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Recent Developments in the World and Chinese Coal Markets and Implications for Turkey

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Introduction

The global utilization of coal energy has substantially increased in the last few decades. This took place despite the growing concerns on climate change and the efforts of many developed countries to limit their use of coal. Between 2003 and 2013, the share of coal energy in the global primary energy demand increased from 24% to 29%[1]. The additional coal demand in this period mostly originated from the developing countries, especially China, while the demand in the OECD countries have been falling down. The industrial development of China has been the leading factor behind the surge in global coal demand. Currently, China is the locomotive behind the world coal demand, being responsible for almost half of coal consumption in the world[2]. The increasing use of coal energy throughout the world is contributing to several environmental problems. Coal is the leading cause of carbon emissions in the world that cause climate change and also contributes to several local environmental problems and damages to human health. According to scientific studies, around 80% of the currently proven coal reserves in the world should be left unused between the years 2010 and 2050 in order to meet the target of limiting global temperature increase to 2°C[3]. On the other hand, coal is relatively abundant and cheap and is thus seen as a convenient energy source by many countries that still have significant development needs.

However, the latest developments across the globe are signaling that the recent trend of increasing coal demand may be coming to an end. There have been several signs that the Chinese appetite for coal may finally be subsiding. After decades of rapid expansion, various factors have caused the recent coal demand increases in the country to decelerate. Recent studies show that the prospects for peak coal in China may be closer than formerly anticipated. The main reasons behind the slowing of the coal demand in the country are the slowing economic growth and the recent alterations in the country's policies towards the use of coal energy. China has been changing its attitude towards coal due to widespread environmental deterioration in the country and the concerns of climate change. The shift in Chinese policy was signified by the climate change mitigation agreement signed between China and US on November, 2014. According to the agreement, China has committed to peak its carbon emissions no later than 2030 and strive to peak earlier while US pledged to reduce its carbon emissions by 26-28% by 2025 from 2005 levels[4]. Later, the commitments of both parties were confirmed and elaborated on in their respected Intended Nationally Determined Contributions (INDC)

[1] International Energy Agency, 'World Energy Outlook 2014', p. 172
[2] Ibid, p. 177
[3] McGlade, Christopher and Ekins, Paul, 'The geographical distribution of fossil fuels unused when limiting global warming to 2 °C'(2015), *Nature* 517, pp. 187–190
[4] Echeverria, Daniella and Gass, Phillip, 'The United States and China's New Climate Change Commitments: Elements, implications and reactions'(2014), International Institute for Sustainable Development

submitted to the United Nations Framework Convention on Climate Change (UNFCCC). One other significant development was the recent announcement of the US 'Clean Power Plan', an extensive federal plan that provides a framework for the US to reduce its carbon emissions and fulfill its pledge outlined in its INDC[5]. These developments in the two top carbon emitter countries in the world will inevitably have important implications on the global carbon market and especially on the outlook for coal energy which is the foremost cause of carbon emissions throughout the world. The approaching Paris conference is another prominent factor that is putting pressure on various countries to lower their carbon emissions and reduce their consumption of coal. Many developed and developing country parties have already submitted their respective INDC's to the conference and the final outcome of the conference is set to have a substantial effect on the global coal market.

Any developments in the global coal market are also bound to have significant impacts on the energy market in Turkey. In an effort to curb its dependence on energy imports, Turkey has recently been carrying on plans to considerably expand the utilization of its domestic coal sources. Even though Turkey lacks substantial reserves of hard coal, there are significant amounts of lignite reserves in the country which have cheaper thermal qualities. Coal demand in Turkey has been on an increasing trend in the recent past as the government ambitiously sought to increase generation capacity fired by domestic coal sources as well as capacity fired by imported coal.

Given the relevance of coal energy for Turkey, it is important to examine the recent developments across the globe and to try to assess their significance for the country. This paper aims at investigating the latest developments and outlook in the global coal market with a focus on the countries that make up large shares of the global market and to highlight the potential bearings of these developments on the Turkish market.

State of the Global Coal Market

Currently, the global coal market is mostly dominated by non-OECD countries and Asian countries in particular. On 2013, the OECD countries were responsible for around 25.5% of world coal consumption and the non-OECD countries were responsible for the other 74.5%[6]. Non-OECD Asian countries made up the bulk of the market with approximately %61 of world production. The total amount of coal produced in the world amounted to 8023 million tons on 2014. Among the non-OECD countries, China dominated with 3748 million tons of production on 2014, while India was a distant

[5] Union of Concerned Scientists, 'The Clean Power Plan: A Climate Game Changer', accessed from http://www.ucsusa.org/our-work/global-warming/reduce-emissions/what-is-the-clean-power-plan#.VelM2hGqqkp on 25.08.2015

[6] International Energy Agency, 'Key World Energy Statistics 2014'(2015), p. 14

second with 668 million tons. Other main producers of significance include Australia with 491 million tons, Indonesia with 471 million tons, the Russian Federation with 334 million tons and South Africa with 253 million tons for the same year. Among the OECD, the United States stands out as the largest coal producer on 2014 at 904 million tons and the second largest in the world after China. Germany is the second largest producer among the OECD countries with 191 million tons. Meanwhile, the production of Turkey is estimated to be around 64 million tons for 2014[7].

The total global coal trade on 2014 amounted to a little over 1400 million tons. China was the largest coal importer in the world with 292 million tons, followed by India with 239 million tons, Japan with 188 million tons, and South Korea with 131 million tons. Turkey was the ninth largest coal importer on 2014 with 30 million tons. Meanwhile, the largest exporters were Indonesia with 411 million tons, Australia with 375 million tons, Russia with 155 million tons, US with 88 million tons, Colombia with 80 million tons and South Africa with 76.4 million tons[8].

Coal can be classified into different types based on its use. The International Energy Agency classifies three main types of coal which are steam coal, coke coal and lignite. Steam coal consists of anthracite and other bituminous and sub-bituminous coal types which are mainly used for power generation. Coking coal is mainly used for the production of steel. Although lignite is also mainly used for the purpose of power generation, it has a lower heat content compared to different types of steam coal and it is thus under a different classification. Total steam coal production in the world was 6147 million tons on 2014, while coking coal production amounted to 1065 million tons and lignite production amounted to 811 million tons. China is the leading country in both steam coal and coking coal production whereas Germany is the leading lignite producer in the world with 178 million tons produced on 2014. Turkey also has a prominent role in the world lignite market, being the sixth leading lignite producer on 2014 with approximately 62 million tons produced[9].

