



Coal & Climate Change - 2016

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Summary of the Report

Scientific studies require leaving the fossil fuels, especially coal, and transition to a zero-carbon economy. While the difficulty of keeping the global temperature rise at 1,5°C is being discussed, it is a fact that the extreme climatic events today becoming ordinary constitute a big danger.

The international agreements are based on the facts revealed by science. After the 1st Assessment Report of IPCC, the UN Framework Convention on Climate Change, and after its 2nd report, Kyoto Protocol have been finalized. After the 5th Assessment Report (AR5), Paris Agreement has been brought to the agenda. Turkey is included among the countries, which signed Paris Agreement, which was opened for signature on April 22nd 2016. **Turkey, which has become a party to the first two agreements after 12 years following their finalization, has not approved Paris agreement, yet.**

Turkey continued to emit more greenhouse gases to the atmosphere in spite of the agreements, to which it became a party late. **While emitting 207,8 million tons of greenhouse gases to the atmosphere in 1990, this number reached 467,6 million tons in 2014.** Energy sector and the fossil fuels used in that sector were kept responsible for such increase with the reason “Energy need”.

The discourse “energy need” found a correspondent only in terms of coal and natural gas. The primary energy supply, which was 53 million toe in 1990, reached 123,9 million toe in 2014. 37,1 million toe of such increase was caused by the natural gas, which was used in a widespread way in order to decrease the air pollution in cities and to increase energy diversity. On the other hand, coal, not only protected its amount in that period, but also showed an increase of 20 million toe. **As the result of the extraordinary increase in coal and natural gas in 1990-2014 period, the share of non-fossil fuel energy resources decreased down to 9,9% from 18,6%.**

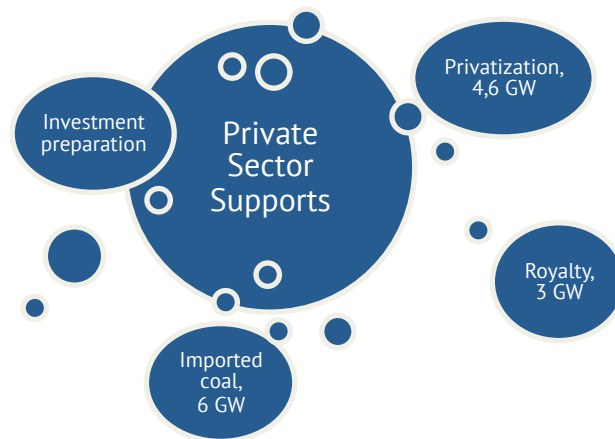
Coal consumption was 54,5 million tons in 1990 and became 97 million tons in 2014. Turkey not only increased its production, but also allowed coal importation especially for electricity production. In accordance with this, **41,5 million tons of the 42,5 million tons that occurred in 24 years was due to the coal thermal plants.** Coal import was 5.5 million tons and increased approximately 6 times and reached 30,2 million tons in 2014.

Coal – induced greenhouse gas emissions has been determinative in the energy sector. As the result of burning coal, 76,8 million tons of carbon dioxide was added in 2014 on 56,2 million tons of carbon dioxide in 1990. Taking into consideration that the main responsibility in the increase of coal amount belongs to the thermal plants, the situation is worse in terms of climate change. *Coal thermal plants emitted 22 million tons of carbon dioxide in 1990 and 76 million tons of carbon dioxide in 2014.* **Hence, one of each three greenhouse gases emitted in 2014 was produced by coal and one of each six greenhouse gases was produced by the coal thermal plants.**

The increase in the coal thermal plants has been the basic indicator of the return of Turkey to high-carbon economy in recent years. In the same way, the role of coal has increased in the last decade especially due to the thermal plants in spite of the natural gas. **While the installed power of the coal plants was 5 GW in 1990, only 2 GW new power was added until 2002. It reached 15 GW in 2014 and 16 GW today.** The inability of Turkey to confine itself with the domestic coal in order to enlarge its coal market had a great role in this increase. The domestic plants, the vast majority of which uses lignite, reached 10 GW installed power, while the plants using imported coal reached an installed power of 6 GW.

4 important models were developed for making the private sector a high-carbon player. The public sector transferred 4.6 GW plants through privatization, and entered into plant contracts of 3GW through royalty. As indicated in the strategy documents, it undertook *the investment preparations with public resources* and by this way another model was added to the existing subsidies as a leverage. The obstructions in front of the imported coal were removed and its market share was increased with an installed power reaching 6 GW in the last decade.

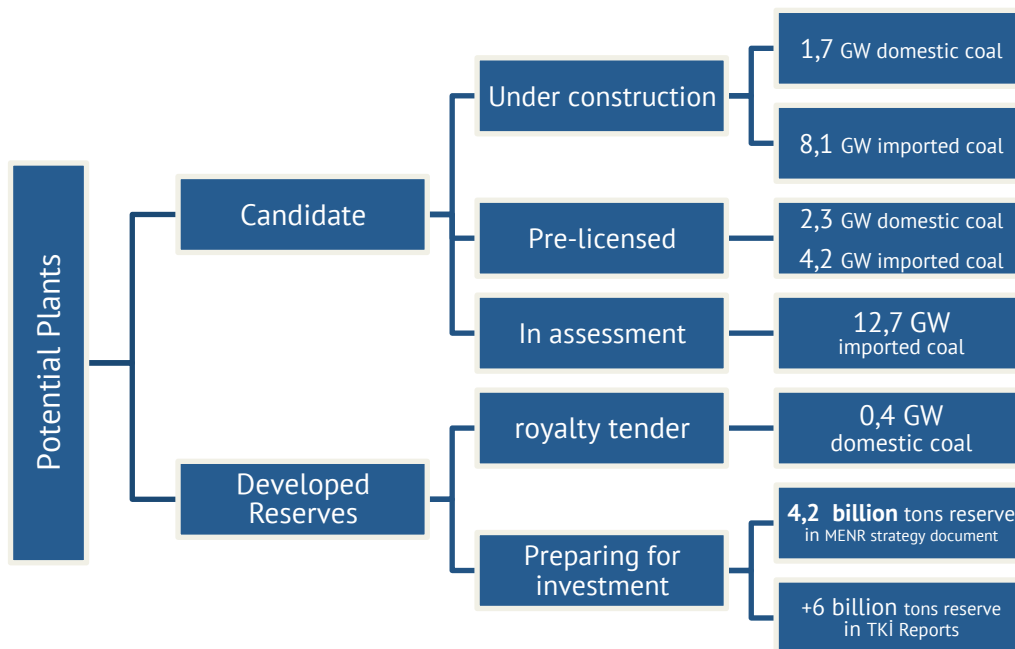
Figure 1: Mechanisms to strengthen private sector for coal



Opening of lignite areas to the private sector is being continued using the public resources. The performance of preliminary preparations for investment in order to present the public-developed coal reserves to electricity production is included in the strategic plan. Hence, 4,2 billion tons of coal will be opened for electricity production after 2019. In accordance with the list included in 2014 Coal report of TCE, the reserve amount opened for electricity production may reach 10,2 billion tons.

When examined in terms of installed power, the most important increase is provided by the imported coal plants, which burn hard coal. A new capacity of 4 GW is expected for the existing 10GW domestic coal plants and a new capacity of 25 GW is expected for the existing 6GW imported coal plants. In another meaning, **6 units of imported coal power against each unit of domestic coal power is awaiting permission as candidates.**

Figure 2: Potential coal plants that may be added after 2015.

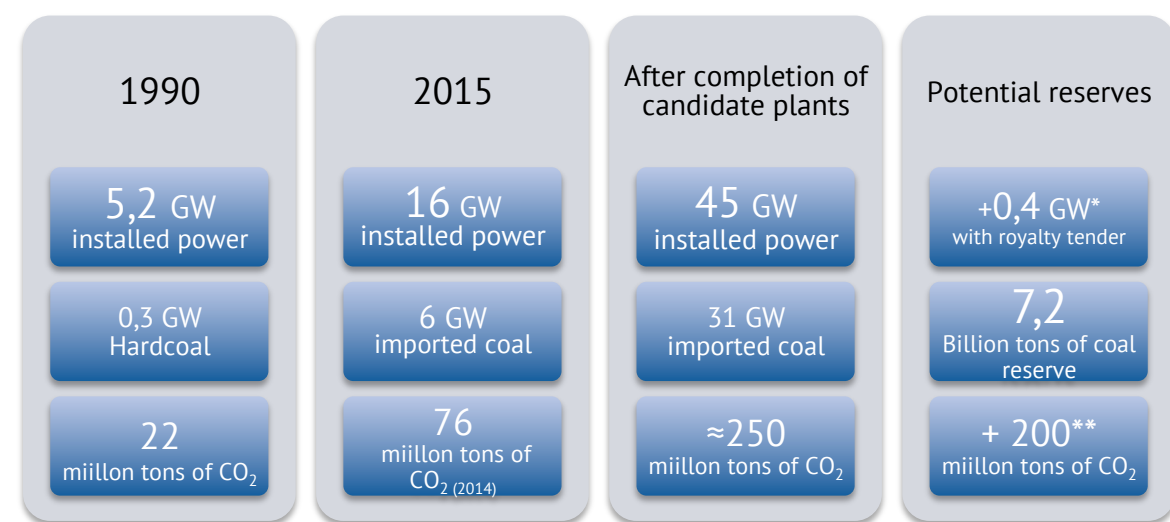


(Candidate projects are the ones in EMRA application process, and the developed reserves are the reserve amounts, a part of which is included in the royalty contract and the rest of which is included in Ministry of Energy & Natural Resources-MENR strategy documents and Turkish Coal Enterprise- TKİ reports. Installed power is not included for the reserves included under the heading "Preparing for investment", and are expected to be finalized when the investment preparations reach a certain stage.)

