

Energy Policies and Their Impact on Investments

tepav

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Executive Summary

Current Account Deficit- Relation between Energy Imports and Growth

Structurally, Turkey is appearing to be a country which is able to secure high growth rates through high current account deficits. Owing to a transformation that took place in 2001, this relation between current account balance and growth began to change, where one unit growth could only be financed with higher current account deficit due to increased dependence on imported inputs and inability to create value added products in manufacturing. Subsequently, while current account deficit-to-growth ratio was 0.25 in the Q4 of 2001, in Q1 of 2002 the rate became 1.

Energy deficit is one of the most important reasons behind the current account deficit figures. Not able to create a sufficient value added on non- energy items, Turkey is left to deal with an increase in energy imports as well as a current account deficit fluctuating with global energy prices. One clear example is the recent 70 percent drop in oil prices positively affecting the relation between growth and current account deficit rates in 2014 and 2015.

The stable share of domestic resources in total energy supply, dependence on country of origin with regards to energy imports and the economic fragility as a result of energy imports despite the ever- rising demand for energy is giving rise to Turkey's energy policy design that puts emphasis on the priority of Turkey's domestic and renewable energy resources. In this context, while the use of lignite resources is supported within the definition of domestic resources, solar, wind, geothermal and hydro- electric plants are supported within the framework of renewable energies.

Coal investment incentives and recent developments

With the contribution of the "Electricity Market Law" which the Council of Ministers' "Decision on State Aids in Investments" in 2012 constitutes the main frame of and which

underwent changes on 04.06.2016, the incentives on coal saw the 730 million dollar levels in 2013; with the addition of the cost of external factors such as air pollution and health, the figure is calculated to have increased up to 31.2 billion dollars annually (3.8 percent of the GDP). Taking its place among the top 20 countries in the world with regards to increases in fossil fuel incentives with a recorded 25 percent increase during 2013- 2015, Turkey also became one of the seven countries in G20 to have seen a rise in its incentives as well as its emissions.

Nevertheless, it is viewed that the target for the incentive scheme put in place in order to promote the use of domestic coal was not met and additionally, it is also viewed that the share of coal in primary energy supply moved up towards the 27 percent levels between the years 1980- 2014; and the import ratio demonstrated a rapid ascent from the 8 percent levels in the early period to 55 percent. In order to prevent the tendency towards imported coal, on 18.07.2016 an additional financial obligation was put in place, adding 30 percent on top of the price of imported coal (15 dollars/ ton) as an additional financial burden. It is yet to be seen whether this additional financial burden could fulfill the goal.

Renewable energy investment incentives and recent developments

The use of renewable resources for the purpose of energy production is supported through the Electricity Market Law No.4628, 'Law on the use of Renewable Energy Resources for the Purpose of Electric Energy Production' (Yenilenebilir Enerji Kaynaklarının Elektrik Enerjisi Üretimi Amaçlı Kullanımına İlişkin Kanun) No. 5346 and the General Investment Incentive Regime (Genel Yatırım Teşvik Rejimi). Through additional bonus payments within the framework of the feed-in tariff provided to renewable energy, the aim is the improvement of domestic technologies. However, due to the fact that these incentives are offered for a shorter term and in lower rates in comparison to those abroad, they lack attractiveness on the side of investors.

It is viewed that the installed capacity of 5.1 GW in wind and the 506 MW in solar power by Turkey as of the end of July 2016 is falling quite short of, respectively, the 16 GW and 10 GW targets set in the Intended Nationally Determined Contribution (INDC) presented to the Secretariat to the United Nations Framework Convention on Climate Change (UNFCCC) within the Paris COP21 process.

Turkey, especially concerning the field of solar power, is only able to direct a very limited portion of its renewable energy potential to production. When EU member and candidate states are analyzed, Turkey with its annual average of 1.500 kWh/m² global radiation value its technical potential outstrips 27 out of 34 countries. Nevertheless, when the total installed

solar capacity and electricity production is examined, Turkey falls behind its EU neighbors as well as the EU countries with similar population sizes and similar radiation values (i.e. technical potential). Similarly, concerning wind energy, Turkey has an installed power equal only to 4 percent of its technical potential. This situation with regards to solar and wind energy proves the need for further and immediate steps to be taken concerning renewable energy in Turkey. According to calculations, as the cost of scenarios aiming at a much higher rate of usage of renewable energy comes out to be less than the costs that will be faced if Turkey is to continue its existing policies until 2030; it can be stated that monetary cost is not one of the major obstacles standing in the way of Turkey in its goal of fulfilling its renewable energy potential.

Trends in the Global Finance

2015 saw the unfolding of important developments where the acceptance of Sustainable Development Goals by the UN General Assembly and the Paris COP21 process have set the post-2015 global development agenda and allowed all stakeholders to take action towards a common goal, forming synergies. Correspondingly, the financial market emerges as one of the most important actors by being a vital part of the agenda as well as means to providing direction to related investments.

While some financial institutions and organizations take action with a concern of the environmental and social impacts – aside from the economic impact of their investments – within the framework of voluntary mechanisms such as ‘Equator Principles’, ‘Carbon Principles’ and ‘Climate Principles’; others demonstrate direct efforts aimed at pulling their investments out of fossil fuels. Up until today, it is viewed that the financial value withdrawn from carbon is around 3.4 trillion dollars, and that many different institutions and organizations, especially some big insurance companies as well as investment and retirement funds, appear to be involved in the process.

It can be expected that these developments that affected the global finance markets substantially to have a decisive role in the investments of countries like Turkey which rely on international financing for big budget infrastructure investments such as energy, due to its domestic savings gap, in the coming periods.

Results of the field study:

Company perceptions regarding the developments in the energy sector

In this project, a survey is conducted in order to better understand how the existing incentive mechanisms and the developments in financial markets are perceived by the investors in the field of energy production, as well as to measure their future predictions.

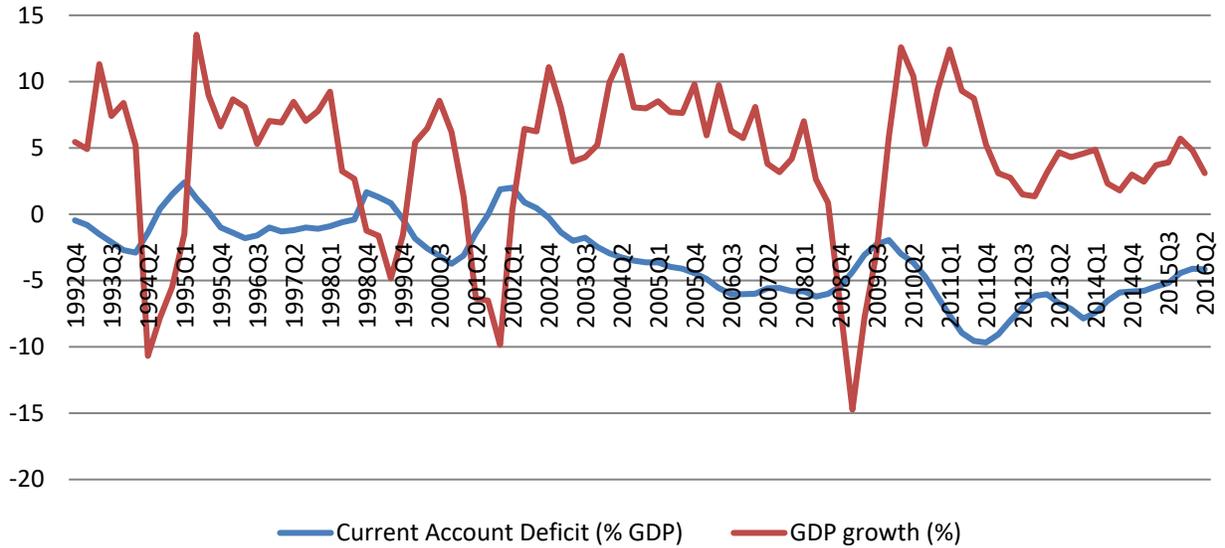
- Predictability of public policies takes precedence over financial capabilities in turning companies towards investments in renewable energy; and therefore increasing the responsibility of the public sector with regards its role in the renewable energy investments. Since predictability directly effects the payback period of the project, it affects the income-expenditure balance and consequently companies' investment decisions.
- Until today, renewable energy investments have provided returns at expected levels at the very least. The levels of return are expected to rise in the future.
 - Until today, a higher rate of small sized investors state that their returns have been above expectations.
 - With regards to an increase in returns in the coming periods, it is viewed that while small sized investors are cautious in their expectations, medium- and-big sized investors are more optimistic.
- While the investors have higher expectations of facing financial risks in short- and-medium term fossil fuel investments, similar rate of expectations are lower concerning renewable energy investments. However, it is to be expected in a possible financial stringency, that renewable energy investments are to be affected as much as the fossil fuel investments.
 - Financing risk with regards to renewable energy investments is perceived to be higher by small sized investors and these investors state that they would be affected by a possible financial stringency more in comparison to medium and big sized investors. This situation, therefore, increases the fragility of an investment field predominated mostly by small sized investors.
- Incentives provided by the public institutions are perceived positively by investors. When compared to fossil fuels, the mentioned rate is higher for renewable resources.
 - While the first choice for medium and big sized investors who state that they would invest regardless of the support and incentives is fossil fuels, small sized investors prefer choosing renewable energy.
- As a result of the survey, the tendency of companies' towards technology development is rather poor. Related, the conclusion on the disuse of public funds for such activities is striking.

- While the medium- to- big sized investors prefer buying new machinery/ equipment as a way of increasing the capability for utilizing a new product/ service, small sized investors firms prefer to employ technical personnel.
 - The act of developing an equipment in cooperation with a supplier or developing it in-firm are some of the options not ranking high in their list of priorities.
- It can be viewed from the results that a higher percentage of small scale firms choose to use domestically made machinery/ equipment. When taken into account within the context of industrial policies, a possible diffusion of technology based on renewable energy could take place especially by the participation of these small scale companies. For this to take place, actions needed to be taken guaranteeing the continuous existence of small investors in the sector by eliminating their financial risks as well as pushing these investors to better utilize public funds for their technology use and development.

