



TURKEY'S 2016 NATIONAL COAL POLICY

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FOREWORD

Whereas coal constitutes a 25% share of the global energy supply market, second only to petroleum, which is the first in the global electricity generation market, with a share of 40%, locally, coal ranks first with a 40% share in the primary energy generation market, but fourth in the electricity generation market, with a 16% share. It is foreseen that coal will come to increase its share in global markets in the future thanks to new “Clean Coal Technologies”. As a matter of fact, coal is the most important indigenous fossil fuel in Turkey, therefore, with the best applicable use of advanced technologies, it should be utilized countrywide for greater electricity generation at a cheaper rate.

In this article, we will strive to evaluate the new lignite, hard coal and/or imported-coal firing thermal power plants in our local market, explain operational problems, and recommend that new coal firing technologies be implemented for the best use and most efficient application of local coal in the new thermal power plant investments from 2016 onward.

RESERVES AND MINING

Turkey has both hard coal and lignite deposits. The hard coal reserves are mostly located in the western part of the country, in the Zonguldak Basin, which has more than 1.6 billion metric tons of workable reserves, 512 million tons of which are proven and about 80% of which can be coked. Lignite deposits are widespread and plentiful throughout the country: reserves are estimated at more than 14 billion metric tons, 7th largest in the world, most of which are economically mineable, though only about 7% thereof have a

heat content of more than 3,000 kilocalories per kilogram (LHV). In 2012, around 68 million of metric tons of lignite were produced annually. About 40% of the Turkey's lignite is found in the Elbistan Basin.

PRODUCTION AND CONSUMPTION

The Turkish Hard Coal Institute operates five underground mines in Turkey, and is the only hard coal production entity in the country. The two most important lignite fields in Turkey -the Afsin-Elbistan and Sivas-Kangal coal fields- are owned by EÜAŞ and operated by private companies under contract.

Even though there is significant production of lignite and some production of hard coal in Turkey, not enough coal is mined to meet domestic demand.

As a result, Turkey imports more than 25 million tons (2013) of hard coal each year, mostly from Russia (33%), Columbia (24%), the USA (14%), South Africa (11%), and Australia (5%) as of 2012. Imported hard coal is used mainly for electric power steelmaking, and cement production. About 75% of the Turkey's lignite is used as a fuel source for electricity generation.

COAL TECHNOLOGY AND COAL MARKETS

Seeing that there is relatively little investment in coal fired power plants in the global liberalized markets, or at least investment priority is given to natural gas fired combined cycle power plants due to their relatively cheap installation-costs and faster construction periods, foreign dependency increases in coun-



tries which depend on imported fuel. For that reason, demand for more natural gas has also triggered the demand for more coal.

This urge for greater utilization of coal has also necessitated the application of new coal technologies. We are now witnessing an obvious evolution in clean coal technologies. When we look at the available technology and new trends in market demand, the most important sector in the field of energy revolves around the development of new technologies. It has now become a new tendency for such leading technologies to be developed and applied not only in the advanced countries, but also in the developing countries, which are consuming more and more energy.

The energy technologies of Western European as well as North American companies are becoming too expensive to export; soon these countries will not be able to sell their products on the global market. Even in their home markets, protective measures such as high import taxes and strict labor codes will need to be implemented in order to avoid an influx of cheap labor from abroad. In recent years, China, India, South Korea, and many other Asian countries have increasingly come to compete in the global energy markets.

The companies in these countries already assert dominance in their home markets with their self-made fabrications supported by advanced technology and fabrication licenses. Although their products are cheap, they have serious difficulties in fabricating the latest and the most efficient designs in compliance with environmental standards that are largely adopted across the globe. However, we can predict that these companies will completely reach these targets soon with the price advantage that they already possess in the first place.

We need to reposition our local energy market in Turkey, keeping these new developments in mind. We have the engineering and intellectual capacities as well as the market

potential for local fabrication and site construction. We must design, fabricate, construct, install, and operate our own thermal power plants that fire our own indigenous fuel.

