

December 2014

# NATIONAL RENEWABLE ENERGY ACTION PLAN FOR TURKEY

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The Directive 2009/28/EC of The European Parliament and of The Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC sets.

- Ambitious targets for all Member States, such that the EU will reach a 20% share of energy from renewable sources by 2020 and a 10% share of renewable energy specifically in the transport sector
- The requirement to develop national action plans that establish targets for the share of energy from renewable sources consumed in transport, electricity and heating and cooling in 2020 (Article 4).

The Annex VI of the above mentioned Directive establishes the content for national renewable energy action plans and the methodology for their preparation.

Based on this methodology, The Government of The Republic of Turkey, Ministry of Energy and Natural Resources and Yenilenebilir Enerji Genel Müdürlüğü, has carried out the National Renewable Energy Action Plan for the period 2013-2023.

The European Bank for Reconstruction and Development ("EBRD"), with the support of The Government of The Kingdom of Spain and Deloitte, Touche & Tohmatsu ("Deloitte"), has collaborated with The Ministry of Energy and Yenilenebilir Enerji Genel Müdürlüğü in elaborating this Plan.

# Table of contents

<b>1 National renewable energy strategy</b>	<b>7</b>		
1.1 Rationale	8		
1.2 Summary of the national policy on energy from renewable energy sources	10		
1.2.1 Current national policy on renewable energy	11		
1.2.2 Commission Staff Working Document. European Commission Guidance for the Design of renewables support schemes. November 5, 2013	13		
1.2.3 Objective of the Renewable Energy National Action Plan (REAP)	14		
<b>2 Expected energy consumption, 2013 – 2023</b>	<b>15</b>		
<b>3 Renewable energy targets and trajectories</b>	<b>21</b>		
3.1 Overall national target	22		
3.2 Sectorial targets and trajectories	23		
<b>4 Measures for achieving the targets</b>	<b>25</b>		
4.1A Overview of all policies and measures to promote the use of energy from renewable resources	26		
4.1B Incentives to promote new investments in Turkey	30		
4.1C Feed-in Tariff	30		
4.1D Management of licensing and authorizing procedures	31		
4.1E National Energy Efficiency Action Plan (NEEAP)	32		
4.2 Specific measures to fulfill the requirements under Articles 13, 14, 16 and Articles 17 to 21 of Directive 2009/28/EC	33		
4.2.1 Administrative procedures and spatial planning (Article 13(1) of Directive 2009/28/EC)	33		
4.2.2 Technical specifications (Article 13(2) of Directive 2009/28/EC)	39		
4.2.3 Buildings (Article 13(3) of Directive 2009/28/EC)	39		
4.2.4 Information provisions (Articles 14(1), 14(2) and 14(4) of Directive 2009/28/EC)	41		
4.2.5 Certification of installers (Article 14(3) of Directive 2009/28/EC)	42		
4.2.6 Electricity infrastructure development	43		
4.2.7 Electricity network operation (Article 16(2) and Article 16(7) and (8) of Directive 2009/28/EC)	47		
4.2.8 Biogas integration into the natural gas network (Article 16(7) and Article 16(9) and (10) of Directive 2009/28/EC)	48		
4.2.9 District heating and cooling infrastructure development (Article 16(11) of Directive 2009/28/EC)	48		
4.2.10 Biofuels and other bioliquids – sustainability criteria and verification of compliance 21 of Directive 2009/28/EC.	49		
4.3 Plans to support and promote the use of energy from renewable resources in electricity applied by Turkey			50
Legislation			50
Specific questions for feed-in fixed tariffs			53
Specific questions on financial support to renewable energy projects			56
4.4 Plans to support and promote the use of energy from renewable resources in heating and cooling applied by Turkey			56
Legislation			57
Financial support			58
4.5 Plans to support and promote the use of energy from renewable resources in transport applied by Turkey			59
Legislation			60
Financial support			61
4.6 Specific measures for the promotion of the use of energy from biomass			62
4.6.1 Biomass supply			62
4.6.2 Measures to increase biomass availability, taking into account other biomass users (agriculture and forest-based sectors)			63
4.7 Planned use of statistical transfers between Turkey and Member States and planned participation in joint projects with other countries			65
<b>5 Assessments</b>	<b>66</b>		
5.1 Total expected contribution by each renewable energy technology to meet the binding 2023 targets and the indicative interim trajectory of energy shares from renewable resources in electricity, heating & cooling and transportation			67
5.2 Total contribution expected from energy efficiency and energy saving measures to meet the binding 2023 targets and the indicative interim trajectory for the shares of energy from renewable sources			71
5.3 Assessments of the impact			71
5.4 Preparation of the National Renewable Energy Action Plan and the follow-up of its implementation			72
<b>6 Bibliography</b>	<b>74</b>		

## Figures

<b>Figure 1:</b> Primary Energy Consumption in Turkey, recent data and forecast for 2023. Source: Ministry of Energy and Natural Resources	8	<b>Figure 18:</b> Details of the New Investment Incentive Program	30
<b>Figure 2:</b> Consumption of electricity in Turkey: recent data and forecast. Source: TEİAŞ	8	<b>Figure 19:</b> List of administrative procedures to install new renewable power capacity	33
<b>Figure 3:</b> Electricity generation structure in Turkey: production and installed capacity. Source: TEİAŞ	9	<b>Figure 20:</b> Adaptation of the transmission infrastructure commitment, TEİAŞ	44
<b>Figure 4:</b> Renewable energy production. Source: Eurostat	9	<b>Figure 21:</b> Current international grid interconnections	44
<b>Figure 5a:</b> Evolution of renewable energy regulations and policies in Turkey including the most important energy efficiency regulations	11	<b>Figure 22:</b> Planned international grid interconnections to be developed	45
<b>Figure 5b:</b> Evolution of energy efficiency regulations and policies in Turkey	11	<b>Figure 23:</b> Legislation and national authority	49
<b>Figure 6:</b> The Evolution of Turkey's GDP (in current prices) Source: IMF and Turkstat	16	<b>Figure 24:</b> Renewable energies for electricity generation: concrete obligations/targets per year (per technology) from 2013-2023	52
<b>Figure 7:</b> Potential GDP growth rate of Turkey	16	<b>Figure 25:</b> Feed-in tariff in Turkey for Renewable Energy	54
<b>Figure 8:</b> Primary Energy Consumption in Turkey	17	<b>Figure 26:</b> Incentive scheme for renewable energies to produce electricity	55
<b>Figure 9:</b> Primary Energy in Turkey	17	<b>Figure 27:</b> Heating and cooling: concrete obligations/targets per year (per technology) 2013-2023 following the methodology established in the Directive 2009/28/EC on the Promotion of the Use of Energy from Renewable Sources	57
<b>Figure 10:</b> Primary energy consumption versus GDP   Sources: BP and IMF (historical data), and Deloitte (forecast)	17	<b>Figure 28:</b> Transportation: concrete estimations/targets per year (per technology), 2013-2023 (Base Year 2012)	60
<b>Figure 11:</b> Turkish Electricity Consumption: Recent and Forecasted	17	<b>Figure 29:</b> Natural gas projection in 2023	71
<b>Figure 12:</b> Final Energy Consumption in the Transportation Sector. Source: Eurostat (recent data) and International Energy Agency (IEA) and Deloitte (forecast)	18	<b>Figure 30:</b> CO <sub>2</sub> emissions avoided by REAP implementation	72
<b>Figure 13:</b> Breakdown of energy supply for the Transportation Sector. Source: Eurostat	18		
<b>Figure 14:</b> Electricity generation and installed capacity: 2013 data, 2023 forecast and increases	18		
<b>Figure 15:</b> Electricity generation and installed capacity: 2013 data and 2023 forecast and increases	19		
<b>Figure 16:</b> Electricity generation and installed capacity from renewable sources: 2013 data and 2023 forecast	19		
<b>Figure 17:</b> Regions of Turkey according to incentive plan	30		

## Tables

<b>Table 1:</b> Expected gross final energy consumption of Turkey for electricity, heating and cooling and transportation up until 2023 taking into account the effects of energy efficiency and energy saving measures	20	<b>Table 11:</b> Estimates of total expected contribution (final energy consumption) by renewable energy technology in Turkey to meet its binding 2023 targets; and the indicative interim trajectory (2012-2023) of energy shares from renewable resources in heating and cooling (ktoe)	69
<b>Table 2:</b> Overall national target for the share of energy from renewable sources in gross final consumption of energy in 2010 and 2023 (figures to be transcribed from Annex I, Part A to Directive 2009/28/EC)	22	<b>Table 12:</b> Estimate of the total contribution expected in Turkey by technology from the use of renewable energy sources, with regard to the binding targets for 2023; and the indicative trajectory (2013-2023) of energy shares from renewable sources, in the transportation sector in (1000 toe)	70
<b>Table 3:</b> National target for 2023 and the expected progression of renewable sources in the sectors of electricity, heating and cooling, and transportation	23		
<b>Table 4a:</b> Calculation table for each sector's contribution to the share of renewable energy in final consumption of energy	24		
<b>Table 4b:</b> Calculation table for the share of renewable energy in the transportation sector	24		
<b>Table 5:</b> Overview of all plans and measures	26		
<b>Table 7:</b> Biomass supply (m <sup>3</sup> as FM/tFM/OIL or ktoe)	62		
<b>Table 7a:</b> Estimated biomass domestic supply for the electricity and heating and cooling sectors in 2018 (other EU = 2015) and 2023 (other EU = 2020) (m <sup>3</sup> as FM/tFM/Oil or thousand toe)	63		
<b>Table 10a:</b> Estimate of total expected contribution (installed capacity, gross electricity generation) by renewable energy technology in Turkey to meet its binding 2023; targets and the indicative interim trajectory (2013-2017) of energy shares from renewable resources in electricity	68		
<b>Table 10b:</b> Estimates of total expected contribution (installed capacity, gross electricity generation) by renewable energy technology in Turkey to meet its binding 2023 targets; and the indicative interim trajectory (2018-2023) of energy shares from renewable resources in electricity	68		

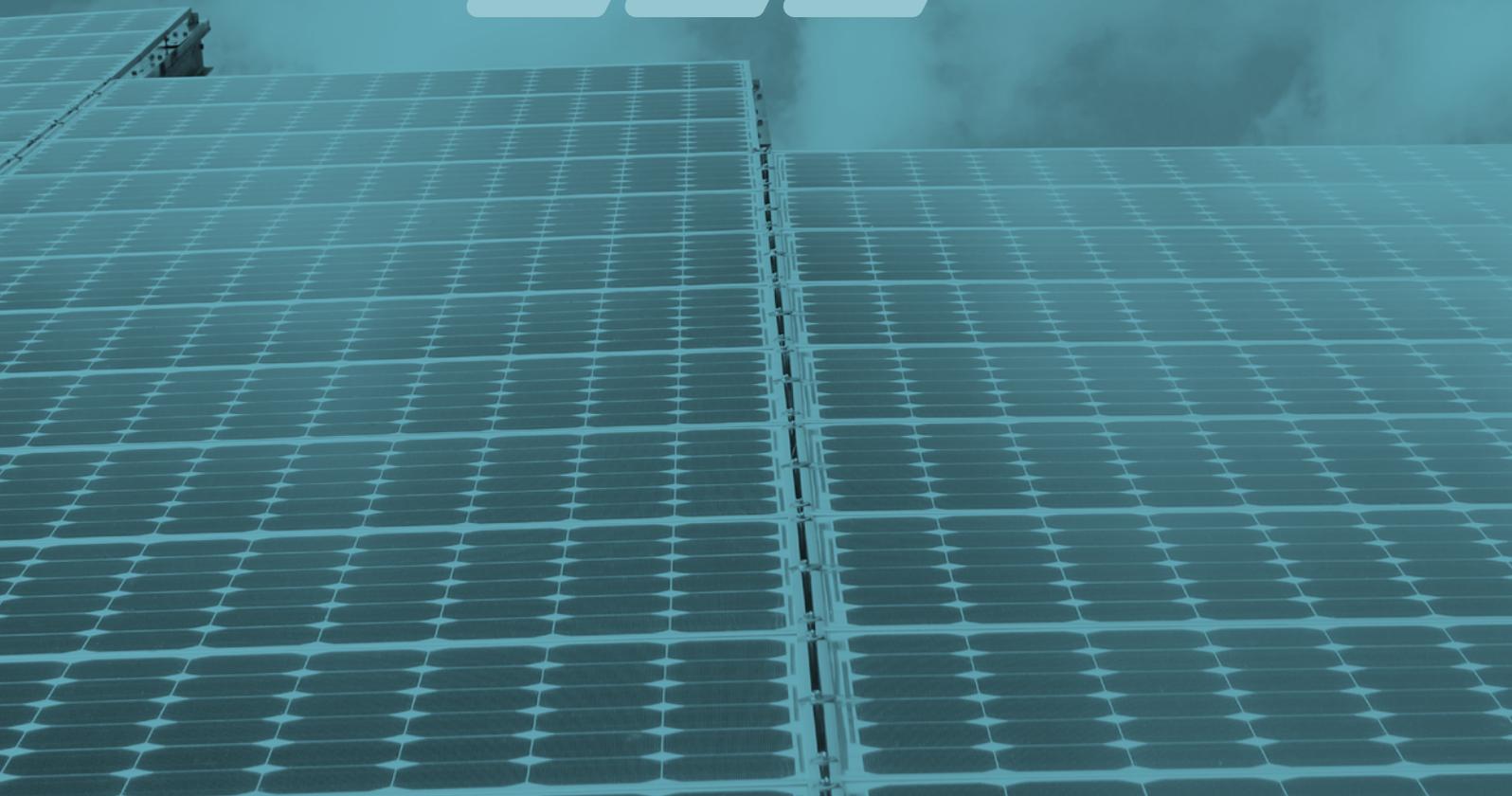
In order to make it comparable to other National Renewable Energy Action Plans, the Tables included in the National Renewable Energy Action Plan for Turkey are in accordance with the template for National Renewable Energy Action Plan under Directive 2009/28/EC of the European Parliament and of the Council (2009/548/EC. Table 6 "Estimated share of renewable energy in the building sector", Table 8 "Current agricultural land use for production of crops dedicated to energy in 2006", Table 9 "Estimated excess and/or deficit production of renewable energy compared to the indicative trajectory which could be transferred to/from other Member States in Turkey" and Table 13 "Estimated costs and benefits of the renewable energy policy support measures" are not applicable.

## List of Abbreviations

<b>AFD</b>	Agence Française de Développement	<b>LEED</b>	Leadership in Energy and Environmental Design (Enerji ve Çevre Dostu Tasarımda Liderlik)
<b>Bio-ETBE</b>	Bio Ethyl Tert-Butyl Ether	<b>LI-DER</b>	Lisanssız Elektrik Üretimi Derneği (The Unlicensed Electricity Generation Association)
<b>BOTAŞ</b>	Boru Hatları İle Petrol Taşıma Anonim Şirketi (Petroleum Pipeline Corporation)	<b>M</b>	Million
<b>BREEM</b>	Building Research Establishment Environmental Assessment Method	<b>M&amp;A</b>	Mergers and Acquisitions
<b>BtL</b>	Biomass to Liquid	<b>MCM</b>	Multi-Chip Module
<b>Btu</b>	British Thermal Unit	<b>MFRC</b>	Market Financial Reconciliation Center
<b>BİYOGAZDER</b>	The Biogas Association	<b>MidSEFF</b>	Turkish Mid-Size Sustainable Energy Financing Facility
<b>CCGT</b>	Combined Cycle Gas Turbine	<b>MTA</b>	Maden Tetkik Arama (General Directorate of Mineral Research and Exploration)
<b>CEO</b>	Chief Executive Officer	<b>Mtoe</b>	Million tonnes of oil equivalent
<b>CHP</b>	Combined Heat and Power	<b>MVA</b>	Megavolt Ampere
<b>CO<sub>2</sub></b>	Carbon dioxide	<b>MW</b>	Megawatt
<b>ÇŞB</b>	T.C. Çevre ve Şehircilik Bakanlığı (The Ministry of Environment and Urbanization)	<b>MWh</b>	Megawatt hour
<b>CSP</b>	Concentrated Solar Power	<b>MWt</b>	Thermal megawatt
<b>DC</b>	Direct Current	<b>MYTM</b>	Milli Yük Tevzii Merkezi (National Load Dispatch Center)
<b>DNO</b>	Distributed Network Operators	<b>m<sup>3</sup></b>	Cubic meter
<b>DSI</b>	Devlet Su İşleri (General Directorate of State Hydraulic Works)	<b>NEEAP</b>	National Energy Efficiency Action Plan
<b>DSO</b>	Distribution System Operator	<b>NGO</b>	Non-Governmental Organization
<b>EBRD</b>	European Bank for Reconstruction and Development	<b>OECD</b>	Organization for Economic Co-operation and Development
<b>EC</b>	European Commission	<b>ÖTV</b>	Özel Tüketim Vergisi (Special Consumption Tax)
<b>EED</b>	Energy Efficiency Directive	<b>PEFC</b>	Programme for the Endorsement of Forest Certification
<b>EML</b>	Electricity Market Law	<b>PMUM</b>	Piyasa Mali Uzlaştırma Merkezi
<b>EMRA</b>	Energy Market Regulatory Authority	<b>PSH</b>	Passive Solar House
<b>ENVER</b>	Association of Energy Efficiency	<b>PV</b>	Photovoltaic
<b>EPB</b>	Energy Performance in Buildings	<b>R&amp;D</b>	Research and Development
<b>EPBD</b>	Energy Performance of Buildings Directive	<b>RE</b>	Renewable Energy
<b>EPDK</b>	Enerji Piyasası Düzenleme Kurumu (Energy Market Regulatory Authority)	<b>REAP</b>	Renewable Energy Action Plan
<b>EPIAS</b>	Enerji Piyasaları İşletme A.Ş.	<b>REL</b>	Renewable Energy Law
<b>ESCO</b>	Energy Service Company	<b>RER</b>	Renewable Energy Research
<b>ESR</b>	Energy Saving Ratio	<b>RES</b>	Renewable Energy Sources
<b>ETBE</b>	Ethyl tert-butyl ether	<b>R<sup>2</sup></b>	R squared, coefficient of determination
<b>ETKB</b>	Enerji ve Tabii Kaynaklar Bakanlığı (The Ministry of Energy and Natural Resources)	<b>SP</b>	Strategic Purpose
<b>EU</b>	European Union	<b>ST</b>	Strategic Targets
<b>FIT</b>	Feed-In Tariff	<b>t</b>	tonne
<b>FM</b>	Fresh Material	<b>TEİAŞ</b>	Türkiye Elektrik İletim A.Ş.
<b>FSC</b>	Forest Stewardship Council	<b>TİGEM</b>	Tarım İşletmeleri Genel Müdürlüğü (The General Directorate of Agricultural Enterprises)
<b>GATT</b>	General Agreement on Tariffs and Trade	<b>TL</b>	Turkish Lira
<b>GDF</b>	General Directorate of Forestry	<b>TOBB</b>	Türkiye Odalar ve Borsalar Birliği (Turkish Union of Chambers and Commodity Exchanges)
<b>GDM</b>	General Directorate of Meteorology	<b>toe</b>	Tonnes of oil equivalent
<b>GDP</b>	Gross Domestic Product	<b>TOKİ</b>	T.C. Başbakanlık Toplu Konut İdaresi Bakanlığı (The Housing Development Administration)
<b>GÜNDER</b>	The International Solar Energy Association	<b>TS</b>	Transformer Substation/Turkish Standard
<b>GW</b>	Gigawatt	<b>TSKB</b>	Türkiye Sınai Kalkınma Bankası A.Ş. (The Industrial Development Bank of Turkey)
<b>GWh</b>	Gigawatt hour	<b>TTGV</b>	Türkiye Teknoloji Geliştirme Vakfı (Technology Development Foundation of Turkey)
<b>ha</b>	Hectare	<b>TÜREB</b>	Türkiye Rüzgar Enerjisi Birliği (Turkish Wind Energy Association)
<b>Halkbank</b>	Türkiye Halk Bankası	<b>TurSEFF</b>	Turkish Sustainable Energy Finance Facility
<b>HEPP</b>	Hydroelectric Power Plant	<b>TWEA</b>	Turkish Wind Energy Association
<b>ICEX</b>	Instituto de Comercio Exterior, Gobierno de España	<b>TWh</b>	Terawatt hour
<b>IEA</b>	International Energy Agency	<b>USD</b>	United States Dollar
<b>IFC</b>	International Finance Corporation	<b>UTM</b>	Universal Transverse Mercator coordinates
<b>IMF</b>	International Monetary Fund	<b>VAT</b>	Value Added Tax
<b>IRR</b>	Internal Rate of Return	<b>VGM</b>	Vakıflar Genel Müdürlüğü (General Directorate of Foundations)
<b>ISO</b>	International Organization for Standardization	<b>YEGM</b>	Yenilenebilir Enerji Genel Müdürlüğü (General Directorate of Renewable Energy)
<b>kg</b>	Kilogram	<b>YEKA</b>	Yenilenebilir Enerji Kaynak Alanı (Renewable Energy Resources Area Regulation)
<b>km</b>	Kilometer	<b>YY</b>	Local authorities, Governorships and Municipalities
<b>km<sup>2</sup></b>	Square kilometer		
<b>KOSGEB</b>	Küçük ve Orta Ölçekli Sanayi Geliştirme ve Destekleme İdaresi Başkanlığı (Small and Medium Enterprises Development Organization)		
<b>ktoe</b>	Thousands tonnes of oil equivalent		
<b>kV</b>	Kilovolt		
<b>kW</b>	Kilowatt		
<b>kWh</b>	Kilowatt hour		

Punctuation system followed: "," thousands separator and "." decimal separator.

# 1 NATIONAL RENEWABLE ENERGY STRATEGY



# 1 National renewable energy strategy

## 1.1 Rationale

Turkey is a candidate country to join the European Union, working diligently on the actions towards building a strong, clear and direct path toward complying with the EU acquis and its requirements. Energy is one of the most critical chapters in the EU acquis. 'The Renewable Energy Directive', Directive 2009/28/EC (1) on the Promotion of the Use of Energy from Renewable Sources calls on every Member State to draw up and promote a National Renewable Energy Action Plan (NREAP) for the period of 2011-2020<sup>1</sup> to present to the European Commission (EC) by June 30, 2010 with a view to complying with the binding targets stated within the Directive.

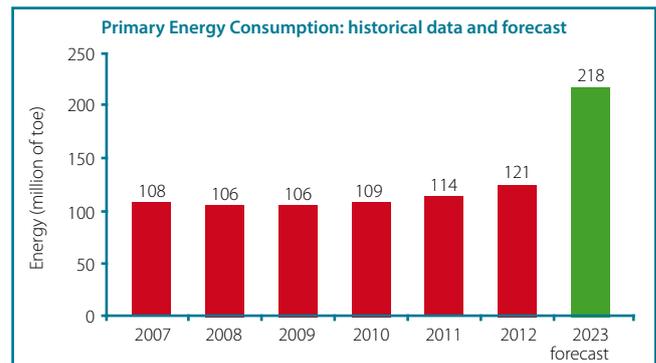
As the Directive indicates, NREAP is expected to conform to the national action plan template adopted by the European Commission via the June 30, 2009 Commission Decision establishing a template for the National Renewable Energy Action Plans under Directive 2009/28/EC of the European Parliament and of the Council. Turkey, as a candidate country, has prepared this action plan as a manifestation of its commitment to those renewable energy targets and EU accession.

Turkey is the 17<sup>th</sup> largest economy in the world and the 6<sup>th</sup> largest in Europe. With a growing economy and population, energy demand in Turkey has steeply risen, which has ranked security of supply at the top of the government's agenda, both for electricity and for other primary energy sources. The Turkish economy is heavily dependent on imported energy supplies, and its primary energy consumption is mainly based on fossil fuels, which was approximately 90% in 2012 where majority of this supply was imported from other countries. In the upcoming years, it is forecasted that Turkey will continue with the major economic development, which will require an increase in the demand of energy supply.

According to current estimates, an increase of around 90% in primary energy demand will take place during the period of 2011-2023. Aside from investments for the creation of new capacity within the field, the source of energy (for instance, the need for local and renewable sources) and maximizing energy efficiency are also critical points for Turkey. In order to both avoid the risks linked to a high level of energy dependency and to develop a sustainable energy model, the Government is committed to promoting alternative solutions based mainly in renewable energy. Therefore, Turkey has initiated a forward-looking and innovative energy policy in which renewable energy plays a significant role.

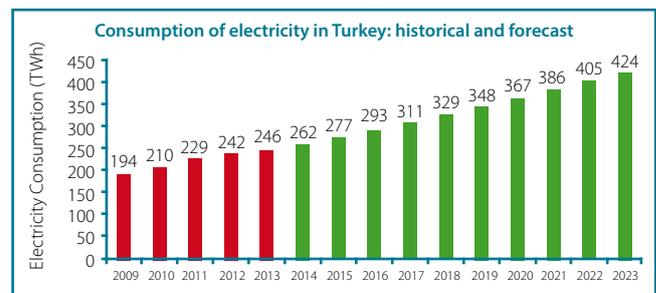
On one hand, by 2023 Turkey plans to have an electricity generation mix in which the share of renewable energy accounts for 30% of overall need, as well as, having 10% of the requirements of the transportation sector met by renewable energy. On the other hand, there is also a commitment to reduce by at least 20% (with reference to 2011 figures) the amount of energy consumed per unit GDP in the year 2023 (in terms of energy intensity).

Figure 1: Primary Energy Consumption in Turkey, recent data and forecast for 2023  
Source: Ministry of Energy and Natural Resources



The Government has established very ambitious objectives for 2023 regarding electricity generation based on the high availability of renewable energy resources: hydro, wind, solar irradiation, geothermal, etc., which would increase the share of renewable energy in electricity generation to at least 30% and 127.3 TWh in 2023.

Figure 2: Consumption of electricity in Turkey: recent data and forecast  
Source: TEİAŞ



For many years, hydroelectric power plants, the use of biomass for heating purposes and use of geothermal were the major contributors in terms of renewable energy resources to the Turkish energy mix. During recent years, other technologies such as geothermal and wind energy have begun to make an impact on the Turkish energy sector.

As demonstrated in Figure 3, in 2013, the renewable energy share in electricity production was 29% of the total production and 40% of the installed capacity

1. For Turkey, rather than the year 2020, the year 2023 is taken as the milestone, as it is the 100<sup>th</sup> anniversary year of the Republic and several macroeconomic and sectorial targets are set for that year.

# 1 National renewable energy strategy

Figure 3: Electricity generation structure in Turkey: production and installed capacity  
Source: TEİAŞ

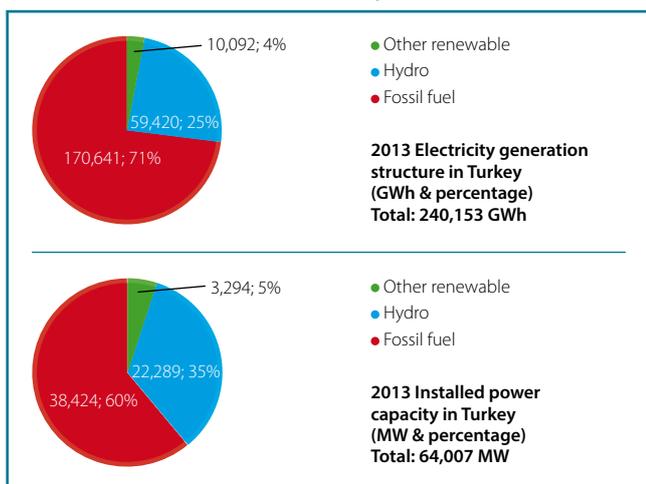
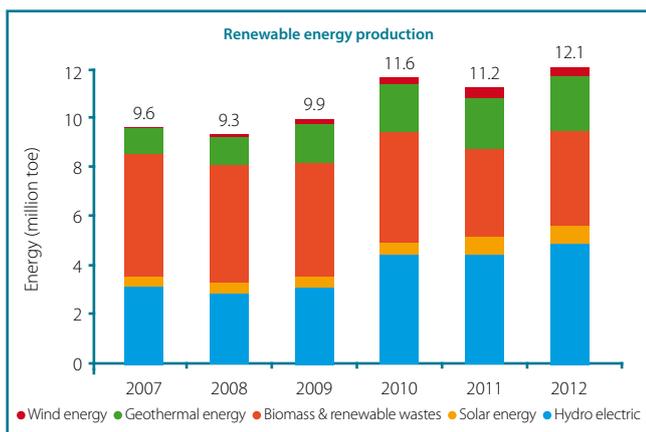


Figure 4 depicts the share of different renewable energy sources in Turkey. In 2012, the total energy produced based on renewable sources reached 12.1 million toe, or approximately 10% of Turkey's total primary energy consumption.

Figure 4: Renewable energy production.  
Source: Eurostat



Renewable energy production structure (million toe)						
	Solar energy	Biomass & renewable wastes	Geothermal energy	Hydro electric	Wind energy	Total
2007	0.4	5.0	1.0	3.1	0.0	9.6
2008	0.4	4.8	1.2	2.9	0.1	9.3
2009	0.4	4.6	1.6	3.1	0.1	9.9
2010	0.4	4.5	2.0	4.5	0.3	11.6
2011	0.6	3.6	2.1	4.5	0.4	11.2
2012	0.8	3.6	2.2	5.0	0.5	12.1

Today, the development of renewable energy sources and the promotion of energy efficiency measures are two of the priorities of Turkish energy policy, supporting a sustainable industrial development under environmental considerations. The best proof of this is the present REAP and the future National Energy Efficiency Action Plan (NEEAP). The latter document will be developed by the Turkish Government in collaboration with EBRD in the coming months. The main objectives of this policy are and will be the security of supply and its sustainability in economic and environmental terms.

It is also important to note that primary energy consumption in Turkey reached 121 Mtoe in 2012, where 82% of the total figure was from imports. In addition, the energy intensity (unit of energy consumed to generated unit GDP) in the country was 0.27 toe per USD 1,000 of GDP and is higher than in the rest of major EU countries.

However, international economic institutions forecast high economic growth rates for the next several years, and energy consumption is expected to increase to 218 Mtoe by 2023 (or a 91.2% increase from 2011 to 2023). These figures give an idea of the important role of energy in Turkey over the next decade. It is critical that the demand will not be a bottleneck for economic development.