By the end of 2014, the total proven reserves of coal in the world amounted to around 891531 million tons. Of this amount, the reserves in the US made up the largest share by 26.6%, Russia accounted for 17.6%, China accounted for 12.8%, Australia accounted for 8.6% and India accounted for 6.8%. Turkey, on the other hand, accounts for around 1% of the global coal reserves, nearly all of which consist of

[7] International Energy Agency, 'IEA Statistics, Key Coal Trends, Excerpt From: Coal Information'(2015), p. 4
[8] Ibid., pp. 8-9
[9] Ibid., pp. 4-6

lignite. Approximately 403199 million tons of the global reserves consist of anthracite and bituminous coal while the remaining 488332 million tons consist of sub-bituminous coal types and lignite[10].

The price for different types of coal has fluctuated greatly in the recent past, both over time and across different regions. The price of coal across all regions have been declining for the past four years. From 2011 to 2014, the Northwest Europe marker price have declined from 121,52 dollars per ton to 75,38 dollars per ton, the US Central Appalachian coal spot price index have dropped from 87,38 to 69 dollars per ton and the Japan steam coal import price have dropped from 136,21 to 97,65 dollars per ton[11]. It is reported that in 2015, the average thermal coal prices are expected to decline further by 17%[12].

The reason behind the declining coal prices are the slowing demand in the Chinese market and the closing of coal plants in the OECD countries. The coal demand from the OECD countries is expected to decline further in the coming years with the pressures to close down older and more polluting power plants, with the increasing competition from natural gas and the policies promoting renewable energy sources. In the coming years, the additional demand is expected to originate from the developing countries with the exception of China. Especially the production and imports of India is set to increase significantly in the medium term[13]. The governmental plans of Turkey suggest that it will also be one of the developing countries with increasing coal demand in the medium term. Even though China has been the main force behind the coal surge in the recent decades, the coal demand growth from the country has slowed down recently. The coal demand of the country basically remained flat between the years 2013 and 2014[14]. The demand from China isn't expected to increase significantly in the near term. However, since the country controls a very large part of the global coal market, any developments in China will have important ramifications for the global outlook for coal.

Coal Energy in China

China has been the leading coal producer in the world since 1985[15] and has been the largest carbon emitter in the world since it surpassed US on 2006 for the first time[16]. Moreover, according to

[10] British Petroleum Public Limited Company, 'BP Statistical Review of World Energy June 2015', p. 30, accessed from http://www.bp.com/content/dam/bp/pdf/Energy-economics/statistical-review-2015/bp-statistical-review-of-world-energy-2015-full-report.pdf on 22.08.2015
[11] Ibid.
[12] World Bank, 'Commodity Markets Outlook, 3rd Quarter'(July, 2015), p.24
[13] Ibid.
[14] Ibid.
[15] International Energy Agency, 'IEA Statistics, Key Coal Trends, Excerpt From: Coal Information'(2015), p. 3
[16] The Guardian, 19 June 2007, 'China overtakes US as world's biggest CO2 emitter', accessed from http://www.theguardian.com/environment/2007/jun/19/china.usnews on 23.08.2015

research undertaken by the Center for International Climate and Environmental Research, China is set to overtake US as the top cause of global warming since 1990 by 2016[17]. In other words, by the end of 2015, China will have more responsibility than any other nation in instigating climate change in the last 25 years. The increasing historical responsibility of China will be putting more pressure on the country to actively support the global mitigation efforts. Since coal is the leading cause of the Chinese carbon emissions and will remain so in the near future[18], curbing coal utilization has to be a key consideration for this aim.

Coal has for long been regarded as a critical source of energy in China. Since China launched its economic reforms in the beginning of the 1980's, coal has been the main source of energy to fuel the country's growing industry[19]. Coal is still the main energy source used in the country and is the only type of conventional energy source with vast reserves available. Coal is being used mostly for electricity generation but significant amounts are also used by the industrial sector, especially by the steel industry. A degree of coal consumption also takes place for domestic use in the households for cooking and heating purposes[20]. The share of coal in the primary energy consumption was 66% on the year 2013[21] and the generation capacity fueled by coal energy made up around 63% of the electricity generation mix[22].

Since the energy needs of China's massive economy are great, energy security is a primary concern for the Chinese economy. Utilizing the abundant and cheap sources of domestic coal has for long been viewed as a viable choice to power the country's energy needs. Even though China is the leading coal producer in the world, the rapid expansion of coal-fired generation in the country necessitated China to be a net coal importer starting from 2009[23]. As the biggest coal producer and importer in the world, China's influence on the international market is substantial. Moreover, since the sector is largely dominated by the public sector through state-owned trading companies and export licenses, the decisions made in Beijing can have direct consequences to be felt on the international coal

[17] Reuters, 13 April 2015, 'China to surpass U.S. as top cause of modern global warming', accessed from http://www.reuters.com/article/2015/04/13/us-climatechange-china-idUSKBN0N411H20150413 on 23.08.2015
[18] Shealy, Malcolm and Dorian P. James, 'Growing Chinese coal use: Dramatic resource and environmental implications', Energy Policy 38 (2010), p.2121
[19] Peng, Liang, 'A Study of Coal Policies in China'(2011), p. 1
[20] International Energy Agency, 'IEA Statistics, Key Coal Trends, Excerpt From: Coal Information'(2015), p. 19
[21] 'China Statistical Yearbook 2014', accessed from http://www.stats.gov.cn/tjsj/ndsj/2014/indexeh.htm
[22] United States Energy Information Administration, accessed from http://www.eia.gov/beta/international/analysis.cfm?iso=CHN on 5.9.2015
[23] Jianjun Tu, Kevin and Johnson-Reiser, Sabine, 'Understanding China's Rising Coal Imports'(2012), accessed from http://carnegieendowment.org/files/china_coal.pdf

market[24]. The Chinese coal-fired electricity generation market is for the most part dominated by five large companies which are Datang, Huaneng, Guodian, Huadian, and China Power Investment, which are also the largest in the world[25].

China's coal production and consumption steadily rose starting from the 1980's. Total coal consumption rose from around 900 million tons in 1985[26] to reach to 4171 million tons on 2013. However, in the recent years, the growth of demand has significantly decelerated. Between the years 2013 and 2014, the coal demand in the country actually went down considerably, by 130 million tons, perhaps marking the beginnings of a substantial transformation[27]. There are also reports which claim that coal consumption in the country may be falling down in the first four months of 2015 and that this new trend may be persistent[28]. This fact is mainly due to two factors. Firstly, China's coal policies are starting to change due to the increasingly deteriorating environmental situation in the country. Secondly, the rapid growth of the Chinese economy experienced in the last decades has started to slow down in the last few years.

