EXECUTIVE SUMMARY

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The opinions expressed in this report belong to the authors.

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COAL REPORT / EXECUTIVE SUMMARY

This report addresses the current status of coal in Turkey as an energy and greenhouse gas source, its impacts on health, the association between increasing the share of coal in electricity generation and climate and economic policies, and the discussions on “clean coal.”

Coal in Turkey’s Energy and Climate Policies

Coal, which has a 29% share in the world’s primary energy supply, accounts for 40% of global electricity generation. Coal comprises 44% of global CO₂ emissions resulting from fossil fuels and 72% of CO₂ emissions resulting from electricity and heat generation. As the energy source that has caused the most greenhouse gas emissions, coal is the primary cause of climate change.

We have already emitted two-thirds (1,900 out of 2,900 GtCO₂) of the greenhouse gases that can be released into the atmosphere before the global temperature increases by 2°C. The potential emissions of current fossil fuel reserves are four times higher than the remaining global budget. Therefore, to keep climate change below 2°C warming, three-fourths of fossil fuels and a larger portion of coal reserves should remain underground.

The share of coal, oil, and gas in Turkey’s primary energy supply was 88% in 2013. Almost more than 70% of electricity is produced from fossil fuels. Total installed capacity is 71 GW, 20.5% of this coming from coal-fired power plants. The installed capacity of coal-fired power plants has increased by 77% when compared to 2004.

Turkey, in which greenhouse gas emissions increased 110% in 2013 when compared to 1990, is among the top 20 emitters in the world. The share of coal in its total emissions is approximately 33%, and coal emissions have increased by 130% during this time period. The government, which foresees that Turkey’s energy demand will double by 2023, aims to meet most of its increased need by building new coal-fired power plants. Turkey is ranked fourth in the world in regard to constructing new coal-fired power plants after China, India, and Russia. In addition to the 25 coal-fired power plants in use and three new ones under construction, more than 70 new coal-fired power plants with a total installed capacity of 66.5 GWs are currently in the pipeline. It can be estimated that these planned coal-fired power plants would emit nearly 400 million tons of greenhouse gases annually. Therefore, if these plans are realized, the emissions of these new plants will be almost be as high as Turkey’s current total annual emissions, which measured 459 million tons in 2013.

Turkey’s energy strategy aims to “use all existing domestic lignite and hard coal potential for energy generation purposes” and “to utilize thermal power plants based on imported coal, which has high calorie value, to ensure supply security.” This approach ignores the contribution that Turkey should make towards combating global climate change and precludes a meaningful mitigation policy.

Coal Mining in the Turkish Economy

The share of coal mining in the total production of the Turkish economy is below 1%, and its contribution to growth rates is very low. The employment rate in the sector is also low, and its share in total employment decreased from 1.3% in 1998 to 0.7% in 2013. Therefore, the reason for the recent increase in incentives provided to the coal sector is the carbon-intensive economic growth pathway of the Turkish economy, which stimulates the economy via carbon-intensive energy generation rather than increasing economic growth rates or creating jobs directly in coal mining.
The sectors that contributed the most to the annual growth rate in Turkey from 2002-2009 are real estate services, domestic transportation, machinery and equipment rental, textile, retail trade, wholesale trade, and construction. It should be noted that most of these sectors are related to construction. This, in turn, led to an increase in energy imports by creating demand for energy intensive sectors such as iron/steel and cement. The share of energy imports in the foreign trade deficit has increased from 40.3% to 63.7% since 2004.

Public support and incentive programs increased low-tech, energy intensive, polluting, and low value-added production after the 2008 crisis. One can also include in these social costs the increase in the number of occupational accidents that have taken place as a result of the pressure to rapidly expand the economy. Further, the severity of environmental regulations has gradually weakened, and Turkey’s position in the international rankings for strictness and the enforcement of regulations receded to 85th and 79th, respectively, among 140 countries in 2012.

**Coal Investments and Current Incentives in Turkey**

According to the official projections, coal-fired power production will reach 200 TWh with a threefold increase by 2030. When its limited reserves are taken into account, it is obvious that Turkey would continue to be dependent upon imported hard coal, and therefore, it would not be possible to eliminate its dependence on imported energy sources.

The most significant support provided to coal in Turkey is incentives for hard coal imports through direct payments from the treasury. Coal investments are also encouraged within the framework of the New Investment Incentive System that entered into force in 2012. There are also incentives provided to the fossil fuel sector such as support for R&D costs, finances allocated to new coal-fired power plants, investment guarantees, and price and purchase guarantees.
Coal is also supported by excluding such investments from environmental legislation. The deficiencies and exemptions in the implementation of Environmental Impact Assessments (EIA) can be qualified as incentives. When all measurable coal incentives in Turkey are taken into account, the amount of incentive per kWh is calculated as approximately 0.01 USD (0.02 USD, if coal support to poor families is included). A total of 730 million USD worth of incentives was provided to the coal sector in 2013.