Therefore, the Turkish energy policy<sup>2</sup> has been articulated ensuring the following basic values and principles:

- **Transparency:** operations conducted in a manner that is open and accessible to all parties concerned, along with informing and soliciting the opinion of the public about the framework of the laws.
- **Reliability:** operations conducted so that the policy and policymakers are both reliable and reputable on a national and international scale.
- **Innovation and Pioneering:** the encouragement of R&D activities and pioneering the use of new technologies.
- **Cooperation:** operations are conducted by recruiting the participation of relevant parties and with the aim of providing services in line with needs and expectations.
- **Efficiency:** overseeing the utilization of public resources allocated to the Ministry of Energy and Resources for the purpose of ensuring efficiency and effectiveness.
- **Coherency:** operations are conducted with a view toward medium and long term goals and according to the global developments in line with Turkey's overall interests.

The National Renewable Energy Action Plan (REAP) for Turkey has been created in alignment with Directive 2009/28/EC and the template predetermined by the European Commission Decision of 30.06.2009 (2009/548/EC).

2. The Republic of Turkey Ministry of Energy and Natural Resources Strategic Plan (2010-2014) (5).

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## 1 National renewable energy strategy

The general conditions of this REAP are based on the information provided by the different Ministries of the Turkish Government and the following strategic energy guidelines:

- Electricity Energy Market and Security of Supply Strategy Paper (2),
- Climate Change Action Plan 2011–2023 (3),
- Energy Efficiency Strategy Paper 2012–2023 (4) and
- The Republic of Turkey Ministry of Energy and Natural Resources Strategic Plan 2010–2014 (5).

### 1.2 Summary of the national policy on energy from renewable energy sources

Several factors such as population growth, increasing energy demand, concerns over energy security supply and climate change have evoked a new era for renewable energy technologies worldwide.

Considering the fact that Turkey is rich in renewable energy resources together with the aim of diversifying energy supply, the maximum level for domestic, renewable resources in the production of electricity has been targeted within the framework of the national energy policy. Turkey, being the 17<sup>th</sup> largest economy in the world and 6<sup>th</sup> largest in Europe, is experiencing a steep increase in its demand for energy. Therefore, Turkey has initiated a forward-looking and innovative energy policy in which renewable energy plays a significant role. On one hand, by 2023 Turkey plans to have an electricity generation mix in which the share of renewable energy accounts for 30% of overall need as well as having 10% of the requirements of the transportation sector met by renewable energy. On the other hand, there is also a commitment to reduce by at least 20% (with reference to 2008 figures) the amount of energy consumed per unit GDP in the year 2023 (in terms of energy intensity).

Investments in sustainable energy will continue to move forward in Turkey as long as emerging technologies appear on the horizon and are supported by sufficient incentives. In accordance with the Turkish Energy Efficiency Strategy Paper (4), there are two specific targets directly related to the renewable energy sector. One of them, Strategic Purpose 2, states the percentage of the targeted share for renewable energy resources within the energy supply. In the other, Strategic Purpose 7, the necessity of minimizing the negative environmental impact of the activities within the energy and natural resources sectors is highlighted.

Since 2010, the strategies followed by the Turkish Government<sup>3</sup> for increasing the share of renewable energy within the energy mix have been:

1. Precautions will be taken for the completion of licensed projects within the projected terms for renewable energy resources of economic value.
2. Production planning will be prepared considering developments within the renewable energy field, in line with advances in technology and the arrangements within current legislation.
3. Precautions will be taken for the maximum utilization of Turkey's hydroelectric potential, as is economically feasible and for the integration of this potential into the national economy through the private sector.
4. Cooperation will increase, in an accelerated rate, with studies conducted for the development of water resources as economically feasible for electricity generation on the basis of integrated approaches in view of meeting changing consumption demands.
5. The criteria for the economic analysis of hydroelectricity plants will be evaluated according to the present day standards.
6. Acceleration in the number of studies required for the growth of the electricity transmission system that would allow for the connection of a higher number of intermittent energy technologies such as solar and wind energy power plants.
7. The protection of geothermal resources during utilization, including their sustainability in terms of their renewal and regeneration.
8. Plans to open up areas for geothermal development, where suitable for electricity production, in order to accelerate private sector participation.
9. Emphasis will be given to technology development studies in the field of renewable energy resources.

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3. The Republic of Turkey Ministry of Energy and Natural Resources Strategic Plan (2010-2014) (5).

# 1 National renewable energy strategy

Regarding the minimization of the negative environmental impact of industrial activities, Turkey has joined the United Nations Framework Convention on Climate Change and ratified The Kyoto Protocol on the May 28, 2009. Additionally, the Turkish Government has carried out a roster of actions against any negative environmental impact since 2010, including:

- The promotion of the usage of renewable energy resources and the effective use of energy and clean coal technologies,
- The reduction of greenhouse gas emissions,
- The utilization of biomass/biogas potential (in infrastructure facilities for water, waste water and solid waste),
- Increase in the effectiveness of control and supervision for compliance with sustainable mining and sustainable environmental principles in mining operations, and
- Training and public awareness of climate change and environmentally friendly energy technologies.

## 1.2.1 Current national policy on renewable energy

Progress has been made in the field of renewable energy starting from 2005, after the publication of the Law on Utilization of Renewable Energy Resources for the Purpose of Generating Electrical Energy (Renewable Energy Law, REL, Law No. 5346). Investments in renewable energy technologies remained limited between 2005 and 2010 due to the lack of secondary legislation and relatively low feed-in tariff levels. Nevertheless, the Renewable Energy Law amendment in December 2010 introduced higher feed-in tariff rates for some technologies, and other various monetary and non-monetary incentives. Therefore, the penetration of renewable energy technologies was accelerated as compared to the period 2005 - 2010. After feed-in tariff rates were revised, renewable energy investments attracted the attention of both local and international investors.

Figure 5a: Evolution of renewable energy regulations and policies in Turkey including the most important energy efficiency regulations

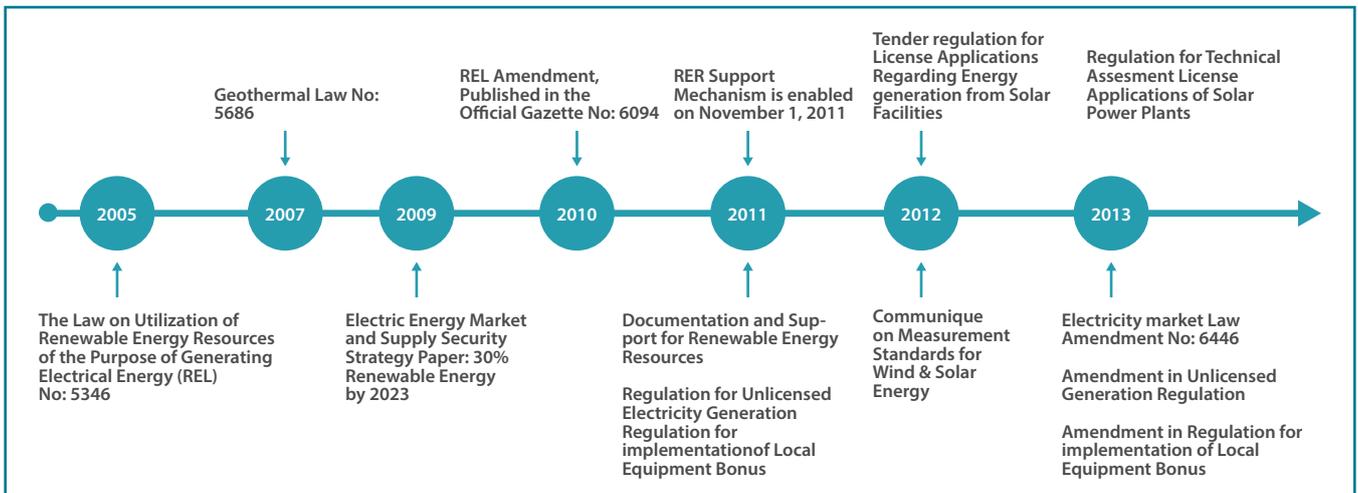
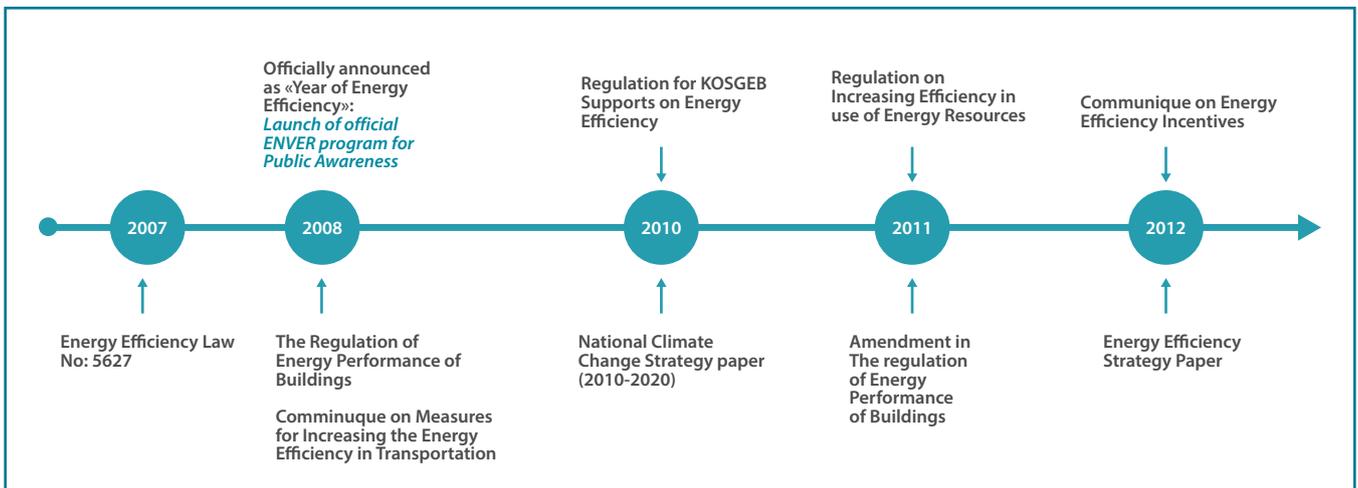


Figure 5 b: Evolution of energy efficiency regulations and policies in Turkey



## 1 National renewable energy strategy

Turkey's current national energy regulation is articulated in the following laws:

### • New Electricity Market Law (Law No. 6446)

This law (6) introduces some important changes in the current electricity market system, including amendments to license types, framing its provisions around each type of market activity, specific provisions for certain license types (generation, transmission, distribution, wholesale, retail, auto-producer and auto-producer group), the introduction of a preliminary licensing mechanism and investment incentives, such as extended deadlines and grace periods for environmental compliance. In reference to the renewable energy sector, it establishes:

- The maximum installed capacity for a renewable energy plant to operate without a license has been raised from 500 kW to 1 MW, with the ease of increasing up to 5 times (5 MW) by a decree of the Council of Ministers without a change in the Law. Furthermore, with the new Law, there is no limit for renewable energy facilities that serve for self-consumption without feeding into the grid.

- Renewable generation facilities that extend over more than one premise can be considered one single generation entity provided that they are connected to the system from the same point.

- The Law reasserts the exemptions and discounts in land use rights as described in the Renewable Energy Law.

- The pre-licensing step is defined in the licensing process and all M&A activities at this stage are restricted.

- For wind and solar power plants that would compete for the grid access rights, the tendering process has been modified to reduce the 20 year payment period of contribution fees to the Transmission System Operator to 3 years. The contribution fee that was paid according to generated kWh was modified to be paid for unit installed capacity (per MW).

### • The Law on the Utilization of Renewable Energy Resources for the Purpose of Generating Electrical Energy (Law No: 5346)

This is the initial legal framework that regulates Renewable Energy Sources for the Purpose of Generating Electrical Energy (7). Renewable energy resources were defined as non-fossil energy resources such as hydro (less than 15 km<sup>2</sup> of reservoir area and run-of-the-river hydroelectric), wind, solar, geothermal, biomass, biogas (including landfill gas), and wave, current and tidal energy.

### • Law Amending the Law on the Utilization of Renewable Energy Resources in Electricity Generation (Law No: 6094)

This law introduces significant amendments to improve the incentive mechanism under the Renewable Energy Law and encourage renewable energy investment opportunities in Turkey (8). The following are its main points:

- Each supplier who sells electrical energy to consumers has an obligation to pay a renewable energy fee proportional to the amount of electricity that the supplier has sold to its consumers divided by the total electric energy that all suppliers have sold to all consumers in the country. In other words, they are indirectly obliged to purchase electricity that is generated from renewable resources.

- A new feed-in tariff plan, categorizing the different levels of feed-in tariff for different technologies is introduced. In addition, the local equipment bonus is to be added to the feed-in tariff plan.

- The scope of time for the support mechanism is extended for facilities that are commissioned before the December 31, 2015. (According to a Board Decision in December 2013, this date was extended to December 31, 2020).

- Feed-in tariffs are based on the USD (United States Dollar) and not subject to any escalation.

- Land Usage Fee Incentives: Until 2020, a discount of 85% for permission, lease, easement rights and servitude right fees for generation facilities based on renewable energy resources will be applicable for the first 10 years, including the period of investment and operation.

### • Energy Efficiency Law (Law No: 5627)

The purpose of this Law (9) is to increase efficiency in using energy sources by avoiding waste, easing the burden of energy costs on the economy and protecting the environment. This law covers principles and procedures applicable to increasing and promoting energy efficiency in the energy generation, transmission, distribution and consumption phases at industrial establishments, buildings, power generation plants, transmission and distribution networks and transport. It also raises energy awareness in the general public.

### • Environmental Law (Law No: 2872), amended in 2006

Industrial plants receive a reduction of up to 50% of their electricity bills if they set up their own waste treatment facilities (10).

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## 1 National renewable energy strategy

### • Geothermal Law (Law No: 5686)

This law (11) establishes the rules and principles for effective search, exploration, development, production and protection of geothermal and natural mineral water resources. It also additionally defines the rights of the beneficiaries for their economic use of resources in compliance with regulations and reclamation of after use.

### • Energy Efficiency Strategy Paper 2012-2023

The Turkish Government has a strong commitment to energy efficiency. This document (4) presents strategic guidelines and actions for creating energy efficiency in the building, transportation and industrial sectors in Turkey. It plans to enhance energy efficiency, preventing unconscious use and dissipation, and decreasing energy density either within the sectorial base or at the macro level. These guidelines form important components of the Turkish national energy policy, in all its stages from energy production and transmission to final consumption.

### • The Ministry of Energy and Natural Resources Strategic Plan (2010-2014)

The plan (5) encompasses energy policy guidelines focused on energy security and mitigation of fossil fuel imports, taking advantage of the available renewable sources in the country.

### 1.2.2 Commission Staff Working Document. European Commission Guidance for the Design of renewables support schemes. November 5, 2013

Due to market regulatory failures (e.g. low competition level), support schemes are necessary to promote the penetration of renewable energy. The European Commission has recently issued a document<sup>4</sup> exploring best practices in reforming/designing these mechanisms.

In order for the support schemes to adapt to the falling cost of renewables, a reform is mandatory. It is important to take into account that this kind of changes normally has an impact on capital financing costs. Therefore, the reform process should be managed considering the following aspects:

- Long term legal commitments on the timing and phasing out of support
- Devising a support scheme that is flexible enough to account for changes in the development of costs and technologies
- Announcement of automatic reductions in support depending on specified caps and/or lower technology costs
- Planned review periods and no unannounced interim changes

- Clear commitments to avoid changes that alter the return on investments already made and undermine investors' legitimate expectations

- Wide and public consultation on scheme design

- Stable scheme financing in line with the EU-acquis linked to consumption and off-budget financing to avoid fiscal impacts and uncertainty

- Keep costs transparent and separate from other system costs

The main objective of the above mentioned communication is to encourage the integration of support schemes in the market. Firstly, competitive allocation mechanisms (e.g. auctions) lead to price reductions. In addition, price decrease is also achieved through competition. The more players entering the auction process the lower the resulting price.

Feed in premiums are support schemes with greater interaction with the market than feed-in tariff systems, so that feed in premiums should be given priority over feed in tariffs. Best practice for feed in premium schemes includes:

- Preference for feed in premiums over feed-in tariffs for technologies that are approaching maturity

- Determine the form of premium - floating (with or without cap) or fixed – as function of desirable exposure of producers to price risk

- No payment of premiums for production in hours where the system price is negative or above the level of remuneration deemed necessary

- Use of competitive allocation mechanisms for granting premiums

- Planned volume based premium reductions for new installations, dependent on when they are approved, connected or commissioned

- Regular, planned and inclusive reviews of premiums for new installations

Another form of promoting market integration is through quota obligations. This instrument exposes the energy producer to market prices, since the energy has to be sold in the relevant market.

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4. Commission Staff Working Document. European Commission Guidance for the Design of renewables support schemes. November 5, 2013.

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## 1 National renewable energy strategy

Moreover, favoring investment over operating support will decouple production from the sales price and might be appropriate to promote market integration. Tax exemptions and Feed in tariffs are two additional support mechanisms used in the renewable energy sector. It has already been said that feed in premiums have a better interaction with the market. Nevertheless, given that feed in tariff is one of the most widely adopted support mechanism, best practice for it are presented below:

- Phase out of feed in tariffs (may be appropriate if combined with a pre-set capacity cap (per technology or market segment) for small scale activities and/or in non-developed markets)
- Tariffs need built-in cost-based or expected cost-based reductions in tariff levels for new installations (in line with learning curves and expected future cost reductions in various technologies)
- Planned volume based tariff reductions for new installations, dependent on when they are approved, connected or commissioned

Apart from market integration, the European Commission highlights in its communication the importance of minimizing system impacts on power markets. Electricity grid balancing, dispatching rules and grid cost management are the main points addressed.

To finalize, when it comes to design/reform support schemes, the cost of the different renewable technologies plays an important role. To start with, the process for determining costs has to be carried out in an exhaustive way. Once actual costs are known, the support level can be set transparently including all estimated costs. The recommendation is that support schemes should be dynamic, independently of the way in which they were set initially. Periodic review and adjustment of the support level should be performed together with the setting of time frames for the mechanism.

### 1.2.3 Objective of the Renewable Energy National Action Plan (REAP)

The objective of Turkey's national Renewable Energy Action Plan (REAP) presented under Directive 2009/28/EC is the establishment of strategies to promote the development of renewable energy in Turkey. These strategies are set to:

- Ensure that the share of renewable energy in electricity production has increased to 30% of the total demand by 2023, based on the high accessibility of renewable sources in Turkey.

- Fulfill the level of usage of renewable energies in transportation established in the Directive 2009/28/EC: a 10% share of renewable energy in the transportation sector.

- Ensure technological and industrial development based on the installation of a higher renewable energy capacity by 2023.

- Plan use of renewable energy resources taking into consideration the impact of climate change and sustainability to the ecosystem, orienting plans toward the mitigation of climate change (3).

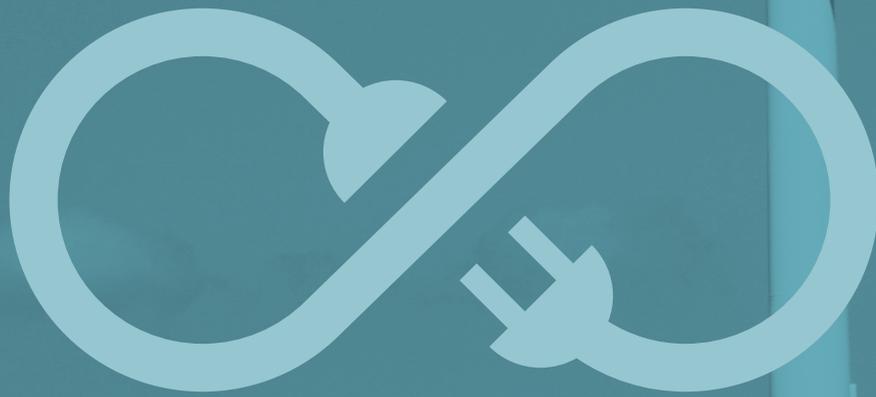
- Avoid obstacles in developing renewable energy in the country, by enabling the following:

- financial support for projects,
- removal of barriers linked to the administrative process,
- develop legal framework for the implementation of new solutions,
- provide secure access to renewable energy for electricity generation
- optimize the usage of any relevant infrastructure
- develop support mechanisms

- Develop an appropriate framework to promote the penetration of distributed generation based on renewable energies and the usage of renewable energy in buildings.

**2**

**EXPECTED ENERGY  
CONSUMPTION 2013 – 2023**



## 2 Expected energy consumption, 2013 – 2023

In order to bring Turkey's strategy in line with the European Union's 2009 Renewables Directive, Turkey's National Renewable Energy Action Plan evaluates the expected final gross energy consumption for the period of 2013-2023. The gross energy consumption forecast is broken down into the sectors of electricity, heating and cooling, and transportation (encompassing petrol, diesel and biofuels consumed in road and rail transportation as well as electricity).

This evaluation takes into consideration the expected effects of energy efficiency policy measures. In this regard, the 'reference scenario' only considers the energy efficiency and the energy savings measures taken into account prior to 2013. While the 'additional energy efficiency scenario' would take into account all the additional policy measures in energy efficiency that could be considered from 2013 to 2023, including the growth of renewable energy.

Moreover, in the short term the Turkish Government in collaboration with the EBRD plans to launch a NEEAP to establish a common framework of measures for the promotion of energy efficiency within Turkey in order to ensure the achievement of the future Turkish's targets on energy efficiency and to pave the way for further energy efficiency improvements.

Economic, international, and geopolitical uncertainties could cause inevitable deviation from the expected objectives. Accordingly, the development of the expected gross energy consumption in the sectors of electricity, heating and cooling, and transportation should be considered a guideline and not an exact prediction of development in these areas in Turkey. In order to better understand both scenarios, a brief overview of Turkey's energy requirements is detailed below.

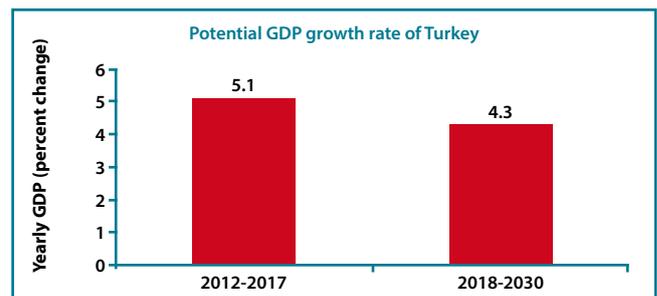
### Economic Growth

During the last seven years, Turkey has undergone a profound economic transformation and its economy experienced remarkable development. Turkey is the 17<sup>th</sup> largest economy in the world and the 6<sup>th</sup> largest economy in Europe with GDP of 1.6 trillion TL in 2013 in current prices.

The average annual Gross Domestic Product (GDP) growth rate from 2003 to 2013 was 4.96%, with the GDP reaching TL 122.5 billion in 2013. Figure 6 demonstrates the GDP development of Turkey

The real GDP growth decelerated sharply in 2012 due to weaker economic conditions in the EU (Turkey's main export market), however in 2013 GDP experienced a 4.12% increase compared to the previous year. In the short term, international economic institutions forecast high growth rates, estimating: 5.1% for the period of 2012-2017 and 4.3% for the period of 2018-2030. Turkey's potential GDP increase is depicted in Figure 7.

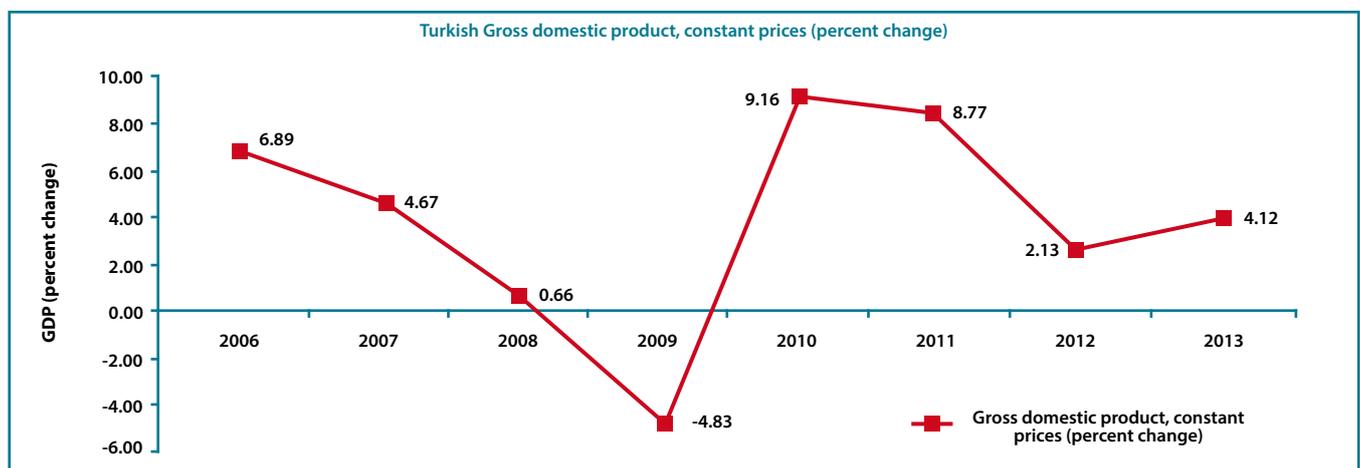
Figure 7: Potential GDP growth rate of Turkey  
Source: OECD Economic Outlook 2013



### Energy consumption

Turkey's continuous economic growth during recent decades has made Turkey increasingly dependent on imported energy supplies. Turkey's total primary energy consumption in 2012 was 121 million tonnes of oil equivalent (Mtoe), 6% higher than in 2011, which was 114 Mtoe; again, most of the supply was imported.

Figure 6: The Evolution of Turkey's GDP (in current prices) Source: IMF and Turkstat



## 2 Expected energy consumption, 2013 – 2023

Figure 8: Primary Energy Consumption in Turkey  
Source: Ministry of Energy and Natural Resources

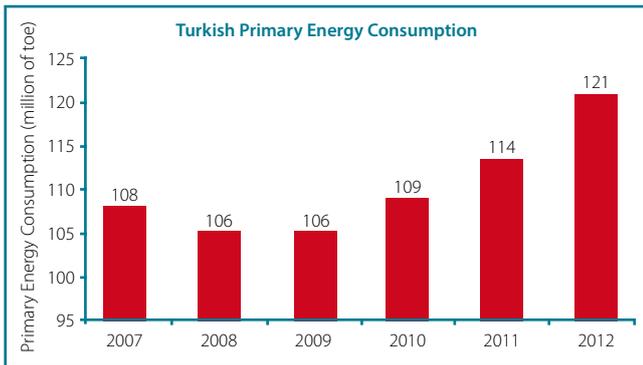
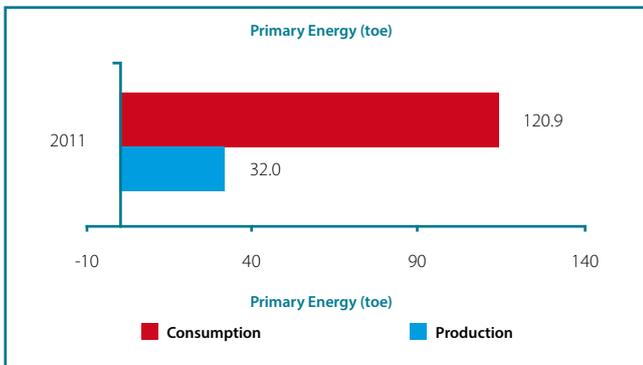


Figure 9 shows the primary energy production and consumption. Accordingly, in 2012 Turkish energy production from national resources accounted for approximately 26% of primary energy consumption.

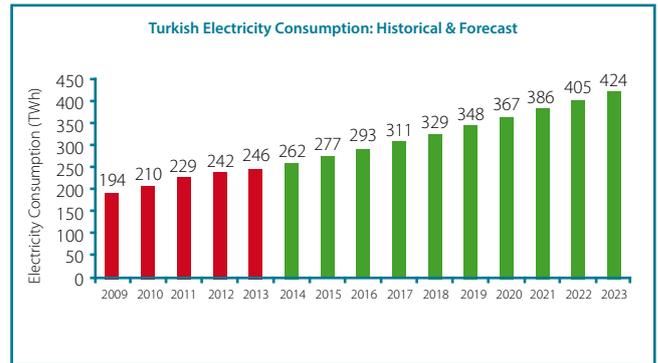
Figure 9: Primary Energy in Turkey  
Source: Ministry of Energy and Natural Resources



Moreover, Turkey is one of the highest countries in terms of energy consumption per GDP (energy intensity<sup>5</sup>) compared to the rest of the largest European countries excluding Poland; its energy intensity was 0.27 toe per \$1,000 of GDP in 2013.

Turkey's primary energy supply is expected to rise in the next decade, the forecast is estimated to be 158 Mtoe for 2023. Turkey has a high correlation between energy consumption and GDP evolution, more than 95% of R2, with an increase of 1 billion TL in GDP resulting in a fuel consumption increase of 0.116 Mtoe. In relative terms, an increase of 1% in GDP would result in an increase of 3.4% in the national energy consumption. Figure 10 depicts the strong correlation between the evolution of energy consumption and GDP.

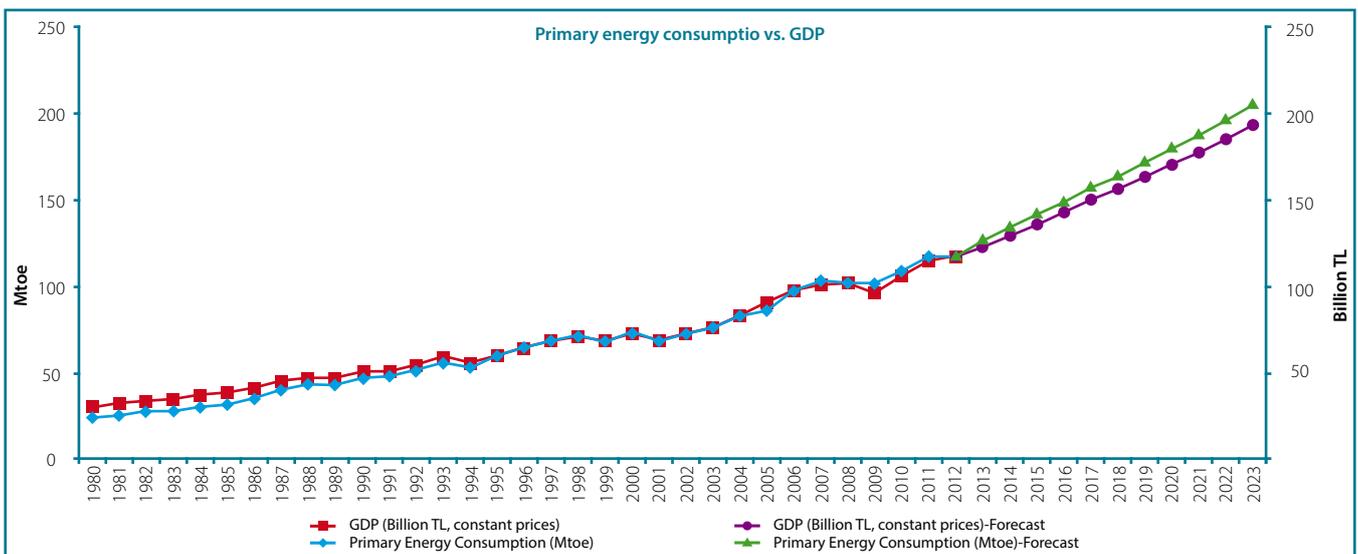
Figure 11: Turkish Electricity Consumption: Recent and Forecasted  
Source: TEİAŞ



With reference to final consumption, electricity consumption is expected to experience an increase of 72% compared to 2013 figures (it would increase from 246 TWh in 2012 to 424 TWh in 2023). The Government is committed to promoting alternative energy solutions to mitigate this energy dependency.

