



**INVEST IN TURKEY**

**WHY INVEST IN  
TURKISH  
ENERGY SECTOR**



# Executive Summary

## Turkey's Energy Outlook

## Growth Drivers in Turkish Energy Sector

Strategic Plan and Vision 2023

Renewable Energy

Coal

Natural Gas & LNG

## Opportunities in Turkish Energy Sector

## Success Stories

# EXECUTIVE SUMMARY

Turkey has a growing lucrative energy industry offering opportunities in many sub-sectors including from renewables to conventional resources...



## Robust Growth in the Industry

- Turkey's electricity industry has been robustly growing over more than a decade with more than 5% CAGR
- Increasing investments and energy infrastructure remains a priority, due to the country's strong demographic growth and the government's commitment to enhance energy supply security.

## Favorable Investment Environment

- Strong macroeconomic growth with increasing income per capita and a burgeoning middle-class
- Favorable demographics with a dynamic, young, and skilled labor force supporting the industry
- Strong government support through incentives and tax benefits
- Lucrative investment areas addressing different scales of energy investors

## Strategic Position as Energy Crossroads

- Strategic position of being an energy corridor for transporting energy resources from the Middle East and Central Asia regions to Europe
- Pipeline and electricity transmission interconnections with neighboring countries allowing for electricity and conventional resources trade.

## Strong Impetus to Utilize Untapped Local Resources

- Strong commitment to support domestic coal, oil and natural gas exploration, and production operations
- Firm commitment to utilize local and renewable energy resources in electricity generation in order to reduce reliance on import fuels



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# TURKEY

6<sup>TH</sup>

LARGEST ELECTRICITY MARKET IN **EUROPE**

WITH 85.2 GW INSTALLED POWER

5<sup>TH</sup>

LARGEST ENERGY CONSUMER IN **EUROPE**

WITH 137.9 MTOE CONSUMPTION PER YEAR (18<sup>TH</sup> Largest in the World)

4<sup>TH</sup>

LARGEST GAS CONSUMER IN **EUROPE**

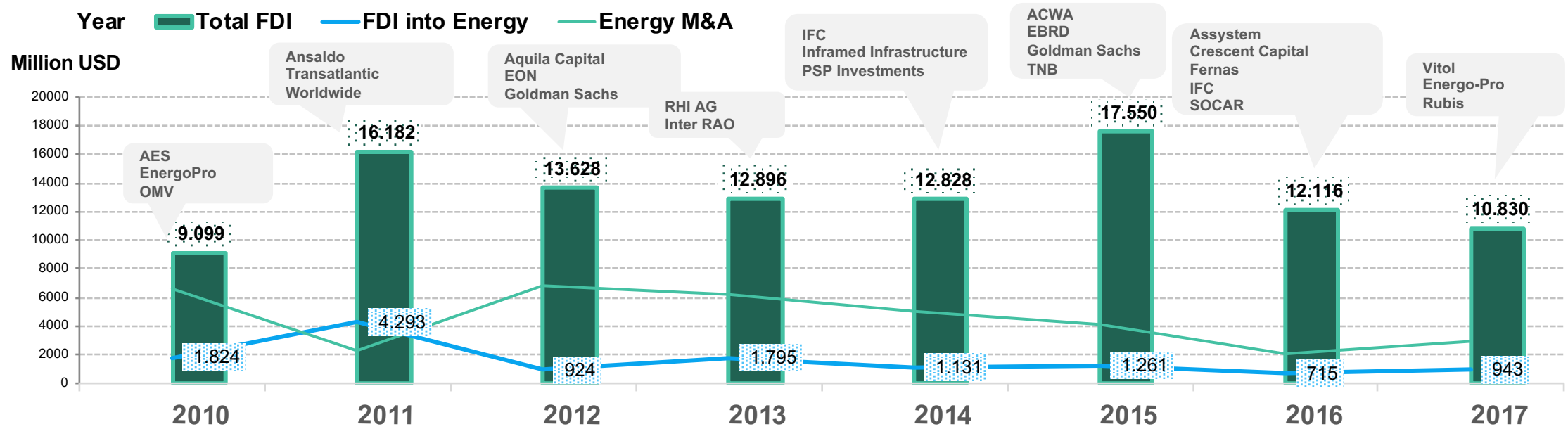
WITH 53.4 BCM CONSUMPTION



GEOGRAPHIC PROXIMITY TO **73% OF WORLD'S OIL AND GAS RESERVES**



AMONG THE WORLD'S LARGEST GROWING **RENEWABLE ENERGY MARKETS**



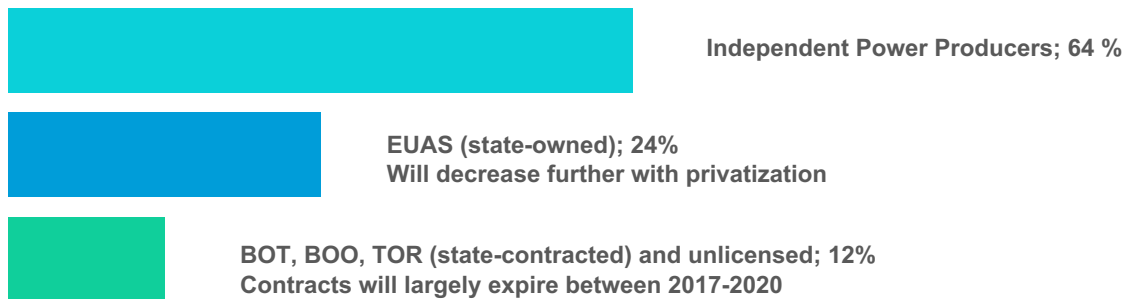
**About 18 billion USD of FDI into energy sector between 2002 and 2017**

The prominent economic performance allows for attraction of around 193 bn USD of FDI between 2002 and 2016 and Turkish economy is expected to attract 70 bn USD of FDI within the next 4 years.

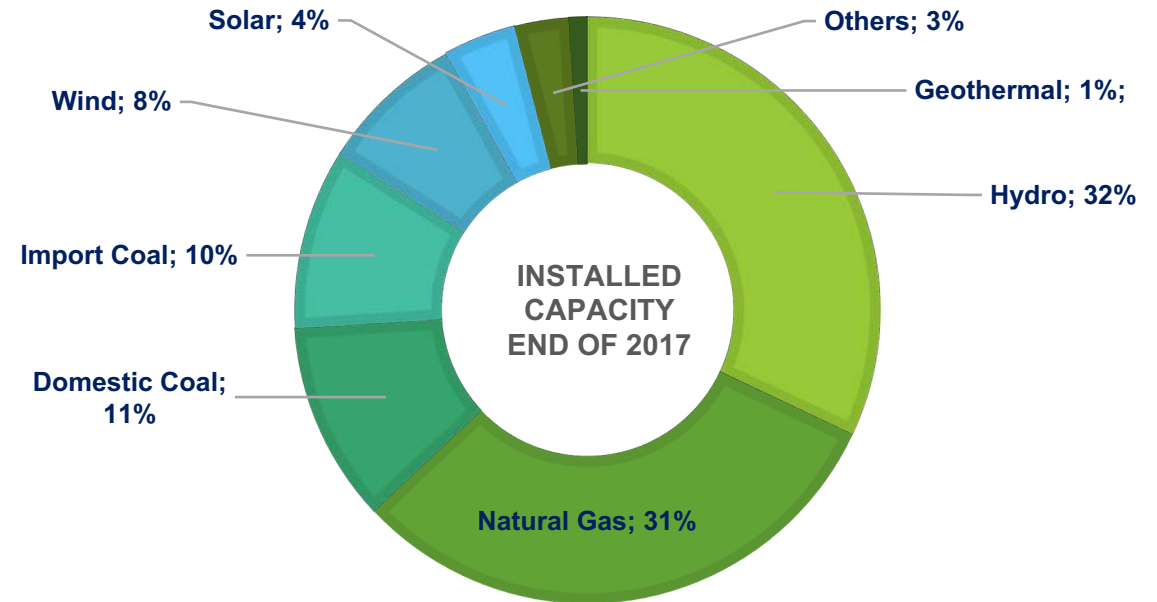
Energy, manufacturing, financial&insurance services and logistics sectors account for 46,2% of the total FDI inflow. And European countries have the biggest share comprising 67% in total FDI.



**Installed Power Breakdown by Generators**



**294.4 bn kWh consumption (Up 6.3% from 2016)**  
**295.5 bn kWh generation (Up 8.4% from 2016)**



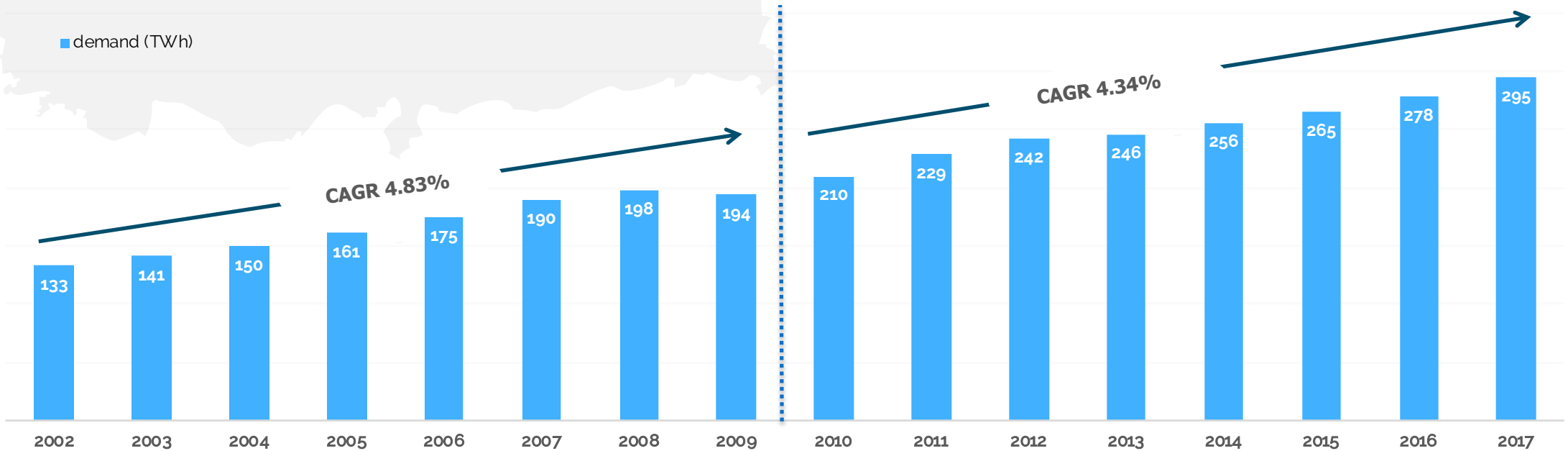


**HIGHEST**  
market growth  
rate  
**in Europe**



**5.1% GROWTH SINCE 2002**

Next to China and India  
Higher than Brazil,  
Mexico, Iran and South  
Africa





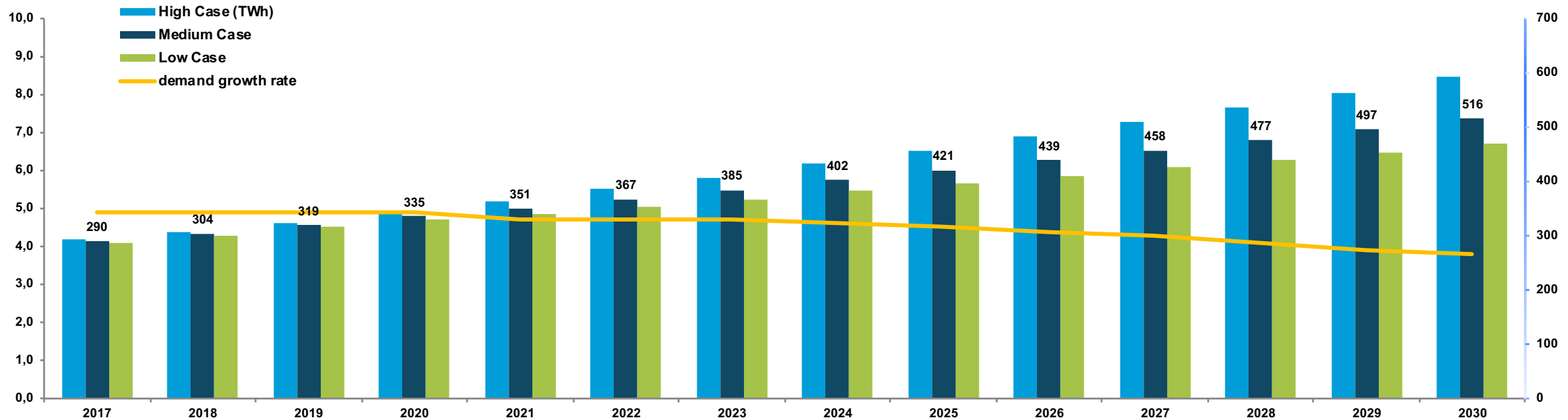


## GROWTH RATE TO BE BETWEEN 4% AND 5%

In line with GDP growth forecast of 3.5-4%



## DEMAND AND SUPPLY TO DOUBLE BY 2030





## GENERATION

Includes 5,021 power plants (EUAS, BOT/BOO/TOR and IPPs with increasing share)



## TRANSMISSION

State-owned monopoly TEIAS is the system operator, runs balancing market and ancillary services. Total length of transmission lines is 66,285 km.



