

ÇUKURÇAYI **Hydro Power Plant**

Project Presentation

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- ❑ ÇUKURÇAYI HEPP is under construction, with approximately the 75% of civil works finalized and all of the electromechanical equipment are already in the zone of works.
 - ❑ The facility with total installed capacity of 4 MW and total annual electricity generation of 16,3 GWh will be expected to operate its commercial activities in November 2011
 - ❑ There is no significant water acquired rights in Project Zone
 - ❑ Although the characteristics geotechnical, geological and seismic in the area, these do not drastically affect the viability of the Çukurçayı HEPP.
 - ❑ Çukurçay creek with the catchment area of 29 km² is the main sources of Çukurçayı HEPP. Kovada creek is another important river in the region, Çukurçayı creek transiting through the to the south-west and joining with the Kovada Stream downstream of Project.
 - ❑ Çukurçayı HEPP is a profitable investment with a cost of \$7,5 million (VAT and Investment Period's interest included) and expected incomes of \$16,8 million in year 0, considering a 8.3% discount rate for life period.
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Key Highlights

- ❑ **Location** : Isparta – Aksu River Basin
 - ❑ **Status** : Under Construction
 - ❑ **Launch of Commercial Operations** : exp. by November 2011
 - ❑ **Installed Power** : 4.00 MW_m / 3.60 MW_e
 - ❑ **Annual Production** : 16.350.000 kWh
 - ❑ **Average Flow Rate** : 0,55 m³/s
 - ❑ **Design Flow** : 1,20 m³/s
 - ❑ **Generation License Period** : 30 Years (to be extended to 49 Years)
 - ❑ **Operation Period** : 25 Years (to be extended to 44 Years)
 - ❑ **Transmission Structure Type** : 2,5 km Closed Box Conduit
 - ❑ **Electromechanical Equipments** : Yulin Hydro-electric equipment/ China
 - ❑ **Estimated project cost** : 7.511.000 US \$
 - ❑ **Water usage fee** : “0” Kr/kWh
 - ❑ **First full operational year exp. EBITDA** : 1.362.000 US\$
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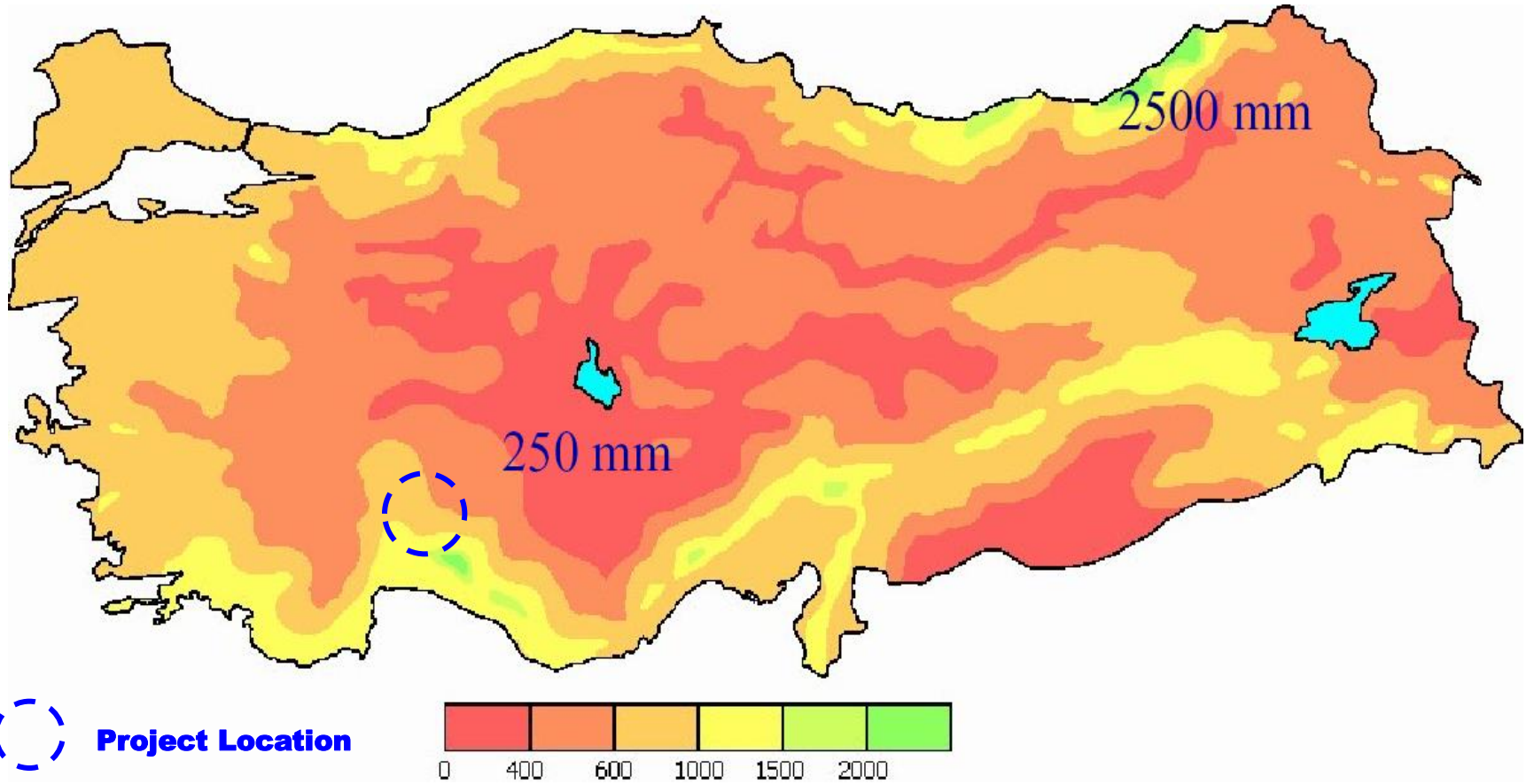
Location - Isparta