In the past, we have prioritized attracting foreign investors that had the financial capability to cover power plant investment projects although their products were not the best of their kind, not the most efficient, and not designed to incorporate the latest technologies that would utilize our local coal. These plants have not been suitable when it comes to using our local fuel, whether lignite or hard coal, and hence they have aged quickly, very quickly, faster than the acceptable market norms.

Reputable western energy companies do not exist anymore, as they are either in bankruptcy, or unable to compete with the market players beyond their national borders. In recent years, Asian companies have presented increasingly cheap offers in thermal power plant tenders. If such an eastern company is prequalified in the pre tender procedure, western companies certainly hesitate to participate in the process as, in the end, it would be a waste of time and resources to go head on against such competitive players.

In this way, it is increasingly difficult to attract western technologies although they may certainly be desired. Price is of little importance to the new players; they are often unaware of the prevailing market figures, and hence, they quote extravagantly low prices. Their labor costs for design and fabrication is extremely low. They seriously have effective market policies that allow them to infiltrate the global energy market.

It is often forgotten, or ignored, that the best design which allows for the use of local fuel is accomplished by tapping into one's own local engineering capital, namely, local engineering and local construction companies. Foreign contractors design the facility, com-

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mence construction, engage in site installation, and then wait for the guarantee period of 2-3 years to come to an end. Having fulfilled their obligations, they then leave the site.

On the other hand, the local operator remains in site, running the plant alone for the long term. It is very difficult to pursue long term rehabilitation and programmed repair works without the design/fabrication support of the original equipment supplier. Therefore, local design and fabrication are indispensable when it comes to long term operations.

UPCOMING ENERGY CRISIS

We all know that we are in the midst of an energy crisis; we lack a sufficient energy supply. Our resources are unable to generate the necessary amounts of energy. In other words, such a huge energy demand is not able to be met by our limited energy supply.

Here, the growing demand for renewable technologies, such as wind/solar, cannot be fulfilled quickly. These technologies will only enter the local energy market with time. Fast/easy/cheap solutions are not available, nor are they practical or feasible.

We must design our own thermal power plants, through the efforts of our own design teams, to operate using our own fuels that are available locally, whether they be lignite or hard coal. We must fabricate the necessary equipment by ourselves in our own fabrication shops. We must take on site installation, and ultimately, operate the facilities by ourselves. Our local engineers are capable of handling the formulation and implementation of such plant designs.

We need to create a positive investment climate in the local market in order for this to be achieved. Local market forces should facilitate that these activities can be handled

independently, in harmony with local investors, financial institutions and academicians, engineers, engineering unions, and contracting service providers. We need to take the initiative, not to leave it to the foreigners. We should not employ foreign contractors just because their labor is cheap. Our energy markets and our energy potential should be protected against foreign domination and incursions.

HOW TO COVER PROJECT FINANCING

Financially, we have serious reasons to support such an end-goal. We have genuine expectations that Turkey will have an electricity market based on real costs. Seeing that crude oil prices are immediately reflected in local petroleum byproducts, and that the consumers accept this burden in their cost calculations, the same will similarly be applied in all phases of the price structure for electricity generation.

When we evaluate the projections for the supply and demand of electricity for the next 10-15 years in Turkey, there is no new potential primary energy resource that could reduce the ever increasing prices. Hence, the short term electricity prices are expected to hover in the range of US\$ 0.04 - US\$ 0.08 per kWh in our local electricity market.

Considering their rehabilitation and renewal costs, the newly privatized thermal power plants will not help to reduce overall electricity prices in the short and medium terms.

Currently, more than 50% of the electricity generated in the local market is dependent on imported natural gas. Due to the delays in hydro- and coal-based power plant investments, those imported-natural gas firing thermal power plants are operating at base load. Unfortunately, this will increase the demand for more combined cycle power plant investments.