Introduction:

When the historical relation between Turkey's economic growth performance and current account deficit is examined, it is concluded that Turkey is able to sustain its high growth rates only through high current account deficits. This analysis stems from Turkey's increasing dependence on imported intermediate input. As shown in Figure 1, another point that requires consideration is that this historical relation between the current account deficit and growth has lately, especially post-2003, witnessed a change in structure. Until that time, Turkey has been recording a current account surplus at times of economic downturns (1994, 1998 and 2001), but later, even in the face of economic contraction due to 2008 global crisis Turkey witnessed a limited improvement in its current account deficit. This condition can be traced back to the increased dependency on imported goods. As it can be seen in the figure, in order for Turkey's economy to record growth rate at the former levels, it requires higher rates of current account deficits.

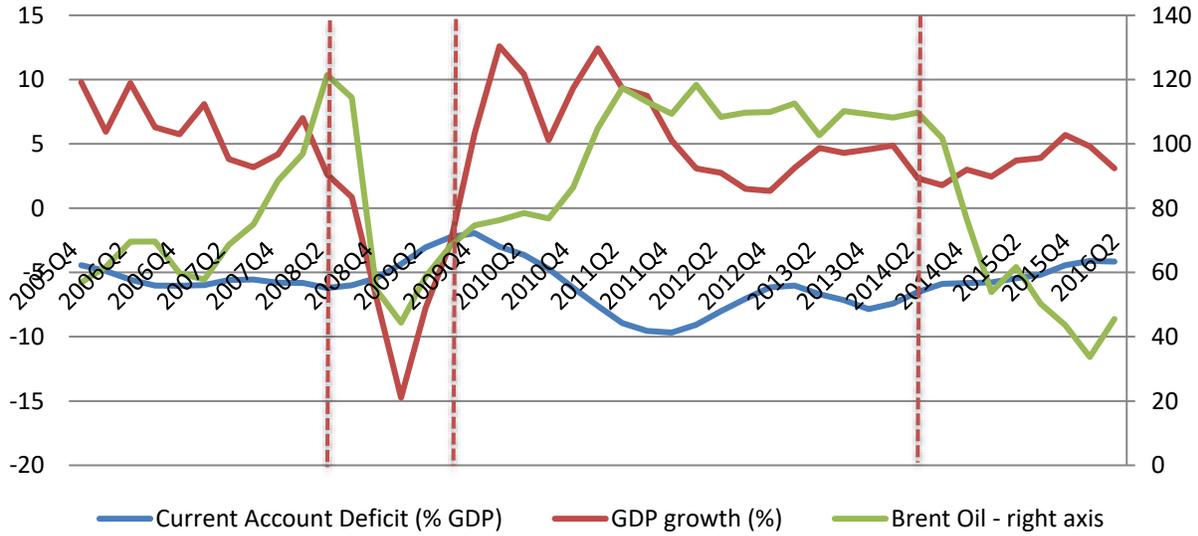
Figure 1: GDP growth and current account deficits as of quarters (% GDP)



Source: TDM

While the course of relation between growth and current account deficit was changing on the one hand, another noteworthy short-term dynamic attracts attention in Turkey’s economy. When data from 2014 and 2015 is examined, it is viewed that the reverse relation between growth and current account deficit point out a change in the positive direction. When the fundamental causes for this change are analyzed, the oil prices which saw a drop globally after the 2nd quarter of 2014 outshines others (Figure 2). With a drop in brent oil prices up to 70 percent between the 2nd quarter of 2014 and 1st quarter of 2016, it is viewed that the current account deficit saw a drop of 2.4 points. A similar relation between oil prices and current account deficit was viewed during the 2008- 2009 period but this time, due to the global contractions Turkey’s economy shrank as well.

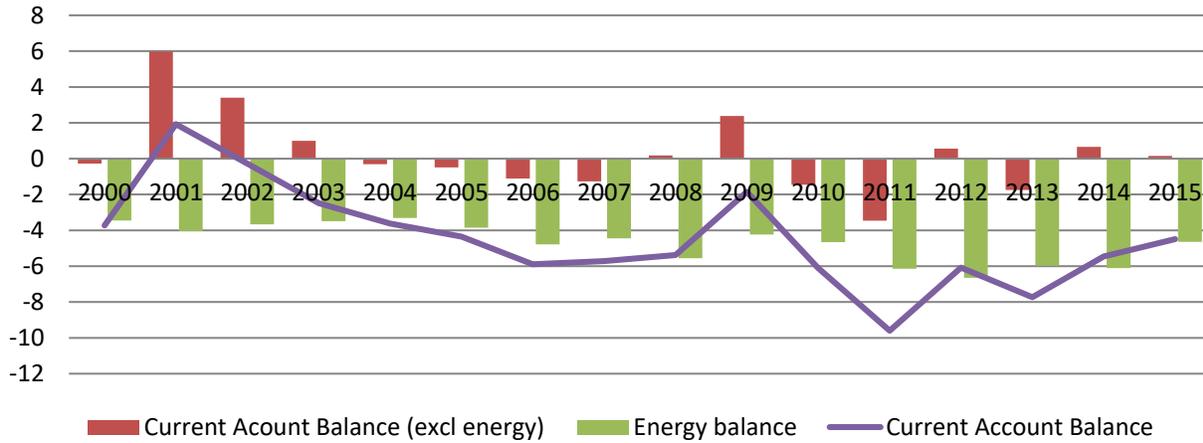
Figure 2: GDP growth (%), Current account deficit (%GDP) and Oil Prices (\$/ bbl)



Source: TDM

When the current account balance is analyzed on two distinct components, namely energy and non-energy, the apparent relation between energy deficit and current account deficit emerges clearly (Figure 3). Due to its energy import dependent structure of the economy, Turkey faces a considerable current account deficit even at times where non-energy account surpluses are recorded. In turn, when this situation is considered together with Turkey’s dependency to countries like Russia, Iraq and Iran, it paves the way for policies regarding energy management to take the forefront of critical policy priorities. Accordingly, Turkey has been putting emphasis on its domestic and renewable energy resources in official documents and therefore, have been following an energy policy framework corresponding to it.

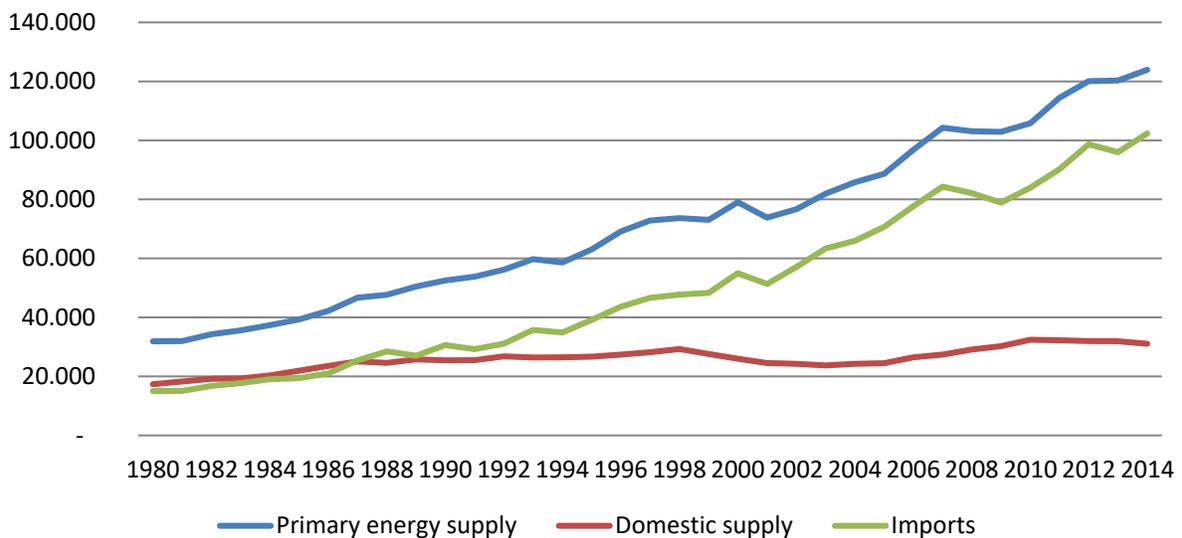
Figure 3: Energy and Current Account Balance (% GDP)



Source: TDM

When the distribution of existing imported and domestically produced energy supply of Turkey is examined, the domestic production figures which remained relatively stable put forth the causes for the import dependent structure of the country (Figure 4). Related, the recorded domestic primary energy production that averaged around the 25 million TOE (Tone of Oil Equivalent) levels starting from the 1980's have not been sufficient enough to meet the 8 percent increase in total energy production, causing an increase of same rate in imports.