ÇUKURÇAYI HEPP is located at 30 km South to Isparta city centre in the South-East region of Turkey between the elevations of 852 m and 411,60 m on upstream of Çukurçay course of Kovada Stream joining with the Isparta Stream.



Location - Turkey Annual Rainfall Map

- ❑ **Drainage Area:** 29,50 km²
- ❑ **Average Annual Water Flow:** 17,46 hm³



Location - Map



Location – Photophratig



Brief Information for Projects

Technical Summary of Çukurçayı HEPP

The Diversion Weir

Type		Full Bodied, Overflow
Thalweg Elevation (m)	m	850,0
Crest Length (m)	m	10,0
Height (from the crest)	m	2,0

Due to high inclination in river basin, Troll type water intake structure is constructed in Çukuçay HEPP. Also Water Diversion Structures (WDS) will be constructed on the conducting line route in order to let in the water in small side creeks.

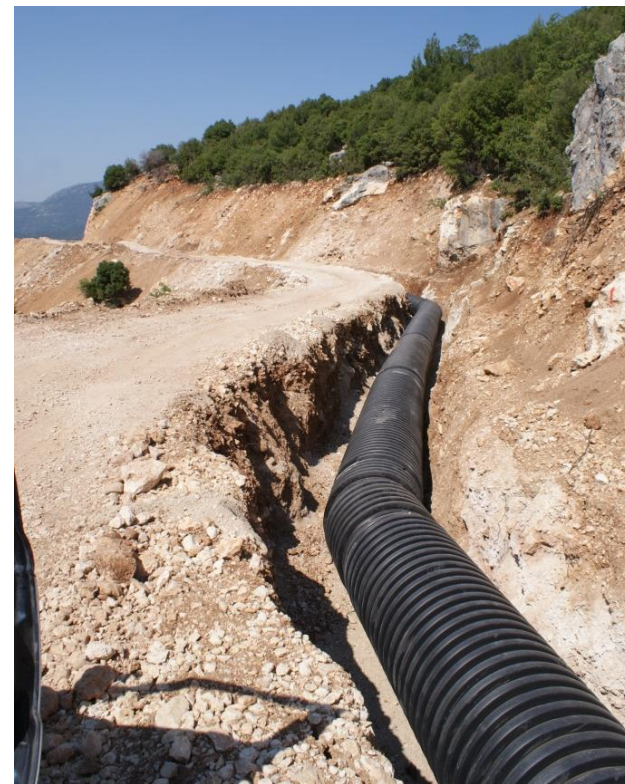


Technical Summary of Çukurçayı HEPP

Conveyance Structure

Type		Corrugated Pipe
Location		Right Bank
Length	m	4.640
The capacity	m ³ /s	1,20
Slope		0,0015
The diameter of the pipe	m	1,00

