**Energy pricing and
non-market flows in Turkey's
energy sector**

About SHURA Energy Transition Center

SHURA Energy Transition Center, founded by the European Climate Foundation (ECF), Agora Energiewende and Istanbul Policy Center (IPC) at Sabancı University, contributes to decarbonisation of the energy sector via an innovative energy transition platform. It caters to the need for a sustainable and broadly recognized platform for discussions on technological, economic, and policy aspects of Turkey's energy sector. SHURA supports the debate on the transition to a low-carbon energy system through energy efficiency and renewable energy by using fact-based analysis and the best available data. Taking into account all relevant perspectives by a multitude of stakeholders, it contributes to an enhanced understanding of the economic potential, technical feasibility, and the relevant policy tools for this transition.

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Design
Tasarımhane Tanıtım Ltd. Şti.
Print
Nar Baskı Merkezi

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LIST OF ABBREVIATIONS

BCM	Billion Cubic Meters
BIST	Istanbul Stock Exchange
BO	Build-Operate
BOT	Build-Operate-Transfer
BOTAŞ	Boru Hatları ile Petrol Taşıma Anonim Şirketi
CPI	Consumer Price Index
DAM	Day Ahead Market
EMRA	Energy Market Regulatory Authority

EPDK	Enerji Piyasası Düzenleme Kurulu (Energy Market Regulatory Authority)
EPİAŞ	Energy Exchange Istanbul (EXIST)
EÜAŞ	Electricity Generation Corporation
FFs	Fossil Fuels
FiT	Feed-in Tariff
FOB	Free On Board
G20	Group of Twenty
G7	Group of Seven
GW	Gigawatts
GWh	Gigawatt-hour
HV	High Voltage
ICT	Information and Communication Technologies
IMF	International Monetary Fund
IPP	Independent Private Producers
kWh	Kilowatt-hour
LNG	Liquefied Natural Gas
LPG	Liquefied Petroleum Gas
LRT	Last Resort Tariff
LV	Low Voltage
MENR	Ministry of Energy and Natural Resources
MTA	General Directorate of Mineral Research and Exploration
Mtoe	Million Tonnes of Oil Equivalent
MV	Medium Voltage
MW	Megawatt
NEEAP	National Energy Efficiency Action Plan
O&M	Operational and Maintenance
OECD	Organisation for Economic Co-operation and Development
OTC	Over the Counter
ÖTV	Special Consumption Tax
PV	Photovoltaic
R&D	Research and Development
SAIDI	System Average Interruption Duration Index
SAIFI	System Average Interruption Frequency Index
TEİAŞ	Turkish Electricity Transmission Corporation
TETAŞ	Türkiye Elektrik Ticaret ve Taahhüt A.Ş.
TKİ	Turkish Coal Enterprises
TL	Turkish Lira
TOR	Transfer of Operating Rights
TPAO	Turkish Petroleum Corporation
TPIC	Turkish Petroleum International Company
TRT	Turkish Radio and Television
TTK	Turkish Hard Coal Institution
TÜİK	Turkish Statistical Institute
TWh	Terawatt-hour
US$	United States Dollar
VAT	Value Added Tax
VİOP	Futures and Options Market
YEKDEM	Renewable Energy Sources Support Mechanism

Executive Summary

Energy pricing choice of countries is among the factors that affect the success of strategies and policies for accelerating the energy transition. In the design of more effective energy transition policies to accelerate the uptake of renewable energy and energy efficiency technologies, it is essential to understand the extent of existing energy subsidy and support schemes.

To date, no study that consolidates the scattered data and information about energy pricing in Turkey has been made. Based on publicly available information, **SHURA Energy Transition Center has prepared this study** in order to make a first attempt in closing this knowledge gap. **The analysis provides a first-order estimate of the magnitude of non-market flows** resulting from subsidies, support, incentives, tax exemptions, special energy taxes and other major support mechanisms in Turkey's energy markets.

In the period between 2015 and 2017, annual average non-market flows were estimated at US$8 billion.[1] This figure accounts for the flows between the government, fossil fuel suppliers, electricity generators and end-users, and includes both fossil fuels and renewable energy resources. For the year 2017, **non-market flows represented 1 per cent of Turkey's gross domestic product (GDP).** While a comparable figure for the global energy sector does not exist, according to the estimates of the International Energy Agency and the International Monetary Fund, global fossil fuel subsidies ranged between US$300 billion and US$5,300 billion over the same period, equivalent to 0.4-7 per cent of the global GDP. This wide range depends on how subsidies are defined.

Incentive and support mechanisms continue to have a significant role in the power sector despite the ongoing liberalisation process since 2001 that succeeded to attract huge private capital inflow in both generation and distribution sectors. There are various forms of incentives and support schemes in Turkey's electricity market, including tax incentives, priority in access to land and grid connection. The most important components of non-market flows are related to pricing mechanisms in the value chain of the industry from generation to supply.

Fossil fuels received US$1.6 billion of support annually, of which US$0.6 billion goes to thermal power generators mainly for electricity generation from domestic coal and in the form capacity payment. **On the other hand, an estimated US$3.2 billion, was paid for low carbon energy transition,** of which US$2.4 billion was for electricity generated from renewable energy under the feed-in tariff.

On the other hand, end-users received US$2.2 billion support, of which US$2 billion was from state-owned fossil fuel providers. This was mainly in the form of subsidised natural gas at US$1.7 billion. The remaining US$0.3 billion was related to coal support granted to low-income households.

[1] Non-market flows, as used in this report, refers to financial resources and benefits provided through mechanisms other than market exchange, such as direct government transfer or investment, subsidies, support, incentives, exemptions and special taxes. The figures include schemes started in 2018, such as capacity payments, so is in fact a hybrid estimate in 2018 values. The value of non-market flows calculated in this report is a low-end figure representing the most tangible support provided to energy suppliers. There is a whole area of support afforded by concessions and priority access to scarce resources like land, grid connection, dispatch, and guaranteed markets whose value calculation was excluded from this report due to limitations in data availability. Inclusion of such factors is expected to likely increase the value of non-market flows and perhaps its distribution as well. Therefore, conclusions and recommendations provided in this report are of a preliminary nature. Nevertheless, current findings still point to some conclusions unlikely to be affected by a more comprehensive numeration of the benefits provided by non-market flows.

Half of all non-market flows, with an estimated volume of just below US$4 billion, were covered by end-users. Non-market flows from end-users included **special taxes on consumption of electricity and gas,** which were estimated at US$0.9 billion, **constituting around 12 per cent of all non-market flows. Financing from the public sector provided US$4.1 billion,** of which a little over half was from state enterprises either through subsidised natural gas sales or coal aid to low income households, and the rest direct government support mostly as investments. **The government has provided support of around US$1.1 billion to fossil fuel suppliers and thermal generators in various forms such as investments and tax exemption.** In contrast, the government provided investment of US$0.6 billion to energy transition, almost entirely for hydropower plants.

Considering the notable volume of non-market flows and the fact that the country's energy demand will grow, the government of Turkey may need to reconsider its energy pricing strategy in each one of these areas. Support to energy transition was important in times when costs of renewable energy were still high and when it was necessary to create a market. Turkey's renewable energy sector has been growing rapidly in recent years with the share of wind and solar energy currently representing around 9 per cent of the total electricity demand. In increasing this share, the government of Turkey has been prioritising the use of auctions since 2017 to create a renewable energy market as this has proved to be a cost-effective market-based mechanism. An enhanced renewable energy auction design complemented with other market-based mechanisms can replace the feed-in tariff once the scheme expires after 2020 and such mechanisms may help to reduce the economic burden on end-users. **More support can be shifted from conventional energy carriers to emerging areas where Turkey has rich local resources and potential such as renewables and energy efficiency. With higher shares of renewable energy in Turkey's energy system, support will also be needed for implementing flexibility strategies that would enable grid integration, and for the necessary transmission and distribution infrastructure. Additional support for Turkey's research and development capacity in new low-carbon technologies would also contribute to advancing the energy transition that is already underway.**

Finally, this report focuses, as much as possible, on measuring the magnitude of non-market flows in Turkey's energy sector, which has been liberalising its natural gas and electricity markets since 2001. Governments often need to employ non-market mechanisms, sometimes in the form of subsidies, for social welfare. In the specific case of Turkey, issues of energy poverty for heating and electricity use remain largely unexplored. It is important to consider public priorities for increasing citizens' welfare together with new strategies for energy pricing to promote the low carbon energy transition. In this paper, we were only able to provide qualitative evidence on the existence of cross-subsidies in retail electricity and heating markets. However, the magnitude, direction of flows, and the impact of these cross-subsidies on devising targeted and effective public mechanisms to ensure affordable energy access need to be understood better and therefore we suggest this as a high priority topic for future research.

1. Introduction

Objectives and scope

Each country devises its own strategy on how its energy prices are determined based on its national circumstances. Even though liberalisation of energy markets has been a global trend since the 1990s, deviations from full liberalisation and the existence of certain subsidies, incentives and support mechanisms in addition to regulation of areas of natural monopoly are rather common. The necessity to balance the security of supply, affordable access and environmental concerns as well as differences in natural and climatic conditions, socioeconomic circumstances and energy resources are factors that influence pricing policies. Subsidy and support mechanisms are among the strategies used by countries to protect vulnerable sections of their population, support investors and minimise budget and balance of payment pressures in line with overall energy policy priorities.

Non-market strategies can take various forms such as direct transfers, cost subsidies, tax exemptions and sales price and investment support as well as concessions and priority of access to scarce resources such as land or grid connection. Tax policies, such as taxes levied on energy consumption or exemptions, is another commonly used non-market mechanism.

Energy sector subsidies are also the subject of international political debates and agendas. In September 2009, the Group of Twenty (G20) leaders agreed to "rationalise and phase out over the medium-term inefficient fossil fuel subsidies that encourage wasteful consumption." In the post-Rio + 20 context, phase out of fossil fuel subsidies is high on the agenda. At the Group of Seven (G7) Ise-Shima Summit in May 2016, G7 leaders also committed to the phase out of inefficient subsidies for fossil fuels. Developing mechanisms to minimise and/or phase out subsidies requires an understanding of these issues.

As a member of the G20, whose economy and energy consumption are among the fastest growing, thorough analysis of Turkey's energy pricing strategies is of substantial interest. This is important also because Turkey's energy import expenditures have risen to at least 5% of the country's total gross domestic product (GDP) in 2017 and energy imports represent about three-quarters of the current account deficit. Energy pricing strategies impinge upon the success of strategies and policies adopted for accelerating the transition to a low-carbon economy through energy efficiency and renewable energy. In its energy strategy, Turkey gives precedence to local renewable energy resources as well as increasing energy efficiency. In addition to long-standing policies, a comprehensive National Energy Efficiency Action Plan (NEEAP), comprising 55 actions across 6 energy sectors, was released at the beginning of 2018. NEEAP is to be implemented by 2023 with the aim to save 14% on primary energy consumption.

This paper analyses Turkey's energy pricing strategies from the standpoint of subsidies, support and incentives to which energy producers and consumers are subject. Specifically, mechanisms related to electricity generation and consumption as well as the consumption of primary energy resources for heating purposes in buildings and the manufacturing industry are emphasized. Energy use in the transport and agriculture sectors, hence the consumption of refined petroleum products like gasoline and diesel, are mentioned, but not extensively analysed. This is mainly

because of the fact that Turkey has been pursuing a long-standing policy of imposing high taxes on their consumption. Extensive analysis of subsidies in areas where regulated natural monopoly prevails such as the distribution and transmission of electricity and natural gas are also outside the scope of this paper[2].

While information about the magnitude of subsidies in Turkey is available, it is scattered, and no study has so far consolidated it in a single study. This brief study seeks to provide a starting point and a first-order estimate to contribute to the debate on support mechanisms, especially as they relate to issues of the low-carbon energy transition.

The paper aims to provide a general consolidated view on the magnitude of non-market flows, resulting from subsidies, support, incentives, tax exemptions, special energy taxes and other major support mechanisms in Turkey. The estimates made in this study are based on publicly available data, statistics, information and expert opinion. For this purpose, government policy documents, budgets, financial statements of state enterprises and publicly available industry resources were reviewed. Where possible, data sets were analysed for the ten-year period between 2008 and 2017 in order to cover long-term trends and the three-year period between 2015 and 2017 in order to address the developments in recent years. 2018 estimates were based on data for the first half or last quarter of the year depending on data availability at the time anaysis for the paper was completed. The paper does not show data made available after the analysis was completed; however, the likely effect of the omission is deemed insignificant to the magnitudes and conclusions in this report. An effort has been made to quantify most of the major subsidies and other non-market mechanisms within the scope of the study. Nevertheless, some important support mechanisms whose value is not regularly priced such as concessions, priority in access to scarce resources and market guarantees are not quantified.

The rest of this paper is divided into four sections. The next section presents the concept of subsidy and defines it in the context of Turkey's energy markets. In Section 3, the energy market structure is explained. In the subsequent section, major subsidies and support provided by sector are quantified. Section 5 sets forth main conclusions and suggestions.

A snapshot of Turkey's energy sector

End of 2017, fossil fuels accounted for 88% of Turkey's total primary energy supply; however, the share of renewables is on the rise as renewables lead new capacity additions in the power sector.

Turkey's total primary energy supply has reached 145 million tonnes of oil equivalent (Mtoe) at the end of 2017. Globally, nearly 14,000 Mtoe primary energy was supplied, around 11,000 Mtoe of which was supplied in the G20 (IEA, 2018a). Even though Turkey's share of total global primary energy supply is just above 1%, Turkey is one of the fastest growing energy users in the world.

Fossil fuels accounted for 88% of Turkey's total primary energy supply, with similar shares contributed by gas, oil and coal. In turn, renewable energy sources -predominantly hydro resources used for electricity generation- comprised the remaining 12% of the total primary energy supply. Total final energy consumption has reached 112 Mtoe per year by the end of 2017 (Enerji İşleri Genel Müdürlüğü, 2018).[3]

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[2] Transmission and distribution are generally defined as "natural monopolies" which are regulated by public authorities or independent regulators because they are network-based. Regulation in these areas is preferred to competition which would require establishment of multiple networks which is costly and inefficient.
[3] The difference between primary energy supply and total final energy consumption stems from energy conversion, transmission and distribution losses.

Total installed electricity generation capacity has reached 88 gigawatts (GW) by the end of September 2018. Renewables comprise just less than half of the total installed capacity, whereas fossil fuels make up the rest since no nuclear power plant is currently in operation in Turkey. In terms of generation, gas accounted for 37% of the total generation, which was 296 TWh per year in 2017. Another 33% came from coal. The share of renewables was 30%, two-thirds of which came from hydropower and the remaining one-third from a mix of geothermal, wind, biomass and solar power generation (see Figure 1). Renewable energy capacity increase has seen record high in 2017, representing two-thirds of the net capacity additions. Until the end of the third quarter of 2018, nearly 90% of the net capacity additions came from renewable energy sources.

Figure 1: Breakdown of Turkey's total installed electricity capacity (left) September 2018 and generation (right) mix, 2017

Source: MENR

The rapid increase in renewable energy capacity has been boosted by the feed-in tariff (*yenilenebilir enerji kaynakları destekleme mekanizması, YEKDEM*) mechanism that has been in place in its current form since 2011. YEKDEM will expire by end of 2020 and investors are eager to complete their investments to make use of the support scheme before its expiry. Turkey's renewable energy regulatory framework also includes a specific form of auction scheme, the primary objectives of which are to create a local renewable energy industry and to ensure technology transfer. The first round of auctions at GW scale took place in 2017 and catered for both wind and solar energy (1 GW each). The per kilowatt-hour (kWh) winning prices were among the lowest in the world, at US$3.48 for wind and at US$6.99 for solar photovoltaic (PV). Following the success of the 2017 YEKA auctions, the government announced three new YEKA auctions in 2018. This second round involves two auctions, one for onshore wind and one for solar PV—each with a total capacity of 1 GW. A third auction for offshore wind with a total capacity of 1.2 GW is also planned. The offshore wind auction was postponed and the second round solar PV auction was cancelled end of 2018 and beginning of 2019, respectively (Sari et al., 2019).

Government policy has been supporting exploration and use of domestic resources such as renewable energy and energy efficiency. The feed-in tariff was a major boost to renewable energy capacity additions.

The government is providing support in various forms to fossil fuels as well. To utilise Turkey's vast resources of lignite, a purchase guarantee for electricity generated from local coal is provided. At the beginning of 2018, a capacity market mechanism has been introduced to help ensure the security and reliability of electricity markets which

would eventually keep coal- and gas-based capacity running even with higher shares of renewables in the system. The rationale behind these mechanisms is to increase the share of domestic resources in the country's energy mix to cut energy imports which account for around three-quarters of the total energy supply.

