National Energy Efficiency Action Plan (NEEAP)

2017-2023



REPUBLIC OF TURKEY
MINISTRY OF ENERGY AND NATURAL RESOURCES

NATIONAL ENERGY

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EFFICIENT ENERGY
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ABBREVIATIONS

ARDSI	Agriculture and Rural Development Support Institute
BOTAS	Petroleum Pipeline Corporation
BRSA	Banking Regulation and Supervision Agency
EIP	Efficiency Improvement Project
EMRA	Energy Market Regulatory Authority
EPC	Energy Performance Certificate
ESCO	Energy Service Company
EUAS	Electricity Generation Company
EXIST	Energy Exchange Istanbul
GDP	Gross Domestic Product
GDRE	General Directorate of Renewable Energy
KGM	General Directorate of Highways
KOSGEB	Small and Medium Enterprises Development Organisation
ktoe	Thousand tonnes of oil equivalent
MENR	Ministry of Energy and Natural Resources
MEU	Ministry of Environment and Urbanisation
mtoe	Million tonnes of oil equivalent
NGO	Non-governmental Organisation
OECD	Organisation for Economic Co-operation and Development
OIZ	Organised Industrial Zone
TAGEM	General Directorate of Agricultural Research and Policies
TCDD	Turkish State Railways
TEDAS	Turkish Electricity Distribution Company
TEIAS	Turkish Electricity Transmission Corporation
TETAS	Turkish Electricity Trade and Contracting Corporation
TOBB	Union of Chambers and Commodity Exchanges of Turkey
TOKI	Housing Development Administration
TSE	Turkish Standards Institute
TTGV	Technology Development Foundation of Turkey
TURKSTAT	Turkish Statistical Institute

FOREWORD

We are going through an era in which radical changes are occurring in energy, storage, production, and consumption profiles based on renewable and hydrocarbon resources and energy market is redesigned.

Increased geopolitical risks and turbulences witnessed in the regions with dense energy resources oblige energy projections which are long-term and free from periodic developments to be brought into action urgently for all countries. In this context, by means of the introduced "National Energy and Mining Policy", we lay the foundations of long-term energy policies aiming at the efficient use of our domestic resources. The most basic goal of our strategy, which we build upon three basic pillars; namely supply security, increased use of local resources and foreseeable markets, is to launch initiatives that ensure our domestic resources to be used at maximum efficiency by reducing import dependence in energy.

We have gained speed on the work we realized with the motto of "More Domestic, More Renewable" for supplying continuous, uninterrupted, accessible and cost effective energy. We force the pace on investments that ensure our energy supply security such as setting up a well-developed storage infrastructure of natural gas, increasing electricity generation from domestic and renewable resources, incorporating nuclear energy into our energy portfolio, putting into operation of new global petroleum and natural gas pipelines and projecting alternative energy resources. In addition to meeting the growing demand, we have also commenced investments that will turn Turkey into regional production base in this sector by improving domestic production possibilities based on research-development and innovation in energy technology. While increasing the investments in energy and mining sector with transparent, investor-friendly and foreseeable market conditions, we will ensure that Turkey becomes a main energy center having a developed energy infrastructure where energy is priced in international arena, market development is directed and vendors and purchasers come together under free market conditions.

One of the topics we focused on in National Energy and Mining Policy is energy efficiency. Reducing energy intensity is targeted at both sectoral and macro levels by increasing efficiency from production to final consumption in all processes. Energy saving and energy efficiency have direct effects on aspects such as ensuring supply security, decreasing the risks of energy import dependence, competitiveness, protection of the environment and climate change.

The primary energy intensity of our country is 0.12 tons of oil equivalent (toe) per 1.000 USD at 2010 prices (USD). This number is lower than the world average of 0.18; however, it is higher than OECD average of 0.11 and EU average (28 members) of 0.09. Therefore, there exists a significant potential for energy efficiency improvement in our country.

In this context, first National Energy Efficiency Action Plan (2017-2023) was prepared as a result of the meticulous work with our Ministry and its partners, accepted by the High Planning Council and issued in the Official Gazette. The Action Plan includes actions to be taken to reach the national goals as well as impacts of these actions.

The Action Plan was prepared in conformity with principles in our target policy documents, such as our 2023 goals, Energy Efficiency Strategy Paper issued in 2012, 2015-2019 Strategic Plan of our Ministry, 10th Development Plan and Medium-Term Plan, by reflecting best practices in the world.

On the other hand, the EU's Energy Efficiency Directive of 2012/27/EU requires member states to prepare national energy efficiency action plan and renew by reviewing once every three years periodically. The National Energy Efficiency Action Plan was prepared in compliance with the template set in EU directive which allows for comparing and monitoring studies with the EU countries.

The Action Plan contains 55 actions defined under 6 categories namely buildings and services, energy, transport, industry and technology, agriculture and cross-cutting (horizontal) areas. The Action Plan encompassing technological, economic, social and environmental aspects, took into consideration innovative and best practices, prioritizes participation, joint management and was prepared pursuant to principles of efficiency and effectiveness as well as resource efficiency. The Action Plan has been developed in a structure that can be updated according to flexible, measurable and changing conditions being open to process and method innovation.

Expected energy savings is 23.9 MTEP cumulatively by investing 10.9 billion USD by 2023. This saving is equal to decreasing primary energy consumption of Turkey by 14 % in 2023 compared to the base usual scenario. Expected savings by 2033 is 30.2 billion USD.

The National Energy Efficiency Action Plan must be fulfilled with rigorous follow-up along with focused and high-quality implementation so that it could contribute to economic, social and technological development of our country. I strongly believe that the implementation of the Action Plan in line with the principles of transparency and accountability under our coordination will deliver beneficial outputs for our country extending to the upcoming decades.

Dr. Berat ALBAYRAK

Minister of Energy and Natural Resources

1 INTRODUCTION

Energy efficiency is an area that complements and cross-cuts such national strategic goals as easing the burden of energy costs on the economy, ensuring energy supply security, alleviating risks arising from external dependency, transition to low-carbon economy and protection of environment. The increased importance of sustainable development increases also the value of efforts in energy efficiency. This moves all countries towards improving energy efficiency and accelerates resolute action to that end.

The energy consumption in our country increases faster than in developed countries on account of such reasons as population growth, rising prosperity, strengthening service sector and industrialisation. The primary energy consumption reached 129.7 mtoe in 2015, representing an increase of 46% compared to 2005. With the import rate of 75.9% in 2015 in energy resources for primary energy supply, our country is in the category of high external-dependency countries.

Premised on the mission to utilise energy and natural resources efficiently and environment-friendly to make the highest contribution to the national prosperity, and the vision to build a secure future in energy and natural resources, our country aims to increase efficiency in all processes from energy generation to end-use consumption.

In this context, the Energy Efficiency Law adopted in 2007 started a new transformation process. The Energy Efficiency Strategy issued in 2012 set energy efficiency goals for 2023, and the National Energy Efficiency Action Plan was formulated for effective implementation and monitoring.

Formulated in consideration of our country's current needs and good practices in the world, the National Energy Efficiency Action Plan lays down the implementation steps, key performance indicators, how to implement, outputs and potential impact. Since energy efficiency is a multi-disciplinary area cross-cutting many sectors and relevant to many stakeholders, it is necessary to build close cooperation among institutions and organisations in charge of implementing the actions defined in this Plan and evaluating the outcomes. The General Directorate of Renewable Energy of the Ministry of Energy and Natural Resources will conduct the process of ensuring the said coordination and cooperation, monitoring, reporting and validating the Action Plan.

Under the National Energy Efficiency Action Plan that will be implemented in the period of 2017-2023, it is aimed to reduce the primary energy consumption of Turkey by 14% by 2023 through 55 actions defined in 6 categories namely buildings and services, energy, transport, industry and technology, agriculture and cross-cutting (horizontal) areas. It is also projected to achieve savings 23.9 mtoe cumulatively by 2023, for which 10.9 billion USD of investment will be made (Table 1). The cumulative savings by 2033 will be 30.2 billion USD at 2017 prices, where the effect of certain savings will continue through 2040. The average payback period for actions is 7 years.

Table 1. Investments and Projected Savings by Year

Total Investment Required (million USD)							
2017	2018	2019	2020	2021	2022	2023	TOTAL
958	1,279	1,593	1,681	1,748	1,824	1,846	10,928

Energy Savings															
2017		2018		2019		2020		2021		2022		2023		Cumulative	
(ktoe)	(m$)	(ktoe)	(m$)	(ktoe)	(m$)	(ktoe)	(m$)	(ktoe)	(m$)	(ktoe)	(m$)	(ktoe)	(m$)	(ktoe)	(m$)
577	202	1,630	571	2,493	872	3,378	1,182	4,298	1,504	5,264	1,842	6,261	2,191	23,901	8,365

Energy Savings																		Cumulative 2017-2033	
2024		2025		2026		2027		2028		2029		2030		2031		2032		2033			
(ktoe)	(m$)	(ktoe)	(m$)	(ktoe)	(m$)	(ktoe)	(m$)	(ktoe)	(m$)	(ktoe)	(m$)	(ktoe)	(m$)	(ktoe)	(m$)	(ktoe)	(m$)	(ktoe)	(m$)	(ktoe)	(m$)
6,261	2,191	6,261	2,191	6,261	2,191	6,261	2,191	6,248	2,187	6,248	2,187	6,248	2,187	6,248	2,187	6,216	2,175	6,216	2,175	86,369	30,228

1.1 Bases of the Action Plan

The **Energy Efficiency Law No. 5627** enforced in 2007 defines its fundamental purpose as to use energy effectively, avoid waste, ease the burden of energy costs on the economy, and improve efficiency in using energy resources and energy to protect the environment.

The **National Climate Change Strategy of 2010-2023** aims to increase energy efficiency and reduce greenhouse gas emissions in buildings, industry, transport and energy sectors.

The **Energy Efficiency Strategy of 2012-2023** defines a set of policies supported by result-oriented goals and devises actions that must be taken to achieve the goals.

Further, the **Tenth Development Plan of 2014-2018** defines energy efficiency measures that will be taken in the period in line with "1.14 Energy Efficiency Improvement Programme."

In addition, the **2015-2019 Strategic Plan of the Ministry of Energy and Natural Resources** defines energy efficiency goals under "Goal 4: A Turkey that Uses Energy Efficiently" and "Goal 5: Developed Capacity for Energy Efficiency and Saving" under "Theme: 2 Energy Efficiency and Energy Savings".

The Directive 2012/27/EU of the European Parliament and Council of 25 October 2012 on Energy Efficiency requires the Member States to draft national energy efficiency action plans that proposes a structural framework and implementation methodology on energy efficiency. The introduction of the National Energy Efficiency Action Plan in our country is an important step in harmonising with the said Directive.

On the other hand, the goals of the National Energy Efficiency Action Plan interlinked with the legislative texts listed above are also included in the National Energy and Mining Policy issued by the Ministry of Energy and Natural Resources.

1.2 Scope of the Action Plan

The National Energy Efficiency Action Plan includes 55 actions in buildings and services, energy, transport, industry and technology, agriculture and cross-cutting (horizontal) areas. Covering the technological, economic, social and environmental dimensions; considering innovative and best practices; prioritising stakeholder management; and having been prepared in line with the principle of effectiveness and efficiency, the Action Plan also includes resource efficiency to promote competitiveness. The Plan is developed as flexible, measurable and revisable to adapt changing conditions and open to innovations in process and methods.

The National Energy Efficiency Action Plan aims to boost and accelerate efforts to improve energy efficiency in all sectors to make energy efficiency support models more effective; develop sustainable finance mechanisms; advance sustainable procurement; develop culture, awareness and consciousness of energy efficiency in public and private sectors; promote on-site generation and consumption; position smart cities and smart networks in respect of energy efficiency; improve energy efficiency in industry, transport and agriculture; scale up district heating systems; increase the use of alternative fuels and resources in the context of energy efficiency; promote environment-friendly structures, and make existing structures more efficient.

1.3 Process of Drafting the Action Plan

The National Energy Efficiency Action Plan was prepared with active participation and contribution from the public institutions and organisations involved in energy efficiency policies and implementations, non-governmental organisations and sectoral stakeholders. General and sectoral workshops were in Ankara, Bursa, Gaziantep, Izmir and Istanbul to solicit the opinions of relevant institutions and organisations.

By the decision of the Energy Efficiency Coordination Board, the agenda of the 2016 meeting of the Advisory Board was set as the "National Energy Efficiency Action Plan." Accordingly, the Advisory Board convened on 28-29 November 2016 with 268 participants from 160 institutions for analysing the actions in the draft plan, prioritising the actions and setting the framework. The actions were finalised with inputs from the responsible institutions and organisations.






2 BASELINE REVIEW







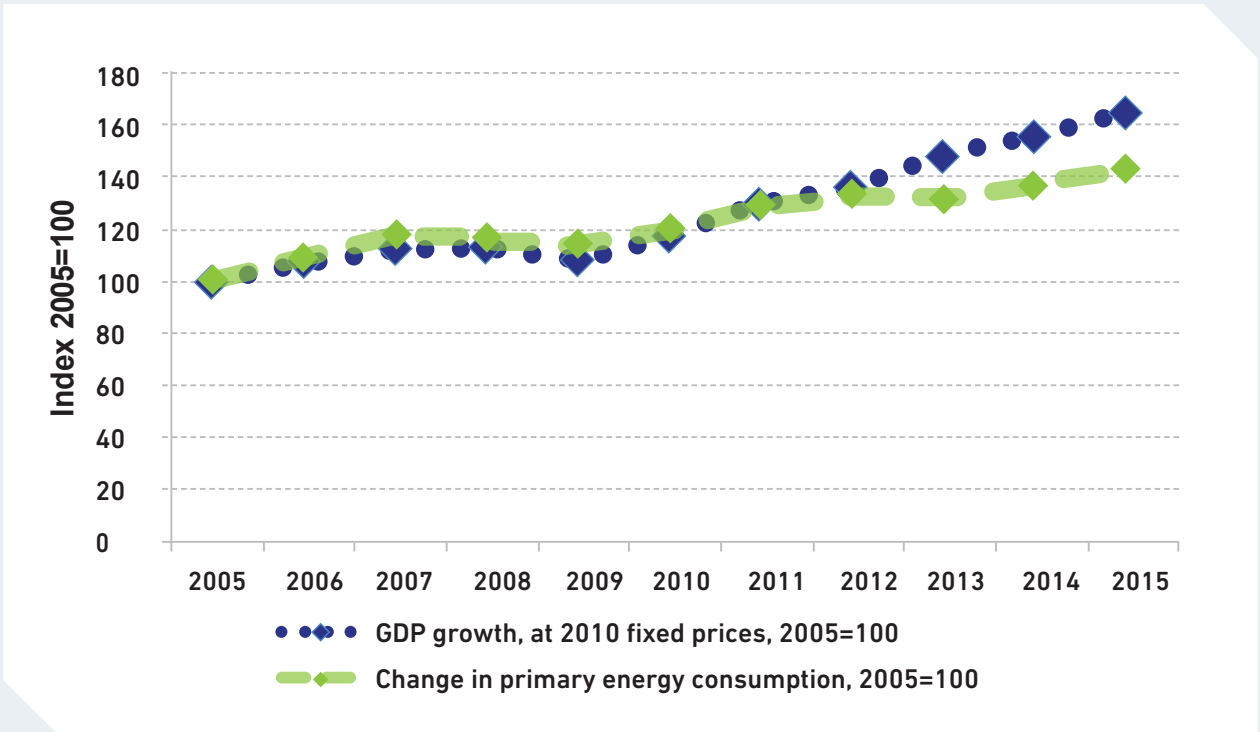




2.1 Overall View

Turkey's gross domestic product (GDP) steadily increased in the period of 2005-2015 except for 2009 and 2010. The cumulative growth in the period is by 65%, corresponding to an annual GDP growth 5.2%. The primary energy consumption in the same period grew by 46%, i.e. lower than GDP growth. This means that less energy is consumed to produce a unit of added value (see Figure 1).