## WHOLESALE

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



## DISTRIBUTION

Regulated market for about 42.5M consumers with 21 private DisCos. Total length of distribution lines is 1,128,550 km



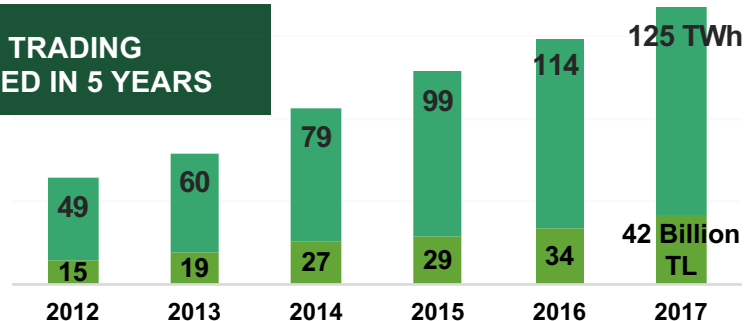
## SUPPLY

Over 4.6 m eligible consumers (and 8 m potential) with a minimum of 2000 kWh consumption per year, Tariffs are appr. 5.2 ¢ USD for household & 5.3 ¢ USD for industry excluding taxes and fees

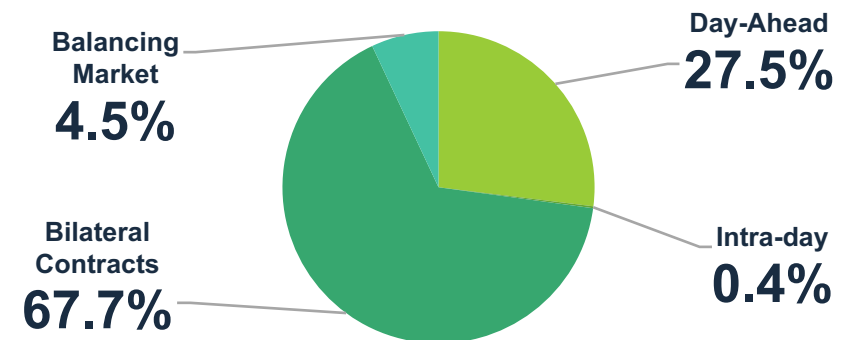


### SPOT MARKET TRADING NEARLY TRIPLED IN 5 YEARS

Accounts for 35% of the market with 938 market participants. Includes day-ahead and intraday markets.



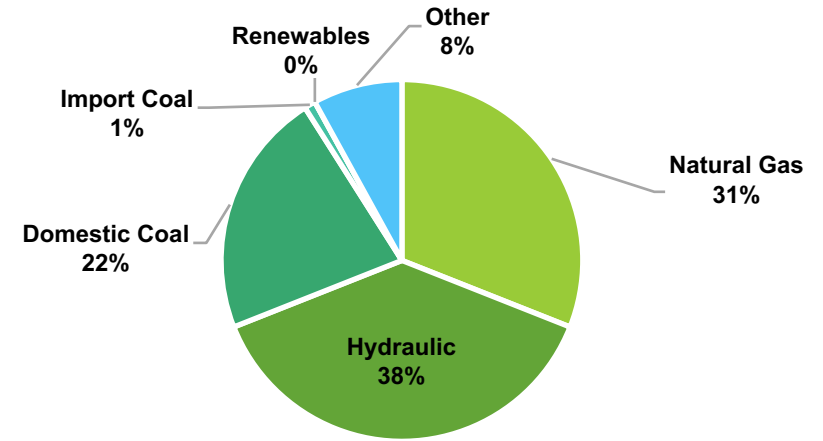
### ELECTRICITY TRADE





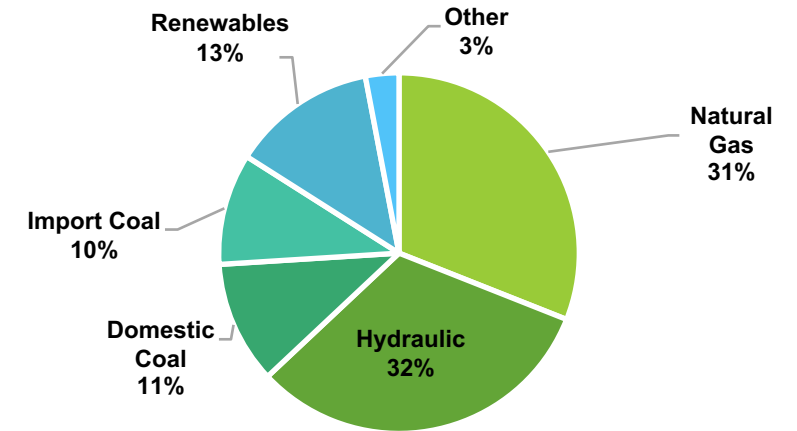
(2002)

Resources	Installed Capacity (MW)	Share (%)	Generation (TWh)	Generation Share (%)
Natural Gas	9,702	31	52.50	41
Hydraulic	12,241	38	33.50	26
Domestic Coal	6,959	22	28.00	22
Import Coal	480	1	4.1	3
Renewables	34	0	2	0
Other	2,761	8	10.90	8
Total	31,846	100	129.40	100



(2017)

Resources	Installed Capacity (MW)	Share (%)	Generation (TWh)	Generation Share (%)
Natural Gas	26,638	31	108.1	37
Hydraulic	27,273	32	58.3	20
Domestic Coal	9,872	11	44	15
Import Coal	8,794	10	51.1	17
Renewables	11,000	13	26.5	10
Other	1,623	3	7.5	1
Total	85,200	100	295.5	100





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## 2015-2019 STRATEGIC PLAN

To ensure energy supply security, quality and affordability across the population while ensuring environmental sustainability



Decrease share of natural gas below 30% in electricity generation



Increase gas storage to 10% of consumption



Increase electricity generation from local coal to 60 TWh



Utilization of renewable energy potential in a cost-effective manner 30% renewables by 2023



Increase hydro capacity to 32 GW, wind capacity to 10 GW, solar capacity to 3 GW

## TURKEY'S 2023 VISION

- Raising Total Installed Power Capacity to 120 GW
- Increasing Share of Renewables to 30 Percent
- Maximizing Use of Hydropower and Reaching 34 GW
- Increasing Wind Installed Capacity to 20 GW
- Increasing Solar Installed Capacity to 10 GW
- Installing 1 GW Geothermal
- Extending Use of Smart Grids
- Raising Natural Gas Storage Capacity to More than 11 BCM
- Commissioning Nuclear Power Plants (Two Operational Nuclear Power Plants, with a Third Under Construction)
- Increasing Coal-fired Installed Capacity to 30 GW



**20 GW WIND**  
**\$22 BILLION**



**10 GW SOLAR**  
**\$7 BILLION**



**34 GW HYDRO**  
**\$17 BILLION**



**NUCLEAR**  
**\$27 BILLION**



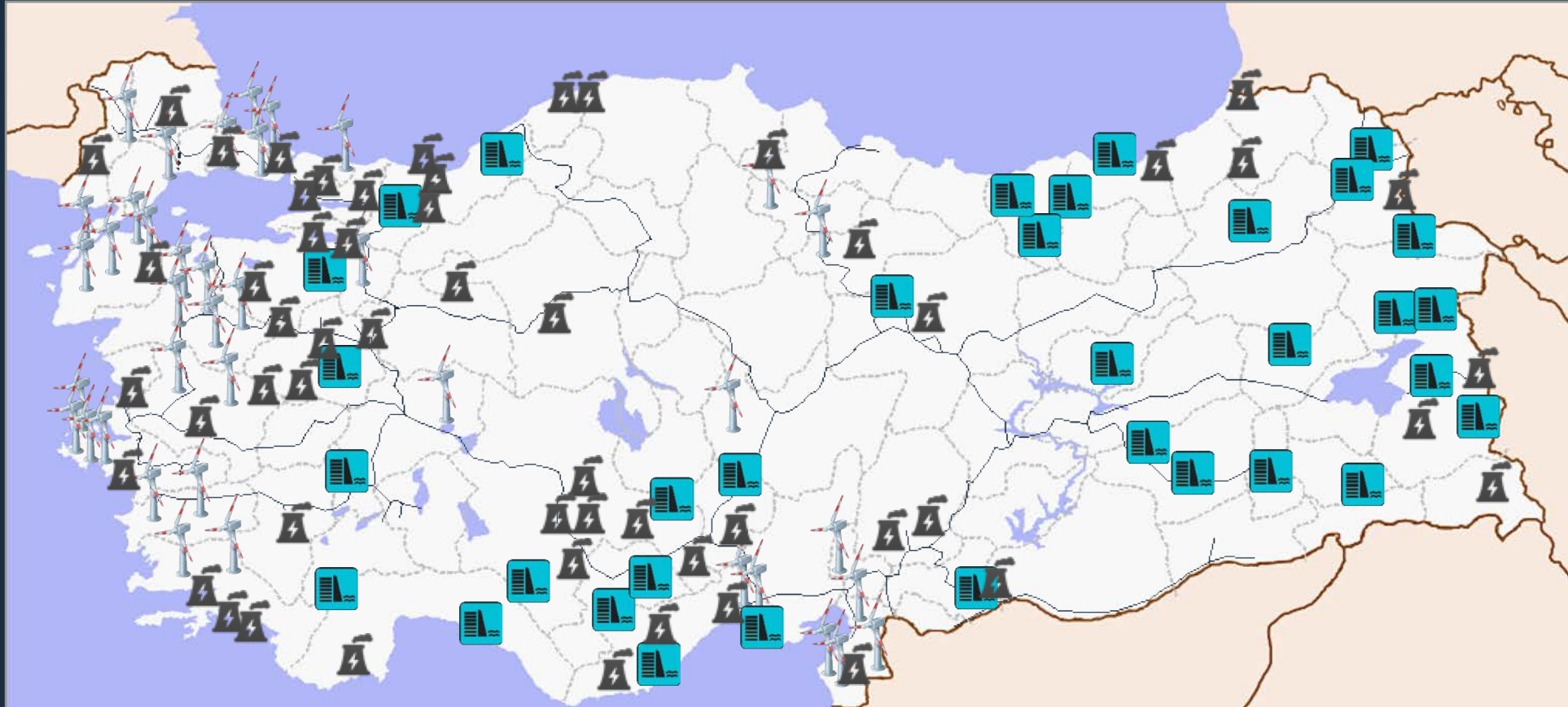
**COAL**  
**\$14 BILLION**



**GRID**  
**\$15 BILLION**



  31,846 MW total installed power    17 MW Wind Power



  64,007 MW total installed power    2,760 MW Wind Power





120 GW total installed power



2 Nuclear Power Plants with  
10 GW (Mersin&Sinop)



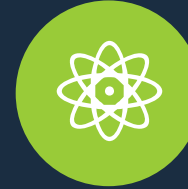
20 GW wind power



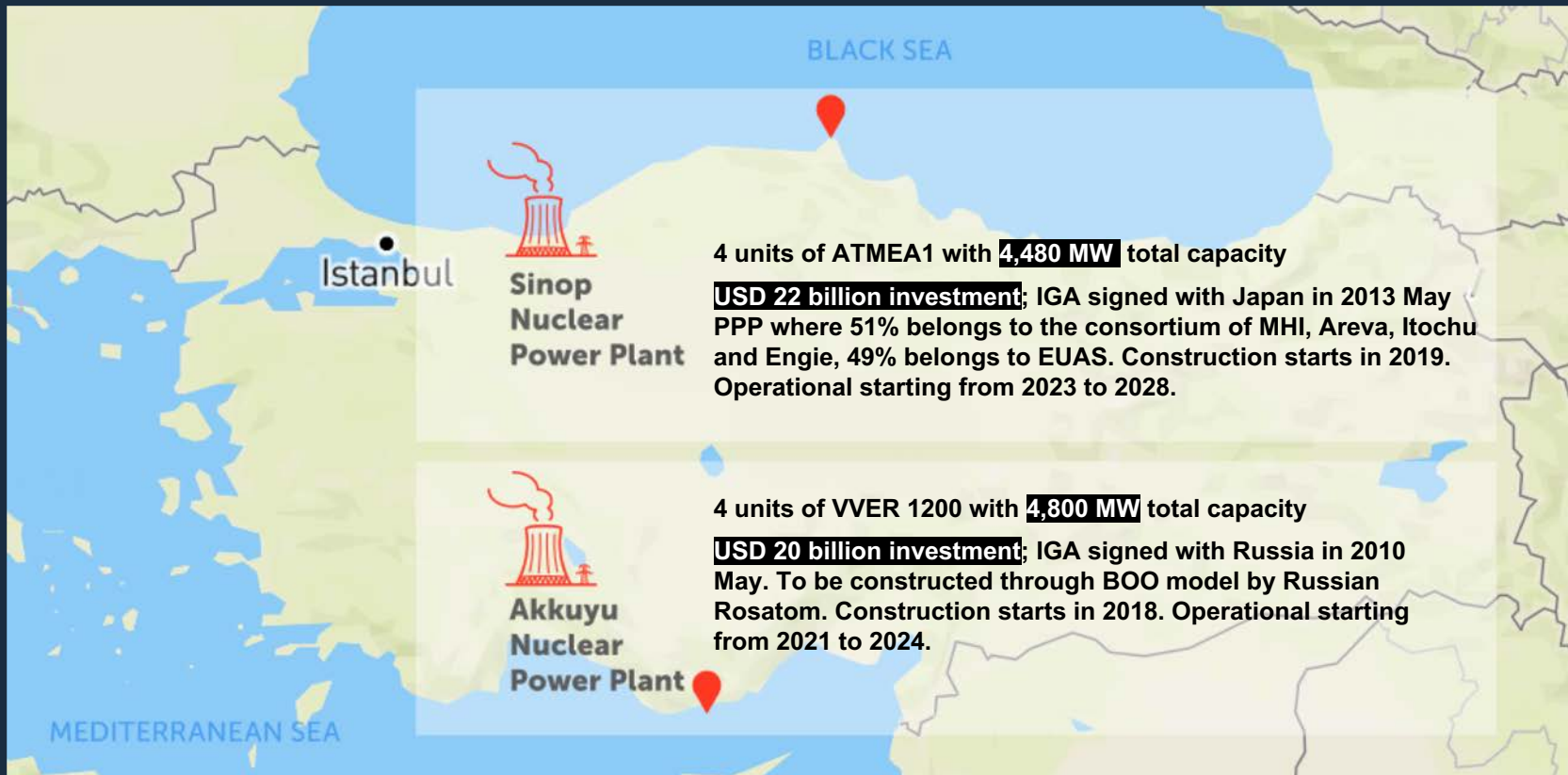
**2 NPP PROJECTS BY 2028**  
Sinop and Akkuyu projects will lead to **USD 16 Billion** of products & services sales.



