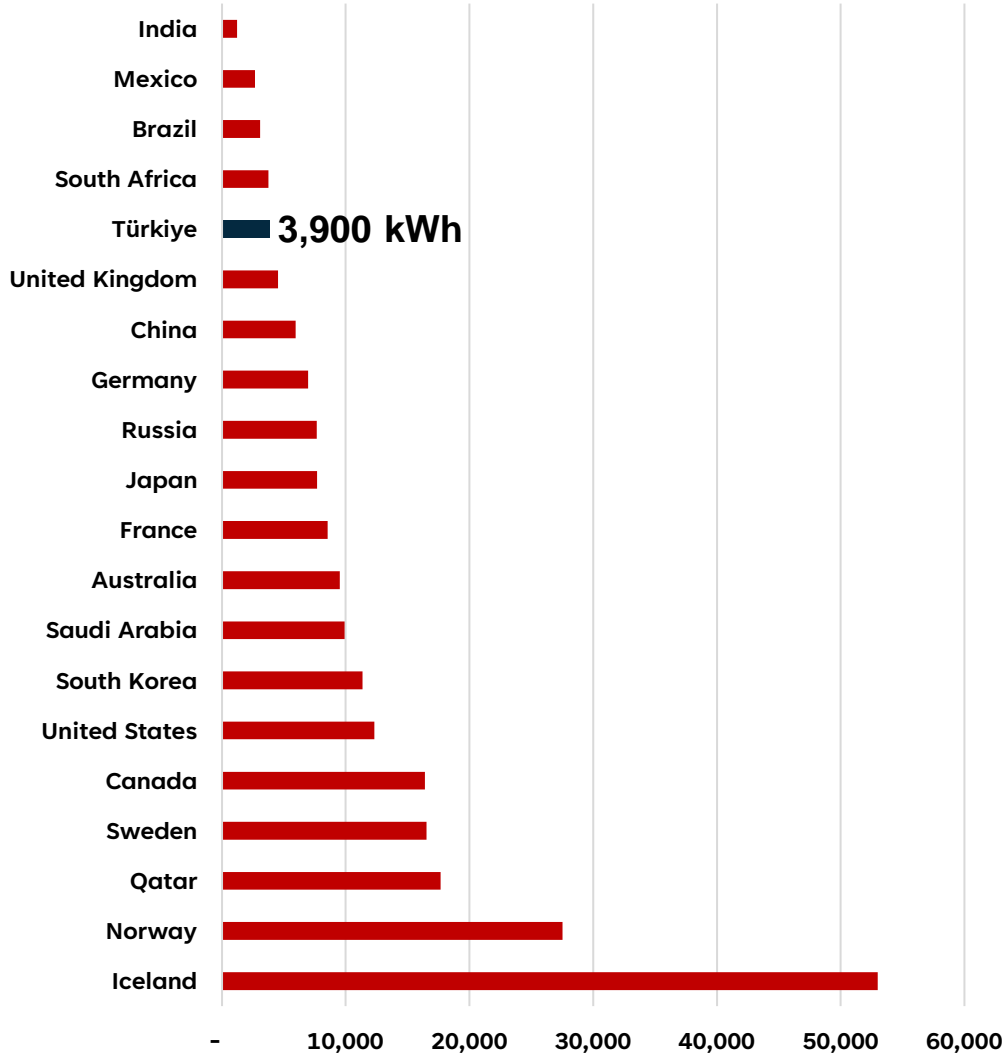
2022 → 48,563,259

Electricity Demand

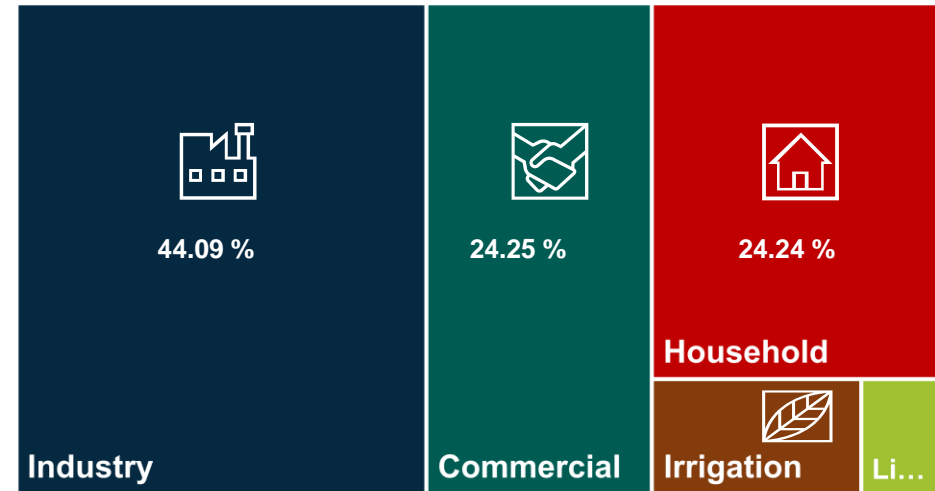
Net demand in Türkiye comes mostly from industrial production, which accounted for 44% of total demand in 2021 and has grown by 15% since 2018.



Electricity consumption per capita - 2021 (kwh)



Invoiced Consumption by Consumer Type - 2021



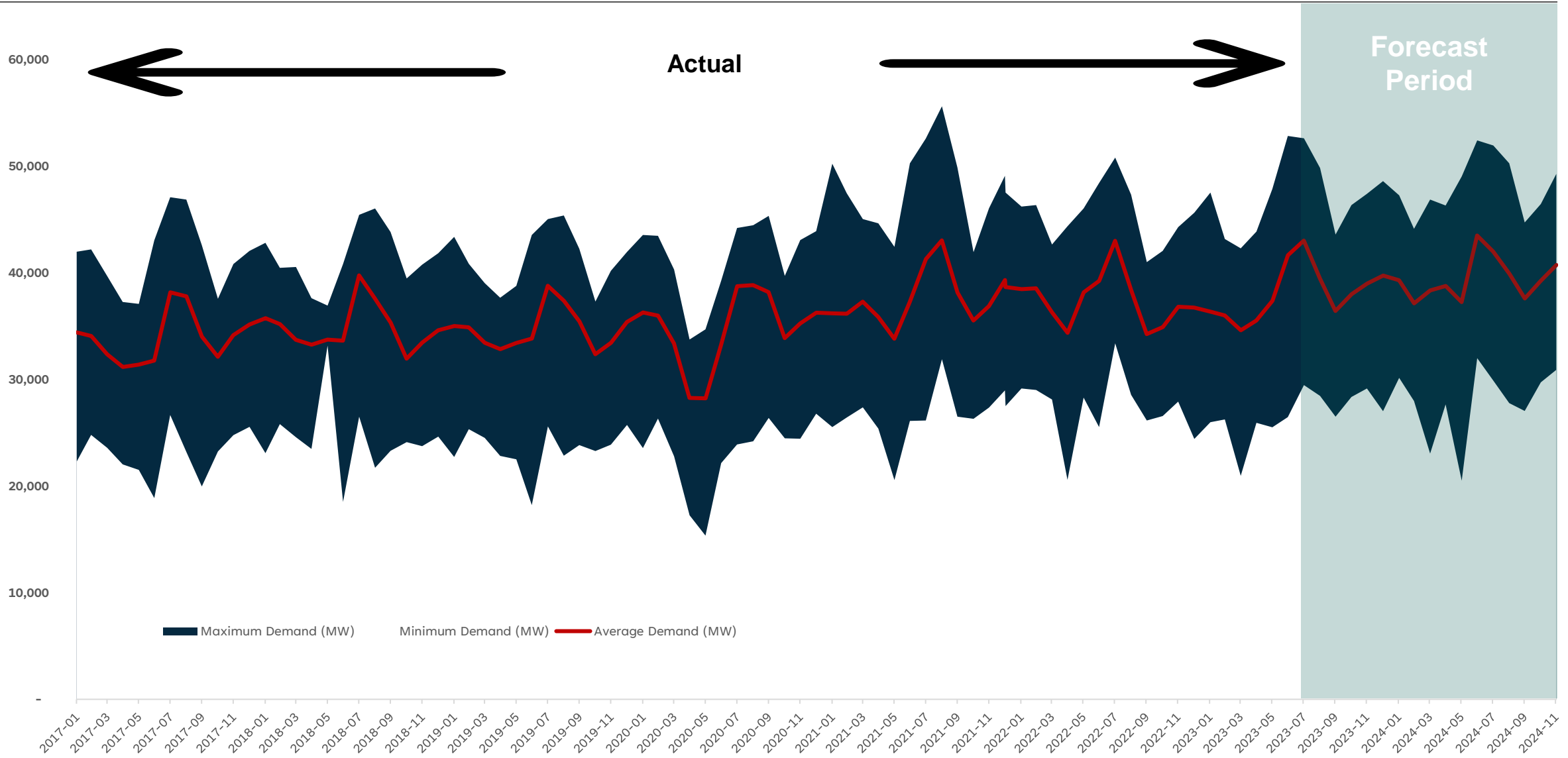
Total Invoiced Consumption 253 TWh

Electricity Market

In the coming decades, growing population with higher incomes will drive a strong increase in power demand.



Monthly Demand Forecast (MWh)





Industry Development & Economic Growth

Industry sectors utilize raw materials and electricity to create value-added products. Increased production directly impacts the overall electricity utilized, and thus, demand.

Higher industry production volumes will increase electricity demand in the long run, though higher efficiency and economic downturns might have opposite impacts.



Government Policies

Government subsidies can directly or indirectly impact electricity consumption. For example, the household consumption support mechanism subsidizes the electricity costs of 2 million households, effectively increasing consumption through government support.



Wealth and Population

A large portion of the increase in global electricity demand comes from developing economies like Türkiye. This phenomenon is attributable to (i) Increases in wealth, which leads to higher demand for consumer goods, and (ii) Increases in population, as a higher number of consumers leads to higher consumption.