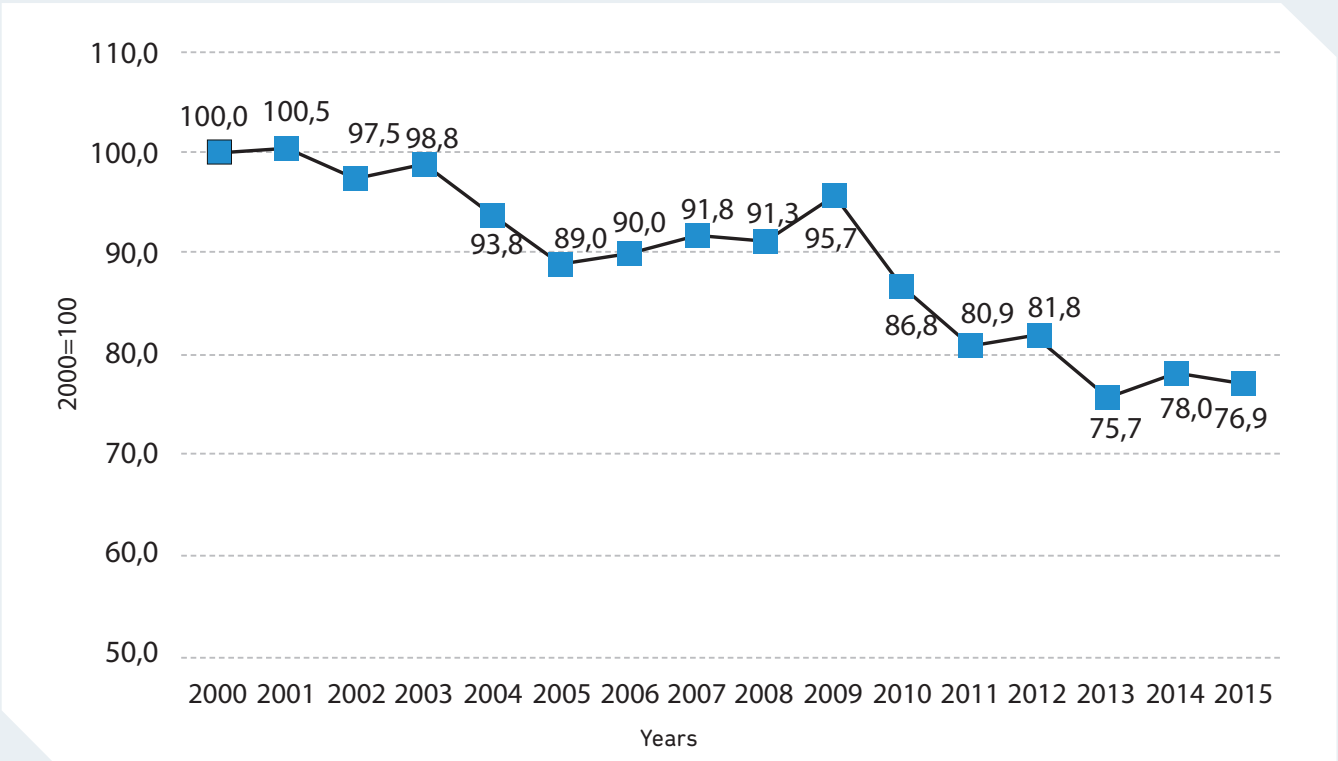
Figure 1. GDP and Primary Energy Consumption by Year.



Source: TURKSTAT, MENR Energy Balance Charts, 2017.

The primary energy intensity index, a significant indicator of energy efficiency, decreased cumulatively by 23.1% in the period of 2000-2015 on account of the measures taken, achieving an average annual improvement of 1.65% (see Figure 2).

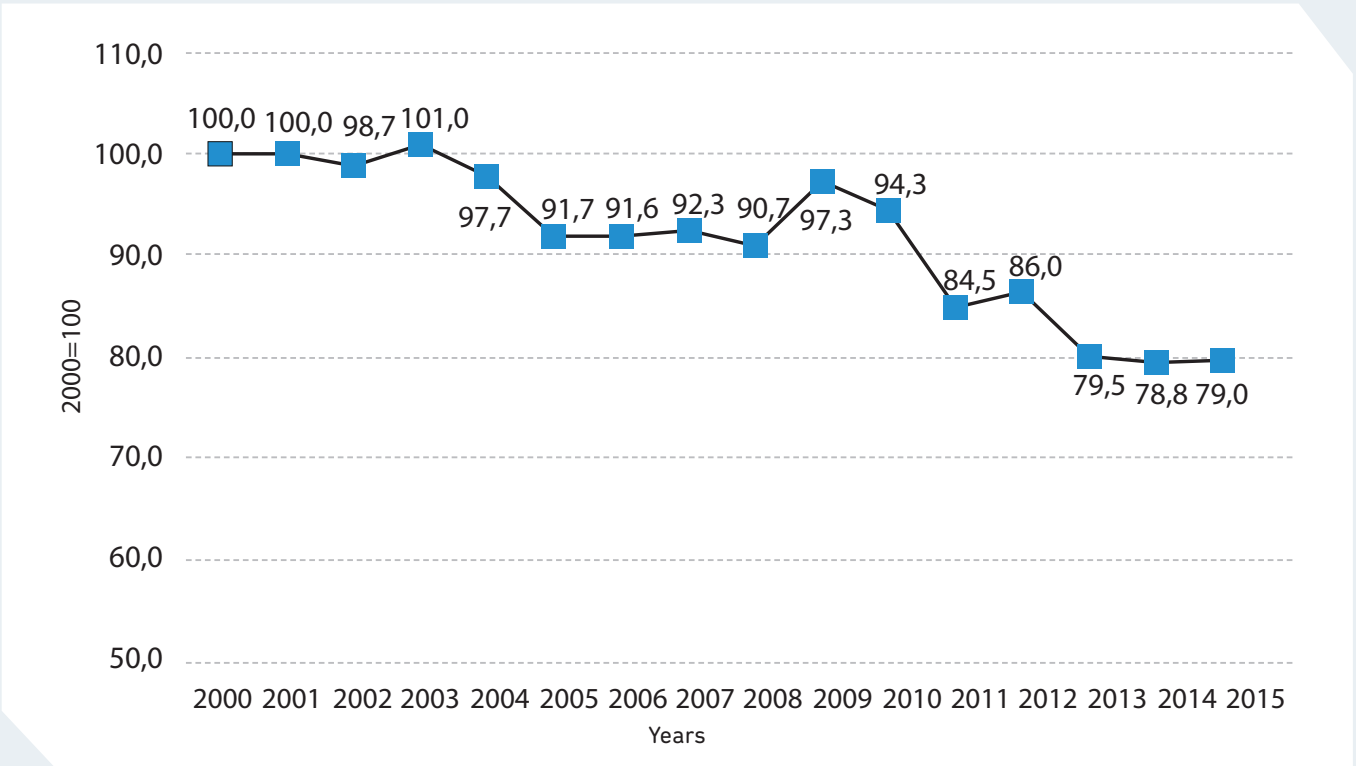
Figure 2. Changes in Primary Energy Intensity Index by Year.



Source: GDRE, 2017.

The end-use energy intensity index in the same period (2000-2015) went down by 21% corresponding to an average annual improvement of 1.5% (see Figure 3).

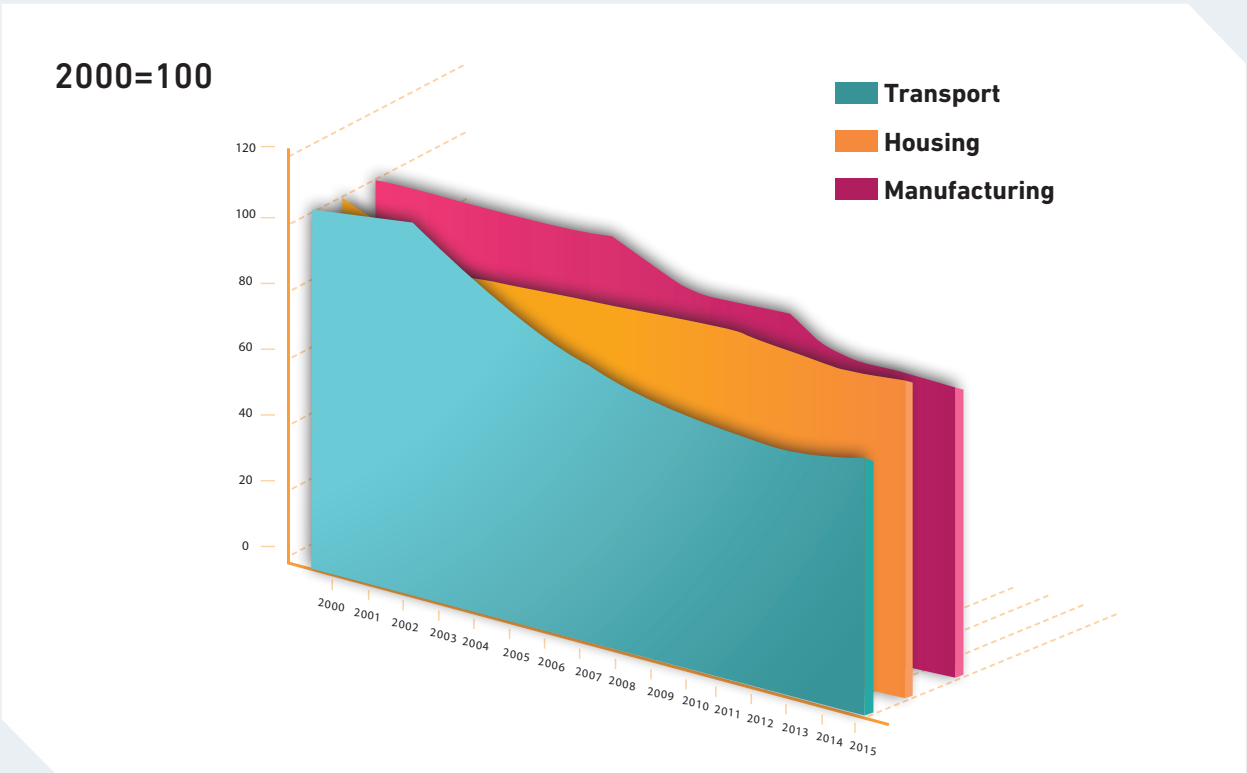
Figure 3. Changes in End-use Energy Intensity Index by Year.



Source: GDRE, 2017.

The energy intensity index is an important indicator of the contribution to the national economy through the energy savings and energy efficiency improvement in primary and end-use energy consumption in manufacturing, housing and transport sectors. The breakdown of the indicator shows that, for the period of 2000-2015, the manufacturing sector achieved an annual improvement rate of 1.8%, housing sector 1.9% and transport sector 2.7% for an overall annual improvement of 2.1% in energy efficiency (see Figure 4).

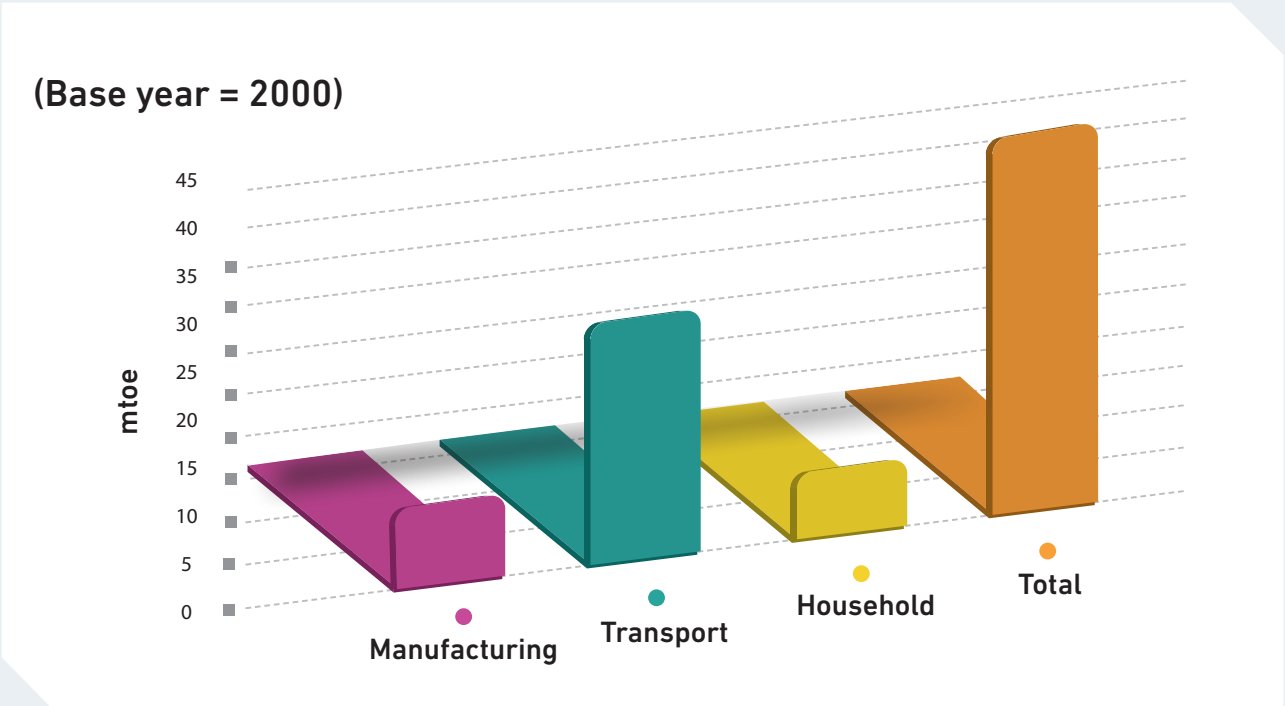
Figure 4. Evolution of Energy Efficiency Index by Sector.



Source: GDRE, 2017.

The energy efficiency measures implemented in the period of 2000-2015 resulted cumulatively in 9.7 mtoe of energy savings in the manufacturing sector, 7.1 mtoe in the housing sector, and 24.6 mtoe in the transport sector amounting a total of 41.5 mtoe (see Figure 5).

Figure 5. Cumulative Energy Savings for 2000-2015.