Additionally as shown in Figure 12, the energy consumption in the transportation sector is expected to reach 29.4 million toe in 2020 and 34.5 million toe in 2023 according to the International Energy Agency and Deloitte forecasts respectively<sup>6</sup>.

Figure 10: Primary energy consumption versus GDP | Sources: BP and IMF (historical data), and Deloitte (forecast)

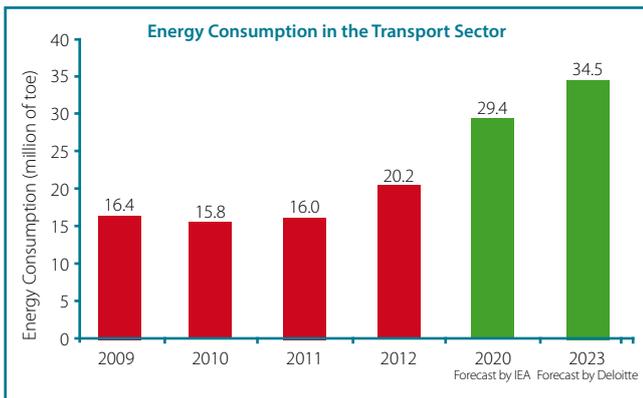


5. Energy consumption per \$1,000 of GDP

6. This figure includes the total energy consumption in the transport sector: road, railway, air transport, maritime transport and others

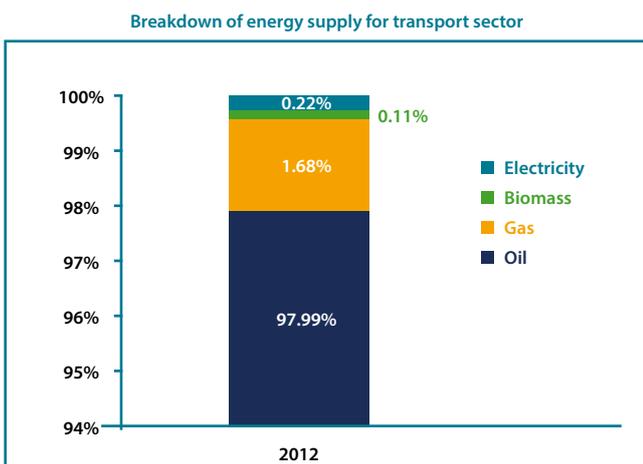
## 2 Expected energy consumption, 2013 – 2023

Figure 12: Final Energy Consumption in the Transportation Sector  
Source: Eurostat (recent data) and International Energy Agency (IEA) and Deloitte (forecast)



The breakdown of energy supply for the transportation sector shows that biomass has just begun being used in the sector. As it can be seen in Figure 13, the share of biomass was 0.11% in 2012: its contribution is still negligible and the major energy source for this sector is oil.

Figure 13: Breakdown of energy supply for the Transportation Sector  
Source: Eurostat



### Energy efficiency

The Energy Efficiency Strategy Paper for 2012 - 2023 targets a decrease of at least 20% of the amount of energy consumed per unit Turkish GDP in the year 2023, by taking 2008 as reference year. The objectives established under this strategy paper can be summarized as follows:

- To reduce energy intensity and energy losses in industry and services sectors.
- To decrease the energy demand and carbon emissions of buildings: to promote sustainable environmentally friendly buildings using renewable energy sources.
- To promote a market transformation toward energy efficient products.
- To increase efficiency in production, transmission and distribution of electricity, and to decrease energy losses and harmful environmental emissions.

- To reduce fossil fuel consumption of motorized vehicles, by increasing the share of public transportation on highways, maritime transit and railroads and by preventing unnecessary fuel consumption in urban transportation.

- To use energy effectively and efficiently in the public sector.

- To strengthen institutional capacities and collaborations.

- To increase the use of state of the art technology and building awareness through diverse activities.

- To develop financial mechanisms other than public financial institutions.

Based on the strategic objectives established in the Energy Efficiency Strategy Paper, Table 1 includes estimates of final energy consumption in the areas of heating and cooling, electricity and transport. The 'reference scenario' and 'additional energy efficiency scenario' are presented separately. The reference scenario includes all the measures on energy efficiency and energy saving taken before 2013, while the additional energy efficiency scenario forecast includes all the additional measures in energy efficiency and energy savings that would be undertaken from 2013 onwards.

New energy efficiency guidelines will be given in the future NEEAP, which will be developed in the near future by the Turkish Government in collaboration with the EBRD.

### Electricity

The following targets depicted in Figure 14 have been established for renewable energy penetration in the electricity sector for 2023 according to :

Figure 14: Electricity generation and installed capacity: 2013 data, 2023 forecast and increases

Renewable energy technology	Installed power capacity (MW)			Electricity generation (GWh)		
	2013	2023	Δ	2013	2023	Δ
Hydro	22,289	34,000	53%	59,420	91,800	54%
Wind	2,759	20,000	625%	7,558	50,000	562%
Geothermal <sup>7</sup>	310	1,000	223%	1,364	5,100	274%
Solar	0	5,000	-	0	8,000	-
Biomass	224	1,000	346%	1,171	4,533	287%

By 2023, 61,000 MW of renewable energy will be installed to generate approximately 159 TWh. Figure 15 shows the electricity generation and installed capacity for 2013 and forecasts for 2023.

7. Taking into account the evolution of the geothermal energy in recent years, geothermal energy capacity is expected to rise to 1,000 MW by 2023

## 2 Expected energy consumption, 2013 – 2023

Figure 15: Electricity generation and installed capacity: 2013 data and 2023 forecast

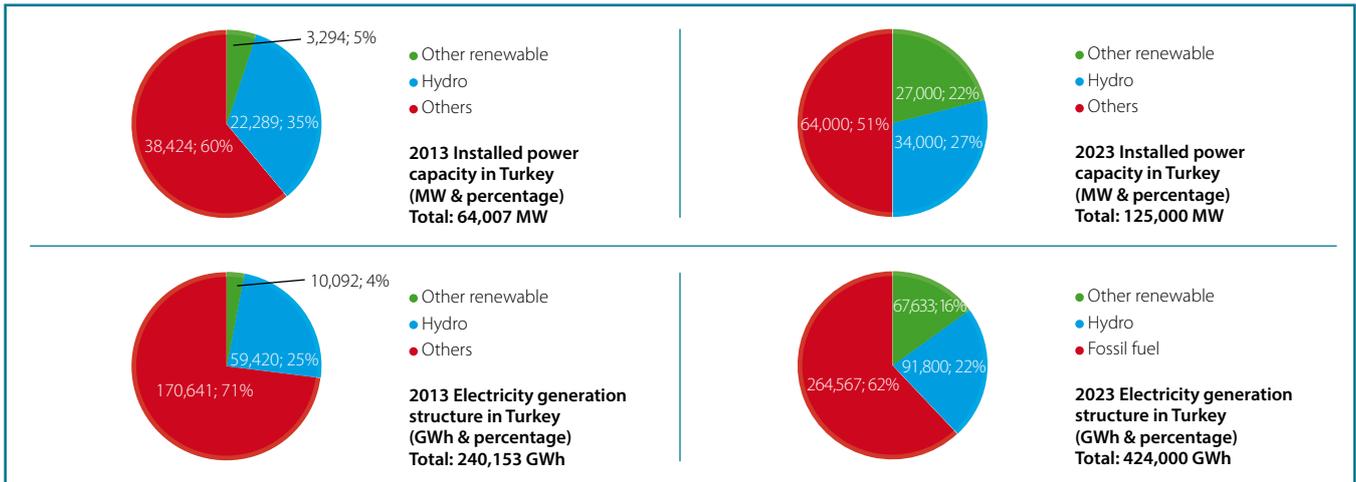
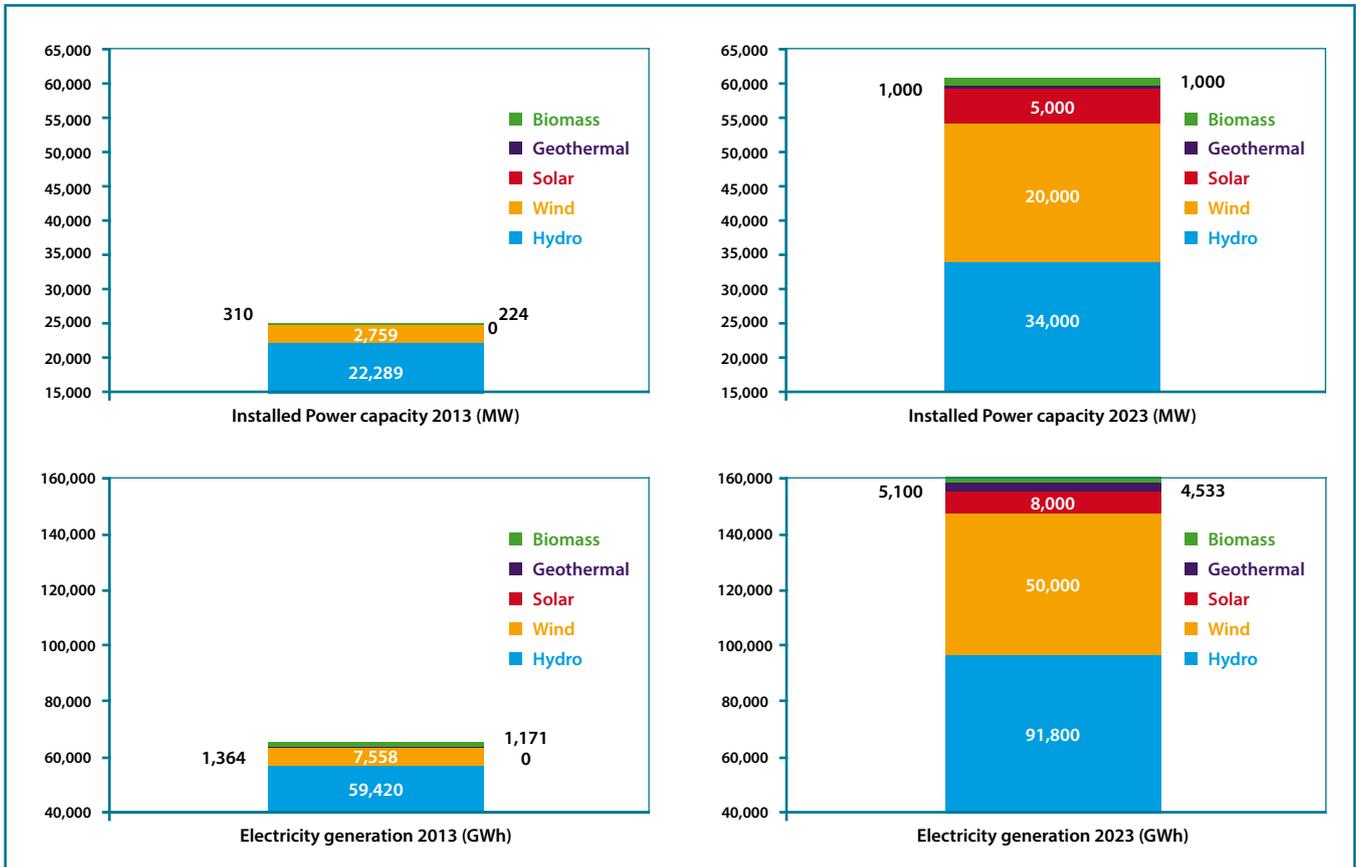


Figure 16: Electricity generation and installed capacity from renewable sources: 2013 data and 2023 forecast



2023 targets were provided by Security of Supply Strategy Paper, the information for hydropower capacity and energy, real data for the base year 2012 and 2013 have been provided by TEİAŞ.

## 2 Expected energy consumption, 2013 – 2023

Development of the gross final consumption of energy in the sectors of electricity, heating and cooling and transportation

Table 1: Expected gross final energy consumption of Turkey for electricity, heating and cooling and transportation up until 2023 taking into account the effects of energy efficiency and energy saving measures<sup>8,9</sup>

Expected final gross energy consumption (ktoe)	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	
	Base year	Reference scenario	Reference scenario	Reference scenario	Reference scenario	Reference scenario	Reference scenario	Reference scenario	Reference scenario	Reference scenario	Reference scenario	Reference scenario	Additional energy efficiency
1) Heating and cooling (Base year = 2011)		49,091	49,245	49,606	49,788	50,018	50,270	50,511	50,691	50,861	51,024	51,213	-
2) Electricity	20,804	21,561	22,935	24,538	26,223	28,067	29,993	31,938	33,973	36,025	38,146	40,223	-
3) Transport as in Article 3(4)a	17,566	18,462	19,404	20,394	21,434	22,527	23,495	24,506	25,559	26,658	27,805	29,000	-
4) Final gross energy consumption	-	89,115	91,585	94,537	97,445	100,613	103,757	106,955	110,223	113,544	116,975	120,436	107,000

8. According to Directive 2009/28/EC on the Promotion of the Use of Energy from Renewable Sources, the targets for the Transport Sector only include road and railway transport (final energy consumption); the rest of activities in the Transport Sector are excluded.

9. A more thorough analysis with other sectorial breakdowns and using other methodology and models can be conducted by the Ministry within the scope of National Energy Efficiency Action Plan.

1 GWh = 0.0859845228 ktoe (source: International Energy Agency).

1 GWh = 0.0859845228 ktoe (source: International Energy Agency).

**3**

## **RENEWABLE ENERGY TARGETS AND TRAJECTORIES**



## 3 Renewable energy targets and trajectories

### 3.1 Overall national target

According to the guidelines of the Ministry of Energy and Resources the main strategic issues regarding energy policy in the next decade are:

- Reduction of energy dependency in order to mitigate the risks linked to high energy dependency on fossil fuel supplies from other countries and the volatility of their prices, and their impact on economic development.
- Additional capacity to reach 125,000 MW and supply the estimated demand growth of 75.4% between 2012 and 2023: the Government strategy includes an increase in natural gas<sup>10</sup> and nuclear generation capacity, and establishes an increase of the share of renewable energy in electricity generation of at least 30% of the total.
- The objectives for the different technologies are 34,000 MW of hydropower, 20,000 MW of wind energy, 1,000 MW of geothermal energy, 5,000 MW of solar energy (photovoltaic and concentrated solar power) and 1,000 MW of biomass (the biomass target is not yet included in the official documents).
- Improvement of the transmission grid infrastructure is targeted, 60,717 km of lines and 158,460 MVA of power distribution unit capacity is expected.
- Improvement of energy efficiency in the electricity transmission grids, reducing electricity loss/theft up to an average of 5% and extending the use of smart grids is targeted.
- Taking full advantage of the agricultural sector enhancing the biofuel industry (biodiesel and bioethanol).

The intention of Turkey's REAP is to have at least 20% of renewable energy sources for its general energy consumption in 2023. Considering an expected total energy consumption of 107 Mtoe, which would imply an energy consumption of 21.7 Mtoe from renewable energy sources.

The overall national target for the share of energy from renewable sources in final gross consumption of energy in 2010 and 2023 is presented in Table 2.

Table 2: Overall national target for the share of energy from renewable sources in gross final consumption of energy in 2010 and 2023 (figures to be transcribed from Annex I, Part A to Directive 2009/28/EC)<sup>11</sup>

A) Share of energy from renewable sources in gross final consumption of energy in 2012 (S2012) (%)	13.5%
B) Target of energy from renewable sources in gross final consumption of energy in 2023 (S2023) (%)	20.5%
C) Expected total adjusted energy consumption in 2023 (ktoe)	107,000
D) Expected amount of energy from renewable sources corresponding to the 2023 target (calculated as B x C) (ktoe)	21,905

10. The objective is a maximum share of natural gas in the generation mix, which is 30%

11. Directive 2009/28/EC on the Promotion of the Use of Energy from Renewable Sources: 20% target for the overall share of energy from renewable sources and a 10% target for energy from renewable sources in transport.

### 3 Renewable energy targets and trajectories

#### 3.2 Sectorial targets and trajectories

Table 3 gives an overview of the expected trajectory of the share of energy from renewable sources in the electricity, heating and

cooling, and transportation sectors in both gross final consumption of energy and total gross final consumption of energy according to the Directive.

Table 3: National target for 2023 and the expected progression of renewable sources in the sectors of electricity, heating and cooling, and transportation

	Base year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Renewable sources of energy – heating + cooling (1) (%)	12.54%	12.74%	12.90%	13.01%	13.16%	13.30%	13.43%	13.56%	13.71%	13.86%	14.01%	14.16%
Renewable energy sources – electricity (2) (%)	27.02%	28.02%	29.40%	31.50%	33.41%	35.27%	36.62%	37.75%	37.84%	37.77%	37.65%	37.57%
Renewable energy sources – transport (3) (%)	0.07%	0.87%	1.29%	1.70%	2.70%	3.70%	4.71%	6.00%	7.29%	8.88%	9.48%	10.08%
Renewable energy sources, total (4) (%)	13.48%	13.92%	14.54%	15.29%	16.20%	17.10%	17.92%	18.75%	19.29%	19.83%	20.16%	20.47%
Of which through cooperation mechanism (5) (%)	-	-	-	-	-	-	-	-	-	-	-	-
Surplus for cooperation mechanism (5) (%)	-	-	-	-	-	-	-	-	-	-	-	-
In accordance with Part B of Annex I to the Directive			2014 - 2015	2016 - 2017	2018 - 2019	2020 - 2021	2023					
Minimum value for target path for renewable energy (6)												
Minimum value for target path for renewable energy sources (ktoe)												

(1) Share of renewable energy in heating and cooling: Gross final consumption of energy from renewable sources for heating and cooling (according to Article 5 (1) (b) and Article 5 (4) of Directive 2009/28/EC), divided by the gross final consumption of energy for heating and cooling. Row A of Table 4a, divided by Row 1 of Table 1

(2) Share of renewable energy in the electricity sector: Gross final consumption of energy from renewable sources for electricity (as referred to in Article 5(1)(a) and Article 5(3) of Directive 2009/28/EC), divided by the total gross final consumption of electricity. Row B of Table 4a, divided by Row 2 of Table 1

(3) Share of renewable energies in the transport sector: End use of energy from renewable sources for the transport sector (see Article 5, paragraph 1, point c, and Article 5, paragraph 5 of Directive 2009/28/EC), divided by consumption in the transport sector is 1. petrol, 2. diesel fuel, 3. biofuels used in road and rail and 4. electricity used in land transportation, see Row 3 of Table 1. Row J of Table 4b divided by Row 3 of Table 1.

(4) Share of renewable energy in gross final consumption of energy. Row G of Table 4a, divided by Row 4 of Table 1

(5) As percentage points of the overall share of renewable energy sources.

### 3 Renewable energy targets and trajectories

Table 4a: Calculation table for each sector's contribution to the share of renewable energy in final consumption of energy

(ktoe)		Base year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
A	Expected gross final consumption of energy from renewable sources for heating and cooling	6,154	6,254	6,353	6,453	6,553	6,652	6,752	6,851	6,951	7,050	7,150	7,249
B	Expected gross final consumption of electricity from renewable energy sources	5,621	5,977	6,613	7,499	8,427	9,425	10,359	11,281	11,925	12,526	13,111	13,709
C	Expected final consumption of energy from renewable sources in transport (1)	10	140	212	293	482	689	902	1,185	1,486	1,868	2,061	2,267
D	Expected total consumption of energy from renewable sources	11,786	12,371	13,179	14,245	15,462	16,766	18,012	19,317	20,361	21,445	22,322	23,225
E	Expected transfer of energy from renewable sources to other Member States 17	-	-	-	-	-	-	-	-	-	-	-	-
F	Expected transfer of energy from renewable sources from other Member States and third countries	-	-	-	-	-	-	-	-	-	-	-	-
G	Expected consumption of energy from renewable sources after adjusting the target (D) - (E) + (F)	11,786	12,371	13,179	14,245	15,462	16,766	18,012	19,317	20,361	21,445	22,322	23,225

(1) In accordance with Article 5(1) to Directive 2009/28/EC, gas, electricity and hydrogen from renewable energy sources will be considered only once. They shall not be counted twice.

Table 4b: Calculation table for the share of renewable energy in the transportation sector

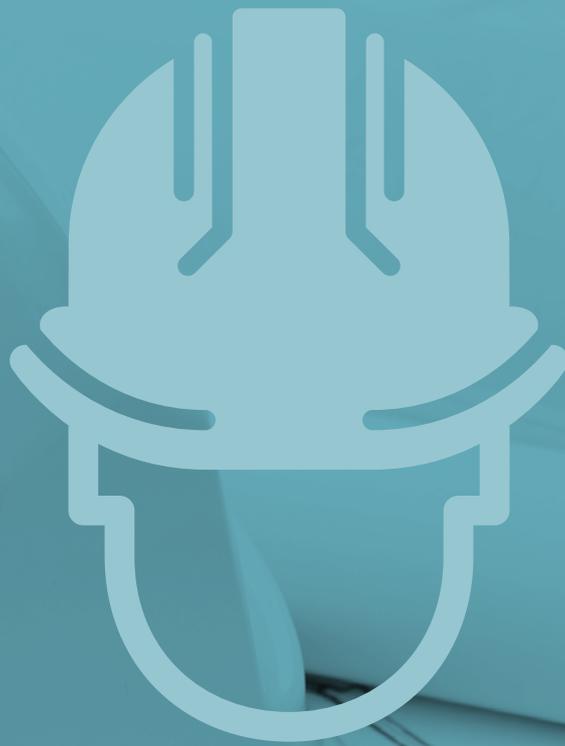
(ktoe)		Base year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
C	"Expected final consumption of energy from renewable sources in transport (1) (H) + (I)"	10	140	212	293	482	689	901	1,185	1,486	1,868	2,061	2,267
H	Expected consumption of biofuels from wastes, residues, non-food cellulosic material, and lignocellulosic material in the transport sector (2)	10	11	12	13	14	16	17	18	19	19	20	20
I	Expected final consumption of energy from renewable sources in transport (1)	-	129	200	280	468	673	885	1,167	1,467	1,849	2,041	2,247
J	Expected contribution of energy from renewable sources in transport in view of the target for the transport sector (C) + (2.5 - 1) × (H) + (2 - 1) × (I)	25	286	430	592	971	1,386	1,812	2,380	2,980	3,746	4,132	4,544

(1) Here all renewable energy sources used in the transportation sector are considered, including electricity, hydrogen, renewable gas and biofuels only that do not meet sustainability criteria (see Article 5(1), last subparagraph). Here actual values are specified, without applying multiplication factors.

(2) Here actual figures are specified, without applying multiplication factors.

# 4

## MEASURES FOR ACHIEVING THE TARGETS



## 4 Measures for achieving the targets

### 4.1A Overview of all policies and measures to promote the use of energy from renewable resources

This section 4.1 introduces possible measures that would contribute to the further development of renewable energy in Turkey (Table 5).

Table 5: Overview of all plans and measures

Name and reference of the measure	Type of measure <sup>12</sup>	Expected result <sup>13</sup>	Target group and/or activity <sup>14</sup>	Exists/is planned	Date of the beginning and end of the measure
<p><b>Feed-in tariff scheme.</b></p> <p><i>The Law on the Utilization of Renewable Energy Resources for the Purpose of Generating Electrical Energy (Law No: 5346) and its amendment (Law No: 6094) (8).</i></p> <p><i>The end date of the feed-in tariff scheme was extended to December 31, 2020 according to the Board Decision published in the Official Gazette on December 5, 2013 (No: 28842, Decision No: 2013/5625)</i></p>	Financial	Investments in renewable energy. New power capacity.	Investors, Private households	Exists	2005 - 2020
<p><b>Incentive to promote the use of local equipment.</b></p> <p><i>Local incentives for renewable energy technologies stated in Renewable Energy Law (No:5346)</i></p>	Financial	Investments in renewable energy. New power capacity and energy generation for heating.	Industrial players, Investors Energy Investors, Industrial players	Exists	2010 - 2030
<p><b>Investment Incentives Program.</b></p> <p><i>The New Investment Incentives Program in Turkey has been in effect since the January 1, 2012 (12).</i></p>	Financial	New power capacity and energy generation for heating	Energy Investors, Industrial players	Exists	2012 - on-going
<p><b>Support from major international financial institutions.</b></p> <p><i>Promoting support from major institutions, such as TurSEFF and MidSEFF provided by EBRD, the World Bank, the Industrial Development Bank of Turkey (TSKB), the International Finance Corporation (IFC) and the Technology Development Foundation of Turkey (TTGV).</i></p>	Financial	Investments in renewable energy. New power capacity and energy generation for heating.	Industrial players, Investors	Exists	2012-2023
<p><b>Subsidized long-term loans for renewable energy projects.</b></p> <p><i>In the short term, the Turkish Government, in collaboration with the Turkish financial sector and international financial institutions focused on economic development, will analyze the possibility of enabling mechanisms to provide long-term loans for renewable energy project construction and implementation.</i></p>	Financial	Investments in renewable energy. New power capacity and energy generation for heating.	Energy promoters, Investors.	Under consideration	Under consideration
<p><b>Advisory services, provided by government agency under the General Directorate of Mineral Research and Exploration (MTA), on engineering and best practices in resource development</b></p>	Technical	Use of geothermal potential more targeted development effort	Geothermal promoters/ investors	Under consideration	Under consideration

12. Indicates whether the measure is (predominantly) regulatory, financial or soft (i.e. an information campaign).

13. Explains the expected result.

14. Identifies who the targeted persons are i.e. investors, end users, public administration, planners, architects, installers, etc. or what the targeted activity/sector is i.e. biofuel production, use of animal manure, etc.