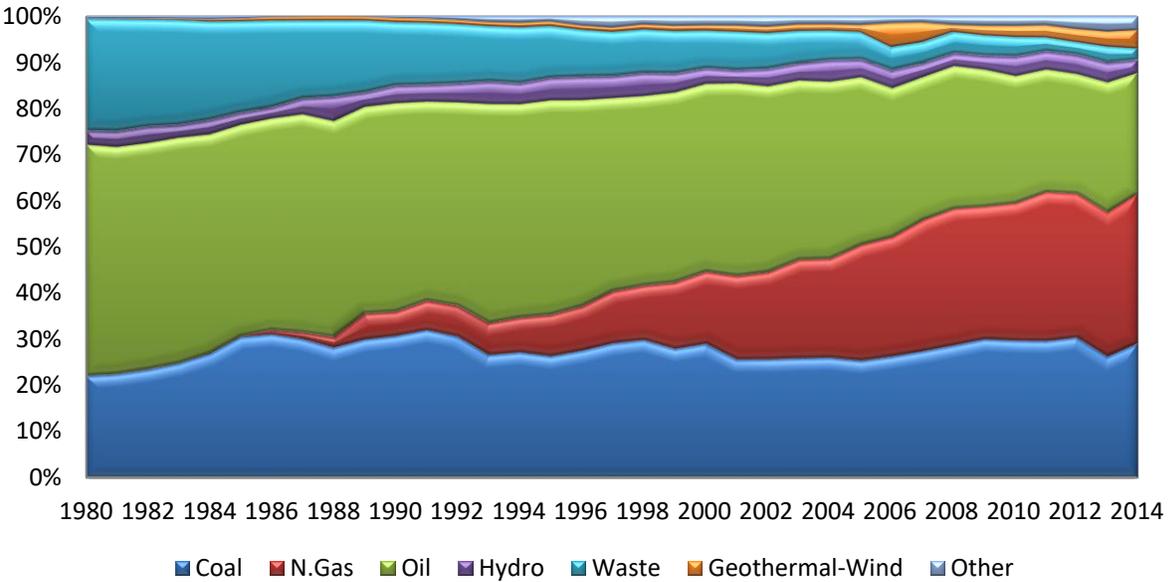
Figure 4: Primary energy supply (total), export and domestic supply (thousand TOE)



Source: General Energy Balance Sheets, Directorate General for Energy Affairs

Important changes have also happened in energy compositions during the mentioned period. Even though, the average share of coal in primary energy supply have not changed that much from 28 percent since the 1980s, the density of mostly imported fossil fuels consisting of coal, natural gas and oil¹ seen a rise from its 72 percent levels in 1980 to 88 percent in 2014 (Figure 5). The supply of renewable resources consisting of wind, solar and geothermal on the other hand was only able to find itself a share of 4 percent within the primary energy supply that tripled in the last 34 years. While geothermal holds the biggest share within the composition of renewable energy supply, wind holds at 14 percent, and solar holds at 16 percent.

Figure 5: Share of alternative resources in primary energy supply (1980-2014)

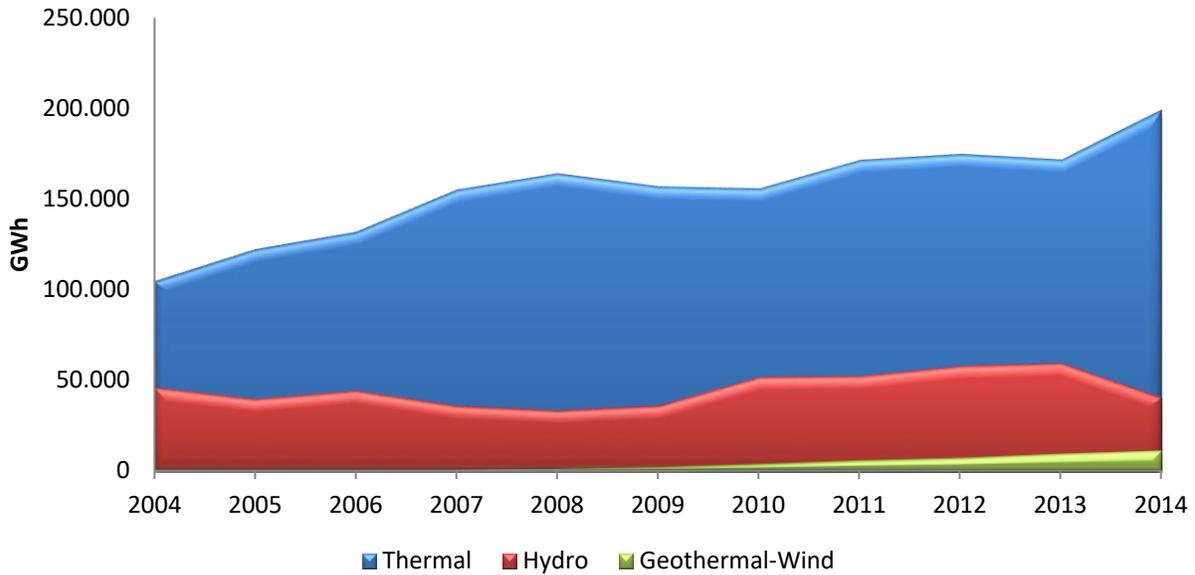


Source: General Energy Balance Sheets, Directorate General of Energy Affairs of Turkey

There are developments similar to those of primary energy supply in electricity production (Figure 6). While electricity production by thermal plants had a share of 76 percent within the 10 year period in which the analysis is made, an improvement has been recorded in the shares of geothermal and wind, but only allowed their shares to go up to 4 percent. As it can be viewed, similar to the total energy production, fossil fuel based thermal plants take the forefront.

¹ The balance sheets as published by the General Directorate for Energy Affairs, the import rate of primary energy supply consisting of coal, oil and natural gas was 63 percent in 1980, with the entering of natural gas within the energy portfolio, in 2014 import rate gone up to 83 percentage

Figure 6: Distribution of electricity production according to resources



Source: General Energy Balance Sheets, Directorate General of Energy Affairs of Turkey

This relation between energy imports, energy deficits and current account deficit has given rise to energy diversification and security measures and uncloaked the clear need to incentivize investments on domestic and renewable energy resources. Accordingly, the use of lignite sources within the definition of domestic source is supported and solar, wind, geothermal and hydroelectric power plants are included among the incentives given to renewable energy.

While, on the one hand, the aforementioned incentives play an important role in directing energy investments on the basis of resources, on the other hand it is viewed that financial means of firms also play a decisive role in this situation. When looked from this point of view, it is important for the future of energy investments in Turkey to keep tabs on the tendencies occurring in the international financial markets. Moreover, understanding the evaluations and expectations of investors concerning the existing situation will shed a light on the designing of energy policies in the coming periods. For this purpose, in this report, first and foremost, the current situation and developments in renewable energy and coal incentives are discussed, and a documentation of the trends occurring in the financial markets which have paved the way for the re-evaluation of energy investments on the basis of resources is provided. Following this, the results of a field study which includes the evaluation of the existing investments of firms in the energy sector in Turkey as well as their expectations about the future is provided.

Incentives for Coal Investments & Recent Developments

The main framework for investing on coal power plants was established by the “Decision on the State Assistance for Investment enacted through the Council of Ministers² number 2012/ 3305. By way of this decision, investments on coal exploration and production as well as investments on coal-fired electricity plants have been allowed to benefit from Region 5 incentives. Among these incentives:

- VAT exemption
- Tariffs exemption
- 70 percent exemption from Corporate Income Tax
 - If the total investment is less than 1 Million TL, up to 30 percent of the total investment
 - If the total investment is more than 1 Million TL, up to 40 percent of the total investment
- Interest subsidy to up to 700.000 TL (TL 5 percent, Foreign Currency 2 percent)
- Insurance bonus employer share support
 - For 6 years for investments made after 01.01.2016
 - Up to 35 percent of the fixed investment
 -

Furthermore, existing benefits in accordance with Electricity Market Law and Legislation:

- While the minimum share capital of the company for other power plants is 5 percent for Associate applications, the rate is 1 percent for domestic coal power plants.
- While the minimum share capital of the company for other power plants is 20 percent for license applications, the rate is 5 percent for domestic coal power plants.

² Decision on the State Aids to Investments no 2012/3305
<http://www.resmigazete.gov.tr/eskiler/2012/06/20120619-1.htm>

- In case there is more than one application, priority is given to domestic coal power plants.
- In the first 10 years of the investment and management period, an 85 percent deduction is applied to the forestry permit fees of power plants and its facilities.
- From power plants becoming operational until 31.12.2020, additional fees will not be taken.

The bill proposal to change the law in question was published in the Official Journal on 04.06.2016 and entered into force.³ Even though the exact framework of the pecuniary guarantees has yet to be clearly stated, it is clear that under this Law additional incentives such as purchase and price guarantees for power plants using domestically produced coal will be provided. According to the new changes:

- With the additions made to the Article 27 of the Electricity Market Law no 6776, dated 30.03.2013, a decision was taken to meet the energy needs of TETAŞ by power plants operating with domestically produced coal at times when electric energy demand cannot be met with (insufficient) current contracts. Council of Ministers is expected to draft new regulations in order for the amount of the procurement, the timeline and the price to be decided.
- Again with Law number 6446, Article 8, which was previously canceled by the Constitutional Court, was included in the new law. Based on this article, in accordance with conformity to environmental regulations, time will be given until 31.12.2019 to the businesses of the Electricity Generation Company and to public production companies formed with regards to the 4046 numbered ‘Law on Implementation of Privatization’ (Özelleştirme Uygulamaları Kanunu), of which are privatized or will be privatized before or after the change comes into force. Accordingly, it is stated that production facilities will not face any administrative penalties or a suspension of their electricity productions.

It is calculated that the arrangement in question, while including incentives paving the way for thermal power plants dependent on domestically produced coal also creates substantial costs on the State and the households. One of the calculations was carried out by experts in the Institute for Energy Economy & Financial Analysis (IEEFA).⁴ According to this study, it is calculated that the purchase guarantee mentioned in the Law could amount to around 1.1 – 2 Billion \$ annually.⁵

³ 04.06.2012 tarih ve 6719 sayılı Elektrik Piyasası Kanunu ile Bazı Kanunlarda Değişiklik Yapılmasına Dair Kanun <http://www.resmigazete.gov.tr/eskiler/2016/06/20160617-1.htm>

⁴ <http://ieefa.org/subsidizing-lignite-plants-create-risks-turkish-economy-undermine-investment-less-expensive-alternatives/>

⁵ If presumed that in free market, price of electricity is around 4.5 US dollar cent/ kWh and purchase price is around 8 US dollar cent/ kWh

When the mentioned cost is reflected on the consumer, it is stated that the market price for electricity could rise between 19 -29 percent.