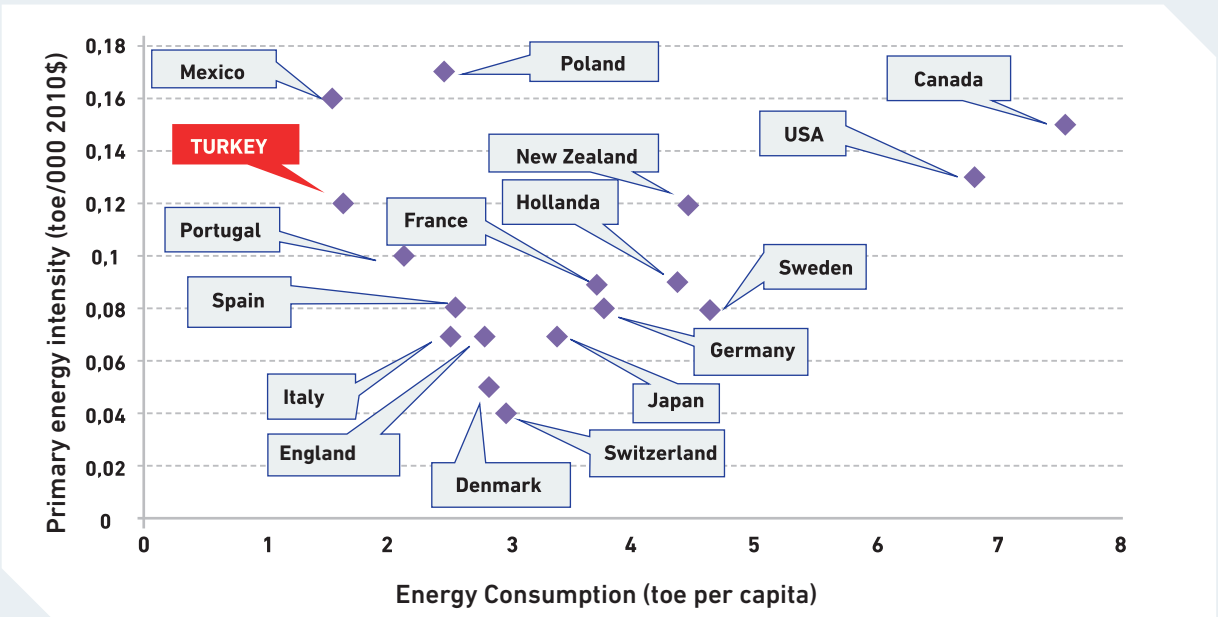


Source: GDRE, 2017.

The fact that our energy intensity is high while our energy consumption per capita is lower than developed countries shows that Turkey has a significant potential for energy savings (see Figure 6). In the period of 2005-2014, when Turkey's GDP increased by 1 unit, the energy consumption increased only by 0.7 unit. In the same period, against the 1 unit of increase in GDP, France reduced its energy consumption by 1.1 unit, Germany 0.7 unit, Japan 3.3 units and the United Kingdom 2.0 units.

The primary energy intensity in 2015 in Turkey is 0.12 toe per 1,000 USD at 2010 prices, estimated on the basis of 2009-based new GDP series published by the Turkish Statistical Institute (TURKSTAT) on 12 December 2016. While this figure is lower than the world average of 0.18 toe, it is higher than the OECD average of 0.11 toe. The figure is 0.08 in Germany, 0.07 in Italy and EU-28 average is 0.09 toe.

Figure 6. Comparison of Countries by Primary Energy Intensity.



Source: International Energy Agency, 2017.

2.2 Sectoral View

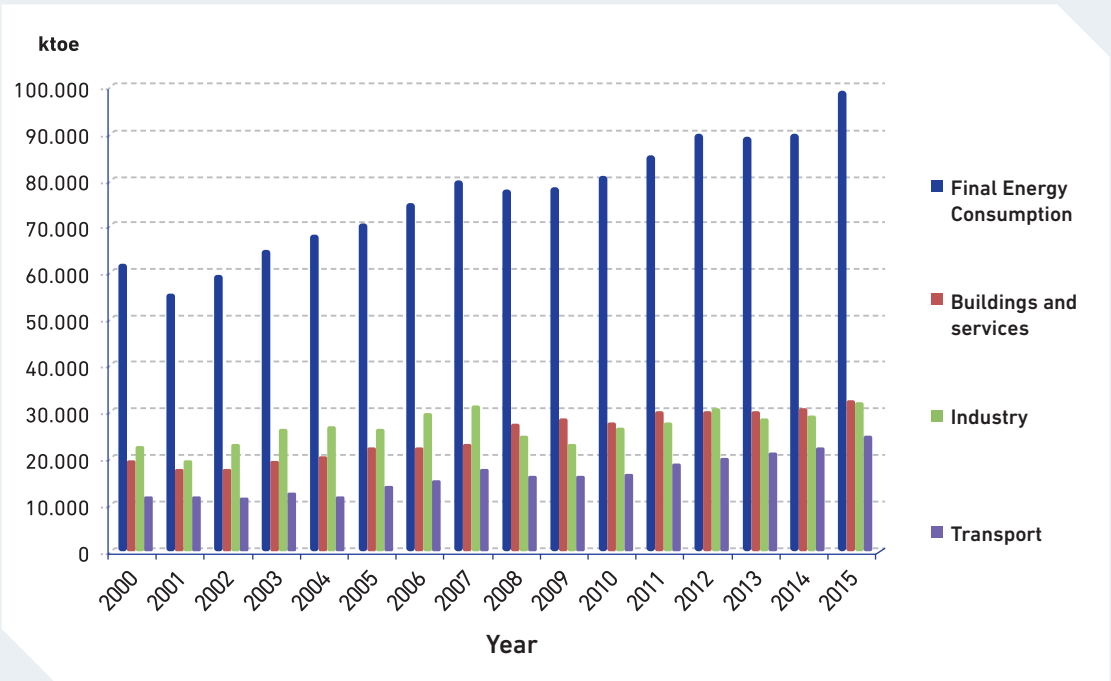
2.2.1 Buildings and Services
2.2.2 Industry and Technology
2.2.3 Energy
2.2.4 Transport
2.2.5 Agriculture


fficient
buildings

2.2.1 Buildings and Services

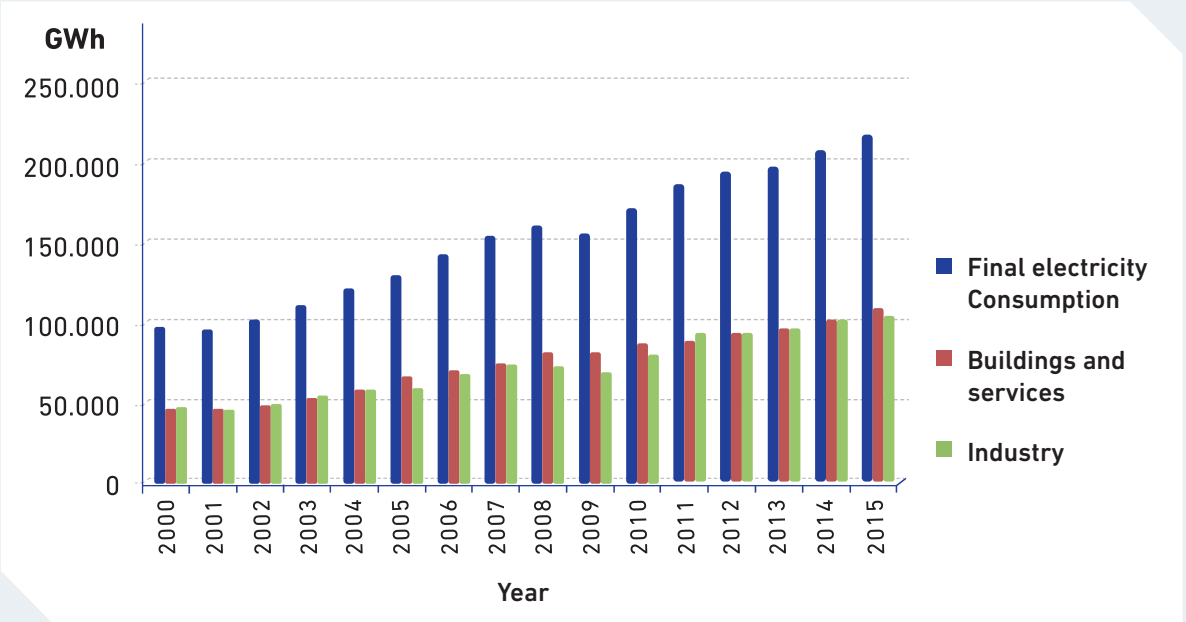
The buildings sector in Turkey has grown strongly in recent years, with 19.5 mtoe of end-use energy consumption in 2000 going up to 32.4 mtoe in 2015 by an increase of 66%. The average annual increase in demand for energy has been 4.4% in the buildings sector, and its share in end-use energy consumption reached 32.8%, exceeding that of the industry (see Figure 7).

Figure 7. Changes in Energy Consumption by Sector and Year.



Similarly, the buildings and services had a share of 47.4% in end-use electricity consumption in 2000, and reached a share of 49.9% in 2015 exceeding that of the industry. In the same period, the total increase in demand was 135%, with an average annual increase of 9% in demand (see Figure 8).

Figure 8. Changes in Electricity Consumption in Buildings and Services Sector by Year.



The TURKSTAT data indicate that as of 2017, there are 9.1 million buildings in Turkey, approximately 87% of which are residential. The number of housing units is above 22 million[1]. According to the occupancy permit statistics, more than 100,000 new buildings are added every year to the building stock. Those statistics suggest that Turkey has a rapidly growing and transforming building stock. In this context, it is possible to save energy significantly through making the new buildings more energy-efficient as well as improving the existing buildings. In addition, the buildings and services sector has significant potential for using renewable energy resources and on-site generation.

[1] Based on TURKSAT 2000 building census and statistics for building occupancy permits.

Goals were set for increasing energy efficiency and reducing building-based energy consumption in Turkey, and actions are underway to achieve the goals. Under the Climate Change Action Plan 2011-2023, various objectives were defined to increase energy efficiency and the share of renewable energy in electricity consumption.

The Energy Efficiency Strategy defines actions to "introduce maximum energy requirements for buildings and limits for maximum emissions" and "impose administrative sanctions on those which emit carbon dioxide at quantities above the legally defined limits" under the strategic goal "reduce building energy demand and carbon emissions; scale up sustainable, environment-friendly buildings that use renewable energy resources." The paper also defines actions to "require sustainability in building licensing" and "scale up on-site generation for mass housing" under the strategic goal "transform at least one fourth of the building stock in 2010 to sustainable buildings by 2023."

The Tenth Development Plan defines a component "Improving Energy Efficiency in Buildings" under the Energy Efficiency Improvement Programme Action Plan; which component requires actions to develop financing mechanisms and improve the legislative framework in order to improve energy efficiency in buildings.

To achieve the defined goals, both the public and private sectors undertake efforts to improve energy efficiency in buildings. The Regulation on Energy Performance for Buildings requires that new buildings have at least C class Energy Performance Certificates. While the existing buildings must have energy performance certificates, the requirement for energy performance certificates in transactions of sales and lease of buildings was deferred to 2020. Work is underway to commission energy efficiency audits and realise the identified potential in the framework of the Regulation on Improving Efficiency in Energy Resources and Energy Use.

Under this Action Plan, 12 actions are defined to improve energy efficiency in the buildings and services sector in line with the strategic goals described above. The said actions involve such activities as improving the efficiency classes of new and existing buildings, realising the savings potential in the public sector, scaling up on-site generation and use of renewable energy in buildings, drawing up a comprehensive inventory of buildings, and engaging in awareness efforts directed to all stakeholding segments. The actions under the Plan are in line with all strategy papers adopted earlier, and include the details of implementation to achieve the goals defined in the said papers.


Efficient
industry

2.2.2 Industry and Technology

The industry with a share of 26% in GDP 2015 has continued in recent years to grow and drive the economic growth in our country as in many other countries. With the industry accounting for 32.4% of the end-use energy consumption and 47.6% of the net electricity in 2015, the Turkish economy is more "energy-intensive" compared to developed countries. Energy efficiency has become a priority area due to the fact that energy costs constitute one of the heaviest burdens on enterprises. Improvement in energy efficiency in industry offers significant opportunities to reduce energy consumption as well as improve process efficiency, upgrade technological development levels, and reduce greenhouse gas emissions.

The Energy Efficiency Law introduced requirements for industrial enterprises of a certain size to commission energy efficiency audits and establish energy management structures. In addition, various support mechanisms were introduced such as Efficiency Improvement Projects (EIPs) and Voluntary Agreements. Investments for energy efficiency projects designed to save energy by at least 20% on the baseline, with a simple payback period of 5 years or shorter in manufacturing industry plants with minimum 500 toe of annual energy consumption are allowed to benefit incentives accorded to investments made in the fifth region.

The Energy Efficiency Strategy aims to reduce energy densities at rates not to be less than 10% to be set by sectoral cooperation in each subsector of the industry. To achieve such objective, various actions are defined such as promoting investments to improve energy efficiency and identifying savings potentials and measures that can be taken for energy efficiency in industrial subsectors.

The Tenth Development Plan defines actions to "replace low efficiency AC electrical motors with higher efficiency ones," "improve mechanisms to support training, audit and consulting services in energy efficiency for SMEs" and "scale up technologies and good practices of energy efficiency in SMEs" under the "Energy Efficiency Improvement Programme."

Under this Action Plan, 7 actions are defined to improve energy efficiency in the industry and technology sector in line with the strategic goals described above. The said actions involve such activities as engaging in support activities, mapping the energy saving potential in industry, increasing the diversity of projects, defining new support mechanisms, scaling up cogeneration systems in large heat-using facilities, implementing environment-friendly design and labelling system for appliances.


Efficient
energy

2.2.3 Energy

In parallel with the rising living standards and growing population, the electricity demand in Turkey has significantly increased in recent years. The gross electricity consumption which increased by 3.3% on the previous year in 2016 to reach 278.8 billion kWh is expected to reach 367.9 billion kWh in 2023 in the low-demand scenario, or 407.9 billion kWh in the high-demand scenario.[2]

A review of per capita electricity consumption as a significant energy indicator reveals that the figure for Turkey is 3,224 kWh (gross), USA 12,902 kWh, France 7,124 kWh, Germany 6,779 kWh, United Kingdom 5,217 kWh and OECD average 8,106 kWh.[3] The data suggest that Turkey has lower per capita electricity consumption than developed economies; and with rising prosperity levels, the per capita electricity consumption will increase in our country.

Through the policies and strategy papers implemented to date, various goals have been identified to improve efficiency in the energy sector in Turkey, and various works undertaken to achieve the goals. In this context, the Climate Change Action Plan defines goals to reduce total loss in transmission and distribution grids to 8% in our country which is above the OECD average, improve energy efficiency in all sectors and increase the share of renewable energy in electricity generation. The Energy Efficiency Strategy sets the strategic goals for the sector under the title "improve efficiency in electricity generation, transmission and distribution; reduce energy losses and emissions harmful to environment." The Tenth Development Plan defines actions to develop projects to use the waste heat from the existing coal-fired thermal power plants in district heating and agricultural activities in order to scale up on-site generation, cogeneration and micro cogeneration in electricity generation; scale up electricity generation from waste heat in industry; build a market for trade of waste heat energy; and take incentivising measures to promote cogeneration and micro cogeneration installations.