## 4 Measures for achieving the targets

Name and reference of the measure	Type of measure <sup>12</sup>	Expected result <sup>13</sup>	Target group and/or activity <sup>14</sup>	Exists/is planned	Date of the beginning and end of the measure
<p>Financial support to private sector for geothermal exploration activities.</p> <p><i>In the short term, the Turkish Government in collaboration with the Turkish financial sector and international financial institutions focused on economic development will consider analyzing the possibility of enabling mechanisms that mitigate capital risk to support geothermal exploration and drilling activities</i></p>	Financial	Use of geothermal potential.	Geothermal promoters / investors	Under consideration	Under consideration
<p>Support for the MTA in expanding its early stage of geothermal exploration activities.</p> <p><i>Turkish Government, in collaboration with the international financial institutions focused on renewable energy development, will consider analyzing the possibility of providing support to the MTA in scaling-up surface and shallow drilling exploration activities across the country</i></p>	Technical / Financial	Greater exploration of geothermal potential	MTA	Under consideration	Under consideration
<p>Land Usage Fee Incentives (Law No: 6094) (8).</p> <p><i>Discount of 85% for permission, lease, easement rights and servitude right fees for generation facilities based on renewable energy resources. It will be applicable for the first 10 years, including the period of investment and operation.</i></p>	Legislative	Investments in renewable energy. New power capacity and energy generation for heating.	Investors	Exists	2005 - 2020
<p>Reduction in electricity bills, in-house waste treatment facilities. Law on the Environment (Law No: 2872) (9), amended in 2006, establishes that industrial plants receive a reduction of up to 59% of their electricity bills if they set up their own waste treatment facilities.</p>	Legislative	Licensed use of waste.	Investors	Exists	2006 -
<p>Permits unlicensed power generation up to 1 MW and the receipt of feed-in tariff revenue. Electricity Market (Law No: 6446) (6).</p>	Legislative	Investment in renewable energy and distributed generation.	Private households, Investors	Exists	2013 -
<p>Permits unlicensed power generation up to 5 MW and the receipt of feed-in tariff revenue. Electricity Market (Law No: 6446) (6).</p>	Legislative	Investment in renewable energy and distributed generation.	Private households, Investors	Planned	Under consideration
<p>Reviewing of procedures for licensing and issuing of permits for unlicensed generation, in order to reduce their costs and establish deadlines for the different administrative tasks.</p> <p><i>In the medium term there will be a revision of administrative requirements to avoid delays and adopting the procedure outlined in Directive 2006/123/EC on services in the internal market.</i></p> <p><i>Among others, the following measures will be taken into consideration: positive administrative silence, time limit for administrative tasks and a one-stop-shop.</i></p>	Legislative	Enabling promotions of facilities.	Investors	Planned	Under consideration
<p>Reviewing of licensing and issuing of permit procedures for renewable energy facilities in order to avoid delays.</p> <p><i>In the medium term, there will be a revision of the administrative requirements, avoiding delays and adopting the procedure outlined in Directive 2006/123/EC on services in the internal market.</i></p> <p><i>Among others, the following measures will be taken into consideration: positive administrative silence, time limit for administrative task and a one-stop-shop.</i></p>	Legislative	Enabling promotion of facilities.	Investors	Regulation studies for authorization of General Directorate of Renewable Energy in the name of Ministry of Energy and Resources are ongoing	Under consideration

## 4 Measures for achieving the targets

Name and reference of the measure	Type of measure <sup>12</sup>	Expected result <sup>13</sup>	Target group and/or activity <sup>14</sup>	Exists/is planned	Date of the beginning and end of the measure
<p>Review of Transmission System Operator legal framework.</p> <p><i>In the medium term, a revision might be considered for the system operator revenue model: an incentive based on renewable energy penetration could be established taking into consideration the positive externalities.</i></p>	Legislative	Enabling facilities promotion	Investors, TEİAŞ	Under consideration	Under consideration
Grid operation procedures to enable large renewable energy penetration.	Soft	Improvement of the transmission grid and enabling renewable energy capacity connection.	Investors, TEİAŞ	Planned	Under consideration
<p>Implementation of systems to monitor and manage renewable energy penetration in the grid and monitoring in the same center which should be close to National Load Dispatch Center (MYTM).</p> <p><i>TEİAŞ considers implementing, in the short and medium term, systems for monitoring and managing a large number of renewable energy facilities</i></p>	Soft	Enabling renewable energy capacity connection.	Investors, TEİAŞ	Planned	Under consideration
<p>Implement the legal framework to develop distributed generation based on renewables.</p> <p><i>Establish the following: connection to the grid, creating the revenue model, distribution system balancing and signaling.</i></p>	Legislative	Increase of distributed renewable energy.	DSO, Investors, Households	Planned	Under consideration
<p>Reinforce international electricity interconnections.</p> <p>Georgia, Azerbaijan, Armenia, Iran, Iraq, Syria, Bulgaria and Greece.</p>	Soft	Enable the penetration of RES and improve the reliability of the system.	Energy promoters, TEİAŞ	Exists (being developed)	2012-ongoing
<p>Obligation to purchase the excess electricity generated.</p> <p><i>The Law on the Utilization of Renewable Energy Resources for the Purpose of Generating Electrical Energy (Law No: 5346) (7) says that distribution companies holding retail licenses are obligated to purchase the excess electricity generated by the unlicensed renewable energy generators (at feed-in tariff prices).</i></p>	Legislative	Enable RES penetration.	Investors	Exists	2005
Establish incentives to promote the installation of capacitor banks in wind farms.	Legislative	Improvement of energy quality and system reliability. Incentive for wind energy penetration.	Wind energy investors, TEİAŞ	Planned	Under consideration
<p>Biofuels obligation</p> <p><i>To obtain a biodiesel content of at least 1% by January 1, 2014, 2% as of January 1, 2015, and 3% as of January 1, 2016 (this regulation was cancelled according to Official Gazette No. 28688 which was published on June 25, 2013).</i></p> <p><i>To obtain a bioethanol content of at least 2% as of January 1, 2013, and 3% as of January 1, 2014.</i></p>	Legislative	Increased use of biofuels.	Biofuel Investors, Transportation sector Ministry of Food, Agriculture and Livestock Ministry of Energy and Resources	Exists	2013 -
<p>Biofuels tax exemption The Energy Market Regulator</p> <p><i>Authority has established that 2% of biofuels (biodiesel and bioethanol) produced from domestic raw material that is blended with diesel fuel is exempt from the special consumption tax (ÖTV is the Turkish acronym).</i></p>	Legislative	Increased use of biofuels.	Biofuel Investors, Transportation sector Ministry of Food, Agriculture and Livestock Ministry of Energy and Resources	Exists	2011 -
Stimulate collaboration plans between biomass energy investors and the agriculture sector.	Soft	Increased biomass usage.	Investors, Farmers	Planned	Under consideration

## 4 Measures for achieving the targets

Name and reference of the measure	Type of measure <sup>12</sup>	Expected result <sup>13</sup>	Target group and/or activity <sup>14</sup>	Exists/is planned	Date of the beginning and end of the measure
Incentives to develop energy crops.	Legislative	Increased use of biofuels.	Biofuel Promoters, Investors, Transportation sector, Ministry of Food, Agriculture and Livestock	Partially exists	Under consideration
Develop the Directive 2010/31/EU of 19 May 2010 on the energy performance of buildings in order to promote distributed generation based on renewable energy in buildings and zero emission buildings.	Legislative	Promote distributed generation based on renewable energy.	Investors, Households YEGM	Partially exists	Under consideration
Training and education initiatives. Introducing specific programs that enable personnel to deal with new energy technologies: training plans, and academic involvement.	Soft	Establishing qualifications for professionals.	Professionals, Population at large.	Planned	Under consideration
Introduction of green certificates for electricity generated in renewable energy power plants.	Legislative	Increased preference for renewable energy consumption will further that will further encourage its generation	All renewable energy investors	Planned	Under consideration
Within the scope of Renewable Energy Resources Area Regulation (YEKA), the measurement of selected solar fields to be completed under one unit	Legislative	To prevent effort, resource and time loss due to measurement of areas close to each other.	Solar energy investors	Planned	Under consideration
Combination of generation and power	Legislative	Removing the disadvantage of not experiencing scale economy for the small scale investments.	All renewable energy investors	Planned	Under consideration
Actualization of Renewable Energy Cooperatives	Legislative	Easy access to project finance for licensed and unlicensed projects and enabling scale advantage	All renewable energy investors	Planned	Under consideration
Financial support to promote the development of the Hot Dry Rock geothermal technology	Financial	Investment in research activities to develop materials and technology	Investors	Planned	Under consideration
Financial support for the promotion for Tidal/Wave, sea thermal, and marine current energy technologies	Financial	Use of tidal/wave and current potential.	Investors	Planned	Under consideration
Development of the Turkish National Energy Efficiency Action Plan (NEEAP)	Legislative	Promote energy efficiency actions	Turkish Government, Energy Sector	Planned	Under consideration

Measures introduced in Table 5 are explained in depth throughout this chapter, including each measure in the appropriate section. The Investment Incentive Program is a special case because it applies to all sectors and for all requirements; therefore it should be considered for every point that follows.

## 4 Measures for achieving the targets

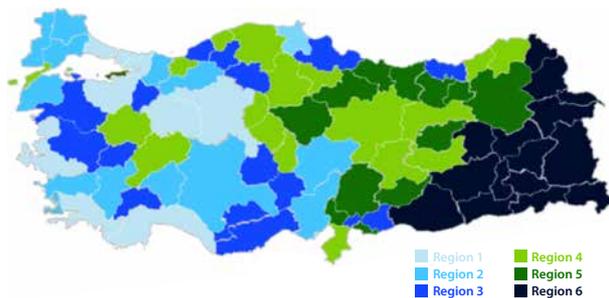
### 4.1B Incentives to promote new investments in Turkey

The New Investment Incentives Program in Turkey has been effective since the January 1, 2012 and offers four different kinds of plans (12):

1. General Investment Incentive Plan: The plan is available for all investment types considering that the investment category is not excluded from the program list, and that the minimum defined fixed investment amount is fulfilled. Within this framework, electricity generation facilities with renewable energy generation are entitled to VAT and customs duty exemption, but other facilities are entitled to the incentives listed below.

2. Regional Investment Incentive Plan: These incentives are allocated depending on the region to eliminate inter-regional imbalances within the country. Minimum investment amounts have been determined for different kinds of investments. If not stated for the specific type of project, the minimum investment amount is TL 1 Million for Regions 1 and 2, and TL 500,000 for regions 3, 4, 5, and 6. An additional labor cost deduction of 38% is available only for region 6.

Figure 17: Regions of Turkey according to incentive plan



3. Large Scale Investment Incentive Plan: The goal of this program is to improve Turkey's technological abilities and R&D capacity.

4. Strategic Investment Incentive Plan: This plan is offered for production of intermediate and final goods with high import dependence (more than 50%). Investments of TL 50 million or above are eligible to benefit from this plan.

Figure 18: Details of the New Investment Incentive Program

Support Measures	General Investment	Regional Investment	Large Scale Investment	Strategic Investment
Vat Exception	✓	✓	✓	✓
Customs Duty Exemption	✓	✓	✓	✓
Tax Deduction	⊘	✓	✓	✓
Land Allocation	⊘	✓	✓	✓
Interest Support	⊘	✓	⊘	✓
Vat Refund	⊘	⊘	⊘	✓
Employer's Social Security Premium Support	⊘	✓	✓	✓
<i>Only For Region 6</i>				
Income Tax Withholding Support	✓	✓	✓	✓
Employee's Social Security Premium Support	⊘	✓	✓	✓

Support Measures	1	2	3	4	5	6
<i>Regional Incentive Applications</i>						
Tax Reduction Investment Contribution Rate	15%	20%	25%	30%	40%	50%
<i>Incentive for Large Scale Investments</i>						
Tax Reduction Investment Contribution Rate	25%	30%	35%	40%	50%	60%
Support for Employer's National Insurance Contribution (Both)	2 Year	3 Year	5 Year	6 Year	7 Year	10 Year

These incentive plans, depending on the activities undertaken, can be applied to renewable energy facilities, R&D initiatives, development of equipment and the manufacturing of component parts for the renewable energy power plant.

Early stage exploration, including exploratory drilling, is arguably the most risky stage for a geothermal project developer from a financial and technical perspective. Currently, there have been some exceptional cases, where private sector investors have developed geothermal fields from surface exploration stage, financed by the company's equity. In collaboration with International Financial Institutions, the Government will develop programs to support private sector investors to participate in early stages of development of geothermal resources, in parallel with the MTA activities. This support will come in the forms of risk-sharing mechanisms, drilling insurance programs, concessional funds with limited recourse to the parent company and/or equity or quasi-equity (mezzanine) products. Additionally, the Government could support private sector investment for early stage geothermal development by offering an additional FiT premium for projects. New formulation of FiT will be elaborated regarding the scale and technology (for instance the use of waste heated water in greenhouses).

The potential of energy technologies, such as Hot Dry Rock and Tidal/Wave, needs to be considered. Hot Dry Rock describes the process of extracting heat from deep crystalline rock while Tidal/Current energy technologies are designed to capture the kinetic motion of the ebbing and surging of ocean tides in order to produce electricity. Both technologies (Hot Dry Rock and Tidal/Current) have a promising future in Turkey, as the country has an extensive surface and a large coastline, suitable to develop them. Therefore, financial support for R&D and the promotion of these technologies will be established.

### 4.1C Feed-in Tariff

The legal framework, the Law on the Utilization of Renewable Energy Resources for the Purpose of Generating Electrical Energy (Law No: 5346) (7), established an incentive plan for the promotion of renewable energy in Turkey, this plan has been modified by the Law Amending the Utilization of Renewable Energy Resources in Electricity Generation (Law No: 6094) (8). The incentive is established in USD, and the licensees can only benefit

## 4 Measures for achieving the targets

from these tariffs during the first 10 years, beginning on the date of operation and for facilities that are commissioned before the December 31, 2015. The plan has been extended until 2020.

Each year, the investor can choose between this feed-in tariff plan and direct sales in the power market. The plan takes into consideration the following issues:

- Wind and hydro energy have very challenging targets<sup>15</sup>, which would be difficult to meet without taking necessary precautionary actions. There are many obstacles and the most critical ones include the following: Investors have difficulty in accessing financial support, as most financial providers take the feed-in tariff as the reference price for electricity (however, the forecasted market price is higher than this feed-in tariff) and the forecasted project cash flow (based on feed-in tariffs) are not attractive enough for financial providers and guarantees are required creating a barrier for new generation facilities.

- Solar energy also has a significant target for 2023, 5,000 MW should be installed by the end of 2023 (currently, the penetration of solar technologies is only marginal). However, due to the evolution of solar PV technology, the investment cost has dropped during recent years. Thanks to this fact, together with the high availability of solar irradiation in Turkey, it would not be necessary to incentivize in the medium term to promote solar PV technology.

- Biomass energy has a low penetration rate in the country and its development depends on the current feed-in tariff in the short term as well as the availability of raw materials, which depend on the type of technology.

- The current feed-in tariff plan established for hydro-power and geothermal energy are appropriate for the feasibility of these investments.

Additionally, an incentive to promote the use of local equipment has been established to promote the development of a national industry.

The Government is evaluating the possibility to link the feed-in tariff to the necessary time (and the level of difficulty) to fulfill the targets. The framework could be developed according to the following scheme:

1. A level of renewable energy technology penetration is established for a yearly period. During this time, there would be a fixed feed-in tariff scheme (USD/MWh).
2. If the penetration target were fulfilled before the end of the period, a lower feed-in tariff scheme would be applied for the rest of the period and the next.
3. If the penetration target were not fulfilled before the end of the period, an equal or higher feed-in tariff scheme would be applied for the rest of the period and the next.

The incentive would be adapted dynamically to the level of renewable energy penetration: For instance; incentives given according to scale and region (regions that are difficult to invest in such as altitude or construction). These mechanisms would allow identifying the technologies that require less (or do not need) incentives.

To obtain the guaranteed FIT, geothermal projects will be required to integrate in a design mechanism that either abate or re-inject non-condensable fluids, extracted from the geothermal resources.

### 4.1D Management of licensing and authorizing procedures

Given the impact that renewable energy projects have on the economy and society, it is necessary to establish control mechanisms to assure the adequate development of these technologies. A number of authorizations and permits from different bodies are required.

Today, the licensing and permits procedures are costly and time consuming. This fact might discourage investors and delay the deployment of new activities in the renewable energy business. Therefore, there is a need to improve the administrative procedures to enable a large penetration of renewable energy in Turkey.

15. For wind energy, it would be necessary to develop approximately 17,800 MW between December 2012 and the end of 2023. In the hydro case, approximately 16,000 MW would have to be installed during the same period.

## 4 Measures for achieving the targets

The Directive establishes the simplicity in the administrative procedures, avoiding duplication and reducing unnecessary delays. The following three aspects could be considered in order to speed up the process:

- A one-stop-shop: it would avoid duplications and the need to manage the necessary tasks with different bodies.
- Time limit to manage administrative tasks: it would reduce delays in the different processes.
- Positive administrative silence: in case of no response, the application would be automatically authorized, helping to reduce the time.

These three measures are explained in detail throughout this document.

### 4.1E National Energy Efficiency Action Plan (NEEAP)

The Turkish Government in collaboration with the EBRD is expected to launch the National Energy Efficiency Action Plan (NEEAP) to establish a common framework of measures for the promotion of energy efficiency within Turkey in order to ensure the achievement of the future Turkish's targets on energy efficiency and to pave the way for further energy efficiency improvements.

In line with the Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency (13), the NEEAP is expected to be completed by taking into consideration the guidance (14) and the template (15) published by the European Commission. It is important to note that, the objectives to be included in the future NEEAP could modify the different targets included throughout this report, the Turkish REAP:

1. Introduction
2. Overview of national energy efficiency targets and savings
  - 2.1 National energy efficiency targets
  - 2.2 Additional energy efficiency targets
  - 2.3 Primary energy savings
  - 2.4 Final energy savings
3. Policy measures implementing EED
  - 3.1 Horizontal measures
    - 3.1.1 Energy efficiency obligation schemes and alternative policy measures (EED Article 7, Annex XIV, Part 2 3.2)
    - 3.1.2 Energy audits and management systems (EED Article 8)

- 3.1.3 Metering and billing (EED Articles 9-11)
- 3.1.4 Consumer information programmes and training (EED Articles 12 and 17)
- 3.1.5 Availability of qualification, accreditation and certification schemes (EED Article 16)
- 3.1.6 Energy Services (EED Article 18)
- 3.1.7 Other energy efficiency measures of a horizontal nature (EED Articles 19 and 20)
- 3.2 Energy efficiency in buildings
  - 3.2.1 Building renovation strategy (EED Article 4)
  - 3.2.2 Other energy efficiency in buildings sector
- 3.3 Energy efficiency in public bodies
  - 3.3.1 Central government buildings (EED Article 5)
  - 3.3.2 Buildings of other public bodies (EED Article 5)
  - 3.3.3 Purchasing by public bodies (EED Article 6)
- 3.4 Other end use energy efficiency measures including in industry and transport
- 3.5 Promotion of efficient heating and cooling
  - 3.5.1 Comprehensive assessment (EED Article 14)
  - 3.5.2 Other measures efficient heating and cooling (EED Article 14)
- 3.6 Energy transformation, transmission, distribution, and demand response
  - 3.6.1 Energy efficiency criteria in network tariffs and regulation (EED Article 15)
  - 3.6.2 Facilitate and promote demand response (EED Article 15)
  - 3.6.3 Energy efficiency in network design and regulation (EED Article 15)

The objectives to be included in the future NEEAP could modify the different targets included throughout this report, the Turkish REAP.

## 4 Measures for achieving the targets

### 4.2 Specific measures to fulfill the requirements under Articles 13, 14, 16 and Articles 17 to 21 of Directive 2009/28/EC

#### 4.2.1 Administrative procedures and spatial planning (Article 13(1) of Directive 2009/28/EC)

##### a) List of existing national and, if applicable, regional procedures concerning authorization, certification, licensing and spatial planning applied to plants and associated transmission and distribution network infrastructure for the production of electricity and heating or cooling from renewable sources.

Authorization, certification and licensing procedures linked to the renewable energy projects.

Figure 19: List of administrative procedures to install new renewable power capacity

Step 1	Step 2	Step 3
<ul style="list-style-type: none"> <li>• For solar and wind: completion of the necessary land use permits and applications to the General Directorate of Meteorological Works to start measuring.</li> <li>• For geothermal energy, applications should be made to the Secretary General of Special Provincial Administration for access to the geothermal source. Then, all the applications are overseen by the General Directorate of Mining Affairs.</li> <li>• For hydro energy, water usage rights agreement should be signed with the General Directorate of State Hydraulic Works.</li> <li>• For biomass power plants, a tender is applicable for those companies that want to build a power plant that uses landfill as fuel. In that case, a usage right of the city landfill is granted through a tender by the municipality.</li> </ul>	<ul style="list-style-type: none"> <li>• For solar and wind energy, gaining grid connection rights through bidding on the tender.</li> <li>• Biomass, geothermal and hydro investors submit their technical specifications to TEİAŞ to enable access to the system.</li> </ul>	<ul style="list-style-type: none"> <li>• Completion of the environmental impact assessment and other related permissions.</li> <li>• Technical and financial feasibility studies and completion of the project's development.</li> </ul>
Step 4	Step 5	
<ul style="list-style-type: none"> <li>• Pre-license application.</li> </ul>	<ul style="list-style-type: none"> <li>• Obtaining the license after completing the necessary documentation.</li> <li>• Review with the grid operator connection requirements.</li> </ul>	
Required Documents for all Resources		
<ul style="list-style-type: none"> <li>• Letter of Application (from EPDK)</li> <li>• Authorization Certificate (from EPDK)</li> <li>• Principal Agreement or Commercial Registry Gazette (also for partners of legal entities)</li> <li>• Production Plant Information Form (from the Applicant)</li> <li>• Single-line Diagram (from the Applicant)</li> <li>• Map and Settlement Plan (1/25,000 scale) (from the Ministry of Environment and Urbanization)</li> <li>• Document concerning the right of resource utilization</li> <li>• No-Lien Affidavit with the Ministry of Energy and Natural Resources</li> <li>• Statement of Partnership Structure (from Commercial Registry Gazette)</li> <li>• Declaration of Financial Status (from the Applicant)</li> <li>• Letter of Guarantee from the Bank</li> </ul>		

The licensing procedures for renewable energy investments have similar requirements to those of other technologies defined in the Electricity Market Law and License Regulation; however, the specific requirements for the different renewable sources differ from one to another.

For solar and wind power plants, grid connection is the most critical step before being entitled to a license. The New Electricity Market Law regulates the tender process for grid connection rights. In light of this, all solar and wind projects that apply at the same transformation center for grid connection, will require a mandatory tender based on a contribution fee payable to the Transmission System Operator for the first 3 years following commissioning. Land restrictions do apply especially in the case of solar and wind energy that require the vast use of land.

For small hydro generation units, water usage rights are granted by the General Directorate of State Hydraulic Works (DSİ) and a water usage fee is payable to the DSİ. This General Directorate can also organize tenders for the water usage rights.

In the case of biomass power plants, a tender is applicable to those companies who want to build a power plant that uses landfill gas as a fuel. In those cases, usage rights to the city landfill are granted through a tender by the municipality.

Additionally, any natural or legal entity generating less than 1 MW in its facility can benefit from the feed-in tariff defined by the Renewable Energy Support Mechanism without a generation license. However, although shorter, easier and cheaper, it should be noted that there are some permits and legal procedures for these facilities as well: municipality licenses, connection to the distribution company and certification to withstand earthquakes, etc.

Other authorizations and licensing procedures include documentation for regional and local authorities as well as those regarding the specific characteristics of the project.

## 4 Measures for achieving the targets

Below are the requirements for the administrative licenses and procedures that should be managed at the regional level:

- Environmental Impact Assessment Report from the Ministry of Environment and Urbanization.
- Cadastral records from the General Directorate of Land Registry and Cadaster.
- Spatial approval and expropriation require local authorization for land use.

It is compulsory to get the necessary clearances from the following organizations for the land that will be used for the project: The municipality where the investment will be made, the municipality of the greater region (if applicable), the Special Provincial Administration, the Ministry of Culture and Tourism, the Regional Board of Preservation of Cultural Assets, the Regional Board of the Preservation of Natural Assets and the Ministry of Environment and Urbanization.

On the other hand, depending on the characteristics of the project, investors should get the approval of the following institutions: the General Directorate of Nature Preservation and National Parks, the State Highways Commission, the State Hydraulic Works, the Regional Board of Preservation of Cultural Assets, the provincial organization of the Ministry of Food, Agriculture and Livestock, the Regional Directorate of Forestry, the provincial organization of the Ministry of Environment and Urbanization, the Transmission System Operator, the provincial organization of the Ministry of Culture and Tourism, BOTAŞ (the National Natural Gas Transmission Company), Türk Telekom (the telecom company), the regional electricity distribution company and the regional gas distribution company.

In order to avoid delays in the licensing and authorizing processes, these procedures will be reviewed by the Government adopting them under Directive 2006/123/EC on services in the internal market: mandatory deadlines should be established for the different administrative tasks in order to reduce process delays.

Additionally, in the case of unlicensed generation, some of the administrative requirements are similar to those of large facilities.

The Directive establishes the simplicity in the administrative procedures, avoiding duplication. It also establishes a time limit to manage administrative tasks (e.g. three months) and the positive administrative silence. Moreover, a one-stop-shop for licensing procedures would enable the management of the abovementioned processes.

Due to the large number of administrative tasks that are necessary to install new power capacity, a one-stop-shop approach would simplify the licensing process and reduce cost and time.

The license for exploration activities in geothermal energy is a special case that should be reviewed: in order to increase the penetration of this technology, the cost of the license should be reduced and the information about possible locations for geothermal capacity should be improved.

### b) Responsible Ministry(ies)/authority(ies) and their responsibility in the field

Power plants that have an installed capacity greater than 1 MW are required to obtain a generation license from the Energy Market Regulatory Authority (EPDK). EPDK has little experience with some renewable energy technologies that have limited penetration. In the case

of wind energy investments, EPDK has gained substantial experience since 2007, however for solar, the mechanisms are quite new and EPDK will be gaining necessary experience throughout the process.

Depending on the renewable energy technology, other entities have to authorize the new facility:

- The Ministry of Energy and Natural Resources - the General Directorate of Renewable Energy: responsible for all renewable energy sources. The technical assessment of the energy license applications are performed under this organization.
- The General Directorate of State Hydraulic Works: hydropower units.
- Turkish State Meteorological Service: measurement station installation permits for wind farms and solar power facilities.
- The Secretary General of Special Provincial Administration and the General Directorate of Mining Affairs (under the Ministry of Energy and Natural Resources): geothermal energy.
- The Ministry of Environment and Urbanization: environmental impact assessment reports and distributed generation based on renewable energy in buildings.
- System Operator: tendering process for wind and solar energy and evaluating the connection of licensed renewable energy units to the grid.

Responsibilities at regional and local levels are described in point 4.2.1.e.

The revision of the procedures would enable the review process of the requirements established in the permits and authorizing processes, and allow the investor and operator to have easier and shorter processes.

A one-stop-shop approach would avoid duplications and the need to manage the necessary tasks with different bodies. Additionally, a reasonable time scope for each procedure would reduce delays.

## 4 Measures for achieving the targets

### c) Revision with a view toward taking appropriate measures to comply with the meaning of Article 13, paragraph 1 of Directive 2009/28/EC planned before the end of 2015.

Article 14 of the New Electricity Market Law (Law No. 6446) (6) defines the activities entitled under law to be conducted without license: the maximum installed capacity for a renewable energy plant to operate without a license has been established at 1 MW. In addition, The Board of Ministers is authorized to increase the maximum installed capacity for a renewable energy plant to operate without a license to 5 MW. It is also important to mention that renewable energy power plants that do not connect the load to the system (generation and consumption take place at the same location) do not need any kind of license.

The detailed procedures have been explained in point 4.2.1.a of this document.

On the other hand, in order to make administrative requirements quicker and avoid duplication, in the medium term there will be a revision of licensing and permits procedures to install renewable energy facilities as well as unlicensed generation. For instance, a one-stop-shop would be a good way to speed up and resolve licenses and permits without delays or duplications, avoiding bureaucracy.

### d) Have obstacles or disproportionate requirements been detected in relation to the approval, certification or licensing rules applicable to plants and associated transmission and distribution network infrastructure for the generation of electricity, heating or cooling from renewable sources and to the transformation of biomass into biofuels or other energy products? If so, which?

Sometimes, the process to apply for new generation licenses can be time consuming. It would be necessary to review the administrative processes in order to reduce unnecessary delays and make the process quicker.

The licensing process should be made faster and delays in the management of these tasks should be avoided. Concentrated effort from the investors is required in time consuming tasks. In order to shorten the period for permits and view processes:

- Reasonable time scopes could be implemented for the different administrative tasks.
- Positive administrative silence could be set for these procedures, as a part of the one-stop-shop approach.
- A one-stop-shop could be implemented to centralize all the licensing and authorizing procedures.

In the case of unlicensed generation, some of the administrative requirements are similar to those of large facilities, and the following should also be considered for the unlicensed generation: municipal licenses, connection to the distribution company and certification of earthquake readiness. Furthermore, there is no difference in application and documentation for very small scale unlicensed projects and 1 MW projects. Topics regarding different administrative procedures which will enable cost effective measures for very small scale projects are expected to be considered in the coming months.

Additionally, the legal framework to develop the distributed generation on a large scale; the establishment of an economic incentive for the distribution company to enable the installation of new capacity based on its positive externalities should be considered.

### e) What level of administration (local, regional and national) is responsible for authorizing, certifying and licensing renewable energy installations and for spatial planning? (If it depends on the type of installation, please specify.) If more than one level is involved, how is coordination between the different levels managed? How will coordination between different responsible authorities be improved in the future?

Several different authorities have roles in the authorization and approval processes in licensing procedures:

- Environmental Impact Assessment Report from the Ministry of Environment and Urbanization.
- Cadastral records from the General Directorate of Land Registry and Cadaster.
- Spatial approval and expropriation rights require local authorization for land use.

It is essential to get the necessary clearance from the following organizations for the land that will be used for the project: The municipality where the investment will be made, the municipality of the greater region (if applicable), the Special Provincial Administration, the Ministry of Culture and Tourism, the Regional Board of Preservation of Cultural Assets, the Regional Board of Preservation of Natural Assets and the Ministry of Environment and Urbanization.

Depending on the specific characteristics of the project, the investor should get the approval of the institutions listed below: the General Directorate of Nature Preservation and National Parks, the State Highways Commission, the State Hydraulic Works, the Regional Board of Preservation of Cultural Assets, the provincial organization of the Ministry of Food, Agriculture and Livestock, the Regional

## 4 Measures for achieving the targets

Directorate of Forestry, the provincial organization of the Ministry of Environment and Urbanization, the Transmission System Operator, the provincial organization of the Ministry of Culture and Tourism, BOTAŞ (the National Natural Gas Transmission Company), Türk Telekom (the telecom company), the regional electricity distribution company and the regional gas distribution company.

The ultimate license application portfolio should include: the Letter of Application (from EPDK), the Authorization Certificate (from EPDK), the Principal Agreement or Commercial Registry Gazette (also for partners of legal entities), the Production Plant Information Form (from the Applicant), the Single-Line Diagram (from the Applicant), the Map and Settlement Plan 1/25,000 scale (from the Ministry of Environment and Urbanization, the document about the right of resource utilization (referring to hydro, biomass, and geothermal power plants), No-Lien Affidavit with the Ministry of Energy and Natural Resources, the Statement of Partnership Structure (from Commercial Registry Gazette), the Declaration of Financial Status (from the Applicant) and the Letter of Guarantee (from the Bank).

In medium term, a one-stop-shop should be implemented in order to coordinate the different bodies and tasks to avoid unnecessary efforts and delays.

It would be beneficial that the activities of monitoring and controlling the licensing and authorizing procedures are performed by the General Directorate of Renewable Energy.

- Identify inefficient procedures and duplications in the abovementioned processes.
- Identify non-justified delays in the performance of licensing and authorizing procedures.
- Identify non-justified delays in the grid access application.
- Identify non-appropriate practices in the licensing and authorizing application: discrimination in the application processes, abusive practices in the reserve of capacity, abusive conditions, speculative practices, etc.

Based on its controlling activity, the Agency will give recommendations to improve the licensing and authorizing procedures. A report will be issued every year.

### **f) How is it ensured that comprehensive information on the processing of authorization, certification and licensing applications and on assistance to applicants is made available? What information and assistance is available to potential applicants for new renewable energy installations on their applications?**

Today, comprehensive information and assistance to applicants are the responsibility of different organizations depending on the technology. Nevertheless, a one-stop-shop approach would make the process more efficient by facilitating administrative procedures. The design of the one-stop-shop for the renewable energy in Turkey should follow the guidelines defined by Directive 2006/123/EC on services in the internal market, simplifying procedures and requirements, and avoiding duplications.

For solar and wind, the General Directorate of Meteorological Works provides information regarding the procedures for starting measurements and the application for land use permits. In addition, EPDK publishes the procedures to take part in the tenders on its website.

In the case of geothermal energy, the investors can ask for instruction about the procedure to access the geothermal source from the Secretary General of Special Provincial Administration.

Investors can consult with the General Directorate of State Hydraulic Works for information on water usage rights agreements and the development of new hydropower facilities. The information about the process to apply for the generation license is published by EPDK both on its website and in the Official Gazette.

Finally, the System Operator TEİAŞ publishes documents on procedures with the information on the conditions to access and operate power generation units in Turkey.

### **g) How is horizontal coordination facilitated between different administrative bodies, responsible for the different parts of the permit? How many procedural steps are needed to receive the final authorization/license/permit? Is there a one-stop shop for coordinating all steps? Are timetables for processing applications communicated in advance? What is the average time for obtaining a decision for the application?**

Referring to the abovementioned procedures, the license application process for energy generation from renewable energy requires completion of different steps through interaction with several authorities. The pre-license period is defined as taking 6 months - 2 years. Currently, there is no one-stop-shop for the coordination of all the effort needed in the process.