**LOCALIZATION**  
Nuclear supply chain in Turkey to develop through international partnerships



**NEGOTIATIONS ONGOING FOR THIRD NPP WITH DIFFERENT PARTIES**





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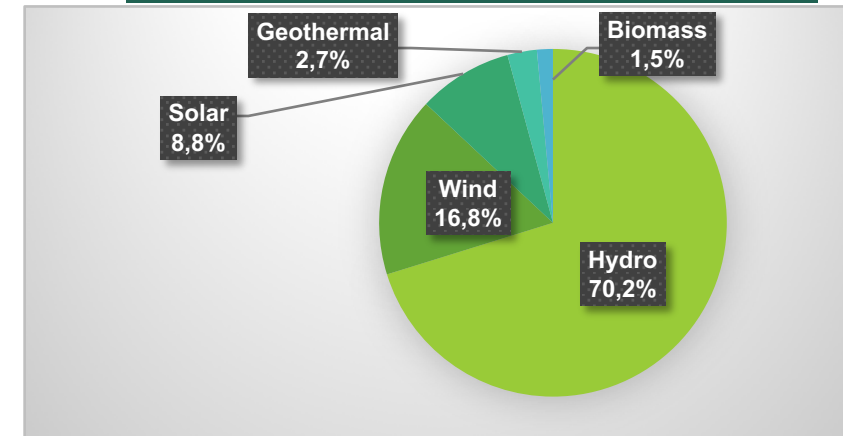
## INSTALLED CAPACITY OF RENEWABLES (END-2017)

Source	Installed Capacity (MW)	Number of Plants	Ratio to Total Renewable Capacity (%)
Hydraulic	27,273	618	33,9
Wind	6,516	161	7,3
Solar	3,421	3,619	1
Geothermal	1,064	40	1
Biomass	575	98	0,6

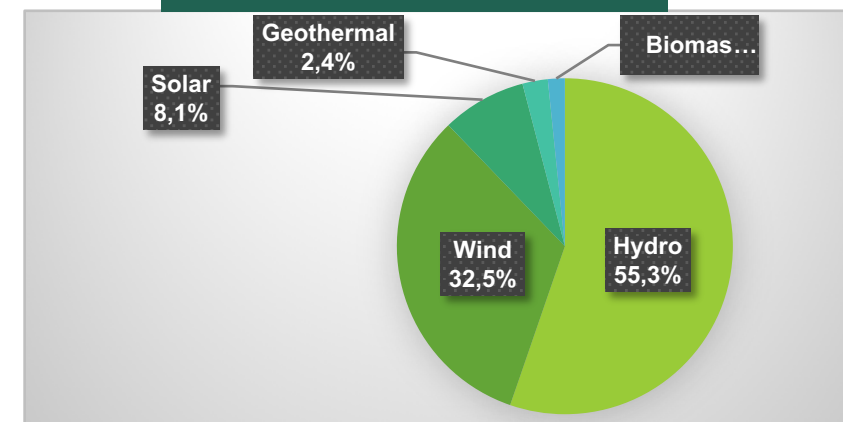
## TARGETS FOR RENEWABLE INSTALLED CAPACITY (MW)

Source	2019	2023
Hydraulic	32,000	34,000
Wind	10,000	20,000
Solar	3,000	10,000
Geothermal	700	1,500
Biomass	700	1,000

## RENEWABLE INSTALLED CAPACITY 2017



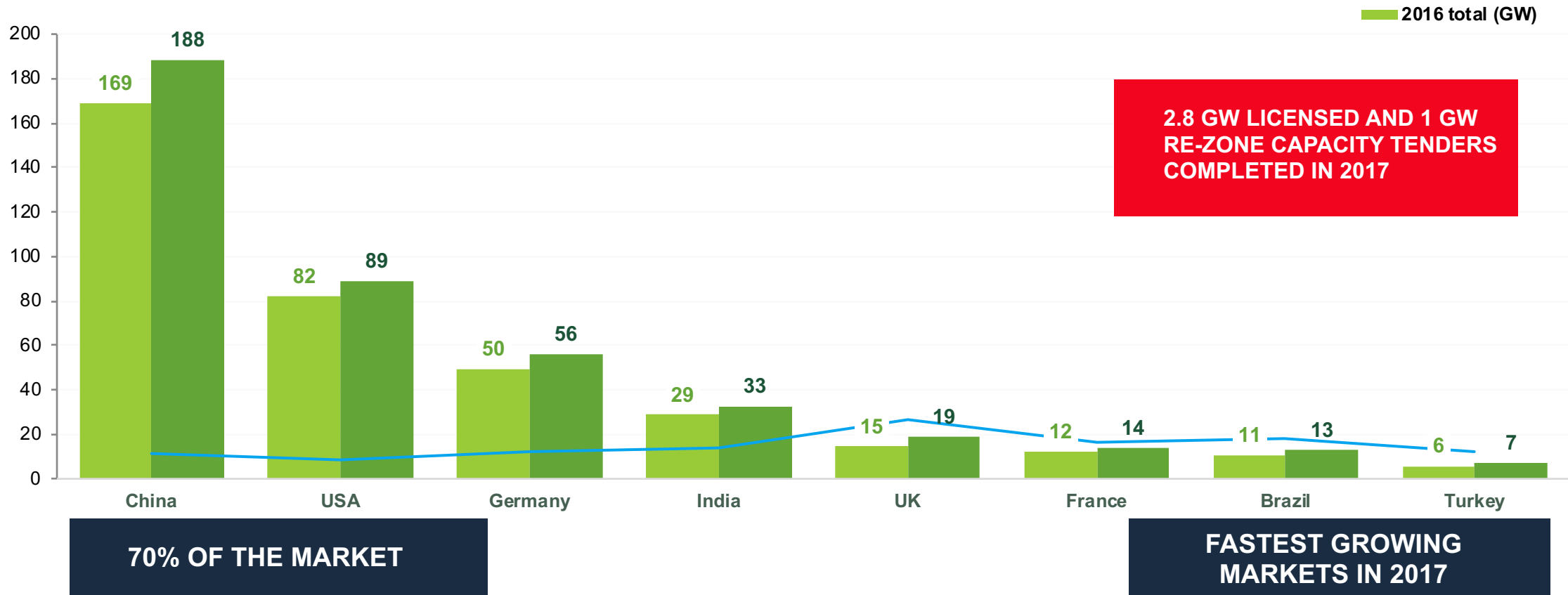
## INSTALLED CAPACITY 2023





**WIND REACHED 539 GW**  
**WITH 52 GW INSTALLATIONS IN 2017**  
**GLOBAL INVESTMENT 107 BN USD**

**TURKEY**  
**2017 Capacity Increase: 766.05 MW- 12.5% growth**





HYDROELECTRIC POWER REACHED

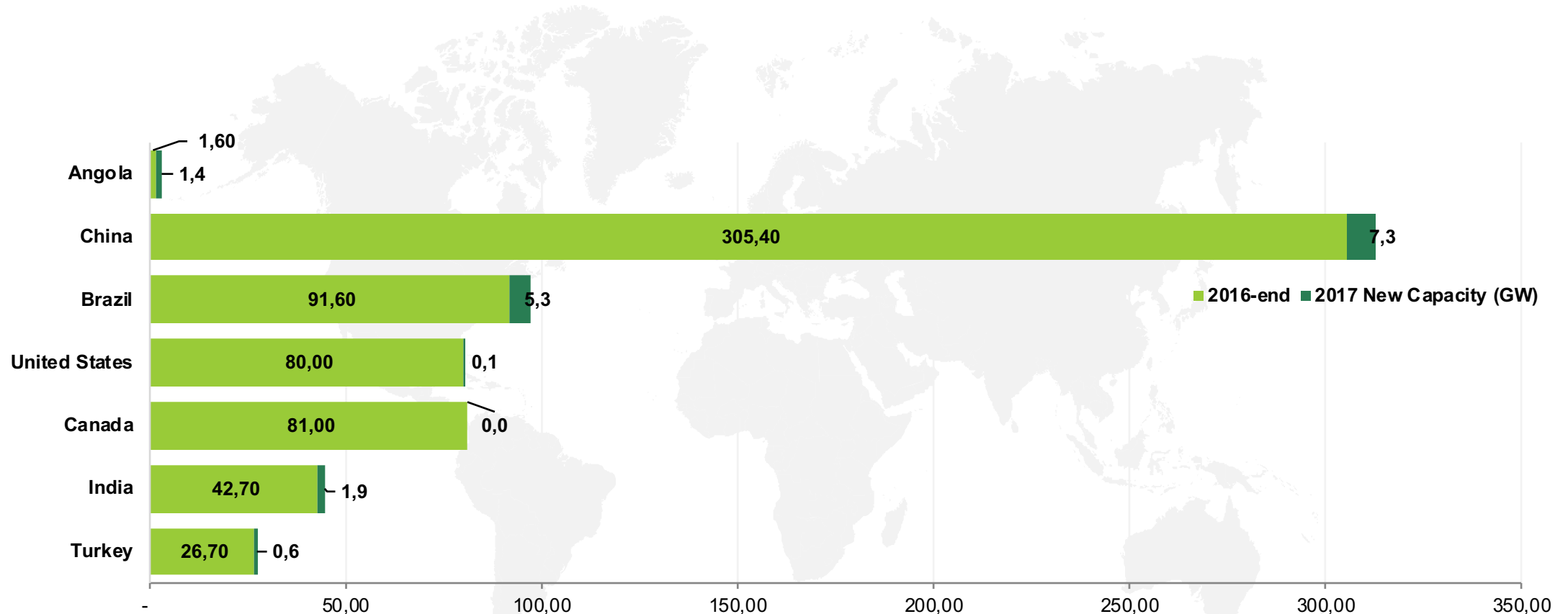
**1,114 GW**

WITH 19 GW INSTALLATIONS IN 2017  
WITH 45 BN USD INVESTMENT

**\$911 BILLION**  
OF NEW HYDRO INVESTMENT  
IS EXPECTED BY  
**2040**



Turkey  
2017 Capacity Increase: 600 MW





GEOTHERMAL POWER REACHED

## 14 GW

WITH **792 MW** INSTALLATIONS IN 2017

GEOTHERMAL DIRECT USE REACHED

## 79 TWH IN 2016

(includes public baths, swimming pools, space heating, domestic hot water supply and greenhouse heating)



Turkey

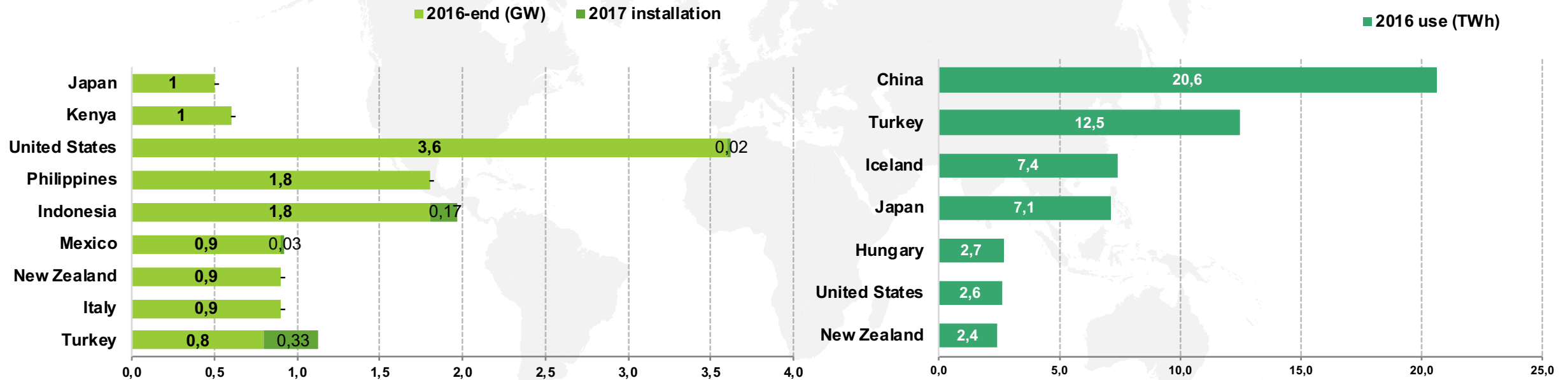
2016 Capacity Increase: 200 MW

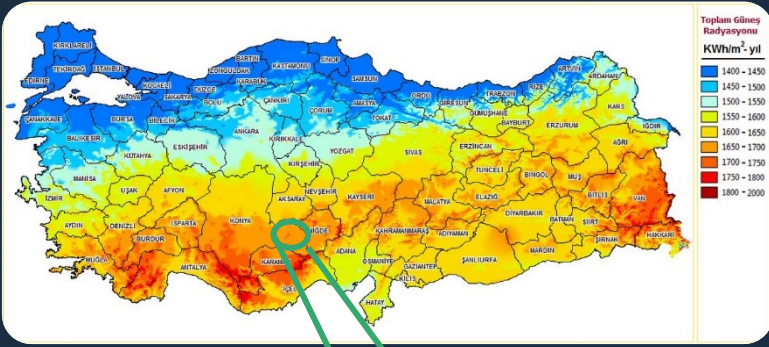
2017 Capacity Increase: 325 MW

**40%**

**OF THE NEW CAPACITY INSTALLED IN TURKEY**

**TURKEY IS NO.4 IN GEOTHERMAL INSTALLED POWER**





A JOINT VENTURE OF HANWHA Q-CELLS AND TURKISH KALYON ENERJİ WINS 1GW MEGA SOLAR PROJECT IN KARAPINAR REGION AT A TARIFF OF US\$0.0699/KWH.