Under the National Energy Efficiency Action Plan, 10 actions are defined to improve the sustainability of the energy sector and accelerate the transformation into an energy-efficient sector in line with the strategic goals set in various policy papers. The said actions involve identifying cogeneration and district heating&cooling systems and preparing a roadmap for legislation, managing peak load arising from heating&cooling, implementing efficiency standards for natural gas infrastructure, scaling up smart meters, presenting the customers with comparable and detailed bills; creating an energy data platform for smart management of measurement data, implementing minimum performance standards for transformers, improving energy efficiency in public lighting, improving energy efficiency in electricity transmission and distribution, improving efficiency in existing power plants, building market infrastructure for demand-side response.

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[2] T.R. Ministry of Energy and Natural Resources (2016), Report on Electricity Demand Projections in Turkey.

[3] TEIAS (2017), Per Capital Installed Power, Gross Generation, Gross Supply, Net Consumption in 2015 in OECD Countries.



efficient transportation

2.2.4 Transport

A rapid integration process, novelties in technology, population getting denser in cities and economic development in the world lead to an increase in the demand for quality, safe and comfortable transport services which in turn makes the transport a rapidly growing, dynamic sector. The growth in the transport sector moves along the axis of road transport depending particularly on petroleum, entailing such issues as energy supply security; environmental, air and noise pollution in environment; degradation of natural areas and health problems. This necessitates that energy be used effectively and efficiently in the transport sector.

The 2015 data suggest that the transport sector accounts for approximately 25% of the total end-use energy consumption in Turkey; where road transport accounts for 91.6% of the consumption in the transport sector. And the energy consumption in the road transport is almost totally based on petroleum products. In our country where a large part of the need for petroleum is met by imports, it is possible by certain measures to improve energy efficiency in the transport sector, and thereby reduce external dependency for petroleum.

In order to ensure a balanced distribution among modes in the transport sector, it is important to develop combined/intermodal/multimodal applications in passenger and freight transport, increase the share of railroad and maritime transport, and adopt the corridor approach in transport planning. In this line, the Transport and Communications Strategy Goal 2023 defines objectives to increase the share of railroad transport in freight transport beyond 15%, and in passenger transport beyond 10%. It is planned thereby to reduce the road transport's share in freight under 60% and passenger under 72% by the end of 2023.



As of 2016, Turkey had approximately 21 million motor vehicles, with an average age of 12.9 years.[4] The high average age is disadvantageous both in respect of fuel economy and environment. Therefore, our country occasionally introduces certain regulations and incentives to set aside old vehicles as scrap. The last of such regulations was issued by the General Communiqué No. 48 on Motor Vehicle Tax, introducing incentives to set aside as scrap the motor vehicles of make year 1997 or older as registered in the motor vehicle registries.

To build a sustainable transport system in our country, it is crucial to integratively plan and operate the transport infrastructure, integrate transport modes, reduce unit fuel consumption of vehicles, and develop policies and strategies that minimises damage to the environment. In this context, the Energy Efficiency Strategy, a major document which addresses energy efficiency in transport in our country, aims to reduce unit fossil fuel consumption of motor vehicles, increase the share of railroads in passenger and freight transport and of urban public transport, prevent unnecessary fuel consumption in urban transport, and reduce emissions harmful to the environment.

The Climate Change Action Plan 2011-2023 aims, among other things, to use transport modes in a balanced way for passenger and freight transport, restructure urban transport in line with sustainable transport principles, scale up the use of alternative fuels and clean car technologies, and improve energy efficiency in the sector. In addition, there are measures for the transport sector in the National Intelligent Transport Systems Strategy (2014-2023) of the Ministry of Transport, Maritime Affairs and Communications which aims to adapt information and communication technologies to the transport sector.

[4] TURKSTAT, Motor Vehicle Statistics, 2017.



In addition to the said papers, transport master plans issued by municipalities lay down the goals and objectives at local scale and engage in activities to those ends. Further, the policy papers issued by various institutions and organisations address energy efficiency in transport.

Under this Action Plan, which holistically treats, analyses and proposes solutions on the issue of energy efficiency in the transport sector which obviously occupies a significant place in the policies and strategies of our country, 9 actions are defined for the transport sector to ensure sustainability and promote energy efficiency. Identified as the priority action areas are promoting energy-efficient vehicles, developing comparative studies on alternative fuels and new technologies, developing and improving bicycle and pedestrian transport, reducing the use of passenger cars to reduce traffic density in cities, developing and implementing institutional restructuring for urban transport, strengthening maritime transport, strengthening rail transport and collecting data on transport.


Efficient
agriculture

2.2.5 Agriculture

To build a competitive agriculture sector in our country, it is necessary and in priority to effectively use the physical potential, energy and resources; regulate and aggregate lands; scale up energy efficiency activities to increase the mechanisation level in agriculture and use renewable energy resources in agriculture.

The Agriculture Law includes as the goals of agricultural policies to develop agricultural production in accordance with the domestic and foreign demand, protect and develop natural and biological resources, improve productivity, strengthen food security and safety, develop producers' organisations, strengthen agricultural markets, increase the prosperity level in the agriculture sector through rural development.

The Tenth Development Plan addresses the effective use of food, water and natural resources and transformation in global energy system as priority matters under the title of global developments and trends. It is aimed to create an agriculture sector that is based on sufficient and balanced nutrition for the society, relies on advanced technologies, has solved infrastructure problems, is highly productive, has effective production structure based on demand, has increased international competitiveness, and uses natural resources sustainably. Additional objectives include supporting such environment-friendly practices as renewable energy, eco-efficiency and clean production technologies in agricultural production and services, promoting the development and branding of new environment-friendly products.

The Ministry of Food, Agriculture and Livestock, Agriculture and Rural Development Support Institute, General Directorate of Agricultural Enterprises, General Directorate of State Hydraulic Works execute support policies focusing on good agricultural practices in terms of the current support systems in the agriculture sector. The said support programmes for agricultural production under various support mechanisms contribute indirectly to improving energy efficiency.

Under this Action Plan, 6 actions are defined to improve energy efficiency in the agriculture sector, involving promoting the replacement of tractors and harvesters with new, energy-efficient ones, switching to energy-efficient irrigation methods, supporting energy efficiency projects in the agriculture sector, encouraging the use of renewable energy resources in agricultural production, identifying agricultural by-products and waste potential to produce biomass and promoting its use, supporting energy efficiency in the fisheries sector.

3 ACTION PLAN
2017-2023

3.1 Main Objective

Drafted with a goal of making the highest contribution to the national prosperity through utilising energy and natural resources efficiently and environment-friendly, this Action Plan pursues the Overarching Goal of 23.9 mtoe reduction in Turkey's primary energy consumption cumulatively in the period of 2017-2023.

3.2 Actions

3.2.1 Cross-cutting Areas
3.2.2 Buildings and Services Sector
3.2.3 Industry and Technology Sector
3.2.4 Energy Sector
3.2.5 Transport Sector
3.2.6 Agriculture Sector

3.2.1 Cross-cutting Areas

1) Action Code and Title	Y1. Establish and increase efficiency of Energy Management Systems
Goal	Increase the effectiveness of the energy management activities that are mandatory for buildings and industrial businesses of particular size. Presently, it is mandatory for the following to establish an energy management system: • Industrial enterprises which have total annual energy consumption of 1000 toe or more • Commercial and service buildings which have total construction area over 20,000 m^2 or total annual energy consumption over 500 toe, • Public buildings which have total construction area over 10,000 m^2 or total annual energy consumption over 250 toe, • Organised industrial zones, • Thermal power plants which have over 100 MW of installed capacity. Energy management activities will be continued within the framework of the current legislative framework; necessary activities will be undertaken to improve effectiveness; all buildings and enterprises that are required by the legislative framework shall have appointed energy managers during the planning period. Energy management systems will be established in line with ISO 50001 Energy Management System – User Manual and Requirements Standard. These activities will be strengthened by periodic audits. The scope will be extended depending on performance in practice. The legislative framework requires buildings and industrial enterprises of particular size to have energy managers and carry out energy management activities. Furthermore, energy management activities must be executed and monitored. Through energy management systems, energy efficiency activities will have the basis for effective and continuous implementation. It is aimed to reach 80% implementation effectiveness by the end of 2019.

Activities to Undertake	• The list of buildings and industrial enterprises across Turkey that are obliged to have an energy manager will be updated. • Energy managers will be appointed to the obligated buildings and industrial enterprises which do not have an energy manager. • Training programmes to build capacities for energy managers will be organised across Turkey. • The status of appointing energy managers and establishment of energy management units will be updated and audited annually. • It will be re-evaluated against the pace of scaling up of energy management implementation in reaching the rate of 80%.
Outputs and Indicators	Reaching the rate of 80% in appointing energy managers and/or establishing energy management unit by obligated buildings and industrial enterprises, promoting and increasing the establishment of Energy Management Systems.
Responsible Institutions	Ministry of Energy and Natural Resources
Relevant Institutions	Ministry of Science, Industry and Technology, Ministry of Environment and Urbanisation, TSE, Authorised Institution and ESCOs
Timeline	The list of obligated buildings and industrial enterprises will be updated in 2018, and the implementation effectiveness will be reached by the end of 2019.

2) Action Code and Title	Y2. Develop national financing mechanism for energy efficiency
Goal	Establish a "National Energy Efficiency Financing Mechanism" to give financial support in implementing energy efficiency investments
Activities to Undertake	• It is expected to impose energy efficiency obligations on energy (electricity, natural gas, petroleum) distribution and/or retail companies and the obligated parties will implement energy efficiency measures. Where they are short of fulfilling their obligations, they will make contributions proportional to their shortfall in order to provide funds to the national energy efficiency financing mechanism. • Other national and international funds (national budget, funds from international financing institutions etc.) will be allowed in the mechanism. • The necessary legislative framework will be developed to establish the mechanism after detailed descriptions of needs, practice and management. • Funds pooled annually in the financing mechanism will be disbursed to the supports included in the plan. • Energy efficiency practices will be monitored by the controlling unit which will be established under the scope of the mechanism, ensuring sectoral monitoring.
Outputs and Indicators	National Energy Efficiency Financing Mechanism established and gained functionality
Responsible Institutions	Ministry of Energy and Natural Resources
Relevant Institutions	EMRA, Ministry of Finance, Ministry of Economy, Undersecretariat of Treasury, Obligated Parties (Energy Distribution and/or Retail Companies)
Timeline	The legislative framework will be developed in 2018-2020, and action will be implemented in 2021.

3) Action Code and Title	Y3. Support energy efficiency projects through energy efficiency contest
Goal	A mechanism is envisaged involving a contest on "cost per ktoe of anticipated energy saving" to support the projects developed by energy consumers to improve energy efficiency. Support will be allocated within the budget in an ascending order of projects by unit cost per toe. The support should be of a character that incentivise the investment costs of efficiency projects, and encourage project authors to produce creative, innovative, low cost solutions with high potential of cost reduction due to the criterion of "unit cost per saving". The budget of the activity will be provided from the other action "Develop national financing mechanism for energy efficiency" under this Plan. • Annual "Energy Efficiency Contests" will be organised; where end-use energy consumers in manufacturing industry, commercial and service buildings, transport and agriculture may participate according to the criteria and priorities identified by the Ministry based on the performance of the praxis. • Consumers with energy efficiency projects will submit their "cost per ktoe of anticipated energy saving". • Proposals will be ranked in an ascending order by unit cost per toe, and projects will be supported within the budget. • The Ministry will organise contests by sector/subsector to ensure fair competition. • Measurement, verification and reporting will be required for the unit cost per toe presented by end-use energy consumers.
Activities to Undertake	• The legislative framework and technical infrastructure will be created for the organisation of contests. • Energy efficiency will be organised within the budget designated.
Outputs and Indicators	Legislative framework developed, execution of contests, quantity of savings in energy and money provided by projects supported.
Responsible Institutions	Ministry of Energy and Natural Resources
Relevant Institutions	Ministry of Finance, Ministry of Science, Industry and Technology, Ministry of Environment and Urbanisation, Ministry of Transport, Maritime Affairs and Communications, Ministry of Food, Agriculture and Livestock
Timeline	The legislative framework and technical infrastructure will be developed in 2018-2020, and contests will be held in 2021.

4) Action Code and Title	Y4. Develop guides, standard contracts and similar bases containing technical, legal and financial aspects for energy efficiency projects
Goal	Enable consumers to benefit at maximum extent from the energy efficiency service sector by developing infrastructure such as guides, standard contracts and similar bases containing technical, legal and financial aspects and a framework that will guide the sector. The standardisation of the services of Energy Service Companies (ESCOs) and strengthening the financing side will help improve the service quality, facilitate the financing and scaling up of energy efficiency services.
Activities to Undertake	• Standard contracts and guidelines will be prepared which are easy-to-understand and consist of clear clauses; standard contract forms, project processes, tools and templates will be created. Sample projects will be drawn up to include an insurance system for Energy Performance Contract (Energy Performance Contract) and contract templates will be created. • Technical training programmes will be delivered to build capacity for ESCOs, and courses, conferences and seminars will be organised for various sectors to introduce successful cases and best practices in order to encourage energy efficiency investments. • Activities will be undertaken which make it possible to use the energy savings derived from energy efficiency projects as security. • A framework for cooperation will be built between ESCOs and financing institutions to support energy efficiency projects. A financial scheme will be developed to suit ESCOs' business models in Turkey; and new financing support mechanisms will be created to develop the sector for small and mid-sized ESCOs particularly.
Outputs and Indicators	Bases containing technical, legal and financial aspects for energy efficiency projects prepared, increase in the number of energy efficiency projects
Responsible Institutions	Ministry of Energy and Natural Resources
Relevant Institutions	Ministry of Environment and Urbanisation, Ministry of Science, Industry and Technology, Ministry of Transport, Maritime Affairs and Communications, ESCOs, Financing Institutions
Timeline	Needs analysis and legislation work will be conducted in 2017 and 2018; and action will be implemented in 2019.

5) Action Code and Title	Y5. Develop registration, database and reporting systems for energy efficiency activities
Goal	Make the ENVER Portal a structure where energy efficiency activities and energy consumption can be tracked, and advanced reporting can be made.
Activities to Undertake	• Work will be undertaken to develop the software and hardware of the ENVER Portal; the technical infrastructure of the ENVER Portal will be improved and new monitoring and reporting modules will be developed. • Glass, ceramics, and paper industries will be included in the benchmarking studies. • Energy efficiency indicators will be identified in end-use sectors and the savings by sector will be monitored and reported • A pool of certified energy efficiency consultants/experts will be created, with the knowledge and experience of pooled persons updated, their energy efficiency studies recorded, reported and a quality assurance scheme built.
Outputs and Indicators	Monitoring and evaluation system developed, reports on benchmarking and energy savings in subsectors
Responsible Institutions	Ministry of Energy and Natural Resources
Relevant Institutions	-
Timeline	Needs analysis will be conducted in 2017, development activities be completed in 2018 and the Portal will be fully functional in 2019.