Çukurçayı HEPP conveying line is completely formed of Corrugated Pipe assembled by open excavation. In Çukurçayı HEPP there is 4 640 meters length of Corrugated Pipe conveying line.



Technical Summary of Çukurçayı HEPP

Headpond

Length	m	20,00
Width	m	8,00
Operational Water Level	m	843,80
Capacity	m ³	111,84



The head pond has been designed as octagon so as to reduce cut and concrete costs because of high inclinations of the location. No reservoir is planned in the head pond

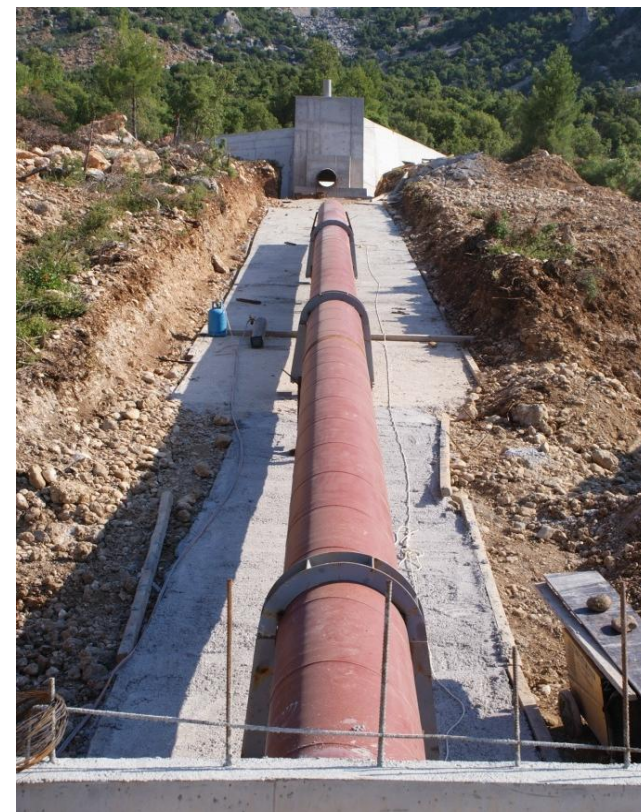


Technical Summary of Çukurçayı HEPP

Penstock

Length	m	1.605,8
Diameter Ø	m	0,7
Wall Thickness	mm	10,0

Penstock of Çukurçayı HEPP is on sufficiently steep for lower cost but flat enough for easy assemblage. In Çukurçayı HEPP there is 1 605 meters length of steel penstock



Technical Summary of Çukurçayı HEPP

Powerhouse Building

Length	m	24,5
Width	m	12,0
Tailwater level	m	411,6

The powerhouse of Çukurçayı HEPP is located on right bank of the creek with 2 X 2 MW installed capacity



Technical Summary of Çukurçayı HEPP

Installed Power and the Energy Production

Gross Head	m	440,40
Net Head	m	423,68
Turbine Type		Horizontal Pelton
Unit		2,0
Installed Power	MW	4,0
Total Energy Production	kWh	16.350.000,0
Firm Energy Production	kWh	930.000,0
Secondary Energy Production	kWh	15.420.000,0



Brief Information of the Financials

Detailed Investment Cost

Investment Costs (Detailed, Thousand US\$)

Development

Project Development	\$
Project Dev. Fee	\$
Total	\$

Installations

Civil Works	3.821 \$
Electromechanical Works	1.111 \$
Total	4.932 \$

Services

Transmission Line	100 \$
Unforeseen	424 \$
Consultant Fee	\$
Engineering and Project Supervision	593 \$
Insurance Fee	197 \$
Total	1.314 \$