In addition to the support provided for electricity generation from renewable and domestic resources, support is also available for the development of fossil fuels. Exploration, development and production of local fossil fuel resources are supported by the government through direct investments by state enterprises. Investments in infrastructure for natural gas transmission and storage are also funded by state enterprises. Another means of government support is the funding of operational losses incurred by state enterprises.

Support to consumers comes mainly in the form of subsidised natural gas prices and coal aid to low income households. In addition, sales prices are lowest for natural gas followed by lignite, intensifying use of fossil fuels for heating. New market-based mechanisms are needed to support energy efficiency and electrification based on renewables.

Support to end-users for energy consumption is provided through subsidised natural gas prices and coal aid granted to low income households, both of which are provided by state enterprises. The only type of direct government transfer to end-users is the Tourism Energy Support, a scheme that finances 20% of the cost of electricity and natural gas consumption of eligible tourism facilities for five years. There is no other direct support mechanism offered to energy consumers, and all feed-in tariffs or capacity payments provided to electricity generators are financed by end-user tariffs. There are also special taxes that apply to energy consumption. Special consumption tax imposed on oil products constitutes a substantial portion of their final sales price. A relatively lower amount of special consumption tax (currently at about 2%) exists for natural gas. Special taxes and VAT on electricity consumption constitute about 17%- 20% of the final price paid by end-users. There is, however, no tax other than VAT on coal, either local or imported, used for space heating or industrial processes. A price floor of 70 United States Dollars per metric tonne (US$/tonne) is imposed over the free on board (fob) price of imported coal used for generating electricity. The difference between the established floor and the import price, if it is lower, is collected as an import duty. Even though incentives are provided for investing in renewable energy, neither consumer-side incentives to promote renewable energy consumption, nor carbon taxes to discourage the use of carbon-intensive energy sources are implemented.

End-users, including commercial and industrial consumers, make their energy purchasing decisions on the basis of the cost and quality of resources. As shown in Figure 2, based on a comparison by energy content (calories), natural gas is by far the cheapest energy source for heating in households, whereas liquefied petroleum gas (LPG) stands as the most expensive. Aside from its low base price per calorie, natural gas benefits from both low special consumption tax and subsidised end-user prices. As the tariff for natural gas has been increasing to reduce losses due to below cost pricing, the price per calorie has been approaching the price of domestic lignite. In the absence of additional price signals, consumers may seek ways of switching to domestic coal for heating, which has high emission of carbon and other pollutants. On the other hand, electricity remains among the most expensive alternatives for heating because of the relatively low conversion ratio of fuels into electricity compared to their rate of conversion to heat. Nevertheless, this picture may change if incentives for consumption of electricity from renewables are provided and more efficient energy consumption is achieved .

Figure 2: *Energy prices paid by buildings in Turkey, 9 January 2018*

Energy Price (US$ cents/kWh)
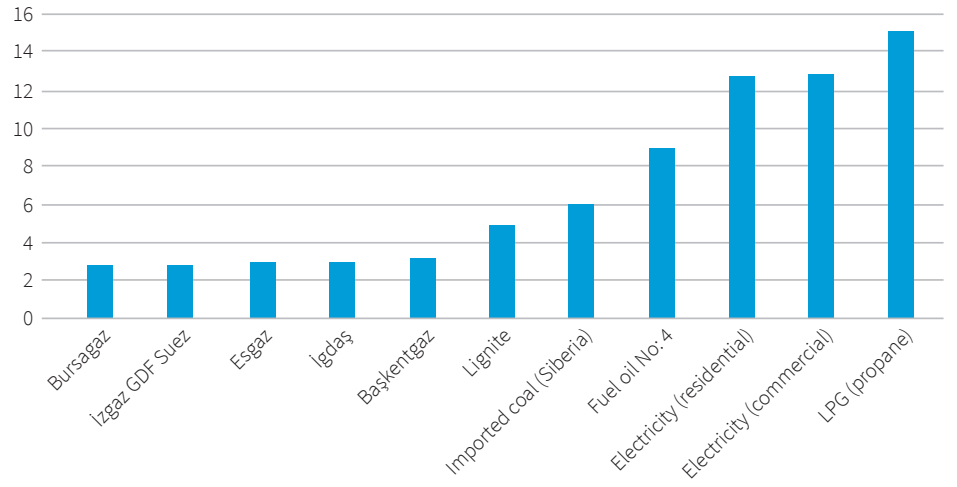
Source: DOSİDER, 2018
Note: The exchange rate of US$ was 3.75 TL on 9 January 2018.

2. The concept and definition of subsidies

There is no consensus about the definition of energy subsidy. As a result, the energy sector and international organisations use miscellaneous definitions, covering the concept in varying scope. The World Trade Organisation (WTO) definition can be regarded as one of the broadest, defining subsidy as "any government programme that confers a benefit on its recipients." More specifically for the energy sector, two common approaches define subsidies from the perspective of market intervention or from the perspective of environmental impact focusing on fossil fuel subsidies (Rentschler and Bazilian, 2016). A definition offered by Kojima and Koplow for fossil fuel subsidies is any policy action targeting fossil fuels or fossil fuel based electricity or heat that causes one or more of the following effects: a reduction of net energy costs, a reduction of energy production or distribution costs, or an increase in the revenues of suppliers (Kojima and Koplow, 2015; Rentschler and Bazilian, 2016).

Along with the definitions, the scope, measurement and quantification of subsidies across different studies exhibit a great deal of variation. Most studies focus on consumer subsidies; in other words, below market price or below-cost supply of energy to consumers, which is easier to measure than producer subsidies that span a range of measures from investment incentives to preferential prices or market access. Differences in data availability, scope and magnitude make international comparisons a difficult task. Estimates on the global magnitude of energy subsidies suggested in different studies range from US$300 million to more than US$5 trillion (Rentschler and Bazilian, 2016). The majority of these studies concentrate on the magnitudes based on market price differences rather than externalities. A notable exception is a study by the IMF where environmental impacts including the social cost for carbon, air pollution and congestion are quantified (Coady et al., 2015). The IMF study estimates the global cost of fossil fuel subsidies at US$ 5.3 trillion, 75% of which is comprised of environmental costs.

An international comparison of fossil fuel consumption subsidies may be accessed at the International Energy Agency (IEA) website along with supporting documents. Aiming to demonstrate the impact of fossil fuel subsidy removal on energy markets, climate change and government budgets, IEA has been measuring fossil fuel consumption subsidies for the past decade. Using the price-gap approach, IEA estimates subsidies granted to fossil fuels that are consumed directly by end-users or consumed as inputs in electricity generation. It compares average end-user prices paid by consumers with reference prices that correspond to the full cost of supply (IEA, 2018). The figures supplied in the IEA website show countries which have significant fossil fuel consumption as a share of GDP. Turkey is not included in the country scope of IEA's subsidy database.

It is evident from the IEA data on subsidies that an approach or definition of the concept simply based on subsidies granted to fossil fuel consumers would not be relevant for Turkey. Therefore, this paper attempts to develop an approach specifically relevant to Turkey. Despite pursuing a general trend towards privatisation and liberalisation, Turkey has been using a variety of non-market mechanisms to support energy producers and sources. A significant portion of these mechanisms involve incentive schemes financed through end-user tariffs rather than direct government purchases.

This paper focuses on three concepts: subsidy, support and incentive as defined below. In this paper, as frequently encountered in the energy sector, these closely related concepts will be included in the analysis and differentiated as needed. The paper will quantify the support mechanisms as much as possible and provide the direction of flows in terms of providers and recipients. The unifying factor will be the existence of "non-market flows", whether through subsidised prices, direct transfer of funds, withholding of taxes or imposition of taxes specific to energy. Direct government investments in energy are also included in non-market flows since their main purpose is to support public aims and policies rather than profit making. The emerging picture is intended to provide a general quantification and the direction of flows that result from deliberate interventions.

Subsidy: Above market price purchase, or below market price or below-cost supply of products or services.

- Price Subsidy: The purchase price paid above market price; amount subsidised is the difference between the purchase price and the market price
- Cost Subsidy: A cost item provided below market price and/or at a loss. Amount subsidised is the difference between the market price and the price at which the item is provided. Or, amount subsidised is the difference between the cost of supply and the price at which the item is provided.

Cross Subsidy: Preferential or below-cost tariff rate applied to selected customer groups subsidised by higher tariffs applied to other customer groups. Total subsidy should be zero if the tariff is fully cross-subsidised.

Support: Preferential treatment in terms of market access, which is not always reflected directly in costs or prices. The main difference between support and subsidy is that, in the former, the transfer or the measure does not involve intervention in prices. Nevertheless, support also involves the use of a non-market mechanism for the provision of funds. Some examples of support schemes are given below.

- Purchase guarantee: Purchase guarantees generally provide support by giving guaranteed access to the market.
- Allocation of government assets: Allocation or preferential access to government land or related assets.
- Prioritisation in access to networks and private assets: Network access when it is not auctioned and access to private assets facilitated by expropriation laws.
- Local content requirement: Preferential treatment for locally produced equipment or fuels provides preferential market access.
- Import taxes and price floors: Import taxes and price floors often support local producers of fossil fuels or energy equipment.
- Investment support: Tax exemptions, social security grants and other advantages provided to investors.

Incentive: Any or a number of the mechanisms mentioned above, or additional mechanisms such as profit sharing, employed to induce a certain behaviour or to achieve a certain target.

The major types of subsidies and support schemes utilized in the Turkish energy sector and analysed in this paper are listed below:

- Subsidies/support for fuel providers
    o Government spending on exploration, production, and research and development (R&D)
    o Government subsidisation of operational loss of related state energy enterprises
    o Import price floor for coal

- Subsidies/support for electricity producers
    o Direct government investment in generation capacity
    o Fuel price (natural gas) subsidies
    o Sales price subsidies/feed-in tariffs/capacity mechanisms

- Subsidies/support for end-users and special taxes on energy use
    o Fuel price (natural gas) subsidies
    o Coal aid to low income households
    o Tourism industry energy support
    o Cross subsidies in the national electricity tariff
    o Special taxes on energy use

- Investment incentives (tax exemptions and other incentives)

3. Market Structure

3.1. Electricity

Electrical energy is vital for the sustainable economic and social development of Turkey. The country-specific dynamics in economic growth, urbanisation and demographical characteristics of the population make electricity a more important energy carrier than before. Currently, electricity meets one-fifth of Turkey's total final energy demand. This is much less than the share in more developed countries of the Organisation for Economic Co-operation and Development (OECD). As Turkey's population and economy grows, making Turkey's electricity market larger, the share of electricity is expected to increase. Currently, Turkey is the sixth largest market in terms of electricity consumption in Europe and is expected to be in the top four in the near future (TÜSİAD, 2018).

The liberalisation process in the Turkish electricity market started with the "Electricity Market Law" in 2001 (EPDK, 2018a). The structural change that affected all aspects of the value chain has been implemented to create a more competitive, environmentally sensitive and consumer-focused market. The process of liberalisation is still ongoing. The establishment of an independent energy regulatory body, licensing of all players in the market, issuance of regulations related to market operations such as licencing, setting of regulated tariffs, network operations and consumer rights, privatisation of electricity generation and distribution assets, balancing and settlement operation, establishment and operation of the energy market exchange, making consumers eligible to select their suppliers are some examples of this major restructuring and transformation. This structural change has resulted in a huge private capital influx into the market for investments enabled by privatisations in both generation and distribution sectors. The estimated investment amount in the last 15 years is about US$95 billion in which generation and distribution constitute about US$67 billion and US$28 billion, respectively.

The following tables provide an overview of the electricity market structure in Turkey.

Table 1: *Market Overview*

Generation	Wholesale	Transmission	Distribution	Supply
The players are the Public Company (EÜAS), Private Genco's under the BO/BOT/TOR model, independent Private Producers (IPP's) and unlicensed power generation assets. The total number of generation licenses is 848.	Wholesale is a part of generation and/ or supply licenses. The spot market is managed by EPİAS, an autonomous central authority. Real-time balancing market and Ancillary Services are managed by the state-owned transmission company TEIAS. Settlement of all market operations is under the operational and managerial responsibility of EPIAS.	The transmission sector is under monopoly control and all relevant activities are carried out by the state-owned company TEİAŞ.	Turkey has 21 regional distribution companies owned by private investors. These companies were privatised between 2007 and 2013.	Each Genco acts also as supply companies for eligible consumers[4]. In addition, there are 175 companies that only have a supply license. The 21 regional incumbent retail companies are the sister companies of regional distribution companies (as a result of the unbundling of distribution and supply businesses, an act carried into effect at the beginning of 2013 according to the related regulation)
Private companies provide a large part of generation services and there are many incentives in place such as support granted to the use of renewable sources and local coal in generation as a result of certain public strategies and policies.	Physical trading is in operation with all of its elements. A bilateral (OTC) market is available. Day-Ahead Market (DAM) and Intraday Market are in operation in the spot market. The Financial Market, which enables the use of derivatives, is operated by VIOP in Istanbul Stock Exchange (BIST).	The industry is highly regulated. The revenue structure / components / mechanisms and amount are subject to approval by the regulator.	The industry is highly regulated. The revenue structure / components / mechanisms and amount are subject to approval and monitoring by the regulator.	The incumbent retailers are obliged to supply all non-eligible consumers as the only single source as well as the eligible consumers by last resort tariff (LRT) unless eligible consumers switch to the free tariff scheme of any supplier including incumbents. The regulated retail tariff and LRT are set by the regulator.

Genco: Generation Company. Build-Operate (BO); Build-Operate- Transfer (BOT), Transfer of Operating Rights (TOR).
Sources: Law No: 6446- Electricity Market; www.epdk.org.tr; as of 30.07.2018; Electricity Market Regulation for Licencing; www.epdk.org.tr, as of 30.07.2018; Electricity Market Regulation for Consumer Services; www.epdk.org.tr; as of 30.07.2018; Electricity Market Regulation for Tariffs; www.epdk.org.tr; as of 30.07.2018; Electricity Market Regulation for Balancing and Settlement; www.epdk.org.tr; as of 30.07.2018; Electricity Market Annual Reports; www.epdk.org.tr; as of 30.07.2018; EPIAS Reporting web page; https://rapor.epias.com.tr/rapor/; as of 30.07.2018.

[4] Eligible consumers are defined as consumers whose annual consumption is larger than a defined threshold and who are allowed to choose their suppliers. The threshold is determined and announced by EMRA each year. Non-eligible consumers are those whose annual consumption is below the threshold and who have to purchase electricity from the regional incumbent company.