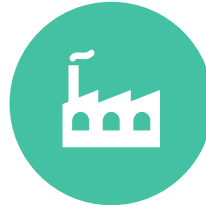
**1.3 BN USD INVESTMENT**

1 BN USD FOR SOLAR PLANT + 300 MN USD FOR FACTORY



**1 GW SOLAR POWER PLANT**

1.7 BN KWH GENERATION PER ANNUM/ELECTRICITY CONSUMPTION MORE THAN 600.000 HOUSEHOLDS



**PV PRODUCTION FACTORY OF 500 MW/YEAR**

MIN. 60% LOCALIZATION



**R&D ACTIVITIES FOR 10 YEARS**

EMPLOYMENT OF 80% LOCAL STAFF





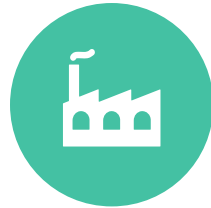
**A CONSORTIUM OF SIEMENS-KALYON-TÜRKERLER WINS 1GW  
MEGA WIND PROJECT AT A TARIFF OF US\$0.0348/KWH.**

**SET-UP OF A  
FACTORY FOR 150  
TURBINES/YEAR**

MIN. 65% LOCALIZATION MIN.  
TURBINE CAPACITY OF AT  
LEAST 2.3 MW

**R&D ACTIVITIES  
FOR 10 YEARS**

EMPLOYMENT OF 80%  
LOCAL STAFF



**1.1 BN USD INVESTMENT**

1 BN USD FOR WIND PLANTS + 100  
MN USD FOR FACTORY

**1 GW CAPACITY WIND  
POWER PLANTS**

3 BN KWH GENERATION PER  
ANNUM/ELECTRICITY CONSUMPTION  
OF MORE THAN 1 MILLION  
HOUSEHOLDS



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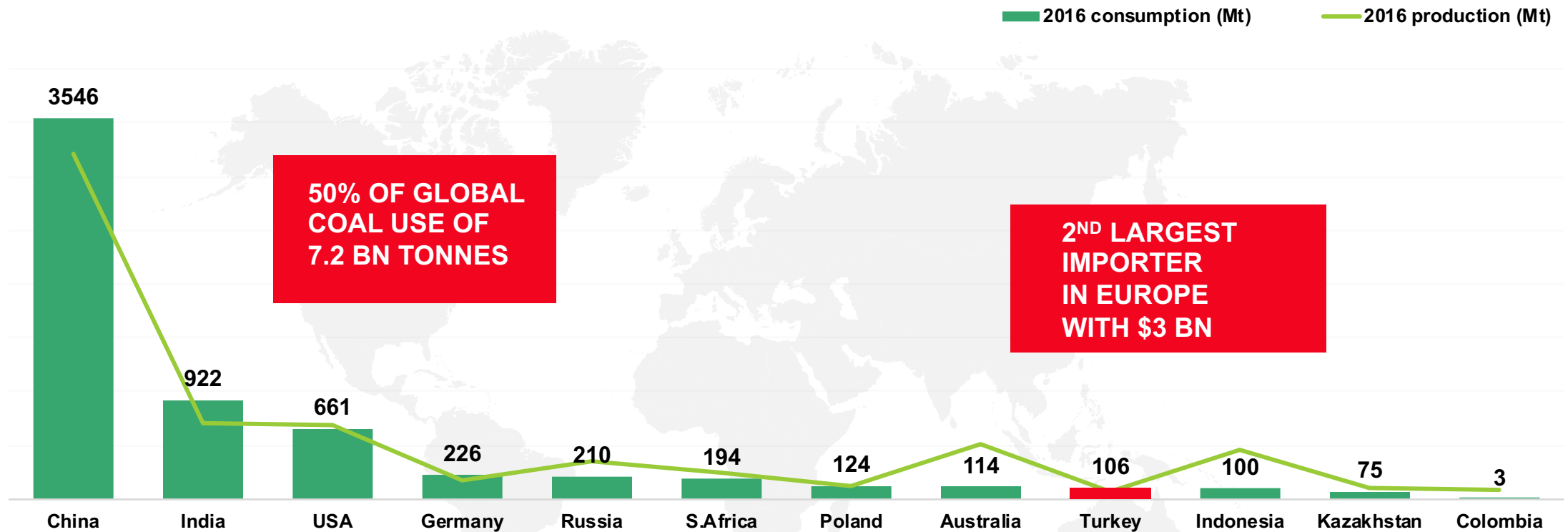


### COAL PRODUCERS-

AMIDST THE TREND OF DECLINING COAL PRODUCTION IN THE LAST TWO YEARS, INDIA (+24.5 MT), RUSSIA (+13.8 MT) AND INDONESIA (+7 MT) INCREASES PRODUCTION IN 2016.

### COAL CONTINUES TO BE A PRIMARY ENERGY RESOURCE IN ASIAN ECONOMIES:

CHINA – 75% coal share; 150 GW of new coal by 2020  
 INDIA – 73% coal share; 125 GW of new coal and double coal output by 2020; no imports allowed past 2019  
 JAPAN – 30% coal share; 28 GW of new coal by 2025  
 S.KOREA – 40% coal share; 6% growth in 2016 with 7,7 GW coming online



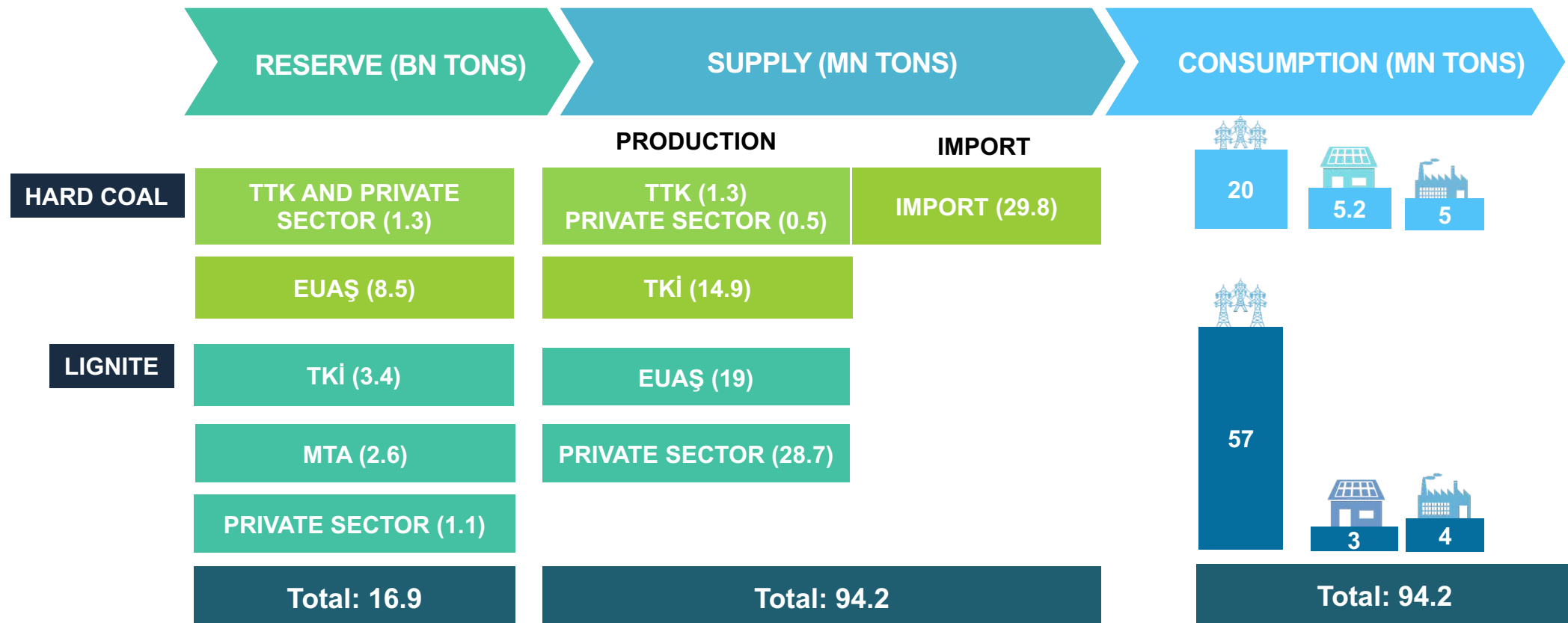


70% OF LIGNITE RESERVES IN 5 COUNTRIES: GERMANY, AUSTRALIA, USA, CHINA AND TURKEY



TURKEY HAS 7% OF WORLD RESERVES WITH 15.6 BN TONNES ( WITH 90% <3000KCAL/KG)

VALUE CHAIN-2015





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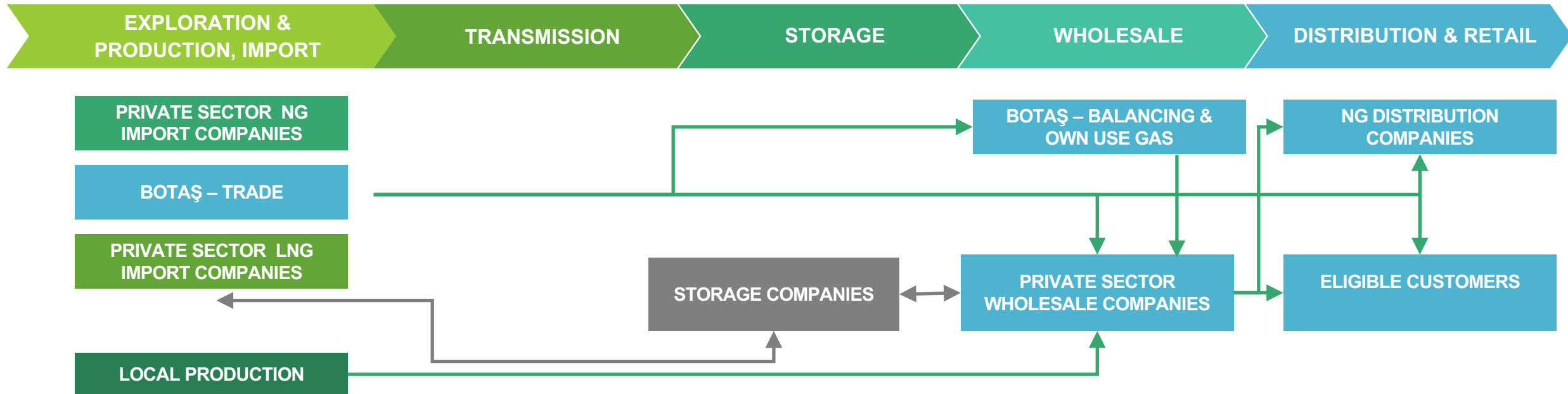
82.5% IMPORT BY BOTAS,  
17.5% IMPORT BY 8  
PRIVATE NATURAL GAS  
AND LNG IMPORT  
COMPANIES

BOTAS AS THE  
TRANSMISSION SYSTEM  
OPERATOR, 13,000 KM  
TRANSMISSION SYSTEM  
ONE OF THE BIGGEST IN  
EUROPE

NEED TO REACH **20%  
CAPACITY & FLEXIBILITY.**  
**NEW LNG TERMINALS**  
AND **FSRU** INVESTMENTS ARE  
NEEDED AS WELL AS  
UNDERGROUND STORAGE.

BOTAS HAS THE  
MAJORITY; OVER 20  
PRIVATE COMPANIES  
ARE ACTIVE.

**REGULATED MARKET FOR**  
13.5M CONSUMERS IN 76 CITIES;  
OVER 500K ELIGIBLE CONSUMERS  
WITH A MIN OF 75,000 SM3  
CONSUMPTION, 81,478 KM  
DISTRIBUTION NETWORK.



Natural gas is supplied to end users (eligible or non-eligible) via the value chain. The chain consists of exploration & production, import, transmission, storage, wholesale, distribution and retail activities.

Import and wholesale license owners can engage in wholesale activities. Wholesale companies supply natural gas to eligible consumers, distribution companies and/or other wholesalers.