Land

Access Roads and Relocation Expenses	200 \$
Expropriation	10 \$
Total	210 \$

Grand Total 6.457 \$

Investment Cost (Thousand US\$)

Project Cost (VAT Included)	7.345 \$
Interest Expense	115 \$
Management & Commitment Fee	50 \$
Total	7.511 \$

Operation Costs (Thousand US\$)

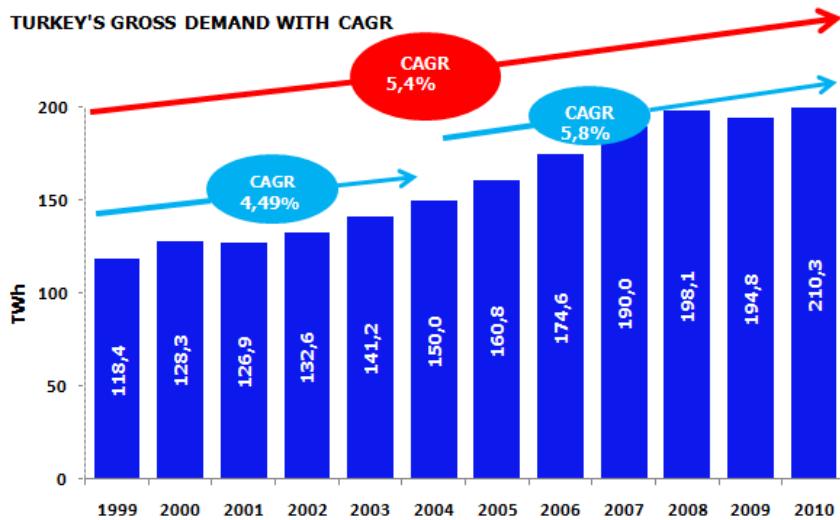
Operation & Management	41 \$
Personnel	24 \$
General Expense	24 \$
Insurance Fee	23 \$
Total	112 \$

Overview of the Turkish Energy Sector

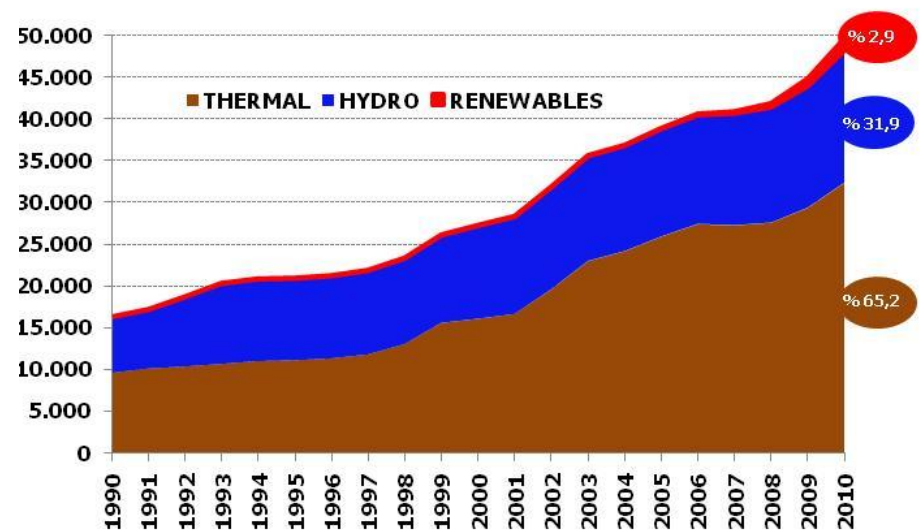
Turkey's energy market is characterized by strong historic growth

- Turkish energy market showed strong growth over the last decade. As an emerging market, in line with expanding economy, increasing rate of industrialization and urbanization, gross electricity demand of Turkey between 1999 and 2010 increased rapidly with a CAGR of 5.4% reaching 210 TWh in 2010, while for the last five years, 2004-2010, CAGR is 5.8%
- Due to global crisis, in 2009, demand decreased 194,8 TWh as compared to 2008 by 1,9%; But there was a sign of a recovery in 2010, demand increased 210,3 TWh, by 7,9%.
- On the other hand, total installed capacity of Turkey reached 44,766 MW as at the end of 2009. Thermal power plants hold the largest share with 65,5%, while hydro's account for 32,5% - geothermal and wind power plants (renewables) only holds 2 % share.