While the installed coal capacity in the country has been rapidly increasing, significant problems related to the negative externalities of coal combustion and mining have emerged. It has already been mentioned that China has been the largest carbon emitter in the recent past and therefore has a great responsibility to contribute to the global climate change mitigation efforts. However, the increased combustion of coal has also created acute local problems in the country related to environmental deterioration and human health. Coal mining and combustion are associated with a number of different environmental problems such as land subsidence, degeneration of water sources, air pollution and acid rains[29]. Along with securing sufficient levels of energy supply for the economy, reducing the environmental externalities will be China's top priority for the near future. A recent study undertaken by Chang and Yao examines the different aspects of energy security in China, dividing the concept into the four components of acceptability, availability, affordability and applicability. According to their research, the availability and acceptability aspects of energy security have deteriorated the most in the recent past and that accordingly the two most urgent focuses of

[24] Peng, Liang, 'A Study of Coal Policies in China'(2011), p. 1
[25] Ailun, Yang, and Yiyun Cui. 2012. "Global Coal Risk Assessment: Data Analysis and Market Research". WRI Working Paper. World Resources Institute, Washington DC. Available online at http://www.wri.org/publication/global-coal-risk-assessment
[26] United States Energy Information Administration, accessed from http://www.eia.gov/beta/international/ on 5.9.2015
[27] International Energy Agency, 'IEA Statistics, Key Coal Trends, Excerpt From: Coal Information'(2015), p. 4-9
[28] CleanTechnica, 15 May 2015, 'China Coal Use Continues To Fall "Precipitously', accessed from http://cleantechnica.com/2015/05/15/china-coal-use-continues-fall-precipitously/ on 23.08.2015
[29] Aden, Nathaniel, Fridley, David and Zheng, Nina, 'China's Coal: Demand, Constraints, and Externalities'(2009), Ernest Orlando Lawrence Berkeley National Laboratory, pp. 37-38

China's energy policy should be to seek as many and diverse energy sources as possible and the reduce the carbon emissions from energy generation[30].

Air pollution is a dire problem in China and has recently become a source of increasing social unrest. The two air pollutants that are most worrisome are the sulfur dioxide emissions and the small particulates in the air[31]. It was calculated that concentrations of total suspended particulates between the years 1981 and 2001 were more than two times China's national air quality standards and five times the level that was calculated in the US before the Clean Air Act passed on 1970. Air quality is particularly bad in northern parts of the country which host several of the most polluted cities in the world[32]. It was estimated that in terms air pollution calculated with the particulate concentration criterion of PM10, twelve of the world's most polluted cities out of twenty were located in China. This was mainly caused by the emissions from the power sector with the industrial and transportation sectors also contributing[33]. On 2013, a heavy smog layer covered most of the eastern and central regions of China, with particulate matter calculations far above the levels considered safe. Reportedly, the smog affected 600 million people in an area of 2.7 million square kilometers, more than a fourth of the country's area and almost half of the population[34]. For the same year, all but two provinces in the country had failed to meet the World Health Organization's recommendation for PM 2.5 levels[35]. The Chinese government views air pollution as a serious problem and plans to spend 277 billion dollars between the years 2013 and 2017 to address the issue[36].

The World Health Organization estimated that for the year 2009, 22% of the burden of disease in China could be attributed to environmental factors[37]. Overall, the nationwide negative effects of air and water pollution were estimated to have an impact between 3% and 7.7% of the nation's gross

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[30] Yao, Lixia and Chang, Youngho, 'Energy security in China: A quantitative analysis and policy implications', Energy Policy 67 (2014) p. 602

[31] Aden, Nathaniel, Fridley, David and Zheng, Nina, 'China's Coal: Demand, Constraints, and Externalities'(2009), Ernest Orlando Lawrence Berkeley National Laboratory, pp. 37-38

[32] Chen, Yuyu, Ebenstein Avraham, Greenstone, Michael and Li, Hongbin, 'Evidence on the impact of sustained exposure to air pollution on life expectancy from China's Huai River policy' (2013), p. 1

[33] Zheng, Siqi, E. Khan, Matthew, Sun, Weizeng and Luo, Danglun, 'Incentives for China's urban mayors to mitigate pollution externalities, The role of the central government and public environmentalism', Regional Science and Urban Economics 47 (2014) , p. 61

[34] Zhao, Xiaoli, Zhang, Sufang and Fan, Chunyang, 'Environmental externality and inequality in China: Current Status and future choices', Environmental Pollution 190(2014) 176-179

[35] Carbon Tracker Initiative, 'The Great Coal Cap, China's energy policies and the financial implications for thermal coal'(2014), p.15

[36] Reuters, 24 July 2013, 'China to invest $277 billion to curb air pollution: state media', accessed from http://www.reuters.com/article/2013/07/25/us-china-pollution-idUSBRE96O01Z20130725 on 5 November 2015

[37] Zhao, Xiaoli, Zhang, Sufang and Fan, Chunyang, 'Environmental externality and inequality in China: Current Status and future choices', Environmental Pollution 190(2014) 176-179

domestic product. The effects of pollution on human health and physical infrastructure can only be expected to increase as the expanding cities cause the inhabitants to locate to areas closer to the sources of pollution[38].

Other important damages of the coal industry are being felt by the workers in the coal mines and power plants. Until recently, around 4000 miners on average died from accidents in coal mines[39], although the situation has somewhat improved in the last few years[40]. There is also an unclear toll from occupational diseases. Coal plants are associated with high rates of cancer and it has been shown that workers in the coal mines, especially those in locally owned mines, are in much higher risks of suffering from several diseases including pneumoconiosis[41].