6) Action Code and Title	Y6. Improve the facilities and effectiveness, ensure coordination and control of the international energy efficiency financing schemes
Goal	Ensure coordination among the various support mechanisms created and implemented by various institutions and organisations across Turkey, and develop protocols to control and monitor such financing mechanisms
Activities to Undertake	• The control and monitoring methodology will be defined related to the current energy efficiency financing mechanisms. • Analyses will be made to identify the weaknesses of and threats to the development processes of the energy efficiency projects in various economic sectors. • Work will be undertaken to establish new financing mechanisms. • Appropriate international financing schemes will be explored for the development of energy efficiency projects in Turkey. • Progress reports will be prepared to review annual status and presented to the relevant authorities.
Outputs and Indicators	Control, monitoring and coordination methodology developed, review and progress reports
Responsible Institutions	Ministry of Energy and Natural Resources
Relevant Institutions	Undersecretariat of Treasury
Timeline	Analyses will be completed; control and monitoring methodology defined in 2018; and the review and progress reports on the activities under this action will be prepared every year-end.

7) Action Code and Title	**Y7. Strengthen the administrative and institutional structure**
Goal	Build the necessary organisational structuring in order to improve and strengthen the capacity of the General Directorate of Renewable Energy (GDRE) in energy efficiency. GDRE will have a strong administrative, financial and institutional structure to undertake work on energy efficiency, renewable energy resources and energy information and technologies; structured to work across cross-cutting sectors, and strengthened to enable integration among policies and practices for various sectors.
Activities to Undertake	• Needs analysis will be conducted towards development of the administrative and institutional structure; and a structural design will be developed for energy efficiency activities. • The legislative framework will be reviewed and re-arranged as necessary for the institutional and administrative structure. • Institutional transformation will be realised progressively as transition period and final implementation.
Outputs and Indicators	Capacity building needs and necessary actions identified, the final objective for institutional structuring defined and implemented
Responsible Institutions	Ministry of Energy and Natural Resources
Relevant Institutions	-
Timeline	Needs analysis will be conducted, necessary legislative changes and transformation will be completed in two phases by 2021.

8) Action Code and Title	Y8. Conduct activities of awareness-raising and training on energy efficiency
Goal	Conduct activities of awareness-raising and training, in addition to providing information, on energy efficiency for all end-user in energy consuming sectors across the country in order to persuade them to adopt energy efficiency approaches and investments.
Activities to Undertake	• Various alternatives used in awareness-raising activities will be reviewed; analyses will be conducted on the implementation in-depthness and effectiveness of such alternatives to identify tools to be used in awareness-raising activities. • A free-access platform will be established which would enable end users to access various educational activities such as online courses, educational materials, tools, guides, games and online conferences in order to inform on technological developments and best practices in energy efficiency. • A separate platform will be established for energy efficiency on the website of the General Directorate of Renewable Energy to post updated statistics and reports for subsectors. • Training and awareness-raising activities will be planned and continued in a sector-based and target audience-focused way that, measures the effectiveness level holistically, increases effectiveness and is reviewed annually.
Outputs and Indicators	Awareness-raising activities, activity effectiveness assessments, planning, increased awareness on energy efficiency, and increase in quality trainings
Responsible Institutions	Ministry of Energy and Natural Resources, Ministry of National Education, Ministry of Environment and Urbanisation, Ministry of Science, Industry and Technology
Relevant Institutions	Public and private sectors and non-governmental organisations
Timeline	The communication strategy will be formulated, and the action will be implemented according to the plan.

9) Action Code and Title	Y9. Energy efficiency audits
Goal	Complete energy efficiency audits to identify measures of energy efficiency as well as savings potential in order to make an inventory of large industrial enterprises and buildings, and projections of energy efficiency for future.
Activities to Undertake	• The inventory will be updated of the buildings and industrial enterprises that meet the required conditions. • In order to capture more accurately the energy consumption of industrial enterprises and commercial buildings, the consumption data will be cross-checked against the data from energy suppliers, TURKSTAT or relevant organisations. • Considering the cost analyses for audits and preliminary audits; audits or, only preliminary audits where sufficient, will be conducted. • Energy audits will also be conducted in sectors other than buildings and industry. • Energy audits will be performed by authorised ESCOs. • Audit formats will be updated; a common methodology and format will be developed. • Annual targets that will accelerate energy efficiency audits in buildings and industry will be defined and the monitoring system will be strengthened. • An energy efficiency inventory will be made based on audits and published electronically.
Outputs and Indicators	Audit formats, energy efficiency inventory reports, completion rates of energy audits
Responsible Institutions	Ministry of Energy and Natural Resources
Relevant Institutions	ESCOs, Industrial Enterprises, Building and Enterprise Managers, Agricultural Enterprises and Electricity Generation Plants
Timeline	An inventory will be made of the covered buildings and industrial enterprises in 2018, and the implementation will start in 2019.

10) Action Code and Title	Y10. Adopt sustainability in public operations and procurement
Goal	Ensure that public procurement of products and services focus on energy efficiency, and to that end, on life cycle cost, and establish the principle of sustainability in public procurement.
Activities to Undertake	• The Public Procurement Legislation will be revised to ensure that procurement will be based on "life cycle cost" rather than "purchase costs". • A methodology will be formulated to calculate life cycle costs, and training will be provided to public officials on the matter. • Works will be completed that allow the procurement of those that will meet minimum efficiency criteria in public procurement of products, services and works that involve energy use, and use high efficiency products. • Guidelines for implementation will be prepared and suppliers will be accordingly guided.
Outputs and Indicators	Relevant legislative framework developed
Responsible Institutions	Public Procurement Authority
Relevant Institutions	Ministry of Energy and Natural Resources, Ministry of Science, Industry and Technology, Ministry of Finance
Timeline	The legislative framework will be developed in 2017 and 2018, and the implementation will start in 2019.

11) Action Code and Title	Y11. Establish an obligation programme for Energy Distribution or Retail Companies
Goal	Establish the national energy efficiency target as obligations on the relevant energy (electricity, natural gas and petroleum) companies in proportion to their market shares which will develop various projects for end-users or increase energy efficiency in their activities to achieve the target. Energy companies will be allowed to charge the cost of efficiency services to their end-use customers at affordable conditions. Those energy companies which fall short of their obligations will pay the shortfall in cash, which will be transferred to the National Energy Efficiency Financing Mechanism.
Activities to Undertake	• The obligations will be imposed on energy distribution or retail companies in line with the energy efficiency targets of the country annually. • A catalogue will be drawn up that standardises such information as energy saving potential, project costs for energy efficiency projects; obligated companies will offer energy efficiency projects to their end-users in line with this catalogue in order to achieve the energy saving for which they are obligated. The costs of achieved projects will be reflected on the end-user within certain schemes.
Outputs and Indicators	Legislative framework developed, catalogue prepared, obligation programme developed, rate of meeting obligations
Responsible Institutions	Ministry of Energy and Natural Resources
Relevant Institutions	EMRA, Ministry of Finance, Obligated Parties (Energy Distribution or Retail Companies)
Timeline	The legislative framework and implementation infrastructure (catalogue, procedures etc.) will be prepared in 2018 and 2019, and the obligation programme will be implemented in 2020-2022.


efficient buildings
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3.2.2 Buildings and Services Sector

1) Action Code and Title	B1. Identify and share best practices on materials and technology in the construction sector
Goal	Develop a guide which contains the energy performance criteria, financial indicators and efficiency analyses of each one of various materials, equipment pieces and technologies used in buildings to be newly constructed or substantially renovated.
Activities to Undertake	• The Ministry of Environment and Urbanisation will prepare, and periodically update this guide of technical and economic best practices on materials and technologies in the construction sector. • Energy-efficient new technologies and renewable energy technologies will be added into the unit price handbook of the Ministry of Environment and Urbanisation. • Minimum energy performance criteria regarding devices, equipment and buildings will be included in the guide. • An Internet portal will be created to publish the guide and post success stories and practices on buildings.
Outputs and Indicators	Guide and internet portal developed, increased recognition
Responsible Institutions	Ministry of Environment and Urbanisation, Ministry of Science, Industry and Technology
Relevant Institutions	Ministry of Energy and Natural Resources
Timeline	The guide will be prepared in 2017 and 2018. The portal will be completed and be functional in 2019.

Efficient buildings

2) Action Code and Title	B2. Create a database for building energy consumption data
Goal	Develop an inventory of the number and typology of buildings in the urban and rural areas in Turkey, including particularly the building characteristics; collect the actual energy consumption and emission data of buildings of certain size; create a national database which will enable benchmarking and energy efficiency assessment of buildings.
Activities to Undertake	• The statistical data currently held in the institutions involved in buildings will be compiled. • Templates will be drawn up for use in the data collection efforts on buildings. • The Ministry of Environment and Urbanisation and TURKSTAT will draw up a comprehensive inventory of buildings. The energy consumption data of buildings will be made available by the Ministry of Energy and Natural Resources to distribution and retail companies.
Outputs and Indicators	Database created, progress performance on the statistical data
Responsible Institutions	Ministry of Environment and Urbanisation
Relevant Institutions	Ministry of Energy and Natural Resources, Ministry of Interior, TURKSTAT
Timeline	Work will be undertaken in 2018 and 2019 to determine the scope of the database and infrastructure. The building inventory work will start in 2020.

3) Action Code and Title	B3. Set energy saving targets for public buildings
Goal	Define annual targets to improve energy efficiency in public buildings.
Activities to Undertake	• Savings targets for public buildings will be defined according to energy efficiency audits. • A guide will be developed for energy savings measures. • Work will be undertaken to raise awareness in public workers for energy savings. • Appointment of energy managers will be made to obligated public buildings. • Energy efficiency renovation and practices will be undertaken in the public buildings based on a programme. • Results of energy savings will be monitored.
Outputs and Indicators	Savings target and actualised saving
Responsible Institutions	Ministry of Energy and Natural Resources
Relevant Institutions	Public Institutions
Timeline	Savings targets will be identified in 2017 and 2018; and the monitoring of saving results will start in 2018.

Efficient buildings

4) Action Code and Title	B4. Improve energy efficiency municipal services
Goal	Identify opportunities and implement measures of energy efficiency in municipalities including but not limited to water supply, wastewater treatment, solid waste collection, solid waste recovery and disposal, and mass transport in priority.
Activities to Undertake	• The effectiveness will be enhanced of the financing mechanism provided by Ilbank to municipalities and the inclusion of international financing institutions will be promoted. • Through the assistance of financing mechanisms, energy efficiency audits will be undertaken and measures implemented. • Municipalities will be encouraged to obtain ISO 50001 Energy Management System certification. • Energy efficiency units will be established in municipalities.
Outputs and Indicators	Number of audits, number of municipalities which have established energy efficiency units, actualised savings
Responsible Institutions	Municipalities and Ilbank (Bank of Provinces)
Relevant Institutions	Ministry of Energy and Natural Resources, Ministry of Environment and Urbanisation, Ministry of Interior
Timeline	Financing effectiveness will be improved, and the conduct of audits and implementation of measures will start in 2018. The practice will be scaled up by 2023 including particularly metropolitan municipalities.

5) Action Code and Title	B5. Rehabilitate existing buildings and improve energy efficiency
Goal	Raise awareness of, support directly or indirectly, and impose obligations on end-users to improve energy efficiency in heat insulation, high-efficiency windows, lighting, appliances, heat pumps, boilers and elevator engines etc. areas in the buildings sector.
Activities to Undertake	• Macroeconomic analyses will be conducted for the rehabilitation of existing buildings. • Based on the analyses, a mechanism will be developed which will involve the use of one or more of incentives, support, taxation or sanctions. • The legislative framework will be developed and implementation plans defined. • Awareness-raising work will be undertaken; guides on the mechanism will be prepared. • A methodology will be developed for controlling and monitoring activities.
Outputs and Indicators	Legislative framework developed, mechanism developed, number of buildings rehabilitated
Responsible Institutions	Ministry of Environment and Urbanisation
Relevant Institutions	Ministry of Energy and Natural Resources, Ministry of Finance, Ministry of Science, Industry and Technology, BRSA
Timeline	The appropriate method will be determined and necessary legislative framework developed in 2017 and 2018. The method will be implemented and results monitored from 2019.

Efficient buildings

6) Action Code and Title	B6. Promote central and district heating&cooling systems
Goal	Increase energy savings and use of renewable energy for heating&cooling by switching to central and district heating systems in mass housing complexes and large settlement units.
Activities to Undertake	• In line with the outputs from the action "E1. Identify the potential of cogeneration and district heating&cooling systems and prepare a roadmap", obligation conditions will be explored for new buildings and settlement units, and incentive programmes for existing buildings. • It will be mandatory to conduct economic feasibility studies for cogeneration systems supported by renewable energy and heating&cooling systems for the new built mass housing complexes with legislative amendmend. • Direct or indirect incentives will be defined for mass housing complexes and large settlement areas identified as having high potential. • For district heating systems, maximum use will be made of geothermal potential, if present in the region, and waste heat from industry and power plants.
Outputs and Indicators	Legislative framework developed, number of feasibility studies, central and district heating applications
Responsible Institutions	Ministry of Environment and Urbanisation, Ministry of Energy and Natural Resources
Relevant Institutions	Ministry of Finance, TOKI
Timeline	Technical and legislative work will be undertaken in 2018. The implementation will start from 2020 in mass housing complexes depending on the economic feasibility. It will be scaled up through mass housing complexes to be built in 2020-2022. For existing high-potential mass housing complexes, the practice will be scaled up by end of 2023.

7) Action Code and Title	B7. Increase the energy performance certificate ownership ratio of existing buildings
Goal	Increase the rate of holding energy performance certificates by the existing buildings by developing technical and administrative capacity and raising awareness on energy performance certificate issuing.
Activities to Undertake	• For the issuing of energy performance certificate, capacity will be built to enable the issuing of energy performance certificate by legal entities who employ engineers or architects with the certificate of authorisation and the certificate of "Independent Consulting Engineer" from chambers of professions. • The energy performance certificates issued will be checked for accuracy through sampling every year. • Necessary regulations will be developed to impose sanctions on the transactions of trade and lease of buildings without energy performance certificates. • In the long term, after all buildings obtain their energy performance certificates, imposing of sanctions will be considered on inefficient buildings.
Outputs and Indicators	Legislative framework developed, rate of holding energy performance certificates
Responsible Institutions	Ministry of Environment and Urbanisation
Relevant Institutions	Ministry of Energy and Natural Resources
Timeline	Necessary legislative framework will be developed in 2017 and 2018. Imposing of sanctions will be considered on inefficient buildings from 2021.

Efficient buildings

8) Action Code and Title	B8. Promote sustainable green buildings and sustainable settlements
Goal	Through the certification of sustainable green buildings and sustainable settlements, improve the energy performance of the built environment as well as efficiency in water use, raise comfort, and scale up green certification including the use of natural materials, waste management and environmental impact.
Activities to Undertake	• A basic assessment guide will be prepared for the "Regulation on Certification of Sustainable Green Buildings and Sustainable Settlements" issued but not yet implemented by the Ministry of Environment and Urbanisation, and the necessary infrastructure will be developed for the National Green Building Information System. • Buildings and settlements with green certificates will be certified and promoted. • Public buildings will be certified to set examples for the private sector. • The Ministry of Environment and Urbanisation will engage in a field study annually to verify the results on the certificates. • Target years will be defined for imposing the obligation of being "nearly zero energy building" on the public and private buildings to be newly built. • The increase in the number of sustainable buildings will be monitored.
Outputs and Indicators	Legislative framework developed, number of certified buildings
Responsible Institutions	Ministry of Environment and Urbanisation
Relevant Institutions	Ministry of Energy and Natural Resources, Financing Institutions
Timeline	The legislative framework will be developed in 2018 and 2019; and the implementation will start in 2020.