**Total non-eligible customers: 13,572,231**  
**Total eligible customers: 551,988**

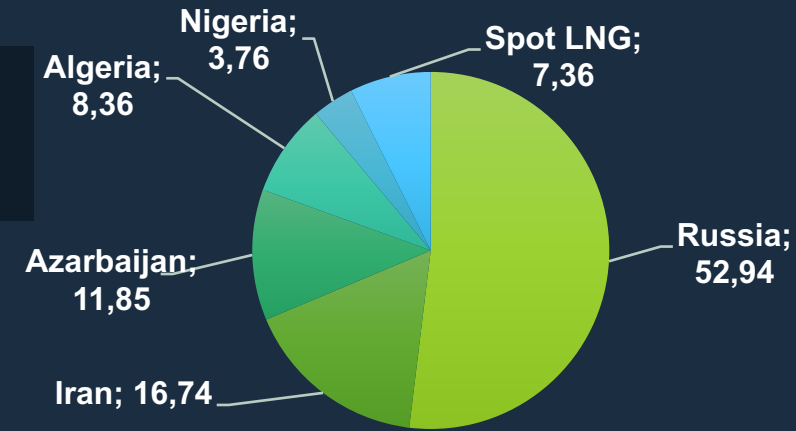


**IN LINE WITH THE GROWING ENERGY NEEDS, TURKEY CONTINUES TO BE A MAJOR GAS CONSUMER:**

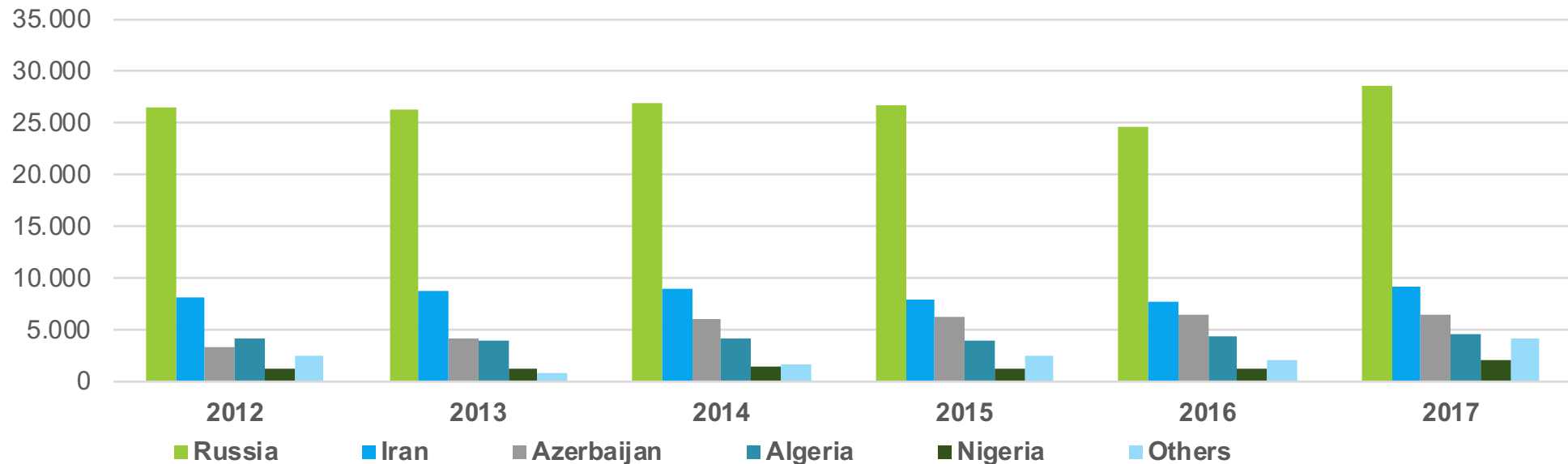
**IMPORT DEPENDENCE:**  
99.21%  
**TOTAL IMPORTS IN 2017:**  
55,249.95 mcm  
**GROWTH RATE OF IMPORTS COMPARED TO 2016:** 19.20 %  
**MAJOR SUPPLIERS:** Russia, Iran, Azerbaijan, Algeria, Nigeria

**TOTAL CONSUMPTION:**  
53,857 mcm  
**TOTAL EXPORTS (GREECE):** 630,67 mcm  
**TOTAL PRODUCTION:**  
354,15 mcm

## IMPORTS BREAKDOWN BY COUNTRIES (%)



## IMPORTS BY COUNTRY (MCM)





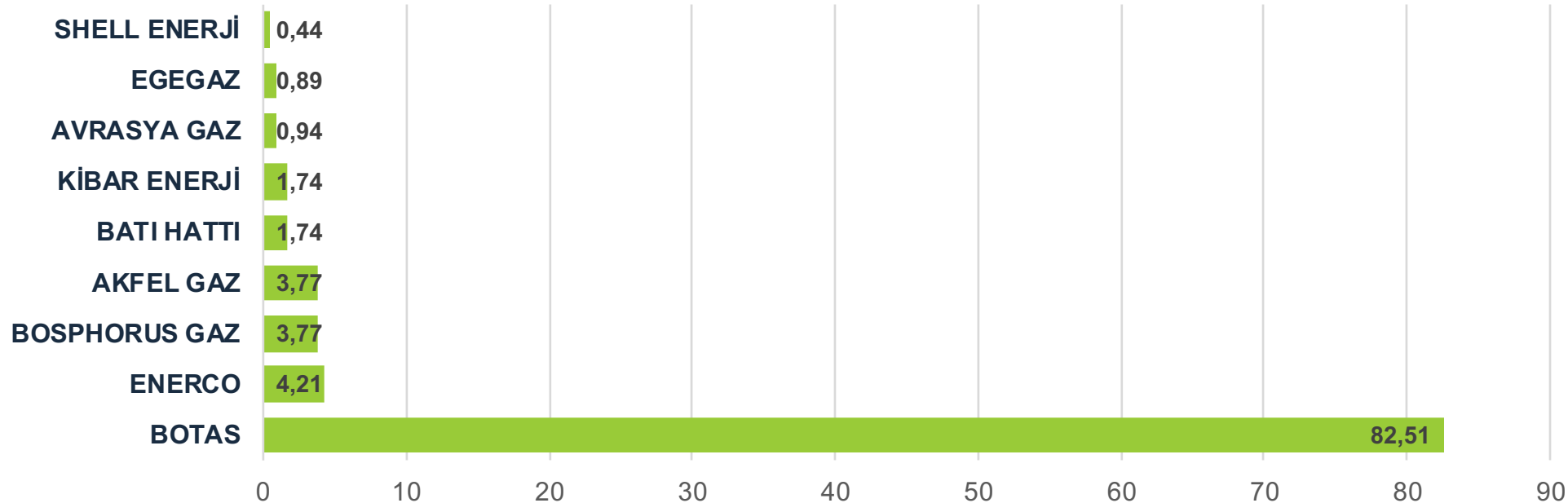
MILESTONES IN GAS IMPORTS



BOTAS aims to transfer to private companies further contracts regarding pipe gas imports. Pursuant to Gas Market Law 4646, BOTAS is forbidden from entering into new contracts until its market share is brought down to 20%. 8 private companies are importing pipe gas and LNG into Turkey.

BOTAS, the state-owned gas company accounts for 82.5% of the total import gas and LNG. About 80.52% of import gas comes through pipelines while the rest is imported as LNG.

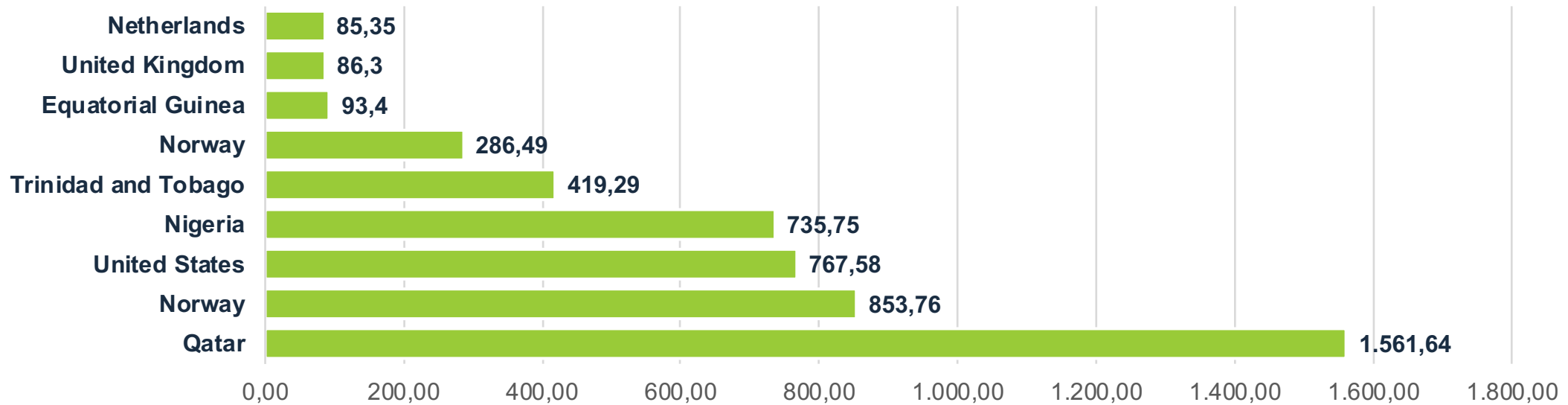
IMPORTS BY COMPANIES 2017 (%)



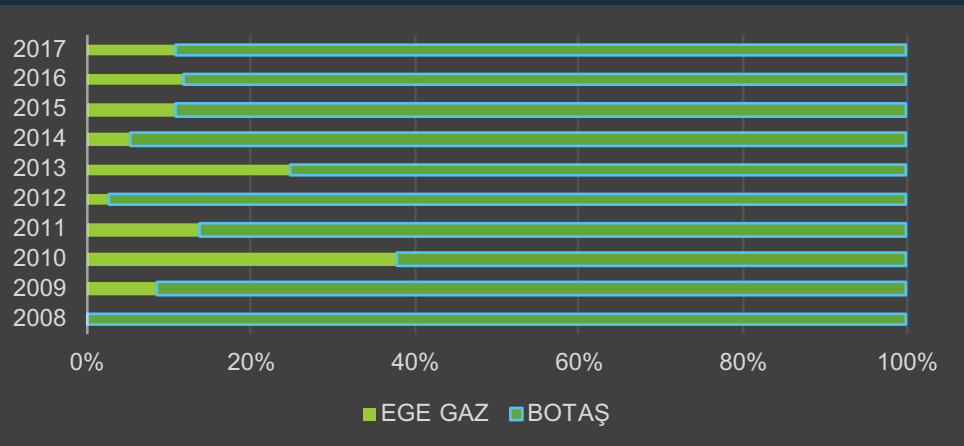




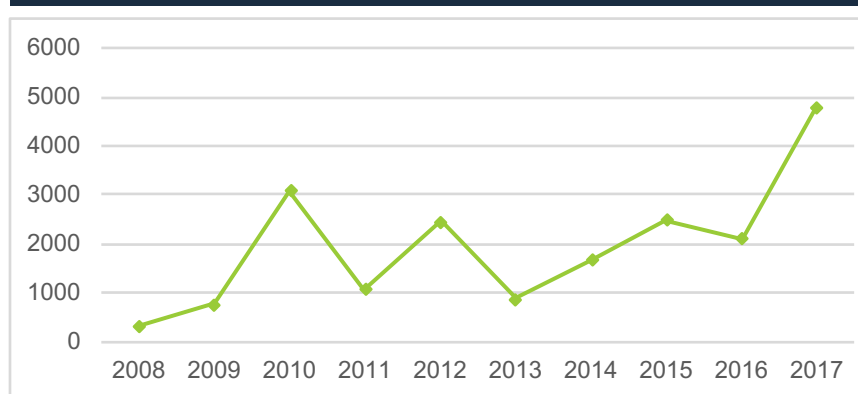
**IMPORTS BY COUNTRY - 2017 (MCM)**



**IMPORTS BY COMPANY (%)**



**IMPORTS 2008-2017 (MCM)**

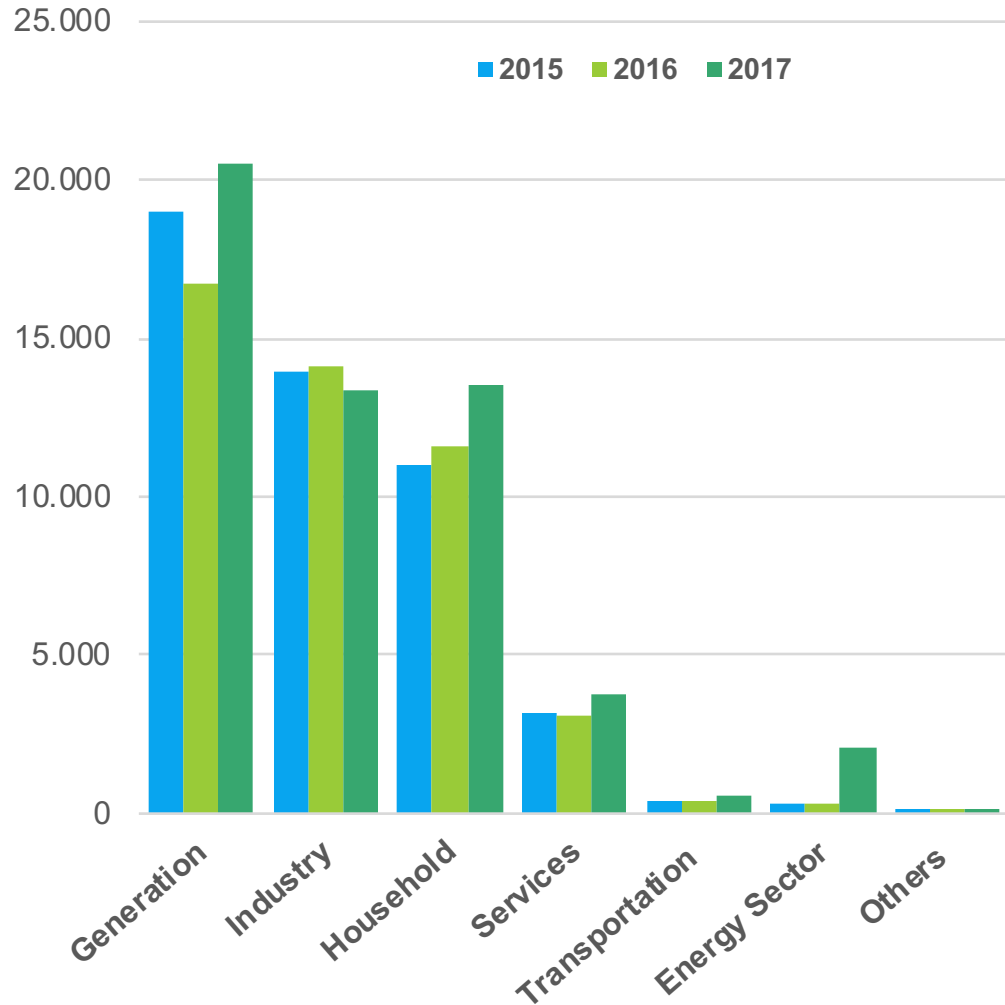


As of the end-2017, there exist 43 import license holders in the market only 2 of which imported spot LNG in 2017.