According to another study conducted concerning the measurable incentives provided to coal in Turkey, the support given in 2013 is calculated to be 730 Million \$.⁶ The aforementioned support provided, (since it does not include the investments provided to coal power plants, price and purchase guarantees, tariffs and VAT exemptions, social security bonus support, land allocation and other incentives seeking to offer below- market interest rates and exemption from environmental regulations) is estimated to be well below the de-facto incentives given in Turkey.

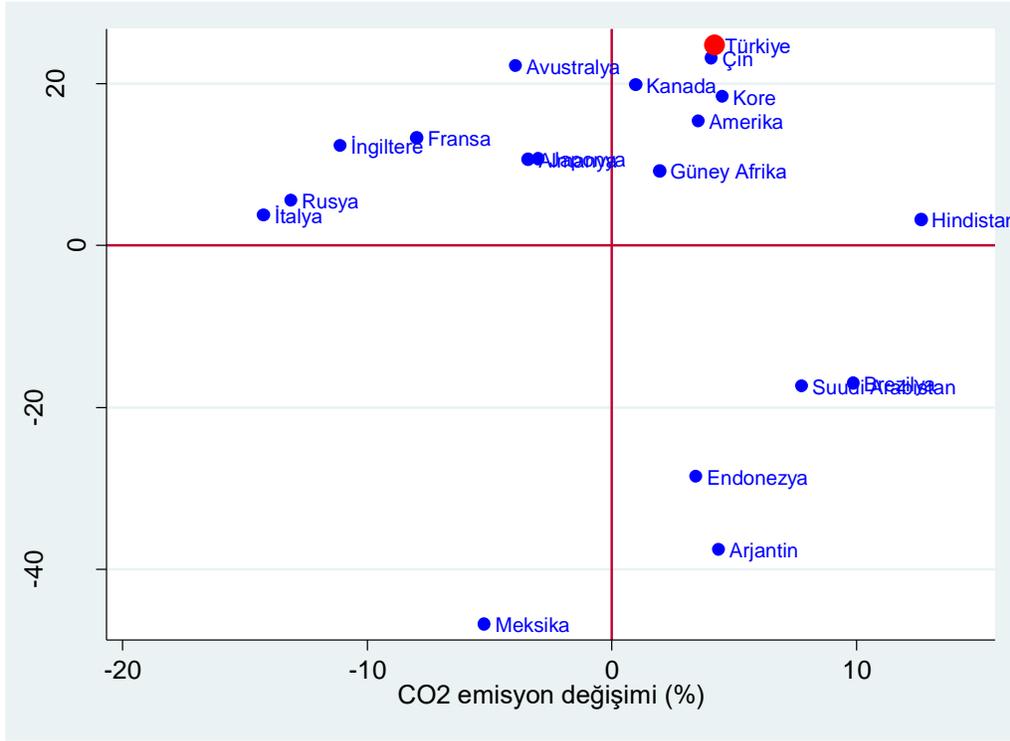
Complementary findings are present in the works undertaken by the IMF and the Oil Change International (OCI). For example, while the calculations made by OCI reveal that the incentives offered in Turkey for fossil fuels amount to somewhere between 300 million and 1.6 billion dollar; IMF, with a study conducted in which external costs such as air pollution and health resulting from coal is included the calculated incentives Turkey is providing amounts to 31.2 billion dollar (3.8 percent of the GDP) annually.

According to the calculations done based on the data- set provided by the IMF, Turkey, for the years in which data is available (2013 and 2015), with an increase of 25 percent was one of the first 20 countries which saw a proportional increase in its incentives for fossil fuels the most. When the G20 countries are considered, of which Turkey is also a member, Turkey emerges as one of the 7 countries which increased both its incentives and CO2 emissions (Figure 7). Other countries in this group of 7 are countries like the United States of America, China, India, Korea, Canada and South Africa which are among the largest coal producers in the world. These figures also give an idea of how much of G20's agenda, since 2009, with the goal of "phasing out inefficient fossil fuel subsidies" have been brought to life.

Although increasing their fossil fuel incentives by 12 percent on average between 2013 and 2015, the effects of the principle decision taken by G7 countries, regarding the gradual removal of inefficient fossil fuel incentives by 2025 and their invitation to other countries to make a similar decision in order to achieve a carbon neutral global economy will be seen in the future.

⁶ Acar, S., Kitson, L. ve Bridle, R. (2015). "Subsidies to Coal and Renewable Energy in Turkey" *Global Subsidies Initiative Report, IISD*.

Figure 7: Fossil fuel incentives of G20 countries and change in CO2 emissions (% , 2013-2015)

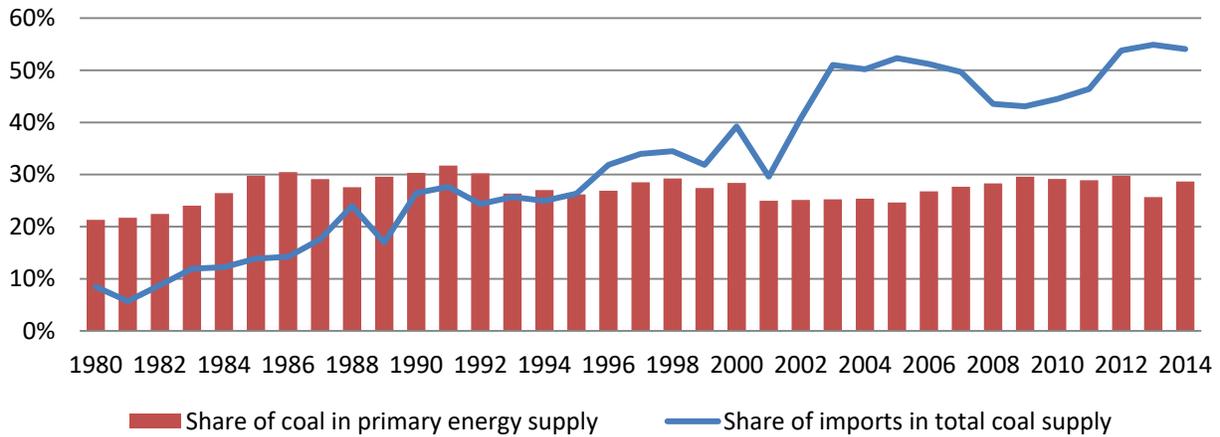


Source: "IMF Survey: Counting the Cost of Energy Subsidies" database, IMF World Economic Outlook ve Olivier, J.G.J., vd. (2015) Trends in global CO2 emissions: 2015 Report.

The above-mentioned incentives, while designed to support the production of domestic coal as stated in official documents, an increased use of imported coal is observed in the following years (Figure 8). While the share of coal in the total primary energy supplies between the years 1980-2014 was moved on average around 27 percent, the share of imports witnessed a rapid increase from 8 percent to 55 percent levels. This picture proves that Turkey's incentives on domestic coal production fell short in reaching the desired goal. In order to prevent this inclination, on 18.07.2016 "Decision on the Imposition of Additional Financial Burdens on Coal Import" (Kömür İthalatına Ek Mali Yükümlülük Konulması Hakkında Karar) was entered into force and accordingly, an additional financial burden of 15 dollars per ton was brought on coal imported for the purpose of electricity production. When compared to the price tag of coal which sells around 50 dollars per ton in the international market, it is viewed that the additional financial burden comes up approximately to 30 percent of the price. It should especially be analyzed in the future whether this additional cost which is determined at a very high rate while the energy

prices are at a record low level, will create a shift in favor of domestic coal within coal usage rates.

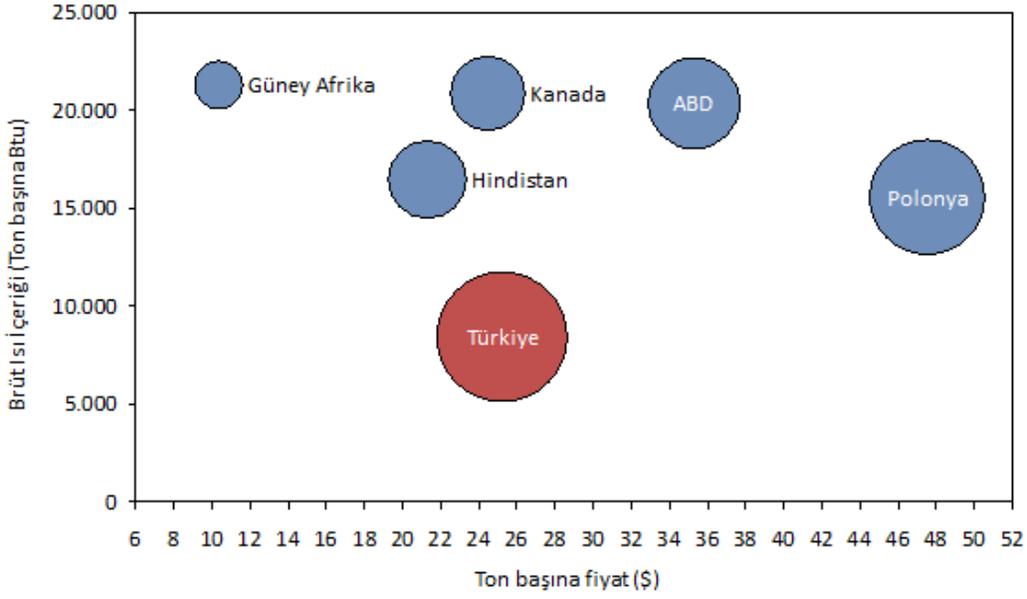
Figure 8: Share of coal and exports in primary energy supply (%)



Source: General Energy Balance Table, Energy Affairs General Manager

The fundamental reason why investors choose to lean towards imported coal is related to the performance of domestic coal with regards to its calorific value content vs price indicator when compared to coals of other countries. It is documented that the calorific value of Turkey’s domestic brown coal (lignite coal) is lower than half in calorific value in comparison to the coal resources possessed by the world’ largest coal producing and importing countries such as Canada, South Africa and the United States (Figure 9). When compared in terms of price, it is viewed that the coal produced in countries like India and Canada, even though they have similar costs to produce to that of Turkey, they have much higher calorific values. Subsequently, this makes domestic coal of Turkey less attractive for investors.