Efficiency in Electricity Use

While electricity demand continues to increase with rising wealth and a growing population, efficiencies from technological development and government policies are able to counter this increase. Türkiye's National Energy Efficiency Action Plan is expected to have a significant impact on electricity consumption in future years.

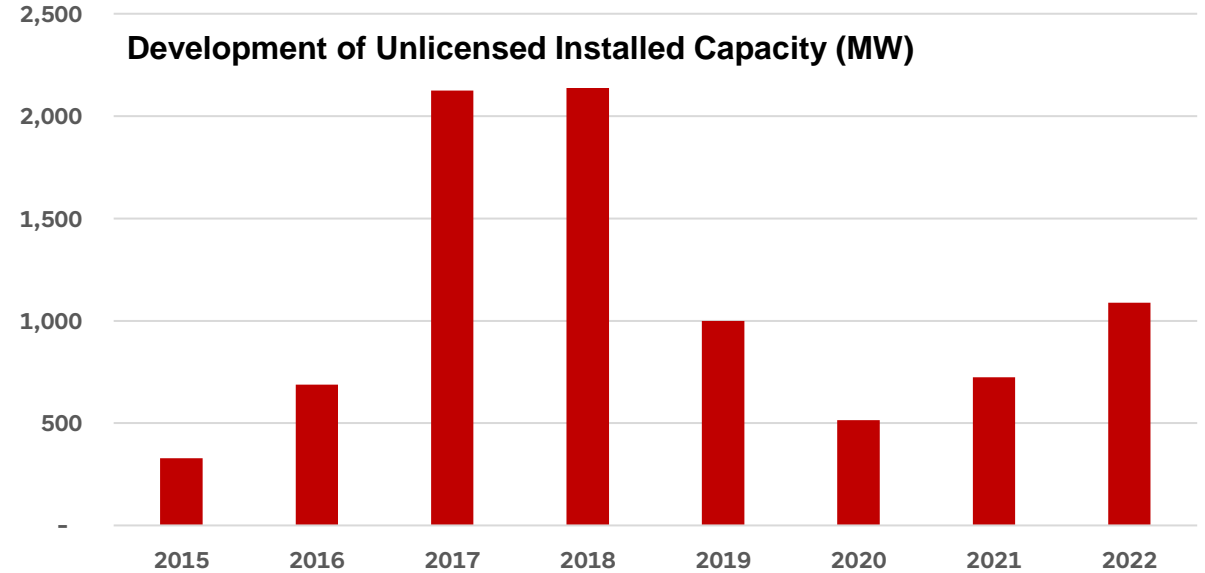
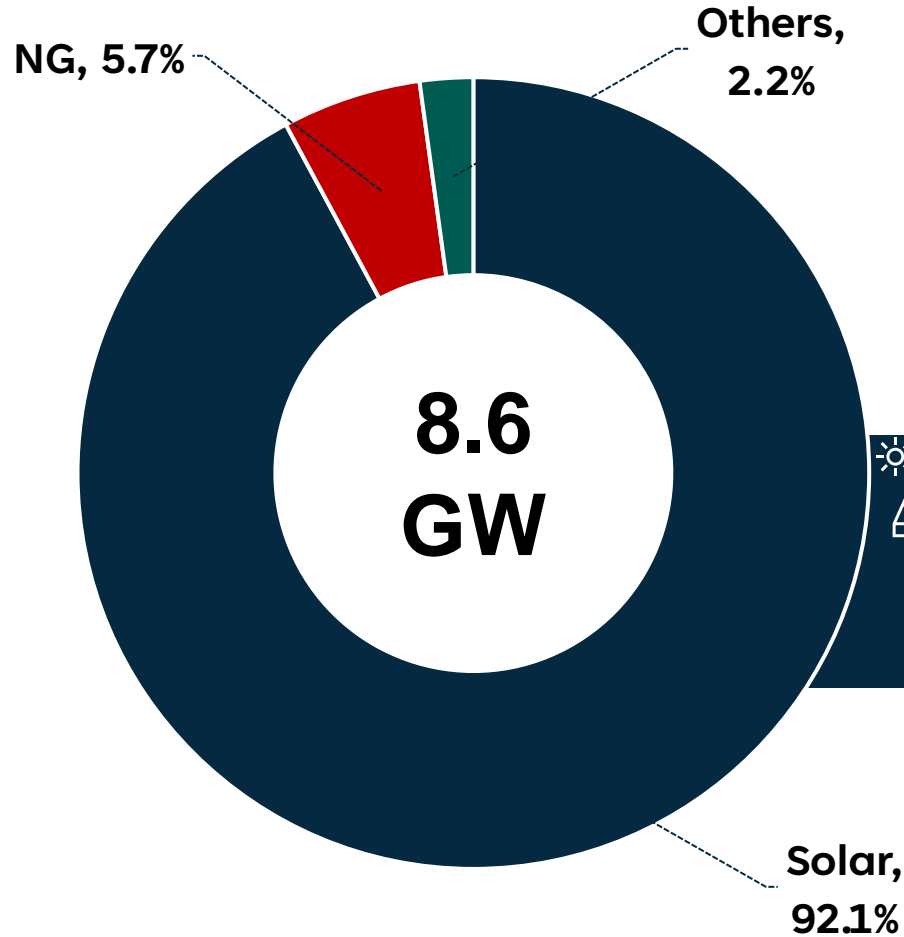


Process of Electrification

Electrification is the process of shifting consumption from combustion-based raw resources to electricity. Examples of this include the introduction of electric vehicles, development of electric-arc furnaces and use of electric heating in households. Türkiye is expected to follow the global policy of shifting towards electrification in an effort to reduce its dependency on imported energy sources.



Total Unlicensed Installed Capacity (%)



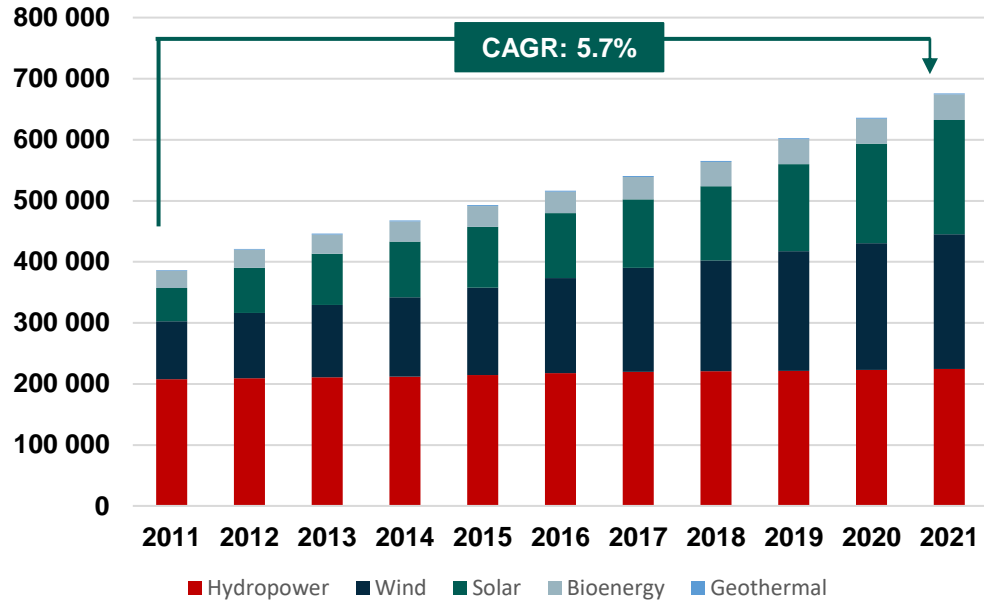
Why Solar?

- Efficiency is not driven by scale
- Panel costs decreasing over time
- Türkiye's huge solar energy potential
- Simple operations compared to other technologies

Total installed capacity of unlicensed power plants has increased significantly over the last couple of years, from around 0.4 GW by the end of 2015 to as high as 8.6 GW by December 2022.



Europe Renewable Installed Capacity (MW)

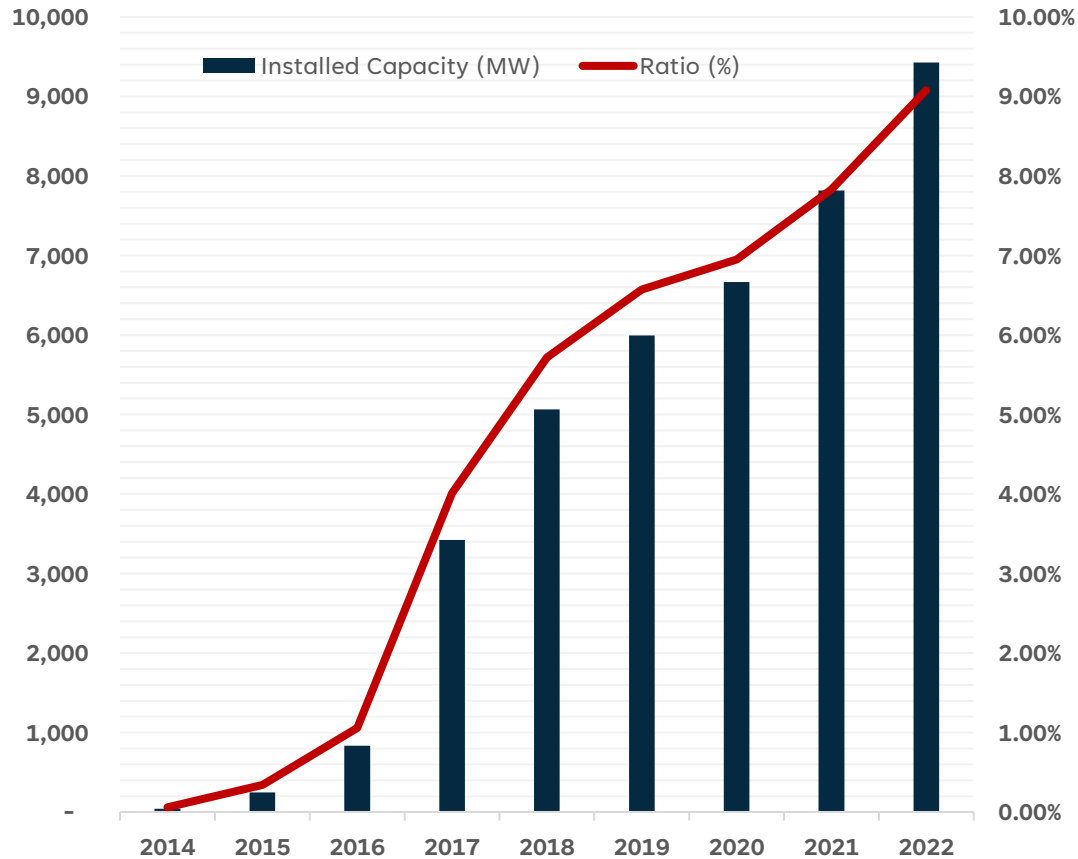


Türkiye has experienced impressive growth in renewables in the past decade driven by a favorable resource endowment, strong energy demand growth and supportive government policies. Accordingly, renewable electricity generation for Türkiye has nearly tripled in the last decade.