The imported coal plants remain as an important player for the development of the market. The plants, which are under construction, which obtained preliminary license and which are in assessment, have the potential of adding a total installed power of 25 GW to the existing 6 GW. The construction of those plants make it impossible for Turkey to decarbonize its economy in the future.

It is obvious that the **greenhouse gas emissions in the future** will increase further in the future and coal will be the leading actor in this increase. With the addition of 4GW capacity for domestic coal and 25 GW new capacity for imported coal, the coal thermal plants may increase their carbon dioxide emissions up to 250 million tons level. Furthermore, with the conversion of 7,2 billion tons of reserve, which was found after 2005, into coal plants, a danger of emission of an additional amount of approximately 8 billion tons of carbon dioxide to the atmosphere occurs. The burning of only this reserve at the plants for a period of 40 years means an additional annual emission of 200 million tons.

Figure 3: Power and fuel projection of coal thermal plants of Turkey



* Excluding permit stages

** Estimated amount in case of burning the given reserve amount within 40 years

The report reveals that Turkey has been developing coal thermal plants in spite of the climate change, delivered INDC and even in spite of its transformer capacity. On the other hand, it is developing a model for burning all of its coal reserves. While the coal-burning plants constitute one over six of the total emissions, the candidate plants will be responsible for almost half of 461 million tons increase given in the INDC. Furthermore, in spite of the total transformer capacity of electricity transmission company TEİAŞ until 2026, which equals 24,9 GW, the candidates being 29 GW means that there is no space for new wind, solar or other sources.

In summary, Turkey is trying to expand its high-carbon economy in spite of the point where the climate change has reached and in spite of its electricity system capacity.

24,9 GW
Connectable capacity planned by TEİAŞ until 2026'ya

29,5 GW
Capacity of candidate coal-burning thermal plants

Introduction

The coal policies of Turkey are not understood by the public. At this point, the lack of transparency of the policies, the limited data and the lack of parallelism with the global trends result in an increase in the question marks. The establishment of the connection between the existing policy documents and the realized projects and their assessment in the context of current developments remain as a question mark for large populations. It is a main problem to see each information that is suggested in the general picture.

The report “Financing Coal”, which was prepared in 2015, tried to reveal the high-carbon economy arithmetic of Turkey as indicated in its sub-heading. The report tried to define the role of coal in the general energy data within the frame of Turkey’s high-carbon economy policies, the coal thermal plants and policies. It examined the development of coal plants, including the candidate plants that exist and that are in the permission process and combined three headings: energy – coal – climate change including the greenhouse gas projections.

Reaching 2016, the new data added result in current results on policies. In order to better read those results by the public, energy policies and coal have to be examined in terms of the role of thermal plants and climate change. Therefore, the data on many headings such as the coal explorations, especially started after 2005, the developed royalty model etc, have become more visible after 2014. Especially the report on Climate Change Through Royalty is included in this study.

In the study, the data that is difficult to understand are examined and it is tried to establish the connection of such data in terms of climate change. Therefore, the report used the data that are determinative in terms of climate change rather than the data such as coal amount or number of plants, and converted them whenever necessary. The report ensured the issuance of parliamentary questions but their responses could not be obtained from the Minister of Energy and Natural Resources, although the relevant period has expired.

The Report Coal and Climate Change -2016 examines the role of coal in Turkey’s favoring a fossil-fuel centered policy on one hand while becoming a party to climate change agreements on the other hand. The data and the analysis show that Turkey is trying to open its high-carbon economy to the private sector and is continuously feeding its policies to include imported coal for privatization, royalty, investment preparation and expansion of the market. Furthermore, while Turkey is becoming a party to the climate agreements, there is data showing that its appetite for changing the climate is bigger than the past.

Notes on the Approach...

The approach used in the report can be explained as follows:

- ◆ It is the carbon content that determines the effect of coal on the climate change. There is a direct proportion between the carbon content and the energy value (TJ or kcal). The amount of greenhouse gases emitted to the atmosphere is found by multiplying *the energy that is obtained as the result of burning the coal and the implied emission factor (for details on emission calculations, see; 2006 IPCC Guidelines for National Greenhouse Gas Inventories)*
- ◆ In this case, what is important in terms of climate change is not the amount of coal, but the emission amount depending on the energy it provides. When the unit amount of coal having low thermal value is burnt, it provides low energy, and hence emits a low emission, while for the coal having high thermal value, more carbon dioxide emission occurs. Therefore, while giving the amount of coal in this study, the corresponding thermal value and emission values are used for climate change dimension.
- ◆ On the other hand, energy balance tables give the data in amount (tons) and energy (TEP). Since different methods are used for the energy balance tables and in inventory calculation, the balance tables are taken into consideration in energy calculations and greenhouse gas inventory report is taken into consideration in the emission calculations.
- ◆ National greenhouse gas inventory is prepared basing on energy balance tables taking into consideration the guides prepared by IPCC/ Intergovernmental Panel on Climate Change. Hence, the inventory prepared by Turkey is the only source with an internal consistency in terms of the used coal, energy value and emission. However, a revision is made due to the method, activity data and the changes in the parameters used as basis for the calculations in the inventory of 2014¹. Since this revision is also made for the previous years, all greenhouse gas amounts since 1990 have been changed.
- ◆ The data of EMRA are taken as basis for the existing plants and candidate projects included in the report. However, this data may show changes due to the changes made in the applications in time and due to the necessity to follow them up.
- ◆ The greenhouse gas projection calculations are prepared in accordance with the relevant methodology and may show changes in accordance with the realization of the projects, their performances and other technical properties.

¹ For the explanation of TURKStat on the subject matter, see: http://www.tuik.gov.tr/HbGetir.do?id=21582&tb_id=6

Background

The policies that will stop climate change depend on the policies responding to the realities revealed by science. Those policies have to be applied by the countries one by one and on global scale through agreements. Here, there are many sub-headings and the reduction in fossil fuels seems to be the most basic step.

In 1991, the Intergovernmental Panel on Climate Change -IPCC issued its First Assessment Report. After the report, in 1992, UN Framework Convention on Climate Change (UNFCCC) was finalized in Rio. In a similar way, in 1995, following the 2nd Assessment Report (SAR), Kyoto Protocol was given its final shape in 1997. The 5th assessment report was issued by IPCC between 2013 and 2014.

Turkey has become a party to UNFCCC in 2004 and to Kyoto Protocol in 2009. Although it has become a party to those two important climate agreements, it continued increasing the ratio of fossil fuels in the economy in the following periods. Turkey, which is among the countries that signed Paris Agreement, which was opened for signature with a big ceremony on April 22nd 2016, has not started the approval process, yet.

Today, there is a gap that needs to be filled between the determinations of science in the past and the global policies. Similarly, there is an increasing gap between the policies of Turkey and the findings of science.

Scientific Background

Reports are published under a series of headings with the 5th Assessment Report (AR5) of IPCC. While none of the projections examined in the reports² succeeded in keeping the temperature increase under 1,5°C in accordance with the average of the years between 1850-1900, only scenario RCP2.6³ keeps the temperature increase under 2°C. Although RCP2.6 scenario is more positive in comparison with the other scenarios, tipping of climate balances, carries the risk of rapid approach to an irreversible process.

IPCC reports and similar studies reveal the fact that the fossil fuels have to be kept in soil and the decrease in their use has to be commenced as soon as possible. Minimum 80% of coal reserve, 30% of oil, and half of the natural gas (50%) must remain in soil and must not be used. Furthermore, the reports show the cost and difficulties of late steps. On the other hand, while the reports define the transition to a low carbon economy, they pronounce a zero carbon economy towards 2050s. Paris Agreement was finalized under such a scientific reality.

² IPCC "Summary for Policymakers. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change" IPCC, 2013. For access: http://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_SPM_FINAL.pdf

³ Representative Concentration Pathways Scenario

Paris Agreement

As of October 1st 2015, the countries submitted their Intended Nationally Determined Contributions-INDCs to UNFCCC Secretariat. Those INDCs, which show the projections of countries until 2030, were assessed with a Synthesis Report⁴ submitted on October 4th. The findings in the reports are included in Parties Conference COP21 resolutions.