G20 leaders who convened in 2009 had promised to end all ineffective fossil fuel incentives gradually in the middle term. According to some projections, if only the incentives provided to coal are removed, an emissions reduction of 5.4% would be achieved when compared to the baseline path in Turkey by 2030.

**International Barriers against the Use of Coal**

The European Union (EU) has claimed a leading role in the transformation to a low carbon economy. As part of its energy targets for 2030, the EU has agreed to increase the share of renewable energy in total energy consumption to 27% and to decrease greenhouse gas emissions by at least 40% when compared to 1990 levels. The EU has announced that it would reduce its emissions by more than 80% when compared to 1990 levels by 2050.
The EU aims to eliminate CO2 emissions from energy production by 2050. The energy provided from coal is expected to decline from 16% to 8% by 2050. Since burning coal does not comply with future low carbon targets and the existing environmental directives have already put negative pressure on the coal sector, some of the coal mines and coal-fired power plants are being closed.

OECD General Secretary Angel Gurria has also called upon the governments of the world to review plans for new coal-fired power plants by stating that such plants are currently the most important threat to the future of the earth. Due to its record high air pollution and new climate objectives, even China, which is the biggest coal consumer in the world, has consumed less coal in 2015 and used more renewable resources and new technologies.

Eventually, Turkey may face increased costs and commercial restrictions if it does not make the required policy changes.

**Health Impacts of Coal-Fired Power Plants**

Coal-fired power plants are among the most polluting industries for the air and the environment in general. The hazardous waste discharged into the environment from coal-fired power plants is comprised of suspended particles, sulphur dioxide, nitrogen oxides, carbon dioxide, carbon monoxide, volatile organic compounds (VOC), dioxins, hydrochloric acid, ash, radioactive materials, and heavy metals.

Air pollution has a number of adverse effects on human health: vulnerability towards respiratory tract infections, aggravation in allergic respiratory system diseases and Chronic Obstructive Lung Disease, irritation of the eyes, respiratory system cancers, increases in the prevalence of respiratory and circulatory system diseases and mortality rates. The International Agency for Research on Cancer (IARC) has included outdoor air pollution as one of the leading causes of cancer in humans (Group 1).

Scientific studies have proved that in the most polluted periods there is a correlation between deaths and hospital admissions and the concentration of air pollutants. Further studies have shown that decreases in the respiratory functions of people living near the vicinity of coal-fired power plants have been linked to coal-related outdoor air pollution.

Globally, 3.7 million fatalities were reportedly linked to outdoor air pollution in 2012. Ischemic heart diseases and stroke ranked among the top causes of death, each accounting for about 40% in total. In Europe the number of working days lost due to air pollution was calculated as 4,100,000, and the cost of health impacts was calculated as 42.8 billion USD. It was estimated that the coal-fired power plants currently in operation in Turkey account for at least 2,876 premature deaths, 637,643 working days lost, and 3.6 billion euros in additional costs.

**Is “Clean Coal” Possible? – Carbon Capture and Storage (CCS) Technologies**

The technology for capturing and storing CO2 generated by coal-fired power plants and other facilities before exiting the funnel is called Carbon Capture and Storage (CCS). Obtained CO2 can be placed in geological structures, oceans, and mineral carbonates after being compressed, or it can be transported for use in industrial operations later.

Capturing and storing carbon instead of releasing it into the atmosphere requires energy. Furthermore, carbon capture is a more expensive technology than releasing carbon freely into the atmosphere since either
such capture systems should be added to the old power plants or new power plants should be built with these technologies. The transportation of captured carbon to the storage location is done via pipelines or land-sea transportation. Since the carbon dioxide obtained by carbon capture is corrosive due to its water vapor content, infrastructure costs will increase substantially. Further, transportation methods via land or sea have not been tested on an industrial scale.

Moreover, we have little technical knowledge and experience regarding storage. So far, only 5 million tons out of 50 billion tons of annual global greenhouse gas emissions (1/10,000) could be stored in the carbon capture and storage projects in operation. The cost of implementing this approach, for instance, in one unit inside the Afşin-Elbistan coal-fired power plant in Turkey, is approximately 80 USD per ton. Even though some countries have presented CCS as the solution of the future, they have not elaborated and developed policies on what their legal responsibilities and related costs would be. This incomplete policy may turn into a weakness of the free market and lead to the use of possibly hazardous methods in the long-term.

**Conclusion**

The economic life of a newly built coal-fired power plant is approximately 40-50 years. If Turkey keeps coal at the heart of its energy policies, if it continues its public support and incentives for coal, and if the new coal-fired power plants in the pipeline are constructed, Turkey’s energy policies will lock-in its commitment to coal, and Turkey will inevitably become more dependent on fossil fuels. This may lead to higher emissions until and after 2050. This could also hinder the competitiveness of renewable energy technologies and jeopardize renewable energy investments.

Therefore, in order to combat climate change, to build a sustainable energy policy, and to reduce health and other social costs, incentives to coal should be removed, and policies that increase the share of coal in electricity generation in Turkey should be abandoned. Turkey’s climate and energy policies should be reconstructed on the basis of the future low carbon economy, renewable energy, and energy efficiency.
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