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
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 bourgeoning 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'S ENERGY OUTLOOK

TURKEY

6th largest electricity market in Europe with 85.2 GW installed power

5th largest energy consumer in Europe with 137.9 MTOE consumption per year (18th Largest in the World)

4th 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
$75BN OF ENERGY INVESTMENTS IN TURKEY IN 10 YEARS
$25BN IN PRIVATIZATIONS

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.

Source: YASED UDY Report 2017, ISPAT team analysis, Deloitte Annual M&A Reviews
OUTLOOK

ELECTRICITY HIGHLIGHTS

85.2 GW
Total installed capacity
up 7.4 GW from 2016

6th largest electricity market in Europe
Liberalization gains speed in the last 16 years

Installed Power Breakdown by Generators

Independent Power Producers; 64%
EUAS (state-owned); 24%
Will decrease further with privatization
BOT, BOO, TOR (state-contracted) and unlicensed; 12%
Contracts will largely expire between 2017-2020

Source: EPIAS Electricity Market Report, 2018
OUTLOOK

ELECTRICITY DEMAND INCREASE

HIGHEST
market growth rate
in Europe

5.1% GROWTH SINCE 2002
Next to China and India
Higher than Brazil,
Mexico, Iran and South
Africa

Source: EPIAS Electricity Market Report, 2018
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

Source: Ministry of Energy, 2016
Includes 5,021 power plants (EUAS, BOT/BOO/TOR and IPPs with increasing share)

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

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

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

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

Source: EPIAS Electricity Market Report, 2018
# Installed Capacity and Generation Development

<table>
<thead>
<tr>
<th>Resources</th>
<th>Installed Capacity (MW)</th>
<th>Share (%)</th>
<th>Generation (TWh)</th>
<th>Generation Share (%)</th>
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<tbody>
<tr>
<td>Natural Gas</td>
<td>9,702</td>
<td>31</td>
<td>52.50</td>
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<td>Hydraulic</td>
<td>12,241</td>
<td>38</td>
<td>33.50</td>
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<tr>
<td>Domestic Coal</td>
<td>6,959</td>
<td>22</td>
<td>28.00</td>
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<tr>
<td>Import Coal</td>
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<td>4.1</td>
<td>3</td>
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<tr>
<td>Renewables</td>
<td>34</td>
<td>0</td>
<td>2</td>
<td>0</td>
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<tr>
<td>Other</td>
<td>2,761</td>
<td>8</td>
<td>10.90</td>
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<td><strong>Total</strong></td>
<td><strong>31,846</strong></td>
<td><strong>100</strong></td>
<td><strong>129.40</strong></td>
<td><strong>100</strong></td>
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</table>

(2002)

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

(2017)

Source: EPIAS Electricity Market Report, 2018
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Growth Drivers in Turkish Energy Sector

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Opportunities in Turkish Energy Sector

Success Stories
Turkey has a series of ambitious targets for 2019 and beyond...

**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
Energy Investments until 2023

VISION 2023

20 GW WIND
$22 BILLION

10 GW SOLAR
$7 BILLION

34 GW HYDRO
$17 BILLION

NUCLEAR
$27 BILLION

COAL
$14 BILLION

GRID
$15 BILLION

34 GW HYDRO
$17 BILLION
ENERGY 2002

31,846 MW total installed power
17 MW Wind Power
64,007 MW total installed power
2,760 MW Wind Power
2 Nuclear Power Plants with 10 GW (Mersin & Sinop)
120 GW total installed power
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

4 units of ATMEA1 with 4,480 MW total capacity
USD 22 billion investment: IGA signed with Japan in 2013 May
PPP where 51% belongs to the consortium of MHI, Areva, Itochu and Engie, 49% belongs to EUAS. Construction starts in 2019. Operational starting from 2023 to 2028.