## 4 Measures for achieving the targets

In order to facilitate the administrative task, reducing the task time scope and avoiding duplication, the licensing and permit procedures will be reviewed by the Government adopting the procedure under Directive 2006/123/EC on services in the internal market. Among other considerations, the following rules should be taken into account:

- Necessary requirements to install new renewable energy capacity must be reexamined and redefined with a focus on optimizing the necessary control and ease of doing business.
- Stakeholders who grant the permissions should be redefined with an optimization focus and should be enabled to share a common database relevant for the renewable permits. The database should be accessed and used by the licensing authority and the transmission system operator at the very least. A one-stop-shop to manage all the permits, licenses and authorizations necessary to install new power capacity should be established.
- A reengineering study for the administrative activities should be conducted with a focus on both enhancing the IT infrastructure for the smooth and fast operation of the permitting procedures. Information and document requirements from different administrative bodies should be optimized.
- A timeframe must be set to manage the different administrative tasks (no more than a three month period for each step) and the total licensing procedure (no more than one year).
- A positive administrative silence should be established: in case of no response the application would be automatically authorized.

### **h) Do authorization procedures take into account the specifics of the different renewable energy technologies? If so, please describe how. If they do not, do you envisage taking them into account in the future?**

The common procedures to be taken into account for each different renewable energy technology are:

#### Wind energy

- Investors would benefit from the Wind Energy Atlas of Turkey before selecting a site for a wind power plant so they would be able to choose sites that are suitable for investment.
- The land restrictions for building wind energy power plants are as follows: according to National Parks Law No: 2873 there are certain defined fields that cannot be utilized for wind energy power plants. These include national parks, natural parks, natural monuments and natural monument protection areas. According to the Land Hunting Law No: 3167 wind energy power plants can be established in wildlife protection areas after obtaining necessary permits. Housing settlement areas and military fields also cannot be used for wind energy power plant establishment. The field to be utilized for wind energy power plants needs to be owned either by the applicant or the government.
- In the application process, UTM coordinates of the wind power plant to be built must be given. The distances between the planned turbine and existing operating turbines also should be submitted within the application.
- Application should include the turbine model, brand, blade diameter and rotor height.
- Applications for pre-license can be submitted to EPDK in the first five business days of October in the scope of the announced wind capacity the year before.
- After the GDM grants approval, 6 months of measurement in the field should be completed. The remaining 6 months should be completed with existing or GDM values (for a total of 1 year of measured data).
- As an additional document, (required since the publication of the Electricity Market License Regulation on November 2, 2013) the applicant should provide total of 1 year of measured wind data obtained at least within 3 years.

#### Solar energy

- When selecting a field for their solar power plants, investors should consider the announced regions/transformer centers set out by the Ministry, including the radiance values and field characteristics.
- Investors must acquire installation report from the General Directorate of Meteorology (GDM) in order to install measurement stations.
- Companies that apply to the GDM should complete their application process within 15 days.
- After the GDM grants approval, 6 months of measurement in the field should be completed. The remaining 6 months should be completed with existing or GDM values (for a total of 1 year of measured data).
- Collected/recorded data covering a 1 year period are sent to the GDM for a final control at least 30 days before an application is sent to EPDK.
- Applications are then evaluated by YEGM in a technical perspective. After this stage, EPDK evaluates the applications an administrative perspective.
- If same region/transformer center has received more than one application, then applications are sent to TEİAŞ in order to organize a competition – a competitive analysis or competition between existing applicants.
- If an application does not share any regions/transformer centers with other applicants, then the licensing process starts.
- The field to be utilized for solar energy power plants needs to be owned either by the applicant or the government.

#### Hydro energy

- Before applying for a license for hydro power plants, a Water Usage Rights Agreement should be signed with the State Hydraulic Works.

#### Biomass energy

- A fuel provision agreement or energy type provision agreement should be committed to by both legal entities (producer of the fuel/energy resource and the applicant).

Additionally, renewable energy investors for any renewable energy technology have to complete the licensing application process described in question 4.2.1.h.

## 4 Measures for achieving the targets

Electricity Market Law (Law No. 6446) (6) defines the activities that can be conducted without a license: the maximum installed capacity for a renewable energy plant to operate without a license has been established in 1 MW. In addition, the Council of Ministers is authorized to increase the maximum installed capacity for a renewable energy plant to operate without a license to 5 MW. Also, renewable power plants, which are not connected to the grid, are exempted from obtaining a license (generation and consumption take place at the same location).

**i) Are there specific procedures, for example simple notification, for small-scale, decentralized installations (such as solar panels on buildings or biomass boilers in buildings)? If so, what are the procedural steps? Are the rules publicly available to citizens? Where are they published? Is the introduction of simplified notification procedures planned in the future? If so, for which types of installation/system? (Is net metering possible?)**

Any natural or legal entity generating less than 1 MW in its facility can benefit from the feed-in tariff defined by the Renewable Energy Support Mechanism.

As described in the Electricity Market Law (EML), distribution companies holding retail licenses are obligated to purchase the excess electricity generated by the unlicensed renewable energy generators via relevant feed-in tariff prices.

Solar thermal energy that is used for water heating does not require any particular license and/or permit.

**j) Where are the fees associated with applications for authorization/licenses/permits for new installations published? Are they related to the administrative costs of granting such permits? Is there any plan to revise these fees?**

The license application fee is payable by the applicant to EPDK and announced by EPDK periodically. Only the ten percent of the price of having a pre license is collected from legal entities who apply to have pre license in order to establish generation power plants based on domestic natural resources and renewable energy. Licensing fees also have a recurring component; a certain amount per MW is applicable to EPDK on a yearly basis. The current license application fees are structured as follows:

$0 < P \leq 10$ MW	TL 5,000
$10 < P \leq 25$ MW	TL 10,000
$25 < P \leq 50$ MW	TL 15,000
$50 < P \leq 100$ MW	TL 25,000
$100 < P \leq 250$ MW	TL 50,000
$250 < P \leq 500$ MW	TL 100,000
$500 < P \leq 1000$ MW	TL 150,000
$P > 1000$ MW	TL 250,000

Additionally, for the recurring component of the license fee: 0.003 kuruş per kWh generated of electricity is payable on a yearly basis throughout the license period.

Furthermore, all solar and wind projects connected to the electricity grid, that apply for the same transformer center to connect to the grid, have to follow a tendering process based on a contribution fee payable to the Transmission System Operator for the first 3 years following commissioning. This contribution fee depends on the tender results. For biomass power plants, a tender is applicable for those companies that want to build a power plant which uses landfill gas as a fuel. In that case, usage rights of the city landfill are granted through a tender by the municipality.

There are other fees associated with the municipal license and with connection to the grid.

For unlicensed generation some fees are applicable such as payments to the municipality and distribution company to access the system.

**k) Is official guidance available to local and regional administrative bodies on planning, designing, building and refurbishing industrial and residential areas to install equipment and systems using renewable energy sources in electricity and heating and cooling, including in district heating and cooling? If such official guidance is not available or insufficient, how and when will this need be addressed?**

Even though there is no official guidance available to local and regional administrative bodies on planning, designing, building and refurbishing industrial and residential areas to install equipment and systems using renewable energy sources in electricity and heating and cooling, including in district heating and cooling, informal guidance is provided if there is a demand.

Nevertheless, secondary legislation clearly indicates the steps to be executed in detail for local and central administrative bodies for electricity generation.

**l) Are there any specific trainings for case handlers of authorization, certification and licensing procedures of renewable energy installations?**

EPDK publishes guidelines about licensed and unlicensed procedures for renewable energy installations and also the General Directorate of Renewable Energy provides advice and support to the local administrative bodies in this field.

Turkey has renewable energy associations that provide support to the investors so that they can fulfill their administrative requirements.

## 4 Measures for achieving the targets

### 4.2.2 Technical specifications (Article 13(2) of Directive 2009/28/EC)

#### a) To benefit from support schemes do renewable energy technologies need to meet certain quality standards? If so, which installations and what quality standards? Are there national, regional standards that go beyond European standards?

The large penetration of renewable energies requires the fulfillment of technical and environmental necessities by facilities and equipment, and additionally appropriate procedures to guarantee the reliability and security in the exploitation of the electricity system.

Technical and quality measures based on international standards focused on renewable energy components, equipment and procedures must be taken into consideration, for example: TR-ISO 12975 for thermal solar energy (system and components), TR-ISO 50548/60904/61829/62093 for solar PV energy, TR-ISO 61400 for wind energy, TR-ISO 62270 for hydropower and TR-ISO 162014/303001 for biofuels.

Moreover, some of the renewable energy technologies have a high volatility. Therefore, the grid codes should be adapted to this characteristic in the medium term. TEİAŞ will update the following grid operation procedures to enable large renewable energy penetration:

- The requirements, criteria and procedures to manage secondary and tertiary reserves.
- The participation of renewable energy facilities in the voltage control management.
- The criteria to develop curtailment procedures in order to avoid problems related to energy exports to the system, and to the maintenance of the security and reliability of the electricity system.
- The requirements that the renewable energy promoters have to fulfill to enable the monitoring of the facilities.

### 4.2.3 Buildings (Article 13(3) of Directive 2009/28/EC)

This section is built on existing documents and plans regarding energy in buildings. There exists a strong commitment from the Turkish Government to energy efficiency, in 2012 the Energy Efficiency Strategy Paper 2012–2023 was published.

#### a) Reference to existing national and regional legislation (if any) and summary of local legislation concerning the increase of the share of energy from renewable sources in the building sector.

The Government of Turkey is evaluating the measures that should be implemented to develop the Directive 2010/31/EU of 19 May 2010 on the energy performance of buildings (in particular regarding self-consumption and zero emission buildings).

So far, there is no specific legislation concerning the increase of the share of energy from renewable sources in the building sector, but the Law on the structuring of areas under risk of natural disasters (Law No. 6306) (13) provides the legal framework for the principles and procedures of restructuring and reconstruction of urban areas at risk of natural disasters. Among other principles, the Law also sets out provisions concerning the implementation of restructuring of these areas.

One of the Strategic Purposes (SP) presented in the paper, SP-02, is directly related to buildings. The goal of this SP is “to decrease energy demand and carbon emissions of buildings; to promote sustainable environmentally friendly buildings using renewable energy sources”.

Lastly, it is important to consider that the Turkish Government is committed to develop a National Energy Efficiency Action Plan (NEEAP) in the near future. Among others, the plan will include measures and actions to increase the share of energy from renewable sources in the building sector. Therefore, the points highlighted in this section are subject to modification in accordance with the new NEEAP.

#### b) Responsible Ministry(/ies)/authority(/ies)

Regarding the Law on structuring of areas under risk of natural disasters (Law No. 6306) (13), the responsibilities would fall under the duties of the Ministry of Environment and Urbanization (ÇŞB). For the measures proposed in the Energy Efficiency Strategy Paper, the responsibilities mentioned in the document concern the Ministry of Environment and Urbanization for ST-01 and the Ministry of Energy and Natural Resources (ETKB) for ST-02.

#### c) Revision of rules, if any, are planned by:

At the moment, the majority of possible measures are not currently in place. Nevertheless, a period between 12 and 36 months has been established for revisions, consultation and preparation for the bill to pass in Parliament. Although the measures themselves do not include any revision, it is likely that during this development period that measures will be completed, reviewed and finalized, including any possible future revision of the rules.

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## 4 Measures for achieving the targets

### **d) Summary of the existing and planned measures at regional/local levels:**

The abovementioned measures do not include any specific modification at regional/local level. Nonetheless, some of them (e.g. SP-02/ST-01/A-01) account for differences according to regions (such as climate conditions). Therefore, this could be seen as encompassing planned measures at a regional/local level.

### **e) Are there any minimum levels for the use of renewable energy in building regulations and codes? In which geographical areas and what are these requirements? (Please summarize.) In particular, what measures have been built into these codes to ensure the share of renewable energy used in the building sector will increase? What are the future plans related to these requirements/measures?**

The existence of the regulation regarding unlicensed generation for electricity, including the availability of feed-in tariff mechanisms for the excess generation, is regarded as the sole most important incentive for buildings; therefore a further incentive mechanism is not on the agenda at the time of writing this report, although it could change with the development of the new NEEAP.

The table with the increase of renewable energy use in buildings is not included here because of the coming NEEAP. The development of the future NEEAP will place Turkey in a better position to forecast the penetration of renewable energy in buildings.

### **f) Have obligations for minimum levels of renewable energy in new and newly refurbished buildings been considered in national policy? If so, what are these levels? If not, how will the appropriateness of this policy option be explored by 2015?**

SP-02/ST-01/A-01 of the Energy Efficiency Strategy Paper establishes the minimum annual energy demand covering the areas of heating, cooling, lighting, etc., will be determined according to the different characteristics of the buildings and based on energy requirements and emission limitations.

The Building Energy Performance Specification shall be revised with all of its sub-arrangements within 36 months of the date of publication of the Energy Efficiency Strategy Paper (July 2, 2012) and the necessary standards shall be defined.

### **g) Please describe plans for ensuring the exemplary role of public buildings at national, regional and local level by using renewable energy installations or becoming zero energy buildings from 2012 onwards? (Please take into account the requirements under the EPBD).**

Apart from the plans already commented on in previous points, and the measures to be pointed out in the future NEEAP, there is a specific Strategic Purpose, SP-06, on the Energy Efficiency Strategy Paper that deals with public buildings: "To use energy effectively and efficiently in the public sector". The plans proposed under that SP ensure the exemplary role of public buildings by using renewable energy installations.

### **h) How are energy efficient renewable energy technologies in buildings promoted?**

The proposed package of measures presented in this chapter promotes energy efficient renewable energy technologies in buildings. Given that the measures/actions are due to come into force in the short/medium term (1 or 2 years) the promotion would be guaranteed.

Moreover, SP-07 aims at strengthening institutional structures, capacities and collaboration to increase use of state of the art technology, awareness activities and to develop financial mechanisms. The lines of action include the following topics: strengthen corporate structures and collaborations, training programs, R&D, agreements with consultancy companies, and communication and consciousness in the community. All these action lines would promote energy efficiency.

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## 4 Measures for achieving the targets

### 4.2.4 Information provisions (Articles 14(1), 14(2) and 14(4) of Directive 2009/28/EC)

In a similar way to previous chapter, this section is built on existing plans.

#### **a) Reference to existing national and or regional legislation (if any) concerning information requirements according to Article 14 of Directive 2009/28/EC.**

Information and public awareness are two key points when it comes to the promotion of renewable energy. One of the Strategic Purposes proposed in the Energy Efficiency Strategy Paper, SP-07, covers this kind of campaign.

So far, the existing legislation concerning information provision has been mentioned. In addition, new mechanisms will be studied during the development of the Turkish NEEAP.

#### **b) Responsible body/(ies) for dissemination of information at national/regional/local levels.**

According to the Energy Efficiency Strategy Paper, the responsible bodies/entities for the dissemination of information are ETKB, the public sector and General Directorate of Renewable Energy. In addition, collaboration with the private sector and NGOs will be required in order to come up with an effective information campaign.

#### **c) Summary of existing and planned activities at a regional/local level (where applicable).**

There are no concrete activities scheduled so far. Plans detailing communication and ways to develop awareness shall be conducted under the recommendations set by the two actions (SP-07/ST-04/A-01 and SP-07/ST-04/A-02) previously presented. The framework for this communication campaign shall be prepared within 12 months of the date of the publication of the paper and shall be applied within three years of that date, at most.

General Directorate of Renewable Energy should design a campaign with local and regional authorities to provide information on support measures to encourage the penetration of renewable energy (in particular, distributed generation based on renewable energy and renewable energy in buildings) to all relevant players, such as consumers, builders, installers, architects, and suppliers of heating, cooling and electricity equipment and systems and of vehicles compatible with the use of energy from renewable sources.

This information program should ensure that information on the net benefits, cost and energy efficiency of equipment and systems for the use of heating, cooling and electricity from renewable energy sources is made available either by the supplier of the equipment or system or by the General Directorate of Renewable Energy.

Regarding certification schemes or equivalent qualification schemes, information will be provided on the installation of small-scale biomass boilers and stoves, solar photovoltaic and solar thermal systems, shallow geothermal systems and heat pumps. Those schemes may take into account existing schemes and structures as appropriate, and shall be based on the criteria laid down.

#### **d) Please indicate how information is made available on supporting measures for using renewable energy sources in electricity, heating and cooling and in transport to all relevant actors (consumers, builders, installers, architects, suppliers of relevant equipment and vehicles). Who is responsible for the adequacy and the publishing of this information? Are there specific information resources for the different target groups, such as end consumers, builders, property managers, property agents, installers, architects, farmers, suppliers of equipment using renewable energy sources, public administration? Are there information campaigns or permanent information centres in the present, or planned in the future?**

The General Directorate of Renewable Energy is the main authority for collecting, analyzing and disseminating the information in the domain of energy efficiency and renewable energy. General Directorate of Renewable Energy's website is the ultimate source of information, open to the public, on the different groups of energy users. All relevant campaigns, regulations (including both incentives and obligations) and recommendations with case studies are available on the General Directorate of Renewable Energy's website.

Furthermore, all the primary and secondary regulations are available to the public through the Official Gazette, which is published both in print and on the web on a daily basis.

From 2008, which was the "Year of the Energy Efficiency", General Directorate of Renewable Energy initiated numerous public campaigns raising awareness in different sectors (Mrs. Energy; ENVER, and the like) and details about these campaigns are available on the web and on separate websites linked to General Directorate of Renewable Energy's main site.

The previous points of this chapter have detailed the specific measures proposed to carry out the information process within its specified dates.

## 4 Measures for achieving the targets

### e) Who is responsible for publishing information on the net benefits, costs and energy efficiency of equipment and systems using renewable energy sources for heating, cooling and electricity? (Supplier of the equipment or system, public body or someone else?)

In Turkey, the Ministry of Energy and Resources is the ultimate owner and entity responsible for disseminating all energy related information and manages this responsibility through one of its divisions specializing in Renewable Energy and Energy Efficiency, which is the General Directorate of Renewable Energy. Thus General Directorate of Renewable Energy, as mentioned in the above item, disseminates information on the internet which includes, but is not limited to, the benefits, costs and energy efficiency of equipment and systems using renewable energy sources for heating, cooling and electricity in a broad sense.

Some academic institutions which have departments specializing in energy efficiency (e.g. Istanbul Technical University, Laboratory for Energy Efficiency and Lighting), some NGOs such as the Chamber of Mechanical Engineers, the Association of Energy Efficiency (ENVER) are also important entities that publish well researched and thoroughly analyzed information specifically on the net benefits, costs and energy efficiency of equipment and systems using renewable energy sources for heating, cooling and electricity. It is expected with the growing emphasis on efficiency from the General Directorate of Renewable Energy, that collaboration from the private sector and NGOs will be further increased.

### f) How is guidance for planners and architects provided to help them to properly consider the optimal combination of renewable energy sources, high efficiency technologies and district heating and cooling when planning, designing, building and renovating industrial or residential areas? Who is responsible for that?

There is no one distinct entity responsible for this purpose: however, the Chamber of Mechanical Engineers has been taking various steps including organizing training events, raising awareness through diverse activities and has developed such things as reports, studies, information packets, surveys and the like. The Chamber of Architects and the Chamber of Civil Engineers are greatly interested in energy efficiency in buildings and have been involved in several training campaigns focusing on energy efficient design and implementation. Some architecture companies have certifications for energy efficient design (both for LEED and BREEAM).

Furthermore, the Government suggests that in the medium term the Turkish Renewable Energy Training and Education Plan should focus on improving professional technical skills in this field. One of the most important lines of action will be programs that develop professional expertise in energy efficiency and renewable energy

integration in buildings. The design of the program by the Ministry of National Education with the collaboration of the Ministry of the Environment and Urbanization and the Ministry of Energy and Natural Resources will be beneficial.

In addition, with contribution of some NGOs there are currently studies to adapt an environmental certificate system for buildings specific to the geographical, climatic, political, social and technological context of Turkey. The association is also working on the evaluation of the environmental impacts of buildings and their surroundings aiming for a green transformation of construction industry.

### g) Please describe the existing and planned information, awareness raising and training programs for citizens on the benefits and practicalities of developing and using energy from renewable sources. What is the role of regional and local actors in the designing and managing these programs?

Currently, "Mrs. Energy" and "ENVER" are the largest public campaigns intended to create public awareness in Turkey. Mrs. Energy was launched in 2013 and is designed to promote awareness of energy efficiency in the home along with training regarding the implementation of basic efficiency principles. ENVER, which was created in 2008, is intended to reach a wide range of different people and sectors within Turkey, including the industrial sector as well as public buildings. The leader in these campaigns is the Energy Efficiency Association, which was officially established through the involvement of General Directorate of Renewable Energy and is now led by the CEOs of some of the largest companies in Turkey.

#### 4.2.5 Certification of installers (Article 14(3) of Directive 2009/28/EC)

##### a) Reference to existing national and/or regional legislation (if any) concerning certification or equivalent qualification plans for installers according to Article 14(3) of the Directive 2009/28/EC.

Certification and qualification plans with regards to training are considered under Strategic Purpose 7 (SP-07) of the Energy Efficiency Strategy Paper. The overall objective of this ST is "to strengthen institutional capacities and collaborations, to increase the use of state of the art technology and awareness, to develop financial mechanisms with the exception of public financial institutions".

Training and certification programs would fall within the strengthening of institutional capacities category. SP-07/ST-01/A-02 is focused on strengthening collaborations among the main players: the Ministry of Energy and Natural Resources (ETKB), the General Directorate of Renewable Energy, the Turkish Union of Chambers and

## 4 Measures for achieving the targets

Commodity Exchanges (TOBB) and the General Directorate of Efficiency (VGM). In this collaborative framework, energy audits, trainings and incentive contests within the industry shall be addressed.

Under the same target, SP-07/ST-01/A-03 points out the need for training programs for the staff of construction supervisory companies and local authorities.

### **b) Responsible body/(ies) for setting up and authorizing certification/qualification schemes by 2012 for installers of small-scale biomass boilers and stoves, solar photovoltaic and solar thermal systems, shallow geothermal systems and heat pumps.**

There is no specific authorization however, generally the following parties relevant for the topic are Energy and Natural Resources (ETKB), the Ministry of Environment and Urbanization (ÇŞB), the General Directorate of Renewable Energy and the local authorities (YY).

Today, there is no distinction among the different systems (small-scale biomass boilers and stoves, solar photovoltaic and solar thermal systems, shallow geothermal systems and heat pumps) although this may change in the forthcoming period.

### **c) Are such certification schemes/qualifications already in place? If so, please describe.**

The General Directorate of Renewable Energy has authorized (and will authorize in the future) a number of Energy Service Companies (ESCOs) to engage in energy efficiency implementations, specialized in either or both industrial and residential energy efficiency (14). However, certification plans for small-scale biomass boilers and stoves, solar photovoltaic and solar thermal systems, shallow geothermal systems and heat pumps are not yet in place. The measures contained in the Energy Efficiency Strategy Paper are due to be enacted in the short/medium term. For the specific measures presented above: SP-07/ST-01/A-02, SP-07/ST-01/A-03 and SP-07/ST-02/A-01, the period shall be 12, 24 and 6 months respectively starting from the July 2, 2012.

### **d) Is information on these schemes publicly available? Are lists of certified or qualified installers published? If so, where? Are other schemes accepted as equivalent to the national/regional scheme?**

A list of residential and industrial ESCOs, authorized by General Directorate of Renewable Energy, regarding the relevant regulations are published on the General Directorate of Renewable Energy's website.

### **e) Summary of the existing and planned measures at regional/local levels (where relevant).**

There are various efforts going on with the participation of chamber of industry, academia, local municipalities, development agencies and NGOs in several cities.

## 4.2.6 Electricity infrastructure development

### **a) Reference to existing national legislation concerning requirements related to the energy grids (Article 16).**

In the medium term, it is advisable for TEİAŞ to update the grid codes to enable large renewable energy penetration according to security and energy reliability criteria. The following procedures, among others may be engaged: secondary and tertiary reserves, voltage control, curtailment, and control and monitoring of renewable energy facilities. TEİAŞ will update its technology to be able to control, monitor and manage a large grid penetration of wind and solar energy.

Additionally, the legal framework to develop distributed generation based on renewables, among others;

- Connection to the grid,
- Balancing in distributed systems (ancillary services, operation criteria, reverse power flows and active demand management, storage, curtailing and smart metering processes linked to the balancing (15))
- And signaling (data exchange with distribution generation and/or consumption, signals among sensors and metering).

It may be composed of the mentioned procedures. In addition, a revenue model for auto-consumption may be defined.

Finally, the Turkish Government may evaluate in the medium term and establish a coordination scheme for the DNOs which will enable connection of distributed generation considering reduction of losses and the economic benefits due to renewable energy (with regards to the mitigation of energy dependency).

### **b) How is it ensured that transmission and distribution grids will be developed with a view to integrating the targeted amount of renewable electricity while maintaining the secure operation of the electricity system? How is this requirement included in the transmission and distribution operators' periodical network planning?**

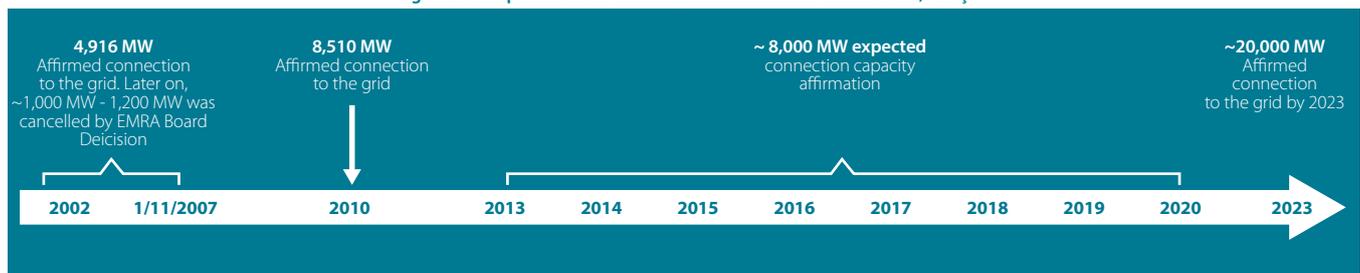
The development of transmission and distribution grids is ensured thanks to the update of the abovementioned procedures.

## 4 Measures for achieving the targets

Additionally, TEİAŞ has a commitment to update the transmission infrastructure for future needs. Figure 20 depicts the adaptation scheme. In medium term, TEİAŞ will elaborate the grid expansion plan for the period 2015-2020 taking into consideration the forecast penetration of renewable energy.

For the System Operator, an incentive scheme (revenue model) based on renewable energy penetration and the positive externalities derived from renewable energy will be designed.

Figure 20: Adaptation of the transmission infrastructure commitment, TEİAŞ



### c) What will be the role of intelligent networks, information technology tools and storage facilities? How will their development be ensured?

The penetration of renewable energy at the distribution level requires the implementation of new solutions based on intensive usage of information and telecommunication technologies. In order to encourage electricity distribution operators to facilitate renewable energy penetration, the Turkish Government will evaluate in the medium term the possibility of establishing incentives for the DNOs, which will enable connections to sources of distributed generation while also taking into consideration the reduction of losses and economic benefits (including mitigation of energy dependency).

Pumped-storage hydroelectricity research in Turkey was initially started by EIE in the year 2009. Japanese expertise was received for PSH systems in combination with wind energy generation. A projection of Turkey's peak energy demand was also included in the scope of the project.

Conceptual designs were created for the Gökçekaya and the Altınkaya HEPPs, rating 278 MW and 700 MW respectively, for possible PSH system implementation. Currently, there is a project in progress regarding the mitigation of the negative effects of wind energy generation on the grid with the utilization of PSH systems. It is located in the Yahyalı district of Kayseri. The project will consist of 4 MW PSH and 4x2.5 MW wind turbines.

Turkey indeed realizes the importance of large scale energy storage for a reliable grid. Even though studies are conducted by governmental organizations, Turkey offers tremendous benefits to investors to utilize the ample sources of hydropower.

### d) Is the reinforcement of the interconnection capacity with neighboring countries planned? If so, which interconnectors, for which capacity and by when?

Turkish authorities are aware of the need for interconnection reinforcement not only to increase renewable energy penetration, but also to guarantee security of supply, increasing at the same time the quality and the reliability of the supply.

In the Resources Strategic Plan (2010-2014), published by the Ministry of Energy and Natural Resources (5), the Strategic Theme-2 emphasized the need to establish Turkey's regional and global influence in the energy sector. The plan also stated that the Government has applied policies for contributing to the supply security of electricity and for supplying adequate energy without any interruption and at a high level of quality. Importance is also being given to interconnections with neighboring countries bilaterally and as multi-parties (i.e. regional).

Currently, the following international interconnections are in place and detailed in Figure 21.

Figure 21: Current international grid interconnections

Interconnection	Lines	Line Handling Capacity (MVA)
Turkey - Georgia	Hopa (Turkey) – Batum (Georgia), 220 kV – 954 MCM, Rail – 28 km	287
Turkey – Azerbaijan	Igdir (Turkey) – Babek (Nakhichevan), 154 kV – 2x477 MCM, Hawk – 180 km	2x132
Turkey - Armenia	Kars (Turkey) – Gumri (Armenia), 220 kV – 2x954 MCM, Cardinal – 80.7 km	574
Turkey – Iran	1. Dogubeyazit (Turkey) – Bazar-gan (Iran), 154 kV – 954 MCM, Cardinal – 40 km 2. Baçkale (Turkey) – Khoy (Iran), 400 kV – 3x954 MCM, Cardinal 124	204 581 (220 kV) 1,510 (400 kV)
Turkey – Iraq	PS3 (Turkey) – Zakho (Iraq), 400 kV – 2x954 MCM, Cardinal- 28 km (154 kV energized)	408
Turkey – Syria	Birecik HES (Turkey) – Aleppo (Syria), 400 kV – 2x954 MCM, Cardinal - 124 km	1,005
Turkey – Bulgaria	1. Hamitabat (Turkey) – Maritsa East (Bulgaria), 400 kV – 2x954 MCM, Rail – 133 km 2. Hamitabat (Turkey) – Maritsa East (Bulgaria), 400 kV 3x954 MCM, Cardinal – 145 km	995 1,510
Turkey – Greece	Babacski (Turkey) – Nea Santa (Greece), 400 kV – 3x954 MCM, Cardinal 130 km	1,510

## 4 Measures for achieving the targets

A series of system development plans are under evaluation for development in the medium term.