Table 2: *Consumer Market Structure*

Main Group	Main Group Consumption Limit (kWh/year)	Subgroup	Subgroup Consumption Limit (kWh/year)	Supplier	Tariff	Applicable Regulated Tariff
Eligible Consumers	>2,000	Large Consumption Consumers	>50,000,000 *	Regional Incumbent	Regulated or Free	LRT
				Other Suppliers **	Free	-
		Small Consumption Consumers	<50,000,000 *	Regional Incumbent	Regulated or Free	Regulated Retail Tariff
				Other Suppliers **	Free	-
Non-Eligible Consumers	<2,000	-	-	Regional Incumbent	Regulated	Regulated Retail Tariff

The limit was reduced to 10 million kWh/year at the beginning of 2019.
*** Including Generation Companies*
Sources: Law No: 6446- Electricity Market; www.epdk.org.tr; as of 30.07.2018; Electricity Market Regulation for Licencing; www.epdk.org.tr, as of 30.07.2018; Electricity Market Regulation for Consumer Services; www.epdk.org.tr; as of 30.07.2018; Electricity Market Regulation for Tariffs; www.epdk.org.tr; as of 30.07.2018; Electricity Market Communique for Retail Sales Prices Arrangement; www.epdk.org.tr, as of 30.07.2018; Electricity Market Communique for Last Resort Tariff Arrangement; www.epdk.org.tr, as of 30.07.2018; Electricity Market Procedure in Retail Sales Tariffs; www.epdk.org.tr, as of 30.07.2018; Electricity Market Annual Reports; www.epdk.org.tr; as of 30.07.2018; EPIAS Reporting web page; https://rapor.epias.com.tr/rapor/; as of 30.07.2018; Regulated National Retail Tariffs announced by Electricity Market Regulatory Agency on August 1, 2018; www.epdk.org.tr

Table 3: *Sourcing Market Structure*

Seller	Buyer	Mechanism	Price
Public Electricity Generation Company (EÜAŞ)	Disco's (Distribution Companies)	Regulated (to meet the demand of commercial & non-commercial network losses and public lighting), Bilateral Contract	Offered by EÜAŞ, Approved by EMRA
	Incumbent Retailers	Regulated (to meet some amount of the demand of non-eligible consumers and eligible small consumption group consumers who remain in regulated retail tariff), Bilateral Contract	Offered by EÜAŞ, Approved by EMRA
	Spot (EPİAŞ)	Free	Market
BO/BOT/TOR	EÜAŞ	Regulated, Bilateral Contract (Take or Pay Agreement)	Signed Contract (on the day of Contract)
IPPs	EÜAŞ	Regulated, limited to the assets allocated for the supporting mechanism of renewables (YEKDEM), local coal and capacity mechanism.	Regulated (by law)
	Suppliers	Free, Bilateral Contract	Market
	Eligible Consumers	Free, Bilateral Contract	Market
	Spot (EPİAŞ)	Free	Market
Distributed Generation (unlicensed generators)	Incumbent Retailers	Regulated, limited to excess generation	Regulated (by law)

Sources: Law No: 6446- Electricity Market; www.epdk.org.tr; as of 30.07.2018; Electricity Market Regulation for Licencing; www.epdk.org.tr, as of 30.07.2018; Electricity Market Regulation for Tariffs; www.epdk.org.tr; as of 30.07.2018; Electricity Market Regulation for Unlicensed Generation; www.epdk.org.tr; as of 30.07.2018; Electricity Market Regulation for Certification and Supporting of Renewable Sources; www.epdk.org.tr; as of 30.07.2018; Electricity Market Communique for Distribution System Revenue Arrangement; www.epdk.org.tr, as of 30.07.2018; Electricity Market Communique for Retail Sales Prices Arrangement; www.epdk.org.tr, as of 30.07.2018; Electricity Market Annual Reports; www.epdk.org.tr; as of 30.07.2018; EPIAS Reporting web page; https://rapor.epias.com.tr/rapor/; as of 30.07.2018

Although structural changes to create a liberal and competitive market are the key elements in the introduction of private capital in investments, incentive and support mechanisms also have a significant role. Until recently special incentives or support for generation were available only for renewable generation (EPDK, 2018b). However, these mechanisms have recently been extended to cover generation from fossil fuels under some circumstances as well.[5] The main motive behind extending support for fossil fuel plants was to promote power generation from local coal resources in line with the National Energy Policy. Another motive was to safeguard financial sustainability and supply security by preventing loss of reserve capacity due to rapidly declining wholesale electricity prices to levels below fuel and financing costs.

3.2. Other Energy Carriers

Since 2001, nearly all segments of the Turkish energy market went through an extensive liberalisation and privatisation process similar to the electricity sector. A comprehensive free market structure throughout most of the energy sector was set up by the adoption of the Electricity Market Law (2001), Natural Gas Market Law (2001) and Petroleum Market Law (2003). Implementing regulations and norms relating to these laws have been completed and carried into effect to a large extent. The Energy Market Regulatory Authority (EMRA), established in 2002, oversees regulation and licensing processes in petroleum, LPG and natural gas markets in addition to the electricity market. Coal is outside the regulatory scope of EMRA and is regulated mostly by the Ministry of Energy and Natural Resources (MENR). The main issues related to fossil fuel markets are summarised below.

While oil product markets have been nearly completely liberalised, various non-market mechanisms continue to play a role in the coal and natural gas sectors.

Oil and oil products: The most complete liberalisation took place in petroleum markets, where refining, distribution and sale of liquid fuels for transport and heating, including LPG, are carried out entirely by the private sector. EMRA licenses market participants and regulates refinery margins.

Coal: In Turkey, coal is mostly produced by state enterprises and by the private sector in lignite fields related to thermal plants operated by private owners. The private sector also carries out mining activities outsourced by state enterprises. The state enterprises engaged in coal mining are Türkiye Taş Kömürü Kurumu (TTK) in hard coal mining and Türkiye Kömür İşletmeleri (TKİ) in lignite mining. Maden Tetkik Arama Genel Müdürlüğü (MTA), on the other hand, undertakes exploration and research activities.

Supply of coal for electricity generation from domestic resources is generally integrated with mining since transport of low-calorie coal is not economically feasible. Therefore, market activity in local coal production for electricity generation is limited. As for electricity generation from imported coal, market conditions under international trading prevail. The only government intervention is a price floor and an import duty, which was introduced in 2016 (see Section 4.1). Lignite and hard coal for industrial processes and heating, on the other hand, are procured through imports or from TKİ under competitive market conditions.

Natural Gas: The natural gas market is dominated by Boru Hatları ile Petrol Taşıma Anonim Şirketi (BOTAŞ), a state-owned enterprise involved in the building and operation of natural gas pipelines as well as the import, transmission and wholesale of natural gas. About 98% of natural gas in the market is supplied by imports based on long-term, oil-indexed contracts through pipelines from the Russian Federation,

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[5] Electricity Market Regulation for Capacity Mechanism; www.epdk.org.tr ; as of 30.07.2018.
 Electricity Market Regulation for Unlicensed Generation; www.epdk.org.tr ; as of 30.07.2018
 Council of Ministers Decision; Decision No: 2017/11070

Iran and Azerbaijan, and as liquefied natural gas (LNG) from Nigeria and Algeria. The Russian Federation, with an average 52% share in imports, is the leading supplier, followed by Iran (17%), Azerbaijan (14%), Algeria (9%) and Nigeria (3%). The rest is supplied through spot LNG purchases.

Being the leading fuel for power generation and space heating, natural gas is an important part of Turkey's energy mix. Annual consumption of natural gas was 53.8 bcm in 2017, 38% of which was used for power generation. While the share of households and commerce in consumption was 37%, the share of industry was 25%.

Currently, wholesale markets are only partially liberalised and the state incumbent BOTAŞ has about an 80% share in import and domestic sales. Contracts for about 20% of the import volumes of BOTAŞ have been transferred to the private sector since 2008 and spot LNG imports have been liberalised; however, high import dependency, the existence of long-term contracts with state-owned exporters and limitations in infrastructure has limited overall liberalisation in the market. Distribution, on the other hand, has been totally privatised with the exception of Istanbul, where the service is provided by a municipality enterprise. All industrial and commercial consumers and households whose annual consumption exceeds 75 thousand cubic-meters are eligible to choose their suppliers.

As natural gas distribution has expanded and household consumption has grown, the importance of storage has increased. Storage capacity was limited until 2017, when the first phase of a major underground storage facility was completed. As of the end of 2017, Turkey's total storage capacity reached 4.1 bcm, including 3.2 bcm of underground and 0.9 bcm of LNG storage. With the recent increase, the storage capacity has reached 7.5% of Turkey's total gas demand of 53.8 bcm. This is three-quarters of the required share of 10% laid down in Law No. 4646 on Natural Gas Market. The comparable law in the European Union sets a 20% standard. Investments in two additional sites are ongoing to increase the storage capacity to 5.4 bcm by the end of 2023. The effect of storage requirements, given the high investment costs of underground storage, and how the costs will be reflected in storage tariffs and the sales price of natural gas, remains an issue for liberalisation in the market.

So far, actual liberalisation and competition in the natural gas market have been limited due to high import dependency combined with long-term, state level international agreements and contracts that limit flexibility, bottlenecks in storage and transmission capacity, the dominant position of BOTAŞ, and sales price subsidies. In order to promote diversification of suppliers in the natural gas market, imports of spot LNG were liberalised in 2008; however, current legislation does not allow the private sector to make new pipeline gas import agreements with countries that already have contracts with BOTAŞ.

Efforts for the liberalisation of the natural gas market, where tariffs for power generators and large industrial consumers are replaced with bilateral agreements along with a balancing market, have been underway for some time. To this end, steps were taken for the development of a wholesale natural gas market with the establishment of a natural gas spot exchange, which started operations in September 2018. Recent improvements in transmission and storage infrastructure may also facilitate market development by enhancing flexibility. As elaborated in Section 4.2, the establishment of an operational natural gas exchange is especially important for the effective functioning of the power market.

4. Major Subsidies and Support in the Sector

On average, US$8 billion was provided annually between 2015 and 2017 in Turkey's energy sector through various forms of subsidy and support, including taxes levied on electricity and natural gas.

Major subsidies discussed further and quantified in this section are summarised in Table 4. According to the findings of this study, in various forms of subsidy and support, US$8 billion per year was provided on average between 2015 and 2017 in Turkey's energy sector, including taxes levied on electricity and natural gas. Renewable energy feed-in tariffs paid by end-users as part of the national electricity tariff accounted for a quarter of this amount. Support granted to coal, oil and gas suppliers represents the lion's share of the government support category, totalling around US$1 billion out of the US$2 billion per year. Within the same category, renewable energy and energy efficiency, which together represent "energy transition", accounted for one-third of the total government support. Another US$2 billion was provided by fossil fuel suppliers to end-users, mainly related to natural gas, as subsidies.

The table should be interpreted with awareness of its limitations. Other than the various assumptions made in the calculations presented in the table, it is important to note that the total number only includes items which could be quantified with the data and resources available. Major support provided to energy suppliers in the form of concessions, market guarantees and priority in access to scarce resources, such as land, could not be quantified and would need to be added to the total number. On the other hand, special energy taxes are included as a non-market flow to compare their magnitude to different types of support.

Table 4: *Annual Average Non-Market Flows Based on 2015-2017 Data (in million US$)*

To	Coal Suppliers	Oil Suppliers	Natural Gas Suppliers	Thermal Power Generators	Energy Transition	End Users	Government	TOTAL
From Government	*447*	*323*	*258*	*71*	*728*	*183*		*2,009*
Government Investments	146	323	258	19	611			1,357
State Enterprise Losses	280							280
Tax Exemptions and Other Investor Incentives	21			52	117			189
Tourism Industry Energy Support						183		183
From Fossil Fuel Suppliers	**0**	**0**	**0**	**49**	**0**	**2,052**	**30**	**2,131**
Local Coal Suppliers						289		289
Coal Importers							30	30
Natural Gas Suppliers				49		1,763		1,812
From Thermal Power Generators	*0*	*0*	*0*	*0*	*0*	*0*	*88*	*88*
Special Consumption Tax Natural Gas							88	88
From End Users	*0*	*0*	*0*	*500*	*2,430*	*0*	*870*	*3,800*
Renewable Energy Feed-In Tariff					2,430			2.430
Coal Generation				200				200
Capacity Payments				300				300
Special Consumption Tax Natural Gas							150	150
Special Taxes on Electricity Use							721	721
TOTAL	*447*	*323*	*258*	*620*	*3,158*	*2,235*	*989*	*8,028*
Special Consumption Tax Oil Products							17,335	17,335

4.1. Subsidies and Support to Fossil Fuel Suppliers

Natural gas and oil

Domestic production of natural gas and oil in Turkey is negligible, and the market is supplied mainly by imports. BOTAŞ, a state enterprise, has the dominant position in domestic supply of natural gas (80% of the market). Private sector refineries supply refined oil products with pass-through oil prices and regulated refinery margins. Nevertheless, the state channels significant funds to natural gas and oil exploration through the state-owned exploration and production company, Türkiye Petrolleri Anonim Ortaklığı (TPAO). In addition, BOTAŞ has invested, and continues to invest, in domestic gas infrastructure. Moreover, both TPAO and BOTAŞ have invested in natural gas storage facilities, which are important for the security of supply and compensating for seasonal fluctuations in demand.

Government investment in natural gas and oil exploration, infrastructure and research averaged US$690 annually between 2015 and 2017. 42% of this total was spent on exploration. Production and field development constituted 20% whereas transmission and storage's share, mainly for natural gas, was 38%.

Between 2008 and 2017, total public sector investments in oil and gas exploration, infrastructure and research were US$7.7 billion, i.e. US$770 million annually on average. This amount includes US$3.6 billion for natural gas and oil exploration, US$1.5 billion for field development and production (including investments in research and development and information/communication technology), US$1.5 billion in transmission infrastructure and US$1.1 billion in natural gas storage (detailed breakdown is available in Annex A) (Kalkınma Bakanlığı, 2018). A closer look at the last three years of this period reveals a 37% decline in the annual amount invested in oil, from the ten-year average of US$500 million to US$323 million. Annual average investment in natural gas transmission and storage infrastructure, in turn, has been maintained at US$260 million during the same period.

It is difficult to assess and track conclusively whether investment costs over time have been fully recovered by domestic sales of oil and gas by state-owned companies. However, as discussed in following sections, it is known that BOTAŞ has been subsidising both electricity generators and industrial and household end-users through below cost sales of natural gas.

Income statements and balance sheets of BOTAŞ are publicly available for the ten-year period studied in this paper (BOTAŞ, 2018a). Income statements and balance sheets of TPAO are publicly available for the period between 2013 and 2016 (TPAO, 2017). In 2017, TPAO was merged into Turkish Petroleum International Company (TPIC) and the latest publicly available annual reports for both TPAO and TPIC were issued at the end of 2016.

Analysis of BOTAŞ income statements reveals net real operating losses for 2011, 2012, 2013, 2014 and 2017, compensated by other operating and extraordinary income in 2013 and 2017. On the other hand, cumulative net operating profit for the period between 2008 and 2017 was US$4.3 billion, other operating income was US$0.7 billion and extraordinary income was US$2.4 billion, which indicate a cumulative net positive flow of US$7.4 billion before taxes. As cumulative net operating profit is positive, it suggests that the company is self-sustaining for the most part. Yet, high levels of extraordinary income are noteworthy. A good part of the extraordinary income is most likely one-off lump sum indemnity payments of international arbitration settlements with Iran and the Russian Federation.

In addition, below-cost sales to end-users and independent power producers seem to be partially cross-subsidised by high price sales to Build-Operate (BO) and Build-Operate-Transfer (BOT) electricity generators whose natural gas costs are reflected in a pass-through manner in their sales to Türkiye Elektrik Ticaret ve Taahhüt A.Ş. (TETAŞ) (which merged with Elektrik Üretim A.Ş., EÜAŞ, in 2018). Sales to BO and BOT generators constituted an estimated 18% of total BOTAŞ sales volume in 2017 (EPDK, 2018c).
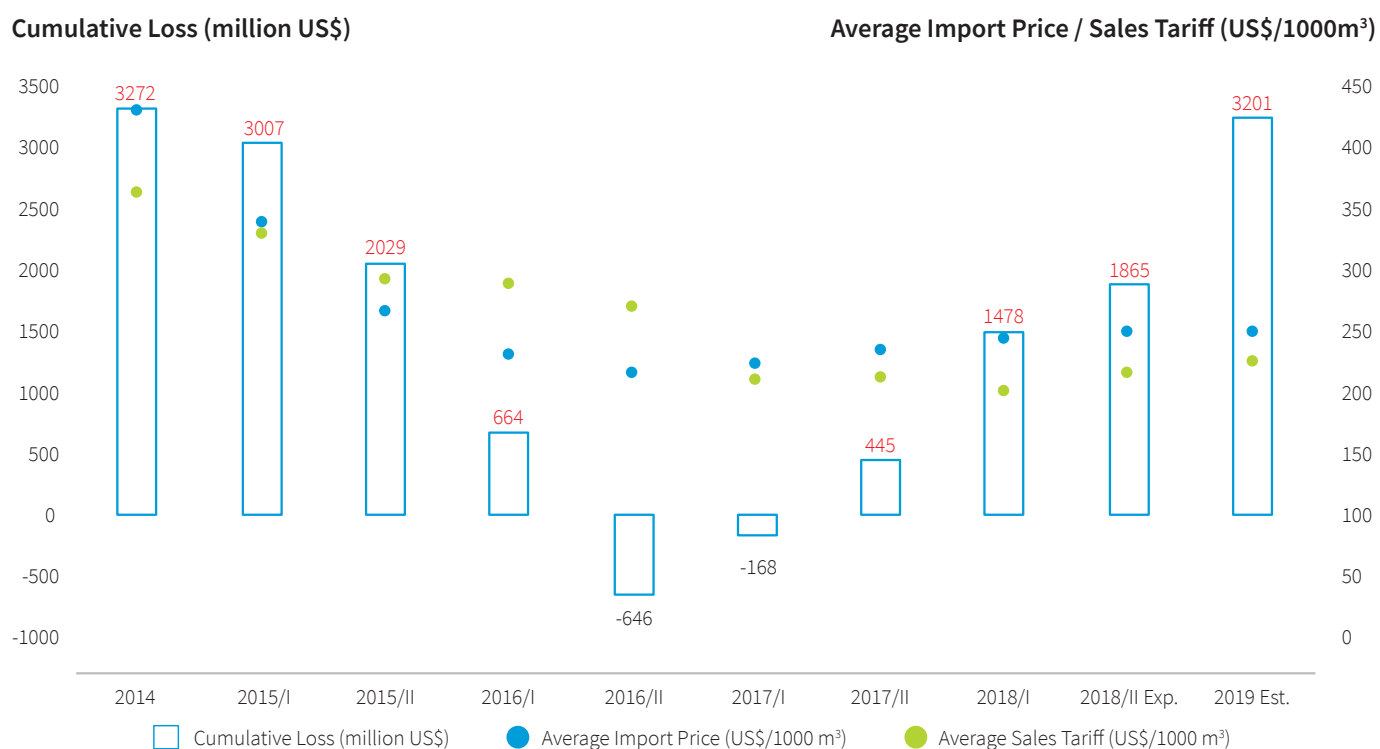
Cumulative loss resulting from below cost sales of natural gas is estimated to have reached US$1.9 billion by end-2018. If current tariff levels are maintained, this is expected to increase by 70% to reach US$3.2 billion by end-2019.