Spot LNG accounts for 8.7% in total gas imports in 2017, mainly coming from Qatar and Norway.



**CONSUMPTION BY SECTORS (MCM)**



Consumption shares of electricity generation, household and industry stand at 38.13%, 25.09% and 24.83% respectively in 2017.

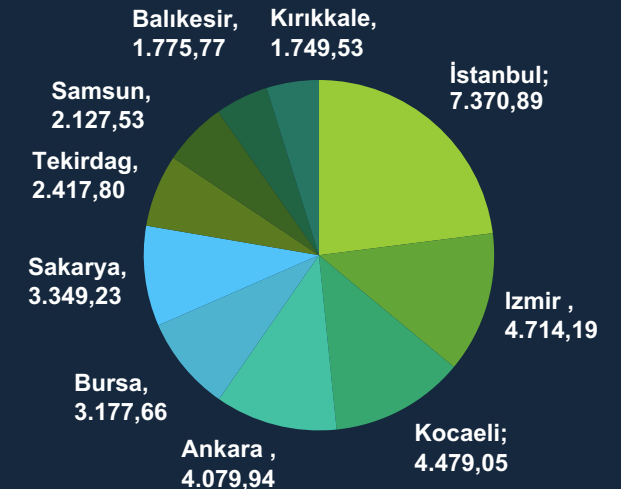
Amount of natural gas used for electricity generation increases by 22,71% compared to 2016.

There exist 49 wholesale license holders in the market, 11 of which produce natural gas within Turkey.

There exist 72 distribution license holders in the market which in total supply natural gas to 78 provinces as of the end-2017. Istanbul, Izmir and Kocaeli are the major provinces in natural gas consumption accounting for about one third of total annual gas consumption of Turkey.

The Ministry of Energy has put in action the plans to bring natural gas to each and every province across Turkey, finalizing recently the distribution tenders for the remaining three provinces of Hakkari, Sırnak and Artvin not having access to natural gas.

**PROVINCIAL CONSUMPTION (MCM)**





**BOTAS SILIVRI UNDERGROUND GAS STORAGE**  
 STORAGE CAPACITY: 2.8 BCM (2024 - 4,3 BCM)  
 INJECTION CAPACITY: 16 MCM/D (2024-45 MCM/D)  
 DAILY SENDOUT CAPACITY: 25 MCM/D (2024-75 MCM/D)

**BOTAS MARMARA EREGLISI LNG TERMINAL**  
 TANK CAPACITY: 3X85,000 M<sup>3</sup> (255,000 M<sup>3</sup>)  
 MX. REGASIFICATION CAPACITY: 6 BCM/Y (9.3 BCM IN 2018)  
 DAILY SENDOUT CAPACITY: 18 MCM/D (2018 - 27 MCM/D)  
 DAILY TRUCK LOADING CAPACITY: 75

**EGEGAZ LNG TERMINAL (PRIVATE)**  
 TANK CAPACITY: 2X140,000 M<sup>3</sup> (280,000 M<sup>3</sup>)  
 MX. REGASIFICATION CAPACITY: 6 BCM/Y  
 DAILY TRUCK LOADING CAPACITY: 50

**TUZGOLU UNDERGROUND GAS STORAGE**  
 STORAGE CAPACITY: 1 BCM (2020 - 5,3 BCM)  
 DAILY SENDOUT CAPACITY: 40 MCM/D (2020-80 MCM/D)

**FLOATING STORAGE AND REGASIFICATION UNIT (FSRU)**  
 TANK CAPACITY: 145,000 M<sup>3</sup>  
 MX. REGASIFICATION CAPACITY: 5 BCM/Y  
 DAILY SENDOUT CAPACITY: 20 MCM/D

**FLOATING STORAGE AND REGASIFICATION UNIT (FSRU)**  
 TANK CAPACITY: 163,000 M<sup>3</sup>  
 MX. REGASIFICATION CAPACITY: 5 BCM/Y  
 DAILY SENDOUT CAPACITY: 20 MCM/D



FURTHER FSRU INVESTMENTS AND UNDERGROUND STORAGE FACILITIES ARE UNDERWAY TO REACH 20% SHARE OF CONSUMPTION...





ACTIVE IMPORT CONTRACTS

	WEST LINE RUSSIA	BLUE STREAM RUSSIA	EASTERN ANATOLIA - IRAN	SOUTH CAUCASUS - AZERBAIJAN	LNG - ALGERIA	LNG - NIGERIA
The total length of the pipeline:	842 km	1,213 km	1,491 km	692 km	-	-
Contract volume:	14 bcm/a	16 bcm/a	9.6 bcm/a	6.6 bcm/a	4.4 bcm/a	1.3 bcm/a
Source country:	Russia	Russia	Iran	Azerbaijan	Algeria	Nigeria
Max. daily capacity:	ca. 51.4 mcm/day	ca. 47.4 mcm/day	ca. 28.6 mcm/day	ca. 19.1 mcm/day	-	-
Importers:	BOTAŞ (4 bcm/a) and 7 Private(10 bcm/a)	BOTAŞ	BOTAŞ	BOTAŞ	BOTAŞ	BOTAŞ
BOTAŞ contract termination date:	End of 2021	End of 2025	July 2026	April 2021	October 2024	October 2021

PROSPECTIVE

<b>TANAP - AZERBAIJAN</b>	<b>TURKISH STREAM - RUSSIA</b>	<b>IRAQI GAS</b>
Contract volume: 16 bcm/a (6 bcm/a to Turkey)	Prospective volume: 31.5 bcm/a (15.75 bcm/a to Turkey)	Prospective volume: ca. 3 bcm/a
<b>IRAN – TURKEY - EUROPE</b>	<b>EAST MEDITERRANEAN GAS</b>	<b>TURKMEN GAS</b>
Prospective volume: 35 bcm/a (Total)	Prospective volume: 10-20 bcm/a	Contract volume: 16 bcm/a



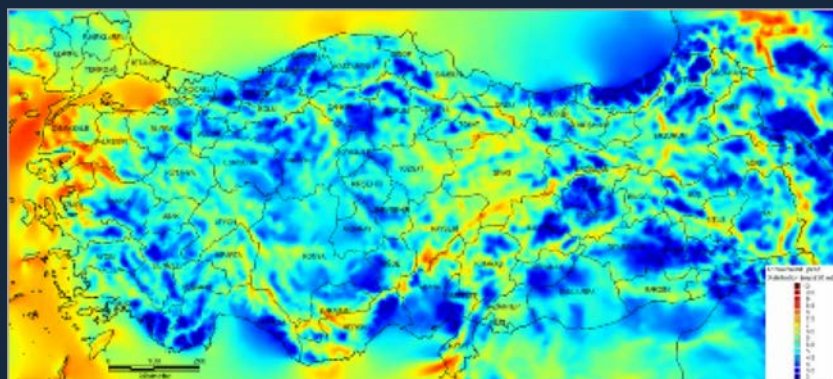
# **Executive Summary**

**Turkey's Energy Outlook**

**Growth Drivers in Turkish Energy Sector**

**Opportunities in Turkish Energy Sector**

**Success Stories**



**48 GW POTENTIAL** with over 7m/s wind speed at 50m

**FIT at 7.3 cents/kWh for 10 years +**  
**Local content FIT at 3.7 cents/kWh for 5 years**

## ON-SITE MEASUREMENT IS CRITICAL

On-site data measurement of minimum one year is required in pre-license applications

	UNLICENSED MARKET	LICENSED MARKET	MEGA PROJECTS
<b>Capacity Threshold</b>	< 1MW	> 1MW	> 1MW
<b>Location</b>	Based on DisCo capacity	Based on TEIAS capacity	Renewable Energy Resource Zones
<b>Electricity sales</b>	Spot market at FIT via authorized supply company	Spot market at FIT	Fixed price identified in auction
<b>FIT Application timeline</b>	Apply to DisCo's with no specific timeline	Apply to YEKDEM in October	-
<b>Auction model</b>	No auction	Reverse auction	Reverse auction
<b>Local content</b>	-	Extra FIT	-
<b>Installed capacity (as of end-2017)</b>	34 MW	6,482.2 MW	-
<b>Pipeline (as of end-2017)</b>	-	552.7 + 2.8 GW + 2 GW	1 GW Re-zone tender completed in 2017 + 2 GW tenders expected in 2018

10 GW in 3 or 4 projects

WPPs have balancing responsibility in the day-ahead market with a tolerance band of 2%

- Blades: 0.8¢/kWh
- Generator & Power electronics: 1.0¢/kWh
- Tower: 0.6¢/kWh
- Complete mechanical parts in rotor and nacelle: 1.3¢/kWh

552.7 MW in construction  
 2.8 GW tendered in June - December 2017  
 2 GW applications in 2020 April



**34 GW-2023 TARGET**  
**8 GW NEW CAPACITY TO BE COMMISSIONED**  
**FIT at 7.3 cents/kWh for 10 years +**  
**Local content FIT at 2.3 cents/kWh for 5 years**

	LICENSED MARKET
Location	existing DSI project or new project
Electricity sales	Spot market at FIT
Application timeline	Apply to YEKDEM in October
Local content	Extra FIT
Installed capacity (as of end-2017)	Dams: 19,776 MW – 117 plants River-run: 7,489 MW- 501 plants
Pipeline (as of end-2017)	4,168.1 MW licensed + 4,021.6 MW prelicensed

- Turbine: 1.3¢/kWh
- Generator & Power electronics: 1.0¢/kWh

**TURKEY IS THE 8<sup>TH</sup> LARGEST GROWING HYDRO MARKET IN 2017 WITH 0.6 GW INSTALLATIONS, SURPASSING JAPAN AND FRANCE**





**STRONG POTENTIAL**  
with avg. annual irradiation of **1.7-2 MWh/m<sup>2</sup>**  
**FIT at 13.3 cents/kWh for 10 years**  
**+ Local content FIT at 6.7 cents/kWh for 5 years**

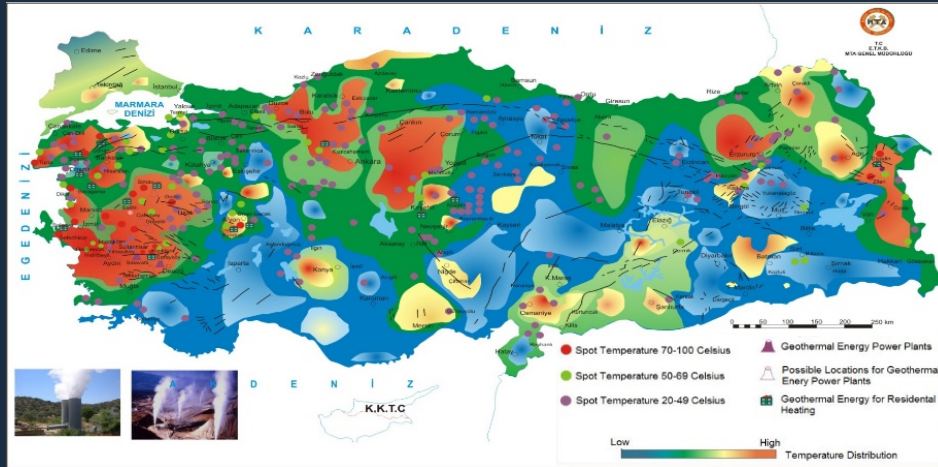
**LAND CLASS IDENTIFICATION IS CRITICAL**  
LAND SHOULD BE 'DRY MARGINAL AGRICULTURAL LAND' FOR GROUND-MOUNTED INSTALLATIONS