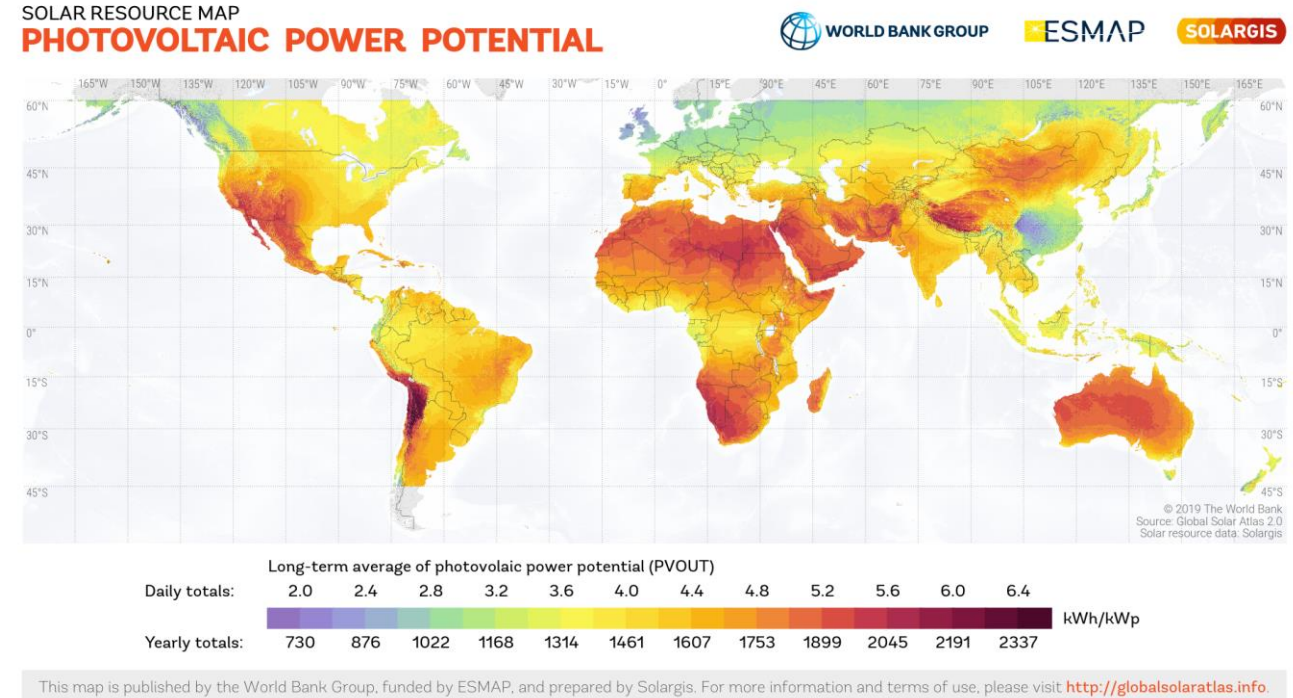
CAGR 11-21	Europe	Türkiye
Wind	9%	20%
Solar	13%	25%
Hydro	1%	5%
Total	5.7%	9%



Solar Power Installed Capacity (MW)



Annual solar irradiation time: 2,741 hours

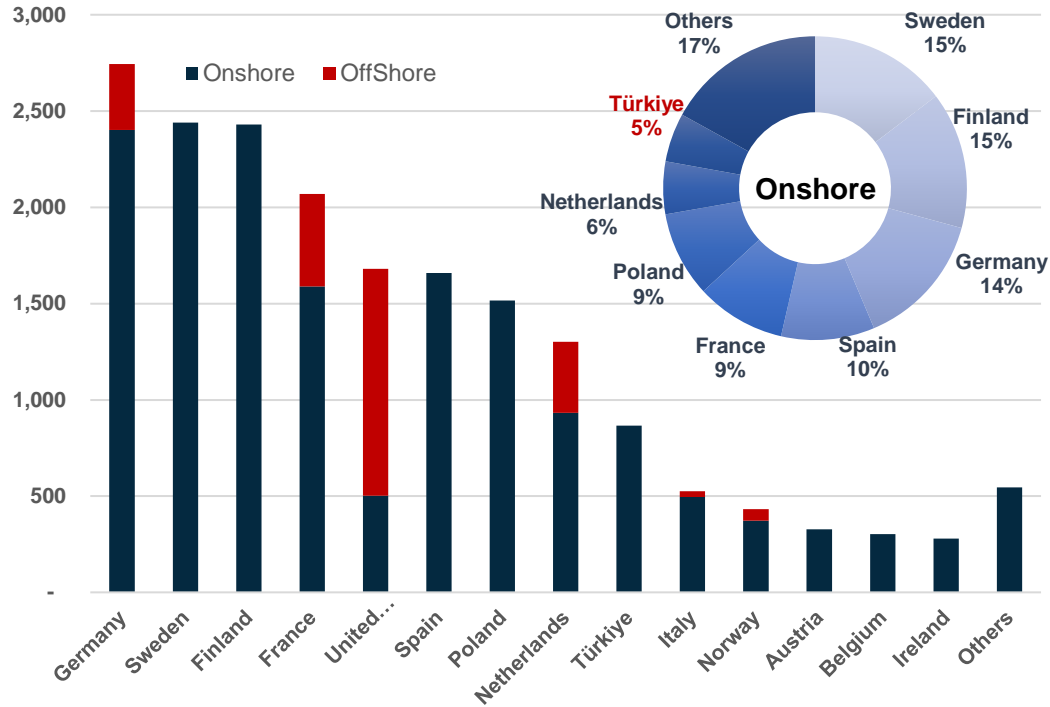


**High potential comes with ever increasing number of projects
9,635 Solar Projects**

National Energy Plan: 52.9 GW projected solar energy capacity by 2035



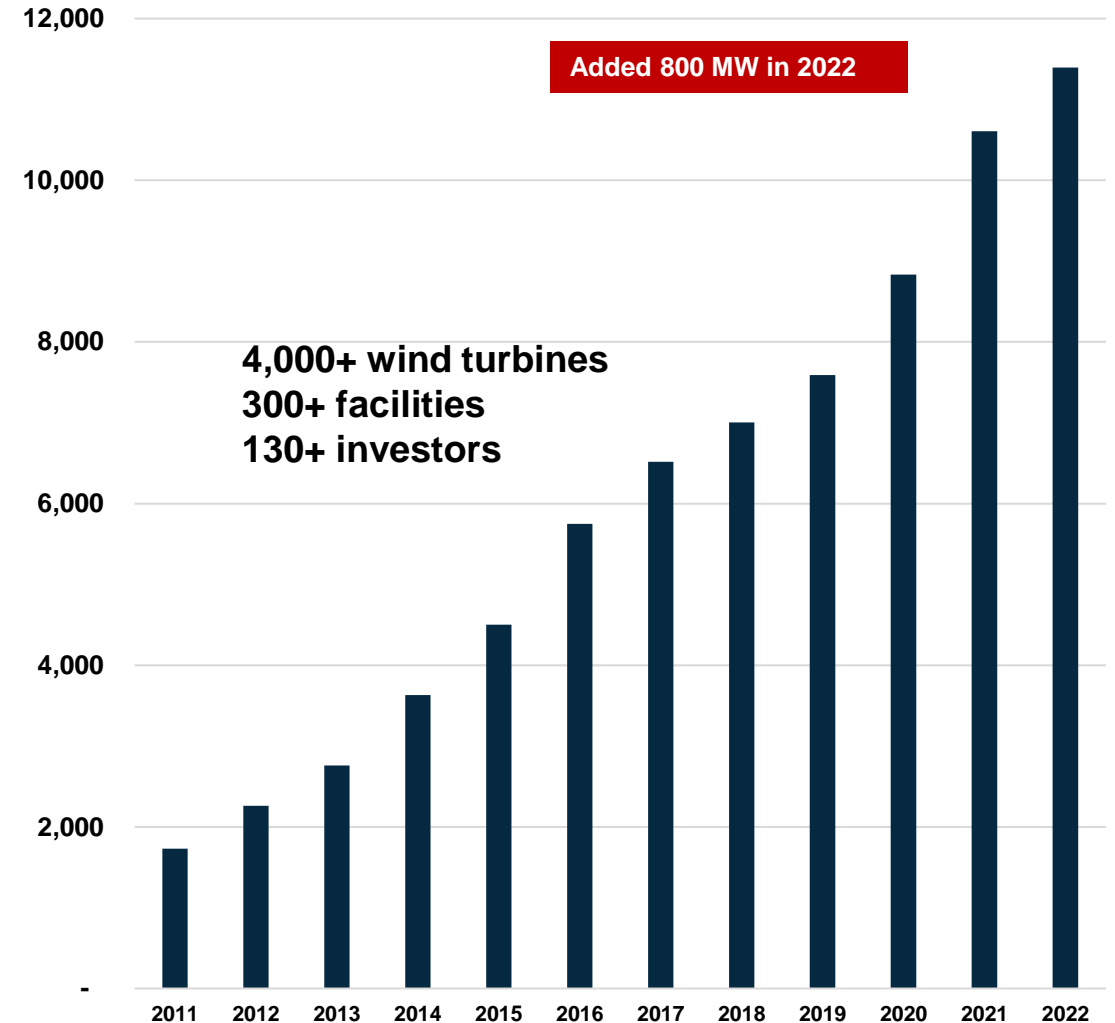
New wind installations in Europe per country in 2022 (MW)