As a result of such concerns, it can be observed that China's attitude towards coal energy has begun to change. Several policy measures are currently being taken in China in order to limit the further expansion of coal based power generation and to reduce the resulting negative externalities. One strategy that the country is pursuing is to shift coal generation to the northwestern coal mining areas and to transmit the generated electricity eastwards which would in turn reduce the competitiveness of seaborne coal imports. Such a strategy would help to reduce air pollution in the coastal regions with high population density[42]. The Chinese government has set absolute caps for total energy consumption and total coal consumption for the year 2015. The coal cap put in place for 2015 was 3900 million tons, which reflects a high degree of ambition to peak coal demand as early as possible given that coal consumption on 2014 was already higher than this figure[43]. Also, on 2014 it was planned that 1,725 small scale coal mines with a combined capacity of 117.5 million tons would be closed in order to pursue the plan to phase out of low quality coal production[44]. Additionally, a 2% to 10% resource tax based on value was put on coal resources on October 2014, effectively making coal investments more costly[45]. Reportedly, there are additional measures considered by China for curbing

[38] Aden, Nathaniel, Fridley, David and Zheng, Nina, 'China's Coal: Demand, Constraints, and Externalities'(2009), Ernest Orlando Lawrence Berkeley National Laboratory, pp. 37-38
[39] Ibid.
[40] The Economist, 18 July 2015, 'Shaft of light: The coal that fuels China's boom is becoming less deadly to extract' , accessed from http://www.economist.com/news/china/21657824-coal-fuels-chinas-boom-becoming-less-deadly-extract-shaft-light on 24.08.2015
[41] Mo, Jingfu, Wang, Lu, Au, William and Su, Min, 'Prevalence of coal workers' pneumoconiosis in China: A systematic analysis of 2001–2011 studies', International Journal of Hygiene and Environmental Health 217 (2014), p. 46
[42] World Bank, 'Commodity Markets Outlook, 3rd Quarter'(July, 2015), p.24
[43] Carbon Tracker Initiative, 'The Great Coal Cap, China's energy policies and the financial implications for thermal coal'(2014), p.15
[44] Reuters, 'China to close nearly two thousand small coal mines', Beijing, April 4, 2014, accessed from http://www.reuters.com/article/2014/04/04/china-coal-idUSL4N0MW2OJ20140404 on 2.9.2015
[45] Ma, Damien, 'Rebalancing China's Energy Strategy'(2015), pp. 9-10

coal utilization. Officials have been discussing putting a cap on coal generation capacity for the next planning period between 2016 and 2020[46]. If a cap on generation capacity is put in place in addition to the production cap, the Chinese coal market may be expected to slow down further in the near future.

A recent study reports a paradigm shift in the way the local officials performances are judged by the central government. It is suggested that while the local officials used to be reviewed based mainly on their provinces economic performance, from the recent examples it is becoming clear that environmental performance is increasingly starting to be an influential factor in rating the performance of local governors. Thus, the local officials are being increasingly incentivized to consider the pollution consequences of their actions along with economic performance[47]. So far, 7 provinces in China, Beijing, Tianjin, Hebei, Guangdong, Shandong, Chongqing and Shaanxi, have committed to cut their coal consumption by differing degrees between 2012 and 2017 for a combined total 133 million tons[48].

While the focus on coal energy is declining in China, several alternative energy sources are being given increased attention. In the government documents outlining China's actions against climate change, it is acknowledged that optimizing the energy structure in the country is a priority for the policy makers in the climate change mitigation effort. Promoting the clean utilization of fossil fuels, especially through increased use of natural gas and controlling coal consumption, utilizing alternative energy sources and boosting energy efficiency are highlighted as the government's plans in mitigating the carbon emissions of the country[49]. As the country increases support for alternative power sources, it can be expected that coal will increasingly be facing more competition from sources like nuclear energy, natural gas and renewables, all of which have recorded high capacity increases in the recent past. One other focus of the government is the development of clean coal technologies, but currently it is not clear whether and when such technologies may become competitive on an industrial scale[50].

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[46] Radio Free Asia, 26 October 2015, 'China may ban new Coal-Fired Power', accessed from http://www.rfa.org/english/commentaries/energy_watch/power-10262015105033.html on 5 November 2015

[47] Zheng, Siqi, E. Khan, Matthew, Sun, Weizeng and Luo, Danglun, 'Incentives for China's urban mayors to mitigate pollution externalities, The role of the central government and public environmentalism', Regional Science and Urban Economics 47 (2014) pp. 70–71

[48] Carbon Tracker Initiative, 'The Great Coal Cap, China's energy policies and the financial implications for thermal coal'(2014), p.17

[49] The National Development and Reform Commission The People's Republic of China, 'China's Policies and Actions for Addressing Climate Change'(2013), pp. 15-18

[50] Downie, Christian and Drahos, Peter, 'Waiting for Godot? China's search for shale gas and clean coal technologies'(2014), p.2

The intention of China to limit its consumption of coal is also evident in its pledge to the UNFCCC. The target to peak the country's emissions by 2030 which was agreed upon in the bilateral talks with the US was later confirmed in China's INDC submitted to the UNFCCC[51]. Several measures to reduce coal use are outlined in the document, as well as measures to promote low carbon technologies and energy efficiency.

Another factor that will be limiting coal demand in the country is that the growth of the Chinese economy has been showing signs of slowing in the recent years. Whereby the average growth rate of the economy was over 10% between the years 2000 and 2011, for the last three years the growth rates were well below 8%[52]. This was undoubtedly influential in bringing down the coal demand in the country. Whether the economic growth rates of the country stay at the current levels or whether they decline further will inevitably affect the future of the coal market in China. Moreover, the structure of the Chinese economy has also begun to shift. As the services sector continues to expand at the expense of the industrial sector, it can be expected that the economy in general will become less energy intensive, thus inevitably reducing the future demand for energy in general and coal energy in particular[53].

The recent policy change in China may cause many of the predictions for reaching peak coal demand to be substantially revised. Whereas earlier predictions estimated China's demand to increase for many years to come, it now seems like the phenomenon of peak coal may happen substantially sooner. There is currently a varying range of opinions on when peak coal consumption will be observed. For example, on 2010 Bo-qiang and Hua estimated that coal demand would peak by the late 2020's or early 2030's[54]. On 2014, the International Energy Agency estimated that Chinese coal demand will keep increasing until the year 2030[55]. Conversely, a report published by the Citi Group estimates that if the current economic growth rates of the country become stable, peak coal demand may be achieved even earlier than 2020[56]. Bernstein Research, on the other hand, had pinpointed 2016 as the year when the Chinese coal demand will start to decline[57].

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[51] 'Enhanced Actions on Climate Change: China's Intended Nationally Determined Contributions', accessed from http://www4.unfccc.int/submissions/INDC/Published%20Documents/China/1/China's%20INDC%20-%20on%2030%20June%202015.pdf

[52] World Bank, accessed from http://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG

[53] Carbon Tracker Initiative, 'The Great Coal Cap, China's energy policies and the financial implications for thermal coal'(2014), p.4

[54] Lin, Bo-qiang and Liu, Jiang-Hua, 'Estimating coal production peak and trends of coal imports in China', Energy Policy 38 (2010), p. 515

[55] International Energy Agency, 'World Energy Outlook 2014', p. 172

[56] Citi Bank, 'The Unimaginable: Peak Coal in China'(2013), pp. 17-19

[57] Bernstein Research, 'Asian Coal & Power: Less, Less, Less... The Beginning of the End of Coal' (2013), p. 14

The facts are that China's coal consumption fell between the years 2013 and 2014 and the initial data for the year suggests that 2015 may end up to be a year of further declining coal demand[58]. These figures strengthen the view that peak coal in China before the year 2020 is achievable and probable. However, there are also opinions that argue against the achievement of peak coal in China in the near term. One argument involves the claim that the statistics provided by China may not be very reliable and that the actual coal consumption in the country may be significantly higher than what the official figures convey[59]. It is still not clear when coal consumption will peak in China. However, it increasingly seems like that the phenomenon may occur much earlier than previously anticipated. If China is to fulfill its pledge of its carbon emissions to peak by 2030, the coal consumption of the country has to peak significantly earlier. Regardless of the exact year of peak coal, all the indications suggest that the consumption growth in the country is coming to end and that the medium and long term increases in the world's coal consumption will no longer be originating from China.