	UNLICENSED MARKET	LICENSED MARKET	MEGA PROJECTS
<b>Capacity Threshold</b>	< 1MW < 50 kW for rooftop	> 1MW	> 1MW
<b>Location</b>	Based on DisCo capacity	Based on TEIAS capacity	Renewable Energy Resource Zones
<b>Electricity sales</b>	Spot market at FIT via authorized supply company	Spot market at FIT	Fixed price identified in auction
<b>FIT Application timeline</b>	Apply to DisCo's with no specific timeline	Apply to YEKDEM in October	-
<b>Auction model</b>	No auction	Reverse auction	Reverse auction
<b>Local content</b>	-	Extra FIT	-
<b>Installed capacity (as of end-2017)</b>	<b>3,402 MW</b>	<b>17.9 MW</b>	-
<b>Pipeline (as of end-2017)</b>	<b>2.8 GW</b>	<b>415 MW prelicensed + 61.8 MW licensed</b>	<b>1 GW tender completed in March 2017 + 1 GW tender expected in 2018</b>

**KONYA KARAPINAR**  
6,000 hectares for 3 GW  
**NIGDE BOR**  
2,500 hectares for 1.5 GW

**TURKEY IS AMONG THE LARGEST GROWING SOLAR MARKETS WITH 2.6 GW INSTALLATIONS IN 2017**

- PV panel integration & structures: 0.8¢/kWh
- PV modules: 1.3 ¢/kWh
- PV cells: 3.5¢/kWh
- Inverter: 0.6¢/kWh
- Optical material: 0.5¢/kWh



## 3<sup>RD</sup> LARGEST GEOTHERMAL POWER MARKET IN EUROPE

2 GWe potential in 25 reserves  
**FIT at 10.5 cents/kWh for 10 years +**  
**Local content FIT at 2.7 cents/kWh for 5 years**

<b>Location</b>	Based on exploration & production license for the reserve
<b>Auction model</b>	Auctions for reserves are done by MTA or İl Özel İdare
<b>Electricity sales</b>	Spot market at FIT
<b>FIT Application timeline</b>	Apply to YEKDEM in October
<b>Local content</b>	Extra FIT
<b>Installed capacity (as of end-2017)</b>	<b>1,064 MW – 40 plants</b>
<b>Pipeline (as of end-2017)</b>	<b>131.2 MW licensed + 589.16 MW pre-licensed</b>

GPPs have balancing responsibility in the day-ahead market with a tolerance band of 2%

- Steam or gas turbines: 1.3¢/kWh
- Generator & power electronics: 0.7¢/kWh
- Steam injector or vacuum compressor: 0.7¢ /kWh

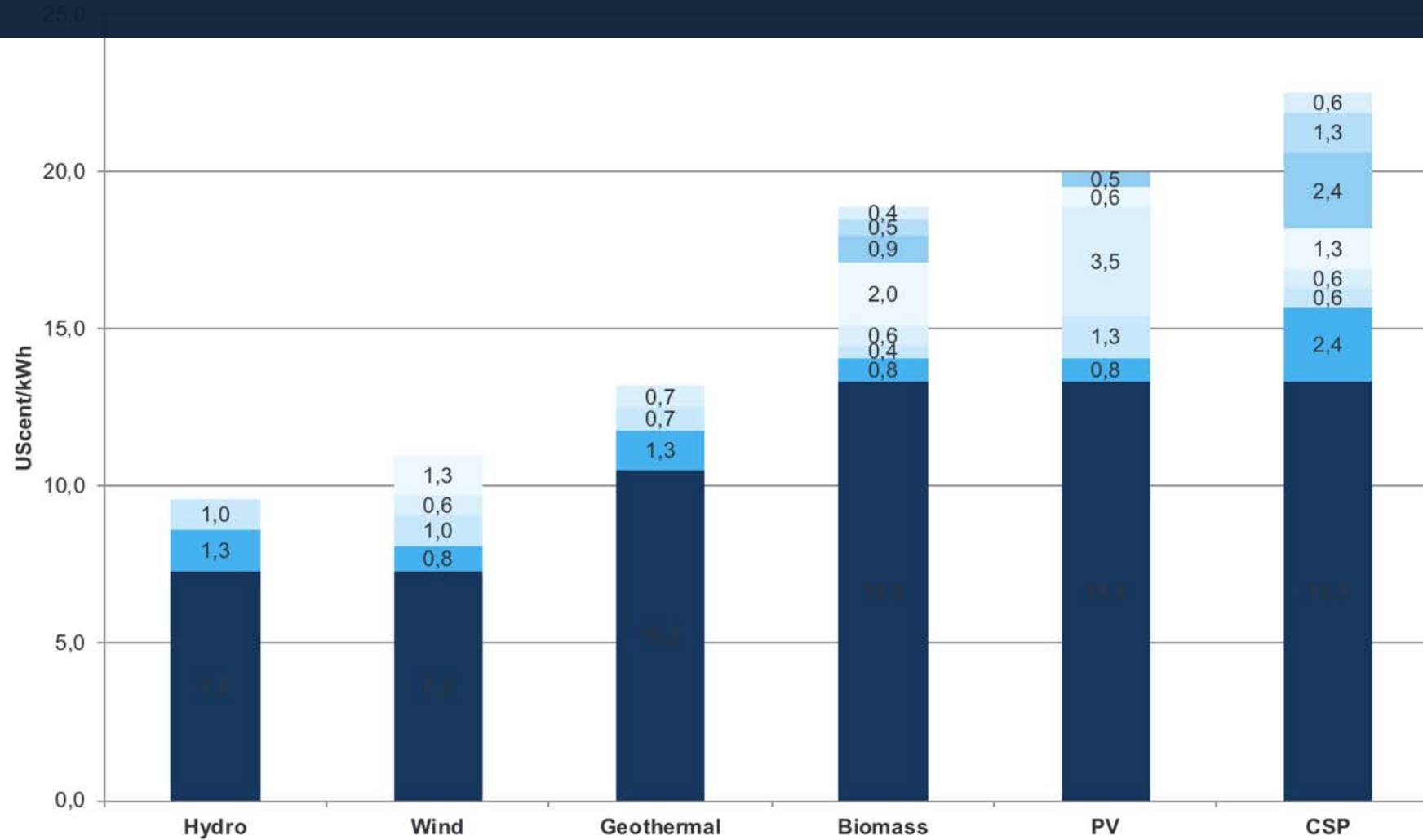
**GEOTHERMAL POWER CAPACITY INCREASED**

**5x IN 5 YEARS**

**165 MW KIZILDERE GEOTHERMAL POWER PLANT INSTALLED IN 2017**



RENEWABLES FEED-IN TARIFF SCHEME





**Main Objectives;**

- **More efficient and more effective utilization of renewable energy resource areas**
- **Commissioning large-scale renewable energy plants on public and private lands in line with the 2023 energy vision**
- **Manufacturing renewable energy equipment of cutting-edge technology and contributing to technology transfer**
- **Increasing the utilization of locally-manufactured components in renewable energy plants**

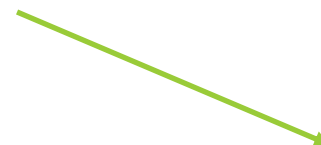
**A Different Investment Model;**

- **An extended PPA term compared to Unlicensed and Licensed Investments**
- **Allocation of large-scale capacities to a single Investment Consortium or Company**
- **Requirement for certain rate of localization in equipment**
- **Strong governmental commitment for assistance in realization of projects**

**Capacity Allocations Based on...**



**the Condition of Local Manufacturing**



**the Condition of Using Locally-Manufactured Equipment**



## 1.2 GW RE-ZONE (YEKA) OFFSHORE WIND TENDER

- ✓ **2.5-3 bn USD Investment**
- ✓ **Min. 60% Localization / Min. Turbine Capacity of 6MW**
- ✓ **1.2 GW Capacity Wind Power Plants Installation**
- ✓ **80% Local Employment**
- ✓ **50 TWH to be Procured under PPA**
- ✓ **Ceiling Price of 8 USD cent/kWh for Reverse-Auction**
- ✓ **Financial criteria for companies or consortiums:**



**Total sales revenues or turnover for 2015, 2016 and 2017  $\geq$   
1,000,000,000 (one billion) TRY (or its equivalent in foreign  
currency)**

**or**

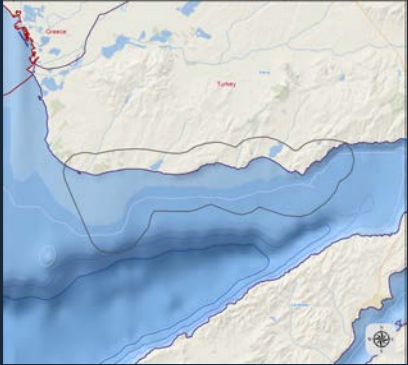
**Total assets' value as of the end of 2017  $\geq$  400,000,000 (four  
hundred million) TRY (or its equivalent in foreign currency)**

- ✓ **Deadline for Financial Offers: October 23<sup>rd</sup>, 2018**



## POTENTIAL YEKA SITES FOR 1.2 GW INSTALLED CAPACITY

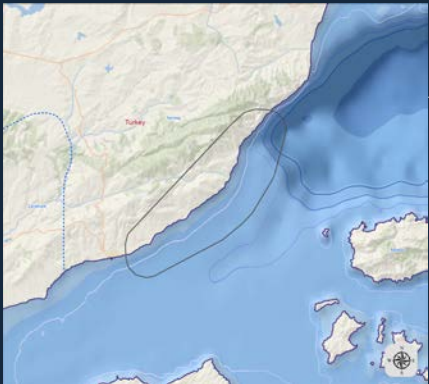
Saros Potential YEKA Site



Kıyıköy Potential YEKA Site



Gelibolu Potential YEKA Site





**20 GW  
NEW POTENTIAL**

Current capacity:  
9.8 GW lignite  
8.7 GW imported coal





The Amendment Law dated 17 June 2016 introduces:

- TETAS (or EUAS) will sign a PPA with the winning bidder of the reverse auction and with current generators from local lignites



### **AFSIN-ELBISTAN**

4,83bn tonnes reserve in 21,110 ha  
 Installed Capacity potential: 8.2 GW  
 Location: Kahramanmaraş  
 Calorific value:1150 kcal/kg



### **KONYA-KARAPINAR**

1,83bn tonnes reserve in 18,000 ha  
 Installed Capacity potential: 5 GW  
 Location: Konya  
 Calorific value:1374 kcal/kg



### **CATALCA-CERKEZKOY**

495 mn tonnes reserve in 545 ha  
 Installed Capacity potential: 1 GW  
 Location: Tekirdağ  
 Calorific value:2050 kcal/kg



### **ALPU**

1,45 bn tonnes reserve in  
 underground site  
 Installed Capacity potential: 4 GW  
 Location: Eskişehir  
 Calorific value:2240 kcal/kg



### **DINAR**

941 mn tonnes reserve in 640 ha  
 Installed Capacity potential: 1,4 GW  
 Location: Afyon  
 Calorific value: 1850 kcal/kg



### **VIZE**

415 mn tonnes reserve in 146 ha  
 Installed Capacity potential: 0.8 GW  
 Location: Kırklareli  
 Calorific value: 1910 kcal/kg





## 1. The Council of Ministers Decree No. 2012/3305 pertaining to investment incentives:

Priority (5<sup>th</sup> Region) Investments:

“... the electricity generation power plants using the minerals as input indicated in the Group-4B (coal) of the Article-2 under Mining Law...”

## 2. The Provisional Article-4 of the Electricity Market Law No. 6446

“...**the transmission system usage fees shall be discounted by 50%** for the power generation facilities to be installed until 31/12/2025 for the first five operational years...”

“...during the investment periods of the generation facilities, all transactions related to the generation facilities shall be **exempt from the fees** and also the relevant papers prepared shall be **exempted from stamp duty**...”

“...During the first ten years of the investment and operation periods from the dates of permits issued by the relevant institutions, an eighty-five percent discount shall be applied for the costs of permits, leases, easements, and usage permits of the renewable energy and local coal power facilities to be installed until 31/12/2025. **Forestry Peasant Development Revenue and Forestation and Erosion Control Revenue shall not be charged** to these facilities....”

## 3. Article 43.4 of the Electricity Licensing Regulation

For the facilities generating electricity from the local natural resources and the renewables, the license holders are not required to pay the yearly license fees for the first eight years following the date of completion of the power plants. Yearly license fees are calculated based on the following formula: **total electricity generated in kWh X 0.003 cent/TRY**. Furthermore, pre-license and license application fees for these facilities are **discounted by 90%** as well.

## 4. The Council of Ministers Decree No. 2017/11070 pertaining to electricity procurement by TETAS from Private Local Coal-Fired Power Facilities

“...The electricity generated from the private coal power plants using local or local-import (mixed) coal as fuel shall be procured by TETAS for the next seven years including 2018 pursuant to the formula indicated in Article 5...”