- Plenty of room for offshore
- 8th in new investments

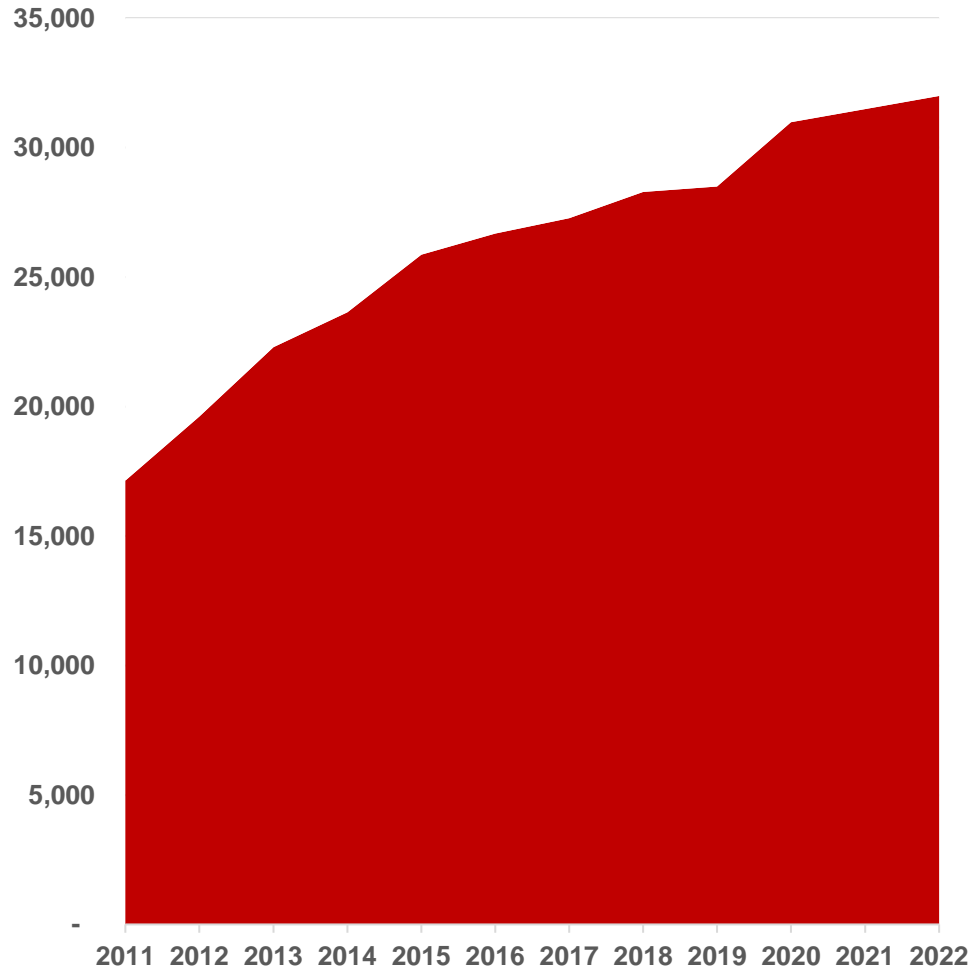
Wind energy makes up 11% of the country's total electricity installed power.

Wind Installed Capacity (MW)

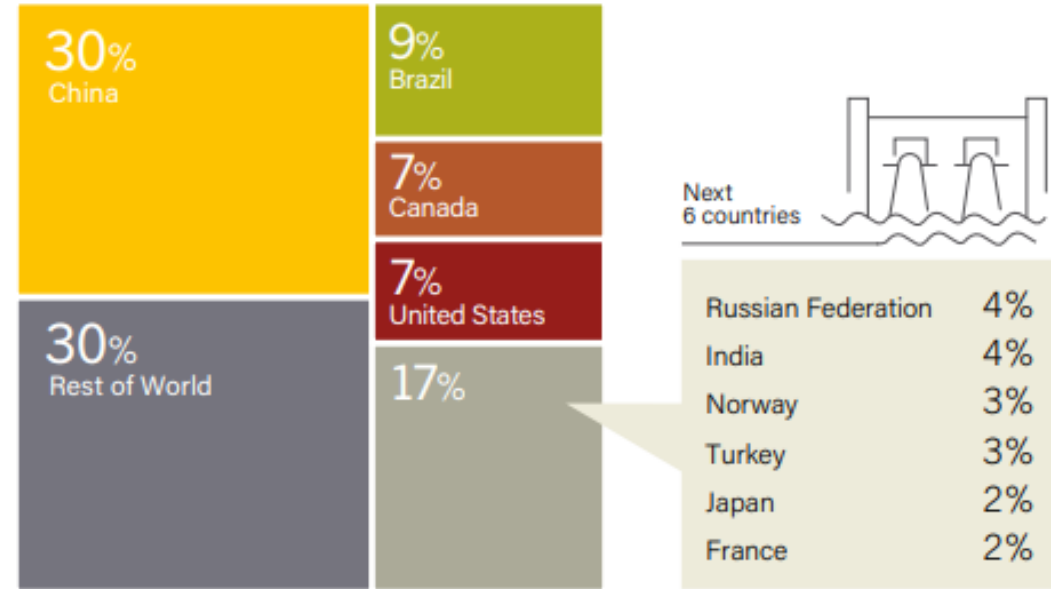




Installed Hydro Capacity of Türkiye (MW)



Hydropower Global Capacity, Shares of Top 10 Countries and Rest of World, 2021

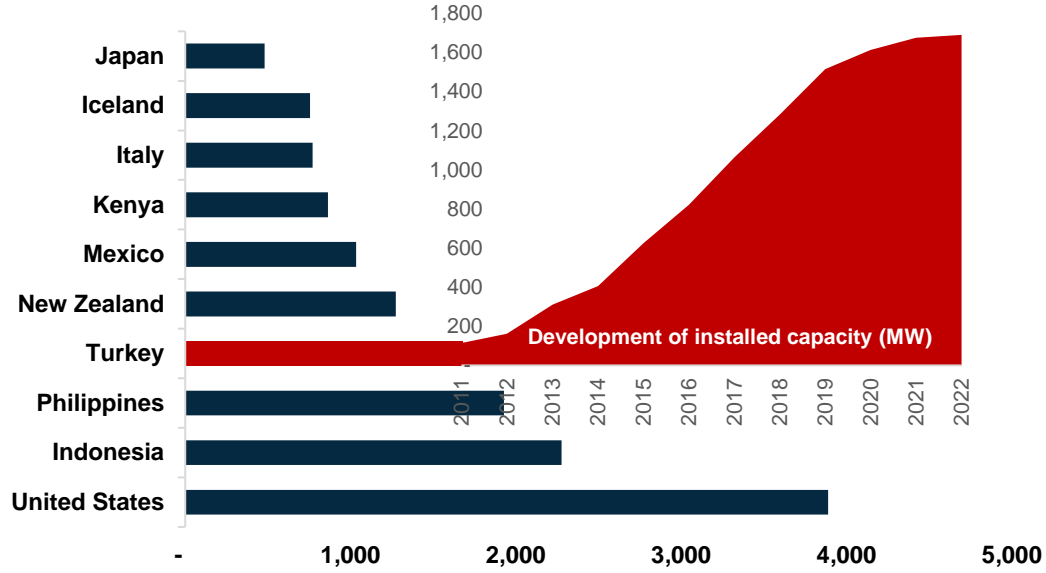


Geothermal

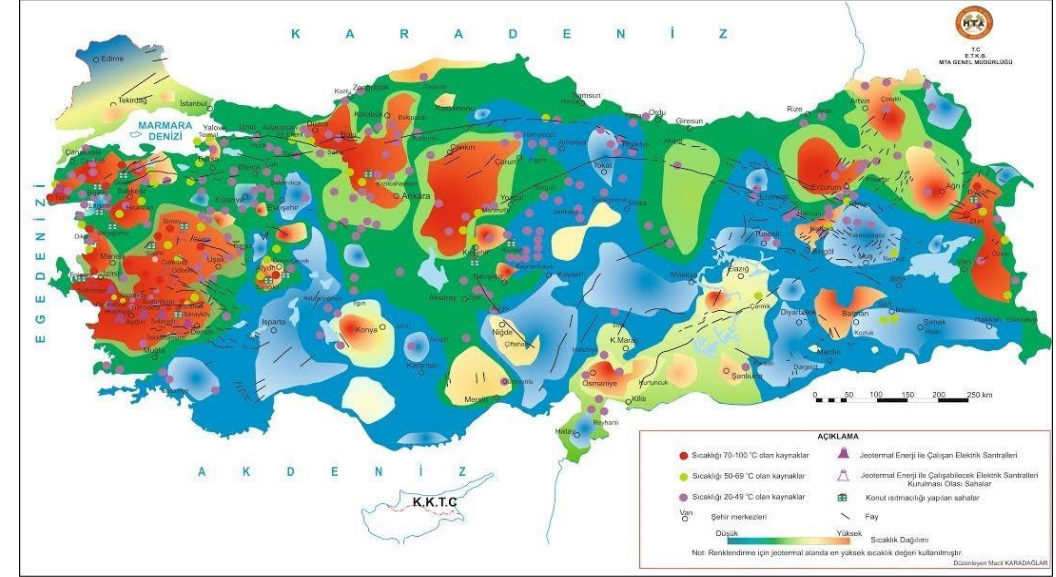
National Energy Plan: 5.1 GW in geothermal and biomass power plants by 2035.