In COP21, which was held in December 2015, Paris Agreement was finalized. In accordance with article 2.1, which is the most important point of the agreement, the countries accepted *holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels*. However, the submitted INDCs by the countries, which constitute the basis of the agreement, have shown that the countries did not reduce their total greenhouse gas emissions, and even increased them. The Synthesis Report showed that total emissions would increase 11-22% in 2030 compared to levels in 2010. Similarly, in the Decision 17/CP.21, it was expressed that total emissions would increase to 55 Gt⁵ in 2030. In this case, it becomes obvious that the amount of greenhouse gases to be emitted to the atmosphere will be in excess of 40 Gt level, which is necessary for keeping the temperature increase under 2°C and 35 GT level, which is necessary for keeping the temperature increase under 1.5°C.

Although Paris Agreement was announced as an international diplomatic success, it remains to be an agreement that is questioned in terms of the response given to the problem. The agreement, which covers 2020-2030 period increases the emissions in 2030 with 11-22% in comparison with 2010, which is caused by the undertakings of the countries⁶:

Sufficient undertakings: Sufficient undertakings of a small number of underdeveloped and developing countries such as Bhutan, Costa Rica, Ethiopia, Morocco and Gambia.

Average undertakings: Limited reduction by developed countries including USA, EU, Norway, and a high-increase in developing countries with high population such as China, India and continuation of increase in countries such as Mexico, Brazil.

Insufficient Undertakings: Developed countries such as Canada, Australia, Japan keeping their reduction undertakings at a limited level, continuation of increase in oil-rich countries such as Arabia, UAE.

Briefly, global emissions have increased too much as a result of the undertakings given by the developed countries without regard to their historical responsibilities and the continuation of increase in developing countries and their failure in taking into consideration their responsibilities both for today and for the future. Hence, the acceding of Paris Agreement and INDCs, which constitute a sub-heading for it, are deemed to be insufficient agreements, where many countries do not take responsibilities in spite of a small number of countries taking sufficient responsibility.

55 billion tons
Total greenhouse gases
target of countries for 2030.

35 billion tons
Global greenhouse gases
target for 2030 for 1.5°C

⁴ UNFCCC, "Synthesis report on the aggregate effect of the intended nationally determined contributions" 2013. For access: <http://unfccc.int/resource/docs/2015/cop21/eng/07.pdf>

⁵ Gt: giga ton (billion ton)

⁶ Climate Tracker : <http://climateactiontracker.org/countries.html>

Turkey's Commitments

Turkey has submitted INDC – National Declaration of Intent for Final Contributions⁷ in Oct. 1, 2015. According to the INDC, 1 billion 175 million tons of greenhouse gas emissions projected for 2030 and committed to reduce to 929 million ton. Furthermore, while 20 thousand MW wind energy is included in the strategy documents for 2023, this target is included as 16 thousand MW in the INDC. While licensed or unlicensed investment potential for solar energy have reached 10 thousand MW level today, the target set for 2030 was 10 thousand MW.

When compared with the new and updated National Inventory Report data submitted in April 2016, Turkey has increased its emissions with 260 million tons between 1990-2014 and declares that it will make a further increase of 461 million tons between 2014-2030. In other words, Turkey has made an undertaking to add much more than the increase in the past 24 years, until 2030.

While the necessity to decrease the missions at global level is obvious, the extraordinary increase made by Turkey creates a problem that will make the efforts of the rest of the world ineffective. Here, rather than the assumptions made, the economic approach matters.



Do we have to?

The Minister of Environment and Urbanization expressed an important detail on the basis of the INDC during his speech in Paris on December 7th 2015⁸. While it was understood in her speech that an annual average growth of 5% and an energy demand increase of 6% were estimated, she mentioned about the importance of the determined target.

The scenarios examined in the study bearing the title “Low Carbon Development Pathways and Priorities for Turkey”⁹ revealed a similar emission increase. 3 important scenarios, the “Official Scenario” that includes the existing policies, the “Base Scenario” taking realistic growth into consideration, and “Climate Policy Package” that takes into consideration the carbon tax, renewable energy investment fund and energy efficiency were included in the scenario report. With the Official scenario 5% and with the base scenario 3,45% growth was taken into account. In the Climate Policy Package, the growth was envisaged as 2,8%. In the study, greenhouse gas estimations are made for 3 scenarios. As the result of modeling, it is concluded that a greenhouse gas emission of 1 billion tons will be reached with the Official Scenario, 787 million tons with the Base Scenario and 620,9 million tons with the Climate Policy Scenario in 2030. Although it is expressed in the report that the annual CO₂ amount should be reduced to 2010 level in order to comply with its share of responsibility in the 2°C target, Climate Policy Package envisages an emission that is much more than 2015.

⁷ For the submitted INDC, please see: <http://goo.gl/2s6EQ9>

⁸ For the speech text dated December 7th: <https://goo.gl/7zQAmk>

⁹ Yeldan E., Voyvoda E. “Low Carbon Development Pathways and Priorities for Turkey”, WWF-IPM, İstanbul, October 2015. For access : <http://goo.gl/CEBmBe>

The report also included estimations on energy consumption. The Climate Policy Package showed that the electricity consumption in 2030 will be doubled compared to 2015 consumption in spite of the fact that it took energy efficiency into consideration¹⁰.

The targets submitted by Turkey in 2015 and the speeches made at COP21 clearly shows that the growth is based on high carbon economy and increasing energy consumption & production. The non-governmental studies similarly give results increasing emissions rather than decreasing them. However, it is interesting that Turkey is increasing the energy, electricity and fossil fuels while increasingly more countries adopt policies/give undertakings decreasing them.

In the same way, Ethiopia committed to decrease its emissions with the INDC. With its INDC dated June 10th 2015¹¹ Ethiopia indicated that it will decrease its emission, which was 150 million tons in 2010 under 145 million tons in 2030. Similarly, the INDC delivered by Morocco indicates that it will decrease its energy production and demand in a way opposite to the “energy need” discourse of Turkey. With its Declaration of Intention¹² dated June 5th 2015, Morocco undertook to make a saving of 15% in energy.

While it is obvious that Morocco undertook to decrease its energy consumption and Ethiopia undertook to decrease the greenhouse gas emissions, Turkey’s doing the opposite creates an important discussion. In opposite to many other countries, Turkey’s need to increase the energy need and greenhouse gas emissions exhibit a difference in approach.

It is an important problem that Turkey does not take into consideration the increasing climate disasters, as well as the data revealed by science in economy. Thinking that it has time in terms of climate change means that the existing disasters are not seen. For example, in accordance with the reports of the Meteorology General Directorate¹³, **a record has been set and 555 extreme climatic events have occurred in 2010, which was the hottest year measured in Turkey. In 2015, the record of 2010 was set with 959 extreme climatic events.** The damage caused by those events such as intense precipitation and flood, storm, hot air wave, tornado etc. and their economic results have not been calculated.

While the policies of Turkey are related with high-carbon growth, it does not assess the results of climate change in terms of life. However, climate change is a problem of existing rather than being a problem of economy.

555 events/year
Number of extreme climatic
events in Turkey in year 2010.

959 events/year
Number of extreme climatic
events in Turkey in year 2015.

¹⁰ ibid p:37

¹¹ For the Declaration of Intent submitted by Ethiopia; <http://goo.gl/1eg2bt>

¹² For the Declaration of Intent submitted by Morocco: <http://goo.gl/MFbZ0X>

¹³ MGM, *2015 Climate Assessment*, February 2016, Ankara. For access: <http://www.mgm.gov.tr/FILES/iklim/2015-yili-iklim-degerlendirmesi.pdf>

Coal Policies

After becoming a party to UNFCCC in 2004, Turkey re-started its coal reserve exploration studies, which were stopped in 1985, again in 2005. Hence, 7,2 billion tons of new reserve is added until today to the known reserve of 8,2 billion tons of coal until 2005¹⁴.

The target set by Turkey with its INDC before Paris Agreement shows that the increase in 2014-2030 period will be much more than the increase between 1990-2014. The claim to emit more greenhouse gases to the atmosphere than the past makes the role of coal, oil and natural gas an important problem. The 70% share of carbon dioxide produced by burning only 3 fossil fuels in the total emissions increases the role of coal in high-carbon policy.

Turkey developed 5 main policies after 2005 in order to strengthen the role of coal:

- ◆ **Coal production model with Royalty Contracts** opened the way to mine more coal. The private sector is able to mine coal with low manpower and occupational safety thanks to the tenders awarded against royalty, and the production is purchased by the state.
- ◆ **Electricity production model with Royalty Contracts** opened the way to burn more coal through thermal plants. By this way, the way leading to 9 coal thermal plants, for which contracts are made and some of which are in operation, basing on a coal reserve of 887 tons, was opened. Hence, a total installed power of 3 GW is commissioned with this model.
- ◆ **Through Privatization**, plants having an installed power of 4,6 GW, which have completed or about to complete their economic lives, are transferred to the private sector together with their assets. By this way, the continuation of those plants is ensured by making new investments in the future and an important step is taken to make the private sector a high-carbon investor.
- ◆ **Through preparation for investment through state**, the works for opening 10,2 billion tons of coal for electricity production are continuing. For 5 of them, Afyonkarahisar-Dinar, Eskişehir-Alpu, Konya-Karapınar and Tekirdağ Çerkezköy area preparations are defined in the strategic plan¹⁵.
- ◆ **By opening the world's coal to the market**, imported coal plants are also added and a bigger and stronger coal market is created. By this way, Turkey imports increasingly more coal from different parts of the world in order to expand the market, which would otherwise be limited with its own reserves.