TURKEY'S GROSS DEMAND WITH CAGR

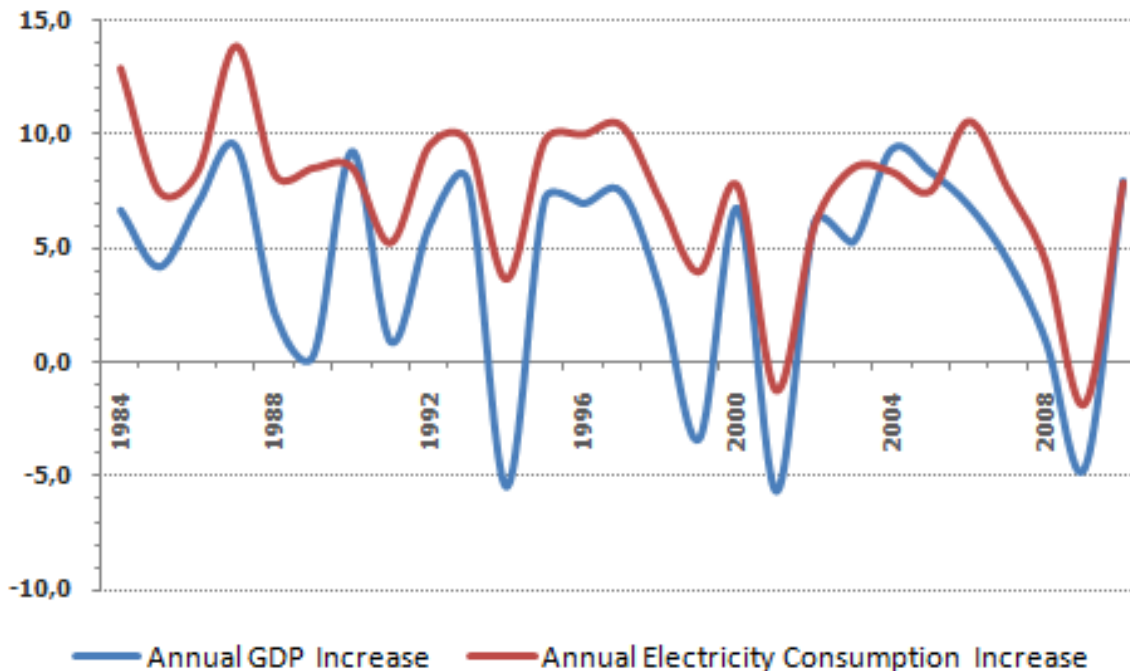


INSTALLED CAPACITY BY PRIMARY ENERGY RESOURCES



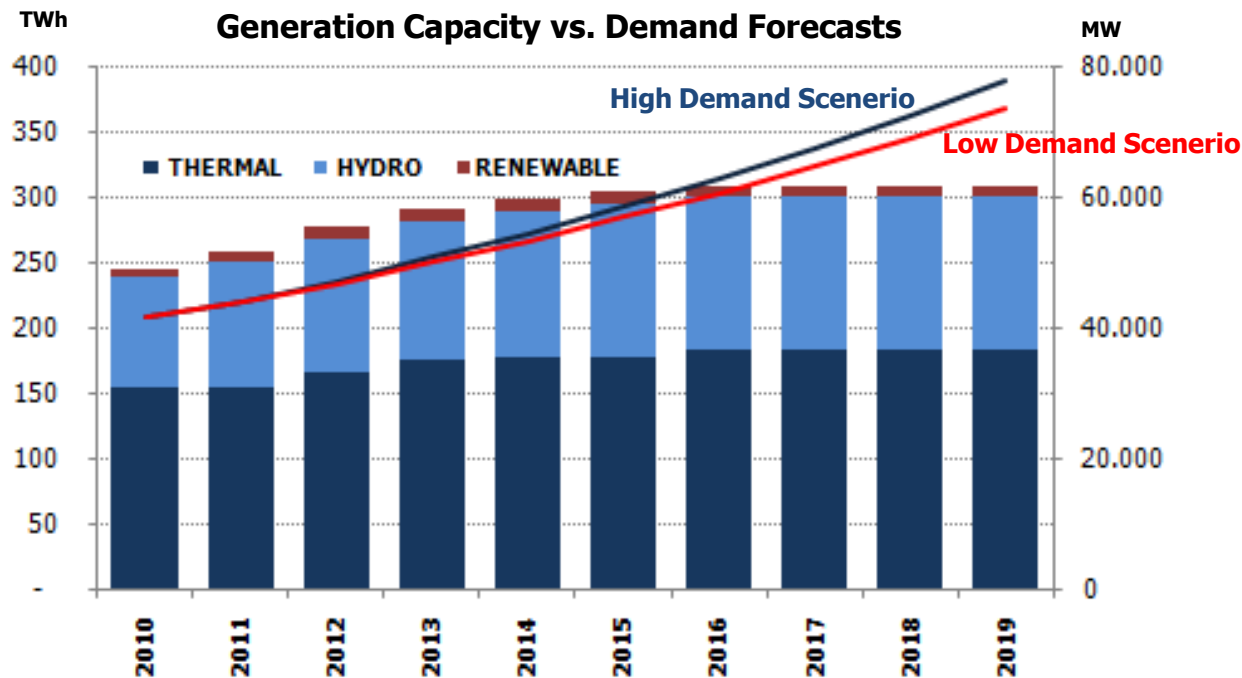
Turkish electricity consumption is closely correlated with GDP

- In the last 20 years, net electricity consumption increased remarkably with 7 % CAGR.
- Electricity consumption proved to be resilient to the downturns in the economy. Increase in electricity demand has mostly been much higher than the increase in national income in growth years, while staying at the positive territory during recession years.
- This has also been the case in financial crises situations. In 2009, Turkey's GDP percentage growth rate change has been - 4,7%, whereas the electricity demand growth rate has been -1,9%.