World Geothermal Capacity (MW)







Türkiye Geothermal Map: 1,000 natural geothermal sources



Member of “1 GW Club” along with US, Indonesia, Philippines, New Zealand and Mexico.

Conducive policies and regulatory reforms have allowed Türkiye to scale up geothermal development, increasing its geothermal electricity capacity from 15 MWe in 2008 to over 1.7 GWe in 2022.



Development of Non-Hydro Renewables	December 2007	December 2022	% of Total Capacity as of December 2022
 <p>Wind Large amount of investments due to attractive FIT Schemes under YEKDEM</p>	148 MW	11,455 MW	11%
 <p>Solar Strong growth in the past few years, mainly attributable to unlicensed generation</p>	0 MW	9,685 MW	9.3%
 <p>Geothermal High number of geothermal sources in Türkiye which can be utilized for generation</p>	23 MW	1,666 MW	1.5%
 <p>Biomass Less interest due to high CAPEX and dependency on external source factors (waste collection).</p>	21 MW	2,200 MW	2%

The introduction of YEKDEM to the Turkish electricity market increased investments in renewable energy plants, as it provided the required framework and incentives for market players looking to engage in renewable investments.



A USD based floor price has been introduced.

Source		FIT Price (TL cent / kWh)	Floor Price (US Dolar cent /kWh)	Cap Price (US Dolar cent /kWh)	Local Content (TL cent /kWh)
Hydraulic	Reservoir	144.00	6.75	8.25	28.80
	Run-of-the-river	135.00	6.30	7.70	28.80
Wind	On-Shore	106.00	4.95	6.05	28.80
	Off-Shore	144.00	6.75	8.25	38.45
Geothermal		202.00	9.45	11.55	28.80
Biomass	Landfill Gas/Waste Tires	106.00	4.95	6.05	28.80
	Biomethanization	173.00	8.10	9.90	28.80
	Thermal Disposal	134.90	5.75	8.00	21.58
Solar		106	4.95	6.05	28.80
ESS integrated with wind or solar		125.00	5.85	7.15	38.45
Pumped-storage hydraulic		202.00	9.45	11.55	38.45
Wave/Current		135.00	6.30	7.70	38.45

The correlation between the TRY based rates and USD escalation formula is increased and the escalation period is decreased to 1-month from 3-months.



- The Green Certificate Market in Türkiye started in 2021.
- YEK-G certificates are issued in compliance with EU standards.
- YEK-G provides exporters with a tax exemption solution like the one the EU would normally apply based on carbon emissions.

Green Certificate (YEK-G Certificate)

- Every 1 MWh electricity production will correspond to a YEK-G Certificate.
- YEK-G Certificate Documentation will be valid only 12 months after electricity produced.
- Certificate will tell the source of electricity generated and inform about the environmental impact.

The image shows a form for a YEK-G Certificate. At the top right is the YEK-G logo. Below it are several fields for data entry, including 'YEK-G Sistem Referans Numarası', 'Yılın (Yorum)', 'Etilerim Sıralı Numarası', 'Yeni Belgesi Numarası', 'Üretim Teslimatı', 'Adı', 'Bilgi ve tarih', 'Elektriksel Enerji Gücü', 'Kaynak Türü', 'Üretim Teslimatı Bulunduğu Ülkelerin Adı', 'Ticari / Kimlik Numarası', 'Üretim Teslimatı Konusu', 'Üretim Ölçümü (MWh) / Yıllık Tarih', 'YEK-G Belgesinin İnceleme Tarihi / Saat', 'Üretim Teslimatı Tarihleri', 'YEK-G'nin Durumu', and 'Diğer Bilgiler'. At the bottom right is the EPIAS logo.

2 Main Advantages of The YEK-G Certificates

Sustainability

YEK-G certificates will be able to be used in the sustainability reports as a direct way of expressing carbon emission levels attained. YEK-G certificates will be issued in compliance with EU standards and provide exporters with a tax exemption solution like the one the EU would normally apply based on carbon emissions.

Revenue for Renewable Assets

Companies generating electricity using renewable resources will be able to generate additional income through the issuance and trade of YEK-G certificates

Renewable Energy Zone (REZ) Model

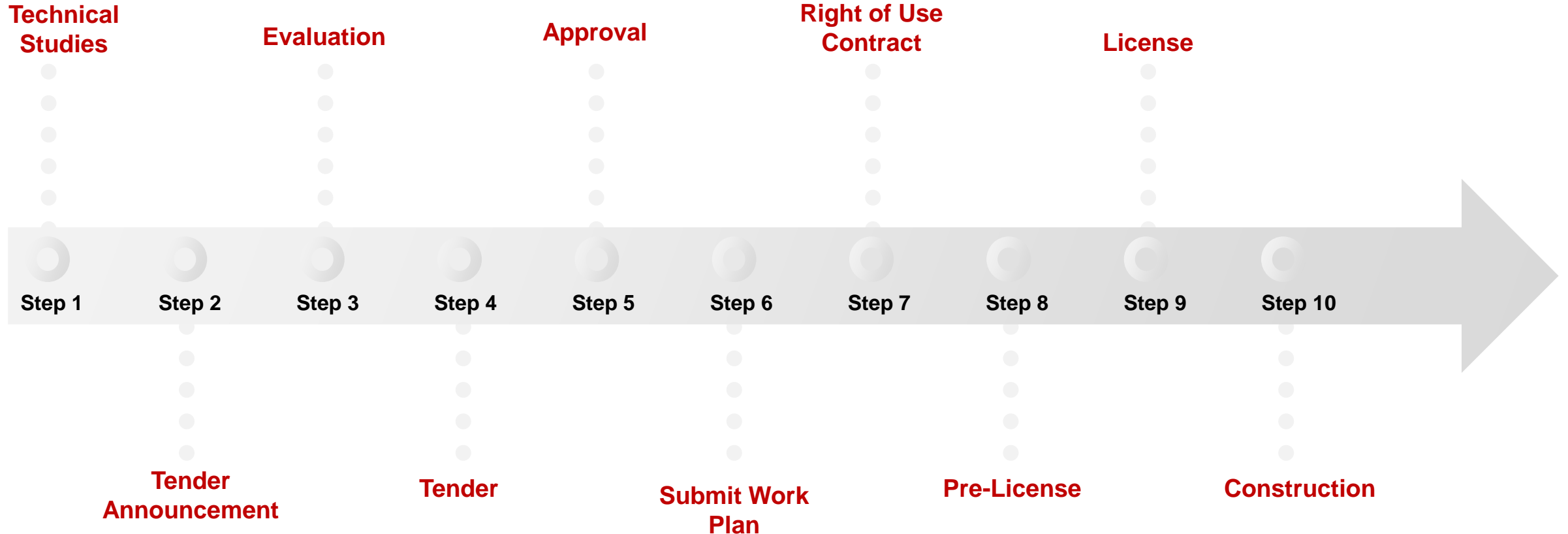
The regulation on the new REZ investment model came into force 2016.



REZ Model

Installed capacities allocated to regions with specific renewable energy capabilities are shared between potential investors, based on their bids in tenders.







- Economies of scale
- Fixed and foreseeable price
- Incentives



Renewable Energy Zone (REZ) Model

The REZ model aims to ensure efficient and effective use of renewable energy resources by setting up large scale REZs in selected areas.



<p><u>REZ GES-1</u> Solar 1 GW \$6,99 cent/kWh Locally Manufactured Components 2017</p> 	<p><u>REZ RES-1</u> Wind 1 GW \$3,48 cent/kWh Locally Manufactured Components 2017</p> 	<p><u>REZ GES-3</u> Solar 1 GW 21.5 TL Kurus/kWh 70% Localization 2021</p> 
<p><u>REZ RES-2</u> Wind 1 GW \$3,53 – \$4.56 cent/kWh 51%-65% Localization 2019</p> 	<p><u>REZ GES-4</u> Solar 1 GW 37.5 – 59.7 TL Kurus/kWh 75% Localization 2022</p> 	<p><u>REZ RES-3</u> Wind 850 MW 40.8 – 77.8 TL Kurus/kWh 51%-70% Localization 2022</p> 



1

IGA SIGNED

Following intergovernmental negotiations, an intergovernmental agreement between the two countries was signed in May 2010.

Akkuyu NPP Project



5

PROJECT CALENDAR

The first unit is due to start operations in the near term. The remaining three units are scheduled to be put into operation one year apart.

2

10% OF DOMESTIC ELECTRICITY NEEDS

Once completed, the plant will fulfill about 10% of domestic electricity needs.

PREVENT GHG EMISSIONS

Akkuyu will prevent around 35 million tonnes of greenhouse gas emissions per year.

3

PROJECT STATUS

Construction of units 1-4 began in April 2018, April 2020, March 2021 and July 2022, respectively. So; the construction site is the largest of its kind around the globe. More than 25,000 people work at the Akkuyu NPP site.