9) Action Code and Title	B9. Promote energy efficiency in new buildings
Goal	Promote investments for upgrading the energy performance class from minimum C to B or A for new buildings and buildings to be purchased/leased, provide support directly or indirectly to building owners.
Activities to Undertake	• Macroeconomic analyses will be conducted to encourage energy efficiency in new buildings; the scope and methodology of the measure will be defined. • Minimum practices will be identified such as minimum energy performance criteria, renewable energy resources, use of cogeneration and heat pump to be incorporated in the new mass housing model. • TS 825 will be updated based on energy consumption and implementation instructions for all areas other than heating. • The action will be annually revised in order to optimize its implementation and assess the impact. • Buildings in the scope of urban transformation and improvement to be made to mass housing will be included in the scope. • It will be considered for new buildings to mandatorily have at least B class EPC.
Outputs and Indicators	Support mechanism designed, standard updated, Number of buildings holding A and B class EPCs
Responsible Institutions	Ministry of Environment and Urbanisation
Relevant Institutions	Ministry of Energy and Natural Resources, Ministry of Finance, TSE, TOKI, Financing Institutions
Timeline	Administrative and technical work will be undertaken in 2018, and appropriate method identified. From 2019, the identified method will be implemented.

Efficient buildings

10) Action Code and Title	**B10. Improve energy performance of existing public buildings**
Goal	Increase energy efficiency investments in public buildings through using Energy Performance Contracts that allow the financing of investments necessary for energy efficiency measures by savings.
Activities to Undertake	• The legislative framework will be developed to enable public buildings to conclude long-term contracts. • Standardised templates will be formulated for Energy Performance Contracts. • Technical and financial capacities of ESCOs will be increased. • A control and verification mechanism will be established.
Outputs and Indicators	Legislative framework developed, standardised templates developed for Energy Performance Contracts, control and verification mechanism established, quantity of saving
Responsible Institutions	Ministry of Energy and Natural Resources
Relevant Institutions	Ministry of Finance, Financing Institutions, ESCOs
Timeline	The technical and administrative infrastructure work will be completed in 2018. The implementation will start in 2019.

11) Action Code and Title	B11. Scale up the use of renewable energy and cogeneration systems in buildings
Goal	Develop the necessary legislative framework for improving the use of renewable energy resources and cogeneration systems in buildings, and promote directly or indirectly low-carbon, sustainable, environment-friendly buildings.
Activities to Undertake	• Obstacles to using renewable energy resources in buildings will be reduced and administrative processes will be made easier and faster. • Minimum limits will be defined in the legislative framework on the basis of economic feasibility studies for new buildings of certain size to use renewable energy resources. • Offsetting will be made easier for buildings using photovoltaic solar panels with the distribution grid operators. • Direct or indirect support models will be defined for heat pump, cogeneration and renewable energy resources usage in the existing buildings. • The legislative framework will be developed for the sale of on-site generated electricity and heat with minimum self-consumption limit. • Control mechanisms for the efficient operation of cogeneration systems will be developed. • Support mechanisms will be prioritised based on cost/benefit analyses. • The impact of supporting mechanisms will be annually monitored and support amounts for the subsequent year will be optimised accordingly. • The said actions will be supported by awareness-raising programmes on the benefits of renewable energy and cogeneration.
Outputs and Indicators	Legislative framework developed, total installed capacity of renewable energy and cogeneration to be built for self-consumption in buildings
Responsible Institutions	Ministry of Environment and Urbanisation
Relevant Institutions	Ministry of Energy and Natural Resources, Ministry of Finance, EMRA
Timeline	The technical and administrative work will be completed in 2018, and the implementation will start.

12) Action Code and Title	B12. Allocate funds to buildings of SME category for energy efficiency audit programmes and audits
Goal	Extend the implementation of the support programme which is currently executed by KOSGEB for SMEs to non-public commercial and services buildings of certain type which are not under obligation to commission audits.
Activities to Undertake	• Macroeconomic analyses will be conducted on the impact and feasibility of the action. • Energy efficiency audit support will be defined for buildings in SME category which are not under obligation to commission audits under the legislative framework. • Criteria will be defined for commercial and service buildings that will be included in the scope of audit. • A progressive support plan will be prepared for the buildings which fulfil the criteria. • Audit templates will be updated, and a common methodology and format will be provided in order to increase the quality of audits.
Outputs and Indicators	Number of audits, amount of support, quantity of saving actualised
Responsible Institutions	Ministry of Science, Industry and Technology, KOSGEB
Relevant Institutions	Ministry of Energy and Natural Resources, Ministry of Finance
Timeline	Technical and administrative work will be completed in 2018, and the implementation will start.




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3.2.3 Industry and Technology Sector

1) Action Code and Title	S1. Scale up cogeneration systems in large industrial facilities using heat
Goal	Promote the installation of cogeneration systems, and use on-site generation technologies to minimise transmission and distribution losses by imposing obligations to commission audits/feasibility assessments for the implementation of cogeneration systems on the new or to-be-rehabilitated industrial enterprises with heat needs of more than 20 MW.
Activities to Undertake	• The legislative framework will be developed, and obligations be imposed to commission audits/feasibility assessments for the implementation of cogeneration systems on the new or to-be-rehabilitated industrial enterprises with heat needs of more than 20 MW. • Work will be undertaken to encourage applications.
Outputs and Indicators	Legislative framework developed, number of cogeneration applications and quantity of savings actualised at enterprises
Responsible Institutions	Ministry of Energy and Natural Resources
Relevant Institutions	Ministry of Science, Industry and Technology, EMRA, Sectoral NGOs
Timeline	The legislative framework will be developed in 2018, and the implementation will start in 2019.

2) Action Code and Title	S2. Provide support to increase the number and diversity of energy efficiency projects in the industry
Goal	Scale up the implementation of energy efficiency projects through support or low-interest loans and enhance competitiveness of the industry.
Activities to Undertake	• Legislative framework will be developed; the saving quantity to be derived from energy efficiency projects will be evaluated as collateral; and the criteria will be determined for support and loan. • Support will be provided to energy efficiency projects that meet the criteria. • Projects will be reviewed for implementation performance and meeting the criteria.
Outputs and Indicators	Legislative framework developed, number of enterprises and projects that benefited from support, energy and money saving provided by successful projects
Responsible Institutions	Ministry of Energy and Natural Resources
Relevant Institutions	Ministry of Finance, Ministry of Economy, Ministry of Science, Industry and Technology, Financing Institutions
Timeline	The legislative and financial infrastructure work will be completed in 2018 and 2019. The implementation will start in 2019.

3) Action Code and Title	S3. Improve efficiency in industry
Goal	Reduce energy intensity by at least 10% in each subsector of industry through sectoral cooperation.
Activities to Undertake	• Focused work on the basis of operations, processes, products to reduce energy intensity will be conducted in the areas of clustering, best practices, process efficiency and lean production techniques. • Organised industrial zones will complete the establishment of Energy Management Units and ISO 50001 Energy Management System, and prepare and present their Efficiency Action Plans. • Alternative fuel use will be promoted. • Industrial symbiosis, recycling and secondary raw material use will be increased. • Minimum energy performance standards will be set for the sector, processes, machines and equipment and the use of using energy-efficient machines and equipment will be promoted. • The current best technologies and practices will be determined for Turkey and sectoral best practice guides be published. • Energy intensity targets for subsectors will be defined in detail as a result of the analyses to be conducted, and revised depending on the progress. • Energy efficiency, process efficiency and competitiveness will be prioritised in Industry 4.0 transition and Internet of Things infrastructure and transition plan will be defined. • The current criteria will be revised for R&D support in energy efficiency and a study will be conducted on extending its scope. • Energy efficiency of electric motors will be increased.
Outputs and Indicators	Guides prepared, annual rates of reduction of energy intensity by subsector
Responsible Institutions	Ministry of Science, Industry and Technology, Ministry of Energy and Natural Resources
Relevant Institutions	TSE, TUBITAK, KOSGEB, TTGV, TOBB, Organised Industry Zones, Sectoral Associations
Timeline	Necessary analyses and preparations will completed in 2018, and actions will be developed and implemented in the period of 2019-2023.

Efficient industry

4) Action Code and Title	S4. Implement energy efficiency performance standards and environment-friendly design, production, labelling system in appliances
Goal	Harmonise the legislation on environment-friendly design and product labelling with EU acquis.
Activities to Undertake	• The environment-friendly design and product labelling legislation which has not been harmonised with EU Directives will be concurrently harmonised by the Ministry of Science, Industry and Technology. • Awareness will be raised among consumers on environment-friendly design and product labelling.
Outputs and Indicators	Rate of increase of the energy-efficient products on the market
Responsible Institutions	Ministry of Science, Industry and Technology
Relevant Institutions	Ministry of Energy and Natural Resources
Timeline	Work on harmonisation will start in 2018.

5) Action Code and Title S5. Support Efficiency Improvement Projects in Industry

Goal	Improve Efficiency Improvement Project processes and support the projects with high potential for savings.
Activities to Undertake	• The necessary legislative framework will be developed to improve Efficiency Improvement Project processes and increase the amount of support. • Support criteria will be identified; work will be undertaken to monitor and verify project.
Outputs and Indicators	Legislative framework developed, number of projects supported and quantity of energy saving actualised
Responsible Institutions	Ministry of Energy and Natural Resources
Relevant Institutions	Ministry of Finance, Ministry of Science, Industry and Technology
Timeline	The legislative and technical infrastructure work will be completed in 2018, and the implementation will start.

6) Action Code and Title S6. Mapping energy saving potential in industry

Goal	Identify measures applicable in energy efficiency in industry subsectors and map the potential.
Activities to Undertake	• Audits will be conducted in at least 5 enterprises selected to represent each subsector of the industry. • The Industry Energy Efficiency Inventory will be compiled and published electronically along with the audits made in enterprises which have annual energy consumption of over 5,000 toe. • National and international benchmarking studies will be conducted on sectoral basis, and savings potential be mapped.
Outputs and Indicators	Industry Energy Efficiency Inventory drawn up, sectoral benchmarking reports, identifying and mapping savings potential
Responsible Institutions	Ministry of Energy and Natural Resources
Relevant Institutions	Ministry of Science, Industry and Technology, TOBB and ESCOs
Timeline	The implementation will start in 2018.

7) Action Code and Title S7. Improve Voluntary Agreements

Goal	Improve and maintain the practice of Voluntary Agreement scheme.
Activities to Undertake	• The necessary legislative framework will be developed to improve the implementation processes of Voluntary Agreements and increase the amount of support. • Support criteria will be identified; work will be undertaken to monitor and verify energy intensity. • All agreements will cover a three-year period and if there are major changes to the original forecasts, they can be renegotiated for one time only during the period of the agreement. • Accordingly, a participant enterprise for the Voluntary Agreement will first have an energy audit by ESCOs, and such audits will be financially supported. • For the provision of incentives, agreements will refer to the energy management actions taken by firms and the audits focusing on improving energy efficiency in production. Various support programmes may be used such as several industrial incentives, enterprise audits, comparative evaluations, monitoring, eliciting and financial incentives.
Outputs and Indicators	Legislative framework developed, number of Voluntary Agreements signed every year, energy and money saving derived from successfully completed Voluntary Agreements.
Responsible Institutions	Ministry of Energy and Natural Resources
Relevant Institutions	Ministry of Science, Industry and Technology, Ministry of Finance, Industrial Enterprises, Sectoral Associations
Timeline	The legislative framework will be developed in 2018, and the implementation will start.


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3.2.4 Energy Sector

1) Action Code and Title	E1. Identify the potential of cogeneration and district heating&cooling systems and prepare a roadmap
Goal	Conduct a nationwide analysis to identify and realise the potential of cogeneration (high efficiency cogeneration and trigeneration) and district heating&cooling systems
Activities to Undertake	• The existing district heating&cooling infrastructure will be mapped. • The demand for heating&cooling will be projected for 10 years into the future considering the regional planning. • Heating&cooling supply points will be identified and the current situation and potential of cogeneration and trigeneration systems will be identified and their future role in the electricity and heating supply system will be determined. • The legislative framework will be developed for auditing to implement cogeneration and trigeneration systems to the buildings. • The waste heat potential will be identified of industry and electricity generation facilities. Plans for progressive utilisation/putting into economic use will be updated. • Cogeneration potential relying on renewable resources will be identified. • The necessary bases will be developed for heat sale and share of heat expenses. The legislative framework will be developed for measurement of heat and sales standards. • The legislative framework will be developed to build a heat market that enables trading of heat. • Best practices will be shared of cogeneration, trigeneration, heating&cooling systems based on results of the cost-benefit analyses.
Outputs and Indicators	Legislative framework developed, points for heating&cooling supply determined, heating&cooling projections made
Responsible Institutions	Ministry of Energy and Natural Resources
Relevant Institutions	Ministry of Environment and Urbanisation, Energy Market Regulatory Authority, Municipalities, TOKI
Timeline	Work will be undertaken to identify potential in 2017 and 2018; cost-benefit analyses be conducted and the legislative framework be developed in 2019.

2) Action Code and Title E2. Implement efficiency standards for natural gas infrastructure

Goal	Develop a mechanism to more effectively control and reduce the losses in the natural gas transmission and distribution infrastructure systems.
Activities to Undertake	• A roadmap will be developed to increase energy efficiency and reduce the losses for natural gas transmission and distribution. • Based on the roadmap, the natural gas transmission system will be evaluated in respect of energy efficiency, and necessary actions will be taken to implement cost effective energy efficiency measures. • The road map will be implemented and monitored.
Outputs and Indicators	Roadmap and/or efficiency standards developed
Responsible Institutions	Ministry of Energy and Natural Resources
Relevant Institutions	Energy Market Regulatory Authority, BOTAS, Natural Gas Distribution Companies
Timeline	Necessary analyses and engineering work will be completed in 2018; and measures to reduce losses will be implemented in 2019-2020.

3) Action Code and Title	E3. Presenting customers with comparable and detailed bills; create an energy data platform for smart management of measurement data
Goal	Provide the consumers with the information on and means to inquire energy consumption quantities, billing information comparing against previous periods and consumption by similar consumer groups, energy efficiency improvement measures, opportunities of energy saving on energy-consuming equipment so that energy consumers in the electricity and natural gas markets avoid inefficient consumption habits.
Activities to Undertake	• The legislative framework will be developed relating to the information included on the bills and implemented in cooperation with energy retail companies. • Energy distribution and retail companies will create a common format and reporting system. While consumers' billing data for previous years are compared; easily intelligible data will be created considering such information as degree days. • Basic statistics on consumption will be included in the bills, usage habits will be analysed and more efficient and effective alerts will be given.
Outputs and Indicators	Legislative framework developed, bills detailing energy consumption presented
Responsible Institutions	Energy Market Regulatory Authority
Relevant Institutions	Ministry of Energy and Natural Resources, Energy Distribution and Retail Companies, EXIST
Timeline	The legislative framework will be completed in 2018; and distribution and retail companies will prepare the necessary technical infrastructure in 2019-2020.