Those five models, which are developed, will become a problem in terms of climate change with the realization of the support provided by Turkey for coal. Coal – sourced carbon dioxide, which is responsible for 25% of the total greenhouse gases of Turkey and 41% of carbon dioxide emissions, has critical importance. The increasing share of thermal plants in this ratio carries electricity production with coal policies to a more important point.

¹⁴Algedik Ö. "Electricity Production with Royalty Model", 2016, p:6. For access: <http://www.onderalgedik.com/rodovans-modeliyle-iklim-degisikligi/>

¹⁵ MENR "2015-2019 Strategic Plan", 2014. For access: http://sp.enerji.gov.tr/ETKB_2015_2019_Stratejik_Plan.pdf

Coal and Climate Change

With her INDC, Turkey has shown that greenhouse emissions will increase more compared to the past. The role of coal in the past in terms of the policies changing the climate is important in terms of understanding the contribution of it to the greenhouse emissions that will increase in the future.

Role of Coal in Greenhouse Gases

The greenhouse gases emitted to the atmosphere by Turkey has increased to 467,6 million tons in 2014 from 207,8 million tons in 1990¹⁶. Hence, an increase of 125% occurred in 24 years. Among the greenhouse gases emitted to the atmosphere by Turkey, carbon dioxide, and among the sectors, energy, are determinative with their high shares.

Due to Turkey's increasing use of fossil fuels after 1990, the amount of carbon dioxide produced as the result of burning those fuels, has increased with a ratio of 160%, which is in excess of total emissions. Only the increase of 235,5 million tons in carbon dioxide includes 90% of 259,8 million tons increase in total in comparison with 1990.

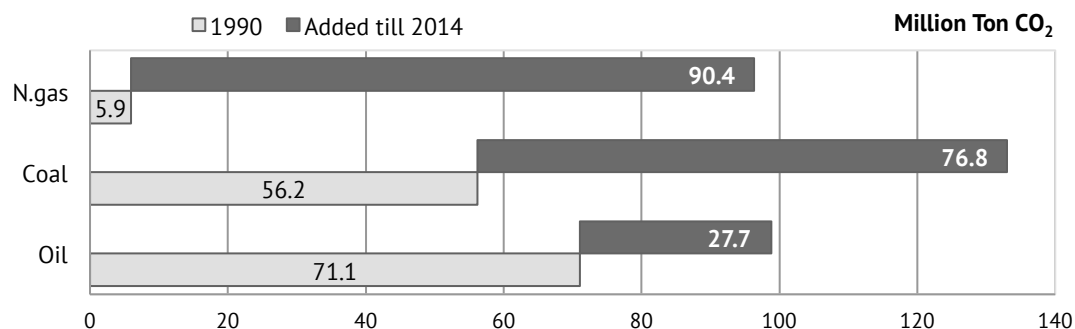
Table 1: Comparison of 1990 and 2014

	1990	2014	Increase (Mil.ton)	Increase (%)
Carbon dioxide among the gases	146,8	382,2	235,5	160%
Energy among the sectors	132,8	339,1	206,6	156%
Total Emissions	207,8	467,6	259,8	125%

When examined in terms of sectors, the energy sector, which has a high share, has been determinative with its high increase. The greenhouse gases produced by the energy sector exhibited an increase of 156% between 1990-2014. By this way, its share in total emissions, which was 64% has increased to 73% in 2014. In that period, the industrial processes sector has shown a higher increase ratio equaling to 173% . However, it has not been as determinative as the energy sector due to its low share. The high share and high increase of the energy sector means that it is responsible for 206,6 million tons of the increase, which was 259,8 million tons between 1990-2014.

The role of only the energy sector and carbon dioxide in determining the increase reveals the source of the growth – sourced greenhouse gas increase of Turkey. While no similar increase is observed in other sectors, especially the increase in energy is caused by the fossil fuels. Only coal, oil and natural gas – sourced carbon dioxide emission has increased to 318 million tons in 2014 by increasing 195 million tons in comparison with 1990.

Figure 4: Fossil-fuel sourced CO₂ increase between 1990-2014.



¹⁶ TURKStat, "Greenhouse Gas Emission Inventory, 2014" .<http://www.tuik.gov.tr/PreHaberBultenleri.do?id=21582>

As the reason of the increase in greenhouse gases, the growth of economy and, in connection with this, the increasing energy need are shown. However, when MENR's energy balance tables are analyzed and when the energy supply is examined, the basic political discourse becomes valid rather for the three fossil fuels:

- 1- While the primary energy supply in 1990 was equal to 53 million toe¹⁷, it has increased 134% reaching 123,9 million toe in 2014. This increase in the supply is caused especially by natural gas and coal.
- 2- It is observed that natural gas, which was made widespread in order to diversify the energy sources and to decrease the air pollution in cities, is the number – one source in energy supply today and is responsible for the half of the increase in energy supply.
- 3- In spite of the discourse of “diversity in energy sources” to be created by natural gas, coal – sourced energy supply has been more than twice the amount of 1990.
- 4- The increase in oil supply has lagged the increase shown by natural gas and coal.
- 5- However, the change in non-fossil fuel sources does not correspond to the “energy need” discourse.
 - a. Although hydroelectricity plants' installed powers have reached four times their capacity in 1990, their share in energy supply increased from 2 million toe to 3,5 million toe only.
 - b. The share of non-HEPP renewable energy decreased to 6,7% in 2014 from 14% in 1990. Hence, wood, animal waste, wind, solar and geothermal sources, which provided 7,7 million toe energy in 1990, provided only 8,3 million toe energy in 2014.

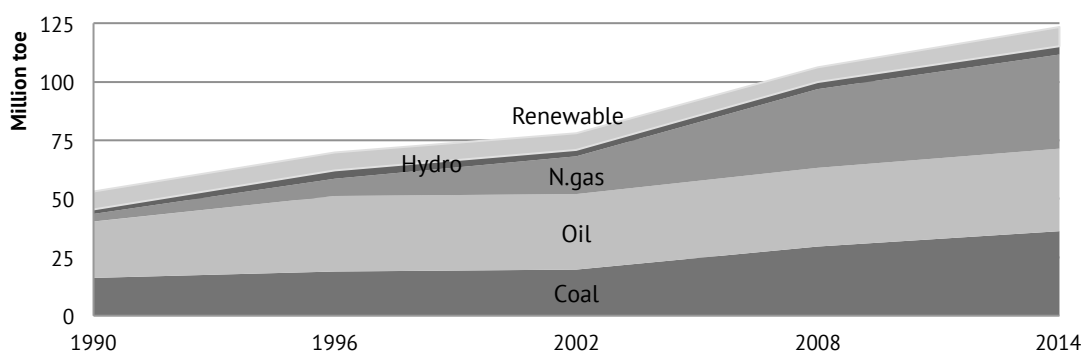
Table 2: Primary energy supply comparison for the years between 1990-2014

	1990 (M tep)	Share (%)	2014 (M tep)	Share (%)	Increase (million toe)
Coal	16,1	30,4%	36,1	29,1%	20,0
Oil	23,9	45,1%	35,4	28,5%	11,5
Natural Gas	3,1	5,9%	40,2	32,5%	37,1
Non-fossil	9,9	18,6%	12,2	9,9%	2,4
TOTAL:	53	100%	123,9	%100	70,9

source: MENR Energy Balance Tables

The data show that in spite of the increase in natural gas, coal protected its place in energy. When primary energy supply change is examined, it is obvious that the supply of energy in coal after 2002 is added to the increase in natural gas after 1990.

Figure 5: Changes in primary energy supply



Source: MENR Energy Balance Tables

¹⁷ toe: Ton of oil equivalent

Sectors in Coal Supply

Turkey, which consumed 54,5 million tons of coal in 1990, increased its consumption to 97 million tons in 2014. By this way, the energy obtained from coal increased to 36,1 million toe from 16,1 million toe. When the consumption of sectors is examined in terms of both amount and energy, the dominance of coal thermal plants is seen in the high carbon economy of Turkey.

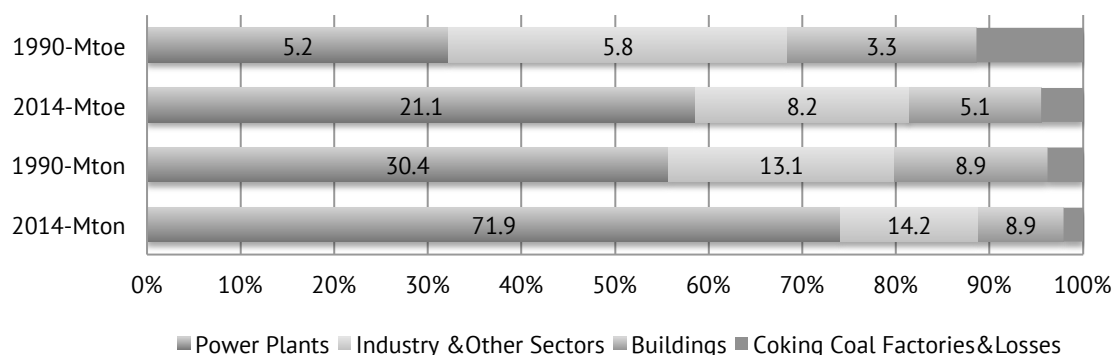
The source of the increase in the coal consumption amount is the coal plants by far. **41,5 million tons of the 42,5 million ton coal consumption increase between 1990-2014 is caused by the thermal plants.** When examined in terms of energy, 15,9 million of 20 million toe increase is also caused by the thermal plants.