While the contract prices of BOTAŞ imports are not disclosed because of agreements with suppliers such as Gazprom, estimates are occasionally provided in industry publications and by price reporting agencies such as Argus Media and Enerji IQ. These estimates are generally in agreement with each other. Therefore, it is possible to give an idea about the magnitude of losses incurred due to below-cost sales tariffs.

As shown in Figure 3, on a US$/1000 m^3 basis, the average sales tariff (indicated with orange markers) has been declining since 2014 in line with the decrease in average import prices (blue markers). However, there is a gap between the two across years, which reflects a loss or gain on different orders of magnitude depending on total gas consumption in specific years. In 2014, a total of US$3.3billion loss was incurred when import prices were at US$424/1000m^3 against a sales tariff set at US$357/1000 m^3. In the first half of 2015, when the difference between the sales tariff and import prices decreased, annual losses declined. From the second half of 2015 to the second half of 2016, average import prices were 10-25% lower than the sales tariff. This has helped to compensate for the cumulative losses incurred since 2014. However, after 2017, the gap between the import price and the average sales tariff increased once again since increases in the exchange rate were not reflected in sales tariffs. Between 2017 and the first half of 2018, when the price in local currency changed only for power generators and large industrial consumers, the estimated import price in local currency increased, resulting in a large gap between the import price and the sales tariff. Hence, cumulative loss has increased to US$1.5 billion.

During the second half of 2018, BOTAŞ tariffs were increased at rates varying according to consumer groups (a detailed discussion on end-user tariffs is available in Section 4.3). After these increases take effect, the weighted average sales tariff for the second half of the year will be around 1,183 TL/1000 m^3, up from 811 TL/1000 m^3 in the first half. In US$ terms, the average sales tariff in the second half of the year will be around US$212/1000 m^3, compared to an estimated import price of US$245 /1000 m^3, raising the expected cumulative loss to US$1.9 billion by the end of the year. If the current average sales tariff is maintained in 2019 at the average exchange rate for the second half of 2018 and at the current estimated import price of US$245/1000 m^3, the cumulative loss will likely go up to US$3.2 billion at the end of the year.

Figure 3: *Cumulative Loss Incurred from the Difference in Natural Gas Import Price and Natural Gas Sales Tariff*

Cumulative Loss (million US$)   Average Import Price / Sales Tariff (US$/1000m³)

□ Cumulative Loss (million US$)   ● Average Import Price (US$/1000 m³)   ● Average Sales Tariff (US$/1000 m³)

Source: For import prices: Enerji IQ, 2018a, 2018b, 2018c, 2018d; Argus Media; authors' estimates. Average sales tariff was calculated as a weighted average of tariffs applied by BOTAŞ to different customer groups (BOTAŞ, 2018b; EPDK, 2018c, 2018d; TMMOB, 2018).

The main support mechanism to natural gas and oil suppliers is provided by the government for exploration and production.

The preceding discussion allows us to reach the following conclusions on support provided to natural gas and oil providers:

- Government support for oil exploration and production cannot be quantified reliably beyond the investment amounts of TPAO. However, since crude oil and natural gas are mostly imported, the effect of such subsidies on the market is limited. A brief analysis of refined products and their effect on end-users is presented in Section 4.3.

- BOTAŞ, the main supplier of natural gas in the market, seems not to benefit from direct government support. However, mechanisms of indirect support outlined below have served to keep sales tariffs below the cost of imports.

  o *Cross subsidisation of sales price through high-price sales to BO and BOT plants:* This mechanism will be terminated with the expiration of all natural gas-powered BO and BOT contracts at the end of 2019.

  o *Persistence of the dominant market position of BOTAŞ in pipeline natural gas imports:* As per the Natural Gas Market Law, private sector importers are not allowed to make new contracts with countries that have contracts with BOTAŞ for pipeline natural gas. The dominant market position provided by its legal status allowed BOTAŞ to provide end-user price subsidies. Although the legal status of BOTAŞ remains unchanged, major changes to its price policy were announced in 2018 as discussed below. With these changes, subsidies to electricity generators were effectively eliminated, reducing the need for direct and cross-subsidisation of BOTAŞ significantly.

  o *Persistence of the bundling of transmission and wholesale activities:* Although BOTAŞ keeps separate accounts for its transmission and supply activities, they are still carried out under a single entity, which can facilitate market domination. Nevertheless, the actual effect is minimal compared to the previous two points.

Coal

State support for coal mining consists of investments in exploration, field development and production as well as financial assistance provided by Treasury to TTK and TKI in order to compensate operational losses. Total annual government support for coal mining was around US$335 million between 2008 and 2017, and support provided for investments and loss compensation amounted to US$426 million between 2015 and 2017.

Over the past ten years between 2008 and 2017, the average annual investment amount was US$65 million for coal exploration and research, around US$73 million for field development and production, and US$7 million for information and communication technologies (ICT), research and development (R&D) and institutional development. Average annual government investment over the period between 2015 and 2017 was around US$77 million for coal exploration and research, around US$60 million for field development and production, and US$7 million for ICT, R&D and institutional development. (Kalkınma Bakanlığı, 2018). Therefore, recent government investment seems to be shifting from production to exploration (a detailed breakdown is presented in Annex A).

Even though the average annual government transfers to TTK and TKİ was US$190 million between 2008 and 2017, it increased to US$280 million between 2015 and 2017. Publicly available income statements and balance sheets of TTK and TKİ reveal that the majority of losses have been in hard coal operations of TTK, while TKİ had been profitable until 2016. Over 2016 and 2017, net real operating loss due to the main operations of TKİ -compensated by income from other operations in 2016- was US$107 million and US$135 million, respectively.

Indirect support to coal mining is provided pursuant to policies that aim to promote power generation from domestic coal. As elaborated in Section 4.2, designated electricity supply companies are required to purchase power generated from domestic coal at preferential tariffs. As elaborated in Section 4.4, another indirect support to domestic coal mining is investment incentives provided for new investments in power plants that utilise domestic coal. In addition, a price floor of US$70/tonne is applied to imported hard coal used in electricity generation. If the fob price of coal is less than US$70/tonne, the importer is required to pay the difference as import duty. In 2016, when the price floor was introduced, the average price of imported coal used in power generation was US$65/tonne and 17.9 million tonnes of imported coal was used in power generation, resulting in a total estimated tax revenue of US$90 million. As the average price of imported coal has been above US$70/tonne since 2017, no import duty is expected in 2017 and 2018. The resulting average annual estimated tax revenue over three years is US$30 million.

4.2. Subsidies and support for electricity generators

Fuel Cost Subsidies

As discussed in Section 4.1, the main fuel cost subsidy provided to power generators is subsidised natural gas tariffs. Though tariff subsidisation has not been a policy constantly and consistently pursued by BOTAŞ; below-cost sales price was applied for most of the period from 2014 to mid-2018.

Since the natural gas market in Turkey is dominated by the incumbent state enterprise BOTAŞ, the sales tariffs applied by the enterprise are the major determinant of fuel costs of natural gas plants. BOTAŞ procures more than 95% of the natural gas it imports through long-term pipeline and LNG contracts. The contract amounts include "take-or-pay" clauses and the import prices are indexed to crude oil prices. This limits BOTAŞ's flexibility in sourcing and controlling costs. Furthermore, import prices of BOTAŞ are usually undisclosed due to confidentiality clauses in the purchase contracts. Similar confidentiality agreements apply to sales contracts of BOTAŞ with BO and BOT plants. Therefore, it is not possible to determine the exact amount of subsidy; however, an indication based on information from available data made public by industry sources show that below-cost average sales tariff since 2017 will result in an estimated cumulative loss of around US$1.9 billion by the end of 2018 (see Figure 3 in Section 4.1).

In 2017, natural gas was the source of about 37% of all electricity generated, amounting to a total of 115 TWh per year (TEİAŞ, 2018a). The amount of gas consumed to generate electricity represented around 44% of BOTAŞ sales and 36% of all gas supply in Turkey (EPDK, 2018c). In the power sector, gas has a prominent role, affecting electricity markets by up to 70%, given that it is the technology that determines electricity prices to a large extent and projects the liquidity of the day-ahead markets. In this regard, it is essential to have gas markets fully liberalised, a consensus opinion among sector experts. Given its interlinkage with the electricity market, this is also a key precondition for switching to a fully liberalised electricity market.

Many regulated power plants whose variable costs are above the average wholesale free market price, continue to run while those operating in the free market are priced out.

One limitation that impedes liberalisation of both gas and electricity markets is the operation of BO, and BOT gas-fired plants controlled by TETAŞ/EÜAŞ. These plants, whose share in total generation was about 15% in 2017, have been operating for about 14 years under long-term guaranteed sales contracts. They often need twice as much natural gas to operate since they are much less efficient than the newer gas plants owned by private sector IPPs. Nevertheless, because of purchase guarantees, capacity utilisation of BO and BOT plants is twice as high as that of more efficient IPPs. This results in higher overall gas consumption per unit of electricity generated (compare left- and right-hand sides of Figure 4). As shown in the figure, plants under the regulated scheme, which include state-owned plants in addition to BO and BOT plants constitute about 30% of total available generation capacity while they carry out about 56% of generation. Many regulated plants whose variable generation costs are above the horizontal blue line representing the average wholesale free market price continue to run while those operating in the free market are priced out.

In addition, EÜAŞ controls a large share of the electricity supply to the retail and wholesale companies, a factor which impedes the development of bilateral contracts and an exchange market. This mechanism pushes BOTAŞ to provide cross-subsidies and causes a large share of electricity and gas volume to be off markets.

Figure 4: *Breakdown of the electricity market in 2016*
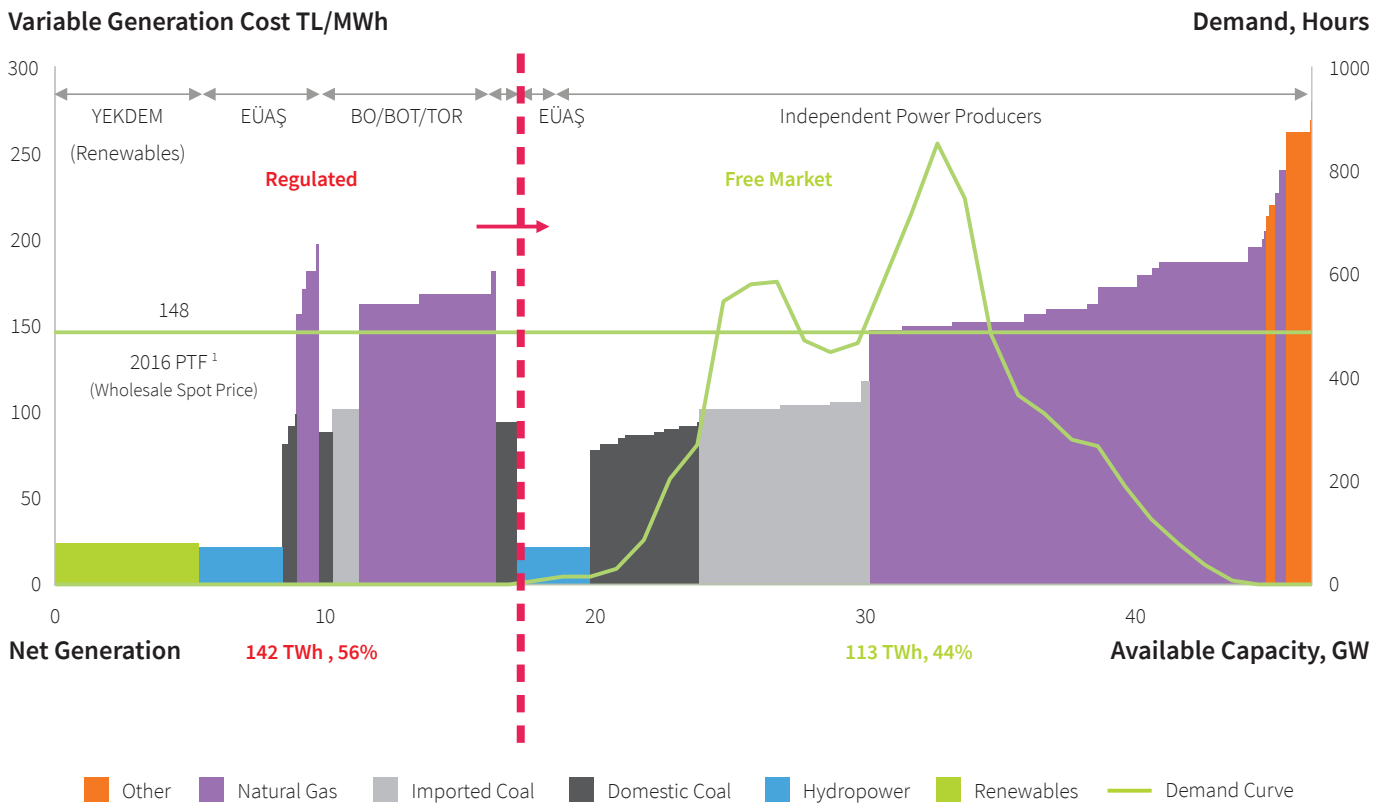
Variable Generation Cost TL/MWh   **Demand, Hours**

Source: TÜSİAD, 2018

At the end of July 2018, Turkish gas markets have experienced an important step towards switching to a cost-based pricing scheme based on US$, where the changes in import price and the exchange rate are passed on to independent electricity producers.

As a result, in August and September, BOTAŞ increased the TL price of gas charged on electricity generators by 49.5% and by another 29.5%, respectively. Due to the decline in the exchange rate, the price was reduced by 9.1% in November (TMMOB, 2018). The price went up from 878 TL/1000 m³ to 1,700 TL/1000 m³ in September and October, and decreased to 1,550 TL/1000 m³ in November and December. Considering the changes in the tariff, the average natural gas price charged on electricity generators during the second half of the year was equal to 1,448 TL/1000 m³, i.e. about US$258/1000 m³. The estimated average natural gas import price for the same period was US$245/1000 m³ (Enerji IQ 2018a, 2018b, 2018c, 2018d). Therefore, it appears that the price subsidy provided to power generators was eliminated in the second half of the year. For the entire year, the amount of cost subsidy provided to power generators amounted to US$49 million.

Even though tariffs for residential and industrial consumers were also increased, they were not increased sufficiently to eliminate subsidisation at current price levels. An evaluation of the amount of subsidy in end-user tariffs is presented in Section 4.3.

Tariff/Sales Price Support

Although the private sector owned around three-quarters of Turkey's total electricity generation capacity in 2017 (EPDK, 2018e), it cannot be said that market prices are set only according to market dynamics. As part of its national energy strategy and policies, Turkey has established direct and indirect schemes to support renewable energy, local coal and reserve capacity mechanisms. Annual support given to power generators through sales price support mechanisms detailed below is estimated to be around US$2.9 billion in 2018.

Support for Renewable Energy

The main support for power generation from renewable energy is the guaranteed feed-in tariff. In addition to the feed-in tariff, electricity generated from renewable energy has priority in connecting to the grid, 90% reduction in licensing and pre-licensing fees, exemption from licence fees for the first eight years of operation and access to land at favourable conditions.

The Law No. 5346 (EPDK, 2018b) sets the general principles of support and incentive mechanisms. According to this law, generation assets that will be in commercial operation until the end of 2020 are subject to a sales price guarantee for a period of 10 years after their first commercial operation date. The basic guaranteed sales prices are provided in Table 5 (EPDK, 2018b). These prices increase with the share of local manufacturing in total equipment. For example, the minimum guaranteed price for wind power plants is US$7.3 cents/kWh. However, if all equipment is produced locally, a premium would be added, which subsequently raises the price to a maximum of US$11.0 cents/kWh. But, if the tower is the only part produced locally, then the price increase will be limited to US$7.9 cents/kWh. Therefore, the guaranteed price depends on the share of local production, which is defined in detail in the regulation. This local production price incentive is only applicable to the first five years after the inception of operation of power plants.