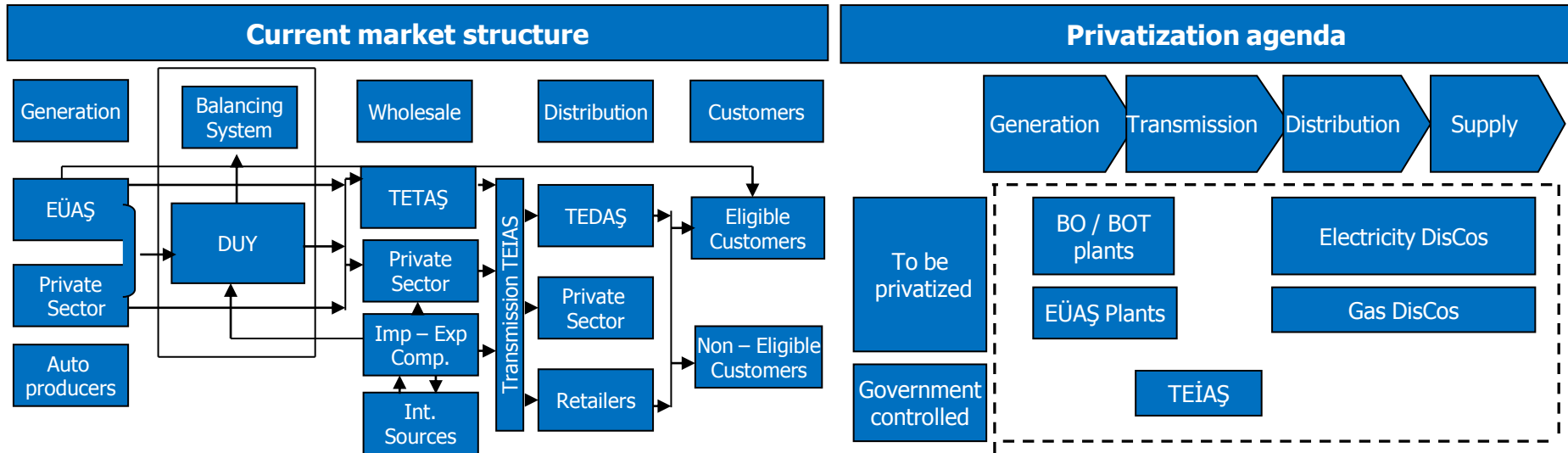


Consumption and capacity forecasts

- TEIAS (National Transmission Grid Operator) estimates that Turkey's demand for electricity will increase at an annual rate of % 7,5 between 2010 and 2019. This growing energy demand in Turkey is one of the significant factors along with market liberalization and the country's potential role as an energy terminal in its region.
- While thermal capacity formed 63,2% and HEPP 34,2% of the total installed capacity in 2010, the share of thermal capacity is expected to slightly decrease to 59,2% whereas HEPP capacity increases to 38% by 2019.



Current liberalization process offers investors with an opportunity to capture significant share in energy market



- ❑ On March 3rd, 2001, Electricity Market Law was launched, aiming to develop a financially sound, stable and transparent electricity market with the key principles and privatization of electricity generation and distribution assets.