Developments in other Significant Markets

The United States currently has the second largest coal market in the world, but the coal consumption in the country has been on a downward trend since the year 2008[60]. Several factors have been effective in bringing down the utilization of coal such as the increased competition from natural gas caused by the shale gas revolution and the policies used to promote renewable energy sources. It is expected that the US market will continue to shrink in the future. US has already pledged to decrease its carbon emissions by 26-28% until 2025 as compared to the 2005 levels in its INDC submitted to the UNFCCC[61]. Furthermore, on August, 2015 the 'Clean Power Plan' was announced which can be seen as an important step for the country to fulfill its climate change mitigation commitment[62]. Under the Clean Power Plan, each of the US states are assigned specific goals for cutting their carbon emissions originating from the power generation sector. The goals have been determined based on distinct characteristics of each state. The specific methods by which the states will fulfill their goals are left completely to the choice of individual states. They are free to employ any policies as they see fit.

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[58] Greenpeace-Energydesk, 14 May 2015, 'China coal use falls: CO2 reduction this year could equal UK total emissions over same period' http://energydesk.greenpeace.org/2015/05/14/china-coal-consumption-drops-further-carbon-emissions-set-to-fall-by-equivalent-of-uk-total-in-one-year/

[59] Wilson, Robert, 'Peak Coal in China? Not so fast', accessed from https://carboncounter.wordpress.com/2015/02/27/peak-coal-in-china-not-so-fast/ on 7.9.2015

[60] United States Energy Information Administration, accessed from http://www.eia.gov/beta/MER/index.cfm?tbl=T06.01#/?f=A&start=1949&end=2014&charted=0-5-8

[61] 'US Cover Note, INDC and Accompanying Information', accessed from http://www4.unfccc.int/submissions/INDC/Published%20Documents/United%20States%20of%20America/1/U.S.%20Cover%20Note%20INDC%20and%20Accompanying%20Information.pdf on 3.9.2015

[62] The White House, accessed from https://www.whitehouse.gov/climate-change#section-clean-power-plan on 3.9.2015

However, whether the states employ policies to boost renewables, to promote energy efficiency or any other similar option, the end result will almost certainly hurt the coal power industry which is responsible for a large part of the power sector's carbon emissions. The plans depicting how the states will choose to fulfill their plans are expected to be submitted to the US Environmental Protection Agency (EPA) between the years 2016 and 2018. The states are then expected to start cutting their emission levels by 2022 and until 2030. If no plan is proposed by a state by the proposed deadline, the EPA can be given the authority to draft a plan for that state[63].

Such new policy initiatives along with other schemes that are already in place to promote renewable energy sources and energy efficiency across the country are expected to be influential in further bringing down the coal demand in the country. A report by the Carbon Tracker Initiative concludes that the US coal demand will be further reduced in the near future due to the continuation of cheap shale gas production, new EPA regulations, the continued growth of renewable energy capacity and additional greenhouse gas regulations[64].

The coal consumption in Europe has also gone down substantially in the recent past and it is expected that this trend will persist in the near future. Between the years 2013 and 2014, coal demand in the OECD Europe fell by 5.2%[65]. A main reason for the downward trend is that economic growth and energy demand has been decoupled in the European Union. The electricity demand in the European Union fell by 3.3% between the years 2008 and 2013, while the GDP grew by 4.1% in the same period[66]. As a result of this decoupling and the improving policies to achieve decarbonization in the energy market, the demand is expected to decline further in the future. The EU submission to the UNFCCC which signifies 'a binding target of an at least 40% domestic reduction in greenhouse gas emissions by 2030 compared to 1990'[67] for all the member countries further point to the organization's commitment to reduce coal consumption. There are only a few countries in Europe from where increases in coal demand are expected for the near future. These include countries like Turkey, Serbia, Montenegro and Ukraine[68]. Meanwhile, the consumption in the OECD countries in

[63] Environmental Protection Agency, accessed from http://www2.epa.gov/sites/production/files/2015-08/documents/cpp-final-rule.pdf on 5.9.2015
[64] Carbon Tracker Initiative, 'The US Coal Crash, Evidence for Structural Change'(2015), p. 40
[65] International Energy Agency, 'IEA Statistics, Key Coal Trends, Excerpt From: Coal Information'(2015), p. 15
[66] Carbon Tracker Initiative, 'Coal: Caught in the EU Utility Death Spiral'(2015), p.6
[67] 'Submission by Latvia and the European Commission on behalf of the European Union and its Member States', accessed from http://www4.unfccc.int/submissions/INDC/Published%20Documents/Latvia/1/LV-03-06-EU%20INDC.pdf on 15.8.2015
[68] Tindale, Stephen and Hinson, Suzanna, 'Cleaning the neighbourhood: How the EU can scrub out bad energy policy'(2015), Centre for European Reform, p. 4

Asia and Oceania dropped by 1.7% between 2013 and 2014[69]. The demand from countries like Japan and South Korea is expected to drop significantly in the coming decades[70].

On the other hand, significant increases in coal demand are expected to originate from several developing countries in the world. India is the chief among these countries. India's coal demand doubled between 2002 and 2012, causing India to overtake the European Union, becoming the third largest coal market in the world[71]. On 2014, India surpassed the United States to become the second largest consumer in the world.[72] The demand from the country is expected to increase by 250 million tons until 2019. It is stressed by the IEA that this increase is larger than coal demand in all the countries in the world except China, US and India. However, even this large amount of expected increase in demand does not compare with the demand surge experienced from the Chinese market in the last decade. There were instances in the near past when even a single year's demand increase in China surpassed India's currently expected 250 million tons of increase until 2019[73]. Therefore, the increasing Indian demand can't really be seen as a substitute for subsiding Chinese demand. A significant future demand increase is expected from other countries in South Eastern Asia and a moderate level of demand growth is expected from the Latin American and African regions[74].