Figure 9: Cost of coal production according to energy content (2005)



Source: U.S Energy Information Administration; Calculations: TEPAV

* The size of the circle represents price per thermal content. The diameter of circles grow as the price increases,.

** Since the price data shown in the graph goes as far as 2005, the assessment belongs to year 2005.

Renewable Energy Incentives in Turkey & Recent Developments

The first regulations on renewable energy incentives was put in place on 20.02.2001, under the framework of Electricity Market Law⁷ no. 4628 and subsequently, brought with it an exemption from acquiring a license and obligations of establishing an enterprise to real and legal entities which invest in renewable energy based plants with a maximum capacity of 500 KW and/or micro-cogeneration power plants. Additionally, related to the regulations carried out in this context, TEİAŞ (Electricity Transmission of Turkey Inc.) was obligated to prioritize the connection of renewable energy power plants to the system.

In the context of Law No 5346 (10.05.2005) on the Use of Renewable Energy Resources for the Purpose of Electricity Production⁸ (Yenilenebilir Enerji Kaynaklarının Elektrik Enerjisi Üretimi Amaçlı Kullanımına İlişkin Kanun) feed in tariff (FiT) guarantee was provided to electricity production through renewable energy resources. FiTs were updated in 2010 allowing for diversification of tariffs with regards to renewable energy technologies and brought with it new incentives to production made through the use of domestic technologies. Accordingly, the FiT guarantees are paid for the first 10 years and the additional bonuses defined for domestic technologies are paid only in the first 5 years of the project. With regards, the FiTs determined for renewable energy resources are shown in Table 1. The fact that the mentioned incentives in Turkey are short-term and in low rates in comparison to those provided abroad, cause these incentives to lose its attractiveness in the eyes of investors which are producing energy using renewable energy resources.

Table 1: Feed in tariff rate for renewable energy (cUS/kWh)

	Feed in	Domestic	Upper Limit for
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⁷ <https://www.tbmm.gov.tr/kanunlar/k4628.html>

⁸ <http://www.resmigazete.gov.tr/eskiler/2005/05/20050518-1.htm>

	Tariff	Technology Bonus	Incentives
Hydroelectric	7.3	2.3	9.6
Wind	7.3	3.7	11
Geothermal	10.5	2.7	13.2
Biomass	13.3	5.6	18.9
Photovoltaic Solar (PV)	13.3	6.7	20
Concentrated Solar Power (CSP)	13.3	9.2	22.5

Source: The law on the law on the use of renewable energy resources for the purpose of producing electricity (29 December 2010) Law No. 6094.

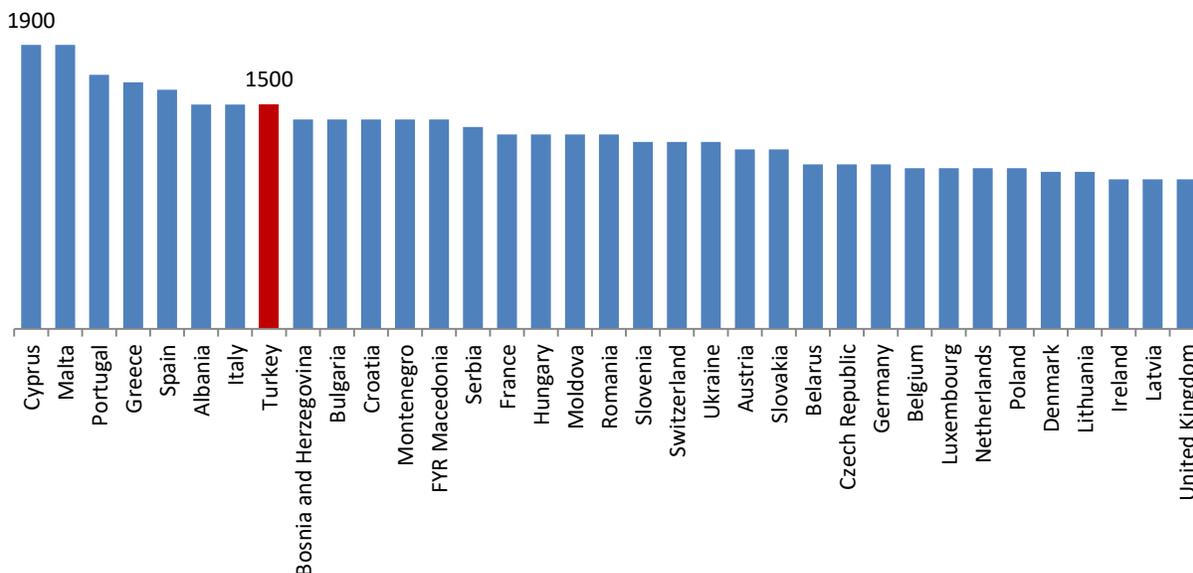
Through the “General Investment Incentive Regime” (Genel Yatırım Teşvik Rejimi) support such as VAT exemption when buying investment equipment (or when importing), exemption from tariffs when importing investment equipment, withholding tax exemption and exemption from other fund and additional fees is provided concerning the renewable energy resources. It must be noted here that these incentives are given without a consideration of the regions’ renewable energy potential but rather administered to the investments made to Zone 6 regions identified solely for the purpose of making use of Government incentives.

Turkey increasing the share of renewable energy in its energy portfolio through incentives is not only important for energy security and reliability but also for international processes it is party to. Turkey with the ‘Intended Nationally Determined Contributions’ (INDC) it presented to the United Nations Climate Change Framework Convention (UNFCCC) secretariat just before the COP21 meeting in Paris, has offered a policy framework to lower its CO2 emission by 21 percent, with respect to its base scenario, until 2030. Among the goals regarding the energy sector which is given a priority in this framework, it is viewed that the goal set for the capacity of energy production through solar energy is set at 10GW while the goal set for wind is at 16GW. In the present case, the existing installed power levels of 4,7 GW in wind and 249 MW in solar proves that, in order to reach the levels required in its INDC, Turkey needs to press on renewable energy investments with a drastically more active policy.

When the existing installed power figures are analyzed in comparison with other countries, it can be seen how much Turkey is utilizing its renewable energy potential. Especially with regards to solar power, the differences between the acquired technical potential and the installed power capacity are conspicuous. Turkey with its average of 1.500 kWh/ m²- per year global radiation

value is able to outstrip most of the European Union member and candidate states in terms of technical potential (Figure 10).

Figure 10: Annual Average of Global Radiation (kwh/m² – year)



Source: Šúri M., Huld T.A., Dunlop E.D. Ossenbrink H.A., 2007.

However, when the same comparison is done with regards to installed solar energy capacity and electricity production figures, it is seen Turkey is left far behind. In tables below, this situation is examined within different country groups.

In Table 2, Turkey’s solar energy potential, electricity production through solar power and existing installed capacity is provided with a comparison to its neighboring EU member states. Turkey, standing as the second country with the highest radiation value in the figure, is only able to reach to 24 percent of Bulgaria despite increasing its installed capacity by 6- fold from 2014 to 2015. Greece takes the lead with regards to installed capacity and electricity production.

Table 2: Solar energy indicators of Turkey and neighboring EU Member States

	Yearly sum of global irradiation [kWh/m ²]	Electricity Generation 2014 [GWh]	Total Installed Capacity 2014 [MWe]	Total Installed Capacity 2015 [MWe]
Greece	1,650	3,792	2,596	2,606
Romania	1,300	1,616	1,293	1,301
Bulgaria	1,400	1,253	1,026	1,032
Turkey	1,500	17	40	249

Source: Šúri M., Huld T.A., Dunlop E.D. Ossenbrink H.A., 2007, IRENA

Another comparison could also be made between EU countries with similar population sizes to that of Turkey. Within this group, Turkey, even though shares the second place with Italy with its high radiation levels, scores among the lowest with regards to installed capacity and production (Table 3). Another point worthy of noting in this table is the performance of installed solar capacity as well as electricity production of a country like Germany which lags behind Turkey in both average global radiation levels and in acreage. Moreover, Germany improved its performance by increasing its installed capacity by 4 percent in 2015. In respect, the energy transformation program Germany follows is worth analyzing.

Table 3: Solar energy indicators of Turkey and EU countries with similar populations

	Yearly sum of global irradiation [kWh/m ²]	Electricity Generation 2014 [GWh]	Total Installed Capacity 2014 [MWe]	Total Installed Capacity 2015 [MWe]	Acreage - land (km ²)
Germany	1,100	36,057	38,236	39,636	348,672
Italy	1,500	22,319	18,615	18,916	294,140
Spain	1,600	13,673	7,087	7,132	498,980
France	1,300	5,909	5,654	6,549	640,427
United Kingdom	1,000	4,050	5,377	8,915	241,930
Turkey	1,500	17	40	249	769,632

Source: Šúri M., Huld T.A., Dunlop E.D. Ossenbrink H.A., 2007, IRENA ve CIA factbook

The last comparison was made between countries in Table 4 which have similar annual global radiation level averages⁹. Even though Turkey's performance is better than some countries like Macedonia, Bosnia and Herzegovina and Albania in electricity production levels, it is known that the mentioned countries' economies are not comparable Turkish economy. Taking 2015 per capita income into account, these countries are only half the size of Turkey. Turkey with the

⁹ Bu karşılaştırma için AB üyesi ve aday ülkeler arasında, yıllık ortalama küresel radyasyon değerleri 1.600-1.400 kWh/m² olan ülkeler ele alınmıştır.

installed power leap it recorded in 2015 outpaced Hungary which has 11.500\$ per capita income and quashed the aforementioned rule.