- ❑ Liberalization of the Turkish energy sector started by the Government with the decision on privatization of the 20 state owned DisCos (Distribution Companies).
- ❑ The Electricity Market Balancing and Settlement Regulation (the "DÜY system") was put into force in August 2006 due to the concerns for a supply crisis during that year. The aim of DÜY system is to establish a competitive environment for price setting based on supply-demand relationship in the market and increase the efficiency in the sector.
- ❑ In addition to the DÜY system, automatic pricing system became effective in 2008, which intends to liberalize the market and takes into account the costs of producers.

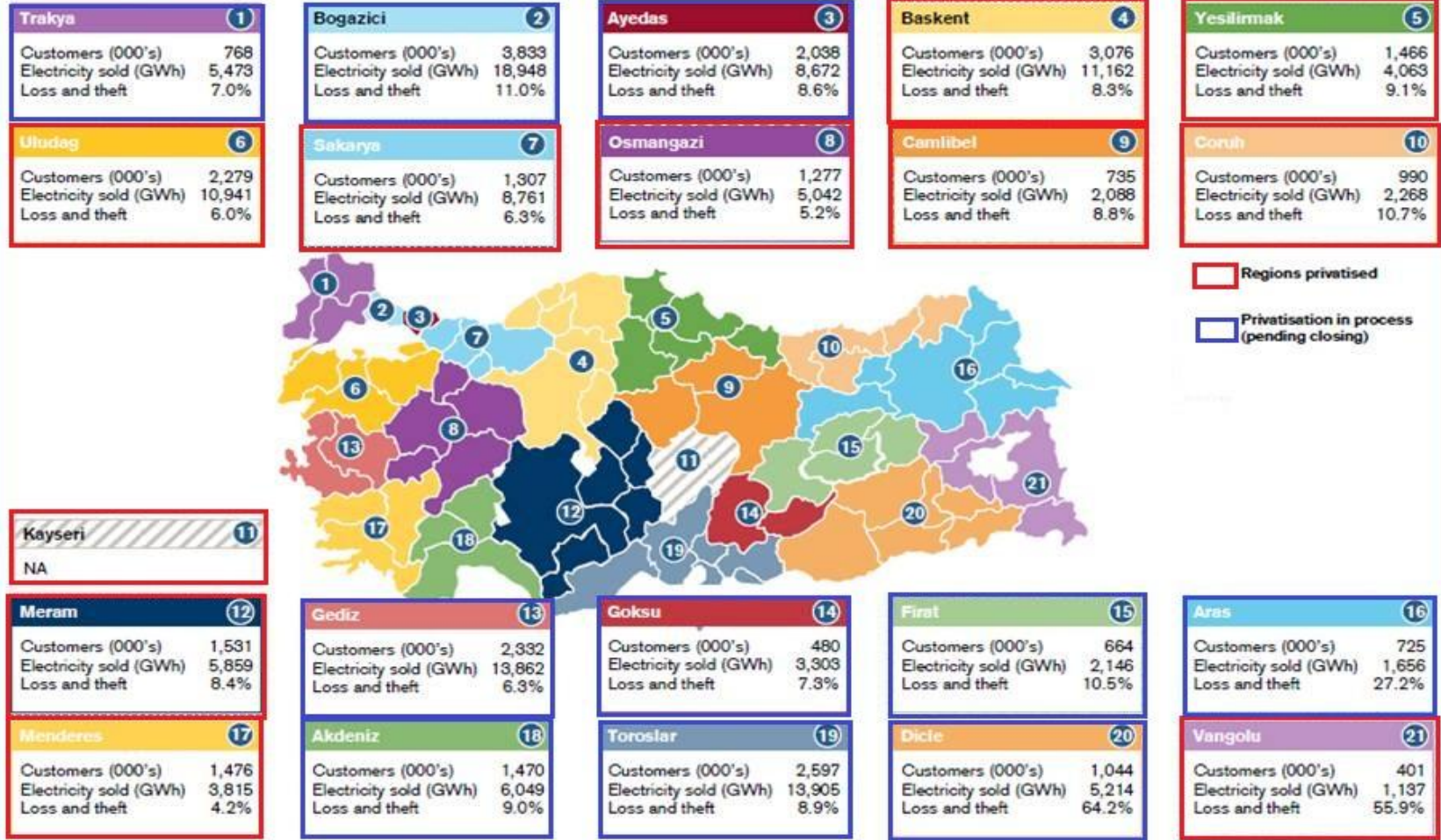
Current liberalization process offers investors with an opportunity to capture significant share in energy market (cont'd)

