

## US-Turkey Business Council, Session III

### Topic 8.

#### Energy

Turkey is one of the world's fastest growing economies and, according to US Energy Information Administration (EIA); its importance in the energy markets is increasing both as a regional energy transit hub and as an expanding consumer. Turkey's strategy for the electricity sector is mainly driven by the objectives of increasing energy security and domestic supplies in order to meet electricity demand growth. Turkey is currently pursuing a privatization and power generation growth agenda, which includes a target of at least 30% of renewable resources by 2023. According to the Turkish Ministry of Energy and Natural Resources, in order for Turkey's supply to meet growing demand, over USD 120-130 billion of investment will be required in the next 10 years. Faced with ever-increasing demand and market liberalization activities, the Turkish electric industry is in need of new players and should therefore create a more competitive power market with incentives to attract foreign investments. Provided that Turkey continues to move towards a market-friendly environment with improvements in the regulatory framework, the following will foster investments and provide great opportunities for US firms who should proactively consider entering the Turkish market:

- ✓ The Turkish government estimates that Turkey needs \$4.5 billion of annual investment in new power projects and \$1 billion annually for power transmission to avoid an energy crisis.
- ✓ The Turkish government is also seeking a crash program to develop power plants, with an increased role for private and foreign investors, which is key to Turkey's continued economic growth.
- ✓ Turkey would like to attract a large infusion of foreign capital to increase its generating capacity.
- ✓ Electricity demand in Turkey has increased an average of 8.4% since 2007, the world's second highest growth rate after China.

According to recent studies of the Turkish government, the share of private sector installed capacity and electricity generation has reached more than 60%, and the government continues implementing new strategies in order to increase this share.

#### Energy Assessment:

1. It should be noted that Turkish energy sector is open to investments, although sometimes there are some concerns of investors due the lack of finance, difficulties

in accessing the soft loans, and sometimes length of bureaucratic process and political uncertainty. Significant steps have been taken to improve this situation as the incentives for the renewable energy in tariff support mechanism is under reconsideration for the period of 2020 and afterwards. The market conditions in the lower EU, and Turkish Banks exposure to conditions in Greece, Syria, Iraq and other troubling neighboring areas, have also effectively stalled access to capital for exporting U.S. goods to Turkey. Recent unfortunate incidents also affected this negatively.

2. There are currently a limited number of US-based companies that are actively investing in power generation and distribution projects overseas. The majority of players in the market are local market participants, though several of them have partnerships with multinational companies. While Turkey has showed commitment towards liberalization of the sector, the pace of reforms has not been as fast as expected to attract large number of foreign private investors.
3. According to the Turkish Government's 2009 Electricity Market and Security of Supply Strategy Paper, market design (the new balancing and settlement regime, day ahead market, capacity mechanisms, optional tendering mechanisms) and target for the electricity generation mix by 2023 have been identified:
  - a. The main target is to provide 30% of total energy production from renewable energy by 2023 (20,000 MW wind, 600 MW geothermal and 5,000 MW solar installed capacities are targeted to be in operation by 2023)
  - b. The whole economically usable existing hydropower potential of Turkey will be provided for generating electrical energy until 2023 (Pump hydroelectric storage, current and tidal energy is not included into this calculation).
  - c. Introduction of nuclear power at least 5% of total installed capacity.
  - d. Minimize losses in production, transmission, distribution through efficiency and reduced energy costs by building a competitive environment based on resource priorities of energy policy.
  - e. Ensure supply security by encouraging diversity of resources, new technologies, and increased use of domestic and renewable resources in order to reduce dependency on energy imports.
4. The 2012 Turkish Renewable Energy Law (No: 6094) introduced new supporting mechanisms such as feed-in tariffs. Namely, 7.3 US cents per kWh for hydro and wind; 10.5 US cents per kWh for geothermal and 13.3 US cents per kWh for solar and biomass and will be provided if the investors opt to sell their electricity to trading companies. An additional support of 0.4 to 3.5 US cents per kWh will be provided to the plants utilizing domestically manufactured technical equipment. The Turkish Energy tariff rates are much higher than other European countries and there is a mix of tax and non-tax incentives offered by the Turkish government.

5. Grid modernization and distribution efficiency will be key objectives as Turkey seeks to capitalize on the recent privatization of distribution utilities and reduce losses. The average level of technical and non-technical electricity losses is about 17% in Turkey (around 10% in large cities in the Western part of the country, but can reach up to 60% in some Eastern regions of the country). These losses cost consumers considerably (approximately \$0.05 per KWh) however, several steps are being taken to reduce them. The privatization of distribution companies is targeted to reduce the losses to 10% by 2015. Moreover, under the current single tariff, western provinces subsidize less developed eastern regions, but tariffs are expected to be replaced in the future with regional tariffs that will better reflect the cost of generating power. Turkish utilities are also expected to invest \$9.3 billion in grid upgrades and other smart grid investments over the next five years.