Table 4: Solar energy indicators of EU countries with similar radiation levels to that of Turkey

	Yearly sum of global irradiation [kWh/m ²]	Electricity Generation 2014 [GWh]	Total Installed Capacity 2014 [MWe]	Total Installed Capacity 2015 [MWe]	GDP per capita (real 2015, \$)
Italy	1,500	22,319	18,615	18,916	32,486
Spain	1,600	13,673	7,087	7,132	25,865
Bulgaria	1,400	1,253	1,026	1,032	6,832
Croatia	1,400	35	33	44	11,573
Turkey	1,500	17	40	249	9,437
FYR Macedonia	1,400	14	15	16	4,787
Bosnia and Herzegovina	1,400	5	4	11	4,088
Albania	1,500	1	1	1	3,995

Source: Šúri M., Huld T.A., Dunlop E.D. Ossenbrink H.A., 2007, IRENA ve IMF WEO.

A very impressive one-fold increase in Turkey’s solar energy installed capacity up to 506 MW in 8 months period (January-August 2016) is still not enough for Turkey to move up the country rankings given above, even if no increase in other countries’ installed capacity is assumed. A more aggressive improvement of installed capacities and their inclusion into electricity production will further improve Turkey’s position.

There is a similar story when wind energy is concerned. As of 2016, it is viewed that the installed wind energy power has reached 5,146 MW.¹⁰ The improvement in installed wind power from the 146 MW levels in 2007 to today can be assessed very positively. However, the fact that the installed power only amounts to 4 percent of Turkey’s technical wind energy potential (İlkılıç, 2011), points out the need for further steps to be taken in this area.

Nevertheless, it is possible for Turkey to utilize its existing renewable energy potential without incurring any additional costs. In the study conducted by WWF-Turkey and Bloomberg New Energy Finance it is viewed that the cost of the ‘Renewable Energy Scenario’ where the share of renewable installed capacity in electricity production will increase from its current level of 7 percent to 25 percent by 2030 is proved to be below the cost of the ‘Existing Policies Scenario’ with fossil fuel continuing its large share of 44 percent and renewable energy reaching a lower level of 13 percent. In other words, it is possible to increase the share of renewable energy resources within the energy portfolio with lower costs. With regards, it shows that costs are not

¹⁰“Türkiye Rüzgar Enerjisi İstatistik Raporu”, TUREB, Temmuz 2016
http://www.tureb.com.tr/files/tureb_sayfa/duyurular/temmuz_2016_istatistik.pdf

an obstacle in front of the possible steps that can be taken by Turkey in order to realize its renewable energy potential.

Finance:

Global Decarbonization and Divestment Trends

Especially in the last few years, most of the discussions concerning the portfolio of energy resources have started to be in the context of climate change and sustainability. With the United Nations Climate Change Framework Convention 21st Conference of Parties (COP 21) held in Paris in 2015, the relatively slowed- down agenda of climate change was heightened, and even before, the acceptance of United Nations process ‘Sustainable Development Goals’ by the leaders of the world, took its place in history as developments setting the post-2015 global development agenda. These developments, by gathering all the stakeholders together, from public to academy, from private sector to non-governmental organizations, under the framework of a common goal have increased the possibility of effectiveness of decisions and practices put forth by different actors.

Among abovementioned actors, the finance sector also holds a very important role. When analyzed from the point of view of climate change, infrastructure projects which include energy investments play a key role in emissions reduction. Due to high need of financing, the trends of financial institutions and organizations are as important as public policies in the process of realizing those investments. While on the one hand, some institutions include social and environmental impacts among their investment evaluation criteria, others who do not can possibly face a public reaction due to globally increased awareness and sensitivity on the matter.

One of the examples that could be given on the increased awareness on social development and environmental sensitivity in the finance sector is ‘Equator Principles’. The fundamental goal of the ‘Equator Principles’, which was prepared based on the performance standards of International Finance Corporation and adopted by 84 finance institutions from 35 different countries, is considering the societal and environmental impacts of projects which will be funded

within the framework of environment, health and security.¹¹ In this respect, projects which do not comply with the Equator Principles do not receive support from Equator Principles Financial Institutions (EPFIs).

Similar approaches are evident in other practices such as Carbon Principles and Climate Principles as well. Created through the partnership of Citi, JP Morgan Chase and Morgan Stanley and the support of many American electric energy producers, Carbon Principles are those that are only valid in United States of America.¹² The ideas at the base of these standards are listed as such; increasing energy productivity, producing energy from renewable resources or with low emission ratios and the support of environmental friendly technologies not independent of their energy sources. Climate Principles, on the other hand, take into consideration the impact of projects on carbon-dioxide emissions and on climate change and play a leading role in the process of fight against global climate change by minimizing the carbon footprints of global scale projects.¹³

The Environmental Performance Reviews, as primarily introduced in 2003 by Organization for Economic Cooperation and Development (OECD), which was revised and published on April 6th, 2016, document the member states' fight against climate change and their policies on green economy and help in the improvement of processes. These reports have started to be adopted both by development banks and export credit agencies.

The developments listed above, with the addition of development that came out as a result of discussions held in COP 21 about climate change; saw its rise towards to the top of the current agenda. In the Paris process, 26 finance and investment organizations (primarily the World Bank) with a total portfolio value of above 11 trillion dollars signed a voluntary agreement stating that they will integrate their evaluations on climate change to all of their decisions they undertake as well as to all the investment decision processes.¹⁴ Consisting of 5 principles, this agreement targets the; development of climate change based strategies, management of climate risk, increasing awareness on climate change, doing environment friendly investments focused on needs and the preparation of transparent reports on the matter. At the base of the support provided for the fight against climate change by the financial sector, lies the willingness of these organizations to increase their performances taking societal and environmental values into

¹¹ <http://www.equator-principles.com/index.php/members-reporting>

¹² http://www.morganstanley.com/pub/content/msdotcom/en/press-releases/leading-wall-street-banks-establish-the-carbon-principles_6017.html

¹³ <https://www.theclimategroup.org/sites/default/files/archive/files/The-Climate-Principles-English.pdf>

¹⁴ Principles to Mainstream Climate Action within Financial Institution
<http://www.worldbank.org/content/dam/Worldbank/document/Climate/5Principles.pdf>

consideration and also the goal of showing the right path to this struggle taking place at a global scale.

In addition to being designed in order to include the social and environmental impacts of investments in the investment decision processes, these principles also pushed for the divergence of investments made by institutions and organizations away from ones based on fossil fuels (Fossil Fuel Divestment). Related, data shows the withdrawal of 3.4 trillion dollars' worth of investments from fossil fuels by institutions and organizations as well as the positive substitution or classification of investments.¹⁵ When the identity of these institutions and organizations are viewed, many world renowned institutions appear to have taken part in this process:

- The Rockefeller Family Fund, worth up to 2 billion dollars, stated their intent to divest from fossil fuel. The worth of their investments in the coal and oil sector are specified to be around 130 million dollars.¹⁶
- The German insurance company Allianz stated they withdrew from coal investments and will invest in wind energy. The criterion for divestment is, companies which provide 30 percent or more of their energy production or sales off of coal.¹⁷
- The invitation of companies in the United States of America's second and world' sixth biggest insurance market, the California insurance market, with a total annual income of 259 billion dollars by the state authorities to withdraw their investments from coal, is considered to be an important development.¹⁸
- While the London School of Economics have withdrawn from their coal investment worth 97.2 million Pounds¹⁹, other world renowned universities such as Georgetown and more have made a statement on pulling their investments on fossil fuels back.²⁰
- One of important media groups, Guardian Media Group has announced that they withdrew their coal investment worth 800 million Pounds.²¹
- Moreover, there are also cities under the spotlight with their investment arrangements. Primarily Oslo, followed by Copenhagen, Melbourne, Stockholm, Berlin, Washington D.C. and more have withdrawn their support from energy production with fossil fuels.

¹⁵ <http://gofossilfree.org/commitments/>

¹⁶ <http://enerjinews.net/2016/05/05/rockefeller-aile-fonu-fosil-yakit-yatirimlarindan-cekiliyor/>

¹⁷ <http://af.reuters.com/article/energyOilNews/idAFL8N1314MJ20151123>

¹⁸ <http://www.reuters.com/article/us-california-insurance-coal-idUSKCN0V32SM>

¹⁹ <http://blog.peopleandplanet.org/blog/2015/11/26/press-release-london-school-of-economics-divest-97-2m-from-coal-tar-sands/>

²⁰ http://www.huffingtonpost.com/2015/06/08/georgetown-divestment-coal_n_7536724.html

²¹ <https://www.theguardian.com/environment/2015/apr/01/guardian-media-group-to-divest-its-800m-fund-from-fossil-fuels>

The Ernst & Young field study on 75 institutional investors examines in detail the reasons behind the international funds' orientation away from fossil fuels towards renewable energy. As a result of the survey conducted among retirement and insurance funds operational in North America and in Europe, the reason of first priority behind this trend of companies came out to be their aim to decrease risk by diversifying their area of investments (62 percent). Second reason pointed out is the compliance of renewable energy investments with the funds ethical values due to the fact that these investments are environmentally and socially responsible projects (41 percent). When the factors that may be effective in directing funds towards the area of renewable energy in the future is asked, the within company experience in this area of renewable energy (35 percent), the need for predictability with regards to financing and support policies of the government as well as the need for transparent investment environment (28 percent) and the environmental sensitivity of fund owners (25 percent), came out as the first, second and third answers, respectively. These answers show that public pressure plays an important role in the investment decisions made between fossil fuels and renewable energy.

These developments affecting the global finance markets could be decisive factors for countries which require international financing for big budgeted infrastructure investments including energy investments, like Turkey; and where fossil fuel investments hold an important part within the total economy, like India. In this context, the financial sustainability of Turkey's coal investments as a part of its aim to turn towards domestic resources will become one of the controversial issues.