Table 5: *Guaranteed Sales Prices for Renewables (applicable for projects that become operational by the end of 2020)*

Type	Min. Guaranteed Price (US$ cents/kWh) (excluding local manufacturing support)	Max. Guaranteed Price (US$ cents/kWh) (with full local manufacturing support)
Hydro	7.3	9.6
Wind	7.3	11.0
Geothermal	10.5	13.2
Biomass	13.3	18.9
Solar	13.3	20.0 (photovoltaic systems) 22.5 (concentrated systems)

Sources: Law No. 5346 – Utilisation of Renewable Energy Resources for Electricity Generation Purpose; www.epdk.org.tr; as of 30.07.2018; Electricity Market Regulation for Unlicensed Generation; www.epdk.org.tr; as of 30.07.2018; Electricity Market Regulation for Certification and Supporting of Renewable Sources; www.epdk.org.tr; as of 30.07.2018

The owners of renewable assets are free to choose whether or not to be involved in this incentive mechanism. They may sell their full generation either through YEKDEM at the guaranteed price or on the free market. Eligible renewable energy plants wishing to sell their energy under YEKDEM should apply each year by the end of October for the upcoming year. Since the expectations on the free market price were lower than guaranteed prices in 2017 and 2018, almost all eligible players preferred to benefit from YEKDEM support. Table 6 provides a summary of the utilisation of YEKDEM support in the last 3 years.

Another incentive is the support given to decentralised generation investments, i.e. to plants that do not need a generation licence as they have less than 1 MW installed capacity (called "unlicensed generation"). If the source of generation lies within the scope of renewable energy definition laid down in the law, the excess energy injected to the grid is procured by the regional incumbent retailer as part of YEKDEM (see Table 5). The following table summarises some major figures related to renewable and unlicensed generation.

Total net support is defined as the amount paid above the estimated market value of the electricity sold. In 2018, the average wholesale market price was around US$4.5 cents/kWh (the equivalent of 21.7 TL kuruş/kWh) and the weighted average price paid for renewable energy under YEKDEM was calculated as US$8.1 cents/ kWh. Therefore, the total net support for renewable energy in 2018 is estimated at US$ 2.4 billion. Total net support for power generation from renewable energy over the past three years, in turn, is estimated at US$5.8 billion. This incentive is a part of end-user tariffs and is directly paid by electricity consumers.

The main support provided to power generators from renewable energy is the feed-in tariff whose net cost for 2018 is estimated at US$2.4 billion. This was financed through the national electricity tariff paid by end users. For new plants becoming operational after 2020, incentives will be reduced to reflect declining renewable energy costs.

Table 6: *The Summary of the Renewable Energy Support Mechanism between 2016 and 2018*

	2016	2017	2018
Number of Participating Power Plants	556	647	708
Total Installed Capacity (MW) [1]	15.083	17.400	19.266
Total Generation (GWh/year) [1]	59,001	69,024	74,225
Weighted Average Price (US$ cents/kWh) [2]	7.87	7.96	8.11
Actual Generation (GWh/year)	44,696	47,499	58,000 [4]
Total Generation with unlicensed generation capacity [3]	0	2,148	9,500 [4]
Total Generation under YEKDEM (GWh/year)	44,696	49,647	67,500 [4]
Total Net Support (million US$)	1,279	2,082	2,430 [4]

1) registered value on licence; 2) with respect to total generation registered value on licence; 3) excess generation under the scope of YEKDEM; 4) estimated generation for the whole year based on end-September actual generation figure and estimated support for the whole year.
Sources: Electricity Market Annual Reports; www.epdk.org.tr; as of 30.07.2018; EPIAS Reporting web page; https://rapor.epias.com.tr/rapor/; as of 30.07.2018

Support for Power Generated from Local Coal
In order to reduce reliance on imported fuels, a support mechanism for utilising domestic coal in power generation has been set up. According to a Council of Ministers Decision (ETKB, 2017), the state-owned generation company EÜAŞ must procure 50% of electricity generated by private sector coal power plants for a period of 7 years starting from 2018. If power plants primarily use imported coal, they are entitled to become a part of this support mechanism for the amount generated from local coal, if they have the ability to use local coal in addition to imported coal. The procurement amount is limited by a theoretical generation quantity, which is calculated simply as the product of installed capacity and a total annual capacity utilisation time of 6,500 hours. EÜAŞ has the right to increase this determined procurement amount by up to 40% for each implementation year. The starting (base) procurement price was 201.35 TL per megawatt-hour (MWh), which was applicable for the first quarter of 2018. The price is subject to increase for each quarter by the average rate of change in the consumer price and power supply price indices of the previous quarter as issued by Turkish Statistical Institute (TÜİK).

The support for power generators using locally produced coal is estimated to be US$200 million. This was financed through the national electricity tariff paid by end users.

Since the support mechanism was put into effect at the beginning of 2018, it is not possible to give an actual value for the total amount of support for a full year of implementation. However, a theoretical calculation can be made based on certain assumptions. The total installed capacity of power plants that use local coal is about 6,000 MW. The theoretical procurement cap from local coal is 39 gigawatt-hour (GWh) for a year, which is roughly 13% of total generation in 2017. Hence, the notional amount of support can be calculated at around 500 million TL for the first half of 2018. This sum is subject to change according to the actual amount of hourly generation and the difference between hourly market clearing price and the guaranteed price. By taking all these points into account for an adjustment and correction, it can be assumed that the amount of support for local coal has been around 1 billion TL or US$200 million in 2018.

Even though EÜAŞ makes the purchases related to domestic coal support, the cost of these purchases is passed on to designated retail companies, which then reflect it in the end-user tariff.

The Capacity Mechanism for Supporting Reserve Capacity
The capacity mechanism is another type of support given in the electricity generation industry. This mechanism became part of the system in 2018.[6] The main purpose of the mechanism is to form and maintain the necessary installed capacity to have long-term electricity supply security. The rules and principles of the mechanism are laid down by a regulation specifying the types of eligible power plants with priority given to local and the implementation principles for financial support.

The regulation defines the eligibility criteria for plants to benefit from the mechanism. Plants that benefit from the capacity mechanism have to fulfil defined efficiency criteria and must not be operating under any other guarantee scheme. For example, power plants which are part of YEKDEM or operating under BO/BOT/TOR contracts are not eligible to take part in the mechanism. Only 27 power plants with a combined installed capacity of 21,258 MW were found eligible to participate in the system in June 2018 (TEİAŞ, 2018b).

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[6] Electricity Market Regulation for Capacity Mechanism; www.epdk.org.tr; as of 30.07.2018

The mechanism provides financial support for power plants in the system with respect to market clearing prices. The support unit price is;

a) fixed unit cost, if the market clearing price is less than the variable cost of the power plant,

b) the difference between the total unit cost and the market clearing price, if the market clearing price is more than variable unit cost but less than the total unit cost of the power plant, and

c) zero, if the market clearing price is more than the total unit cost of the power plant.

The fixed, variable and total costs of power plants are the same for all the power plants that are in the same source category such as natural gas, local coal or imported coal.

The amount of the support is a part of the transmission network fee. It means that the cost of the support granted under the capacity mechanism is incurred by all consumers through the payment of the transmission network fee.

The budgeted amount of support, which has been taken into consideration in setting the transmission network revenue ceiling for 2018, is 1.41 billion TL, the equivalent of about US$300 million. The actual total support payment received by operators that benefit from the mechanism is not allowed to exceed the budgeted amount.

The capacity mechanism to cover the costs of efficient thermal power plants when the market price falls short provided US$300 million in 2018. This was financed through the national electricity tariff paid by end users.

4.3. Subsidies to End-users

Support and subsidies to end-users, as elaborated below, amounted to about US$2.3 billion in 2018. The only direct transfer from the government to end-users was US$183 million allocated for the Tourism Industry Energy Support. The Tourism Industry Energy Support is equivalent to 20% of electricity and natural gas bills paid by tourism facilities for five years of operation. Other subsidies and support consist of coal aid of about US$300 million provided by TKİ to low income households and subsidised natural gas sales to households, commercial consumers and small/medium sized industrial consumers, which reached a sum of about US$1.8 billion in 2018. On the other hand, a total of US$721 million in special electricity taxes and funds and US$150 million in special consumption for natural gas is expected to be billed to end-users in 2018.

For electricity, the national tariff is estimated to cover the cost of regional cross-subsidies without additional transfers by the government. The main issue for electricity is regional and cross subsidies among consumer groups and regional bill collection problems rather than subsidisation of the overall system by the government.

Coal and Oil Subsidies
In Turkey, refined oil products are used primarily as transport fuels. A relatively small portion is used by agricultural machinery and by households for cooking. There is no government subsidy provided to end-users for oil products. On the contrary, taxes constitute both a major portion of the final price paid by consumers and an important source of revenue for the government. The total estimated amount of special consumption tax or excise tax (Special Consumption Tax, ÖTV) to be paid by end-users for oil products in 2018 is US$17.3 billion. Even though this is a large and significant sum, it should be basically considered outside the scope of this paper, which focuses mainly on energy use for the generation of electricity and heat rather than transport.

Coal subsidies to end-users are provided by TKİ as coal aid to low income households. The amount and value of the coal aid provided are made public in TKİ's annual reports. Between 2008 and 2017, 2 million tonnes of coal were supplied annually on average to households as part of the coal aid program. While the average annual value of coal aid over the past ten years was US$338 million, it decreased to US$289 million in the last three years (TKİ, 2018).

Subsidies on Natural Gas Tariffs

As discussed in previous sections, BOTAŞ tariffs have been below import costs for a while. While the tariff applied to power generators as of the end of 2018 was above the estimated import price, subsidisation of industry and household tariffs was maintained. Prices charged on households and industrial consumers whose annual consumption is below 300 thousand cubic-meters were increased by 9% in each month between August and October, amounting to a total increase of 29.5% in 2018. Prices charged on industrial consumers whose annual consumption is above 300 thousand cubic-meters were increased by 9.7% in April, 14% in August, 14% in September and 18.5% in October, amounting to a total increase of 68.9% in 2018. The summary of electricity tariffs by consumer groups is given in the table below.

Table 7: *Comparison of 2018 Natural Gas Tariffs by Consumer Group and Estimated Import Price (TL/1000m³)*

	January-March	April-July	August	September	October	Nov.-Dec.
Households and Small Commercial Consumers	764	764	834	909	989	989
Industry 1 (Annual Cons.<300 1000m³)	764	764	834	909	989	989
Industry 2 (Annual Cons.>=300 1000m³)	800	878	1,001	1,141	1,351	1,351
Electricity Generators	800	878	1,312	1,700	1,700	1,550
Estimated Natural Gas Import Cost	914	1,058	1,404	1,558	1,436	1,318

Source: For import prices: Enerji IQ 2018a, 2018b, 2018c, 2018d, Argus Media, authors' estimates. For sales tariffs (BOTAŞ, 2018b; EPDK, 2018c, 2018d; TMMOB, 2018).

The estimated annual subsidy by consumer group is given in the following table. Estimated total annual subsidies granted to households and small commercial consumers, to small and medium industrial consumers and to large industrial consumers are US$1041million, US$574 million and US$148 million, respectively. For electricity generators, the tariff increase introduced in the second half of the year compensated for most of the loss in the first half, but the estimated amount for the full year remained at US$49 million.

Table 8: *Estimated 2018 Natural Gas Subsidies by Consumer Group (US$ million)*

	2018/I	2018/II	TOTAL
Households and Small Commercial Consumers	608	432	1,041
Industry 1 (Annual Cons.<300 1000m³)	210	364	574
Industry 2 (Annual Cons.>=300 1000m³)	65	83	148
Electricity Generators	197	-148*	49
TOTAL	1,081	731	1,811

* The negative figure indicates that in the second half of the year, the sales tariff is above the import price, resulting in a profit of US$148 million.
Source: For import prices: Enerji IQ, 2018a, 2018b, 2018c, 2018d; Argus Media; authors' estimates. For sales tariffs (BOTAŞ, 2018b; EPDK, 2018c, 2018d; TMMOB, 2018).

Approaches alternative to tariff subsidies may be developed together with incentives for energy efficiency and targeted social support to ensure access to affordable energy.

In summary, despite the increases in tariffs, there is still a subsidy gap to be closed, which would create an effective incentive towards a transition to low-carbon buildings in Turkey in case it is removed. Nevertheless, the increased cost of heating for low- and middle-income households should be considered in a social context and alternatives to tariff subsidies should be developed to provide access to affordable heating.

In addition to the basic natural gas tariff, end-users pay distribution fees differentiated by region and special consumption tax (ÖTV). The regional distribution fees, which are cost-based and pass-through, contain no subsidies. The total estimated amount of special consumption tax to be paid by end-users in 2018 is about US$150 million. The basic natural gas tariff constitutes around 80-90% of the final bill paid by consumers.

Subsidies on Electricity Tariffs

Electricity sales to end-users in Turkey is carried out either by designated (incumbent) retail sale companies or by other licensed suppliers. In the current system, all 21 regional retail sale incumbent companies are required to use a single national tariff which applies to all consumers who do not choose to purchase electricity in the free market. While consumers whose annual consumption exceeds 2 MWh are eligible to choose their suppliers, non-eligible consumers can only buy electricity from their regional incumbent company at the regulated national tariff rate. At the current threshold, the consumption of potential eligible consumers or the theoretical market opening rate is over 90%. Although the rate of market opening is high, the total consumption of consumers who choose to procure from the market rather than the incumbent at the national tariff rate was about 55% in 2017. While the amount of electricity procured through bilateral agreements in the free market constitutes more than half of eligible consumption, only about 10% of potential eligible consumers choose to participate in the market (EPDK, 2018c). The market for small consumers is yet to develop with more advanced metering and diversified tariffs making it worthwhile for them to switch from the national tariff. The national regulated tariff is relevant not only for the majority of consumers who use it, but also as a reference point for pricing in the eligible consumer market where prices are generally negotiated as a discount on the national tariff rate.

The end-user retail price in electricity consists of four main components: energy sourcing cost, retail fees, network fees, and taxes and funds, as indicated in the following figure. The regulated tariffs, which can be offered only by regional incumbent retailers, are regulated retail tariff and last resort tariff as indicated in Table 2. The regulated tariff is categorised according to the type of the grid connection and the consumer group. Moreover, the tariff is proposed to the consumer as two different products: single term or multiterm tariff. The price is the same throughout the day in the single term tariff. On the other hand, the price is segmented in three time zones in the multiterm tariff as indicated in Figure 5.

Figure 5: *Regulated Retail Tariff Structure*

Sources: Law No: 6446- Electricity Market; www.epdk.org.tr; as of 30.07.2018; Electricity Market Communique for Price Equalisation Mechanism; www.epdk.org.tr, as of 30.07.2018; Electricity Market Communique for Distribution System Revenue Arrangement; www.epdk.org.tr, as of 30.07.2018; Electricity Market Communique for Transmission System Revenue Arrangement; www.epdk.org.tr, as of 30.07.2018; Electricity Market Communique for Market Operation Revenue Arrangement; www.epdk.org.tr as of 30.07.2018; Electricity Market Communique for Retail Sales Prices Arrangement; www.epdk.org.tr, as of 30.07.2018; Electricity Market Communique for Last Resort Tariff Arrangement; www.epdk.org.tr, as of 30.07.2018; Electricity Market Procedure in Retail Sales Tariffs; www.epdk.org.tr, as of 30.07.2018; Regulated National Retail Tariffs announced by Electricity Market Regulatory Agency on August 1, 2018; www.epdk.org.tr

One of the aims of the liberalisation and reform process of the electricity sector in Turkey was to gradually phase out the national tariff in favour of market-based exchange between eligible consumers and independent suppliers. The intended system is 100% market opening where cost-based regulated tariffs remain only in distribution and transmission, and power is sold as a market-based commodity. Large regional disparities in loss and theft and in bill collection rates has so far impeded the realisation of the intended system. In 2018, the Last Resort Tariff was introduced as an intermediate step in the transition to a fully liberalised market.