PREVAILING COAL PRICES ON THE GLOBAL MARKET

Thanks to the latest developments in technology, coal fired thermal power plants based on PC (Pulverized Coal) and CFB (Circulating Fluidized Bed) designs have reached 46% efficiency and beyond, with the application of supercritical pressures and temperatures.

Imported coal at the prevailing market price of US\$ 40-55 per ton, or spot price of US\$ 2-3 per MMBtu, are now comparable with the prices of natural gas, at US\$ 7-8 per MMBtu, that is used in combined cycle power plants generating electricity with 60% efficiencies. However, imported coal is indexed to oil prices and there is no reason to expect any drastic change in these price ranges in the medium and long terms. Therefore, we should not expect any decrease in coal prices any time soon.

In any case, one should keep in mind that the raw coal price of our local Afşin-Elbistan coal is less than US\$ 1.80 per MMBtu as of 2014. Nonetheless, firing this coal in our thermal power plants located nearby is not so easy; this is supplemented by the fact that these plants are not so efficient. Specially tailored academic and commercial methods need to be explored and enforced to amend these deficiencies.

NEW TECHNOLOGIES FOR FIRING DIFFICULT COAL

IGCC (Integrated Gasification Combined Cycle), CFB, Oxy-fuel firing, and underground gasification methods could be applied to our local coals with low calorific values. CFB, for example, has proven to allow up to an output of 165 MWe per unit.

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combination and management of local natural and socio-economic resources in parallel with the implementation of the latest technology.

It is difficult to think that a country can protect its borders if its energy investment policy is fully import-oriented. Turkey has many energy resources but they are not easy to exploit. For example, hydro power in Turkey, while exhibiting great potential, requires careful and intelligent policies taken into account for the impact of such projects on the environment and on local rural and urban areas.

Our local coal mines have varying specifications, even if they are in the same basin. Therefore, for better and more efficient firing of the available coal in these thermal power plants, we need to apply more expensive and selective mining techniques rather than our traditional, cheap mining methods. This is an expensive investment that is only observable in a few private operations in Turkey.

The traditional mining method involves the extraction of coal complete with a host of undesirable and non-burnable materials such as sand, ash, moisture, etc. All new imported-coal fired power plant investors are major players in other sectors which are in need of cheap electricity. Therefore, they consume almost 60-70% of electricity generated within their own plants. The remainder is then sold on the national market; and this is not a problem seeing that there is always a need for more energy in our ever shrinking energy environment. Generally, local investments are realized by methods of "corporate finance". Between 1993 and 2005, power plant projects exhibiting an overall installed capacity of more than 4000 MW have been realized. These natural gas firing, cogeneration plants pay for themselves quickly, thus freeing up more money for the use in further investments in new plants.

CONCLUSIONS AND RECOM-

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MENDATIONS

The energy policies of today's administration prioritize the securement of the best quality, most reliable electricity for the local market at the cheapest rate. Considering this, the effective and rational use of local fuel resources is of vital importance as domestic energy planning is synonymous with planning for the future of the country, allowing us to avoid any foreseen economic crises.

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We do not have the luxury to make mistakes in our energy policies, as any misstep will have severe repercussions down the road. While securing a steady supply of energy is the first priority, it is our sincere and humble opinion that new investments based on imported-coal are too risky. The construction of such facilities on the coasts of the Black Sea adds more up to this risk due to increased coal prices on the world markets and the limited routes through which coal can travel in the ever-congested Turkish Channels. Russian coal is not cheap and it never has been. Moreover, we have bitter relations with Russians due to downing of SU-24 jet fighter.

We must be very careful in issuing Environmental Impact Report certifications as well as regulatory licenses. Plants should never be placed on forested lands. Any new and significant increases in a plant's capacity and any fuel changes from local coal to imported coal should be carefully evaluated. Seaports where the unloading of cargo occurs should be carefully selected. The deep sea discharge of thermal plant bottom ash should also be avoided.

The best price is not the best choice for the long term, consistent, and cheap generation of electricity.