Even if there is a proportional increase in the industrial sector, which is the key of economic growth, it has not been multiplied as is the case for thermal plants. However, 1,1 million tons consumption is added to 13,1 million tons of consumption and consumption has increased to 14,2 million tons.

In consumption in the residential and service sectors, although there has not been any increase in amount, there is an increase in energy. In this case (a) coal has not decreased in buildings in spite of the natural gas, (b) an increase of 1,8 million toe has occurred in terms of energy due to the use of coal having high calorific value, especially the imported coal.

The data above, which are summarized in Figure 6, show some dangers for Turkey. What determines the production in the high carbon economy of Turkey is thermal plants rather than industry. Furthermore, as will be seen in the thermal plants and buildings, the increase in high-calorific value imported coal doubles the growth. In terms of climate change, it is the carbon content and the energy provided by this content that determines the amount of carbon dioxide emitted to the atmosphere. In this respect, Turkey increases the greenhouse gas emissions much more than the consumption amounts by adding high-calorific value imported coal to the increase in the coal amounts.

Figure 6: Comparison of coal amount and energy supply between 1990 & 2014



The numbers written in the graphic as Mtoe (million toe), Mton (million ton) give the amount and the ratios given under the graphic give the share. Coke factories and the numbers included in loss are not separated.
(Source: MENR Energy Balance Tables.)

Coal Supply

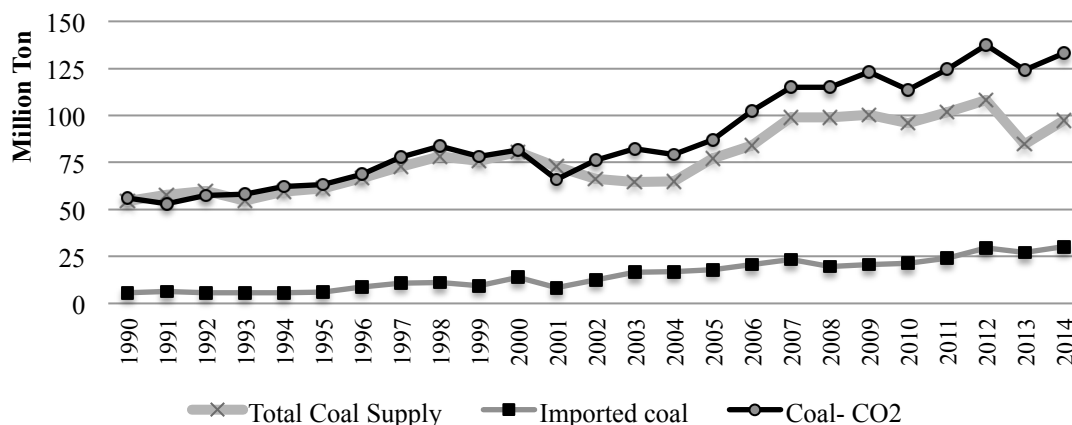
Turkey, while increasing its coal consumption on one hand, is also increasing coal production and import on the other hand. Turkey has produced 48,9 million tons of coal in 1990, the most of which consists of lignite, emitted 56 million tons of carbon dioxide to the atmosphere against a total of 54,5 million tons of coal, including 5,5 million tons of imported coal. As the result of the policy of opening the way leading to imported coal especially in recent years in order to both increase domestic coal production and to strengthen the coal market, there has been an important increase in the amount of supply. Reaching 2014, production increased to 67 million tons and the amount of imported coal reached six times becoming 30,2 million tons. Hence, against a total coal consumption of 97,2 million tons, 133 million tons of carbon dioxide was emitted to the atmosphere. In a meaning, **the carbon dioxide emission caused by burning coal has been multiplied as the result of increase in domestic production and import by Turkey.**



By this way, Turkey is changing the climate by burning the coal it imported from all parts of the world one hand, while producing more of its own coal on the other hand. Taking into consideration that the coal imported in 1990s was rather used for coke production, it is understood that the biggest address of use of imported coal in Turkey is the thermal plants.

Taking into consideration the coal import, total coal supply and coal- sourced carbon dioxide given in Figure-7, it is observed that there has been an increase both in supply and in import after 2004, and there has been an increase in carbon dioxide emission; and the one-to-one correspondence between the coal supply given as million tons and the carbon dioxide given in million tons changes with the imported coal.

Figure 7: Comparison of coal supply and carbon dioxide emission between 1990-2014



Source: MENR –Energy Balance Tables and National Inventory Report

Coal Thermal Plants

The coal plants of Turkey in 1990 had an installed power of 5.228 MW in accordance with MENR energy balance tables. 4,896 MW of this power consumed lignite and the remaining capacity used hard coal as fuel. Reaching 2014, the installed power increased to 14.814 MW. Hence, a new production capacity of 9538 MW was added.

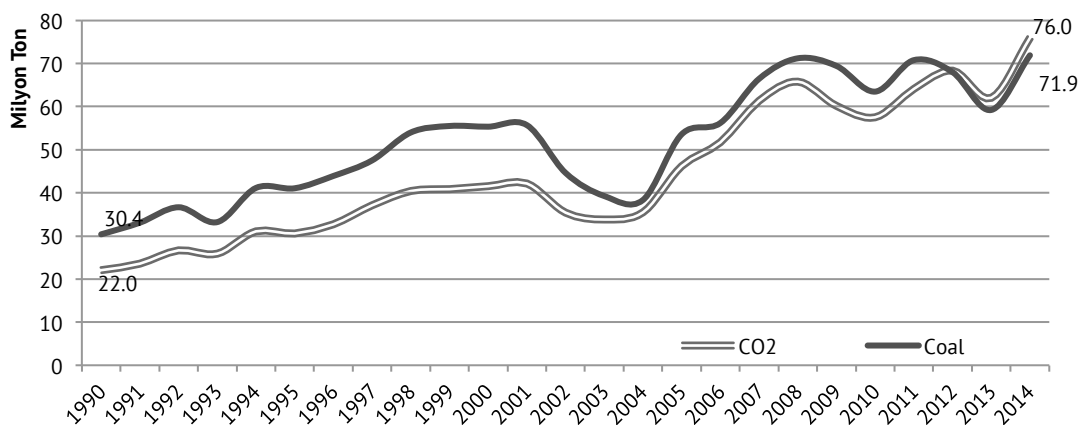
Two third of the new capacity added between 1990-2014 corresponding to 6.066 MW consists of plants with fuels included in hard coal class and generally imported coal. The remaining 3.385 MW burns lignite and 135 MW burns asphaltite. **Hence, while domestic coal added one unit capacity, imported coal increased two units capacity.**

Emissions

The existing thermal plants emitted 22 million tons of carbon dioxide to the atmosphere by burning 30,4 million tons of coal in 1990. As the result of the economy policies of the period, only 1755 MW capacity, most of which burns lignite, was added until 2002. Turkey accelerated its high- carbon economy policies with the lignite and imported coal plants that were added after that period. Hence, while the amount of coal consumption at the thermal plants increased 134%, the greenhouse gases produced by those plants increased 245%.

The coal thermal plants of Turkey emitted 22 million tons of carbon dioxide to the atmosphere in 1990. Reaching 2014, this amount increased to 76 million tons. In other words, 54 million tons were added to the emissions of 1990. The imported coal had an important role in the increase in the carbon dioxide amount, which is in excess of the consumption at the thermal plants.

Figure 8: Coal consumption and CO2 emission at the thermal plants in 1990-2014 period



Source: MENR Energy Balance Tables, National Inventory Report

Existing Plants

In accordance with EMRA data, there are 56 thermal plants having an installed power of 14.766 MW¹⁸ as of the end of 2014 in Turkey. In 2015 and thereafter, the capacities under construction belonging to Silopi TES, Kardemir Demir Çelik and Tufanbeyli TES were commissioned. The 3 new thermal plants are commissioned and the total thermal plant number reached 59.

Table 3 : Newly added plants and their capacities after 2014

Plant Name	Type of Fuel	Place	Added Cap. (MWe)	Commissioning (u: unit)
Silopi Thermal Plant	Asphaltite	Şırnak	270	u2: May 2015 u3: Dec. 2015
Kardemir Demir Çelik	Lignite	Karabük	15	10/01/2015
Bolu-Göynük Electricity Plant	lignite	Bolu	135	u2: 15/07/15
Tufanbeyli Thermal plant	lignite	Adana	450	u1&2: Dec.2015, u3: Apr. 2016
Yunus Emre TES	Domestic	Eskişehir	145	u1:Febr. 2016

With the addition of 1150 MW capacity and 3 new thermal plants commissioned after 2014 (Table 3), the coal thermal plant capacity reached 15.916 MW. List of 59 plants is given in Annex -1.