### **Recommendations:**

1. Energy Policy: The Turkish Government and industry, both energy producers and energy users, should work together to develop an integrated national strategy to support reliable, competitive supply of energy for public use, manufacturing and utilities. By developing an integrated strategy, Turkey can better target effective investment in energy that will deliver multiple value-add, including incentivizing manufacturing investment, supporting energy efficient access for consumers and creating new investment markets. Therefore, the Council recommends that the Turkish and US governments form energy policy working group with participation of the Council. This group would meet semi-annually to evaluate legislative and regulatory actions in order to achieve effective policies.
2. Grid Solutions: US smart grid companies have been competitive in the initial stages of market development even as European suppliers maintain the major presence in Turkey's electricity sector. It is recommended that the Turkish Government can promote greater competition in the smart grid sector by enacting relevant standards. With respect to budgetary limitations, the government could also work through cost-benefit analyses of grid solutions by leveraging the Council to facilitate technical workshops, feasibility studies and pilot projects between the electricity sector and US smart grid companies.
3. Integrated Renewable Energy Solutions and Bio-Fuels: Turkey can meet its domestic energy need with its renewable energy resources with the assistance of the US technologies/investments, decrease its energy dependency considerably and perhaps, it can become an energy exporting country. This requires coordinated effort to tap into the combination of renewable energy technologies such as solar, wind, various types of hydro renewable energy technologies and bio-fuels. By integrating these technologies in one or multiple locations in the country, Turkey may eliminate the majority need for foreign energy import to meet its energy.

Integrated renewable energy projects will require strong financial, resource and economic commitment from both governments. Renewable energy credits, or RECs, which are tradable commodities that represent the green attributes associated with energy generated from renewable energy resources, such as sunlight, wind, or hydro must be introduced to the Turkish energy sector. Appropriate legislation with strong government backing will grant development of these technologies rapidly in Turkey. It would be best that the approval processes for licensing, environmental analysis and other requirements should be expedited for such projects and the bottlenecks for delaying these projects should be eliminated. Some of these American renewable energy technologies are available to launch immediately and these are:

- a. Conventional Solar: Covering one half of one percent of the land area of Turkey with solar panels would be sufficient to generate all of the electricity used by the Turkish consumer. Average annual solar radiation is 1521 kWh/(m<sup>2</sup>yr) or 4.17 kWh/(m<sup>2</sup>d). Some locations have even 30% higher than this average annual solar radiation. The annual average total insolation duration is 2740 hours (7.5 hours per day). The Turkish government is aiming for at least 5 gigawatts (GW) by 2023. Turkish solar energy potential is one of the best in Europe and it should be supported with more incentives:
  - (i) Such incentives should include annual escalation clauses to the current feed-in-tariff rate of US\$0.133 per kilowatt. For example, 2% annual escalation is very common in the United States.
  - (ii) Predetermined tax breaks (labor, land, etc.) to investors for a certain period should be offered. (Already being applied).
  - (iii) At this time, systems producing up to 1-megawatt (MW) of energy do not need a license, and are eligible for payments of US\$0.133 per kilowatt-hour (additional \$0.067 per kwh for usage of domestic components) for 10 years when plugged into the national grid. Expanding years of service from 10 years to 20, perhaps 25 years for projects over (including) 1MW may encourage both domestic and foreign investors to expand their solar energy operations rapidly in Turkey.
  - (iv) Investment, land, employment and tax credits should be offered to rich solar radiation regions such as Central Anatolia and Southeast regions in Turkey.
  - (v) It would be beneficial for Turkey to implement SREC (Solar Renewable Energy Certificate/Credit) markets. In SREC markets, the Renewable Portfolio Standard (RPS) requires electricity suppliers (namely utilities) to secure a portion of their electricity from solar generators. The SREC program provides a means for Solar Renewable Energy Certificates (SRECs) to be created for every megawatt-hour of solar electricity created. The SREC is sold separately from the electricity and

represents the "solar" aspect of the electricity that was produced. The value of an SREC is determined by the market subject to supply and demand constraints. SRECs can be sold to electricity suppliers needing to meet their solar RPS requirement. The market is typically capped by a fine or solar alternative compliance payment (SACP) paid by any electricity suppliers for every SREC they fall short of the requirement.