**Figure 22: Planned international grid interconnections to be developed in the short/medium term**

Interconnection	Lines
Turkey – Iran	600 MW back-to-back DC with a 400 kV is planned.
Turkey - Iraq	Construction for a 400 kV interconnection line from Cizre (Turkey) and Musul (Iraq) is on-going. Investments in this project are expected to be completed by 2013. According to feasibility studies, a 500 MW back-to-back DC link has been planned to be built.
Turkey – Syria	In order to increase the current transmission capacity of 400 kV between Birecik (Turkey) and Halep (Syria) a 600 MW back-to-back DC facility is planned.

### e) How is the acceleration of grid infrastructure authorization procedures addressed? What is the current state and average time for getting approval? How will it be improved? (Please refer to current status and legislation, bottlenecks detected and plans to streamline procedure with timeframe of implementation and expected results.)

All power plants above 1 MW apply to EPDK for licensing and EPDK sends the project details to TEİAŞ for its approval to gain grid access for those plants that want to connect to 154 kV or 380 kV. For connections on a middle voltage level, the regional distribution authority provides consent or denial. TEİAŞ checks the possible transformation center to which the plant would connect and checks the availability of capacity and sends its consent or denial back to EPDK. If the power plants get its license, the investor applies to TEİAŞ to sign a “System Use Agreement”. This procedure could take time and changes from project to project can be necessary.

Additionally, in order to avoid the main problem regarding the management of these procedures, the delays in the process, a maximum time scope should be established to the grid infrastructure authorization procedure, e.g. three months. On the other hand, to improve the quality of the service provided by the system operator to the promoters, a call center should be established to manage all the information regarding grid access of these facilities in a centralized way: this mechanism would facilitate the communication to the applicants and will reduce the interruptions in the technical assessments (avoid/reduce the need to contact the technician to acquire information about the applications state).

### f) How is horizontal coordination facilitated between different administrative bodies, responsible for the different parts of the permit?

The Research, Planning and Coordination Department of TEİAŞ plans the location, length and necessary investments for new transmission lines or a capacity increase in the existing lines. These studies are placed

in the relevant year’s investment plan and approved by the Ministry of Energy and Natural Resources and the Ministry of Development.

After the necessary approvals are complete, TEİAŞ conducts land use studies for the properties that are within the territories of the planned facilities. Permits are filed with the relevant departments of TEİAŞ including – allocation for non-agriculture use of land, permits for forested areas, removal of meadow feature, permits for protected areas, permits from the State Hydraulic Works, the City Health Directorates and the City Environmental Directorates, etc. – and after completion of the permits, expropriation procedures can begin. TEİAŞ lists the properties concerned and determines the value of the properties. If necessary, TEİAŞ may ask for the opinion of the related tax and deed offices and the local chamber of industry and trade. Generally, the judicial and the transfer process ends in two or three months, if the parties agree on the expropriation; however, the whole process of getting the approval from all relevant parties takes a considerable amount of time depending on the parties involved. All information flow is done through official letters, and this extends until the start of construction. Once the approvals are complete and the construction has started, construction work is conducted according to the plan.

The different parties involved in the process of granting permission are: TEİAŞ, the Ministry of Energy and Natural Resources, the Ministry of Development, the Ministry of Forestry and Hydraulic Works, the Ministry of the Environment and Urbanization, the Ministry of Finance, the State Hydraulic Works, the City Health Directorates, the City Environmental Directorates, the Chamber of Industry and Trade, the Judiciary, etc.

In order to improve horizontal coordination between the different bodies in charge of granting the permit, a one-stop-shop approach would be ideal. It would have a two-fold objective: one is to facilitate the communication between the different administrative bodies involved, the other to simplify the administrative burden on the applicant side. A call center should be established to manage all the information in a centralized way: this mechanism would facilitate the communication between the applicants and the different organizations; with only one contact point (in just one call/visit to a site) the applicant could consult the state of all the requirements linked to the application (or manage them).

## 4 Measures for achieving the targets

### g) Are priority connection rights or reserved connection capacities provided for new installations producing electricity from renewable energy sources?

According to the Law on the Utilization of Renewable Energy Resources for the Purpose of Generating Electrical Energy, when EPDK evaluates license applications, renewable resource based generation facilities shall be prioritized in connection to the grid.

However, the same Law states that until December 31, 2013, 600 MW at most of solar power plants can be connected to the system. After this date, the capacity at which solar generation facilities can be connected shall be announced by the Ministry of Energy and Natural Resources every year.

Similar to solar based generation facilities, wind power plants cannot be connected to the system randomly. The Ministry determines the maximum capacity that can be connected to the grid and announces that capacity periodically. In regards to the capacity announced – for both solar and wind – if there are more applications requesting connection, a competition (tender) shall be conducted in order to determine the generators that will be connected to the grid.

In practice, there are connection capacities reserved for new installations producing electricity from wind and solar.

In 2007, there were a total of 751 wind power plant applications to EPDK rated at 78,000 MW and TEİAŞ was asked for connection rights, as well as restrictions of these wind turbines. TEİAŞ projected a peak demand of 48,000 MW for 2013 and has allocated 12,000 MW for the connection of wind power plants.

Additional Transformer Substations (TS) with 380 kV were planned to be built in areas where wind potential was high, and the number of applications received was also high. The following TS are included in the Investment Program and capacities have been announced for these regions:

- Izmir Havza TS in Izmir.
- Can Havza TS and Gelibolu Havza in Canakkale.
- Vize Havza TS in Kırklareli.
- Catalca Havza in Istanbul.

For wind power plant applications that were not in the areas of TS, applications were evaluated as single applications and were provided 2,000 MW of capacity. For wind power plant applications that applied for the same TS region, they were evaluated as multiple-applications, which resulted in a competition for connection of the wind power plants. There were a total of 13 competitions regarding wind applications resulting in a total allocation of 5,500 MW. 596 companies took part in this competi-

tion for 87 connection points. 147 companies that had proposed the highest price per kWh were awarded system connection rights.

After the completion of the competitions, a contribution fee was signed between TEİAŞ and the winners. Connection agreements were made for companies that acquired their licenses from EPDK.

A 5% restriction of Short Circuit for connecting wind turbines into the connection point was removed in January, 2013 with the amendment of the Regulation Regarding Supply Security and Quality for Electricity Transmission.

TEİAŞ announced a total of 600 MW capacity that can be connected to the grid by December 31, 2013. Applications for solar power plants were received by EPDK between the June 10 and 14, 2013. In case of land/regional crossings between the applicants for solar power plants, TEİAŞ will organize competitions compatible with the Electricity Market Law for solar power and capacities will be allocated.

### h) Are any renewable installations ready to come online but not connected due to capacity limitations of the grid? If so, what steps are taken to resolve this and by when is it expected to be solved?

Currently, there does not exist any installation ready to come online, which has not been connected due to capacity limitations of the grid.

The procedure to access to the grid depends on the renewable energy technology:

- Regarding the procedures in wind and solar, the licensing is based on tender procedures.
- The rest of technologies can apply directly to the system operator for access to the grid.

The criteria to allocate capacity depend on the limits of connectable capacity to the available transformers, and the application of the grid codes with reference to the following topics: overload of the circuits, voltage control (over/under voltage), frequency control and application of N-1 criteria.

## 4 Measures for achieving the targets

**i) Are the rules on cost sharing and bearing of grid technical adaptations set up and published by transmission and distribution system operators? If so, where? How is it ensured that these rules are based on objective, transparent and non-discriminatory criteria? Are there special rules for producers located in peripheral regions and regions with low population density?**<sup>16</sup>

The legal and regulatory rules that have been defined for the transmission network have established, in general terms, that the internal development of the network is supported by tariffs paid by consumers. TEİAŞ is responsible for building the transmission infrastructure and for those cases where TEİAŞ is unable to build the transmission line from the power plant to the transformer in a timely manner, the power plant investor may build the line and deduct it from the system usage and system operation fees which are payable to TEİAŞ for the first 10 years after commissioning. Payback is on a monthly basis. The payback amount is calculated by TEİAŞ based on a fixed methodology. The rules are those published by TEİAŞ in the form of announcements and secondary regulations and are available on the TEİAŞ website in detail.

In case the investor did not have the total cost of the transmission line covered in the first 10 years through these deductions, TEİAŞ pays the remaining portion of the investment in one cash payment at the end of the 10 years.

The level of system use is actually announced by TEİAŞ, but escalation within the Consumer Price Index is used for forecasting future values. The Electricity Market Law Provisional Article 14: For plants commissioned until December 31, 2015, a 50% discount on the system usage fee is applicable. Although the date is announced as 2015, this can be further postponed by policymakers. The date is now extended until 2020.

**j) Please describe how the costs of connection and technical adaptation are attributed to producers and/or transmission and/or distribution system operators? How are transmission and distribution system operators able to recover these investment costs? Is any modification of these costs bearing rules planned in the future? What changes do you envisage and what results are expected?**

The transmission and distribution system operators are responsible for reinforcing and expanding the electricity network, and supporting the resulting costs. These costs are integrated into the network tariffs and are paid for by the customers.

16. Cost bearing rules define which part of the costs is covered by the generator wishing to be connected and which part by the transmission or distribution system operator. Cost sharing rules define how the necessary cost should be distributed between subsequently connected producers that all benefit from the same reinforcements or new lines.

In turn, electricity producers are responsible for connecting their production plant to the electricity network and are only responsible for the costs associated with building this link.

The operator of the transmission network recovers its investments by means of the network tariff, in the same way as in the case of any other investment that it makes in the network it operates.

However, if it is necessary to reinforce the grid infrastructure, this can be done by the grid operator or the renewable energy investor. In the first case, the grid operator recovers the investment with the tariff, while in the second case the investor develops the infrastructure; the investment is recovered in 10 years through system use and the operation fee as described in the above section.

**k) How will it be ensured that transmission and distribution system operators provide new producers wishing to be connected with the necessary information on costs, a precise timetable for processing their requests and an indicative timetable for their grid connection?**

Regulations regarding license applications for solar and wind energy and their connection to the grid have been prepared and published in the Official Gazette.

On one hand, before connecting the facilities to grids meetings are held between the grid operator and the investor: they discuss the grid capacity, the costs and the timeframe for connection to the grid.

On the other hand, to encourage the penetration of a distributed generation based on renewables in distribution grids, the Turkish Government will evaluate, in the medium term, the establishment of an economic incentive for the DNOs based on the level of renewable energy within its grid. The economic incentive should be established according to the benefits of this integration: reduction of losses, economic benefits due to renewable energy and mitigation energy dependency, etc.

### 4.2.7 Electricity network operation (Article 16(2) and Article 16(7) and (8) of Directive 2009/28/EC)

**a) How is the transmission and distribution of electricity from renewable energy sources guaranteed by transmission and distribution system operators? Is priority or guaranteed access ensured?**

The Law on the Utilization of Renewable Energy Resources for the Purpose of Generating Electrical Energy (Law No: 5346) (7) establishes that the distribution companies holding retail licenses are obligated to purchase the excess electricity generated by the unlicensed renewable energy generators via relevant feed-in tariff prices. Referring to item 4.2.6, (c) renewable power plants have priority access to the grid by Law.

## 4 Measures for achieving the targets

### **b) How is it ensured that transmission system operators, when dispatching electricity generating installations give priority to those using renewable energy sources?**

The Law on the Utilization of Renewable Energy Resources for the Purpose of Generating Electrical Energy (Law No: 5346) clearly establishes this priority.

Further, TEİAŞ has been appointed to update its technology to be able to control, monitor and manage a large grid penetration of wind and solar energy.

Due to the large scale penetration of renewable energies with high levels of volatility that can produce problems of reliability and security in the electricity system, in the medium term a curtailment procedure for renewable energy will be established to avoid legal uncertainty.

### **c) How are grid- and market-related operational measures taken in order to minimize the curtailment of electricity from renewable energy sources? What kinds of measures are planned and when is implementation expected?**

Grid operation procedures will be updated to enable large renewable energy penetration, including: secondary and tertiary reserves, voltage control, curtailment, and control and monitoring of renewable energy facilities. Additionally, curtailment procedures will be defined for the distribution grid to enable the penetration of distributed generation, and guarantee the security and reliability of the system.

TEİAŞ will implement technology solutions to monitor and manage large renewable energy penetration in the grid.

Finally, an increase of international interconnections to export excess production and to improve the reliability of the system will take place in the short/medium term.

### **d) Is the energy regulatory authority informed about these measures? Does it have the competence to monitor and enforce implementation of these measures?**

In Turkey, EPDK, as the regulatory authority, is fully informed on the plans, actions, measures and possible implications of the measures both planned and in progress in the domain of energy. EPDK has the authority to monitor and to execute the applications for the aforementioned measures.

### **e) Are plants generating electricity from renewable energy sources integrated in the electricity market? Could you please describe how? What are their obligations regarding participation in the electricity market?**

Plants generating electricity from renewable energy sources are integrated in the electricity market which is operated under PMUM (Market Financial Settlement

Center) in TEİAŞ. PMUM is soon to be restructured under a different corporate entity, EPIAŞ, that is in the preparation phase while this report is being submitted. Generating plants are able to be involved in the bilateral agreements with eligible consumers or wholesalers and also benefit from the feed-in tariff mechanism.

### **f) What are the rules for charging transmission and distribution tariffs to generators of electricity from renewable energy sources?**

The end user pays the distribution tariff and the generator bears the transmission cost, payable to TEİAŞ.

### **4.2.8 Biogas integration into the natural gas network (Article 16(7) and Article 16(9) and (10) of Directive 2009/28/EC)**

### **g) How is it ensured that the charging of transmission and distribution tariffs does not discriminate against gas from renewable energy sources?**

At the moment there is no such mechanism.

### **h) Has any assessment been carried out on the need to extend the gas grid infrastructure to facilitate the integration of gas from renewable sources? What is the result? If not, will there be such an assessment?**

At the moment there is no such assessment.

### **i) Are technical rules on grid connection and connection tariffs for biogas published? Where are these rules published?**

At the moment there are no such rules.

### **4.2.9 District heating and cooling infrastructure development (Article 16(11) of Directive 2009/28/EC)**

### **a) Please provide an assessment of the need for new district heating and cooling infrastructure using renewable energy sources and contributing to the 2023 target. Based on this assessment, are there plans to promote such infrastructure in the future? What are the expected contributions of large biomass, solar and geothermal facilities in the district heating and cooling systems?**

At the moment, there are no planned short term efforts for new district heating and cooling infrastructure using renewable energy sources.

However, geothermal and biomass resources have the potential of being used in district heating and cooling (the proven geothermal capacity is 31,500 MWt).

## 4 Measures for achieving the targets

### 4.2.10 Biofuels and other bioliquids – sustainability criteria and verification of compliance 21 of Directive 2009/28/EC.

#### a) How will the sustainability criteria for biofuels and bioliquids be implemented at the national level?

In terms of the sustainability of biofuels, the first concern is the availability of sufficient crops for food before generation of biofuels, and thus, these criteria will be implemented through a gradual introduction of biofuels into the fuel mix without compromising the food requirements of the country. This sustainability concern has just led the government to revise the biodiesel obligation as the Ministry of Food, Agriculture and Livestock warning and the Ministry of Energy and Resources on the problem of insufficient and unsustainable local crops that are to be used for biodiesel generation rather than for use as food for the respective year.

A set of obligations for biofuel and bioethanol has already been established in order to guarantee this progressive integration. The plan is detailed in the next point (4.2.10.b) of this chapter.

#### b) How will it be ensured that biofuels and bioliquids that are counted towards the national renewable target, towards the national renewable energy obligations and/or are eligible for financial support comply with the sustainability criteria set down in Article 17(2) to (5) of Directive 2009/28/EC?

The fulfillment of the sustainability criteria has been taken into account by the Energy Market Regulatory Authority. The decision of this authority was published in the Official Gazette on September, 27, 2011.

The obligation for biodiesel content in diesel fuels that is produced from domestic agricultural products for road fuel supplied to the market is mandated to be at least 1% as of January 1, 2014, 2% as of January 1, 2015, and 3% as of January 1, 2016. However, this obligation has been cancelled after a communiqué published by EPDK in the Official Gazette (No.28688) on June 25, 2013. EPDK by its mandate is fully involved in keeping track and providing opinions on these developments.

The obligation for bioethanol content in gasoline that is produced from domestic agricultural products for road fuel (petroleum) supplied to the market is mandated to be at least 2% as of January 1, 2013, and 3% as of January 1, 2014.

In the case of bioliquids, no measures have been established so far.

#### c) If a national authority/body will monitor the fulfillment of the criteria, does such a national authority/body already exist? If so, please specify. If not, when is it envisaged to be established?

The national authority in charge of monitoring the fulfillment of the criteria is the Energy Market Regulatory Authority and it already exists. Furthermore, as the ultimate authority with the data, information and knowledge on the availability of crops and the food requirements of the country, the Ministry of Food, Agriculture and Livestock is involved in the process by providing input with regards to the viability of energy policies on crop based energy generation.

#### d) Please provide information on the existence of national law on land zoning and national land register for verifying compliance with Article 17(3) to (5) of Directive 2009/28/EC. How can economic operators have access to this information? (Please provide information on the existence of rules and distinction between different land statuses, like biodiversity area, protected area, etc.; and on the competent national authority responsible who will monitor this land register and changes in land status.)

The table below (point 4.2.10.e) shows the different legislation related to biodiversity and protected areas.

#### e) As far as protected areas are concerned, please provide information under which national, European or international protection regimen they are classified.

Figure 23: Legislation and national authority

Legislation	Law/Decree/Regulation	National Authority
<b>Forest Law, No: 6831</b>	Law No. 6831, 31 August 1956 (Amended by Laws: 3302 (1986), 3373 (1987), 2896 (1983), 3493 (1988), 4999 (18 November 2003) and "Law Amending some provisions of Forest Law No. 6831" (02 July 2004))	General Directorate of Forestry
<b>National Parks Law, No: 2873</b>	Law No. 2873, 09 August 1983 (Amended by Law No. 5400 (14 July 2005)). Revised text in Law No. 5919 on National Parks. (17 August 2011)	Ministry of Forestry and Water Management, General Directorate of Nature Conservation and National Parks
<b>Pasture Law, No: 4342</b>	Law No: 4342, 25 February 1998; (amended by "Law Amending the Law on Pastures No. 4342." (27 May 2004) and by "Law Amending the Law on Soil Preservation and Land Utilization and the Law on Pastures" (26 March 2008))	Ministry of Food, Agriculture and Livestock
<b>Terrestrial Hunting Law, No: 4915</b>	Law No. 4915, (01 July 2003)	Ministry of Forestry and Water Management, Central Hunting Commission
<b>Environmental Law, No: 2872</b>	Law No. 2872, 11 August 1983 (amended by Law No. 5491 (26 April 2006))	Ministry of Environment and Urban Planning
<b>Coastal Law, No: 3621</b>	Law No. 3621 of April 4, 1990 amended by Law No. 3830 Amending the Coastal Law No. 3621 of 1990. 01/07/1992	Ministry of Environment and Urban Planning

## 4 Measures for achieving the targets

Legislation	Law/Decree/Regulation	National Authority
<b>Soil Protection and Land Use Law, No: 5403</b>	Law No. 5403 of July 3, 2005 on Soil Preservation and Land Utilization (5403-03.07.2005). Official Journal No. 25890 of 19 July 2005, amended by the Law Amending the Law on Soil Preservation and Land Utilization and the Law on Pastures of 26 March 2008, published in Official Journal No. 5751, 26 March 2008.	Ministry of Food, Agriculture and Livestock
<b>Ramsar Convention</b>	Ramsar Convention The convention (came into force – was enacted by the Ministry verdict 94/5434 and the decision was declared on 05.17.1994 with Official Journal No. 21937.	Ministry of Forestry and Water Management
<b>Decree on Specially Protected Areas</b>	Updated version was published on 4 <sup>th</sup> of April 2014 in Official Gazette No. 28962.	Ministry of Forestry and Water Management, Special Environmental Protection Agency
<b>Law for the Protection of Cultural and Natural Assets</b>	Law No. 2863 of July 21, 1983 on the Conservation of Cultural and Natural Property (as last amended by Law No. 5835 of February 4, 2009 and Law No. 5917 of June 25, 2009) (23.07.1983, Official Gazette 18113)	Ministry of Culture and Tourism
<b>Regulation on Wetland Protection</b>	17.05.2005, Official Gazette, 25818	National Wetlands Committee
<b>Regulation Concerning the Protection and Use of Agricultural Land</b>	13.06.2003, Official Gazette 25577	Ministry of Food, Agriculture and Livestock
<b>Aquatic Products Law</b>	Law No. 1380 on Aquatic Products (04-04-1971, Official Gazette 13799) (amended by Laws No. 3288 of 28-05-1986, Official Gazette 19120 and No. 4950 of 22-07-2003)	Ministry of Food Agriculture and Livestock
<b>National Biodiversity Strategy and Action Plan</b>	Was published on 2007. ISBN: 978-605-393-030-3	Ministry of Environment and Forestry

### f) What is the procedure for changing the status of land? Who monitors and reports at the national level on land status changes? How often are land zoning registers updated (monthly, annually, bi-annually, etc.)?

In Turkey, for land that is within the borders of a municipality, the municipality has the right and responsibility of changing the land status through 5-year resettlement plans. For the others, the Ministry of Environment and Urbanization, and the General Directorate of Spatial Planning are in charge.

The Municipality, the General Directorate of Land Registry and Cadaster and the provincial section of the Ministry of Environment and Urbanization keep the records on the status of land.

### g) How is compliance with good agro-environmental practices and other cross-compliance requirements (required by Article 17(6) of Directive 2009/28/EC) ensured and verified at national level?

Dedicated non-food lignocellulosic energy crops, such as short rotation willow or miscanthus, grown on surplus agricultural land could provide additional feedstock for bioenergy production. Competing land use requirements for the food and livestock sector as well as land use conversion from agriculture to other uses determines the availability of agricultural land for energy crop production. Food demand in Turkey is expected to expand in the coming decades as a result of population growth and economic development.

However, 30% of agricultural land in Turkey is currently not used and it can be assumed that by 2020 one million hectares of degraded forests in Turkey can be used for lignocellulosic energy crop plantings with yields of 5 tonnes/ha. It would provide 2 Mtoe of bioenergy from the agricultural sector.

### h) Do you intend to help develop voluntary 'certification' plan(s) for biofuel and bioliquid sustainability as described in the second subparagraph of Article 18(4) of Directive 2009/28/EC? If so, how?

Currently, there is no voluntary certification plan for biofuel and bioliquid sustainability.

## 4.3 Plans to support and promote the use of energy from renewable resources in electricity applied by Turkey

This section collects information from existing documents and plans regarding the use of energy from renewable resources in electricity. The National Energy Efficiency Action Plan (NEEAP) is meant to play an important role in the near future since energy transformation, transmission, distribution, and demand response issues will be covered.

### Legislation

#### a) What is the legal basis for this obligation/target?

The Law on the Utilization of Renewable Energy Resources for the Purpose of Generating Electrical Energy (Law No: 5346) (7) established an incentive plan for the promotion of renewable energy in Turkey, this plan was modified by the Law Amending the Utilization of Renewable Energy Resources in Electricity Generation (Law No: 6094) (8). The incentive is established in USD, and the licensees can only benefit from these tariffs during the first 10 years beginning on the date of operation and for facilities that are commissioned before the December 31, 2020.

## 4 Measures for achieving the targets

The Council of Ministers will determine the feed-in tariffs applicable to generation plants starting operation after the December 31, 2020 but such tariffs cannot exceed the rates already introduced by the Law.

Each year, the investor can choose between this feed-in tariff plan and direct sales in the power market. In addition, an incentive to promote the use of local equipment has been established to promote the development of national industry.

The current feed-in tariff plan ends in 2020, therefore, an update of the plan would be needed. The new plan would take into consideration the following issues:

- Wind energy has a very challenging target<sup>17</sup>, which would be difficult to meet without taking necessary precautionary actions. There are many obstacles and the most critical ones include the following: Investors have difficulty in accessing financial support, as most financial providers take the feed-in tariff as the reference price for electricity (however, the forecasted market price is higher than this feed-in tariff) and the forecasted project cash flow (based on feed-in tariffs) are not attractive enough for financial providers and guarantees are required creating a barrier for new generation facilities. The feasibility studies for the diversification of Feed-In-Tariff options depending on the geography and investment scale can be considered. Additionally, as described below a gradual Feed-In-Tariff can be applied in order to achieve the targeted installed capacity.

- Solar energy also has a significant target for 2023, 5,000 MW should be installed by the end of 2023 (currently, the penetration of solar technologies is only marginal). However, due to the evolution of solar PV technology, the investment cost has dropped during recent years. Therefore, together with the high availability of solar irradiation in Turkey, it would not be necessary to incentivize in the medium term to promote solar PV technology. Therefore, rather than the financial aspects, the main barrier to developing solar PV technologies in Turkey is linked to the 600 MW limitation introduced in Renewable Energy Law (No. 5346).

- Biomass energy has a low penetration rate in the country and its development depends on the current feed-in tariff in the medium term as well as the availability of raw materials, which depend on the type of technology.

- The current feed-in tariff plan established for hydro-power and geothermal energy is appropriate for the feasibility of these investments.

The Government is evaluating the possibility to link the feed-in tariff to the necessary time to fulfill the targets (and the level of difficulty). The framework could be developed according to the following scheme:

1. A level of a renewable energy technology penetration target is established for a yearly period.

During this time, there would be a fixed feed-in tariff scheme (USD/MWh).

2. If the penetration target were fulfilled before the end of the period, a lower feed-in tariff scheme would be applied for the rest of the period and the next period.

3. If the penetration target were not fulfilled before the end of the period, an equal or higher feed-in tariff scheme would be applied for the rest of the period and the next period.

The incentive would be adapted dynamically to the level of renewable energy penetration: this mechanism would allow identifying the technologies that require less (or do not need) incentives.

### b) Are there any technology-specific targets?

According to the Security of Supply Strategy Paper, the Strategic Plan of the ETKB and other policy declarations made by the Minister of Energy and Resources, the targets to promote the use of energy from renewable resources in electricity by 2023 are:

- Hydro: 34,000 MW
- Wind: 20,000 MW
- Geothermal<sup>18</sup>: 1,000 MW
- Solar: 5,000 MW
- Biomass: 1,000 MW

17. For wind energy, it would be necessary to develop approximately 16 GW between December 2014 and the end of 2023.

18. Considering the actual developments in geothermal energy, it is expected that the geothermal installed capacity might surpass 1,000 MW.

## 4 Measures for achieving the targets

### C) What are the concrete obligations/targets per year (per technology)?

Figure 24: Renewable energies for electricity generation: concrete obligations/targets per year (per technology) from 2013-2023<sup>19</sup>

	Base year		2013		2014		2015		2016		2017	
	MW	GWh	MW	GWh	MW	GWh	MW	GWh	MW	GWh	MW	GWh
<b>Hydropower:</b>	19,620	57,837	22,289	59,420	23,908	64,359	25,526	68,767	27,145	73,175	28,763	77,584
<b>Geothermal energy:</b>	162	849	310	1,364	338	1,724	412	2,099	485	2,474	559	2,849
<b>Solar energy:</b>	-	-	-	-	40	64	300	480	800	1,280	1,800	2,880
photovoltaics	-	-	-	-	40	64	300	480	800	1,280	1,800	2,880
concentrated solar energy	-	-	-	-	-	-	-	-	-	-	-	-
<b>Tides, waves, other ocean energy:</b>	-	-	-	-	-	-	-	-	-	-	-	-
<b>Wind energy:</b>	2,261	5,970	2,759	7,494	3,759	9,398	5,660	14,151	7,604	19,010	9,549	23,873
land-based	2,261	5,970	2,759	7,494	3,759	9,398	5,660	14,151	7,604	19,010	9,549	23,873
offshore	-	-	-	-	-	-	-	-	-	-	-	-
<b>Biomass:</b>	159	721	224	1,171	300	1,367	377	1,719	453	2,071	530	2,422
<b>Overall:</b>	22,202	65,377	25,582	69,449	28,345	76,911	32,275	87,215	36,487	98,010	41,201	109,608

	2018		2019		2020		2021		2022		2023	
	MW	GWh	MW	GWh	MW	GWh	MW	GWh	MW	GWh	MW	GWh
<b>Hydropower:</b>	30,382	81,992	32,000	86,400	32,500	87,750	33,000	89,100	33,500	90,450	34,000	91,800
<b>Geothermal energy:</b>	632	3,224	706	3,599	779	3,975	853	4,350	926	4,725	1,000	5,100
<b>Solar energy:</b>	2,400	3,840	3,000	4,800	3,600	5,760	4,000	6,400	4,400	7,040	5,000	8,000
photovoltaics	2,400	3,840	3,000	4,800	3,600	5,760	4,000	6,400	4,400	7,040	5,000	8,000
concentrated solar energy	-	-	-	-	-	-	-	-	-	-	-	-
<b>Tides, waves, other ocean energy:</b>	-	-	-	-	-	-	-	-	-	-	-	-
<b>Wind energy:</b>	11,458	28,644	13,308	33,270	15,090	37,725	16,800	41,999	18,436	46,089	20,000	50,000
land-based	11,458	28,644	13,308	33,270	15,090	37,725	16,800	41,999	18,436	46,089	20,000	50,000
offshore	-	-	-	-	-	-	-	-	-	-	-	-
<b>Biomass:</b>	606	2,774	683	3,126	759	3,477	836	3,829	912	4,181	1,000	4,533
<b>Overall:</b>	45,478	120,474	49,697	131,196	52,729	138,687	55,488	145,678	58,174	152,485	61,000	159,433

19. National Renewable Energy Plan includes renewable and non-renewable hydro plants. It should be noted that according to the Renewable Energy Law, only power plants with less than 15 km<sup>2</sup> of reservoir area and the river-type hydroelectric power plants are considered as renewable energy resources. Both types of hydro units are included in the national plan according to the Directive 2009/28/EC.

## 4 Measures for achieving the targets

### d) Who has to fulfill the obligation?

Fulfilling the obligations is a commitment of the Government of Turkey, and specifically, it is by the under-signature of the Ministry of Energy and Natural Resources.

### e) What is the consequence of non-fulfillment?

Consequences for the non-fulfillment of the renewable targets fall under several aspects, the most important of these are as follows:

1. Negative impact on the Turkish Current Account Balance: Regarding the higher dependence on imported energy sources (fossil fuels), the majority of which are imported at a considerable cost.
2. Negative impact in terms of energy dependency: The risk exposure of the Turkish economy to the volatility of fossil fuel prices will be higher and there will be higher risk exposure to the fossil fuel supply chain.
3. Negative impact on domestic industry and the economy: The large scale penetration of renewable energies according to current commitments will contribute to the industrial development of the country. It will be necessary to provide equipment, components and services to develop new infrastructure, most of these supplies will come from local providers.
4. Negative impact in opportunity cost terms: This means, the high availability of renewable energy resources in Turkey: wind, solar irradiation, geothermal capacity and hydro will be wasted when more expensive (not only in capital expenditures, but also regarding environmental and other macroeconomic impact) approaches are selected to solve the energy supply problem.
5. Negative environmental impact: The utilization of local and renewable sources creates less environmental hazard (waste, CO<sub>2</sub>, etc.) and with less renewable contribution in the national generation mix, the environmental impact will be higher per MWh of energy generated.