Results of the Field Study

A survey was conducted in order to better understand how investors evaluate the investment incentive mechanisms in the field of energy production with regards to the abovementioned framework as well as their risk perception with regards to the sector. Among the firms which participated in the survey, 70 percent were small sized (49 or less employees) enterprises, 30 percent were medium or large sized enterprises. Most of the investors (92 percent) only had existing business activities in Turkey, while the share falls when medium- or- large scaled investors are considered (80 percent). 90 percent of firms constituting the sample for the survey is investing in renewable energy resources.

When the factors are examined influencing the firms' tendencies towards investing in renewable energy, the existence of a more predictable environment with regards to government incentives and policies takes precedence (Table 5). Accordingly, in light of similar findings that were found in face-to-face interviews, the lack there of brings with it an uncertainty in the payback period with regards to investments therefore inhibit firms, especially the small firms, from investing in this field. In the case of overcoming the uncertainty in related policies, the second factor in play which is related to the experience of firms in the field of renewable energy paves the possibility of increased investment and an expectancy of faster growth in the sector by more experienced firms. Medium and large scaled companies, in comparison to small scale firms, attach more importance to within company experience.

Table 5: Returns of renewable energy and expectation for the future (%)

Greater certainty of government support and policy	23.5
Greater in-house expertise in renewable energy investments	22.2
Easier access to finance, funds' tendency towards renewable energy	17.9
Finalization of laws and regulations regarding renewable energy investments	14.2
Partnership opportunities with other investors	11.7
Greater transparency of potential investments	9.3
Requests from international partners/associates	1.2

Source: TEPAV Survey on Energy Investments

While financing alternatives and the tendency of financial resources towards renewable energy come after in importance to policy predictability and the investment experience of firms in this particular field, it is viewed that firms investing in the field of renewable energy did not face any trouble in getting a positive return on their investments. While only the 10 percent of the investing companies state that the return on their investments have been below expectations, more than half of the companies (52.6 percent) stated that the return on their investments were at the expected level (Table 6). Furthermore, the expectations of investors for the next 10 years are optimistic. While 90 percent of the companies expect an increase in returns, 55 percent of them expect these returns to be 10 percent and above. With regards to an increase in returns in the coming periods, it is viewed that while small sized investors are cautious in their expectations, medium-and-big scale investors are more optimistic.

Table 6: Returns of renewable energy and expectation for the future (%)

Met the expectations	52.6	Increase by 10% and above	55.0
Not evaluated yet	21.1	Increase by up to 10%	35.0
Exceeded expectations	15.8	No change	5.0
Fallen short of expectations	10.5	Decrease	5.0

Source: TEPAV Survey on Energy Investments

Investors perceive the receipt-expense balance as the most important risk factor (Table 7). Accordingly, expectations of high returns on renewable energy investments in the coming period point out investments of the kind could stop to be considered in the risky area, once it is realized. Risks regarding the general economic policies such as interest rate risks and currency risks are among the firsts in risk factors. Another result to be highlighted is that environmental/social factors, potential carbon prices and EU directives which could be considered as additional

costs are perceived as having relatively lower risk factors by the investors. Contrary to expectations, at this instance costs related with environmental regulations are not seen as one of the prominent factors effecting the decisions with regards to energy investments.

Table 7: Risk factors affecting investment decisions (%)

Receipt-expense balance	83.6
Interest rate risk	80.3
Exchange rate risk	78.7
Concessionary finance	72.1
Additional subsidies	72.1
Ambiguous and/or frequently revised government policies	72.1
Delays due to lengthy administrative processes regarding the pre-construction period	72.1
Insufficient incentives for the domestic producer/supplier	68.9
Demand increase falling short of expectations	60.7
Feed in tariff level	59.0
Environmental/social costs decreasing positive return on the project	55.7
Potential carbon price	54.1
Directives related with the EU accession process (IED etc)	54.1

Source: TEPAV Survey on Energy Investments

For investors, risks with regards to the financing of investments come after developments concerning the receipt-expense balance and general economic risks. However, expectations of financial difficulties are apparent in investors regarding their short and medium term investments, especially in coal and natural gas sectors (Table 8). At this point, one of the important risks that came to prominence in face-to-face talks is the current low electricity prices despite high operational costs. There are cases where the income of some companies is insufficient in covering their costs, therefore obligate these companies to stop their operation.

The expectations of financial difficulties with regards to renewable energy investments are relatively lower. It is viewed that expectations vary depending on the size of the company. The expectations of small scaled firms are systematically worse than medium-large scaled firms. Keeping this in mind, while the negativity is apparent concerning coal and natural gas investments in most of the firms' independent of their size; expectations of most of the medium- large sized companies are positive with regards to renewable energy investments.

Furthermore, companies point out that in the face of any possible difficulties in financing, their investment decisions will be highly effected (Table 9). At this point, a differentiation in approach between different energy resources is non-existent. Similar to the expectations of financial

difficulties, small scaled investors, independent of the energy source, state that most of their investments would be affected by a possible difficulty in financing. With regards to renewable energy investments, the gap between small and medium/large scaled firms widen, and a higher percentage of small scaled investors point out that any prospective challenge with respect to renewable energy financing would affect their investments.

Table 8: Effect of possible difficulties in financing to investment decision (exists, %)

Coal	75.0
Natural gas	71.4
Renewable resources	58.3

Table 9: Are the incentives sufficient? (%)

Coal	83.9
Natural gas	78.6
Renewable resources	83.6

Source: TEPAV Survey on Energy Investments

Regarding the perception of investors on the subject of incentives, a higher number of investors find the renewable energy incentives sufficient/ partially sufficient (Table 7). Concerning both of the types of resources, the ratio of small sized investors who find the incentives sufficient are lower compared to those who find it among medium-large scaled investors. When the question of whether the incentives meet the needs, the difference in the perception of the investors become in favor of renewable energy incentives (Table 10). However, it is viewed that the small scaled investors find the propriety of incentives for both of the types of resources to be much more positive in comparison to other investors. In response to this, only 44 percent of the investors declared that they find the scheduled purchase guarantees directed towards renewable energy resources sufficient. On the other hand, companies are informed of the incentives (75 percent) by public officials and only a small portion (25 percent) have a hard time in applying for or the use of incentives.

Table 10: Are the incentives sufficient enough? (%)

Fossil fuels	63.5
Renewable resources	77.4

Table 11: Are the incentives oriented towards needs? (%)

Fossil fuels	69.6
Renewable resources	86.9

Source: TEPAV Survey on Energy Investments

While evaluating energy investment in terms current account deficits, the subject matter should not only be viewed from the point of energy resources imports. The most of the machinery and equipment used for energy production in Turkey is being imported as well. In imports European countries (53 percent) and China (35 percent) come in the first couple countries in rankings. Among the European countries, Germany holds a share of 50 percent.

Among the investors who have participated in the survey, only 37 percent stated that they use domestic machinery/equipment. In comparison to small scaled investors, medium and large scaled investors use imported machinery/equipment more. The most important reason stated for this is that they are able to produce at lower costs, even though the domestic product is not high quality (Table 12). Additionally, the effects of incentives as well as the possibility of utilizing additional incentives are among the leading reasons for this behavior.

Table 12: Reasons for procuring machinery- equipment domestically (%)

Because it is cheaper	31.4
Effect of subsidies	29.9
Access to additional subsidies	29.9
Because of its high quality	8.8

Source: TEPAV Survey on Energy Investments

While the domestic production of energy equipment and an increase in the use of domestic machinery/equipment could be a solution to the problem of current account deficit, it could also be adopted as a part of an industrial strategy to increase the added value in production in the manufacturing industry. When evaluated in this respect, it is apparent that the actions taken by investors in the field of developing and utilizing new technologies are not at sufficient levels.

Almost half of the companies (48 percent) stated that they have been undertaking such an activity. Nevertheless, these mentioned actions are more focused on the use of new product/service rather than developing one. The integration of new/improved product or services by investors into their activities is realized mostly through the inclusion of exterior sources like purchase of new machinery or equipment or employment of key technical staff (24 percent and 21 percent respectively) to the production process (Table 13). The development of

machinery/equipment in cooperation with suppliers or its improvement/adaptation within the company are among the least preferred alternatives.

Table 13: Path followed for the use of new products or services (%)

Purchase of new equipment/machinery	24.5
Employment of key technical personnel	21.1
Acquiring of liscence/turn key technology projects from Turkey	14.7
Acquiring of liscence/turn key technology projects from abroad	13.2
Developing with the cooperation of the machinery/equipment supplier	10.3
In-house development and implementation	8.8
Transferring it from the holding company	7.4

Source: TEPAV Survey on Energy Investment

The kind of financial resources firms refer to in order to develop product/ service or to use the already developed product/ service in their production processes, are vital to the sustainability of aforementioned actions. It is seen that an important percentage of firms (43 percent) sustain these actions with their equities (Table 14). At times where equity is not enough bank loans are being used (29 percent). The rate of referral to public funding and EU/ other external sources is lower. Replacing the use of equities and bank loans, which are considerably more costly, with public funding opportunities would pave the way for important returns both to the investors and to the sector as a whole.

Table 14: Financing method of new technologies/ processes (%)

Equity finance	43.1
Bank loan	29.4
Public funds/incentives (TTGV, TGSD, TÜBİTAK, KOSGEB, Development Agencies)	11.8
Other	11.8
EU or other external funds	3.9

Source: TEPAV Survey on Energy Investments

Conclusion

Energy supply and demand, is located at the center of the debate on sustainability with the increasingly important global agenda on the fight against climate change, besides its historical economic and geopolitical importance. Related to this, the national and international official policies on energy focus on the provision of safe, accessible and sustainable energy and try to make decisions at the energy-economy-ecology intersection.