The Last Resort Tariff was devised to eliminate very low tariffs applied to large industrial consumers by incumbents and to replace them with a tariff that reflects the full cost recovery plus profit. The last resort tariff will apply to consumers procuring from incumbent companies whose annual consumption exceeds 50 GWh for 2018 and 10 GWh for 2019. The Last Resort Tariff structure is simpler than the regulated retail tariff.[7] There is no product according to grid connection type, consumer group,

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[7] Electricity Market Communique for Last Resort Tariff Arrangement; www.epdk.org.tr, as of 30.07.2018

term usage or any other criteria. The tariff has a customised pricing formula where the actual energy sourcing cost is calculated on the basis of actual hourly consumption and market clearing price by adding a gross profit margin which covers cost of customer acquisition, retention and operation, other cost elements in sourcing such as profiling and balancing and net profit margin of the supplier. The main logic in the Last Resort Tariff is to force eligible consumers to switch to the free market in order to select a more attractive tariff and sign a new bilateral contract offered by any retailer including the regional incumbent supplier. The Last Resort Tariff can be considered as a price cap in electric energy costing for eligible large-scale consumers. Its level depends on gross profit margin, which is 12.8% currently, and may change depending on the regulator's decision. The current gross margin seems to be enough to encourage almost all eligible large consumers to enter into free bilateral contracts according to current market conditions. The tariff will also facilitate transition to a system based more on demand response and efficiency.

Figure 6: *The Last Resort Tariff Structure*

The Last Resort Tariff: Specific Price to Each Consumer
Taxes & Funds
Network
The same with regulated retail tariff fees
Energy Sourcing + Retail
(Actual Energy Cost @ Actual Weighted Average Market Clearing Price and Renewable Support Mechanism Cost) x (1+ Gross Profit Margin)

Sources: Electricity Market Communique for Last Resort Tariff Arrangement; www.epdk.org.tr, as of 30.07.2018; Regulated National Retail Tariffs announced by Electricity Market Regulatory Agency on August 1, 2018; www.epdk.org.tr
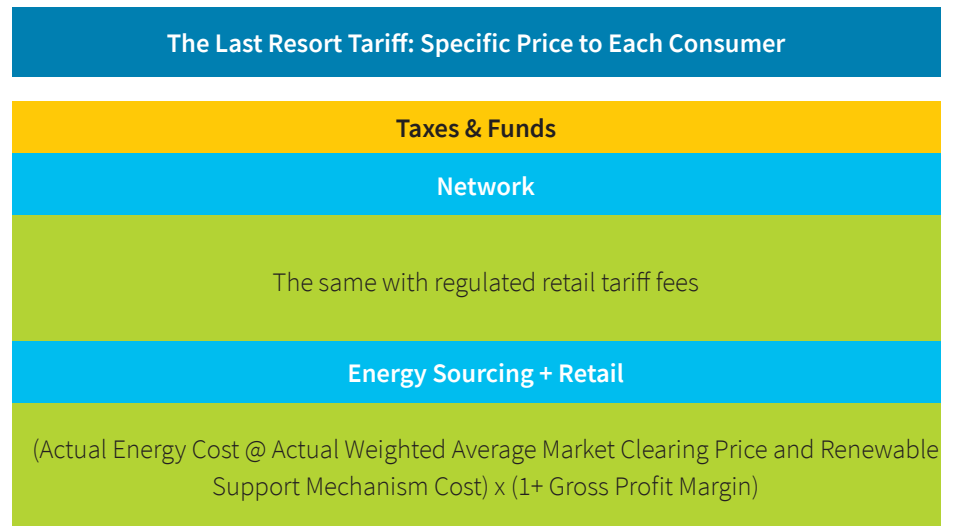
As stated before, the regulated retail tariff is applicable for non-eligible consumers and eligible small-scale consumers who do not prefer a free tariff from a supplier. For this reason, the regulated retail tariff, like the Last Resort Tariff, can be considered as a price cap or a reference point in the competitive market for eligible small-scale consumers.

In the current system all 21 regional retail sale incumbent companies are required to use a single national tariff which applies to all consumers who do not choose to purchase electricity in the national market. Each company has different energy sourcing costs, loss-theft and collection rates as well as different operating costs and investment requirements, all of which are averaged out in the national tariff. After each company invoices the amount for the electricity it sells to end-users utilising the national tariff, any amount above the regulated regional income cap is transferred to the equalisation mechanism to be redistributed to regions whose regulated income cap is above the national average.

In order to assess whether end-users in the overall system are subsidised, it is first necessary to determine whether the regulated distribution tariff sufficiently covers

the costs of all regions. When the sum total of regulated revenue caps of all 21 regions adjusted for consumer price index (CPI) inflation was compared to the total actual expected revenue from the national tariff in 2017, it was found that the revenue from the national tariff was able to cover the required amount plus about 5% extra for non-payment risk. The same test was repeated for 2018 and produced similar results. Therefore, it can be assumed that end-users as a group do not benefit from any direct subsidies on the national electricity tariff other than non-market mechanisms that may keep energy sourcing costs of retail companies lower than generating costs under normal market conditions, such as below-cost natural gas sales to power generators already discussed in Section 4.2.

While the national electricity tariff sufficiently covers overall costs of service delivery, there are cross subsidies among regions and different consumer groups.

Therefore, cross-subsidies are the main mechanism by which certain end-user groups are subsidised. The national tariff for commercial consumers is 21% higher than households and 16% higher than industrial consumers. In addition, a preferential tariff exists for families of veterans and martyrs which is half the level of the standard household tariff. However, the amount of electricity sold under this scheme is less than 1% of the total. As there is no publicly available information on the amount of electricity sold under the national tariff differentiated by consumer group, the amount of cross-subsidy among consumer groups could not be calculated.

Other than the tariffs differentiated by consumer groups, regional cross-subsidy is the main mechanism by which end-users are cross-subsidised in the system. It would be possible to calculate the amount of regional cross-subsidy by taking the difference between the amount collected in each region by the national tariff and the amount provided by the regional tariff; however, detailed data on the income caps of each distribution region, which is no longer made public by EMRA, would be required for this purpose. Therefore, it was not possible at this time to make an estimate of regional cross-subsidies.

A detailed note on the national tariff and the price equalisation mechanism is provided in Annex-B.

Special taxes on electricity and VAT are an important part of end-user tariffs. As of August 2018, taxes and funds constitute 17% to 20% of end-user tariffs depending on consumer groups. The special taxes on electricity are charged on energy sourcing portion of the national tariff and are applied as follows:

	Industrial Customers	Others
Energy Fund	1%	1%
Municipality Tax	1%	5%
TRT (National Public TV Channel) Tax	0%	2%

The total estimated amount of special taxes on electricity to be paid by end-users in 2018 is about US$721 million.

Although there is no direct incentive and support in regulated retail tariffs, cross-subsidy among distribution regions and consumer groups is a point for improvement. Elimination of regional and consumer group subsidies may encourage more effective

use of scarce resources. Replacing cross-subsidies with more targeted incentives and support for vulnerable groups may also increase policy effectiveness. To this end, new incentive programs for end-users tied to improvements in energy efficiency, use of renewables and demand side participation may be considered.

4.4. Government Incentives for Energy Investments

Since the onset of the liberalisation process in the energy sector in 2001, the government has increasingly assumed the role of regulator and general policymaker rather than directly providing services or investing in power generation capacity. Nevertheless, despite its reduced role as direct provider of services, the government continues to deploy incentive mechanisms for the private sector to promote investments.

Government incentives provided to private investors in the energy sector take the following forms (Invest in Turkey, 2018):
1. General Investment Incentives Scheme
2. Regional Investment Incentives Scheme
3. Large-Scale Investment Incentives Scheme
4. Strategic Investment Incentives Scheme
5. Sector-Specific Incentives

The support instruments within the framework of various investment incentive schemes are shown in Table 9.

Table 9: *Government Incentive Schemes and Support Instruments*

Support Instruments	General Investment Incentives Scheme	Regional Investment Incentives Scheme	Large-Scale Investment Incentives Scheme	Strategic Investment Incentives Scheme
VAT Exemption	✓	✓	✓	✓
Customs Duty Exemption	✓	✓	✓	✓
Tax Reduction		✓	✓	✓
Social Security Premium Support (Employer's Share)		✓	✓	✓
Income Tax Withholding Allowance *		✓	✓	✓
Social Security Premium Support (Employee's Share) *		✓	✓	✓
Interest Rate Support **		✓	✓	✓
Land Allocation		✓	✓	✓
VAT Refund***				✓

*Provided that the investment is made in Region 6.
**Provided that the investment is made in Regions 3, 4, 5 or 6 within the framework of the Regional Investment Incentives Scheme.
***For construction expenditures of strategic investments with a minimum fixed investment amount of TRY 500 million.
Source: Invest in Turkey, 2018

1. *General Investment Incentives Scheme:* The general investment incentives scheme, consisting of VAT exemption and import duty exemption for imported machinery and equipment, is the basic package available to most investors. All energy investments, with the exception of natural gas power generation plants licensed after 19/06/2012, can benefit from the general incentives. Natural gas plants licensed after 2012 are excluded from all four investment incentive schemes mentioned in this section. The main reason for excluding natural gas plants, which rely almost entirely on imported natural gas, is the aim to reduce import dependency in power generation

2. *Regional Investment Incentives Scheme:* The regional incentive scheme has varying levels of support depending on the location of the investment. Provinces of Turkey are grouped into six levels from the most (1) to the least (6) developed; with region 1 receiving the lowest level of support. Investments located in organised industrial zones are supported at one level higher than the province where they are located.

   Under the scheme, depending on their region, investors are able to get a tax exemption rate of 50%-90% for up to 15%-55% of the amount of their investment. In addition, the government contributes to the employer's share of social security payments for 10% to 100% of their employees for a period of 2 to 12 years. For Region 6, 100% employee's share of social security payments is paid by the government for 10 years. Another type of support is the interest rate support, whereby a portion of the interest/profit share regarding the loan equivalent, at most 70 percent of the fixed investment amount registered in the investment incentive certificate, is covered by the government for a maximum period of the first five years.

   The grouping of provinces and the types and rates of support are given in Annex C.

3. *Large Scale and Strategic Investment Incentives Schemes:* Priority and strategic areas identified by the government qualify for incentives provided to Region 5. In addition, if the fixed investment amount in priority investments is 1 billion TL (around US$200 million) or more, tax reduction is applied by adding 10 points on top of the "rate of contribution to investment" available in Region 5. If priority investments are made in Region 6, the regional incentives available for this particular region applies. The energy sector investments defined as priority and/or large-scale investment areas are energy efficiency investments, mining and electricity generation from local coal, transit pipelines and oil refineries.

4. *Sector-Specific Incentives:* Sector-specific incentives related to the energy sector are incentives offered for power generation from renewable energy and local coal and capacity mechanisms discussed in Section 4.2. These incentive payments, however, are not made by the government but by end-users through electricity tariffs.

Regional and other incentives apply to energy investments as they do to other eligible projects. Three types of support applicable under the incentive scheme for energy projects are relevant and relatively measurable: social security premium support, interest rate support and corporate tax exemption.

The tally of applications for investment incentive certificates provide an indication for the investment amount eligible for incentives. During the four-and-a-half years from June 2012, the date on which the regional incentive scheme started, to the end of 2017, a total of 5,479 energy projects with a total investment amount of about US$80 billion (equivalent of 206 billon TL) and expected employment of about 26 thousand people, obtained incentive certificates (Ekonomi Bakanlığı, 2018). Energy investments constitute about 20% of the total number of projects, about 35% of the total investment amount and 3% of employment creation under the incentive scheme. The estimated amount of energy investment actually completed during the same period is estimated at about US$30 billion. Assuming a regional distribution of energy projects similar to the national distribution, the total cap for tax exemption for the investments is around US$7 billion.

The total amount of investment incentives provided to private sector energy investors is estimated to be less than 1% of the national budget expenditures in 2018.

While specific data on the amount of payment made or exemption provided by the government to energy projects for each type of support under the incentive scheme is not available, it is possible to make an estimation based on the existing data. Table 10 shows the estimated annual amount of government support provided for energy investments. The total amount of private sector incentives as interest rate and social security premium support is estimated to be around 1% of the national budget expenditures for 2018. The share of energy investments in the incentive scheme for 2018 is estimated to be around 2-3% for social security premium support and around 13% for interest rate support.

Table 10: *Estimated Annual Government Support for Private Sector Energy Investments (US$ million)*

	2018 Total Government Budget	Estimated Amount for Energy Investments
Social Security Premium Support	4,167	104*
Interest Rate Support	313	40
Corporate Tax Exemption	not budgeted	45

*Estimate includes social security premium support for coal mining.
Source: Authors' estimates based on Ekonomi Bakanlığı, 2018; Invest in Turkey, 2018.

Compared to the actual amount of investment and the potential total cap of around US$7 billion, the estimated amount of annual tax exemption seems modest. The main reason for the low level of corporate tax exemption is the low profitability of projects due to financing and depreciation costs, which leads to very low tax accrual.

This particular set of incentives do not specifically target the energy sector and their effect has been limited compared to specific incentives targeting the energy sector such as feed-in tariffs. The incentive scheme mainly rewards investments characterized by high direct job creation at the operational stage and high profitability which would lead to tax accrual especially in less developed regions. Energy investments, which are capital rather than labour intensive, and which have long pay back periods and high financing costs, are not well positioned to benefit from this scheme.

Other types of support, such as land allocation, priority in access to land through appropriation, access to transmission networks and concessions are significant. The opening of a whole new sector to the private sector and public support in terms of legislation and priority access to scarce resources has a value on its own. The valuation would require going into details of individual projects, each with its own set of circumstances determining the value of allocated resources, which goes beyond the scope of this preliminary study on standard subsidy and support mechanisms. In most cases concessions involving transfer of exclusive rights is carried out through competitive auctions, which provide an indication of value for some types of access such as grid connection. An effort for full quantification of the resources allocated to the private sector would be worthwhile for further studies.

4.5. Subsidy/Support Flows and Who is Financing Whom

The preceding sections attempted to identify and quantify subsidies, support, incentives and other non-market flows such as special taxes or tax exemptions going to fossil fuel suppliers, thermal power generators, low-carbon transition and end-users. In this section, a summary of all relevant non-market flows and their sources will be summarised and discussed.

Estimated annual flows are expressed as 10-year and 3-year averages for government investments, state enterprise losses and coal aid to low income households. For all other annual flows, 2018 estimates or most recently available data are used. The reason for using long term averages for government investments (including state enterprise investments), state enterprise losses and coal aid is to enable an analysis of shifts in government policy and support in recent trends compared to long term averages. For example, privatisation of EÜAŞ thermal plants has caused a major decline in government investments in thermal power generation compared to government investments for low-carbon energy transition. A similar approach for subsidies to thermal power generators and end-users would be preferable; however, long term data are scarce and sketchy. For this reason, two hybrid tables combining three-year and ten-year averages for government investments and losses with 2018 estimates for other data were produced. The tables for government investments are presented in Annex A. Average annual non-market flows, excluding the amount for special consumption tax for refined oil products, over the past ten years (2008-2017) were estimated at US$8.5 billion compared to a total of US$8 billion for the past three years (2015-2017). The main reason for the decline is a reduction of US$521 million or 27% in government investments. In line with the changing role of government and privatisation programs, average annual government investment over the last three years declined by US$222 million (%27) for renewable energy (mainly hydropower) investments, by US$187 million (35.4%) for oil and gas exploration and by US$111 million (85%) for thermal power plants. While government investments declined on average over the past three years compared to the ten-year average, annual average losses of state enterprises, TTK and TKİ, increased from US$190 million to US$280 million.

Analysis of non-market flows by provider for the past three years reveals that 48% of total support is provided by end-users through natural gas and electricity tariffs as energy taxes and support for feed-in tariffs in electricity. About 27% of total support is provided by state-owned fossil fuel suppliers to end-users and thermal power generators as subsidised natural gas tariffs or coal aid to low income households. 25% of total support is provided by the government as direct investments or loss

By recipient, about 60% of non-market flows goes to energy suppliers, 28% to end users and 12% to the government. By provider, 48% of total support is provided by end users through tariffs, 27% by state-owned enterprises through price subsidies or direct aid and 25% by the government mainly through investments and loss compensation to state enterprises.

compensation for state energy enterprises (80%), private sector energy investment incentives (10%) and tourism energy support (10%).

By recipient, the largest share of non-market flows, at 60%, goes to energy suppliers followed by 28% to end-users and the remaining 12% to the government. Table 11, which shows support for energy sources by provider, reveals that out of total non-market flows to energy sources, about one third goes to fossil fuels and two thirds to low-carbon energy transition. While support for fossil fuel suppliers is provided entirely by the government, 80% of support for thermal power plants comes from end-users. Of the remaining flows to thermal power plants, natural gas price subsidies and government investments constitute 8% and 12%, respectively. Of the flows to low-carbon energy sources, 77% comes from end-users through feed-in tariffs.