4 units of VVER 1200 with 4,800 MW total capacity
USD 20 billion investment: IGA signed with Russia in 2010 May. To be constructed through BOO model by Russian Rosatom. Construction starts in 2018. Operational starting from 2021 to 2024.
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Success Stories
### Installed Capacity of Renewables (End-2017)

<table>
<thead>
<tr>
<th>Source</th>
<th>Installed Capacity (MW)</th>
<th>Number of Plants</th>
<th>Ratio to Total Renewable Capacity (%)</th>
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</thead>
<tbody>
<tr>
<td>Hydraulic</td>
<td>27,273</td>
<td>618</td>
<td>33.9</td>
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<tr>
<td>Wind</td>
<td>6,516</td>
<td>161</td>
<td>7.3</td>
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<tr>
<td>Solar</td>
<td>3,421</td>
<td>3,619</td>
<td>1</td>
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<tr>
<td>Geothermal</td>
<td>1,064</td>
<td>40</td>
<td>1</td>
</tr>
<tr>
<td>Biomass</td>
<td>575</td>
<td>98</td>
<td>0.6</td>
</tr>
</tbody>
</table>

### Targets for Renewable Installed Capacity (MW)

<table>
<thead>
<tr>
<th>Source</th>
<th>2019</th>
<th>2023</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydraulic</td>
<td>32,000</td>
<td>34,000</td>
</tr>
<tr>
<td>Wind</td>
<td>10,000</td>
<td>20,000</td>
</tr>
<tr>
<td>Solar</td>
<td>3,000</td>
<td>10,000</td>
</tr>
<tr>
<td>Geothermal</td>
<td>700</td>
<td>1,500</td>
</tr>
<tr>
<td>Biomass</td>
<td>700</td>
<td>1,000</td>
</tr>
</tbody>
</table>

### Renewable Installed Capacity 2017

- **Hydro**: 70.2%
- **Wind**: 16.8%
- **Solar**: 8.8%
- **Geothermal**: 2.7%
- **Biomass**: 1.5%

### Installed Capacity 2023

- **Hydro**: 55.3%
- **Wind**: 32.5%
- **Solar**: 8.1%
- **Geothermal**: 2.4%
- **Biomass**:...
Global Comparison – Robust Growth in Wind

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.

2.8 GW licensed and 1 GW re-zone capacity tenders completed in 2017.

Fastest growing markets in 2017:
- 70% of the market
- Fastest growing markets in 2017

Source: REN21 Global Status Report 2017
GLOBAL OUTLOOK - HYDRO PASSES THE 1,000 GW MARK AMIDST COMPETITION

$911 BILLION OF NEW HYDRO INVESTMENT IS EXPECTED BY 2040

Turkey 2017 Capacity Increase: 600 MW

Source: REN21 Global Status Report 2017
RENEWABLE ENERGY

GLOBAL OUTLOOK - GEOTHERMAL POWER AND HEAT SHOWS STEADY GROWTH

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

TURKEY IS NO. 4 IN GEOTHERMAL INSTALLED POWER

Source: REN21 Global Status Report 2017
A JOINT VENTURE OF HANWHA Q-CELLS AND TURKISH KALYON ENERJI 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.

- **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 ANNUN/ELECTRICITY CONSUMPTION OF MORE THAN 1 MILLION HOUSEHOLDS

- **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

- **EMPLOYMENT OF 80% LOCAL STAFF**
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COAL

GLOBAL OUTLOOK – GLOBAL PRODUCTION FALLS BY 6.3% DUE TO LOW PRICES AND WEAK DEMAND IN 2016

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

2016 consumption (Mt) 2016 production (Mt)

Source: IEA Key Coal Trends Report 2017
70% of lignite reserves in 5 countries: Germany, Australia, USA, China and Turkey.

Turkey has 7% of world reserves with 15.6 billion tonnes (with 90% <3000KCAL/KG).