General Outlook on the Global Market

It seems that with the subsiding of the Chinese demand, the overall world demand growth will not reach the high levels experienced in the last decade. To provide a basic overview of coal demand in the near future, it can be stated that the demand from the OECD countries will continue to decline, the Chinese demand will plateau and start to decline in a not far distant future and the main significant increases in coal demand will originate from India and various other developing countries in the world.

The International Energy Agency uses three main scenarios in its 'World Energy Outlook 2014' which pertain to future coal demand. In the 'Current Policies Scenario', which assumes that there are no additional policies enacted in the world for decarbonization after 2014, the world coal demand grows by an average of 1.5% between the years 2012 and 2040 as opposed to the last 30 years average of 2.5%. The 'New Policies' scenario, on the other hand, assumes that governments take on additional emissions reduction commitments and implement additional policies after 2014 to pursue

[69] International Energy Agency, 'IEA Statistics, Key Coal Trends, Excerpt From: Coal Information'(2015), p. 15
[70] International Energy Agency, 'World Energy Outlook 2014', p. 177
[71] Ibid, p. 197
[72] International Energy Agency, 'IEA Statistics, Key Coal Trends, Excerpt From: Coal Information'(2015), p. 16
[73] International Energy Agency, 'Medium-Term Coal Market Report 2014 (2014), p. 13
[74] International Energy Agency, 'World Energy Outlook 2014', p. 177

decarbonization. According to this scenario, the global coal demand is expected to grow by 0.5% annually between 2012 and 2040. The final scenario outlined by the IEA is the so called '450' scenario which assumes that policies are widely adopted to have a 50% chance to keep the long-term increase in average global temperature to 2 °C. Under this scenario, the global coal market shrinks by one third in 2040 compared to 2012, roughly returning to the consumption levels at the beginning of the 2000's. Reportedly, for this to happen, the global demand needs to peak at the current decade[75].

When we consider the changes in the global coal policies since the year 2014, it may be reasonable to consider the New Policies scenario to be the more likely scenario for the future of coal energy. The policy changes in China and the US along with a possible momentum that will be achieved by a successful climate change mitigation agreement in the Paris Conference can be instrumental in further reducing the future demand. According to the New Policies scenario of the IEA, most of the growth in coal demand occurs in the next decade and the pace of growth slows afterwards in large part because the Chinese demand is expected to peak around 2030[76]. As we have seen in the earlier analysis on China, there is a case for arguing that the Chinese coal peak may occur much earlier than 2030, even maybe earlier than 2020. If this indeed happens, the growth of global coal demand can turn out to be even less than anticipated in the IEA's New Policies scenario and closer to the 450 scenario. The statistics from the recent years also support that the global coal demand is significantly slowing. According to data from the British Petroleum, the global coal demand growth has been 0.6%, 1.8% and 0.4% respectively on the years 2012, 2013 and 2014[77], in contrast with the 2.5% growth average observed over the last 30 years.

The gradual change in China's coal policy will inevitably have considerable effects on the global coal trade for an extended period of time. Perhaps the most acute effects of the developments in China will be felt in the Pacific coal trade. Currently, the Asian market constitutes a large share of the world market. In the Pacific region, China is the main importer with India and Japan also having sizeable import volumes. The main exporters are Indonesia and Australia. Therefore, the effects of lowering imports of China is probably going to be felt the most in these countries as reduced exports since the Indian imports are expected to only partially make up for lowering Chinese imports in the future. Therefore, an oversupply in the Pacific market seems inevitable. The other main trade market for coal is the Atlantic market where the main importer is Europe and the main exporting regions are North

[75] Ibid., pp. 172-174
[76] Ibid.
[77] British Petroleum Public Limited Company, 'BP Statistical Review of World Energy June 2015', p. 33, accessed from http://www.bp.com/content/dam/bp/pdf/Energy-economics/statistical-review-2015/bp-statistical-review-of-world-energy-2015-full-report.pdf on 22.08.2015

America, Africa and South America. A recent change has also taken place in this trade route mainly due to the so called shale gas revolution. In a short timeframe, US has shifted from being a net importer of coal to a net exporter. Whereas the US had imported 2% of its coal consumption on 2003, it has exported 15% of its coal production on 2012. This change in the US market coupling with decreasing demand from Europe caused an oversupply to occur also in the Atlantic region[78].

There are several indications that suggest a global decline may be taking place for the coal industry. The Citi Group predicts an acceleration of mine closures, liquidations and bankruptcies for the global coal industry in the near term. The value of different coal companies monitored by the Citi Group has reportedly shrunk from a total of 50 billion dollars on 2012 to only 18 billion dollars on 2015 and this seems to be a trend that is likely to continue[79]. A similar trend can also be observed in the bond markets. According to an analysis made by the Bloomberg Intelligence, bonds issued by the US coal companies lost 17% in value in the second quarter of 2015. This has been the fourth consecutive quarter with price declines and has happened at a time when other energy bonds like oil and gas bonds were gaining value[80].

Coal prices have also been significantly low in the last few years due to a combination of factors. On the second quarter of 2015, the thermal coal prices fell down by a further 4% due to weak demand and excess supply. The decreasing imports from China was instrumental in lowering the prices. As a result of slow or negative growth of many of the major coal markets in the world, the average thermal coal prices are expected to further drop by 17% on 2015 and only record modest growth going forward. Lowering demand from the OECD countries and from China puts a strong pressure on demand that is only partially lifted by the demand increases from India and some other emerging economies[81].

Moreover, the Carbon Tracker Initiative warns that there may be a real risk for asset stranding for new coal investments. According to their research, the thermal coal market is already having a hard time accruing profits with increased energy efficiency, cheaper alternatives and declining demand due to new pollution regulations. The future coal demand and prices will likely not meet the expectations of the industry and that many of the high cost producers are in the most risk. They warn that an

[78] Channell, Jason, Savvantidou, Sofia, Jansen, Heather R, Morse, Edward L, Syme, Alastair R and Yuen, Anthony, 'Energy Darwinism: The Evolution of Energy Industry'(2013), Citi GPS, pp. 36-40

[79] Channell, Jason, Curmi, Elizabeth, Jansen, Heather R, Nguyen, Phuc, Syme, Alastair R, Prior, Elaine, Rahbari, Ebrahim, Morse, Edward L., Kleinman, Seth M. and Kruger, Tim,'Energy Darwinism II: Why a Low Carbon Future Doesn't Have to Cost the Earth'(2015), Citi GPS, p.88

[80] Bloomberg, July 13 2015, accessed from http://www.bloomberg.com/news/articles/2015-07-13/the-latest-sign-that-coal-is-getting-killed on 13.9.2013

[81] World Bank, 'Commodity Markets Outlook, 3rd Quarter'(July, 2015), p.24

oversupply in the global market is imminent which could further drive down the coal and asset prices[82]. The Citi Group agrees with this point of view, arguing that increased regulations that will be put in place after the Paris Conference can potentially make assets or individual projects unviable[83].