**SREC (Solar Renewable Energy Certificates/Credits) FACTS:**

- a. 1 SREC = 1 Mwh of solar electricity
- b. A 10 kW facility generates around 12 SRECs annually
- c. SRECs are sold separately from the electricity
- d. Value is determined by market supply and demand mechanics
- e. Facilities must be certified by government entity to sell SRECs.

- b. Concentrated Solar Power (CSP) Systems: Technological developments in concentrated solar power systems now have the potential to reach electricity costs under 6-7 cents/kilowatt-hour in small projects. Because of its ability to store large amounts of solar heat for non-daytime use, coupled with occasional backup fuel, the these type of plants can provide firm, flexible, dispatchable power around the clock. CSPs can be sized as small as 400 kWe (kilowatts, for roughly 80-100 US homes) to provide distributed power adjacent to the load while also providing waste heat from the turbines in combined heat and power (CHP) applications. It would be beneficial for solar rich Turkey to provide similar encouragements for this technology as the conventional solar.
- c. Wind: Wind power in Turkey is gradually expanding in capacity, mainly in the Aegean and Marmara regions. The Central Anatolia and Southeast portions of the country should be included into the expansion of wind energy in Turkey. Turkey has about 5 GW of installed capacity. The Turkish government has a target of increasing Turkey's wind capacity 20 GW by 2023. Several US Wind manufacturers have interest in joint venture projects; however, lack of investment funds, low feed-in-tariff incentives (even with bonus feed-in-tariff which is \$0.05 per kwh), no escalation clauses for feed-in-tariff rates, bureaucratic barriers and excessive, low cost, but ordinary and shoddy competition from Europeans and Asians for wind power discourages the American firms to move forward and dedicate funds to invest in Turkey. A number of large projects may be implemented both in the Central and Southeast Anatolia if prior hurdles are resolved. Similar to SREC's above, renewable energy credits, or RECs, should be offered for wind power. It is important to note that long term sustainable policies and better financing conditions are needed to facilitate investments.

- d. Pump Hydroelectric Storage: Pumped hydroelectric storage facilities store energy in the form of water in an upper reservoir, pumped from another reservoir at a lower elevation. During periods of high electricity demand, power is generated by releasing the stored water through turbines in the same manner as a conventional hydropower station. During periods of low demand (usually nights or weekends when electricity is also lower cost), the upper reservoir is recharged by using lower-cost electricity from the grid or renewable energy sources to pump the water back to the upper reservoir. Combination of this technology (pump hydroelectric storage) with solar and wind renewable energy will allow a non-stop generation without any conventional energy sources. Pump Hydroelectric Storage is widely used both in US and Europe since early 1920s. In Turkey, it has been studied in Kayseri-Yahyalı region. This technology may be applied to some of the dams which have ownership of both upper and lower streams/reservoirs (specifically government managed sites) in Turkey. We believe that salt water pump hydroelectric storage systems may be more beneficial to build in Turkey since high elevated areas are closely approximated to the sea. The 30 MW Yanbu project in Okinawa, Japan was the first demonstration of seawater pumped storage. A 300 MW seawater-based project has recently been proposed on Lanai, Hawaii, USA and several seawater-based projects have recently been proposed in Ireland and Chile. When this technology is used in combination with solar and wind energy technologies, it provides a more efficient process and usefully smooths out the variability of energy captured from all sources. For example, in northern Chile, the Espejo de Tarapacá power project combines solar and hydroelectric resources. The project takes advantage of the unique geographic characteristics of the Atacama Desert in order to build a 300 MW pumped storage hydroelectric plant that uses the Pacific Ocean as its lower reservoir and an existing natural concavity as its upper reservoir, and a 600 MW solar photovoltaic plant that is located in the region with one of the highest solar irradiation in the world. A similar condition exists in Central Anatolia and all three renewable energy technologies may be used to achieve the desired result. This application of these technologies (Saltwater/Seawater Pump Hydroelectric Storage, Wind and Solar) may also help sustaining ecosystem at Tuz and Burdur salt lakes in Turkey which are environmentally threatened and went through drastic drying as a result of climate change. Same combination, in unsalted water form, can be applied to Southeast Anatolia near Euphrates and Tigris rivers, and Van lake. At this time there are no Turkish legislation regarding this technology. We would be happy to assist the Turkish government to place appropriate legislation to implement this technology.
- e. Current/Tidal: Marine current power is a form of marine energy obtained from harnessing of the kinetic energy of marine currents. UK, Ireland and

China are looking into taking advantage of this technology even though it is more expensive than other conventional renewable energy options. Turkey has a unique source for this technology. Two way currents in Turkish straits may be able to satisfy all Istanbul's current and future energy demand. This requires preparation of appropriate legislation, monetary incentives, and high feed-in-tariffs for this technology now to achieve the desired competitive rates in the near future.