When the existing plants are examined basically;

- Although there are 9 thermal power plant that burns hard coal, except one, all of them imports coal. Only the largest 4 of them correspond to a power of 5 thousand MW.
- 24 of 59 plants have an installed power in excess of 50 MW, and the remaining 25 plants are small plants that generally meet the needs of the plants.
- Today, there is 6 GW thermal plants based on imported coal and 10 GW thermal plants based on domestic coal. However, the electricity productions of domestic and imported coal based plants are almost equal. The thermal plants burning imported coal, which has high calorific value, produced 38,7 TWh electricity in 2014 while domestic coal plants produced approximately 37,6 TWh, making their productions similar.
- Hence, there has been a carbon dioxide emission in proportion with electricity production. In 2014, half of the coal power plant –sourced carbon dioxide emissions is produced by imported coal, while the other half of it is produced by the plants using domestic coal. In other words, while Turkey emits one unit of carbon dioxide with its domestic coal, it emits one more unit with the imported coal.
- This capacity will increase with the completion of a total of 1545 MW incomplete units of Çatalağzı (1320 MW) and Yunusemre (145 MW) thermal plants, a part of which is in operation.

¹⁸ In accordance with MENR balance tables, there is a total of 14.884 MW coal thermal plants as of the end of 2014 and information compiled from EMRA data is used in this section.

Candidate Plants

In Turkey, the new thermal plant projects to be added to the system are determined not in accordance with an integrated planning, but in accordance with demand projection and the market mechanisms completing this projection. The demand projection is fundamentally based on “increasing energy need” discourse. As a result of this discourse, the targets related with coal are defined in the development plans¹⁹, strategic plans containing their correspondent in the energy sector are found, and supported with the supply and demand projections prepared by the institutions. Even if the investments to be made by the public find a place in the planning in this respect, the investments to be made by the private sector are continued in an entrepreneurship structure rather than planning.

Before privatizing its thermal plants, public was an important player in electricity production. It became a limited producer with a few plants left after the privatization of the thermal plants in 2012-2014 period. For some period, the role of the public sector consists of leading the way to and providing subsidies for the private sector investments²⁰, preparing the preliminary preparations of investment for the private sector or creating new market mechanisms such as electricity production with royalty model²¹.

With opening of the high-carbon market to the private sector, the projects, for which the investment attempt is started earlier and for which the necessary transactions are completed, can be converted into plants. Hence, rather than mentioning about the planning concept about thermal plant investments in Turkey, entrepreneurship can be mentioned. There are two basic stages, where those enterprises can be officially monitored:

- 1- **TEİAŞ connection opinion:** The transformer connection opinion for the investment, which will be obtained from TEİAŞ (Turkish Electricity Transmission Company), is the first important step. However, the connection opinions issued by TEİAŞ or applications are not known by the public²².
- 2- **EMRA Application:** EMRA (Energy Market Regulation Board), which is a regulation institution and which issues the permissions necessary for investment, is the most authorized institution in the period starting from processes of the thermal plant such as preliminary assessment, preliminary license, until the issuance of license. The next stage can be reached after the completion of the preparations, which are the requirements of those processes²³.

In the investment processes, the transformer connection permission to be obtained from TEİAŞ and the licensing process of EMRA with the contract to be signed constitute the two important benchmarks. However, in addition to the transformers providing service for the installed power today, it is indicated in TEİAŞ report²⁴ that an additional transformer capacity of 14,4GW for 2011 and 9.5 GW for 2026 will be provided. In this case, the plant capacity, which can be permitted for

¹⁹ 10. Development Plan page 174 includes “Evaluation of Domestic Coal for Electricity Production” is included as a target.

²⁰ Financing Coal, p:25

²¹ Electricity Production with Royalty Model, p:7

²² Within the frame of the report, the issuance of a parliamentary question to be answered by the Minister of Energy in TNGA was ensured on March 25th 2016 with the reference number 7/3951. No answer could be obtained within the relevant period. For Access to the parliamentary question: <http://www2.tbmm.gov.tr/d26/7/7-3951s.pdf>

²³ For access to EMRA’s “Licensing Period Related with Preliminary License & Production License in Electricity Market” document: <http://www.EMRA.org.tr/TR/Dokuman/5220>

²⁴ TEİAŞ, Turkey’s Transmission System Connection Capacity Report (2016 - 2026 Period), April 2016. For access: <http://www.teias.gov.tr/YayinRapor/APK/projeksiyon/KapasiteRaporu.pdf>

the transformers until 2026, is limited with 24,9 GW. However, the information on the existing transformer connection applications is not publicized²⁵. In this case, the applications from the preliminary assessment stage until the licensing stage, and the licensed plants under construction, which have completed their permission process, are the plants that are candidates for addition to the system.

When examined in this frame, the candidate plants consist of the following: 12.647 MW in preliminary assessment, 6.511 MW obtained preliminary license, 8.288 MW licensed and under construction. 1,545 MW, a part of whose units is in operation and the remaining of which is under construction, is awaiting completion. The candidate plants in this condition are;

- 1- **Plants under construction:** After obtaining license, the projects start the construction process, which consists of the administrative and technical studies. 12 plants having a total power of 8.288 MW are licensed by EMRA and are defined to be under construction²⁶.
- 2- **Plants that obtained preliminary license:** The projects, which passed the preliminary assessment, continue their preparations for the licensing process after obtaining preliminary license. 12 plants having a total installed power of 6511 MW are included in the list of plants that obtained preliminary license of EMRA.
- 3- **Plants under assessment:** It includes the projects, for which the necessary information is provided for preliminary license application and which entered the preliminary license assessment process, and which are being assessed by EMRA. The plants, whose license is assessed, consist of 13 plants having an installed power of 12.647 MW.

Except the 2 plants, the completion of the incomplete units of which is awaited as indicated here, the 37 candidate plants indicate a new total capacity of 29 thousand 411 MW²⁷. The complete list of the candidate plants is given in Annex-2.

Developed Mine Sites

Turkey is developing various models in order to present its reserves to high carbon economy, while opening the way to both domestic and imported coal with the licensing processes. The basic purpose here is defined as *to use it as fuel in thermal plants in general due to its low calorific value and the high amount of ash and humidity content*²⁸.

The development works for electricity production consists of 3 stages:

- 1- **Reserve Exploration Studies:** The coal reserve exploration studies, which were stopped in 1985, were launched in 2005. By this way, a new reserve of 7,2 billion tons is added to the known lignite reserve of 8,3 billion tons. Burning of all of this added reserve means the mission of approximately 8 billion tons of carbon dioxide.

²⁶ As the result of the case opened after the positive EIA report obtained for the thermal plant with a power of 1100 MW belonging to HEMA Madencilik in Bartın-Amasra, the decision was canceled. However, it is still included in EMRA lists as under construction and has the status of a plant that obtained license and it is not included in the list here.

²⁷ A total of 420 MW projects having royalty contracts included under the heading developed areas are included herein.

²⁸ "Turkish Republic, Ministry of Energy and Natural Resources - Coal."; <http://goo.gl/RAdbJ8> (ET: 04.04.2016)

- 2- **Royalty Model:** The public sector executed 9 royalty contracts for electricity production having an installed power of 3GW, containing a total coal reserve of 887 million tons²⁹. The production or licensing processes of those plants have been started, except Bingöl-Karlıova and Şırnak (Annex-3). The conditions and details of these projects with a royalty contract are not clearly known by the public³⁰.
- 3- **Preparation for Investment:** In the same way, in the strategic plan³¹ of MENR belonging to 2015-2019, it is set as a target that Afyonkarahisar-Dinar, Eskişehir Alpu, Konya-Karapınar and Tekirdağ Çerkezköy areas will be made ready for investment until 2019 for electricity production by the private sector. By this way, the pre-investment processes will be prepared with the public resources and the way for the use of 4,7 billion tons of coal in those 4 areas for electricity production after 2020 will be opened. Opening those areas, which are included among the 10 areas given in TCE reports, and other areas that are not included in the program, for electricity production, means a total of 10,2 billion tons of reserve. The list of reserves is given in Annex-3.

The capacity that can be installed for those areas, which are developed by using the public resources, will become final after the investment preparation period or upon tendering the areas, which are held by TKİ. The installed power included in the reports prepared after the reserve determination studies, is given in the technical sense, and installed power will be lower at the stage of realization.

The attempt of Turkey to use its potential areas accommodates a serious danger of increase in terms of greenhouse gas emissions. This increase in emission is at a level that will affect the global efforts. Burning only a part of the 10,2 billion tons of reserve included in TKİ reports, for example, 7,2 billion tons of coal found after 2005, at the plants for 40 years means an annual carbon dioxide emission of 200 million tons over the existing emissions.