4) Action Code and Title	E4. Harmonise legislative framework on electric metering with EU acquis (scale up Smart Metering)
Goal	Equip end-users with smart metering systems through a transition plan that is economically and technically feasible.
Activities to Undertake	• A cost-benefit analysis will be conducted based on EU acquis. If the results of the cost-benefit analysis are positive, smart metering systems will be scaled up along targets similar to those set by EU acquis. • Focus groups will be identified and prioritised (first industrial facilities, business places, hotels etc.). • Infrastructure needs will be identified, and costs be calculated accordingly. • The impact of smart meter cost on the tariff will be evaluated.
Outputs and Indicators	Cost-benefit analysis conducted, implementation plan developed
Responsible Institutions	Energy Market Regulatory Authority
Relevant Institutions	Ministry of Energy and Natural Resources, Electricity Distribution Companies, OIZs Holding Distribution Licences
Timeline	The cost-benefit analysis and technical work will be undertaken and evaluated in 2018 and 2019. The implementation will start in 2020.

5) Action Code and Title	E5. Implement minimum performance standards for transformers
Goal	Set minimum performance standards for efficiency of transformers in electricity transmission and distribution systems, and ensure that purchases be made accordingly.
Activities to Undertake	• An inventory will be made of the existing transformers, failures be classified to prioritise those with higher rates of failure, and efficiency-focused work will be defined. • Minimum efficiency values for transformers in Commission Regulation (EU) No *548/2014* of 21 May 2014 on implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to small, medium and large power transformers will be transposed to Turkey. • The legislative framework will be developed on the implementation of standards and transmission and distribution companies will start implementation in the fourth implementation period.
Outputs and Indicators	Legislative framework developed, inventory of transformers made, minimum performance criteria identified and implemented
Responsible Institutions	Ministry of Energy and Natural Resources, Ministry of Science, Industry and Technology
Relevant Institutions	Energy Market Regulatory Authority, TEIAS and Distribution Companies, Relevant NGOs
Timeline	The technical and legislative framework will be developed in 2018 and 2019; and the implementation will start in 2020.

6) Action Code and Title	E6. Manage peak demand arising from heating&cooling
Goal	Switch to a demand tariff structure considering both consumption (kWh) and capacity needed for instantaneous demand (kW).
Activities to Undertake	• Work on legislative framework and impact analysis will be made, and according to the results of the analysis, relevant procedures will be integrated into the tariff structure. • The instantaneous demand control and frequency control activities addressed in the "Regulation on Ancillary Services in Electricity System" will be addressed in this context. • Activities will be undertaken to scale up thermal storage systems for those with high heating&cooling load through planning for the reduction of peak load. • Renewable energy generation and peak demand will be planned and managed.
Outputs and Indicators	Legislative framework developed, demand tariff structure implemented
Responsible Institutions	Energy Market Regulatory Authority
Relevant Institutions	Ministry of Energy and Natural Resources, TEIAS, Electricity Distribution and Retail Companies
Timeline	The legislative framework will be developed in 2017 and 2018; and after the transition program will start.

7) Action Code and Title	E7. Improve energy efficiency public lighting
Goal	Replace armatures used in public lighting with efficient ones.
Activities to Undertake	• Work will be undertaken to plan the replacement of sodium vapour lamps with LED lamps considering cost-benefit, time and efficiency; and also, necessary revisions will be made in the procedures and principles regarding LED lighting systems. MENR, TEDAS, EMRA, distribution companies, the Ministry of Urbanisation and Environment, municipalities, General Directorate of Highways etc. will prepare detailed transition programmes. • Innovative technologies will be monitored and integrated into the legislative framework. • Control and monitoring activities will be undertaken to maximise energy savings potential; the implementation of Energy Performance Contracts will be promoted associated with ESCOs. • Plan actualisation and energy savings verification will be monitored. • Development of competences for local design and production in efficient lighting systems will be promoted.
Outputs and Indicators	Legislative framework developed, Number of transitions to LED, quantity of energy saving actualised
Responsible Institutions	Ministry of Energy and Natural Resources
Relevant Institutions	Energy Market Regulatory Authority, TEDAS, Electricity Distribution Companies, Municipalities, KGM, MEU
Timeline	The legislative framework will be developed in 2017 and 2018; and the transition programme will start in 2020.

8) Action Code and Title	E8. Improve efficiency increase in electricity transmission and distribution
Goal	Set targets of distributed generation for distribution companies on such criteria as grid theft&loss rate and extensiveness of distributed generation.
Activities to Undertake	• The current practices will be maintained in the tariff structure for distribution companies in order to reduce theft&losses in the distribution grid; practices will be developed to reduce theft&losses. • Actions will be explored to reduce grid congestions for the fourth implementation period of distribution companies. • Performance criteria will be identified for distribution companies on extensiveness of distributed generation; and promotion opportunities will be evaluated. • Regional targets will be set for distributed generation in the regions of distribution companies.
Outputs and Indicators	Distributed generation scaled up, targets set, theft&loss rates
Responsible Institutions	Energy Market Regulatory Authority
Relevant Institutions	Ministry of Energy and Natural Resources, Electricity Distribution Companies, TEDAS, TEIAS
Timeline	The legislative framework and procedural infrastructure will be developed in 2018 and 2019; and the target-based implementation will start in 2020.

9) Action Code and Title	E9. Improve efficiency in existing power generation plants
Goal	Perform necessary servicing and maintenance activities to improve energy efficiency of fossil-fuel-fired thermal power plants and hydropower plants; conduct studies on renewal and improvement; and design financial incentive models as necessary.
Activities to Undertake	• The development and implementation of total productive management (TPM), protective and preventive maintenance programs of power plants will be monitored and coordinated. • Power plants to be studied will be identified and prioritised based on such criteria as age, technology, efficiency and internal consumption etc. • Financial and technical feasibility studies will be conducted. • Based on the overall planning, activities and investments will be planned in detail. • The need for incentives will be evaluated, and if necessary, an incentive mechanism will be designed accordingly. • Necessary resources will be allocated if economically and technically feasible. • Monitoring, verification and awareness-raising activities will be carried out.
Outputs and Indicators	Baseline studies conducted, number of audits, amount of efficiency increase actualised
Responsible Institutions	Ministry of Energy and Natural Resources
Relevant Institutions	Energy Market Regulatory Authority, Electricity Generation Companies, EUAS
Timeline	The preparatory work will be completed in 2018 and 2019; and the implementation will start in 2020.

10) Action Code and Title E10. Build a market infrastructure for demand-side response

Goal	Demand response is a mechanism that enables management of peak demand through flexibility of electricity consumers who have flexible/switchable load. In order to implement this action, consumers with flexible load should be gathered (aggregation) and given the opportunity to be allowed in the balancing power market. The necessary legislative framework will be developed for the implementation of demand response mechanism and the institutional infrastructure be created.
Activities to Undertake	• Legal status and licencing qualifications of the aggregation institutions will be identified. • A flexible consumption portfolio will be created consisting of large industrial consumers with flexible consumption (e.g. cement, iron and steel etc.). • Assessments will be made to include other consumers including residential ones in the implementation. To that end, demo areas will be created in the scope of micro grids, smart city, smart grids by supporting the scaling up of smart meter and pilot schemes.
Outputs and Indicators	Legislative framework developed, target groups identified
Responsible Institutions	Ministry of Energy and Natural Resources
Relevant Institutions	Energy Market Regulatory Authority, TEIAS, EXIST, TETAS
Timeline	The legislative framework will be developed in 2018 and 2019; the institutional infrastructure will be completed in 2020 and 2021; and the implementation will start in 2022.



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Efficient transportation

3.2.5 Transport Sector

1) Action Code and Title	U1. Promote energy-efficient vehicles
Goal	Introduce tax advantages for highly energy efficient, low emission, environment-friendly, small motor volume vehicles including fuel-cell, electric and hybrid vehicles.
Activities to Undertake	• The Special Excise Law includes tax discrimination for electric and hybrid vehicles; analyses will be conducted for additional tax discrimination, and according to results, a new legislative framework will be considered. • The infrastructure will be developed in order to introduce differentiated taxation according to the fuel consumption and emission values (CO2/km). Tax advantage will be provided to low emission vehicles by improving the current motor vehicle tax system. The imposition of higher taxes for older vehicles will be included in this system considering the balance of environmental impact and purchasing power. • A database will be created where the CO2 emission figures of all vehicles on the market will be recorded. The tax system will be supported by this database. • Standards and infrastructure will be established for the installation of charging stations for electric and hybrid vehicles. • Awareness on electric and hybrid vehicles will be raised and low emission vehicle culture will be established. Vehicle manufacturers will play an active role in the introduction and promotion of electric and hybrid vehicles to the public.
Outputs and Indicators	Legislative framework developed, standards on the installation of charging stations developed, database created
Responsible Institutions	Ministry of Finance, Ministry of Science, Industry and Technology, EMRA
Relevant Institutions	Ministry of Energy and Natural Resources, Ministry of Transport, Maritime Affairs and Communications, Ministry of Environment and Urbanisation, Ministry of Customs and Trade
Timeline	The legislative framework will be developed in 2018 and 2019. The implementation will start in 2020.

Efficient transportation

2) Action Code and Title U2. Develop benchmarking on alternative fuels and new technologies

Goal	Scale up vehicles that use alternative fuels and/or new technologies
Activities to Undertake	• Vehicles that use alternative fuels and/or new technologies will be analysed and compared for cost, energy consumption and environmental impact on the basis of benchmarks. • Vehicles that use alternative fuels and/or new technologies will be analysed and benchmarked in terms of costs per ton-km or passenger-km, energy resources and consumption, and greenhouse gas emissions through lifecycles. • Trainings and physical infrastructure needs will be assessed for repair and maintenance services of new technology vehicles. • A benchmarking study will be made of vehicles that use traditional and alternative fuels, and energy efficiency policies will be determined in line with the results of this study.
Outputs and Indicators	Benchmarking
Responsible Institutions	Ministry of Science, Industry and Technology, TUBITAK
Relevant Institutions	Ministry of Transport, Maritime Affairs and Communications, Ministry of Energy and Natural Resources
Timeline	The initial analysis and benchmarking studies will start in 2019 and the action be completed in 2023.

Efficient transportation

3) Action Code and Title	U3. Develop and improve bicycle and pedestrian transport
Goal	Develop and improve bicycle and pedestrian transport to scale up zero-emission transport to ensure sustainable urban and regional transport.
Activities to Undertake	• Urban bicycle and pedestrian ways infrastructure (bicycle and pedestrian ways, bicycle park areas, smart bicycle / bicycle stations) will be constructed and developed. • Bicycle and pedestrian ways/areas with no motor vehicles will be established in city centres. • Urban planning approaches will be implemented that make using bicycle or pedestrian transport attractive. Pedestrian and bicycle ways will be smoothly integrated into other tyre-wheeled, rail or maritime transport modes. • The legislative framework will be developed to promote zero emission transport. • Bicycle and pedestrian ways/areas will be prioritised in the transport master plans, construction plans and urban transport plans. Transport master plans of cities will be prepared based on sustainable urban philosophy and cover bicycle and pedestrian ways. • Work will be undertaken to raise awareness on the importance of bicycle use for health and environmental benefits. "Vehicle-free day/week" events will be organised to increase public awareness where senior administrators of public institutions will be role models in such activities. • A platform will be established to support healthy life and zero emission transport with the participation of NGOs and the Ministry of Health. • Best practices will be compiled and introduced to set models for practice. • The subject of bicycle and pedestrian traffic and rules will be treated more effectively in the driving courses. The training on traffic rules will became mandatory to the bicyclists.
Outputs and Indicators	Legislative framework developed, "vehicle-free day/week" events, platform created, bicycle and pedestrian ways constructed (km)
Responsible Institutions	Ministry of Interior, Municipalities
Relevant Institutions	Ministry of Transport, Maritime Affairs and Communications, Ministry of Energy and Natural Resources, Ministry of Environment and Urbanisation, Ministry of National Education, Ministry of Health
Timeline	The legislative framework will be developed in 2018; and the implementation will start in 2019.

Efficient transportation

4) Action Code and Title	U4. Reduce traffic density in cities: Discourage use of automobiles
Goal	Implement effective control of street-parking of vehicles, dissuasive parking fee system, and establish smart parking area systems in order to reduce traffic density in urban centres.
Activities to Undertake	• Dissuasive precautions will be taken that restrict entry of automobiles into urban centres. • The parking capacities of the attraction centres that cause traffic density, will be planned according to their vehicle parking capacity; no buildings without parking lots be allowed; and parking fees charged by municipalities will be used effectively for building new parking lots. • Work will be undertaken to vehicles' invasion of roads and pavements and plan street parking on busy arteries. Physical arrangements will be made for drop-off and pick-up by mass vehicles such as taxis, buses and collective taxis. • Arrangements will be made where parking fees are high where the urban traffic is dense and low where the urban traffic is comparatively low. Transport systems will be arranged intermodally. "Park and move on" practice will be scaled up. • Garbage/earth-moving trucks, earth-movers will be inspected and restricted in peak traffic hours. Heavy cargo vehicles will be allowed to enter the city only in certain hours in the scope of local logistics. • Low carbon emission areas will be established in cities where large tonnage vehicles will not be allowed to enter. • The traffic density will be effectively managed with the support of smart transport systems of the transport management units within metropolitan municipalities. • Urban freight transport will be promoted for times when the traffic density is low. • The start and end time of public institutions, private institutions and schools will be effectively and progressively managed. • A guide will be prepared for municipalities by compiling best practices on reduction of traffic density in cities. • Activities will be organised to raise awareness about annual cost of using vehicles.
Outputs and Indicators	Traffic density improved, work conducted on planning and physical arrangement, guide prepared on good practices in urban transport
Responsible Institutions	Ministry of Interior, Municipalities
Relevant Institutions	Ministry of Transport, Maritime Affairs and Communications, Ministry of Energy and Natural Resources, EMRA
Timeline	The legislative framework will be developed in 2017 and 2018. The implementation will start in 2019.

Efficient transportation

5) Action Code and Title U5. Promote public transport

Goal	Develop infrastructure and mobility plans to promote public transport systems
Activities to Undertake	• National and international financial supports will be used to enlarge and strengthen the public transport service network. • Public transport will be promoted with awareness-raising and information activities. A "mobility week" including various events across the country will be organised to make behavioural changes to increase public transport awareness. Carpooling, promoting new technologies, fast (dedicated) lines and alternative transport methods will be promoted. • Transport modes will be integrated smoothly to promote use of environment-friendly, low weight, electric or hybrid, hydrogen, natural-gas-fired vehicles. • Arrangements will be made in public transport routes and stops on intermodal transport. • Companies will encourage their employees to use public transport in cooperation with the local authorities. • Service quality will be increased to attract passengers to using public transport. • Arrangements will be made that mass transport vehicles have appropriate places and devices for passengers to carry their bicycles. • Safe driving techniques and communication training will be provided to drivers to increase energy efficiency and safety in public transport systems
Outputs and Indicators	Legislative framework developed, mobility week organised
Responsible Institutions	Ministry of Interior, Municipalities
Relevant Institutions	Ministry of Transport, Maritime Affairs and Communications, Ministry of Environment and Urbanisation, Ministry of Energy and Natural Resources
Timeline	The legislative framework will be developed in 2018 and 2019. The implementation will start in 2020.