- ❑ Generating companies currently sell mostly to government agency Turkish Electricity Trading and Contracting Co., ("TETAS") with limited direct sales to clients from auto producers. This is expected to change when more liquidity in demand arises after the privatizations of the DisCos.
- ❑ After privatization of the DisCos there is expected be a regulated period in which integrated DisCos will be able to buy from free market for Government / EÜAŞ supply shortfall amount and on charge it to its non-eligible customers.
- ❑ Non-eligible clients ensure protected market share for DisCos in the short to mid-term as full liberalization envisioned in 2012. Eligible client segment will face fierce competition from the outset .
- ❑ The Government has recently pushed the button to privatize -15,000 MW power generation capacity of EÜAŞ in March 2010



Privatization of Distribution Companies (DisCo)

Electricity distribution regions in Turkey



Overview



Generations

- Turkey Electricity Generation Company was established as an autonomous state enterprise with a capital of TRY1.3 bn
- As envisaged in the Law No.4628, EÜAŞ has taken over the electricity generation operations of TEAS and operating rights of hydro electric power plants ("HEPP") in DSI portfolio were transferred to EÜAŞ accordingly
- EÜAŞ will operate the HEPPs until private sector involvement is completed
- Currently EÜAŞ and its affiliates have 104 HEPPs with a total installed capacity of 11,456 MW and 20 thermal power plants with a total installed capacity of 12,787 GWh
- In addition to EÜAŞ there are private companies and auto producers operating in the electricity generation sector



Transmission

- TEİAŞ started to operate in March 2003 following the license authorization by EMRA
- TEİAŞ owns all transmission lines in Turkey, operates the national grid exclusively and makes capacity planning in line with the state policies
- Pricing of TEİAŞ is regulated by EMRA



Wholesale & Trading

- As envisaged in the Law No.4628 TETAŞ took over existing liabilities of the State stemming from long term bilateral contracts. In summary, wholesale & trading operations of the State are governed by TETAŞ
- TETAŞ purchases electricity from private companies or EÜAŞ and sells to distribution companies
- As of yet Turkish State has not passed the necessary legislation to privatize TETAŞ

Overview



Distribution

- Electricity distribution in Turkey is undertaken by 21 regional distribution companies
- The distribution companies were granted the distribution & retail license for 30 years in 2006
- 11 regional distribution companies have been privatized in 2008 - 2010 and remaining 10 regional distribution companies' auctions were made in the last quarter of 2009 – 2010 and waiting for final approval to complete privatization



Regulation & Supervision

- The Law No:4628 also envisaged the establishment of an independent regulatory and supervisory authority for electricity markets
- As per the Law No. 4628 Electricity Market Regulatory Authority was established and then renamed as EMRA upon the expansion of the scope of the operations to include all segments of energy market



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