Table 11: *Estimated Annual Non-Market Flows to Energy Sources (US$ million)*

	From Government	From Fossil Fuel Suppliers	From End-users	TOTAL
Flows to Fossil Fuels	**1,099**	**49**	**500**	**1,648**
Fossil Fuel Suppliers	*1,028*	*-*	*-*	*1,028*
Coal	447	-	-	447
Oil	323	-	-	323
Natural Gas	258	-	-	258
Thermal Power Generators	*71*	*49*	*500*	*620*
Flows to Energy Transition	**728**	**-**	**2,430**	**3,158**
TOTAL	**1,826**	**49**	**2,930**	**4,805**

Source: Authors' estimates

The shares of non-market flows in the energy sector by type are shown in Figure 7. Feed-in tariffs and capacity mechanisms have the largest share, constituting 35% of total non-market flows, followed by fuel cost subsidies which have a share of 26%. Government investments constitute 16% of flows while the share of investment incentives provided by the government for private sector investors consitute merely 2%. Direct support provided to end-users by the government has a 6% share while the share of energy taxes paid by end-users is 12%.

Figure 7: *Shares of Non-Market Flows by Type*

- Coal Aid
- Government Investments
- Compensation of State Enterprise Losses
- Fuel Cost Subsidies
- Feed in Tariffs and Capacity Mechanism
- Private Sector Investment Incentives
- Tourism Industry Energy Support
- Special Energy Taxes
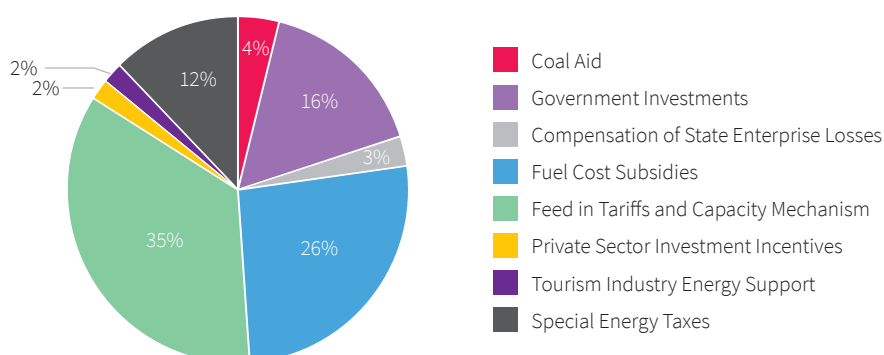
5. Conclusion and Recommendations

The question on the volume of existing subsidy and support schemes in Turkey's energy sector is being discussed for several years. Due to scattered availability of information, an analysis that consolidated and quantified the monetary flows of such schemes is unavailable. This study prepared by the SHURA Energy Transition Center makes a first step forward to collect such data from publicly available sources and quantifies the total non-market flows resulting from subsidies, support, incentives, tax exemptions, special energy taxes and other major support mechanisms in Turkey's energy markets in a comparable way. The analysis covers a period of ten years between 2008 and 2017. In addition, 2018 data covering the first six or nine months of the year, depending on data availability, were used to make the final estimates.

This analysis is particularly important as Turkey's energy imports represented around 5% of the country's total GDP in 2017 and the study finds that non-market flows represented 1% of the GDP in the same year. In crafting enhanced policies to utilise Turkey's rich resources of local renewable energy and energy efficiency, it will be crucial to understand how these non-market flows can be more effectively allocated. The analysis points to three areas that represent a large share of the total non-market flows in the period analysed: support for fossil fuels related to their exploration, research and development, and for fossil fuel-based electricity generation and heating; support for energy transition through renewable energy feed-in tariffs; and finally, special consumption taxes and energy transition support covered by end-users. In light of the continuing decline of renewable energy costs, switching to the increased use of market-based mechanisms will help alleviate the economic burden of energy transition on end-users. As the share of renewable energy in Turkey's energy sector increases, it will also be important to explore options about how non-market flows that are currently being employed for conventional technologies, can be used more effectively to support investments in flexibility technologies and infrastructure for grid integration of renewables.

The value of non-market flows calculated in this report can be considered a low-end figure representing the most tangible support provided to energy suppliers. There is a whole area of support afforded by concessions and priority access to scarce resources like land, grid connection, dispatch, and guaranteed markets whose value calculation was excluded from this report due to limitations in data availability. Inclusion of such factors is expected to likely increase the value of non-market flows and perhaps its distribution as well. Therefore, conclusions and recommendations provided in this report are of a preliminary nature. Nevertheless, current findings still point to some conclusions unlikely to be affected by a more comprehensive numeration of the benefits provided by non-market flows.

Finally, this report focused, as much as possible, on measuring the magnitude of non-market flows in Turkey's energy sector, which has been on the road to liberalise its natural gas and electricity markets since 2001. Governments often need to employ non-market mechanisms, sometimes in the form of subsidies, for social welfare. In the specific case of Turkey, issues of energy poverty for heating and electricity use remain largely unexplored. It is important to consider public priorities for increasing citizens' welfare together with new strategies for energy pricing to promote the low carbon energy transition. In this paper, we were able to provide qualitative evidence on the existence of cross-subsidies in retail electricity and heating markets.

However, the magnitude, direction of flows, and the impact of these cross-subsidies on devising targeted and effective public mechanisms to ensure affordable energy access need to be understood better and therefore we suggest this as a high priority topic for future research. In particular, more data transparency on cross subsidies and more accurate measurement of energy use on the consumer side would provide a basis for designing more effective policy instruments both for energy efficiency and for more targeted social protection.

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Annex A: Detailed Breakdown of Government Investments

Table 12: *Cumulative Government Investments, 2008-2017 (in US$ million)*

	BOTAŞ	TPAO	TTK	TKİ	MTA	EÜAŞ	DSİ	MENR	TÜBİTAK	Universities	TOTAL
Oil and Gas Exploration	-	3,593	-	-	-	-	-	-	-	-	3,593
Oil and Gas Production/ Field Development	-	1,418	-	-	-	-	-	-	-	-	1,418
Oil and Gas R&D, ICT, Institutional Development	41	40	-	-	-	-	-	4	3	1	89
Oil and Gas Transmission Infrastructure	1,557	-	-	-	-	-	-	-	-	-	1,557
Natural Gas Storage	930	121	-	-	-	-	-	-	-	-	1,051
Coal Exploration	-	-	144	59	243	206	-	-	-	-	652
Coal Production	-	-	150	378	-	202	-	-	-	-	730
Coal R&D, ICT, Institutional Development	-	-	1	50	-	10	-	4	2	0	67
Thermal Plants	-	-	-	-	-	1,331	-	-	-	-	1,331
TOTAL Fossil Fuels	*2,529*	*5,172*	*295*	*487*	*243*	*1,750*	*0*	*8*	*5*	*1*	*10,489*
Energy Transition R&D, ICT, Institutional Development	-	-	-	-	-	-	-	71	20	30	120
Geothermal Exploration	-	-	-	-	38	-	-	-	-	-	38
Hydroelectric Plants	-	-	-	-	-	430	7,738	-	-	-	8,169
TOTAL Energy Transition	*0*	*0*	*0*	*0*	*38*	*430*	*7,738*	*71*	*20*	*30*	*8,328*
TOTAL FOSSIL FUELS + ENERGY TRANSITION	**2,529**	**5,172**	**295**	**487**	**282**	**2,180**	**7,738**	**79**	**25**	**31**	**18,817**

Table 13: *Cumulative Government Investments, 2015-2017 (in US$ million)*

	BOTAŞ	TPAO	TTK	TKİ	MTA	EÜAŞ	DSİ	MENR	TÜBİTAK	Universities	TOTAL
Oil and Gas Exploration	-	875	-	-	-	-	-	-	-	-	875
Oil and Gas Production/ Field Development	-	382	-	-	-	-	-	-	-	-	382
Oil and Gas R&D, ICT, Institutional Development	6	30	-	-	-	-	-	1	0	0	37
Oil and Gas Transmission Infrastructure	463	-	-	-	-	-	-	-	-	-	463
Natural Gas Storage	300	13	-	-	-	-	-	-	-	-	313
Coal Exploration	-	-	44	32	78	78	-	-	-	-	232
Coal Production	-	-	60	81	-	41	-	-	-	-	182
Coal R&D, ICT, Institutional Development	-	-	0	18	-	2	-	1	2	0	23
Thermal Plants	-	-	-	-	-	57	-	-	-	-	57
TOTAL Fossil Fuels	*769*	*1,301*	*105*	*131*	*78*	*178*	*0*	*2*	*2*	*0*	*2,565*
Energy Transition R&D, ICT, Institutional Development	-	-	-	-	-	-	-	29	3	11	42
Geothermal Exploration	-	-	-	-	19	-	-	-	-	-	19
Hydroelectric Plants	-	-	-	-	-	131	1,641	-	-	-	1,773
TOTAL Energy Transition	*0*	*0*	*0*	*0*	*19*	*131*	*1,641*	*29*	*3*	*11*	*1,834*
TOTAL FOSSIL FUELS + ENERGY TRANSITION	**769**	**1,301**	**105**	**131**	**97**	**310**	**1,641**	**31**	**4**	**11**	**4,398**

Annex B: Note on the National Tariff and the Price Equalisation Mechanism

Since the regulated tariff is a benchmark and reference point in the competitive market, it is important to understand its formation methodology and components. Indeed, the regulator in Turkey uses tariff formation methodologies applied by many regulators in liberal markets. However, the regulated retail tariff includes many subsidies, which results in inefficiency (e.g. cross-subsidisation of commercial & non-commercial losses among distribution regions) despite certain socioeconomic benefits (e.g. subsidies in irrigation as part of national agricultural policy).

Table 14 is a summary of the methodologies used in setting up the regulated retail prices. The first step in setting up the tariffs is the determination of the revenue requirement to cover all costs and profits allowed by the regulator. Subsequently, the pricing evaluation should be done to recover revenue needs. The most important point in pricing is the reflection of the actual revenue requirements according to the characteristics of the consumer group. However, this is a part of the process in which the subsidy among the consumer groups starts.

Table 14: Regulated Retail Tariff Process Structure

Component	Tariff Methodology	Subsidisation	Subsidisation Mechanism
Energy Sourcing – Retail	Revenue Ceiling / Price Cap	Cross & Regional Subsidisation	Price Equalisation
Network – Transmission	Revenue Ceiling	Cross & Regional Subsidisation	Price Equalisation
Network – Distribution	Revenue Ceiling	Cross & Regional Subsidisation	Price Equalisation

Sources: Electricity Market Regulation for Tariffs; www.epdk.org.tr; as of 30.07.2018; Electricity Market Communique for Price Equalisation Mechanism; www.epdk.org.tr, as of 30.07.2018; Electricity Market Communique for Distribution System Revenue Arrangement; www.epdk.org.tr, as of 30.07.2018; Electricity Market Communique for Transmission System Revenue Arrangement; www.epdk.org.tr, as of 30.07.2018; Electricity Market Communique for Market Operation Revenue Arrangement; www.epdk.org.tr, as of 30.07.2018; Electricity Market Communique for Retail Sales Prices Arrangement; www.epdk.org.tr, as of 30.07.2018; Electricity Market Communique for Last Resort Tariff Arrangement; www.epdk.org.tr, as of 30.07.2018; Electricity Market Procedure in Retail Sales Tariffs; www.epdk.org.tr, as of 30.07.2018

There are two types of subsidies in the retail market, namely, the regional subsidy and the cross-subsidy. The Electricity Market Law allows the regulator to continue or revise the subsidies for each tariff period.[8]

The regional subsidy is related to subsidies allocated among distribution regions. The regulated retail tariff is a national tariff in Turkey. A single tariff table is used in every distribution region. In fact, the tariffs should be different in every region due to differences in cost elements such as commercial and non-commercial losses. For example, while the targeted commercial and non-commercial loss as a percentage of distributed energy is 7.00% for 2018 in one of the distribution regions in Turkey, it is 12.34% in another region.[9] In other words, the energy cost in the sourcing of commercial and non-commercial losses differs between two regions. This cost difference renders the network fee different in these regions. However, the national tariff takes the combined cost of all distribution regions into account. The regional subsidy results in customers in low cost regions to subsidise customers in high cost regions.

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[8] Law No: 6446- Electricity Market; www.epdk.org.tr; as of 30.07.2018
[9] http://www.epdk.org.tr/Detay/Icerik/3-1517/elektrik-piyasasi-duzenleyici-tarife-kurul-kararlari

Cross-subsidy refers to subsidies distributed among consumer groups.[10] Cross-subsidisation relies on a very similar approach with the allocation of regional subsidies. In fact costs of service delivery are different for each consumer segment. For example, the cost of bad debts may vary between residential and industrial customer segments. However, the cross-subsidy mechanism assumes that the cost of bad debt is the same in all consumer groups. The national tariff takes the combined cost of all consumer groups into consideration. The cross subsidy results in low cost customers segments to financially support high cost customer segments.

The price equalisation mechanism is the main tool of regional and cross-subsidies.[11] This is a mechanism which aims to transfer the excess revenue generated in distribution regions where the actual generated revenue is higher than revenue needs determined by the regulator to the regions where the generated actual revenue is lower than revenue needs. The mechanism can be considered as a pool in which the actual revenue generated in the system is equal to the revenue needs and the balance is kept by redistribution. The money transfer among distribution regions flows through EÜAŞ.

Figure 8: *Price Breakdown in National Regulated Retail Tariffs (August 2018)*
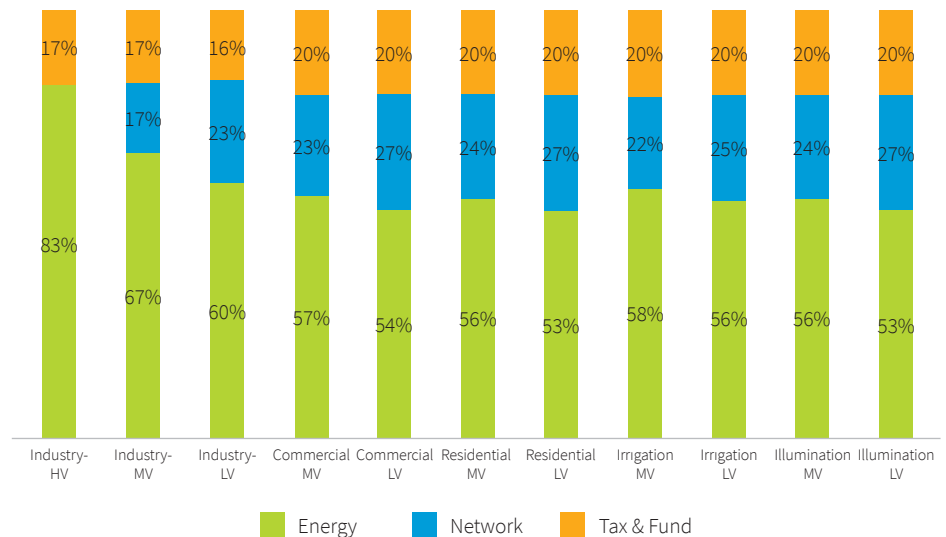
Source: Regulated National Retail Tariffs announced by Electricity Market Regulatory Agency on August 1, 2018; www.epdk.org.tr

In order to understand support/incentives mechanisms and potential points of improvement to encourage energy efficiency applications, it would be worthwhile to look at the details of each cost component.

- **The energy sourcing cost** in the regulated retail sales tariff is a pass-through item. Currently, the tariffs are set quarterly by means of both ex-ante and ex-post methods in each period. The energy sourcing cost of the following quarter is forecasted according to projected sales and energy procurement prices. In addition, the amount of correction of the previous two quarters is added to the forecasted energy cost. The correction amount is the difference between the actual and the forecasted energy sourcing costs. The methodology has an efficiency factor in calculation of the total energy sourcing cost. The formulation includes a forecasting efficiency coefficient to increase the performance of the companies in making their forecasts. If company forecasts deviate largely from the actual

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[10] Electricity Market Regulation for Tariffs; www.epdk.org.tr; as of 30.07.2018
[11] Electricity Market Regulation for Tariffs; www.epdk.org.tr; as of 30.07.2018
   Electricity Market Communique for Price Equalisation Mechanism; www.epdk.org.tr, as of 30.07.2018

cost, a part of the cost will be borne by companies. This application leads to improvements of efficiency in the sourcing market by means of effective balancing management.