6) Action Code and Title U6. Develop and implement institutional restructuring for urban transport

Goal	Support the institutional restructuring of local organisations which will prepare national and local transport master plans to ensure sustainable transport
Activities to Undertake	• Urban Transport Planning Units will be established on a regional/urban scale under the municipalities, and capacities developed. These units will ▫ Determine, direct and supervise the policies for sustainable urban transport, planning and management and also be vested with national level responsibility; ▫ Prepare the Urban Transport Strategy at national level with an independent committee consisting of related public and private sector representatives, local governments, scientists and experts. • Transport management units within municipalities will be strengthened and all vehicle and pedestrian movements will be managed with an mobility management approach supported by intelligent transporting systems in terms of traffic flow, safety, energy efficiency and environment. The necessary legislative framework will be developed in Metropolitan Municipality Law and Municipality Law on this subject.
Outputs and Indicators	Legislative framework developed, urban transport units established, urban transport strategies developed
Responsible Institutions	Ministry of Interior, Municipalities
Relevant Institutions	Ministry of Transport, Maritime Affairs and Communications, Ministry of Environment and Urbanisation, Ministry of Energy and Natural Resources, Union of Municipalities of Turkey
Timeline	The legislative framework and capacity building will be completed in 2019 and 2020; and urban transport strategies will be developed by end of 2021.

Efficient transportation

7) Action Code and Title U7. Strengthen maritime transport

Goal	Improve current technology, infrastructure and relevant legislative framework including energy efficiency to strengthen maritime transport.
Activities to Undertake	• Work will be undertaken to improve the technology of existing ports, infrastructure and related legislative framework. • New ports will be built through Build-Operate-Transfer (BOT) model at designated locations under the scope of Transport Coastal Structures Master Plan. • The maritime sea fleet will be strengthened with new ships, machines and equipment. • The number of Ro-Ro ship lines will be increased where there is demand for cargo, passenger and vehicles. • Modern port operating techniques will be implemented in ports. • The share of container transport will be increased in cargo transport. • Activities will be carried out to promote maritime transport and raise public awareness. • Standards and comfort levels of maritime passenger vessels will be upgraded. • Green port applications will be promoted.
Outputs and Indicators	Legislative framework developed, share of maritime transport
Responsible Institutions	Ministry of Transport, Maritime Affairs and Communications
Relevant Institutions	Ministry of Environment and Urbanisation, Ministry of Energy and Natural Resources,
Timeline	The legislative framework and financing infrastructure will be developed in 2018 and 2019. The implementation will start in 2020.

Efficient transportation

8) Action Code and Title U8. Strengthen rail transport

Goal	Transfer a part of cargo and passenger transport from road to railways on account of high-capacity rail infrastructure.
Activities to Undertake	• High speed, fast and conventional railway projects will be implemented. • The current railway network will be renewed, higher standards be implemented, electrification and signalization be provided. • The current rolling stock pool will be renewed. • The rail network will be connected to production centres and ports.
Outputs and Indicators	Share of railways in freight and passenger transport
Responsible Institutions	Ministry of Transport, Maritime Affairs and Communications, TCDD
Relevant Institutions	-
Timeline	The implementation of the action will start in 2018.

Efficient transportation

9) Action Code and Title U9. Compile transport data

Goal	Create a database/information network infrastructure in local authorities allowing the compilation, comparison and assessment of data on urban transport.
Activities to Undertake	• Accurate, reliable and necessary data on passenger and freight transport in all sectors will be compiled, monitored and evaluated by building the necessary infrastructure. • Statistical data will be created on the use of alternative fuels in passenger and freight transportation. • Strategies will be developed to reduce the emissions by recording data and statistics on emission figures of all passenger and freight vehicles in use. • Data compiling, monitoring and assessing will be provided by the relevant units of municipalities.
Outputs and Indicators	Database/information network infrastructure developed
Responsible Institutions	Ministry of Interior, Municipalities
Relevant Institutions	Ministry of Transport, Maritime Affairs and Communications, Ministry of Energy and Natural Resources, Ministry of Environment and Urbanisation, TURKSTAT
Timeline	The infrastructure will be developed in 2019, and the implementation will start.


Efficient agriculture
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3.2.6 Agriculture Sector

1) Action Code and Title	T1. Promote the replacement of tractors and harvesters with energy-efficient ones
Goal	Promote the replacement of the existing fleet of tractors and harvesters with energy-efficient ones
Activities to Undertake	• A support mechanism will be defined to replace the existing fleet of tractors and harvesters with energy-efficient ones; and the necessary legislative framework will be reviewed. • Work will be undertaken to structure the support mechanism including scrap incentives, interest support etc. • Support will be provided for the replacement of tractors aged more than 20 years and harvesters aged more than 10 years with energy-efficient ones. • Shared use of tractors and harvesters will be promoted to increase the impact of energy efficiency support.
Outputs and Indicators	Support mechanism designed, support impact analysis conducted, number of tractors and harvesters replaced
Responsible Institutions	Ministry of Food, Agriculture and Livestock
Relevant Institutions	Ministry of Energy and Natural Resources, Ministry of Finance, Ministry of Science, Industry and Technology
Timeline	Work on support mechanisms and analyses will be undertaken in 2017 and 2018; all work will be completed, and the implementation start in 2019 and 2020.

Efficient agriculture

2) Action Code and Title T2. Switch to energy-efficient irrigation methods

Goal	Use the state of the art technologies enabling energy efficiency in the process of transmitting water from source to plant, and promote low pressure drip irrigation methods.
Activities to Undertake	• Efficiency Improvement Projects will be supported that include cover the improvement of the currently-used water pumps or their replacement with more efficient ones. • Support will be provided to the activation of the compensation systems in order to reduce reactive losses in the system. • An inventory will be made of the old type open irrigation systems, detailed transition plans be prepared and rehabilitation be made to transform the existing irrigation systems into closed ones. • Based on the technical evaluation results, technical and economic support will be provided for transition from surface irrigation to pressurised irrigation. • Training and awareness-raising activities will be undertaken for farmers on resource-efficient water consumption. • Associations will effectively be in charge of the process of switching to energy-efficient irrigation.
Outputs and Indicators	Number of projects supported, inventory of old type open irrigation systems made, transition plans prepared
Responsible Institutions	Ministry of Food, Agriculture and Livestock
Relevant Institutions	Ministry of Energy and Natural Resources, Ministry of Forestry and Water Affairs, Ministry of Science, Industry and Technology
Timeline	The legislative framework will be developed and inventory work completed in 2018; and the implementation will start in 2019.

Efficient agriculture

3) Action Code and Title	T3. Support energy efficiency projects in agriculture sector
Goal	Provide support to energy efficiency projects in the stages of agricultural production, preparation, drying, storing, cooling and transporting of agricultural products based on feasibility study results. In order to ensure resource efficiency in sustainable agricultural production, direct and indirect energy inputs will be reduced in high quality sowing and/or planting, and production and use of harvesting equipment, fertiliser, plant nutritive elements, plant growth regulators, bioactive microorganisms.
Activities to Undertake	• A support system for Efficiency Improvement Projects will be designed. • Support will be provided, in greenhouses, animal production places and storages, to reducing energy consumption via prevention of heat loss, heat recovery and energy efficient heating&cooling&ventilation systems, use of heat pumps, cogeneration or trigeneration applications where it is technically feasible and cost-effective. • The promotion of projects that include land aggregation will be maintained and augmented.
Outputs and Indicators	Number of energy efficiency projects supported, quantity of energy saving actualised
Responsible Institutions	Ministry of Food, Agriculture and Livestock
Relevant Institutions	Ministry of Energy and Natural Resources, Agriculture and Rural Development Support Institute
Timeline	Preliminary analyses for support will be conducted in 2018. The work on legislative framework will start in 2019; and the action be implemented in 2019 and 2020.

4) Action Code and Title	**T4. Promote use of renewable energy resources in agricultural production**
Goal	Promote the use of renewable energy resources (solar, wind, geothermal, biomass) for agricultural production processes in order to make use of distributed energy systems by supplying the energy needed in sustainable agricultural production on site and through local resources, and reduce energy costs and environmental impact of agricultural production.
Activities to Undertake	• Awareness will be raised regarding the usage of solar-powered water pumps in irrigation. • The use of wind and solar energy (photovoltaic, concentrated solar panels, etc.) will be supported for irrigation. • The use of solar power will be supported in drying and air conditioning (acclimatisation). • The use of renewable energy resources will be supported in agricultural production (greenhouse, barn, fold, coop, etc.) areas. • It is essential to use agricultural and forestry wastes as animal feed and fertiliser. Awareness-raising activities will be promoted for biomass use (apart from agricultural and forestry waste used as animal feed and fertiliser) for energy generation. • Cogeneration and trigeneration systems will be supported which especially work with agriculture and forestry waste. • TUBİTAK and TAGEM will support special call projects in R&D activities.
Outputs and Indicators	Number of facilities and installed capacity based on renewable energy resources that are built for agricultural production
Responsible Institutions	Ministry of Food, Agriculture and Livestock, Ministry of Energy and Natural Resources
Relevant Institutions	Ministry of Forestry and Water Affairs, Ministry of Environment and Urbanisation, TKDK, TAGEM, TUBITAK
Timeline	The legislative framework will be developed in 2018; and the action will be implemented in 2019, 2020 and 2021.

5) Action Code and Title	T5. Identify agricultural by-products and waste potential to produce biomass and promote its use
Goal	Identify agricultural by-products and waste potential to produce biomass and promote its use of agricultural by-products and waste as fodder and soil improving material in priority, then use as contributing materials to on-site generation of energy needed in the sector; and reduce adverse environmental impact and energy consumption.
Activities to Undertake	• Work will be undertaken to identify the potential of agricultural by-products and waste, and domestic organic waste for generating biomass energy. • Awareness will be raised on the scaling up of possible development of energy generation methods. • Support will be continued to the use of energy from agricultural by-products and waste to generate electricity and heat at agriculture facilities. • Training and raising-awareness activities will be promoted on the use of biomass.
Outputs and Indicators	Energy potential identified, number and installed capacity of facilities
Responsible Institutions	Ministry of Food, Agriculture and Livestock
Relevant Institutions	Ministry of Energy and Natural Resources, Ministry of Environment and Urbanisation, TKDK
Timeline	Work on identifying energy potential will be undertaken in 2018 and 2019. The support scheme will be designed in 2019 and 2020; and the implementation will start in 2021.

Efficient agriculture

6) Action Code and Title T6. Support energy efficiency in fisheries sector

Goal	Promote energy efficiency in equipment and facilities used in the fisheries sector.
Activities to Undertake	• In fisheries, the use of renewable energy resources will be supported. • Indicators will be developed on energy efficiency in the fisheries sector. • Energy-efficient heating, cooling, ventilating and transporting projects will be supported. • The use of cold storage advantage of trigeneration will be promoted. • The legislative framework will be developed to form the bases for the support mechanism. • The most efficient practices in the sector will be identified; and work will be undertaken to raise the awareness of the users.
Outputs and Indicators	Legislative framework developed, number of projects supported, quantity of energy saving actualised
Responsible Institutions	Ministry of Food, Agriculture and Livestock, Ministry of Science, Industry and Technology
Relevant Institutions	Ministry of Energy and Natural Resources, Ministry of Forestry and Water Affairs
Timeline	The legislative framework will be developed in 2018 and 2019; and the implementation will start in 2020.

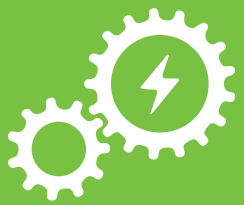
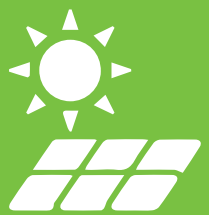


4 IMPLEMENTATION, COORDINATION AND MONITORING

In order to improve energy efficiency across the country; the effective implementation of policies and measures, monitoring and evaluation of results are as important as the identification of correct and consistent policies and measures. The actions under the National Energy Efficiency Action Plan will be implemented, coordinated and monitored as follows:

- Energy efficiency actions involve multiple disciplines; and institutions and organisations designated as responsible institutions are responsible for implementing and scaling up the actions. The designated responsible institutions under the Action Plan will pay special attention to the actions under the Action Plan when preparing their institutional budgets and annual work programmes. Those designated as relevant institutions will cooperate with the responsible institutions and support the actions. All public organisations and relevant stakeholders included in the Action Plan will be responsible for nationwide implementation of the Action Plan. The designated responsible institutions will coordinate the activities by the relevant institutions for actions.
- The General Directorate of Renewable Energy of the Ministry of Energy and Natural Resources is the responsible institution for monitoring and coordinating the Action Plan.
- Outputs and performance indicators for actions have been identified, which will allow the further definition of detailed performance indicators. Activities for monitoring and evaluating the actions will proceed on semi-annual basis. For effective monitoring and evaluation, the progress will be reported, potential deviations be identified and measures be taken timely.

- The Energy Efficiency Coordination Board which is mandated, authorised and charged with preparing national energy efficiency strategies, plans and programmes, assessing the impact and revising as necessary thereof, and coordinating the introduction and implementation of new measures will also serve as the Monitoring, Evaluation and Steering Board for the National Energy Efficiency Action Plan. The board may also make general assessments of the actualisation levels of the actions under the Action Plan as well as the achievement levels of the targets defined in the Action plan. The Board is authorised to update the actions under the Action Plan, and re-designate responsible and relevant institutions and amend timelines.
- Six Monitoring and Evaluation Commissions will be established on the basis of categories under the Action plan, namely cross-cutting (horizontal) areas, buildings and services, industry and technology, transport, energy and agriculture. Coordinated by the General Directorate of Renewable Energy, the Monitoring and Evaluation Commission will have at least one expert from institutions designated as responsible and relevant under the respective actions. Starting from May 2018, the Commissions will convene in May and November of every year, assess the actualisation levels of actions, and identify additional measures needed. The progress reports will be prepared and submitted to the Energy Efficiency Coordination Board. The Board may request detailed presentation, additional explanation on actions from the responsible institutions.
- The General Directorate of Renewable Energy will undertake necessary activities and provide bases for the monitorability of actions, and for commissions to effectively function.
- Relevant institutions will be responsible, within their remits, for providing all possible support to the responsible institutions, participating in the meetings during the implementation and engaging in necessary correspondence.
- The information on the actualisation levels of the actions under the National Energy Efficiency Action Plan will be prepared in a common reporting format. The said information will also be entered and monitored in the ENVER Portal.
- A summary progress report of the National Energy Efficiency Action Plan will be disclosed in April every year to the public following the approval by the Energy Efficiency Coordination Board.











REPUBLIC OF TURKEY
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