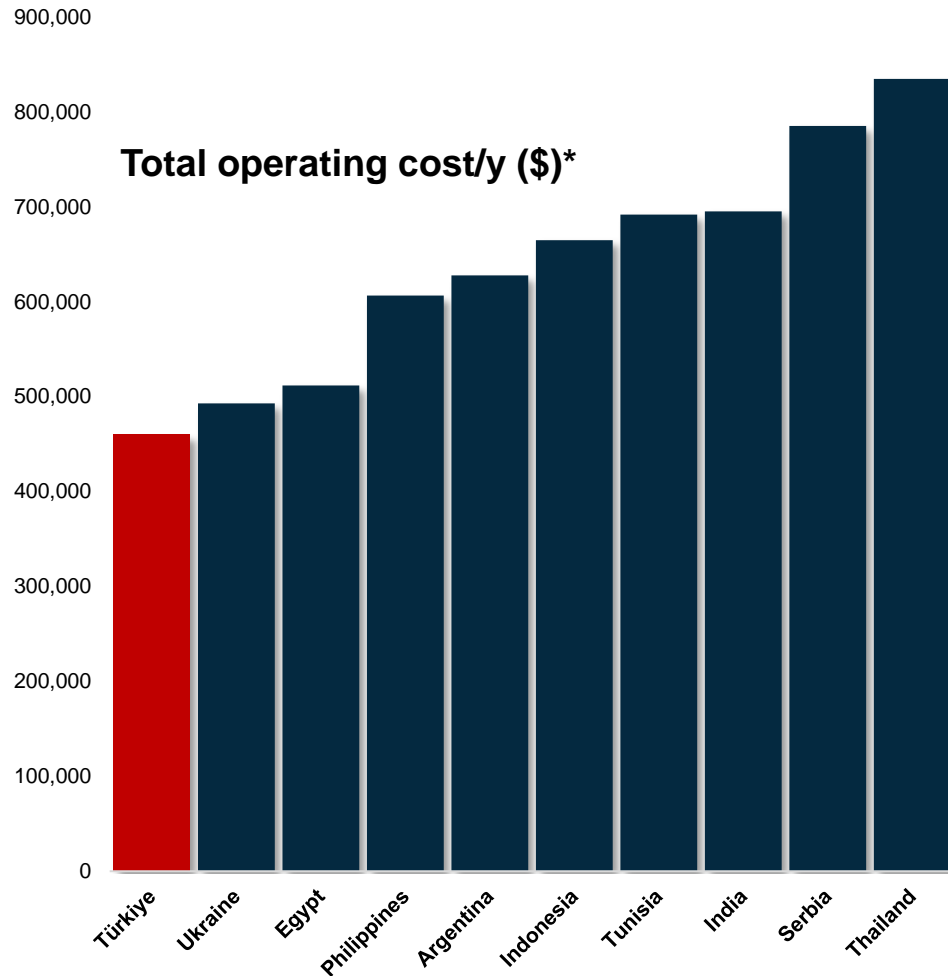
4

Wind Equipment Manufacturing

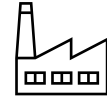
With the Turkish government's strong ambitions to build out its wind manufacturing capacity, int'l companies have made commitments to the Turkish market over recent years.



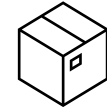
Best locations for cost of operating a wind turbine manufacturing facility



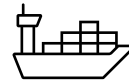
*Labour costs required to operate a facility with 75 employees for a year.



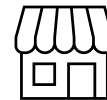
~ 100 manufacturers



1 b €/a worth equipment export



Export to 45 countries



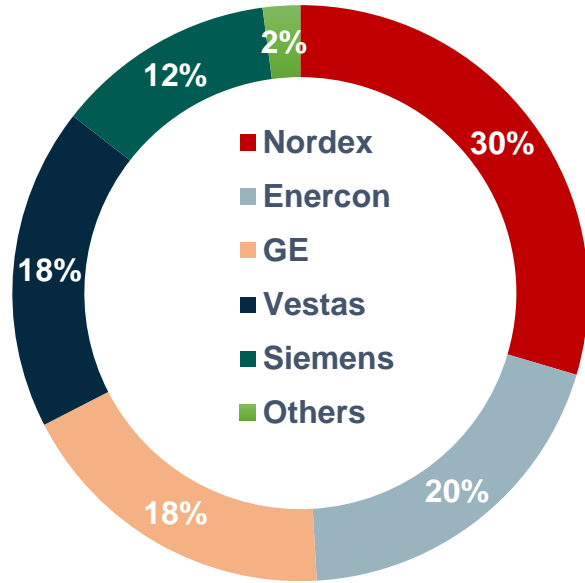
85% export
15% domestic market sales



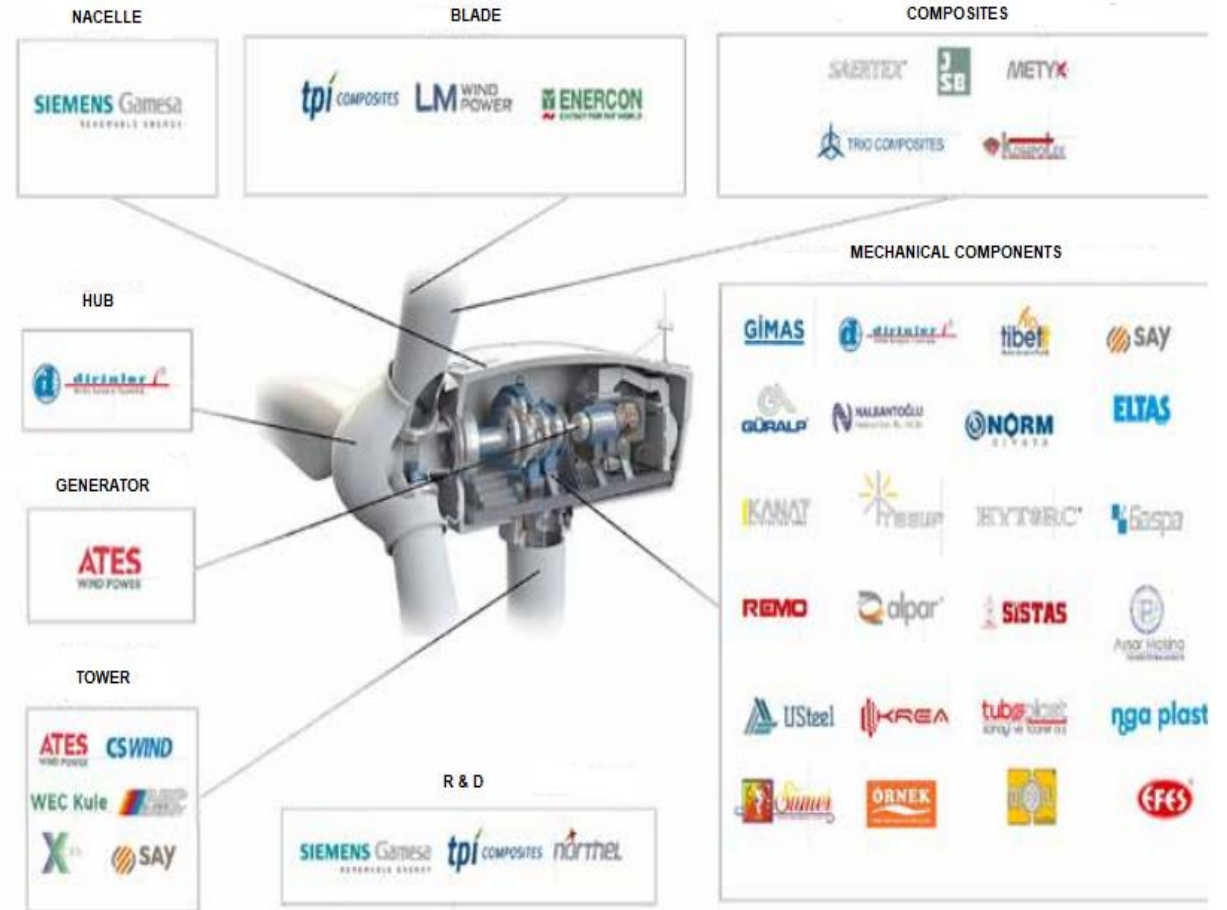
20,000 direct labor force



Wind Turbine OEMs in Türkiye (December 2021)



- 6 tower producers
- 4 blade producers
- 2 casting producers
- Almost 300 operational wind energy plants
- İzmir is the wind energy capital of Türkiye and the surrounding geography in Eastern Europe.

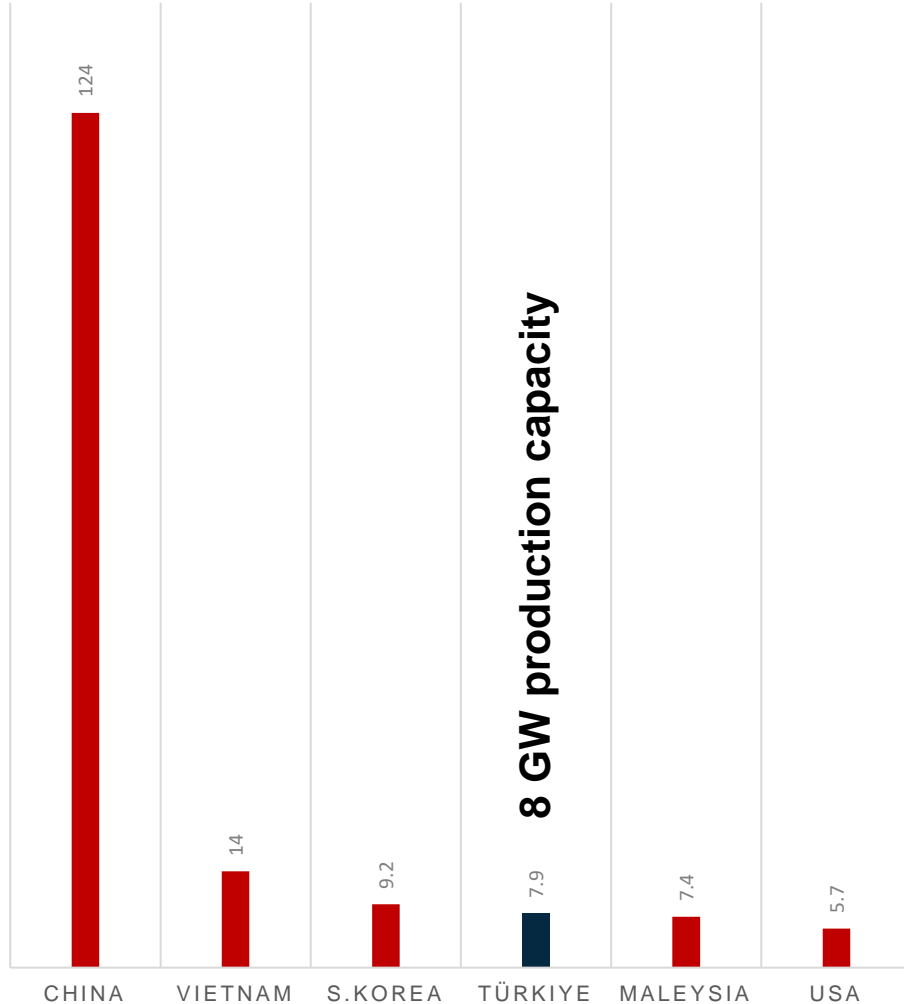
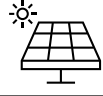


Solar PV Installation Costs

Rapidly growing market and changing production structure needs continuous investments.