- The tariffs in retail sales include a **gross margin** on top of the energy sourcing cost except market costs such as zero residual amount adjustment and market operation fee. The gross margin is set by the regulator so as to cover the operational cost of retail sales such as energy sourcing management, and to provide a net profit margin to the supplier. The margin is currently 2.38% (for the period between 2016 and 2020).[12]

- Another element in retail sales tariffs is the **retail service cost,** which mainly covers costs related to customer services and operations such as customer relations, billing/invoicing and receivable management. It is determined as a total revenue ceiling for each application year in every tariff negotiation period. The amount of retail service revenue ceiling is specified on the basis of fixed, variable and uncontrollable operational expenditures as well as a reimbursement of capital expenditures. The fixed part is a guaranteed revenue allocation, whereas the variable part depends on the number of customer contracts. The uncontrollable part is a revenue item which covers the actual cost of companies such as taxes and severance payments, the amount of which is not under the control of companies. Moreover, bad debt costs are integrated based on the actual bad debt rate, but capped by 1% of the total revenue in the uncontrollable part to incentivise companies to keep their collection rates more than 99%. The depreciation of approved capital expenditures is also a part of the retail service revenue ceiling.

Table 15: *Retail Sales Tariffs*

Main Cost Group	Sub-Cost Items	Need of Regional Cost Differentiation	Need of Cost Allocation	Performance Efficiency Parameters Used
Energy	Bilateral Contracts	Regional / Consumer Segment	Yes (according to customer group and their energy consumption profiles)	Deviation between the forecast and actual energy cost
	Spot Market			
	Unlicensed			
	Market Costs (YEKDEM, etc.)			
Gross Margin	Opex	Regional / Consumer Segment	Yes (according to customer group and their energy consumption profiles)	
	Net Profit Margin			
Retail Service	Opex Controllable-Fixed	Regional / Consumer Segment	Yes (according to customer group and their number)	Efficiency factor in Opex, bad debt, quality factor incentives
	Opex Controllable-Variable			
	Opex Uncontrollable (including bad debt)			
	Capex			

Sources: Electricity Market Regulation for Tariffs; www.epdk.org.tr; as of 30.07.2018; Electricity Market Regulation for Service Quality in Distribution and Retail Sales Operations; www. epdk.org.tr; as of 30.07.2018; Electricity Market Communique for Price Equalisation Mechanism; www.epdk.org.tr, as of 30.07.2018; Electricity Market Communique for Distribution System Revenue Arrangement; www.epdk.org.tr, as of 30.07.2018; Electricity Market Communique for Transmission System Revenue Arrangement; www.epdk.org.tr, as of 30.07.2018; Electricity Market Communique for Market Operation Revenue Arrangement; www.epdk.org.tr, as of 30.07.2018; Electricity Market Communique for Retail Sales Prices Arrangement; www.epdk.org.tr, as of 30.07.2018; Electricity Market Communique for Last Resort Tariff Arrangement; www.epdk.org.tr, as of 30.07.2018; Electricity Market Procedure in Retail Sales Tariffs; www.epdk.org.tr, as of 30.07.2018; EPIAS Reporting web page; https://rapor.epias.com.tr/rapor/; as of 30.07.2018

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[12] This is set by the regulator for each regulated tariff period. It has started with 2.33% for the 2006-2010 period and increased to 3.49% for the 2011-2015 period.

The cost elements that form the distribution tariff are summarised in Table 16. The distribution tariff is set according to the revenue ceiling methodology, which includes four main cost elements; operational and maintenance (O&M) costs, capital costs, R&D costs and energy sourcing cost.

- The O&M cost component includes controllable and uncontrollable parts similar to retail service revenue ceiling. The uncontrollable part depends on the network length, number of meters connected to the grid and the transformer's total installed capacity. Once again, an efficiency factor is applied in the determination of its amount to ensure a continuous improvement of O&M. This efficiency factor is set according to the benchmarking methodology used by the regulator. Moreover, the regulation provides a bonus system to companies to incentivise them to produce a better result in their quality performance indicators such as the System Average Interruption Duration Index (SAIDI) and the System Average Interruption Frequency Index (SAIFI). Another incentive employed to generate additional revenues is linked to network assets such as advertisement on poles. The regulator allows companies to keep the majority of the revenue generated in this way. However, in order to transfer some amount of the revenue to consumers, a certain part of it is deduced from the O&M revenue requirement.
- Capital cost requirement is determined according to the required amount of investment because of increases in demand as well as the replacement and renewal needs of the region. The reimbursement period and the rate of return applied to the regulated asset base is the same for each region. The allowed capital cost budget is converted into a detailed plan by using material/equipment unit prices announced by the regulator. If the company obtains a better price in the actual implementation of investments, the cost saving with respect to allowed capital cost budget is retained by the distribution company as a benefit (before tax).
- The R&D incentive system is an item that was added to incentivise Distribution Companies to work on R&D projects related to the distribution business. The R&D budget is a certain share of O&M costs (1% of the O&M revenue need). The budget should be spent only on projects approved by the regulator. R&D projects at implementation phase are sought to create value from various aspects such as cost efficiency, environmental protection and customer satisfaction.
- The energy cost element employs a similar methodology as described for the retail part. The most important point with regard to this element is that the energy cost is calculated according to targeted commercial and non-commercial loss rates set by the regulator. If the actual loss rate is more than the targeted rate, the excess cost remains as a burden on the company.

Table 16: *Network – Distribution Tariffs*

Main Cost Group	Sub-Cost Items	Need of Regional Cost Differentiation	Need of Cost Allocation	Performance Efficiency Parameters Used
O&M Costs	Controllable-Fixed	Regional / Consumer Segment	Yes (according to customer group and their network utilisation profiles/characteristics)	Efficiency factor in O&M, deduction of other revenues from O&M, quality factor incentives
	Controllable-Variable			
	Uncontrollable			
Capital costs	Capacity Increase (Extension)	Regional / Consumer Segment	es (according to customer group and their network utilisation profiles/ characteristics)	Unit price application
	Replacement			
	Renewal			
R&D Costs	-	-	-	-
Energy	Commercial & Non-Commercial Losses	Regional / Consumer Segment	Yes (according to customer group and their energy consumption profiles)	Target rate for commercial and non-commercial losses
	Street Lighting			

Sources: Electricity Market Regulation for Tariffs; www.epdk.org.tr; as of 30.07.2018; Electricity Market Regulation for Service Quality in Distribution and Retail Sales Operations; www.epdk. org.tr; as of 30.07.2018; Electricity Market Regulation to Reduce Distribution Losses; www.epdk.org.tr; as of 30.07.2018; Electricity Market Communique for Price Equalisation Mechanism; www.epdk.org.tr, as of 30.07.2018; Electricity Market Communique for Distribution System Revenue Arrangement; www.epdk.org.tr, as of 30.07.2018

Energy pricing and non-market flows in Turkey's energy sector

Annex C: Grouping of Provinces and The Types and Rates of Support

REGIONS

1	2	3
4	5	6

Regional Investment Incentives Scheme Instruments								
Incentive Instruments		Region						
		1	2	3	4	5	6
VAT Exemption		YES						
Customs Duty Exemption		YES						
Tax Reduction	Tax Reduction Rate (%)	50	55	60	70	80	90
Rate of Contribution to Investment (%)	Out of OIZ*	15	20	25	30	40	50
	Within OIZ*	20	25	30	40	50	55
Social Security Premium Support (Employer's Share)	Support Period	Out of OIZ*		2 years	3 years	5 years	6 years	7 years	10 years
		Within OIZ*		3 years	5 years	6 years	7 years	10 years	12 years
		Upper Limit for Support (%)	Out of OIZ*	10	15	20	25	35	No limit
			Within OIZ*	15	20	25	35	No limit	No limit
Land Allocation		YES						
Interest Rate Support	TRY Denominated Loans (points)	N/A	N/A	3 points	4 points	5 points	7 points
	FX Loans (points)			1 point	1 point	2 points	2 points
Social Security Premium Support (Employee's Share)		N/A	N/A	N/A	N/A	N/A	10 years
Income Tax Withholding Allowance		N/A	N/A	N/A	N/A	N/A	10 years

*OIZ: Organised Industrial Zones

Investment Contribution Rates Applicable During Investment / Operating Periods Under Regional Investment Incentives Scheme		
Regions	Investment Period	Operating Period
1	80 %	20 %
2	80 %	20 %
3	80 %	20 %
4	80 %	20 %
5	80 %	20 %
6	80 %	20 %

Annex D: Note on Methodology for Calculating Non-Market Flows

In this note, identifying the main methodology and assumptions used in each section as outlined below, the methodology employed in quantifying subsidies and support is summarised.

Subsidies and Support for Energy Suppliers

Note on Currency Conversion
The figures in the report are expressed in current US dollars. The conversion from Turkish Lira to US dollars is made at the average exchange rate for the year for annual data and for the month for monthly data.

Government Investments
Government investments in fossil fuels were classified as Oil and Gas Exploration, Oil and Gas Production/Field Development, Oil and Gas R&D, ICT & Institutional Development, Oil & Gas Transmission Infrastructure, Natural Gas Storage, Coal Exploration, Coal Production, Coal R&D, ICT & Institutional Development, and Thermal Plants. Investments in hydroelectric plants, geothermal resources exploration, and Energy Transition R&D, ICT & Institutional Development were considered under energy transition investments. Information was obtained from annual Government Investment Programme documents for the period between 2008 and 2017. Government institutions considered in relation to fossil fuels were TPAO, BOTAŞ, TTK, TKİ, MTA (coal), EÜAŞ, MENR, TÜBİTAK and universities. Government institutions taken into consideration in relation to energy transition were DSİ, MTA (geothermal), MENR, TÜBİTAK and universities.

State Enterprise Losses
Income statements of state enterprises for 2008-2017 were reviewed to explore net operating profit and final profit after other operating income and extraordinary income. Annual averages for 2008-2017 and 2015-2017 were assessed, and the amount is considered a subsidy if it is negative. The state enterprises taken into consideration were TPAO, BOTAŞ, TTK, TKİ and TETAŞ/EÜAŞ.

Fuel Cost Subsidies to Electricity Generators

Natural Gas
Estimated natural gas import prices were compared with natural gas tariffs for power generators and the difference between the two were multiplied with the estimated expected consumption of natural gas generators in 2018. Estimations on consumption of power generators was based on actual data for the first nine months of 2018 and a projection based on past seasonal trends for the last three months.

Tariff/Sales Price Support to Electricity Generators

Renewable Energy
The average of wholesale balancing pool prices were compared to the weighted average of feed-in tariff price for renewable energy generators. The weighted average feed-in tariff was calculated on the basis of actual generation mix (hydro, wind, geothermal, biomass and solar) for 2016, 2017 and the first half of 2018. To quantify the support provided to renewable energy generators, the difference between the

weighted average feed-in tariff and the estimated weighted average price in EPİAŞ wholesale pool was multiplied by the estimated volume of energy to be sold under the feed-in tariff. To estimate the volume of renewable energy sold in 2018, actual volumes for 9 months were added on an estimate based on trends for the remaining 3 months.

Local Coal

The estimate, as detailed in Section 4.2, was based on the theoretical generation amount, which caps the quantity of generation to be subsidized. The difference between the support price and the estimated weighted average price in the EPİAŞ wholesale pool was multiplied by the theoretical generation cap.

Capacity Mechanism for Supporting Reserve Capacity

The estimate, as detailed in Section 4.2, was based on the budgeted amount considered in setting the transmission network revenue ceiling for 2018.

Fuel Subsidies to End-users

Coal

Local coal subsidies consist of coal aid provided to low income households by TKİ, the amount and value of which was obtained from TKİ annual reports and cross checked with market value.

Natural Gas

Estimated natural gas import prices were compared with natural gas tariffs for each consumer group and the difference between the two were multiplied by the estimated expected consumption of each group in 2018. Estimations on the consumption of power generators was based on actual data for the first nine months of 2018 and a projection based on past seasonal trends for the last three months.

Subsidies on Electricity Tariffs to End-users

In order to determine whether the regulated national tariff covers the total cost of regulated regional tariffs, total distribution company revenue cap data available for March 2016 was updated to the end of 2018 using the estimated CPI inflation for 2018. The amount of distribution revenue to be collected from the national tariff was estimated by multiplying the estimated amount of distributed energy for industrial customers and others by corresponding distribution tariffs. The amount of revenue was then compared to the updated total distribution revenue cap for 2018. The same procedure was repeated for 2016 and 2017. For each year, it was observed that the revenue from the national tariff was sufficient to cover the total distribution income cap. It was thus concluded that consumer tariff as a whole did not contain subsidies.

Regional cross-subsidies, on the other hand, were not calculated, because data on the income cap of each region was not publicly available. Similarly, cross-subsidies among consumer groups was not calculated, because data on electricity sold on the national tariff by consumer group was not publicly available.

Special Energy Taxes on End-users

Oil
The estimated annual consumption amounts of diesel, fuel oil and LPG were multiplied by the calculated special consumption tax (ÖTV) on each[13]. Data for consumption and ÖTV were obtained from EMRA reports for the first 9 months of 2018 and estimated for the remaining 3 months based on trends.

Natural Gas
The estimated annual consumption of natural gas was multiplied by the special consumption tax (ÖTV) on natural gas. Data for consumption was obtained from EMRA reports for the first 9 months of 2018 and estimated for the remaining 3 months based on trends. ÖTV on natural gas is a fixed TL amount per cubic-meter of consumption.

Electricity
As explained in Section 4.3, different rates of special taxes on electricity are levied on industrial consumers and other consumers. The total amount of tax was calculated by multiplying the corresponding energy tariff for each consumer group by the tax rate for each group and the amount of consumption. The amount of consumption for each group was estimated based on data available for total distributed energy from EMRA Annual Electricity Report for 2017, and primary energy consumption tables of MENR.

Government Investment Incentives and Other Government Subsidies

Tax Exemptions Under the Investment Incentive Scheme
As explained in Section 4.4, the government provides tax exemptions for investors according to the region where the investment is located. The least developed region, Region 6, gets the largest exemption as explained in the tables provided in Annex C. Investments in power generation plants that use local coal and investments in local coal mining are eligible for incentives provided to Region 5 regardless of where they are actually located; and for Region 6 if they are located in Region 6. Investments in power generation from natural gas, unless they obtained a licence prior to 2012, are ineligible for incentives regardless of where they are located. Because of data limitations a series of assumptions had to be made for estimating the amount of tax exemption utilised by energy investors.

First, the total amount of the tax exemption cap for energy investors was estimated. Data on the total amount of energy investment eligible for exemption was obtained from Investment Incentive Certificates issued between mid-2012 (when the incentive scheme became effective) and the end of 2017. The regional distribution of energy investments under the scheme was assumed to be the same as all investments under the scheme. Based on the assumed regional distribution, the total amount of the of tax exemption cap was estimated at US$18 billion for the obtained certificates and US$7 billion for the estimated amount actually invested.

Next, the estimated amount of accrued taxes to be exempted was calculated. To estimate the amount of accrued taxes, a simulation based on energy generation projects of different types that have become operational over the past three years, their generation, income, profits and taxes was used. Because of high financing and depreciation costs, estimated annual accrued taxes were about US$90 million, half of

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[13] The special consumption tax is levied as a TL amount per unit of consumption, not as a percentage on price.

which was estimated to be tax exempt, based on an assumed average exemption rate suggested by overall regional project distribution.

Social Security Premium Support

Social Security premium support is provided for investments as explained in Annex C. The support available to energy investments was estimated by multiplying the budgeted amount for 2018 with the estimated percentage of employment created by energy investments based on Investment Incentive Certificate data and TUİK's employment data.

Interest Rate Support

Interest rate support for energy projects was estimated using the criteria in Annex C and utilising the budget data.

NOTES

About Istanbul Policy Center at the Sabancı University

Istanbul Policy Center (IPC) is a global policy research institution that specializes in key social and political issues ranging from democratization to climate change, transatlantic relations to conflict resolution and mediation. IPC organizes and conducts its research under three main clusters: The Istanbul Policy Center–Sabancı University–Stiftung Mercator Initiative, Democratization and Institutional Reform, and Conflict Resolution and Mediation. Since 2001, IPC has provided decision makers, opinion leaders, and other major stakeholders with objective analyses and innovative policy recommendations.

About European Climate Foundation

The European Climate Foundation (ECF) was established as a major philanthropic initiative to help Europe foster the development of a low-carbon society and play an even stronger international leadership role to mitigate climate change. The ECF seeks to address the "how" of the low-carbon transition in a non-ideological manner. In collaboration with its partners, the ECF contributes to the debate by highlighting key path dependencies and the implications of different options in this transition.

About Agora Energiewende

Agora Energiewende develops evidence-based and politically viable strategies for ensuring the success of the clean energy transition in Germany, Europe and the rest of the world. As a think tank and policy laboratory, Agora aims to share knowledge with stakeholders in the worlds of politics, business and academia while enabling a productive exchange of ideas. As a non-profit foundation primarily financed through philanthropic donations, Agora is not beholden to narrow corporate or political interests, but rather to its commitment to confronting climate change.