**Value Chain - 2015**

- **Reserve (BN Tons)**
  - **HARD COAL**
    - TTK and Private Sector (1.3)
    - EUAŞ (8.5)
  - **LIGNITE**
    - TKİ (3.4)
    - MTA (2.6)
    - Private Sector (1.1)

- **Supply (MN Tons)**
  - **Production**
    - TTK (1.3)
    - Private Sector (0.5)
    - EUAŞ (1.9)
    - TKİ (14.9)
  - **Import**
    - Private Sector (28.7)

- **Consumption (MN Tons)**
  - Total: 16.9
  - Total: 94.2
  - Total: 94.2

**Notes:**
- Production and import values are given in millions of tonnes (MN Tons) for the year 2015.
- The values represent the contribution of different sectors and companies to the market outlook.
- The reserve and consumption figures indicate the balance between available resources and demand.
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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 (%)**

- **Russia:** 52.94%
- **Iran:** 16.74%
- **Azerbaijan:** 11.85%
- **Algeria:** 8.36%
- **Nigeria:** 3.76%
- **Spot LNG:** 7.36%
- **Others:**

**Imports by Country (MCM)**

- **Russia**:
- **Iran**:
- **Azerbaijan**:
- **Algeria**:
- **Nigeria**:
- **Others**:

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.
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.

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

- Netherlands: 85.35 MCM
- United Kingdom: 86.3 MCM
- Equatorial Guinea: 93.4 MCM
- Norway: 286.49 MCM
- Trinidad and Tobago: 419.29 MCM
- Nigeria: 735.75 MCM
- United States: 767.58 MCM
- Norway: 853.76 MCM
- Qatar: 1,561.64 MCM

**IMPORTS BY COMPANY (%)**

- EGE GAZ
- BOTAŞ
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, Şırnak and Artvin not having access to natural gas.
FURTHER FSRU INVESTMENTS AND UNDERGROUND STORAGE FACILITIES ARE UNDERWAY TO REACH 20% SHARE OF CONSUMPTION...

**BOTAS SILIVRI UNDERGROUND GAS STORAGE**
- STORAGE CAPACITY: 2.8 BCM (2024 - 4.3 BCM)
- INJECTION CAPACITY: ±6 MCM/D (2024-45 MCM/D)
- DAILY SENDOUT CAPACITY: ±6 MCM/D (2024-75 MCM/D)

**BOTAS MARMARA EREGLISI LNG TERMINAL**
- TANK CAPACITY: 3×85,000 M³ (255,000 M³)
- MX. REGASIFICATION CAPACITY: 6 BCM/Y (9.3 BCM IN 2018)
- DAILY TRUCK LOADING CAPACITY: 75

**DINGUL UNDERGROUND GAS STORAGE**
- STORAGE CAPACITY: 1 BCM (2020 – 5.3 BCM)
- DAILY SENDOUT CAPACITY: 40 MCM/D (2020-80 MCM/D)

**EGEGAZ LNG TERMINAL**
- (PRIVATE)
- TANK CAPACITY: 2X140,000 M³ (280,000 M³)
- MX. REGASIFICATION CAPACITY: 6 BCM/Y
- DAILY TRUCK LOADING CAPACITY: 50

**FLOATING STORAGE AND REGASIFICATION UNIT (FSRU)**
- TANK CAPACITY: 145,000 M³
- MX. REGASIFICATION CAPACITY: 5 BCM/Y
- DAILY SENDOUT CAPACITY: 20 MCM/D
73% of the world's oil and gas reserves
# Natural Gas & LNG

## Existing and Prospective Oil and Gas Pipelines

<table>
<thead>
<tr>
<th>Pipeline</th>
<th>Source Country</th>
<th>Total Length</th>
<th>Contract Volume</th>
<th>Source Country</th>
<th>Total Length</th>
<th>Contract Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>West Line Russia</td>
<td>Russia</td>
<td>842 km</td>
<td>14 bcm/a</td>
<td>Russia</td>
<td>1,213 km</td>
<td>16 bcm/a</td>
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<tr>
<td>Blue Stream Russia</td>
<td>Russia</td>
<td>1,491 km</td>
<td>9.6 bcm/a</td>
<td>Iran</td>
<td>692 km</td>
<td>6.6 bcm/a</td>
</tr>
<tr>
<td>Eastern Anatolia - Iran</td>
<td>Iran</td>
<td>1,491 km</td>
<td>9.6 bcm/a</td>
<td>Azerbaijan</td>
<td>692 km</td>
<td>6.6 bcm/a</td>
</tr>
<tr>
<td>South Caucasus - Azerbaijan</td>
<td>Azerbaijan</td>
<td>692 km</td>
<td>4.4 bcm/a</td>
<td>Algeria</td>
<td>-</td>
<td>1.3 bcm/a</td>
</tr>
<tr>
<td>LNG - Algeria</td>
<td>Algeria</td>
<td>-</td>
<td>-</td>
<td>Nigeria</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>LNG - Nigeria</td>
<td>Nigeria</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