Solar Panel Producing Capacity (GW)



Solar PV Installation Costs

Country	Cost – 2021 (USD / kW)
India	590
China	628
Viet Nam	690
Germany	694
Italy	785
France	808
Türkiye	810
Spain	816
United Kingdom	848
Republic of Korea	940
Netherlands	1,022
Australia	1,023
Ukraine	1,035
United States	1,085
Japan	1,693

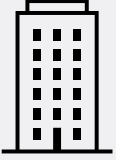
Competitive cost structures continue to prevail in more recently established markets like Türkiye, where total installed costs declined 5% between 2020 and 2021.



National Hydrogen Plan
Share of hydrogen in the gas mixture for 2035 is set at 3.5%
Installed electrolyzer capacity will reach 2 GW in 2030, 5 GW in 2035

Renewable Energy Potential
Ready Port Infrastructure
Export Route (Pipeline)
Geographic proximity EU&MENA

Project Based Incentives
Tailor-Made Incentives



128 license holders as of May 2023

- Min. 50 units
- License fee: \$33,000
- Necessary software
- Brand



15,000 EVs

2030 Projections: 1,000,000 EVs

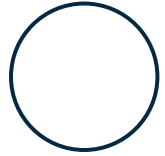
TOGG has a huge potential



6,500 charging units

Increasing need of charging units both commercial and residential





Application
Documentation



**Teias – Distribution
Company**
Connection review



MENR
Technical review



Pre-License
Collateral



License

Total expected licensed capacity 35-40 GW

- **Independent from intermittent resource capacity evolution**
- **Connection view can be generated independently of any capacity allocation competition.**
- **Does not require measurement for wind investments**



Oil & Gas Market

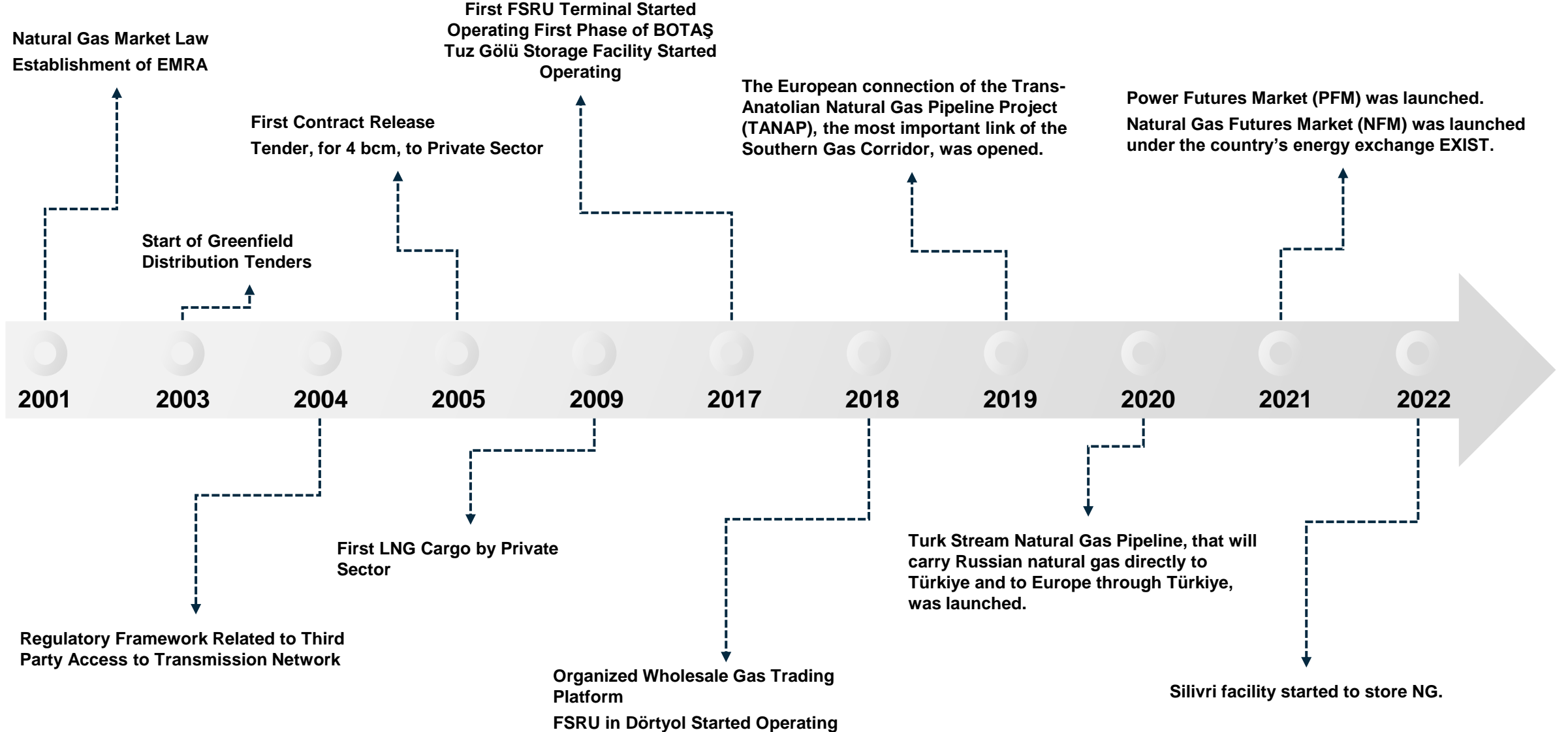
Oil & Gas Infrastructure

Important for world oil flow and Europe.



Natural Gas

Several important milestones of natural gas market in Türkiye took place in the last two decades.

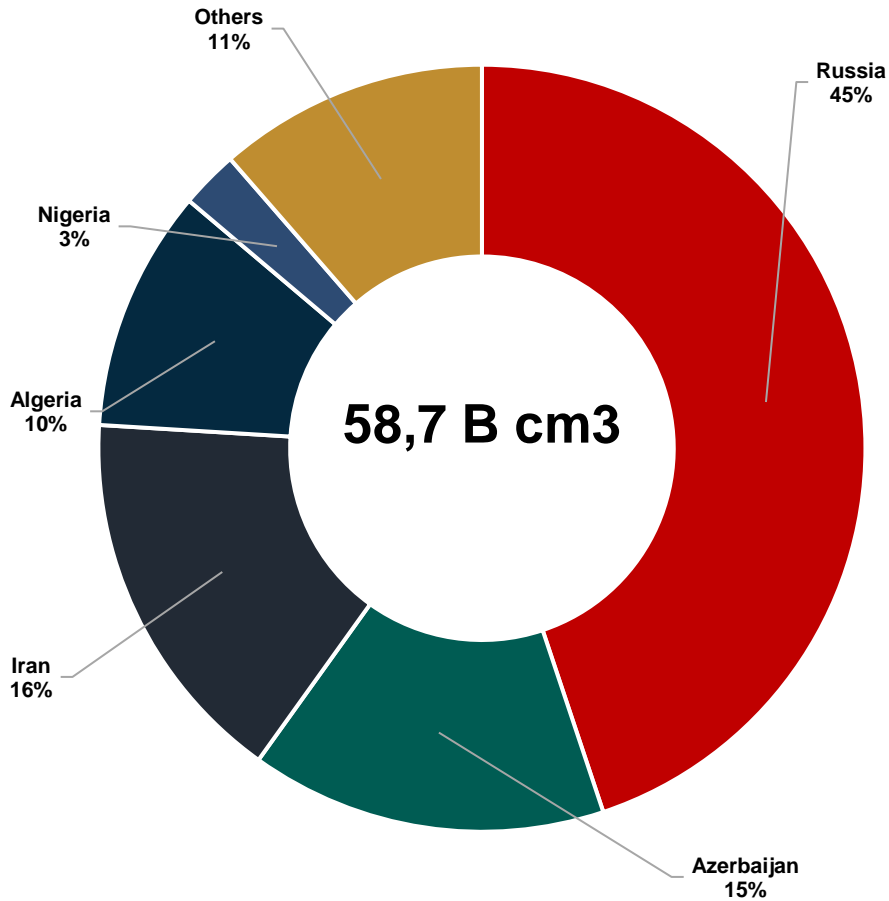


Natural Gas Market

Improved storage, diversification of import sources and flexibility in the natural gas network help strengthen Türkiye's position in negotiations with suppliers.

