



**IV MEETING OF
TURKPA COMMISSION ON ECONOMIC COOPERATION
REPORT
ON COOPERATION IN DEVELOPING THE ENERGY SECTOR**

I. INTRODUCTION

1. Energy is one of the key factors economic growth and the social stability throughout the world. Currently the world pursues the goal of ensuring energy security. In this context TurkPA member-states have worked out their vision and strategies on the matter.

2. The member countries differ largely in terms of their economic and energy potential, availability of energy resources, diversity of energy supply patterns and degree of development of domestic energy markets and infrastructure. At the same time they share the same concerns regarding the stability of energy markets, the reliability and growth of imports and exports, the need to modernize the energy sector, to improve energy savings and reduce greenhouse gas emissions from energy production and use.

3. Contemporary world has entered into a new era, which is characterized with increased energy demand. Energy production and energy consumption are both crucial to the TurkPA member-states. Turkic-speaking countries have huge traditional energy sources. The International Energy Agency considers a reasonable range of proven oil

reserve estimates in Central Asia and Transcaucasia to be 15-40 billion barrels, with about 70-150 billion barrels of additional reserves possible. Estimates of the region's proven natural gas reserves are between 6.7 and 9.2 trillion cubic meters, with 8 trillion cubic meters of additional reserves possible. This represents approximately 5% of the world's proven oil reserves and 6% of its gas reserves.

4. At the same time, the Kyoto and subsequent climate conferences have substantially influenced on the energy policies in many countries. During the last decade several major events such as the events in the Middle East and the increasing oil prices brought the whole range of energy issues even more to the attention of the public.

5. Because of gradual shortfall of traditional energy sources and vast hazards to environment yielded by their utilization, developed countries widely use environmentally sound alternative (renewable) energy sources (solar and wind power, small HPPs, thermal waters, biomass power). USA, Canada, Germany, Finland, Norway, Denmark, Spain, Japan and China have leading positions in this area. According to statistics, renewable energy sources (including hydro power plants) constitute 13.5 percent of overall power generation in developed countries.

6. Meanwhile, efforts of the TurkPA member-states to enhance the role of renewable energy sources, which includes hydro, geothermal, solarthermal and wind as well as solid biomass, are underway. In the field of renewable sources the introduction of new technology is of critical importance, since it would allow substantial further savings in energy consumption, benefiting the environment in the process. According to International Energy Agency's information the share of electricity production from renewable sources including hydro and excluding charcoal, was more than 2500 GWh in Azerbaijan, more than 7500 GWh in Kazakhstan, more than 14000 GWh in Kyrgyzstan and ***surpassed 68000 GWh in Turkey for the year of 2013 (amendment of Turkish delegation)***.

7. The Report is based on the contributions received from the national delegations of Azerbaijan, Kazakhstan, Kyrgyz Republic and Turkey as well as on the data of organizations dealing with energy sector.

II. USE OF ALTERNATIVE ENERGY IN THE WORLD

8. About 16% of global final energy consumption presently comes from renewable resources, with 10% of all energy from traditional biomass, mainly used for heating, and 3.4% from hydroelectricity. New renewables (small hydro, modern biomass, wind, solar, geothermal, and biofuels) account for another 3% and are growing rapidly. At the national level, at least 30 nations around the world already have renewable energy contributing more than 20% of energy supply. National renewable energy markets are projected to continue to grow strongly in the coming decade and beyond. Wind power, for example, is growing at the rate of 30% annually, with a worldwide installed capacity of 282,482 megawatts (MW) at the end of 2012.

9. Wind power is widely used in Europe, Asia, and the United States. At the end of 2012 the photovoltaic (PV) capacity worldwide was 100,000 MW, and PV power stations are popular in Germany and Italy. Solar thermal power stations operate in the USA and Spain, and the largest of these is the 354 MW power plant in the Mojave Desert. The world's largest geothermal power installation is The Geysers in California, with a rated capacity of 750 MW. Brazil has one of the largest renewable energy programs in the world, involving production of ethanol fuel from sugar cane, and ethanol now provides 18% of the country's automotive fuel. Ethanol fuel is also widely available in the USA

10. As of 2011, small solar PV systems provide electricity to a few million households, and micro-hydro configured into mini-grids serves many more. Over 44 million households use biogas made in household-scale digesters for lighting and/or cooking, and more than 166 million households rely on a new generation of more-efficient biomass cookstoves. United Nations' Secretary-General Ban Ki-moon has said that renewable energy has the ability to lift the poorest nations to new levels of prosperity.