To sum up, it is clear that we are entering a new period for the global coal market. The high demand growth that was the norm for the last few decades will no longer be the case, to be eventually followed by negative growth. Several factors have been influential in this change. A primary factor is the changing policies aiming to reduce coal use throughout the largest coal markets in the world, spurred by concerns of climate change and the various other localized harmful effects related to coal combustion. Another factor is the rising appeal of alternatives to coal energy, such as the lowering price of natural gas spurred by the shale gas revolution and the ever lowering costs of renewable energy sources such as wind and solar. As a result, currently the financial indicators suggest that the coal industry is having a hard time making profits and new investments look riskier with expectations of low prices and low asset values for the near future. Such a global market environment will undoubtedly have important implications for Turkey since it is trying to expand its own coal market. In order to connect this global picture with the latest developments in the Turkish coal market, a closer look into the market in Turkey is necessary.

Coal Energy in Turkey

The share of coal-fired energy has been on an increasing trend in the Turkish electricity generation mix in the recent years. The coal fired generation capacity in the country was around 14.8 GW by the end of August, 2015 which makes up around 20.6% of the total generation capacity of the country. Of this amount, 25 plants fired by lignite and local hard coal sources accounted for 8.7 GW of capacity, while 8 power plants fired by imported coal sources accounted for around 6.1 GW of capacity[84]. The nearly 15 GW of coal-fired capacity in the country marks a significant increase from 2008 levels of around 10 GW when the increasing trend in coal-fired electricity generation began[85]. On 2014, power plants using lignite and domestic hard coal sources accounted for 38335 GWh of the total 249701

[82] Carbon Tracker Initiative, 'Carbon supply cost curves: Evaluating financial risk to coal capital expenditures'(2014), p.2

[83] Channell, Jason, Curmi, Elizabeth, Jansen, Heather R, Nguyen, Phuc, Syme, Alastair R, Prior, Elaine, Rahbari, Ebrahim, Morse, Edward L., Kleinman, Seth M. and Kruger, Tim,'Energy Darwinism II: Why a Low Carbon Future Doesn't Have to Cost the Earth'(2015), Citi GPS, p.94

[84] Turkish Electricity Transmission Company, accessed from www.teias.gov.tr/yukdagitim/kuruluguc.xls on 11.9.2015

[85] Turkish Electricity Transmission Company, accessed from http://www.teias.gov.tr/T%C3%BCrkiyeElektrik%C4%B0statistikleri/istatistik2013/istatistik2013.htm on 11.9.2015

GWh of electricity generation, while the power plants that use imported coal accounted for around 34849 GWh[86].

The current energy policy plans of the Turkish government envision a further expansion of coal fired generation in the country for the immediate future. The official plans involve raising the total coal capacity in the country to around 25 GW by the year 2023 and to around 35 GW by 2030[87]. Such an expansion of coal-fired generation capacity would require the country's coal consumption to grow significantly. However, Turkey lacks the resources to account for this growth in consumption. Due to the insufficiency of the hard coal reserves in the country, such a planned expansion of coal capacity will inevitably cause the import needs of the country to substantially increase, further exacerbating the import dependency problem of the country in terms of energy sources.

The hard coal production in the country dropped from around 2.4 million tons on the year 2000 to around 1.8 million tons in 2014. On the other hand, the hard coal consumption in the country was around 15 million tons on 2000 and rose to nearly 34 million tons on 2013, the difference between consumption and production being met by imports[88]. Meanwhile, lignite production in the country peaked on 2008 with 76 million tons of production but then fell down to 57.5 million tons on 2013[89]. The government projections foresee 70 million tons of hard coal consumption for the year 2019 and 202 million tons of lignite consumption[90]. These figures would make Turkey one of the few European countries to substantially increase its coal demand and with domestic coal production going down, most of this demand would have to be met by imported sources.

Greenhouse gas emissions are one of the main negative externalities caused by fossil fuel combustion. The fact that the Turkish emissions rose rapidly in the last decades can be attributed in large part to the expansion of coal-fired generation capacity in the country. On the year 2013, the total greenhouse gas emissions of the country were calculated to be 459,1 million tons of CO2 equivalent which marks a 110.4% increase from the 1990 levels. Additionally, while the per capita emission levels were around 3.96 tons on the year 1990, they were calculated to be around 6.04 tons of CO2 equivalent on 2013[91]. If the current government plans go forward, the greenhouse gas emissions of the country will continue to grow at a rapid pace making it harder for Turkey to fulfill its responsibilities in the climate change mitigation effort. Another main type of externality caused by

[86] Electricity Generation Company, 'Annual Report 2014', p. 21
[87] Bloomberg New Energy Finance, 'Turkey's changing power markets'(2014), p. 11
[88] Türkiye Taşkömürü Kurumu Genel Müdürlüğü, 'Taşkömürü Sektör Raporu 2014'(2015), pp. 23-24
[89] Türkiye Kömür İşletmeleri Kurumu, 'Kömür Sektör Raporu(Linyit) 2014'(2015), p. 20
[90] Türkiye Taşkömürü Kurumu Genel Müdürlüğü, 'Taşkömürü Sektör Raporu 2014'(2015), p. 26
[91] Turkish Statistical Institute, accessed from http://www.tuik.gov.tr/PreHaberBultenleri.do?id=18744 on 3.9.2015

the coal plants are the health costs exacted on the society. According to the estimates of the Health and Environment Alliance, air pollution caused by coal-fired power plants in Turkey cause 2876 premature deaths, 3823 cases of chronic bronchitis in adults, 4311 hospital admissions and 637643 lost working days on a yearly basis. The economic costs of these impacts are estimated to be between 2.9 billion euros and 3.6 billion euros per year[92]. An additional cost of the coal market to the society is the loss of human life in the coal mines due to accidents. 2014 was a disastrous year in this regard, with large scale accidents occurring in Soma and Ermenek. According to unofficial estimates, a total of 348 workers lost their lives due to mining accidents only on the year 2014. This figure would translate to 59 lives lost per 10 million tons of coal production which is a very high number compared to many other countries in the world[93].