### Formula:

for local coal-fired power plants: Procurement Amount for each power plant (kWh) = Installed Power of the Plant (MWe) x 6500 (hour) x 0,5 x 1000

for plants operating on mixed-fuel: Procurement Amount for each power plant (kWh) = Installed Power of the Plant (MWe) x 6500 (hour) x 0,5 x 1000 x m

$m = \frac{\text{local coal used in electricity generation (tonne)}}{\text{total coal (including imports) used in electricity generation (tonne)}} \times \frac{\text{Average KCal/tonne of the local coal used in electricity generation}}{\text{Average KCal/tonne of the total coal used in electricity generation}}$

**Price:** The electricity price for the first quarter of 2018 is 201 TRY/MWh while the following quarterly prices will be identified according to the following formula:

$$P = P_0 \times \left[ \left( 0,5x \frac{PPI_1}{PPI_{10}} \right) + \left( 0,5x \frac{CPI_1}{CPI_{10}} \right) \right]$$

P= Quarterly price (TRY/MWh)

P<sub>0</sub>= The price used for previous quarter (TRY/MWh)

PPI<sub>1</sub>: TUIK Producer Price Index relating to the previous month followed by the relevant quarter

PPI<sub>10</sub>: TUIK Producer Price Index relating to the previous fourth month before the relevant quarter

CPI<sub>1</sub>: TUIK Consumer Price Index relating to the previous month followed by the relevant quarter

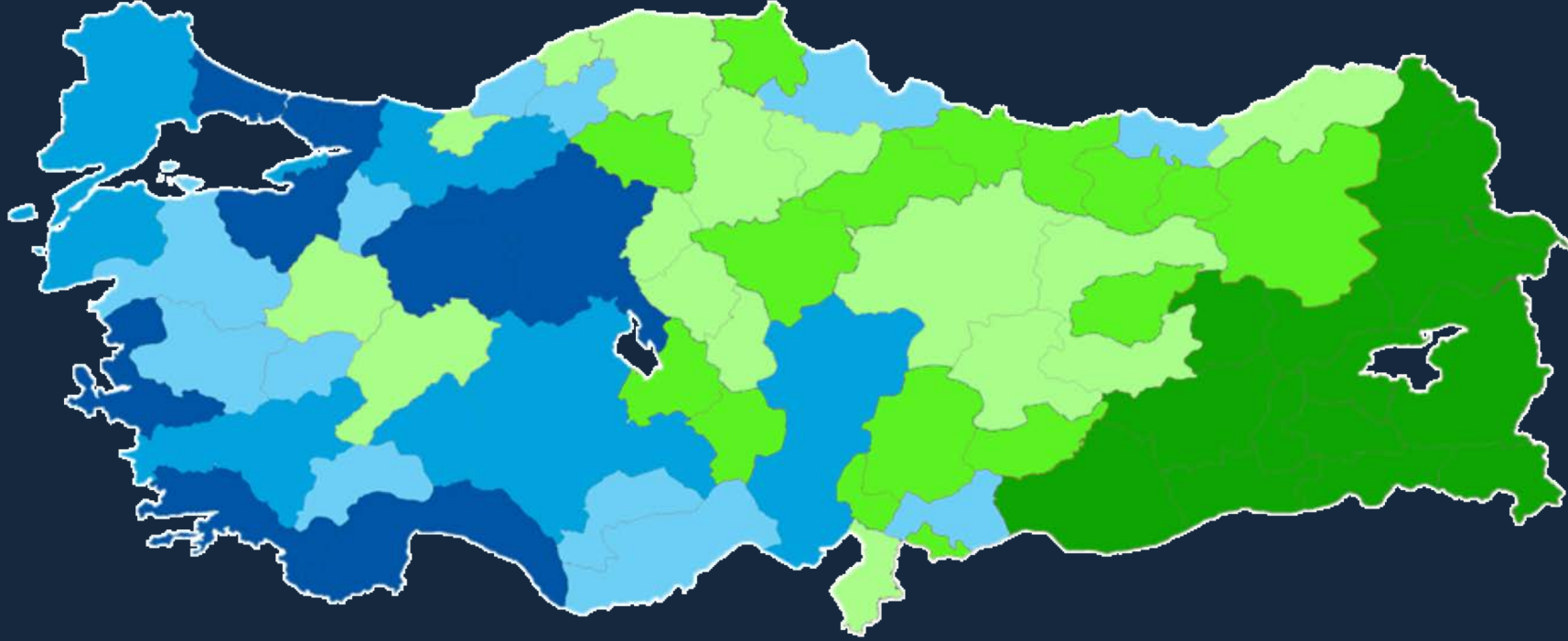
CPI<sub>10</sub>: TUIK Consumer Price Index relating to the previous fourth month before the relevant quarter



## Priority Investment Incentive Scheme

- Mining Investments
- Coal operations and power generation investments where domestic coal is used as input.
- Energy efficiency investments that would reduce energy consumption (minimum of 20% increase for at least 5 years in 500 TOE consumption and above)
- Investments for electricity generation through waste heat recovery (excluding natural gas PPs)
- LNG investments and underground gas storage investments (minimum 50 million TL)
- Production of turbines and generators used in renewable energy generation
- Production of blades used in wind energy generation
- Production of solar panels

**\* Strategic Investment Incentives will apply if the investment amount is over 3 billion TL in any of the above investments**



Region - 1	Region - 2	Region - 3	Region - 4	Region - 5	Region - 6
Ankara, Antalya, Bursa, Eskişehir, İstanbul, İzmir, Kocaeli, Muğla	Adana, Aydın, Bolu, Çanakkale, Denizli, Edirne, İsparta, Kayseri, Kırklareli, Konya, Sakarya, Tekirdağ, Yalova	Balıkesir, Bilecik, Burdur, Gaziantep, Karabük, Karaman, Manisa, Mersin, Samsun, Trabzon, Uşak, Zonguldak	Afyonkarahisar, Amasya, Artvin, Bartın, Çorum, Düzce, Elazığ, Erzincan, Hatay, Kastamonu, Kırıkkale, Kırşehir, Kütahya, Malatya, Nevşehir, Rize, Sivas	Adıyaman, Aksaray, Bayburt, Çankırı, Erzurum, Giresun, Gümüşhane, Kahramanmaraş, Kilis, Niğde, Ordu, Osmaniye, Sinop, Tokat, Tunceli, Yozgat	Ağrı, Ardahan, Batman, Bingöl, Bitlis, Diyarbakır, Hakkari, Iğdır, Kars, Mardin, Muş, Siirt, Şanlıurfa, Şırnak, Van



Support	Regions: 1, 2, 3, 4, 5	Within OIZ in Region 5	In Region 6	Within OIZ in Region 6
	✓	✓	✓	✓
Customs Duty Exemption	✓	✓	✓	✓
Tax Deduction	Tax Reduction Rate (%)	80	90	90
	Reduced Tax Rate (%)	4.4	2.2	2.2
	Rate of Contribution (%)	40	50	55
Social Security Premium (SSP) Support for Employer's Share	Years of Support	7	10	10
	Cap for Support (% of Investment)	35	No limit	No limit
Land Allocation	✓	-	✓	-
Interest Rate Support	TL Denominated Loans (points)	5	5	7
	FX Loan (points)	2	2	2
	Maximum Support (TL)	0-0-500K-600K-700K	700K	900K
SSP Support for employee share (years)	-	-	10	10
Income Tax Withholding Support (years)	-	-	10	10



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**Opportunities in Turkish Energy Sector**

**Success Stories**



- ENGIE has been active in Turkey for more than 40 years. The Group used its expertise in energy to develop its activities in energy service, power generation and natural gas distribution as well as wholesale and retail of both power and natural gas. ENGIE is one of the biggest foreign investors in the Turkish energy market.
- The Group is one of the leading natural gas distributors, and also owns two gas-fired power plants (CCGTs) as an Independent Power Producer (IPP). ENGIE is also active in the gas distribution with IZGAZ, Turkey's third largest natural gas distributor. The company distributes and markets natural gas to 323,000 residential, commercial and industrial customers.
- Tractebel Engineering, a subsidiary of ENGIE, is also active in Turkey for more than 40 years with its two specialized divisions: power & gas and hydro.



- Shell entered the Turkish market in 1923. Having celebrated its 90th year in Turkey in 2013, Shell is one of the prominent companies of Turkey in terms of investments. Since the very first day of its activities in Turkey, Shell has improved industry standards as the pioneer of the Turkish fuel sector, by raising awareness among its employees, suppliers and subcontractors on health, safety, environmental protection, and applying global developments and new technologies in Turkey.
- Shell Upstream Turkey's oil and gas exploration activities include the completion of two exploration campaigns in partnership with Turkish Petroleum Corporation (TP): the Konacık-1 and the Akcay-1 wells, both completed and tested in southeastern Anatolia. The company has also drilled a deep-water well in the Black Sea: the Sile-1 well, which has also been completed and has also produced data that is being analyzed.
- Shell & Turcas Petrol A.S. carries out retail fuel and lubricant, and commercial fuel, lubricant and fleet activities.



- GE has been powering, improving and constructing with its activities in Turkey for more than 65 years. Since its entry into the Turkish market in 1948, GE has expanded through the formation of strong partnerships, invested in innovation, technology and local capacity.
- Today, nearly 300 skilled Turkish engineers work in the Turkey Technology Center (TTC) in Gebze, where they carry out design, research and development – a quarter of these engineers are women.
- TTC achieved an impressive 300 percent growth in the past five years and to date 2.5 million engineering hours have been generated as a solid achievement for Turkey's aviation sector know-how. GE offers more than 1,000 types of energy-saving bulbs, illumination and LED systems to meet the requirements of the local market.
- In 2017, the world's largest wind blade manufacturer LM Wind Power, a subsidiary of GE, opened a new blade manufacturing facility with 500 MW/y capacity in Bergama, making a 50 million USD investment and creating up to 450 skilled technical jobs.



## SIEMENS

- Using its experience and knowledge gained in 160 years in Turkey, the company develops solutions in the energy, infrastructure, electrification, automation, digitalization and healthcare sectors in Turkey. In line with its plans for growth in Turkey, the company invested in the Gebze Organized Industrial Zone for production geared towards the energy sector. Commissioned in 2009, the plant in Gebze is located on 150,000 square meters of area and is among the most modern in Europe.
- Moreover in 2011, Siemens opened its 14th R&D center in the world in the Gebze Organized Industrial Zone. The center's field of activities includes energy transmission automation systems, power generation management systems, industrial automation panels, and building automation systems.
- The company's exports to a wide geographical region from the Middle East to the Far East partly comprise high- and medium-tension boards. Circuit breakers are exported to five continents, while automation products are exported to three continents.
- In August 2017, the company, in cooperation with Turkey's Türkerler and Kalyon Enerji holdings, won the first wind YEKA project which calls for 1 GW wind farm installation and establishment of a local wind turbine factory, offering the lowest power purchasing price to the state with US\$3.48 cents per kilowatt hour.

- SOCAR Turkey is the icon of growing economic collaboration between the two sister countries, Azerbaijan and Turkey. While transforming into one of the largest corporations of the country, SOCAR Turkey keeps empowering Turkish industry with its significant investments; thus assisting Turkey to become a major player in international energy platforms.
- With its total investment volume of USD 19.5 billion to be realized by 2023, SOCAR stands as one of the biggest foreign investors of Turkey. Similarly, SOCAR's group companies in Turkey, namely Petkim, STAR Refinery, Petlim Container Terminal and Trans-Anatolian Natural Gas Pipeline (TANAP) represent the largest-scale investment Azerbaijan has made to a single country to date.
- SOCAR defines its main investment fields in Turkey as natural gas trade and distribution, oil refinery and distribution, production and trade of petrochemicals and relevant operations to support these areas. Additionally, SOCAR is the principal partner of the Trans-Anatolian Natural Gas Pipeline (TANAP) Project, the longest line of the Southern Gas Corridor, an infrastructure project, planned to carry natural gas to Turkey and Europe from the Caspian Sea region resources.





RWE



EnBW

SIEMENS

LM WIND POWER

tpi COMPOSITES



e-on

ALSTOM



ENGIE

Vestas



RES SOCAR

Hanwha

LUKOIL

valeura energy inc.

MITSUBISHI HEAVY INDUSTRIES

Vitol

TCC 中国天辰 TIANCHEN CORP. CHINA



ENERGO-PRO

ACWA POWER

steag

CSUN energy for today

Statkraft

航天机电 HT-SAAE

edf

ENERCON ENERGIE FÜR DIE WELT

SHANGHAI ELECTRIC POWER CO., LTD.



**February 2017** - The consortium of Kolin-Kalyon and Celikler wins the tender for privatization of Cayirhan B coal reserve located in the province of Ankara, offering the lowest bid of \$6.04 cent/kWh. The consortium will install a coal-fired power plant with 800 MW installed power and benefit from the PPA for 15 years.

**March 2017** - The consortium of Kalyon – Korean Hanwha Q-Cells Group ends up winning the first 1 GW solar YEKA tender bid, submitting the lowest offer of 6.99 cent/kWh. The PPA will be valid for 15 years, and the solar equipment will be domestically procured from the manufacturing plant to be set up by the consortium.



**April 2017**- The Minister of Energy launches National Energy and Mining Strategy which identifies as key priorities security of supply, prioritization of national resources and localization, deployment of renewable energy and a predictable market.

**June 2017**- Construction of the TurkStream gas pipeline is initiated in the Black Sea near the Russian coast with the docking of the shallow and deep-water parts of the pipeline. Once completed, the pipeline will transport up to 31.5 billion cubic meters of gas to Turkey and Europe each year.



**August 2017** - The consortium of German giant Siemens and Turkey's Türkerler and Kalyon Enerji Holdings wins the first 1 GW wind YEKA tender, offering the lowest power purchasing price to the state with \$3.48 cent/kWh. The consortium will benefit from the PPA for 15 years. A local turbine manufacturing plant will be set up and supply the 1 GW wind power plants.

**September 2017**- Menzelet and Kilavuzlu hydroelectric powerplants with a total installed capacity of 178 MW are privatized for TL 1,276 million, being the highest bid offered by Entek Elektrik Üretim A.Ş, a subsidiary of Koc Holding.





# INVEST IN TURKEY



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