²⁹ Climate Change With Royalty Model, p:3

³⁰ The matters mentioned in the report on Climate Change with Royalty Method are thereafter given as a parliamentary question to the Minister of Energy in TGNA with the reference number 7/5522 on March 10th 2016. For Access to the parliamentary question: <http://www2.tbmm.gov.tr/d26/7/7-5522s.pdf>

³¹ MENR, 2015-2019 Strategic Plan, 2014. For access: http://sp.enerji.gov.tr/ETKB_2015_2019_Stratejik_Plani.pdf

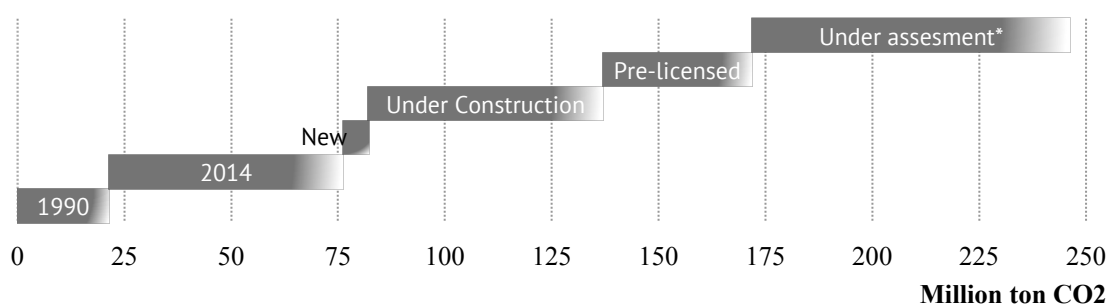
Emission Projection

While the coal thermal plants emitted 22 million tons of carbon dioxide to the atmosphere in 1990, this amount reached 76 million tons in 2014. In 2014, the coal thermal plants having an installed power of 14,8 GB, reached 16 GW power with the addition of 1,2 GW until today. The installed power will reach 45 GW, when 29 GW capacity, which is the total for the plants that are licensed and under construction, that obtained preliminary license, that are taken to assessment and that only have royalty contract in accordance with the classification of EMRA is completed.

What is important in terms of climate change is not the number of plants, but the energy amount of the used fuel. There is a relation between the consumed energy (in calorific value) and carbon emissions. The relation between the consumed energy and produced electricity is determined by efficiency. In this case, taking into consideration the realized performances of the existing plants and that the candidate plants will show a similar performance, it becomes clear that the candidate plants will increase the emissions of the existing plants in 1990 ten times and there is a potential to reach 250 million tons of carbon dioxide.

However, with the completion of opening the reserves found after 2005 to electricity production, the mission of 8 billion tons of carbon dioxide corresponding to a reserve of 7,2 billion tons will be allowed. Considering that some of those areas will be opened towards 2030, coal plant-produced carbon dioxide emissions may well exceed 250 million tons depending on their installed powers and the amount of reserve they will use.

Figure 9: CO2 emissions of existing and candidate projects.



(The calculations are performed taking into consideration the realized emissions and the plant performances. This data is calculated to provide an opinion and may differ in case of realization. The plants, for which royalty contracts are signed, but which are not shown in EMRA lists are calculated under the heading In Assessment*)

Conclusion

Turkey, while becoming a party to the climate agreements on one hand, made its economy more fossil fuel-centered. The world started to experience consequence of climatic change. In this period, during which temperature records are set, excessive climatic events such as flood are encountered, Turkey made the country economy more fossil fuel-centered.

The candidate plant projects revealed in the *Financing Coal* report and the greenhouse gas emissions to be created by them clearly show that Turkey is trying to both develop domestic coal and to include imported coal in its portfolio.

Similarly, the report on *Climate Change with Royalty Model* reveals the point, where royalty contract has reached in opening the domestic coal to the market and the potential for the future domestic coal plants.

This report updates the picture in 2016:

- 1- The most critical player in Turkey's greenhouse gas emissions is coal and natural gas. **167,2 million tons of the 259,8 million tons of emission increase between 1990-2014 is caused by the carbon dioxide produced as the result of burning coal & natural gas.**
- 2- The "energy need", which is shown as the reason of those increases, in fact has the purpose of only increasing the production and consumption of fossil fuels. Therefore, **the share of non-fossil fuel energy resources, which was 18,6% in 1990, decreased below 9,9% in 2014.**
- 3- The determinative of the increase in the coal consumption is **the thermal plants, which are responsible for 41,5 million tons of the 42,5 million tons** increase between 1990-2014.
- 4- Thermal plants are being developed in double ways with domestic coal plants on one hand and imported coal plants on the other hand. While Turkey is almost doubling its total coal consumption, **coal import has reached a level in 2014 that is 6 times the level in 1990.**
- 5- Today, **59 plants are in operation in accordance with EMRA lists, and they have an installed power of 16 GW.** Approximately 6 GW of the installed power consists of imported coal plants and is responsible for the half of the missions produced by electricity production and coal plants.
- 6- The thermal plants, which burn only coal **emitted 22 million tons of carbon dioxide to the atmosphere in 1990, and this amount has reached 76 million tons in 2014.** This amount will increase further with the units added after 2014.
- 7- 37 plants, which are licensed but none of their units are in operation, which obtained preliminary license, or whose preliminary license application is under assessment, are included as candidates in EMRA lists. 14 of those candidate plants will burn lignite and asphaltite and the remaining 23 plants will import coal. When 2 projects, which have royalty contracts, are added to those plants, the power of candidate plants reaches 29,4 GW.
- 8- **Turkey will add an installed power of 4 GW to burn its own coal and an installed power of 25 GW to burn the world's coal** as the result of its high-carbon policies.
- 9- Turkey's coal plant development program is not limited only with the EMRA licensing processes. **With the coal exploration works that it restarted in 2005, a new reserve of 7,2 billion tons was added.** The existing and the newly found reserves are being developed by the state.
- 10- With the royalty model, 9 plants having a total power of 3GW was gained, two of them has not started the licensing process, yet. Furthermore, 5 areas are being developed by the state.

All this data shows that the coal thermal plants, which are responsible for one sixth of total emissions today, will be responsible for the half of the increase that will occur until 2030.

ANNEXES

Annex-1 : Coal Thermal Plants in Production

	Plant Name	Type of fuel	City of plant	Installed Power (MWe)	Capacity in operation (MWe)
1	Çatalağzı TES (ZETES I-I-III)	Imported Coal	Zonguldak	2.790	1.390
2	Afşin-Elbistan-A	Lignite	Kahramanmaraş	1.355	1.355
3	İSKEN - Sugözü Power Plant	Imported Coal	Hatay	1210	1210
4	İÇDAŞ	Imported Coal	Çanakkale	1.200	1200
5	Atlas Thermal Plant	Imported Coal	Hatay	1.200	1200
6	Afşin - Elbistan B	Lignite	Kahramanmaraş	1.355	1.355
7	Soma T.S.	Lignite	Manisa	1.034	1.034
8	Yatağan Thermal Plant	Lignite	Muğla	630	630
9	Kemerköy Thermal Plant	Lignite	Muğla	630	630
10	Çayırhan Thermal Plant	Lignite	Ankara	620	620
11	Seyitömer TES	Lignite	Kütahya	600	600
12	Kangal TES	Lignite	Sivas	457	457
13	Tufanbeyli Thermal Plant (*)	Domestic Coal	Adana	450	450
14	Yeniköy	Lignite	Muğla	420	420
15	İçdaş Biga Thermal Plant	Imported Coal	Çanakkale	405	405
16	Silopi Thermal Plant (*)	Asphaltite	Şirnak	405	405
17	Tunçbilek	Domestic Coal	Kütahya	365	365
18	İzdemir Enerji	Imported Coal	İzmir	350	350
19	Çan	Domestic Coal	Çanakkale	320	320
20	Çatalağzı	Hard Coal	Zonguldak	300	300
21	Orhaneli	Domestic Coal	Bursa	210	210
22	Çolakoğlu-2 Thermal Plant	Imported Coal	Kocaeli	190	190
23	Yunus Emre TES	Domestic Coal	Eskişehir	290	145
24	Bolu-Göynük Elektrik Santrali	Domestic Coal	Bolu	270	270
25	Polat-1 Thermal Plant	Lignite	Kütahya	51	51
26	Beyazırma ETİ-SODA Kojen.	Lignite	Ankara	24	24
27	Çumra Thermal Plant -Konya	Lignite	Konya	37	37
28	Kardemir Demir Çelik (*)	Lignite	Karabük	87,5	37,5
29	Konya Şeker Sanayi-Çumra	Lignite	Konya	23,8	23,8
30	Türkiye Şeker Fab.A.Ş.	Other	Konya	14,4	14,4
31	Türkiye Şeker Fab.A.Ş.	Lignite+fuel oil	Tokat	14,2	14,2
32	Eti Alüminyum A.Ş.	Lignite+fuel oil	Konya	12,9	12,9
33	Türkiye Şeker Fab.A.Ş.	Lignite+fuel oil	Afyonkarahisar	12,8	12,8
34	Türkiye Şeker Fab.A.Ş.	Lignite+fuel oil	Burdur	11,0	11,0
35	Eti Maden İşletmeleri	Lignite	Balıkesir	10,7	10,7
36	Türkiye Şeker Fab.A.Ş.	Lignite	Sakarya	10,4	10,4
37	K.maraş Kağıt San.A.Ş.	Imported Coal	Kahramanmaraş	15,7	15,7
38	Türkiye Şeker Fab.A.Ş.	Lignite+fuel oil	Niğde	9,6	9,6
39	Türkiye Şeker Fab.A.Ş.	Lignite+fuel oil	Balıkesir	9,6	9,6
40	Türkiye Şeker Fab.A.Ş.	Lignite	Konya	9,6	9,6