Direct and indirect subsidies provided for coal energy constitute a large part of the coal policies pursued by Turkey. A range of subsidies are made available to the coal industry, ranging from exploration subsidies to direct transfers from the treasury to the hard coal industry, coal aid to poor households and investment incentives for mining. According to a study made on 2015, the total amount of the subsidies provided to the coal industry was around 730 million dollars on the year 2013. However, this number only includes the quantifiable subsidies and leaves out several types of subsidies provided that are harder to quantify such as investment guarantees and the regional incentive scheme. Therefore, the actual amount of subsidies can be expected to be significantly higher[94].

Chinese investments have also played an important role in Turkey's recent rush for coal. A subsidiary of the China Energy Engineering Group, Heilongjiang No.3 Thermal Power Construction Corporation has built 8 coal power plants between the years 2003-2014 in different parts of the country for a total of 1375 MW capacity[95]. Harbin Electric International, a Chinese state owned enterprise, recently got involved in the 2640 MW Amasra coal power plant project which is projected to cost around 2.4 billion US dollars[96]. Another Chinese state owned enterprise, the Zhejiang Energy Group, developed a coal mine on 2011 projected to produce around an annual 3 million tons of coal. An additional part of

[92] Health and Environmental Alliance, 'The Unpaid Health Bill: How Coal Plants in Turkey make us sick?'(2015), p.6
[93] Türkiye Kömür İşletmeleri Kurumu, 'Kömür Sektör Raporu(Linyit) 2014'(2015), p. 38
[94] Acar, Sevil, Kitson, Lucy and Bridle, Richard, 'Subsidies to Coal and Renewable Energy in Turkey'(2015), p.10
[95] Heilongjiang No. 3 Thermal Power Construction Corporation, 'Turkey projects: 8 thermal power plants for ten years', accessed from http://www.hpcc3turkey.com/en/newsdetail/8-thermal-power-plants-in-turkey-for-10-years on 7 November 2015
[96] 'Turkish and Chinese companies ink USD 2.4 billion coal-based power plant deal'(13 May 2013), accessed from http://www.invest.gov.tr/en-US/infocenter/news/Pages/150513-hattat-harbin-electric-coal-fired-plant-turkey.aspx on 7 November 2015

the project is envisioned which includes the construction of either a single 660 MW power plant or two 300 MW power plants[97]. A deal worth 1.5 billion dollars was also signed on 2012 between the Chinese AVIC International and the Turkish Hattat Holding to build a coal power plant[98]. These large scale investments show that as the Chinese coal market slows down, large Chinese coal firms can look to countries like Turkey for replacing some portion of their lost market.

Key Take-Aways for Turkey

Turkey is aiming to expand its coal market while the global coal market is experiencing a significant period of stagnation, which is most likely irreversible. One issue that needs to be kept in mind is that coal-fired power plants are long term investments. The average lifespan of a coal plant is around 40 years[99]. Therefore any decision made today regarding Turkey's coal energy infrastructure does not only effect the present but runs the risk of committing the country to a high carbon energy path for many decades to come. Coal combustion is an outdated mode of energy generation which has got little to offer in the long term. On the other hand, various new technology options such as energy efficiency and renewable options are becoming less costly each year and Turkey is ideally suited for benefiting from several of these alternatives. Promoting such technologies instead of coal-fired generation could ensure Turkey to profit from the long term benefits of these technologies. While the global coal industry is having problems finding profitable markets, countries like Turkey run the risk of becoming new destinations for coal investments and thus becoming more invested in high carbon energy generation. The process of decarbonization will get more costly in the future as more investments are made into coal energy infrastructure.

The expectation of low global coal prices can be seen as a positive for Turkey in the short term since Turkey would have to significantly boost its imports in order to supply its expanding coal energy infrastructure. However, relying on increased imports would exacerbate the problem of import dependency of the country for energy sources and make the country more vulnerable to potential price fluctuations in the future.

There are several lessons that can be drawn for Turkey from the example of the Chinese coal market. It is important to understand the factors that has caused China to substantially switch its policies to

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[97] 'Chinese firm in major mining-energy investments in Turkey'(29 September 2011), accessed from http://www.invest.gov.tr/en-US/infocenter/news/Pages/290911-chinese-zhejiang-investment-mining-energy-turkey.aspx on 7 November 2015

[98] 'Erdogan's China visit reaps investment deals worth billions'(11 April 2012), accessed from http://www.invest.gov.tr/en-US/infocenter/news/Pages/110412-erdogan-china-visit-cooperation-deals-signed.aspx on 7 November 2015

[99] Health and Environmental Alliance, 'The Unpaid Health Bill: How Coal Power Plants make us sick?'(2013), p.6

reduce its consumption of coal. Problems such as intense air pollution and water scarcity in China can give us a glimpse of the future Turkey will have to face if it pushes its agenda of expanding coal infrastructure. As studies indicate, Turkey is already suffering considerably from the negative impacts of coal combustion and as the coal consumption of the country increases, the negative impacts will only be felt more acutely. These effects will be harder to reverse the longer they are ignored.

China and Turkey are not nearly on the same scale in terms of their respective impact on global climate change. However, the Turkish carbon emissions have been rapidly rising in the near past, contrary to the trend in most of the OECD countries. Currently, it seems that many of the largest emitters in the world have reached a degree of consensus to curb their carbon emissions and slow down global climate change. With the approaching Paris Conference, such a consensus will undoubtedly create a pressure on Turkey to draft plans to reduce its future emissions. The current governmental plans are completely incompatible with this goal.

There is another parallel between China and Turkey In terms of safety and occupational hazards in the coal mining sector. Both countries have quite poor occupational safety records although China has managed to increase its standards in the last few years. Turkey should also implement tighter safety regulations in its coal mines to protect the lives of its workers. This would increase the costs of coal extraction, thus allowing for a better reflection of the actual costs of coal generation.

By its policy choices today, Turkey has the potential to shape its energy future for the next few decades. One option is to continue with the current policy of coal energy promotion which would be easier and economically less costly for the short term but would commit Turkey to an outdated and uncompetitive energy generation regime for decades to come with constantly worsening problems of environmental degradation and loss of human health. However, if Turkey decides to invest in low carbon energy options and energy efficiency, in the long term a more competitive energy regime can be created with more value-added and which creates more and better quality employment, even though the economic costs of such a choice may be higher for the short term. While it should be acknowledged that such a transformation can’t happen overnight, it should be noted that gradual change can occur with small policy changes made in the present. Such a policy change could be to divert some of the resources allocated for coal energy subsidization into subsidizing low carbon energy generation options.