### Active Import Contracts

- **BOTAS (4 bcm/a) and 7 Private (10 bcm/a)**
- **Importers**: BOTAS
- **Max Daily Capacity**: ca. 51.4 mcm/day (BOTAS) ca. 47.4 mcm/day (BOTAS) ca. 28.6 mcm/day (BOTAS) ca. 19.1 mcm/day (BOTAS)
- **Termination Date**: End of 2021 (BOTAS) End of 2025 (BOTAS) July 2026 (BOTAS) April 2021 (BOTAS) October 2024 (BOTAS)

### Prospective

- **TANAP - Azerbaijan**: Contract volume: 16 bcm/a (6 bcm/a to Turkey)
- **Turkish Stream - Russia**: Prospective volume: 31.5 bcm/a (15.75 bcm/a to Turkey)
- **Iraqi Gas**: Prospective volume: ca. 3 bcm/a
- **Iran - Turkey - Europe**: Prospective volume: 35 bcm/a (Total)
- **East Mediterranean Gas**: Prospective volume: 10-20 bcm/a
- **Turkmen Gas**: Contract volume: 16 bcm/a

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Success Stories
### Turkey Wind Market Outlook - Road to 20 GW by 2023

**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

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#### UNLICENSED MARKET | LICENSED MARKET | MEGA PROJECTS

<table>
<thead>
<tr>
<th>Capacity Threshold</th>
<th>&lt; 1MW</th>
<th>&gt; 1MW</th>
<th>&gt; 1MW</th>
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</thead>
<tbody>
<tr>
<td><strong>Location</strong></td>
<td>Based on DisCo capacity</td>
<td>Based on TEIAS capacity</td>
<td>Renewable Energy Resource Zones</td>
</tr>
<tr>
<td><strong>Electricity sales</strong></td>
<td>Spot market at FIT via authorized supply company</td>
<td>Spot market at FIT</td>
<td>Fixed price identified in auction</td>
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<tr>
<td><strong>FIT Application timeline</strong></td>
<td>Apply to DisCo’s with no specific timeline</td>
<td>Apply to YEKDEM in October</td>
<td>-</td>
</tr>
<tr>
<td><strong>Auction model</strong></td>
<td>No auction</td>
<td>Reverse auction</td>
<td>Reverse auction</td>
</tr>
<tr>
<td><strong>Local content</strong></td>
<td>-</td>
<td>Extra FIT</td>
<td>-</td>
</tr>
<tr>
<td><strong>Installed capacity (as of end-2017)</strong></td>
<td>34 MW</td>
<td>6,482.2 MW</td>
<td>-</td>
</tr>
<tr>
<td><strong>Pipeline (as of end-2017)</strong></td>
<td>-</td>
<td>552.7 + 2.8 GW + 2 GW</td>
<td>1 GW Re-zone tender completed in 2017 + 2 GW tenders expected in 2018</td>
</tr>
</tbody>
</table>

- **10 GW in 3 or 4 projects**
- **WPPs have balancing responsibility in the day-ahead market with a tolerance band of 2%**
- **Installed capacity**: 34 MW (2017) + 552.7 MW in construction + 2.8 GW tendered in June - December 2017 + 2 GW applications in 2020 April

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

- **Timeline:**
  - 1 GW Re-zone tender completed in 2017 + 2 GW tenders expected in 2018
OPPORTUNITIES