- f. Bio-Fuels: Consumption of biofuels is projected to grow to \$105.4 billion by 2018 worldwide. Somewhat in response to this projection, the Turkish Government has adopted a zero tax policy to ease the process for launching bioenergy projects. With its strategic location and its zero percent customs duty policy with the European Union, Turkey presents a great opportunity for U.S. firms to take advantage of an effectuated EU 2020 sustainable energy target while diminishing the special tariffs for US producers. One of the main ingredients to produce bio fuel/ethanol is sugar and currently Turkey is the 3rd largest producer of sugar beet in Europe and 4th largest in the World. It is important to note that the EU has higher tariffs for U.S. produced biofuel, including the production performed in Canada. Since Turkey is part of the European Customs Union, there will be zero tax for any sales to Europe from and to Turkey. There is already a pipe line between Turkey and the EU which presents the most cost effective transportation channel. At the same time, the EU has mandated that all of its partners consume diesel labeled "B20" which contains 20% biodiesel. Even though such advantages and incentives are available to produce bio-fuels in Turkey, no US based bio-fuel producers decided to participate and set up a facility in Turkey. US bio-fuels firms choose to invest heavily in Brazil due to the Brazilian governments incentives such as land, tax, investment funding and abundance of raw material (sugar cane) for the process. We believe that US bio-fuel producers need to notice the note-worthy potential that Turkey offers. This could only be achieved by the Turkish governments direct investment guarantee, US government's introduction, mediation and assurance, in addition to further incentives from Turkish government such as land allocation, tax incentives, build-out credits, and incentives to farmers to grow sugar beet, etc. Turkey may be a major hub for bio-fuels in the region due to its central location connecting Europe, Asia and Africa. The Council would be a catalyst to this process to achieve the desired results. Therefore, we recommend forming an American-Turkish biofuels joint working group with industry representatives, government leaders and the council members, meeting periodically, establishing relationships and working towards achieving making Turkey a biofuel hub with the American partnership. Producing Bio-Fuels (Ethanol) in Turkey with US technologies would be tremendously beneficial to both countries.

- g. Lignite: Turkey has note-worthy lignite reserves and would like to utilize these reserves for its energy security. Moreover, Thermal plants (with lignite) increase reliability of the supply of electricity during periods of low hydrology or low availability of renewable sources, as well as contribute to guarantee low tariffs. The security of supply and price advantage of lignite-fired power plants, and their contribution to reduce foreign trade deficit justify their utilization for Turkey. Appealing public-private partnership structures should be introduced in order to make lignite projects fundamentally attractive and financeable without conflicting with the liberalization efforts. It would be beneficial for Turkey to privatize some the lignite fields to efficiently harness the reserves. Moreover, U.S. Clean Coal Technologies may be implemented to the Turkish thermal plants. These technologies can help meet the regulatory challenges by incorporating pollution control into a portfolio of cost-effective regulatory compliance options for conventional and developmental coal-fired power plants.
- h. Technology Transfer: A number of small to mid-sized U.S Energy firms are interested in setting up manufacturing facilities if their technologies are used fully in Turkey. They are seeking local partners whom would work with them, invest in their technology and market their technology not only in Turkey, but also in the surrounding region. Any incentives given by the governments to the local firms for this type of partnership would certainly accelerate these types of projects in Turkey.

4. Legal Framework: Due to the necessary large capital investments, investors usually prefer to invest in markets with well-established legal framework, transparent legal system, stable political climate and competitive tariff rates with annual escalation clauses. Appropriate adjustments in legal structure, building confidence in legal and business systems, competitive tariff rates with steady escalation clauses and modifications to speed up licensing procedures will attract significant investment opportunities to Turkey. In the short to medium term, until these markets are fully liberalized, the Turkish Government should consider some interim measures to address the financing challenge. Additionally, Renewable Energy Certificates/Credits must be structured within the legal framework, so that it encourages energy distributors to consume a portion of their energy needs from renewable energy sources. Furthermore, gradually increasing feed-in-tariff rates may not be popular; however, the annual rate increase helps the country in two ways:



- a. It makes country attractive to the energy investors,
- b. It also encourages the market to invest in network improvements and savings technologies.

5. Price Subsidies: A gradual solution should be implemented to avoid last minute required sudden increase which may lead to opposition and instability.

6. Grants and Incentives: Turkish authorities may give financial grants, loans and worthwhile incentives such as investment matches, land allocation, tax incentives.