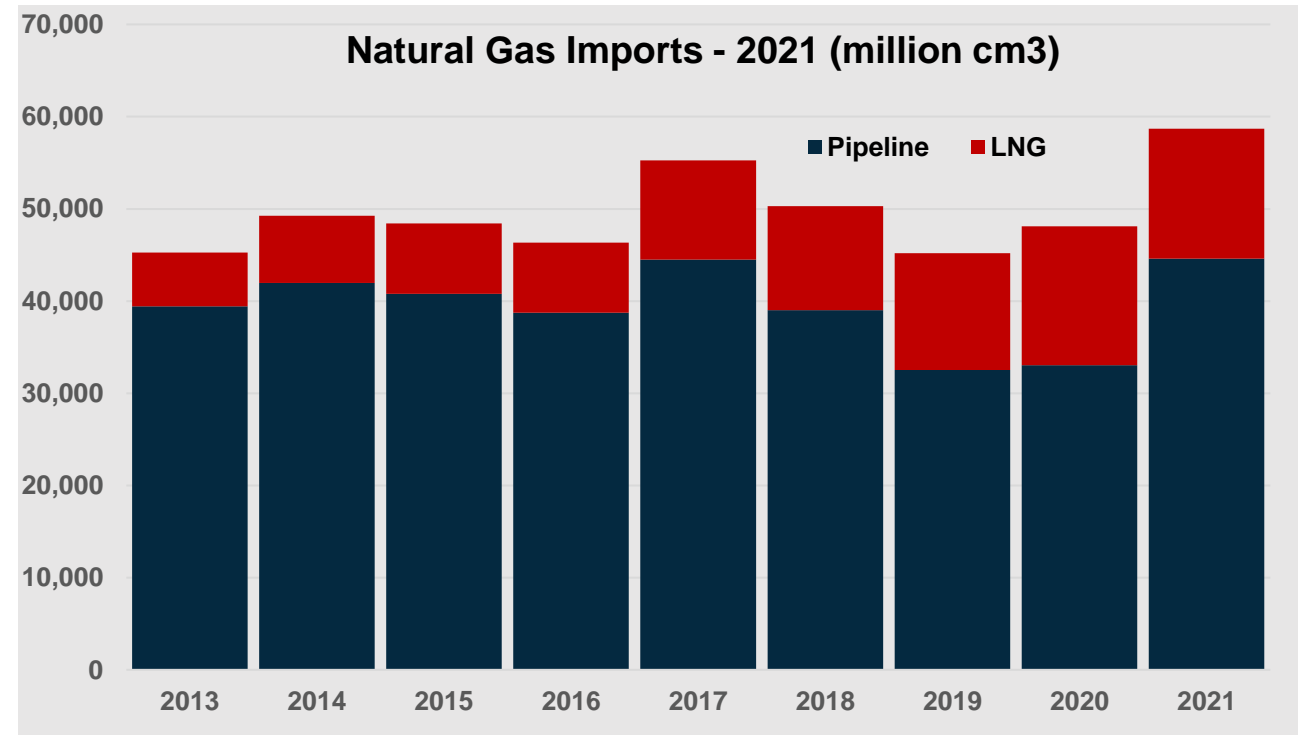


Natural Gas Imports Breakdown By Countries (2021)



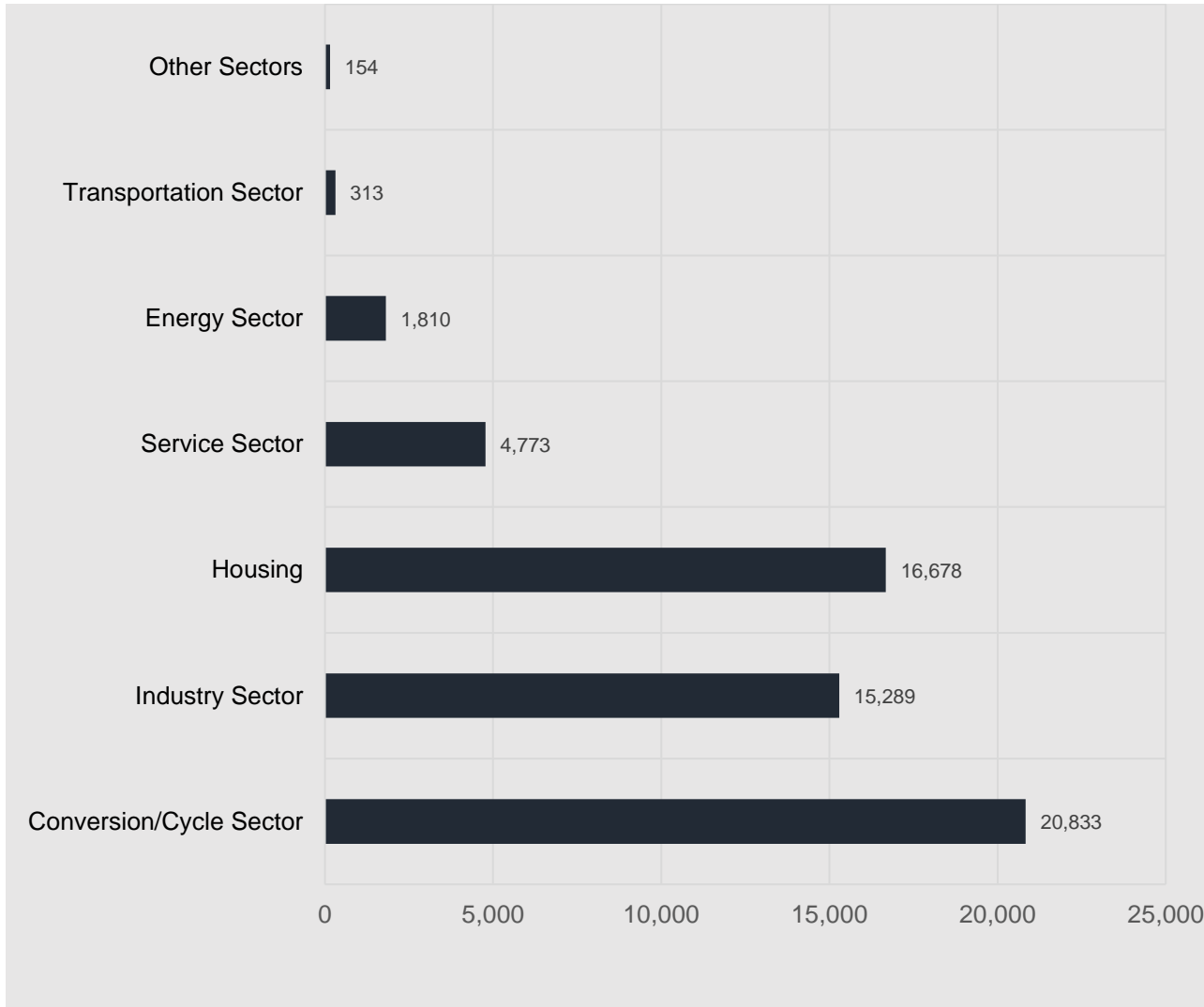
Total Demand: 60 B cm3

Natural gas is supplied via imports made through long-term pipeline and LNG contracts. Almost all of the natural gas supply is imported via long-term contracts.





Natural Gas Consumption by Sectors (million Sm3)



Number of consumers

2020 → 17,500,000

2021 → 18,500,000

2022 → 19,000,000



Incentives



General Investment Incentives

- Custom duty exemption
- Vat exemption

Regional Investment Incentives

- Customs Duty Exemption
- VAT Exemption
- Corporate Tax Reduction Social Security Premium
- Support (Employer's Share)
- Land Allocation
- Interest Rate Support



- Social Security Premium Support (Employee's Share)
- Income Tax Withholding Support

Strategic Investment Incentives

- Customs Duty Exemption
- VAT Exemption
- Corporate Tax Reduction Social Security Premium
- Support (Employer's Share)
- Land Allocation
- Interest Rate Support
- VAT Refund

Project Based Investment Incentives

- Cash Support
- VAT Exemption
- Customs Duty Exemption
- Corporate tax reduction up to 200% of investment expenditures
- Social security premium support for up to 10 years (employer's share)
- Income tax withholding support for 10 years Qualified personnel support for up to 5 years
- Energy support for up to 50% of energy expenditures for up to 10 years
- 10 years Interest rate support for up to 10 years
- Capital contribution up to 49% of the investment amount
- Land allocation for 49 years Infrastructure support Purchasing guarantee
- Facilitation of authorization-permit-license procedures
- VAT refund for building-construction expenditures

Project Based Incentives

Tailor-made incentive mechanisms are available for selected investors.



Incentive	Eligibility Criteria	Supports
Project Based Investment Incentives	Minimum fixed investment amount of TRY 1 Billion (~52 Million USD)	<ul style="list-style-type: none"> Cashback Support VAT Exemption VAT Refund Customs Duty Exemption Corporate Tax Reduction up to 200% of investment expenditures Social Security Premium Support (Employer's Share) for up to 10 years
	Technology intensive and strategic products should be produced	<ul style="list-style-type: none"> Income Tax Withholding Support* for 10 years Qualified Personnel Support for up to 5 years
	High added-value in investment and manufacturing	<ul style="list-style-type: none"> Energy Support for up to 50% of energy expenditures for up to 10 years Interest Rate Support for up to 10 years Capital Contribution up to 49% of the investment amount <ul style="list-style-type: none"> Land Allocation Infrastructure Support Purchasing Guarantee Facilitation of Authorization / Permit / License Procedures
	Manufacturing focusing on import-dependent products (non-locally produced or locally produced at small quantities)	

PROJECT BASED INVESTMENT INCENTIVE EXAMPLES

Ford's Commercial Vehicle and Battery Production Investment (TRY 20.5 Billion)	VAT Exemption	Customs Duty Exemption	VAT Refund	Corporate Tax Reduction (Support Rate 100%)	Social Security Premium Support - Employer's Share (10 years)	Income Tax Withholding Support (10 years)	Qualified Personnel Support (TRY 250 Million)	Energy Support (TRY 200 Million)	Land Allocation
Kalyon's Photovoltaic Solar Panel Production Investment (TRY 3.7 Billion)	VAT Exemption	Customs Duty Exemption	VAT Refund	Corporate Tax Reduction (Support Rate 70%)	Social Security Premium Support - Employer's Share (10 years)	Income Tax Withholding Support (10 years)	Qualified Personnel Support (TRY 100 Million)	Interest Rate Support (TRY 300 Million)	Energy Support (TRY 240 Million)
Smart's Photovoltaic Solar Panel Production Investment (TRY 7.7 Billion)	VAT Exemption	Customs Duty Exemption	VAT Refund	Corporate Tax Reduction (Support Rate 80%)	Social Security Premium Support - Employer's Share (10 years)	Income Tax Withholding Support*	Qualified Personnel Support (TRY 120 Million)	Energy Support (TRY 100 Million)	Land Allocation



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