	Plant Name	Type of fuel	City of plant	Installed Power (MWe)	Capacity in operation (MWe)
41	Türkiye Şeker Fab.A.Ş.	Lignite+fuel oil	Kahramanmaraş	9,6	9,6
42	Çimsa Atıkısı Santrali	Lignite	Mersin	9,6	9,6
43	Amasya Şeker Fab.A.Ş.	Lignite	Amasya	7,8	7,8
44	Türkiye Şeker Fab.A.Ş.	Lignite+fuel oil	Kastamonu	7,3	7,3
45	Kütahya Şeker Fab.A.Ş.	Lignite	Kütahya	7,1	7,1
46	Petlas Otoprodüktör Tesisi	Lignite	Kirşehir	6,0	6,0
47	Türkiye Şeker Fab.A.Ş.	Lignite+fuel oil	Yozgat	6,0	6,0
48	Türkiye Şeker Fab.A.Ş.	Lignite+fuel oil	Kirşehir	6,0	6,0
49	Aynes Gıda A.Ş.	Lignite	Denizli	5,5	5,5
50	Türkiye Şeker Fab.A.Ş.	Lignite+fuel oil	Kirklareli	5,4	5,4
51	Türkiye Şeker Fab.A.Ş.	Lignite+fuel oil	Erzurum	5,4	5,4
52	Küçüker Termik Kojen. Tesisi	Lignite	Denizli	5,0	5,0
53	Türkiye Şeker Fab.A.Ş.	Lignite+fuel oil	Samsun	4,8	4,8
54	Türkiye Şeker Fab.A.Ş.	Lignite+fuel oil	Erzincan	4,0	4,0
55	Türkiye Şeker Fab.A.Ş.	Lignite+fuel oil	Uşak	3,7	3,7
56	Türkiye Şeker Fab.A.Ş.	Lignite	Afyonkarahisar	3,4	3,4
57	Çankırı Tuz Fabrikası Kojen.	Lignite	Çankırı	1,6	1,6
58	Göknur A.Ş. TES	Lignite	Niğde	1,6	1,6
59	Bolluk Tesisi (Kojenerasyon)	Lignite	Konya	1,4	1,5
TOTAL:				15.916 MW	
Together with units under construction:				17.461	

(*) The plants with units that are commissioned after 2014.

Annex-2 : Candidate Coal Thermal Plants

Licensed & Under Construction Projects

	Plant name	Fuel type	Plant location	Licensed installed power (MWe)	Cap. Under Construction (MWe)
1	Cenal Thermal -Power Plant	Imported Coal	Çanakkale	1.380,0	1.320,0
2	Karaburun Thermal Plant	Imported Coal	Çanakkale	1320	1320
3	Hunutlu Thermal Plant	Imported Coal	Adana	1200	1200
4	Selena Coal Plant	Imported Coal	Hatay	936	900
5	Ayas Power Plant	Imported Coal	Adana	635,1	625,5
6	Kirazlıdere Thermal Plant	Imported Coal	Çanakkale	1280	1260
7	Ilgın Thermal Plant	Domestic Coal	Konya	505,0	500,0
8	Soma Kolin TES	Domestic Coal	Manisa	460	460
9	ÇAN-2 Thermal Plant	Domestic Coal	Çanakkale	330	330
9	Silopi Power Plant	Asphaltite	Şırnak	137,8	135,0
10	Etyemez Coal Thermal Plant	Domestic Coal	Sivas	137,7	135,0
11	Hakan Coal Plant	Imported Coal	Adana	110,0	100,0
12	Çayırhan Tesisleri Koj. Project	Coal	Ankara	2,8	2,7
				Total:	8.288 MW
				<i>With the completion of the ones in partial operation:</i> 9.833 MW	

Projects that obtained Preliminary License

	Plant Name	Type of Fuel	City of Plant	Installed power (MWe)
1	DOSAB Vapor and electricity production	Domestic Coal	Bursa	49,5
2	AğanTES	Imported Coal	Çanakkale	1.540
3	Kınık TES	Coal	İzmir	691
4	ÇANKIRI-ORTA THERMAL PLANT	Domestic Coal	Çankiri	150
5	Sanko Yumurtalık Thermal Plant	Imported Coal	Adana	800
6	Diler Elbistan Thermal Plant	Domestic Coal	Kahramanmaraş	400
7	Gürmin Enerji Amasya Thermal Plant	Domestic Coal	Amasya	300
8	Atakaş Thermal Plant	Imported Coal	Hatay	660
9	Çelikler Domaniç TES **	Domestic Coal	Kütahya	300
10	Tosyalı İskenderun Thermal Plant	Imported Coal	Hatay	1.200
11	Çelikler Keles Thermal Plant**	Domestic Coal	Bursa	270
12	Sanko Gölbaşı Thermal Plant	Domestic Coal	Adıyaman	150
Total:				6.511 MW

* : EIA positive report was canceled by the Administrative Court of Bursa.

** : It is a royalty contract.

Projects in Assessment

	Plant Name	Type of fuel	City of plant	Installed power (MWe)
1	Petkim New Vapor Production Plant *	Imported Coal	İzmir	278
2	Biga Entegre TES**	Imported Coal	Çanakkale	1.564
3	MİSİS THERMAL PLANT**	Imported Coal	Adana	830
4	Sedef II-Thermal Plant***	Imported Coal	Adana	615
5	Zorlu Enerji Kumpınar TES**	Imported Coal	Düzce	1.240
6	Güreci TES**	Imported Coal	Çanakkale	1.340
7	Akdeniz Thermal Plant	Imported Coal	Adana	607
8	Adana Yumurtalık TES****	Imported Coal	Adana	606
9	Bandırma III TES	Imported Coal	Bandırma	810
10	Gölovası Thermal Plant***	Imported Coal	Adana	1.400
11	Ada Power Plant***	Imported Coal	Adana	1.340
12	Kilikya TES***	Imported Coal	ADANA	670
13	Irmak Power Plant	Imported Coal	ÇANAKKALE	1.348
TOTAL:				12.647 MW

* : Re-application is made in 2016, and capacity was revised.

** : applications in and after 2015.

*** : These are in assessment stage since 2012 and have law suits.

**** : Assessment application is made at the end of 2014.

Annex-3: Potential Coal Mines

Projects under a Royalty Contract

All projects are given collectively and information could not be obtained only for the last two ones showing that they have gone beyond royalty contract.

Place	Tendering date	Reserve (Mil.Ton)	Installed power (MW)	Awarded firm	Final condition
Silopi Harpul	2003	41,6	405	Park Elektrik	Production
Bolu Göynük	2006	39	270	Aksa Enerji	Production
Eskişehir-Mihalıççık	2007	40	290	Adularya	Production
Adana-Tufanbeyli	29.05.12	323	600	Teyo	Not included in EMRA list *
Manisa-Soma	28.08.12	153	450	Hidrojen -Kolin	Construction
Bursa-Keles	01.11.12	61	270	Çelikler	Preliminary License
Kütahya-Tunçbilek	26.03.13	117	300	Çelikler	Preliminary License
Bingöl-Karlıova	30.05.13	80	150	Flamingo	Winner of the tender
Şırnak	29.08.14	31,2	270	MAM Enerji	Winner of the tender

* : In accordance with Turkish Coal Enterprise-TKİ reports, the firm has made an application for Energy Production License for 700 MW installed power on 02.01.2013.

Developing Areas

"Main Coal Areas that can be Used for Electricity Production" in accordance with TKİ reports

Area	Total reserve (1000 ton)	Institution
Afşin-Elbistan Havzası	4.831.902	EÜAŞ
Çayırhan Havzası	425.896	EÜAŞ
Kütahya Seyitömer	160.000	Private
Konya Karapınar *	1.833.000	EÜAŞ
Afyon Dinar *	941.000	MTA
Eskişehir Alpu*	1.453.000	TKİ
Adana Tufanbeyli**	323.329	TKİ
Bingöl Karlıova **	103.662	TKİ
Bolu Göynük **	37.875	TKİ
Manisa Soma **	688.000	TKİ
Kütahya Tunçbilek**	253.000	TKİ
Tekirdağ Saray *	283.000	TKİ
Şırnak Asphaltite **	71.000	TKİ
Konya Ilgın	143.000	Private
Çankırı Orta	94.390	Private
Adıyaman Gölbaşı	32.000	Private

* : They are the plants included in the investment preparation in Ministry of Energy & Natural Resources Strategic Plan

** : Areas, for which royalty contract is made

(MTA: Mineral Research and Exploration Institute – EÜAŞ: Electricity Generation Company, TKİ: Turkish Coal Enterprises Institution)