Since there are no customs/tariffs to import solar panels from Turkey to US, the Turkish government should give export credits for solar industry within the anti-dumping limits to encourage the exportation of high-quality solar products to US. In addition, Turkey should support development of alternative energies by incentivizing and encouraging local investment in alternative energy production – including manufacturing of wind blades, solar panels, turbine parts. Increasing the market for alternative energy will have positive corollary impacts in driving investment in the production of necessary goods, technologies and services for alternative energy provision. We value the Turkish Ministry of Economy's new project based incentive program, which includes renewable energy technologies as a priority areas, and are looking forward to the finalization of the legal framework with secondary legislation to operationalize the incentive program

7. Long Term Contracts: The lack of capacity payment mechanism for security of supply and the merchant risk nature of the Turkish power generation market make it difficult to attract US and global investors. In particular, the absence of long-term contracts and power purchase agreements creates uncertainty in the market. The Transition Period Contracts ("TPCs") prevent Distribution Companies from evolving to long-term power purchase agreements, and therefore are hindering the bankability of new greenfield investments. Immediate termination of the TPCs and 20-25 year contracts strongly are recommended in order to improve efficiency and promote competition in the market.

8. Investment Guarantees and Government Sponsored Projects: An investment guarantee is a special provision that is designed to protect investors from incurring losses as the result of an investment opportunity that carries risk. A guarantee of this type is not available with every type of investment, but is relatively common when it comes to real estate and construction projects. The purpose of the investment guarantee is to protect the interests of the investor in the event that circumstances or events should arise that could not be foreseen, and are considered outside the scope of typical and known risk factors. Protection of this nature is sometimes extended through insurance coverage associated with foreign investments, especially if the investment involves operations within a nation that is currently undergoing significant political turmoil. It is recommended that the

Turkish government should offer investment guarantees and make arrangements to cover any insurance costs of any American investor for renewable energy and energy efficiency projects to counter the recent political concerns. An addition, when an investors come with large renewable energy projects, the Turkish government also should sponsor such projects financially after evaluation & allow investor to payback the investment to the government at a predetermined time period.

9. Financing: Both Turkish and U.S. banks, as well as multilaterals, should work together to help finance some of the private sector projects and should provide easy access to export loans. Additionally, both governments may provide guarantees to private banks to make funds available for capital and export projects. Currently EXIM Bank provides this service; however, it is very limited. The US and Turkish governments should work together to promote greater access to financing for energy, energy efficiency and other infrastructure projects in Turkey. On the US side, OPIC's carbon cap – which limits its participation in supporting thermal projects to approximately 400MG globally – should be re-evaluated for countries like Turkey which are eligible for preferred duty rates (GSP) and contribute a small percentage to global emissions or where there are imperatives for security of supply and affordability of the power generation. EXIM Bank should also re-evaluate its policies to make it more available and attractive in Turkey, including US content requirements in line with OECD averages, making MARAD (Maritime Administration) and economic impact requirements less burdensome and promoting partnerships with Turkish Engineering, Procurement and Construction companies (EPCs) in the region through automatic co-financing to include their content for deals in other countries. On the Turkish side, the delays in liberalization of electricity and gas markets constitute a major challenge to the financing and development of large scale energy projects. The liberalization process on electric sector has been completed. 21 distribution regions have already been privatized and Energy Exchange Istanbul (EXIST) has been established and it operates smoothly. On the gas sector, liberalization process is still going on. The Law Nr. 4646 is in the parliament for approval. This law includes unbundling of BOTAS, tariff settlements, regulations on gas import-export, etc. In the short to medium term, until these markets are fully liberalized, the Turkish Government should consider some interim measures to address the financing challenge. The government of Turkey and the World Bank is running a project together with the GEF loan to promote energy efficiency through Turkish State Banks. One solution is Turkish State Banks' support to the financing of larger scale projects and minimizes risk for the investors by providing investment guarantees. The government of Turkey has succeeded to complete large scale projects such as the 3rd bridge over the Bosphorus, a bridge over the Marmara Bay as well as the connecting highways, by means of a new type of financing. There are and will be more projects which are being built in the same way. Therefore, Turkey's experience in financing such projects is quite valuable and can be utilized especially for any types of large energy projects. Moreover, new incentive programs have been

announced recently for numerous projects. Therefore, all types of energy projects and their financing methods have to be discussed with the responsible government officials.

#### CONCLUSION:

There is tremendous potential for US and Turkish public and private sectors to cooperate in the energy sector and share best practices for restructuring the Turkish market to reduce risk and promote mutually beneficial investments.