### f) Is there any mechanism to supervise fulfillment?

The General Directorate of Renewable Energy will monitor the development of the National Renewable Energy Plan.

The Plan will be evaluated at regular intervals through progress reports. It contains sector descriptions of developments, recommendations for appropriate adjustments, corrections and cost of recovery among the different renewable energy technologies. The progress report will be followed by an update of the Plan.

### g) Is there any mechanism to modify obligations/targets?

The Ministry of Energy and Natural Resources can update the targets. Target adjustments are made in the context of the Plan's revisions, mentioned in the previous point, f.

### Specific questions for feed-in fixed tariffs

The current feed-in tariff scheme is established in the Law Amending the Law on the Utilization of Renewable Energy Resources in Electricity Generation (Law No: 6094). The feed-in tariff scheme has been introduced for the sale of electricity by generation facilities based on renewable energy resources according to following characteristics:

- It establishes a fixed price per kWh produced by renewable energy units (see the Figure 25). Every renewable technology, wind energy, solar, hydropower, biomass and geothermal, has its own level of feed-in tariff. The feed-in tariff is complemented with a bonus plan for power plants that utilize locally produced equipment (which fulfills current regulation on this point).
- Engaging in the feed-in tariff mechanism is not mandatory for the renewable energy power plants, rather, it is optional. Each year, until the October 31, the investor can apply to EPDK to engage in the feed-in tariff mechanism for the next calendar year. It is left to the preference of the investor, whether to sell the generation through a bilateral agreement, to the day-ahead market or to engage in the feed-in tariff mechanism.
- Licensees can only benefit from these tariffs during the first 10 years from its opening date of operation. While the feed-in tariff is valid for the first 10 years following commissioning, the local equipment bonus plan is available to the investor for the first 5 years.
- The current feed-in tariff time scope applies to facilities that start their operations before the December 31, 2020.
- The new incentive was established in US Dollars (US Dollar cent/kWh), and is not subject to change or any kind of escalation.

The Council of Ministers will determine the sale tariffs applicable to generation plants starting operations after December 31, 2020, but such tariffs cannot exceed the rates defined above.

## 4 Measures for achieving the targets

As result of the abovementioned framework, the following Renewable Energy Resources Support Mechanism was published on November 1, 2011:

Figure 25: Feed-in tariff in Turkey for Renewable Energy

Feed-in-tariff in Turkey for Renewable Energy	
Technology	Incentive (USD cent/kWh)
Wind energy	7.3
Solar	13.3
Hydro	7.3
Biomass	13.3
Geothermal	10.5

### a) What are the conditions to get the fixed tariff?

The conditions to get the fixed tariff in Turkey are included in Article 6 of the Law No: 5346 (7) and amended by Law No: 6094 (8) in which the legal entities holding licenses to generate electricity from the renewable energy resources under the scope of this Law are subject to the following principles of implementation:

*“Those wishing to be subjected to the RES Support Mechanism in the next calendar year are obliged to obtain RES Certificates and apply to the EPDK (Energy Market Regulatory Authority) until the October 31.*

*Time periods projected in the RES Support Mechanism shall commence as from the date of commissioning for those facilities under operation, and as from the date they will be commissioned for those facilities that are not yet under operating. Those subject to the RES Support Mechanism cannot leave the practice in the year they are included in the practice.*

*A list of those subject to the RES Support Mechanism and information on the commissioning dates, annual electrical energy production capacities and annual production programs of their facilities shall be published by the EPDK (Energy Market Regulatory Authority) until the 30<sup>th</sup> of every November, based on the types of resources.*

*The MFRC (Market Financial Reconciliation Center) shall announce the RES total amount for each invoice period and determine the payment obligation rate of each supplier. During the determination of the payment obligation rate, the amount of electrical energy produced from the Renewable Energy Resources within the scope of this Law and sold in the market without being subject to the RES Support Mechanism are not included in calculations within the scope herein. The amount that each supplier supplying the consumers with electrical energy is obliged to pay is calculated and invoiced to the supplier in question and the collections made are paid pro rata to the entities that are subject to the RES Support Mechanism. Principles and procedures concerning applications covered herein including the MFRC (Market Financial*

*Reconciliation Center) shall be regulated with a regulation to be issued by the EPDK (Energy Market Regulatory Authority).*

*The annual production amount to be affixed on the licenses of facilities producing electrical energy from Renewable Energy Resources is the maximum annual amount that such facilities can produce with their existing installed capacity with their resources. And the licenses available on the date this article becomes valid shall be corrected in line with this within three months upon application of concerned parties.*

*Entities generating electrical energy from Renewable Energy Resources within the scope hereof and not intending to be subjected to the provisions of this article are allowed to make sales in the market within the scope of their licenses.”*

### b) Is there a cap on the total volume of electricity produced per year or of installed capacity that is entitled to the tariff?

Yes, TEİAŞ according to the provisional Article 17 of the Electricity Market License Regulation and in the scope of Article 23 of the Electricity Market Law (No.6446) will announce connection capacities for solar and wind energy depending on the connection point and/or for the five years following 2014 and the next ten years.

For solar energy, a specific limitation exists: The total installed capacities of production facilities based on RES Certified solar power to be connected until 31/12/2013 may not be over 600 MW.

For wind energy capacity, TEİAŞ announced 3,000 MW limit for the years between 2014 and 2018.

For the rest of the technologies, there is no cap on the total volume of electricity produced per year or of installed capacity that is entitled to the tariff.

## 4 Measures for achieving the targets

### c) Is it a technology specific scheme? What are the tariff levels for each?

There are specific feed-in tariffs for hydro, wind, solar, biomass and geothermal energy as detailed in Figure 26.

### d) Are there other criteria differentiating tariffs?

There are differing prices for hydro, wind, solar, biomass and geothermal energy when the facilities are built using components manufactured domestically. The following tables detail the specific bonus for each technology.

Figure 26: Incentive scheme for renewable energies to produce electricity

Feed-in-tariff and Local Equipment Bonus for Wind Power	
Locally manufactured component	Bonus (USD cent/kWh)
Wind energy	7.3
Blade	0.8
Generator and power electronics	1.0
Turbine tower	0.6
All mechanical equipment in rotor and nacelle (excluding blade group, generator, and power electronics)	1.3

Feed-in-tariff and Local Equipment Bonus for Solar PV	
Locally manufactured component	Bonus (USD cent/kWh)
Solar PV	13.3
PV panel integration and production	0.8
PV Modules	1.3
PV Module Cells	3.5
Inverter	0.6
Material which focuses radiation on PV Module	0.5

Feed-in-tariff and Local Equipment Bonus Prices for Solar CSP	
Locally manufactured component	Bonus (USD cent/kWh)
Solar CSP	13.3
Radiation collector tube	2.4
Reflective surface	0.6
Sun tracking system	0.6
Mechanical components of heat energy storage system	1.3
Mechanical components of heat energy storage system	2.4
Stirling engine	1.3
Panel integration and production of structural solar mechanics	0.6

Feed-in-tariff and Local Equipment Bonus for Hydro Power	
Locally manufactured component	Bonus (USD cent/kWh)
Hydro Power	7.3
Turbine	1.3
Generator and power electronics	1.0

Feed-in-tariff and Local Equipment Bonus Prices for Biomass	
Locally manufactured component	Bonus (USD cent/kWh)
Biomass	13.3
Steam boiler with fluid bed	0.8
Liquid or gas fired steam boiler	0.4
Gasification or gas removal group	0.6
Steam or gas turbine	2
Internal combustion or stirling engine	0.9
Generator and power electronics	0.5
Cogeneration system	0.4

Feed-in-tariff and Local Equipment Bonus for Geothermal	
Locally manufactured component	Bonus (USD cent/kWh)
Geothermal	10.5
Steam or gas turbines	1.3
Generator and power electronics	0.7
Steam injector or vacuum compressor	0.7

### e) For how long is the fixed tariff guaranteed?

As indicated in the above items, the fixed tariff is valid for 10 years from the date of the power plant's commissioning. Law No: 6094 (8) specifies:

*"Time periods stipulated in the RES Support Mechanism shall commence for facilities under operation from their date of commission and for facilities not yet operating from their date of commission. Those subject to the RES Support Mechanism shall not leave the practice in the year they are included in the practice."*

*A list of those subject to the RES Support Mechanism and information regarding commissioning dates, annual electrical energy production capacities and annual production programs of their facilities shall be published by EPDK (Energy Market Regulatory Authority) until the predefined deadline each year, based on the types of resources."*

### f) Is there any tariff adjustment foreseen in the scheme?

The sale tariffs applicable to generation plants starting operation after the December 31, 2020 will be defined before the end of 2020.

## 4 Measures for achieving the targets

### Specific questions on financial support to renewable energy projects

Financial providers require guarantees from renewable energy investors and in some cases are reluctant to support projects, e.g. exploration in geothermal energy. Due to this reason, the current penetration of geothermal energy and the target for 2023 (1,000 MW) is very low in light of the potential within the country. In order to overcome this barrier in the short term, the Turkish Government is collaborating with the financial sector, and international financial institutions focused on economic development, and will analyze the possibility of enabling mechanisms to mitigate capital risk, in order to support geothermal exploration and drilling activities.

However, renewable energy investors (both large units and unlicensed facilities) have problems in accessing financial support and guarantees that are required by financial providers. In a similar fashion, the Turkish Government is collaborating with the financial sector, and international financial institutions for economic development and will analyze the possibility of enabling mechanisms to provide financial guarantees for renewable energy projects.

### 4.4 Plans to support and promote the use of energy from renewable resources in heating and cooling applied by Turkey

The Energy Efficiency Strategy Paper (2012-2023) is a supporting document outlining how the country will achieve energy targets and facilitate the necessary changes in energy efficiency laws (4). The questions included in this chapter are answered based mainly on this document. Although, in a near future, the new NEEAP will play an important role in the promotion of renewable energy in heating and cooling. The report will include, among others, a comprehensive assessment of the potential for the application of high-efficiency cogeneration and efficient district heating and cooling.

#### a) How are the support plans for electricity from renewable energy sources adapted to encourage the use of CHP from renewable energy sources?

Currently, there is no support plan for electricity from renewable energy sources adapted to encourage the use of CHP. Nevertheless, one of the purposes of the Energy Efficiency Strategy Paper (SP-02) is to define the measures that are proposed to decrease energy demand and CO<sub>2</sub> emissions of buildings, promoting at the same time the use of renewable energy sources. Specific actions are also defined to encourage the use of CHP from renewable energy sources.

#### b) What support plans are in place to encourage the use of district heating and cooling using renewable energy sources?

Currently, there is no support plan in place to encourage the use of district heating and cooling using renewable energy sources. However, under Strategic Purpose 02 (SP-02) of the Energy Efficiency Strategy Paper (2012-2023), "To decrease energy demand and carbon emissions of the buildings; to promote sustainable environmentally friendly buildings using renewable energy sources".

#### c) What support plans are in place to encourage the use of small-scale heating and cooling from renewable energy sources?

Currently, there are no specific support plans in place to encourage the use of small-scale heating and cooling from renewable energy sources. Nevertheless, according to regulatory framework small-scale heating and cooling do not fall under the renewable energy category.

Regarding finance facility, the use of small-scale heating and cooling from renewable energy sources falls within the category of small-scale renewable energy projects. This is one of the credit lines supported by two institutions in order to promote sustainable energy.

First, the European Bank for Reconstruction and Development (EBRD) launched the Turkey Sustainable Energy Financing Facility (TurSEFF) on the July 14, 2010, with a USD 200 million credit line that is available for households and private enterprises. Apart from EBRD, in March of 2011, the Agence Française de Développement (AFD) launched the Climate Turkey Program. This program provides Halkbank (Türkiye Halk Bankası) with a €100 million credit line in order for the bank to be able to support small and medium enterprises through investment loans. Out of the €100 million granted by AFD to Halkbank, €60 million will support energy efficiency improvements in enterprises and €40 million will finance small-scale renewable energy production units.

## 4 Measures for achieving the targets

### d) What support schemes are in place to encourage the use of heating and cooling from renewable energy sources in industrial applications?

Under Strategic Purpose 01 (SP-01) of the Energy Efficiency Strategy Paper (2012-2023), "To reduce energy intensity and energy losses in the industrial and services sectors", a Strategic Target (ST) is defined with the goal of decreasing energy intensities at a rate determined in collaboration with the sector. The SP has one ST, ST-01, with 4 actions, which are due to be applied within 12 months of the date of the publication of the document.

### b) Are there any technology-specific targets?

The targets for 2023 only include 606.2 ktoe of geothermal solutions. There are no specific numerical targets for solar, biomass or heat pumps.

### c) What are the concrete obligations/targets per year (per technology)?

Figure 27: Heating and cooling: concrete obligations/targets per year (per technology) 2013-2023 following the methodology established in the Directive 2009/28/EC on the Promotion of the Use of Energy from Renewable Sources

(ktoe)	Base year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Geothermal (except in low-temperature geothermal heat pump applications)	329	344	358	372	386	400	414	428	443	457	471	485
Solar energy:	630	644	659	673	687	702	716	730	745	759	773	788
Tides, waves, other ocean energy:	-	-	-	-	-	-	-	-	-	-	-	-
Biomass:	3,537	3,537	3,537	3,537	3,537	3,537	3,537	3,537	3,537	3,537	3,537	3,537
solid	3,537	3,537	3,537	3,537	3,537	3,537	3,537	3,537	3,537	3,537	3,537	3,537
biogas	-	-	-	-	-	-	-	-	-	-	-	-
bioliquids (1)	-	-	-	-	-	-	-	-	-	-	-	-
Renewable energy through heat pumps:	1,657	1,729	1,800	1,871	1,942	2,013	2,084	2,155	2,226	2,297	2,369	2,440
- aerothermal	-	-	-	-	-	-	-	-	-	-	-	-
- geothermal	1,657	1,729	1,800	1,871	1,942	2,013	2,084	2,155	2,226	2,297	2,369	2,440
- hydrothermal	-	-	-	-	-	-	-	-	-	-	-	-
Overall:	6,154	6,254	6,353	6,453	6,553	6,652	6,752	6,851	6,951	7,050	7,150	7,249

SP-01/ST-01/A-01 and SP-01/ST-01/A-03 deal with energy audits in certain industries every 4 years in order to test the application of the plans and measures in place. Therefore, if heating and cooling measures were promoted in Turkey, these audits would be able to check the scope of their fulfillment.

SP-01/ST-01/A-02 establishes the need to obtain an Energy Management System Standard, ISO 50001, in the industrial and services sectors. On the other hand, SP-01/ST-01/A-04 promotes the development of studies to provide additional support mechanisms to increase energy efficiency. Heating and cooling systems fall within this category too.

## Legislation

### a) What is the legal basis for this obligation/target?

The legal basis for the use of energy from renewable resources in heating and cooling will be set by the Strategic Purposes, Targets and Actions mentioned above. These measures are not in place yet, but the changes shall be made in the framework of the legislation and enactment of these measures is due to take place soon. The period varies according to the actions. The range is from 12 to 36 months from the publication of the Energy Efficiency Strategy Paper on the July 2, 2012.

### d) Who has to fulfill the obligation?

The Turkish Government has committed to establishing partial objectives for national agencies. Specifically, heating and cooling targets shall be under the auspices of General Directorate of Renewable Energy.

## 4 Measures for achieving the targets

### e) What is the consequence of non-fulfillment?

There are several downsides to non-fulfillment of these targets (or perhaps a more realistic way to phrase this in Turkey's case would be not acting in a way to promote the already developing use of renewables in heating and cooling), among which the most critical are:

1. Negative impact in the Turkish Current Account Balance: Low utilization of renewable energy for heating and cooling would call for increased use of fossil fuels and thus, imported energy sources, which in return cause an increase in the deficit in the current account balance.
2. Negative impact in terms of energy dependency: Similar to the above item, there is the risk of exposure to the fossil fuel supply and fossil fuel price volatility.
3. Negative impact in economic terms: Less contribution to economic development due to less activity in developing these facilities and installing solutions/equipment.
4. Opportunity cost: Available renewable energy resources in Turkey including solar irradiation, geothermal capacity and biomass would be wasted.
5. Environmental risks: Low utilization of renewable energy for heating and cooling would call for increased use of fossil fuels, which have an adverse impact on the environment, in terms of waste, emissions, etc.

### f) Is there any mechanism to supervise fulfillment?

See 4.3.f for details.

### g) Is there any mechanism to modify obligations/targets?

See 4.3.g for details.

## Financial support

### a) What is the name and a short description of the plan?

"Projects such as "Efficiency Improvement Projects" and "Voluntary Agreements" will also apply to and support the use of energy from renewable sources in heating and cooling in Turkey. This topic was arranged in the Regulation Regarding Increasing Efficiency in the Use of Energy Resources and Energy Consumption (Published in Official Gazette No. 28097 on 27.10.211). Apart from aforementioned plan, an additional plan for this specific field does not exist.

"Facilities which use electricity generation systems from renewable energy or cogeneration/micro-cogeneration system that have a cycle efficiency of at least eighty percent and above which supply the energy need of the industrial business and is located at most within the ten kilometers of the business" is supported.

According to this: Within two years of the signing of the Efficiency Improvement contract and after the industrial business informs General Directorate of Renewable Energy, the General Directorate or an authorized legal delegate will evaluate the industrial business within the scope of the communicate's procedures and principles within sixty days of the notification date. Within the scope of the aforementioned statement, the suitability of the project is controlled. Necessary measurement defined within the scope of the communicate published by the General Directorate of Renewable Energy will be utilized to measure if the expected saving were obtained or not. Performance report which contains information about the performance, certified public accountant approved bills, measurements and calculations of the industrial business should be prepared and presented to General Directorate of Renewable Energy. If the required conditions for the site evaluation are not met, then the business cannot be supported.

Additionally, within the scope of the same regulation two incentives are available regarding "Voluntary Agreements";

Legal entities that make voluntary agreements with the General Directorate of Renewable Energy and fulfill their commitment regarding the industrial business agreement, General Directorate of Renewable Energy will meet the 20% of the energy expenses if the Directorate has enough grants and will pay up to two hundred thousand Turkish Liras. The arithmetic average of the difference between each year compared to the reference energy intensity year is taken as the principle value in order to calculate the reduction ratio. At the same time, if the energy intensity reduction committed is less than the committed value in the end year of the agreement, it has to be less than the reference energy intensity.

In the case of the following activities are to be performed by the industrial business within the agreement period, the annual total energy consumption will be deducted as well as energy intensity calculation just for one year; converting waste to heat and electricity through modern combustible systems, locally manufactured cogeneration systems that have a cycle efficiency greater than eighty percent or generation of electricity through hydro, wind, geothermal, solar and biomass resources. Cogeneration facilities that can prove that more than seventy percent of the cost is fulfilled by local manufacturing through certified public accountant are considered to be locally manufactured. The payment plan for the end of the voluntary agreement period is decided by the General Directorate depending on its allowances. The priority is offered for the support payments of previous years, and for the current year the payment is processed as the ratio of the allowance to the support amount. Therefore, there will not be any demands for rights or interest if deferred payments occur."

## 4 Measures for achieving the targets

### b) What are the measures taken to ensure availability of necessary budget/funding to achieve the national target?

There has not been any measure defined within this scope.

### c) Does support differ according to technology?

The "Projects for Increasing Energy Efficiency" and "Volunteer Contracts" do not distinguish according to technology.

### d) What is the expected impact in terms of energy production?

The proposed financial plans would aim to promote new eligible heat generation projects from renewable energy in order to help Turkey meet its target, which is a 20% reduction of energy intensity by 2023 compared to the values for 2011.

### e) Is support conditional on meeting energy efficiency criteria?

The supports are structured according to energy efficiency criteria.

### f) Is it an existing measure? Could you please indicate national legislation regulating it?

The mentioned measures are defined in the energy efficiency legislation.

- Energy Efficiency Law (No. 5627 published in Official Gazette No.26510 on May 2, 2007)
- Regulation Regarding Increasing Efficiency in Using Energy Resources and Energy Usage (Published in Official Gazette No. 28097 on October 27, 2011)
- Small and Medium Size Enterprises Development and Support Administration (KOSGEB) Support Regulation (Published in Official Gazette No. 27612 on June 15, 2010).

### g) Are there maximum or minimum sizes of system which are eligible?

There are no limitations for the system sizes.

## 4.5 Plans to support and promote the use of energy from renewable resources in transport applied by Turkey

Questions below are answered based on current and future plans already agreed by the Turkish Government. Nevertheless, the future NEEAP is also concerned with other end use energy efficiency measures including in industry and transport. Thus, this chapter is subjected to future updates in accordance with the measures proposed in the NEEAP.

### a) What are the concrete obligations/targets per year (per fuel or technology)?

In order to fulfill European directives, at least 10% renewable energy is to be used in the transportation sector. The Turkish Government has established a set of obligations for biofuel use per year. The objectives have been defined for the different biofuels: biodiesel and bioethanol, as described in section 4.2.

In the case of biodiesel fuel, the Energy Market Regulatory Authority Board Decision states the obligation for biodiesel fuel (No. 28607) published in the Official Gazette on the September 27, 2011. Biodiesel content (produced from domestic agricultural products) for road fuel supplied to the market has been mandated to be at least 1% as of the January 1, 2014, 2% as of the January 1, 2015, and 3% as of the January 1, 2016, but these targets have been cancelled after a communiqué published by EPDK in the Official Gazette (No.28688) on June 25, 2013.

For bioethanol fuel, the obligation was published by the same organization on the September 27, 2011 in the Official Gazette (No. 28607). Bioethanol content (produced from domestic agricultural products) for road fuel (petroleum) supplied to the market has been mandated to be at least 2% as of the January 1, 2013, and 3% as of the January 1, 2014, and these obligations are still valid despite the deferral for biodiesel.

### b) Is there differentiation of the support according to fuel types or technologies? Is there any specific support to biofuels which meet the criteria of Article 21(2) of the Directive?

In Turkey, in regards to biofuels, there is no differentiation in the support in reference to the tax exemption plans established. Both types of biofuels, biodiesel and bioethanol, are subjected to the same tax exemption plan. 2% of biodiesel/bioethanol produced from domestic raw material, that is blended with diesel fuel/petrol is exempt from the special consumption tax (ÖTV, in the Turkish acronym).

This measure responds to Strategical Purpose (SP) 5 and Strategical Target (ST) 2, SP-05/ST-02, of the Energy Efficiency Strategy Paper 2012 – 2023. One of the actions presented in the document proposes a tax reduction to promote the use of biofuels obtained from biomass sources or synthetic fuels in transportation.

## 4 Measures for achieving the targets

### Legislation

#### a) What is the legal basis for this target?

The obligation was referred in the legislation published by the Energy Market Regulatory Authority in the Official Gazette the September 27, 2011 and numbered 28067 on "Amendment on Technical Regulation Communiqué on Diesel Types.

#### b) Are there any technology-specific targets?

The targets apply to fuels for road transportation. There are currently no specific targets for other carriers. The Directive 2009/28/EC sets a 10% share of renewable energy specifically in the transportation sector. According to the biofuel obligations presented above, the specific targets set by Turkey are:

Biodiesel content that is produced from domestic agricultural products the targets set below were deferred in light of concerns regarding sustainability that were put forth in June 2013:

- 1% as of the January 1, 2014
- 2% as of the January 1, 2015
- 3% as of the January 1, 2016.

Bioethanol content that is produced from domestic agricultural products:

- 2% as of the January 1, 2013
- 3% as of the January 1, 2014.

#### c) What are the concrete obligations/targets per year (per technology)?

Figure 28: Transportation: concrete estimations/targets per year (per technology), 2013-2023 (Base Year 2012)<sup>20</sup>

(ktoe)	Base year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Bioethanol/ETBE	18	127	195	272	352	440	529	623	723	830	857	886
Biodiesel:	9	33	57	81	105	218	338	522	718	988	1,148	1,319
Hydrogen from renewable energy sources:	-	-	-	-	-	-	-	-	-	-	-	-
Electricity from renewable energy sources	10	11	12	13	14	16	17	18	19	19	20	20
of which in road transport	3	3	3	3	3	4	4	4	4	4	4	4
of which not in road transport	7	8	9	10	11	12	13	14	15	15	16	17
Other (biogas, BTL, vegetable oils, lower limit)	-	-	-	-	-	-	-	-	-	-	-	-
Other (biogas, BTL, vegetable oils, ceiling):	-	-	-	-	-	-	-	-	-	-	-	-
Total (lower limit)	37	171	264	366	471	674	883	1,163	1,459	1,837	2,025	2,226
Total (upper limit)	37	171	264	366	471	674	883	1,163	1,459	1,837	2,025	2,226

20. Production estimations are calculated according to the Directive and related legislative frameworks. Currently there is not a yearly production expectation for biodiesel however there might be developments depending on a new legislative framework.

## 4 Measures for achieving the targets

### d) Who has to fulfill the obligation?

Biofuel obligations, similar to other obligations in the domain of energy efficiency and renewable energy, are a commitment of the Government of Turkey.

In order to fulfill the target, partial objectives are established for retail petrol companies in charge of supplying fuel(s) to the market.

### e) What is the consequence of non-fulfillment?

Failing to fulfill the targets in biofuels, or in general, failing to take action to promote biofuels is expected to cause some problems, among which the most important ones are:

1. Negative impact on the Turkish Current Account Balance: More use of biofuels would in turn lessen the volume and thus, cost of energy input, which is basically supplied by imported fossil fuels.
2. Negative impact in terms of energy dependency: Risk exposure to fossil fuel supply and fossil fuel price volatility.
3. Negative impact in economic terms: Less contribution in economic development due to less activity in developing these facilities and installing solutions/equipment.
4. Wasting the high level of availability of renewable energy resources in Turkey, including solar irradiation, geothermal capacity and biomass.
5. More pollution.

### f) Is there any mechanism to supervise fulfillment?

See 4.3.f for details.

### g) Is there any mechanism to modify obligations/targets?

See 4.3.g for details.

### Financial support

At the moment, financial support to promote the use of energy from renewable resources in transportation is mainly supported through a tax exemption plan. It has already been introduced, so that hereinafter the answers to the questions of this section will be given in light of this plan.

### a) What is the name and a short description of the plan?

As mentioned before, the amendment of the obligation was published by the Energy Market Regulatory Authority in the Official Gazette (No.28607) on the September 27, 2011.

### b) Is it a voluntary or obligatory plan?

It is a mandatory plan that retail petrol companies have to include biofuels in the final product according to the established percentages.

### c) Who manages the plan? (Implementing body, monitoring authority)

The targets were established by the Energy Market Regulatory Authority.

### d) What are the measures taken to ensure availability of necessary budget/funding to achieve the national target?

The tax exemption plan will achieve the targets without budget/funding needs, since it is basically a reduction of tax revenue.

### e) How is long-term security and reliability addressed by the plan?

The current plan should be extended since it only covers the short and medium term. New targets/obligations should be set from 2016 and 2014 onward for biodiesel and bioethanol, respectively.

### f) Does support differ according to technology?

In the case of biodiesel, the Energy Market Regulatory Authority decision (No. 28067) published the obligation for biodiesel in the Official Gazette on the September 27, 2011. Biodiesel content that is produced from domestic agricultural products for road fuel supplied to the market has been mandated to be at least 1% as of the January 1, 2014, 2% as of the January 1, 2015, and 3% as of the January 1, 2016. This obligation (Official Gazette 28688) is deferred with another regulation published in June 2013.

For bioethanol, the obligation was published (Official Gazette 28067) by the same organization on the September 27, 2011. Bioethanol content that is produced from domestic agricultural products for road fuel (petroleum) supplied to the market has been mandated to be at least 2% as of the January 1, 2013, and 3% as of the January 1, 2014.

However, both biofuels are subjected to the same tax exemption plan. 2% of biodiesel/bioethanol produced from domestic raw material, that is blended with diesel fuel/petrol is exempt from the special consumption tax (ÖTV, in the Turkish acronym).

### g) What are the expected impacts in terms of energy production?

The expected impact is the reduction in the consumption of diesel and gasoline in Turkey due to their substitution by biodiesel and bioethanol (this substitution will mitigate the dependency on petrol). The level of substitution will depend on the mandatory yearly target.

### h) Is support conditional on meeting energy efficiency criteria?

At the moment, the support is not conditional.

## 4 Measures for achieving the targets

### i) Is it an existing measure? Could you please indicate national legislation regulating it?

The measure already exists. Rather than a regulation, the issue is handled through EPDK Board decisions.

The obligation was added as a clause to the first paragraph of the second article of the "Technical Regulation Communiqué on Diesel Types (Liquid Fuel serial no: 15)" published in the Official Gazette dated the August 7, 2009 and numbered 27312. This amendment was published by the Energy Market Regulatory Authority in the Official Gazette on the September 27, 2011 and numbered 28067.

### j) Are there maximum or minimum sizes of systems which are eligible?

For the mandatory use of biofuel, there are two yearly minimum mandatory usage rates, one for biodiesel and the other for bioethanol.

In reference to the tax exemption, there is no maximum or minimum system size for eligibility. The total amount of fuel subjected to tax exemption has not been regulated.

### k) Is it possible for the same project to be supported by more than one support measure? Which measures can be cumulated?

Support mechanisms are not mutually exclusive.

### l) Are there regional/local schemes? If so, please detail using the same criteria.

The plan is applicable at national level only.