TURKEY HYDRO MARKET OUTLOOK – ROAD TO 34GW BY 2023

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

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

LICENSED MARKET

<table>
<thead>
<tr>
<th>Location</th>
<th>existing DSI project or new project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity sales</td>
<td>Spot market at FIT</td>
</tr>
<tr>
<td>Application timeline</td>
<td>Apply to YEKDEM in October</td>
</tr>
<tr>
<td>Local content</td>
<td>Extra FIT</td>
</tr>
<tr>
<td>Pipeline (as of end-2017)</td>
<td>4,168.1 MW licensed + 4,021.6 MW prelicensed</td>
</tr>
</tbody>
</table>

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

Source: Ministry of Energy, 2017
**STRONG POTENTIAL**
with avg. annual irradiation of 1.7-2 MWh/m²
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

<table>
<thead>
<tr>
<th>Capacity Threshold</th>
<th>&lt; 1MW</th>
<th>&gt; 1MW</th>
<th>&gt; 1MW</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 50 kW for rooftop</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Location</th>
<th>Based on DisCo capacity</th>
<th>Based on TEIAS capacity</th>
<th>Renewable Energy Resource Zones</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Electricity sales</th>
<th>Spot market at FIT via authorized supply company</th>
<th>Spot market at FIT</th>
<th>Fixed price identified in auction</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>FIT Application timeline</th>
<th>Apply to DisCo’s with no specific timeline</th>
<th>Apply to YEKDEM in October</th>
<th>-</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Auction model</th>
<th>No auction</th>
<th>Reverse auction</th>
<th>Reverse auction</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Local content</th>
<th>-</th>
<th>Extra FIT</th>
<th>-</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Installed capacity (as of end-2017)</th>
<th>3,402 MW</th>
<th>17.9 MW</th>
<th>-</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Pipeline (as of end-2017)</th>
<th>2.8 GW</th>
<th>415 MW prelicensed + 61.8 MW licensed</th>
<th>1 GW tender completed in March 2017 + 1 GW tender expected in 2018</th>
</tr>
</thead>
</table>

---

**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
## 3rd 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

### Geothermal Power Capacity Increased

5x IN 5 YEARS

### 165 MW Kızılderı Geothermal Power Plant Installed in 2017

### Location

Based on exploration & production license for the reserve

### Auction model

Auctions for reserves are done by MTA or İl Özel İdare

### Electricity sales

Spot market at FIT

### FIT Application timeline

Apply to YEKDEM in October

### Local content

Extra FIT

### Installed capacity (as of end-2017)

1,064 MW – 40 plants

### Pipeline (as of end-2017)

131.2 MW licensed + 589.16 MW pre-licensed

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

GPPs have balancing responsibility in the day-ahead market with a tolerance band of 2%
OPPORTUNITIES
A LUCRATIVE SUPPORT SCHEME...

RENEWABLES FEED-IN TARIFF SCHEME

<table>
<thead>
<tr>
<th>Source</th>
<th>U$ cent/kWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydro</td>
<td>1.0</td>
</tr>
<tr>
<td>Wind</td>
<td>1.3</td>
</tr>
<tr>
<td>Geothermal</td>
<td>0.7</td>
</tr>
<tr>
<td>Biomass</td>
<td>0.4</td>
</tr>
<tr>
<td>PV</td>
<td>0.5</td>
</tr>
<tr>
<td>CSP</td>
<td>0.6</td>
</tr>
</tbody>
</table>

250
RENHELWABLE ENERGY RESOURCE ZONES (RE-ZONE/YEKA) - A NEW INVESTMENT MODEL

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
**WHAT’S ON AGENDA?**

**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 ≥ 1,000,000,000 (one billion) TRY (or its equivalent in foreign currency)
  - or
  - Total assets’ value as of the end of 2017 ≥ 400,000,000 (four hundred million) TRY (or its equivalent in foreign currency)
- Deadline for Financial Offers: October 23’rd, 2018
POTENTIAL YEKA SITES FOR 1.2 GW INSTALLED CAPACITY

- Saros Potential YEKA Site
- Gelibolu Potential YEKA Site
- Kıyıköy Potential YEKA Site
OPPORTUNITIES

LIGNITE RESERVES TO BE DEVELOPED VIA PPAs

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.