When evaluated from this angle, it is viewed that Turkey is at a very critical point with regards to these three components. In accordance with the existing situation concerning energy, high current account deficit figures contributed to by the import dependent structure of the industry is putting Turkey's economy in a fragile state; dependence on the country of origin with regards to primary resource imports put the topic of energy among the important factors dictating foreign policy. Moreover, in light of the Paris Agreement, policy followed by the Turkish government encouraging a turn towards domestic resources (mainly towards coal) in order to alleviate the import dependence, complicates Turkey's position further. Emitting approximately 1 percent of the global greenhouse gas emissions, Turkey, in accordance with the presentation of its INDC to United Nations prior to the Paris Agreement, stated that, taking the base path into account, it targets to increase in greenhouse gas emissions by 2.5 times in 15 years (between 2015-2030). Considering the 2.25 fold increase in emissions during the 25 year period up until now (between 1990- 2014) where Turkey had an annual growth rate of 4,2 GDP, the target put in place for 2030 could be better understood.

However, rapid developments that took place especially with renewable energy technologies, allowed for the pressure of 'high costs' on decisions regarding the distribution of fossil fuel-renewable energy in the energy basket to be lifted. According to the World Energy Investment Outlook (2016) report of International Energy Agency, the fall in the costs of resource based energy between 2008 and 2015 is recorded to be above 20 percent in wind energy, and above

80 percent in solar energy where this trend is expected to continue in the near future. On the other hand, the 20 percent levels have been recorded in natural gas and oil prices. The current trend in energy prices as well as the worry of the decision makers in the international finance markets to divest in coal, led to an acceleration in renewable energy investments, and allowed for 2015 to be the first year in which the increase in the renewable based energy production capacity has reached a level meeting the energy demand of the same year.²² This and similar developments, although promising, is lagging behind the required efforts in order to satisfy, now the slogan of fight against climate change, “2°C Target”. It is viewed that the INDCs presented to the United Nations prior to the Paris Agreement are only able to limit global warming at a point between 2,4 -2,7°C.²³

Drastic steps need to be taken by all stakeholders in their respected areas, in order to harmonize the abovementioned Intended Nationally Determined Contributions with the 2°C, or even the 1.5°C, as mentioned officially in the text of the Paris Agreement for the first time. This survey conducted with energy producers, emphasizes once again the importance of public policies with regards to renewable energy investments in allowing for predictability to increase in the investment environment. Long-term, stable, foreseeable public policies play a critical role in directing investments towards renewable energy and helping Turkey to tap its high renewable energy potential. This will also be a direct solution to Turkey’s dependence on energy resource imports as well as on resource rich countries.

When taking into account that small scale firms are more densely active in the renewable energy sector, the vitality of the role of public institutions becomes clear once more. Even though the returns of investments in the renewable energy so far have at least met the expectations and expected to rise in the future, in light of a possible financial difficulty, small firms declare that they would be affected greatly. In order for these companies to continue their operations, renewable energy must be given a strong and a constant place among Turkey’s energy policies.

When viewed from a holistic angle, energy policies must be thought of an important part of Turkey’s industrial policy. Turkey’s economy, as an emerging economy, is expected to increasingly invest in high-tech sectors and aiming to capture qualitative growth. The “middle-income trap” Turkey is caught in can only be surmounted through technology breakthroughs that will be realized in industrial production. Moreover, the area of renewable energy could be taken as a suitable sector for such a breakthrough due to its high- technology content and

²² Uluslararası Enerji Ajansı, Dünya Enerji Yatırımları 2016

²³ Effect of current policies and pledges on global temperature, Climate Action Tracker.
<http://climateactiontracker.org/global.html>

utilization of nanotechnology. The further improvement of renewable energy technologies is one of the components which could give a rise to Turkey's industrial transformation. However, in accordance with the field study, the companies' action towards technology improvement is recorded as weak and it is proven that more steps are needed to be taken in this direction. With regards, while these steps would allow for companies to benefit more from public incentives, a more predictable policy environment would also initiate technology improvements through a thriving renewable energy sector in Turkey.

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Appendix: Results of the Field Study

OF THE PARTICIPATING COMPANIES...

DISTRIBUTION OF SIZE (ACCORDING TO THE NUMBER OF EMPLOYEES)

<49 employee	%74	(Small)
=>50 employee	%26	(Medium-Large)

DOES IT HAVE INVESTMENTS OUTSIDE OF TURKEY?

		Medium- Large	Small
Yes	%8	%20	%2
No	%92	%80	%98

DOES IT INVEST IN RENEWABLE ENERGY RESOURCES?

		Medium- Large	Small
Yes	%90	%87	%91
No	%10	%13	%9

FACTORS EFFECTING THE INVESTMENTS ON RENEWABLE ENERGY

		Medium- Large	Small
A more predictable environment with regards to Government incentives and policies	%24	%27	%24
The presence of existing renewable energy investments within the company (experience)	%22	%27	%20
Easier financing possibilities, the tendency of monetary resources towards renewable resources	%18	%24	%15
Completion of drafted legislations on renewable energy investments	%14	%5	%16
Partnership opportunities with other investors	%12	%5	%14
A more transparent environment for potential investments	%9	%5	%11
Request of the International partner/ partnership	%1	%5	-

RETURN OF RENEWABLE ENERGY INVESTMENTS UP UNTIL NOW

		Medium- Large	Small
Exceeded expectations	%16	-	%21
Met expectations	%53	%62	%48
Fallen short of expectations	%11	%8	%12
Not evaluated yet	%21	%31	%19

PREDICTIONS ON RETURN FOR INVESTMENT ON RENEWABLE ENERGY INVESTMENTS IN THE NEXT 10 YEARS

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		Medium- Large	Small
Increase by 10% and above	%55	%73	%47
Increase up to 10%	%37	%20	%44
No foreseen increase	%5	-	%7
Decrease up to 10%	%2	-	%2
Decrease by 10% and below	%2	%7	-

EXPECTATION OF FINANCIAL DIFFICULTY IN SHORT- MEDIUM TERM (YES, %)

		Medium- Large	Small
Coal	%75	%77	%75
Natural gas	%71	%62	%76
Renewable resources	%58	%47	%65

WOULD FINANCIAL DIFFICULTIES AFFECT INVESTMENT DECISIONS? (YES, %)

		Medium- Large	Small
Coal	%84	%84	%84
Natural gas	%79	%69	%81
Renewable resources	%84	%73	%91

RISK FACTORS INFLUENCING INVESTMENT DECISIONS (HIGHLY EFFECTIVE, %)

		Medium- Large	Small
Receipt-expanse balance	%85	%87	%84
Interest risk	%80	%73	%83
Exchange rate risk	%80	%80	%80
Concessional financing resources	%78	%80	%78
Additional incentives	%76	%80	%76
Unclear and/ or frequently amended regulations	%72	%87	%70
Long term delay due to management in pre-construction process	%72	%60	%79
Lack of adequate local producer/ supplier incentive	%69	%67	%72
The low level of realization of expected/ projected increase in demand	%63	%67	%61
Wholesale purchasing price level	%59	%47	%65
Environmental/Social factors decreasing the positive value of the Project	%56	%80	%50
Potential carbon price	%54	%40	%62
Directives regarding the accession process to the EU (IED etc.)	%54	%47	%59

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THE CASE OF BENEFITING FROM ANY SUBSIDIES IN THE LAST 5 YEARS

		Medium- Large	Small
Yes	%59	%60	%56
No	%41	%40	%44

WOULD OR WOULD NOT INVEST DESPITE THE ABSENCE OF SUBSIDIES (WOULD INVEST, %)

		Medium- Large	Small
Fossil Fuel	%52	%60	%46
Renewable Resources	%53	%50	%56

ARE THE SUBSIDIES SUFFICIENT? (YES, %)

		Medium- Large	Small
Fossil Fuel	%62	%69	%61
Renewable Resources	%75	%80	%72

IS THE SCHEDULED PURCHASE GUARANTEE INTENDED FOR RENEWABLE ENERGY SUFFICIENT ENOUGH?

		Medium- Large	Small
Yes	%44	%53	%37
No	%56	%47	%63

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ARE THE SUBSIDIES DIRECTED TOWARD NEEDS? (YES, %)

		Medium- Large	Small
Fossil Fuel	%70	%54	%76
Renewable Resources	%87	%60	%95

DID YOU HAVE TROUBLE IN APPLYING FOR/ UTILIZING THE SUBSIDY?

		Medium- Large	Small
Yes	%25	%22	%26
No	%75	%79	%74

WHERE DO YOU PURCHASE YOUR MACHINE/ EQUIPMENT FROM?

		Middle- Large	Small
Domestic market	%36	%29	%40
Abroad	%64	%71	%60

THE REASONS FOR PROCURING MACHINE/ EQUIPMENT DOMESTICALLY

		Medium- Large	Small
It is cheaper	%34	%32	%35
Impact of subsidies/ incentives	%29	%27	%30
The possibility of utilization of additional subsidies/ incentives	%29	%29	%29
Have better quality	%8	%11	%7

ARE THERE ANY ACTIVITIES TOWARDS THE DEVELOPMENT/ UTILIZATION OF NEW TECHNOLOGIES? (YES, %)

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		Medium- Large	Small
Yes	%48	%85	%32
No	%52	%15	%68

ALTERNATIVE METHODS FOR THE USE OF NEW PRODUCT/ SERVICE?

		Middle- Large	Small
By purchasing new machinery/ equipment	%24	%21	%25
Employment of technical staff	%22	%14	%28
By obtaining licenses domestically or by purchasing turnkey technology project services	%15	%14	%19
By obtaining licenses abroad or by purchasing turnkey technology project services	%13	%15	%9
By developing in cooperation with equipment/ machinery supplier	%10	%14	%9
By adopting or developing in-firm	%9	%14	%6
By transferring from the parent company	%7	%10	%3

HOW THE NEW PRODUCTS/ SERVICES ARE FINANCED?

		Medium- Large	Small
Equity finance	%43	%44	%38
Bank loans	%29	%32	%28
Public finance/ incentives (TTGV, TGSD, TÜBİTAK, KOSGEB, Development Agency)	%12	%16	%8
Other	%12	%4	%20
EU or other external sources	%4	%4	%4

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