## 4.6 Specific measures for the promotion of the use of energy from biomass

### 4.6.1 Biomass supply

Table 7: Biomass supply (m<sup>3</sup> as FM<sup>21</sup>/tFM/Oil or ktoe)

Sector of origin	Domestic resources	Imports		Imports	Net	Primary energy production (ktoe)	
		EU	Non-EU				
A) Biomass From forestry	Of which						
	1. direct supply of wood biomass from forests and other wooded land for energy generation (thousand m <sup>3</sup> )	4,258	166		-	4,424	761
	2. indirect supply of wood biomass for energy generation				-		
B) Biomass From agriculture and fisheries: (% year 2009)	Of which						
	1. biodegradable fraction of industrial solid wastes, (biodegradable garden and park waste, food and kitchen waste from households, restaurants, canteens and retailers, comparable waste from food processing plants), and landfill gas including organic waste	-	-	-	-	4,682	
	2. biodegradable fraction of industrial waste (including paper, cardboard, pallets)	-	-	-	-		
C) Biomass From waste: (year 2011)	Of which						
	1. biodegradable fraction of industrial solid wastes, including organic waste (biodegradable garden and park waste, food and kitchen waste from households, restaurants, canteens and retailers, comparable waste from food processing plants), and landfill gas	25,277	-	-	-	25,277	75
	2. biodegradable fraction of industrial waste (including paper, cardboard, pallets)		-	-	-		
	3. Sewage sludge	-	-	-	-	-	

21. Fresh matter.

## 4 Measures for achieving the targets

Table 7a: Estimated biomass domestic supply for the electricity and heating and cooling sectors in 2018 (other EU = 2015) and 2023 (other EU = 2020) (m<sup>3</sup> as FM/tFM/Oil or thousand toe)

Sector of origin		Year 2018		Year 2023	
		Expected amount of domestic resource	Primary energy production (ktoe)	Expected amount of domestic resource	Primary energy production (ktoe)
A) Biomass from forestry:	1. direct supply of wood biomass from forests and other wooded land for energy generation	1.57	268.00	3.92	670.00
	2. indirect supply of wood biomass for energy generation				
B) Biomass From agriculture and fisheries:	1. biodegradable fraction of industrial solid wastes, including organic waste (biodegradable garden and park waste, food and kitchen waste from households, restaurants, canteens and retailers, comparable waste from food processing plants), and landfill gas	-	860.00	-	2,150.00
	2. biodegradable fraction of industrial waste (including paper, cardboard, pallets)				
C) Biomass From waste:	1. biodegradable fraction of industrial solid wastes, including organic waste (biodegradable garden and park waste, food and kitchen waste from households, restaurants, canteens and retailers, comparable waste from food processing plants), and landfill gas	-	2.31	-	4.62
	2. biodegradable fraction of industrial waste (including paper, cardboard, pallets)				
	3. Sewage sludge	-	0.01	-	0.02

### 4.6.2 Measures to increase biomass availability, taking into account other biomass users (agriculture and forest-based sectors)

#### Mobilization of new biomass sources

##### a) Please specify how much land is degraded

The total growing stock is quoted as 1.37 billion m<sup>3</sup>. Forests have experienced consistent growth since the 1970s. However, the contribution of degraded forest has remained constant at around 82.2 million m<sup>3</sup> (6% of the total figure). The total forest area amounted to 21,389,783 ha in 2009. Half of the forest area is either degraded or severely degraded, which is mainly a result of severe forest fires. For example, during the last decade between 2,800 ha (in 2005) and 29,700 ha (in 2008) of forest has been destroyed by fire.

Degraded and abandoned forests may be used for lignocellulosic energy crop production. Energy crop plantings on degraded areas usually can only achieve lower yields compared to their potential when growth is on fertile farmland. Especially in the first 3 to 5 years, when plantings are established, yields are between 5 and 7 tonnes dry biomass per hectare. When plantings are mature and well managed, yields may increase to 10-15 tonnes/ha.

According to recent studies (16), by 2020 one million hectares of degraded forest in Turkey can be used for lignocellulosic energy crop plantings and can achieve yields of 5 tonnes/ha. This would provide an additional 2 Mtoe of bioenergy from the agricultural sector. Furthermore, biomass energy can also serve as a mechanism to finance the rehabilitation of degraded lands.

##### b) Please specify how much unused arable land there is.

The total utilized agricultural area of Turkey in 2009 was about 38.9 million ha, where 24.3 million ha was used as arable land or land containing permanent crops. In general, agriculture is on a very small scale in Turkey. The largest agricultural player is state-owned TİGEM. In total TİGEM has 370,000 ha of land, out of which 200,000 (54.05%) is arable land and the rest marginal grassland, 170,000 (45.95%).

##### c) Are any measures planned to encourage unused arable land, degraded land, etc. to be used for energy purposes?

As it has already been stated, 34% of the agricultural land in Turkey is currently not used and by 2020, one million ha of degraded forests will be available for lignocellulosic energy crop plantings with yields of 5 tonnes/ha. This would provide an additional 2 Mtoe of bioenergy from the agricultural sector.

## 4 Measures for achieving the targets

Today, forest management activities are predominantly focused on forest rehabilitation, afforestation and erosion control. Some 28% of forests have been replanted during the past decades; 2 million ha afforested and 1.5 million ha rehabilitated. Additionally, 620,000 ha of energy wood plantings have been established on forest land since 1978.

It is well known that biomass energy can also serve as a mechanism to finance the rehabilitation of degraded lands. In spite of this, there are no measures planned to encourage unused arable land and degraded land to be used for energy purposes. However, neither is there any legal restriction for converting arable land to grow lignocellulosic energy feedstock, such as short rotation forestry.

### **d) Is energy use of certain already available primary material (such as animal manure) planned for energy?**

Experience and use of biomass for heat and electricity in rural areas is limited to traditional uses at the household level (direct burning of firewood, crop residues and dried manure). Large scale introduction of modern bioenergy technologies will entail structural changes in Turkey's agricultural sector.

Regarding animal manure, a low use factor of 20% of cattle manure has been assumed to be exploitable for biogas production, suggesting an annual bioenergy potential of 0.58 Mtoe. The poultry industry's waste is even more concentrated, this property facilitates the use of manure for biogas production. The total potential is estimated at 0.3 Mtoe making the total potential from livestock manure 0.9 Mtoe.

Currently, there are some projects still not released publicly and two projects that have been announced for producing energy (biogas) from manure are in the pipeline. The Efeler Dairy farm, one of the largest dairy breeding farms in Turkey has 2,600 head of dairy cattle. There are plans to use the biogas output from the farm for heating, hot water production and treatment of liquid fertilizers. The Sütaş group has a daily milk processing capacity of 1,200 tonnes in the Karacabey factory and 1,300 tonnes in the Aksaray facility. The company is invested in biogas production and the 2.2 MW scale biogas facility was commissioned in 2013.

### **e) Is there any specific policy promoting the production and use of biogas? What type of uses are promoted (local, district heating, biogas grid, natural gas grid integration)?**

In the case of biogas from waste, waste law implements EU directives and regular waste deposits are in line with EU law. It aims to reduce the amount of biodegradables by 30% in 50 years. Biogas from waste is often used in small captive industrial process, and therefore, does not benefit from FIT. In the Turkish case, the seven commercial licensed players are eligible for FIT, which contributes to the development of this technology.

In terms of landfill gas, its use is restricted within the limits of available technology. It seems that it is unlikely that modern, stricter requirements and standards for the operation of landfills will be implemented in the near future, which should encourage investments in this technology, however this fact has not led to a significant increase in the use of landfill gas so far.

Regarding biogas from livestock manure, its rapid development was mainly driven by favorable feed-in tariffs for electricity. Farmers of smaller scale biogas plants mainly earn money (13.3 USD cent/kWh) with the production of electricity. Therefore, feed-in tariff plans can be seen as a policy for the promotion of the production and use of biogas.

### **f) What measures are planned to improve forest management techniques in order to maximize the extraction of biomass from the forest in a sustainable way? How will forest management be improved in order to increase future growth? What measures are planned to maximize the extraction of existing biomass that can already be put into practice?**

The General Directorate of Forestry (GDF) is currently promoting the use of forest residues for energy purposes. Currently forest residues are mostly disposed of by stacking and burning in order to reduce forest maintenance costs, however, there is still room for improvement in that regard.

Turkey is mountainous and forestry infrastructure is in poor condition, as a result transportation costs climb easily. This is one of the main issues that should be addressed in order to maximize the extraction of biomass from forests and increase future growth. The overall demand for forest roads was estimated at about 210,000 km in 2009, of which an approximate two-thirds (2/3) have been constructed. Regulations on the transportation of forest products in Turkey and the criteria used in the calculation of costs are regulated in Governmental Decree No: 288 (published on the January 5, 1996).

To ensure that biomass extraction from forests is performed in a sustainable way, all forestry measures (thinning, cuttings) have to be carried out in compliance with the forest management plans prepared by the General Directorate of Forestry (GDF). These plans are prepared according to Forest Management Regulation, which has been regulated since the February 5, 2007. Forestry, including pruning and thinning of forests, is regulated in Government Decree No. 298 "Silvicultural Fundamentals and Principles to be Applied in our Forests" published on the November 1, 2006.

The easiest way to prove sustainability is the use of verified woodland. There are currently two Forest Management Certificates covering 94,662 ha and 103 Chain-of-Custody Certificates in Turkey (FSC, 2012). All certificates are granted

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## 4 Measures for achieving the targets

by the Forest Stewardship Council (FSC). Other certification plans, such as the Program for the Endorsement of Forest Certification (PEFC), are not yet operational.

Apart from the feed-in tariffs (FIT) plan, there exists a set of incentives within the Renewable Energy Law No: 5346 framework. Among them, the most closely related to forestry is the one that allows the use of national parks and protected areas through the necessary permits.

### Impact on other sectors

**a) How will the impact of energy use of biomass on other sectors based on agriculture and forestry be monitored? What is the impact? (If possible, please provide information also on quantitative effects.) Is the monitoring of the impact planned in the future?**

There is growing concern about competing land use: food, livestock and conversion from agriculture to other uses, such as for energy crops. The population is worried about the risk of trading food against fuel.

Future domestic food and feed area requirements are the result of developments in food demand (population and dietary changes) combined with changes in production intensity (crop yields and intensity in livestock production) and trade in agricultural products. As a result, food demand in Turkey is expected to expand in the coming decades.

With respect to forestry, this industry could find a market for biomass that was previously left as residue and sawmills could achieve higher incomes from sawdust, bark, etc. For instance, most pruning residues are either left on ground after they have been shredded or destroyed in the case of parasite problems. The economics of pruning collection and environmental considerations suggest that about 25% are potentially usable for modern bioenergy production resulting in 0.2 Mtoe/a<sup>22</sup> bioenergy potential.

At the same time, an increase in demand on the part of bioenergy could lead to competition over pulpwood and thereby, contribute to increased prices even on biomass that would be used for industrial purposes (e.g. raw materials for the forestry industry).

**b) What kind of development is expected in other sectors based on agriculture and forestry that could have an impact on the energy use? (e.g. could improve efficiency/productivity increase or decrease the amount of by-products available for energy use?)**

First, by-products and residue not currently used by industry could lead to additional income for companies within both the agriculture and forestry industries.

Productivity increase would also increase the amount of residue, impacting the raw material used for energy purposes. However, efficiency improvements in the utilization of raw materials could lead to lower by-product levels. For example, sawmills with better machinery, thinner blades or optimized cut layout, result in lower residue: sawdust, wood chips and waste wood. The optimization of processes often leads to a decreased consumption of raw materials for the main product and therefore, to the reduction of by-products.

### 4.7 Planned use of statistical transfers between Turkey and Member States and planned participation in joint projects with other countries

There is no planned use of statistical transfers between Turkey and Member States nor planned participation in joint projects with other countries, however these participations and collaborations may be in the agenda for near future.

For the moment, Turkey does not expect to use any renewable energy from abroad to meet the objectives established. Therefore, no negotiations with other Member States or other countries have started as of today. Nevertheless, Turkey is interested in ensuring flexible cooperation mechanisms among countries, which might lead to further development of renewable energies. As a result, the participation of working groups on flexible cooperation mechanisms should be promoted.

Regarding national procedures to be established for arranging a statistical transfer or joint project, Turkey will publish guidelines on the use of flexible mechanisms for cooperation. These guidelines will comply with the European Directive and be in line with the mechanism and processes agreed in the working groups.

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22. Source: EBRD

# 5 ASSESSMENTS



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## 5 Assessments

### 5.1 Total expected contribution by each renewable energy technology to meet the binding 2023 targets and the indicative interim trajectory of energy shares from renewable resources in electricity, heating & cooling and transportation

The figures in Tables 22a 22b are the Turkish forecast. They are based on model calculations with 2012 as their base year, the calculations were performed for the years 2013 to 2023.

The model estimates the installed capacity for different technologies and is based on the 2023 targets for the Turkish energy system. Installed capacity targets are:

- 34,000 MW of hydropower
- At least 600<sup>23</sup> MW of geothermal power.
- At least 5,000 MW of solar power.
- 20,000 MW of wind power (this power capacity has all been sized for onshore technology).
- 1,000 MW of biomass power.

In total, by 2023, around 60 GW of renewable energy will be installed.

The evolution of the installed capacity from the base year to 2023 is based on the following assumptions:

- Hydropower: the growing trend based on recent data of this technology and its future forecast.
- Geothermal power: assessed, according to the trends in the evolution of electricity demand and the need to meet its established target.
- Solar power: for solar PV according to the evolution of electricity demand and the need to meet the established target.
- Wind power: an incremental increase to 1,000 MW for 2014. From 2014 onward the growing trend is to be estimated according to the evolution of electricity demand and the need to meet the established target.
- Biomass power: according to the evolution of electricity demand and the need to meet the established target.

Given the targets presented above, the gross electricity generation in 2023 would be 91,800 GWh for hydropower; 50,000 GWh for onshore wind energy; 5,100 GWh for geothermal energy; 8,000 GWh for solar energy; and 4,533 GWh for biomass. All in all, the total gross electricity generation would be 159,433 GWh. This quantity represents 37% of the total forecast consumption in 2023; the commitment of the Government is 30%, 127,324 GWh.

In reference to heating and cooling, the capacity would have an increase of 18% with reference to base year.

The Turkish Government has a strong commitment to renewable sources in the transportation sector. Obligations and support plans have been established in order to meet the targets. The policies for biodiesel and bioethanol can be seen below:

- Biodiesel: two measures have been adopted to promote its usage, tax exemption and mandatory usage of this fuel (this has been repealed).

Tax exemption: 2% of biodiesel produced from domestic raw material, that is blended with diesel fuel is exempt from the special consumption tax (ÖTV, in the Turkish acronym).

Obligation: According to the Energy Market Regulatory Authority Decision published in the Official Gazette (No. 28607) on the September 27, 2011, biodiesel content that is produced from domestic agricultural products for road fuel supplied to the market has been mandated to be at least 1% as of the January 1, 2014, 2% as of the January 1, 2015, and 3% as of the January 1, 2016.

- Bioethanol: as in the case of biodiesel, the same type of measures have been adopted.

Tax exemption: 2% of bioethanol produced from domestic raw material, that is blended with petrol is exempt from the special consumption tax.

Obligation: According to the Energy Market Regulatory Authority Decision published in the Official Gazette (No. 28607) on the September 27, 2011, bioethanol content that is produced from domestic agricultural products for road fuel (petroleum) supplied to the market has been mandated to be at least 2% as of the January 1, 2013, and 3% as of the January 1, 2014.

Thanks to these policies and the consumption of electricity in transport based on renewable sources, the total amount of energy coming from renewable sources has been estimated at 1,800 ktoe in 2023.

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23. Considering the actual developments in geothermal energy, it is expected that the geothermal installed capacity might surpass 1000 MW.

## 5 Assessments

Table 10a: Estimate of total expected contribution (installed capacity, gross electricity generation) by renewable energy technology in Turkey to meet its binding 2023; targets and the indicative interim trajectory (2013-2017) of energy shares from renewable resources in electricity<sup>24</sup>

	Base year		2013		2014		2015		2016		2017	
	MW	GWh	MW	GWh	MW	GWh	MW	GWh	MW	GWh	MW	GWh
<b>Hydropower:</b>	19,620	57,837	22,289	59,420	23,908	64,359	25,526	68,767	27,145	73,175	28,763	77,584
<b>Geothermal energy:</b>	162	849	310	1,364	338	1,724	412	2,099	485	2,474	559	2,849
<b>Solar energy:</b>	-	-	-	-	40	64	300	480	800	1,280	1,800	2,880
photovoltaics	-	-	-	-	40	64	300	480	800	1,280	1,800	2,880
concentrated solar energy	-	-	-	-	-	-	-	-	-	-	-	-
<b>Tides, waves, other ocean energy:</b>	-	-	-	-	-	-	-	-	-	-	-	-
<b>Wind energy:</b>	2,261	5,970	2,759	7,494	3,759	9,398	5,660	14,151	7,604	19,010	9,549	23,873
land-based	2,261	5,970	2,759	7,494	3,759	9,398	5,660	14,151	7,604	19,010	9,549	23,873
offshore	-	-	-	-	-	-	-	-	-	-	-	-
<b>Biomass:</b>	159	721	224	1,171	300	1,367	377	1,719	453	2,071	530	2,422
<b>Overall:</b>	22,202	65,377	25,582	69,449	28,345	76,911	32,275	87,215	36,487	98,010	41,201	109,608

Table 10b: Estimate of total expected contribution (installed capacity, gross electricity generation) by renewable energy technology in Turkey to meet its binding 2023 targets; and the indicative interim trajectory (2018-2023) of energy shares from renewable resources in electricity<sup>25</sup>

	2018		2019		2020		2021		2022		2023	
	MW	GWh	MW	GWh	MW	GWh	MW	GWh	MW	GWh	MW	GWh
<b>Hydropower:</b>	30,382	81,992	32,000	86,400	32,500	87,750	33,000	89,100	33,500	90,450	34,000	91,800
<b>Geothermal energy:</b>	632	3,224	706	3,599	779	3,975	853	4,350	926	4,725	1,000	5,100
<b>Solar energy:</b>	2,400	3,840	3,000	4,800	3,600	5,760	4,000	6,400	4,400	7,040	5,000	8,000
photovoltaics	2,400	3,840	3,000	4,800	3,600	5,760	4,000	6,400	4,400	7,040	5,000	8,000
concentrated solar energy	-	-	-	-	-	-	-	-	-	-	-	-
<b>Tides, waves, other ocean energy:</b>	-	-	-	-	-	-	-	-	-	-	-	-
<b>Wind energy:</b>	11,458	28,644	13,308	33,270	15,090	37,725	16,800	41,999	18,436	46,089	20,000	50,000
land-based	11,458	28,644	13,308	33,270	15,090	37,725	16,800	41,999	18,436	46,089	20,000	50,000
offshore	-	-	-	-	-	-	-	-	-	-	-	-
<b>Biomass:</b>	606	2,774	683	3,126	759	3,477	836	3,829	912	4,181	1,000	4,533
<b>Overall:</b>	45,478	120,474	49,697	131,196	52,729	138,687	55,488	145,678	58,174	152,485	61,000	159,433
from combined heat and power	-	-	-	-	-	-	-	-	-	-	-	-

24. National Renewable Energy Plan includes renewable and non-renewable hydro plants. It should be noted that according to the Renewable Energy Law, only power plants with less than 15 km<sup>2</sup> of reservoir area and the river-type hydroelectric power plants are considered as renewable energy resources.

25. National Renewable Energy Plan includes renewable and non-renewable hydro plants. It should be noted that according to the Renewable Energy Law, only power plants with less than 15 km<sup>2</sup> of reservoir area and the river-type hydroelectric power plants are considered as renewable energy resources.

## 5 Assessments

Table 11: Estimate of total expected contribution (final energy consumption) by renewable energy technology in Turkey to meet its binding 2023 targets; and the indicative interim trajectory (2012-2023) of energy shares from renewable resources in heating and cooling (ktoe)

(ktoe)	Base year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
<b>Geothermal (except in low-temperature geothermal heat pump applications)</b>	329	344	358	372	386	400	414	428	443	457	471	485
<b>Solar energy:</b>	630	644	659	673	687	702	716	730	745	759	773	788
<b>Tides, waves, other ocean energy:</b>	-	-	-	-	-	-	-	-	-	-	-	-
<b>Biomass:</b>	3,537	3,537	3,537	3,537	3,537	3,537	3,537	3,537	3,537	3,537	3,537	3,537
solid	3,537	3,537	3,537	3,537	3,537	3,537	3,537	3,537	3,537	3,537	3,537	3,537
biogas	-	-	-	-	-	-	-	-	-	-	-	-
bioliquids (1)	-	-	-	-	-	-	-	-	-	-	-	-
<b>Renewable energy through heat pumps:</b>	1,657	1,729	1,800	1,871	1,942	2,013	2,084	2,155	2,226	2,297	2,369	2,440
- aerothermal	-	-	-	-	-	-	-	-	-	-	-	-
- geothermal	1,657	1,729	1,800	1,871	1,942	2,013	2,084	2,155	2,226	2,297	2,369	2,440
- hydrothermal	-	-	-	-	-	-	-	-	-	-	-	-
<b>Overall:</b>	6,154	6,254	6,353	6,453	6,553	6,652	6,752	6,851	6,951	7,050	7,150	7,249

(1) Only those are considered that meet the sustainability criteria set out in Article 5(1), last sub-paragraph, of Directive 2009/28/EC.

(2) District heating and/or cooling as part of the total consumption of renewable energy for heating and cooling.

(3) As part of the total consumption of renewable energy for heating and cooling.

## 5 Assessments

Table 12: Estimate of the total contribution expected in Turkey by technology from the use of renewable energy sources, with regard to the binding targets for 2023; and the indicative trajectory (2013-2023) of energy shares from renewable sources, in the transportation sector in (1000 toe)

(ktoe)	Base year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Bioethanol/ETBE	18	127	195	272	352	440	529	623	723	830	857	886
Biodiesel:	9	33	57	81	105	218	338	522	718	988	1,148	1,319
Hydrogen from renewable energy sources:	-	-	-	-	-	-	-	-	-	-	-	-
Electricity from renewable energy sources	10	11	12	13	14	16	17	18	19	19	20	20
of which in road transport	3	3	3	3	3	4	4	4	4	4	4	4
of which not in road transport	7	8	9	10	11	12	13	14	15	15	16	17
Other (biogasBtL, vegetable oils, lower limit)	-	-	-	-	-	-	-	-	-	-	-	-
Other (biogas, BtL, vegetable oils, ceiling):	-	-	-	-	-	-	-	-	-	-	-	-
<b>Total (lower limit)</b>	37	171	264	366	471	674	883	1,163	1,459	1,837	2,025	2,226
<b>Total (upper limit)</b>	37	171	264	366	471	674	883	1,163	1,459	1,837	2,025	2,226

(1) Biofuels that meet the provisions of Article 21(2) of Directive 2009/28/EC.

(2) Of the total amount of bioethanol/bio-ETBE. The import volume shown here is subject to great uncertainty because at present it is not possible to estimate how the international biofuels market - also in terms of compliance with sustainability standards - will develop until 2023.

(3) Of the total amount of biodiesel. The import volume shown here is subject to great uncertainty, for the same reason as mentioned in (2).

## 5 Assessments

### 5.2 Total contribution expected from energy efficiency and energy saving measures to meet the binding 2023 targets and the indicative interim trajectory for the shares of energy from renewable sources

The estimated targets are subject to the fulfillment of energy efficiency measures set by Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on Energy Efficiency (18), and Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for ecodesign requirements for energy-related products. Moreover, measures designed by the Turkish Government, existing and new mechanisms to be included in the future NEEAP, will also play an important role in the fulfillment of these targets.

### 5.3 Assessments of the impact

Large scale penetration of renewable energies will have a very positive impact on Turkey due to the following externalities:

- Energy dependence reduction from other countries and security of supply. According to political objectives, electricity consumption is expected to be 30 percent from renewables by 2023. Considering the latest developments in Turkey, by 2023 due to energy generation from renewables, 21 billion m<sup>3</sup> of natural gas importation will be avoided along with 47 million tons of CO<sub>2</sub> emissions.
- Positive contribution in economic terms: Substantial impact on GDP due to the development of renewable energy facilities, and the supplying of equipment, components and services.
- Human resources development: qualified employment.
- Development of R&D activities.

These externalities are detailed hereafter.

### Energy dependence reduction from other countries

The development of renewable energy facilities in the electricity sector based on autochthonous sources will avoid the installation of fossil fuel fired units based on imported energy inputs as well as contributing to the security of supply.

The forecast of this impact is based on the following assumptions:

- Renewable energy would substitute the installation of more combined cycle gas turbine units, currently the most advanced and common fossil fuel technology.
- The performance ratio of natural gas combined cycle gas turbine would be 55%.
- All natural gas that is substituted by renewable energy would be imported.
- According to political objectives, in 2023 30% of electricity will be generated from renewable resources: RES would generate 127 TWh (30% of 424 TWh) in 2030.

Penetration of renewable energy as targeted will help to avoid the importation of more than 19 million toe of natural gas per year. According to the natural gas price forecast published by the US Department of Energy Organization (around USD<sub>2010</sub> 5/Btu), the forecast total saving due to the avoided energy imports would USD 4,000 million.

Figure 29: Natural gas projection in 2023

	2023
Demand/Forecast demand (TWh)	424
RES generation (TWh) based on 30% of RES production target in 2023	127
Performance ratio of natural gas CCGT	55%
Reduction of Natural Gas imports (TWh)	231
Annual reduction of Natural Gas imports (toe)	19 million
Annual reduction of Natural Gas imports (m <sup>3</sup> )	21 milliard
Annual reduction of Natural Gas imports (USD 2010)	4,000,000,000

## 5 Assessments

### CO<sub>2</sub> emission abatement

The development of renewable energy facilities for electricity generation will mitigate CO<sub>2</sub> emissions in the atmosphere.

The estimate of this impact is based on the following assumptions:

- Renewable energies would substitute combined cycle gas turbine units, currently the most advanced and common fossil fuel technology.
- The emission factor per MWh generated by combined cycle gas turbine technology is 0.37 tons.

According to political objectives, in 2023 30% of electricity will be generated from renewable resources: RES would generate 127 TWh (30% of 424 TWh) in 2030.

Adoption of renewable energy as targeted will help to avoid more than 47 million tons of CO<sub>2</sub> emissions: considering a price of € 20 per CO<sub>2</sub> emission EU allowance<sup>26</sup>, the economic impact of CO<sub>2</sub> emission mitigation would amount to USD 1,262 million.

Figure 30: CO<sub>2</sub> emissions avoided by REAP implementation

	2023
Demand/Forecast demand (TWh)	424
RES generation (TWh) based on 30% of RES production target in 2023	127
Emission factor of natural gas CCGT (tons/MWh)	0.37
CO <sub>2</sub> emissions that would be avoided by renewable energies (000 tons)	47,101
CO <sub>2</sub> emissions that would be avoided by renewable energies (USD)	1.2 milliard

### Positive contribution in economic terms: impact on GDP

Based on the large scale penetration of new renewable energy infrastructure, new industrial activities will be developed.

The figures detailed below represent a sampling of the possible impact on the GDP:

- Impact in the construction phase of wind energy infrastructure:
  - Installed capacity in 2013: 2,759 MW
  - 2023 target: 20,000 MW
  - Investment per MW (hypothesis): USD<sub>2013</sub> 1.179 milliard
  - Investment by Turkish residents (hypothesis): 30%.

Forecasted impact on the Turkish GDP during the investment phase (2013-2023): USD<sub>2013</sub> 6.274 milliard.

- Impact in the operational phase (annual economic impact).
  - Annual contribution per MWh: USD<sub>2013</sub> 86,401
  - 2023 target: 20,000 MW.

Forecast annual impact on the Turkish GDP (2023): approximately USD<sub>2013</sub> 1.728 billion.

### 5.4 Preparation of the National Renewable Energy Action Plan and the follow-up of its implementation

#### a) How were regional and/or local authorities and/or cities involved in the preparation of this Action Plan? Were other stakeholders involved?

The European Bank for Reconstruction and Development has collaborated with The Turkish Government in the task of preparing the National Renewable Energy Action Plan. A broad consultation was carried out in order to involve the major stakeholders and authorities in Turkey. The main entities consulted are listed below:

- The Ministry of Energy and Natural Resources. The General Directorate of Renewable Energy (YEGM, Yenilenebilir Enerji Genel Müdürlüğü)
- The Ministry of Energy and Natural Resources. The Mineral Research & Exploration General Directorate (Maden Tetkik ve Arama Genel Müdürlüğü)
- The Ministry of Energy and Natural Sources. EU & IFI's department
- TEİAŞ, The Turkish Electricity Transmission Co. Department-Research, Planning and Coordination Department
- The Energy Market Regulatory Authority (EPDK, Enerji Piyasası Düzenleme Kurumu). The Electricity Market Department
- TWEA, The Turkish Wind Energy Association (TÜREB, Türkiye Rüzgar Enerjisi Birliği)
- GENSED, The Turkish Photovoltaic Industry Association
- GÜNDER, The International Solar Energy Association (Turkey Branch)
- BİYOGAZDER, The Biogas Association
- LI-DER, The Unlicensed Electricity Generation Association
- Pales Engineering & Consultancy Services CO. LTD.
- MidSEFF, Mid-size Sustainable Energy Financing Facility

26. Long term CO<sub>2</sub> emission allowance reference price established by the European Union.

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## 5 Assessments

- Fina Enerji Holding A.Ş
- Garanti Bank
- Deniz Bank
- SAIF, Biomass Business branch of SAIF S.p.A. Group
- Gürış İnşaat ve Mühendislik A.Ş.
- Gama Energy
- TOKİ, Residential Buildings and Urban Transformation
- GE Wind Energy
- Enerjisa
- Zorlu Energy
- Polat Enerji San. ve Tic. A.Ş.

The European Commission Energy Statistics Ordinance also regulates the transfer of statistics to Eurostat. General Directorate of Renewable Energy is also responsible for the annual task of devising indicators for the energy sector.

**b) Are there plans to develop regional/local renewable energy strategies? If so, could you please explain? In case relevant competencies are delegated to regional/local levels, what mechanism will ensure national target compliance?**

The National Renewable Energy Action Plan has been created with the collaboration of the main entities and stakeholders in the industry. The energy strategies included in the Plan account for the national, regional and local levels.

**c) Please explain the public consultation carried out for the preparation of this Action Plan.**

A series of meetings were held with the main representatives of the entities listed in the first point (a) of this chapter. The aim of these meetings was for consultation with representatives within the industry and the collection of information in order to prepare this action plan.

Furthermore, questionnaires were addressed to other renewable energy players in order to extend the scope of the study.

**d) Please indicate your national contact point/the national authority or body responsible for the follow-up of the Renewable Energy Action Plan?**

General Directorate of Renewable Energy is the authority responsible for the follow-up of this Renewable Energy Action Plan.

**e) Do you have a monitoring system, including indicators for individual measures and instruments, to follow-up the implementation of the Renewable Energy Action Plan? If so, could you please give more details on it?**

Turkey will endeavor to establish a complete and reliable monitoring system, including indicators for individual measures and instruments. Following up on the developments in the energy sector and associated statistics are the responsibility of the General Directorate of Renewable Energy.

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