### Lignite Reserves to Be Developed via PPAs

- **AFSIN-ELBISTAN**
  - 4.83bn tonnes reserve in 21,110 ha
  - Installed Capacity potential: 8.2 GW
  - Location: Kahramanmaras
  - 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: Tekirdag
  - Calorific value: 2050 kcal/kg

- **ALPU**
  - 1.45 bn tonnes reserve in underground site
  - Installed Capacity potential: 4 GW
  - Location: Eskisehir
  - 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: Kirklareli
  - Calorific value: 1910 kcal/kg
1. The Council of Ministers Decree No. 2012/3305 pertaining to investment incentives:

Priority (5th 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 $\times$ 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) $\times$ 6500 (hour) $\times$ 0.5 $\times$ 1000

For plants operating on mixed-fuel: Procurement Amount for each power plant (kWh) = Installed Power of the Plant (MWe) $\times$ 6500 (hour) $\times$ 0.5 $\times$ 1000 $\times$ m

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

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:

\[ P = P_0 \times \frac{(0.5x \text{-------------})+(0.5x \text{-------------})}{P_{PPI10} \times C_{PPI10}} \]

\[ P = \text{Quarterly price (TRY/MWh)} \]
\[ P_0 = \text{The price used for previous quarter (TRY/MWh)} \]
\[ P_{PPI1} = \text{TUIK Producer Price Index relating to the previous month followed by the relevant quarter} \]
\[ P_{PPI10} = \text{TUIK Producer Price Index relating to the previous fourth month before the relevant quarter} \]
\[ C_{PPI1} = \text{TUIK Consumer Price Index relating to the previous month followed by the relevant quarter} \]
\[ C_{PPI10} = \text{TUIK Consumer Price Index relating to the previous fourth month before the relevant quarter} \]
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
OPPORTUNITIES Regional Investment Incentive Scheme

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

<table>
<thead>
<tr>
<th>Support</th>
<th>Regions: 1, 2, 3, 4, 5</th>
<th>Within OIZ in Region 5</th>
<th>In Region 6</th>
<th>Within OIZ in Region 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customs Duty Exemption</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Tax Deduction</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tax Reduction Rate (%)</td>
<td>80</td>
<td>90</td>
<td>90</td>
<td>90</td>
</tr>
<tr>
<td>Reduced Tax Rate (%)</td>
<td>4.4</td>
<td>2.2</td>
<td>2.2</td>
<td>2.2</td>
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<tr>
<td>Rate of Contribution (%)</td>
<td>40</td>
<td>50</td>
<td>50</td>
<td>55</td>
</tr>
<tr>
<td>Social Security Premium (SSP) Support for Employer’s Share</td>
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<td></td>
<td></td>
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<tr>
<td>Years of Support</td>
<td>7</td>
<td>10</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>Cap for Support (% of Investment)</td>
<td>35</td>
<td>No limit</td>
<td>No limit</td>
<td>No limit</td>
</tr>
<tr>
<td>Land Allocation</td>
<td>✓</td>
<td>-</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>Interest Rate Support</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TL Denominated Loans (points)</td>
<td>5</td>
<td>5</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>FX Loan (points)</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Maximum Support (TL)</td>
<td>0-0-500K-600K-700K</td>
<td>700K</td>
<td>900K</td>
<td>900K</td>
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<tr>
<td>SSP Support for employee share (years)</td>
<td>-</td>
<td>-</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Income Tax Withholding Support (years)</td>
<td>-</td>
<td>-</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>
Executive Summary

Turkey’s Energy Outlook

Growth Drivers in Turkish Energy Sector

Opportunities in Turkish Energy Sector

Success Stories
**SUCCESS STORIES**

Energy industry giants have a deep-rooted and growing presence in Turkey...

- **ENGIIE** 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.

- **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 knowhow. 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.

- **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.

- **SOCAR** 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 an 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.

- **Siemens** 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 knowhow. Siemens is one of the leading natural gas distributors, and also owns two gas-fired power plants (CCGTs) as an Independent Power Producer (IPP). Siemens 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.
- 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.
SUCCESS STORIES

Strong international presence in Turkey...
**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 Kılavuzlu 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.
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