11. Renewable energy resources and significant opportunities for energy efficiency exist over wide geographical areas, in contrast to other energy sources, which are concentrated in a limited number of countries. Rapid deployment of renewable energy

and energy efficiency, and technological diversification of energy sources, would result in significant energy security and economic benefits.

12. Renewable energy replaces conventional fuels in four distinct areas: electricity generation, hot water/space heating, motor fuels, and rural (off-grid) energy services:

- **Power generation.** Renewable energy provides 21.7% of electricity generation worldwide as of 2013. Renewable power generators are spread across many countries, and wind power alone already provides a significant share of electricity in some areas: for example, 14% in the U.S. state of Iowa, 40% in the northern German state of Schleswig-Holstein, and 49% in Denmark. Some countries get most of their power from renewables, including Iceland (100%), Norway (98%), Brazil (86%), Austria (62%), New Zealand (65%), and Sweden (54%).

- **Heating.** Solar hot water makes an important contribution to renewable heat in many countries, most notably in China, which now has 70% of the global total (180 GWth). Most of these systems are installed on multi-family apartment buildings and meet a portion of the hot water needs of an estimated 50–60 million households in China. Worldwide, total installed solar water heating systems meet a portion of the water heating needs of over 70 million households. The use of biomass for heating continues to grow as well. In Sweden, national use of biomass energy has surpassed that of oil. Direct geothermal for heating is also growing rapidly.

- **Transport fuels.** Renewable biofuels have contributed to a significant decline in oil consumption in the United States since 2006. The 93 billion liters of biofuels produced worldwide in 2009 displaced the equivalent of an estimated 68 billion liters of gasoline, equal to about 5% of world gasoline production.

13. National renewable energy markets are projected to continue to grow strongly in the coming decade and beyond, and some 120 countries have various policy targets for longer-term shares of renewable energy, including a 20% target of all electricity generated for the European Union by 2020. Outside Europe, a diverse group of 20 or more other countries target renewable energy shares in the 2020–2030 time frame that range from 10% to 50%.

III. REGIONAL COOPERATION AND PERSPECTIVES OF THE MEMBER STATES IN THE APPLICATION OF RENEWABLE ENERGY RESOURCES (RES)

14. Renewable energy sources, as a part of the alternative energy sources, have gained wide support for being environmentally friendly. They are also seen to have a valuable part to play in ensuring diversity of supply.

15. Access to clean and affordable energy services is an essential element of sustainable development. A key advantage of most renewable energy sources is that they can be built as “distributed power” – small, geographically dispersed units built close to the end consumer. This minimizes transmission costs, power losses and grid reliability concerns, and ensures local development benefits as jobs are widely dispersed. This is the best option for providing power to low-income rural people in Turkic speaking countries.

16. The need for the TurkPA member-states to support the renewable energy is clear. Several of the technologies, especially **hydro** and **wind energy**, energy from **solar thermal** applications, are economically viable and competitive. The others, especially **photovoltaic** (silicon module panels directly generating electricity from the sun’s light rather than heat), depend only on (how rapidly) increasing demand and thus production volume to achieve the economy of scale necessary for competitiveness with central generation.

17. Each member-state has own specific potential and experience in the application of the alternative energy sources. In spite of fact that several countries are exporters of the traditional energy sources, their governments during last decades have been elaborating certain programs and projects in the field of application of the renewable energy sources.

Azerbaijan

18. **Azerbaijan** is one of the leading oil and gas exporter countries in the region. This acts as a disincentive for the promotion and development of the potentially significant

renewable energy resources. Nevertheless country has a large potential for renewable energy power generation in the areas of wind, hydro and biomass. Total wind power technical potential is estimated to be 1,500 MW. Biomass and hydro also have substantial potential for power production. The Nakhchivan Autonomous Republic is particularly suited to renewable energy development due to its separation from common state network and the fact that it has a power deficit.

19. Convenient geographical location and climate condition allows for wide utilization of environmentally sound alternative (renewable) energy sources in Azerbaijan. This would save large amount of fuel combusted in thermal power plants, as well significantly reduce hazardous substances. Production of electric and heat energy using alternative energy sources would be incentive for progressive changes in future development of energy sector.

20. Institute of Physics of National Academy of Sciences, Institute of Radiation Problems, Scientific-Research and Power Design Institute and Baku Hydro Design Institute have undertaken expedient scientific activities towards utilization of renewable energy sources. This State Program have been prepared based on Law on Energy Utilization; Law on Power Engineering; Law on Energy; Law on Electric and Thermal Power Plants; State Program on Poverty reduction and Economic Development for 2003-2005 approved with Presidential Decree N854 dated February 20, 2003; Measures on Strengthening Financial Discipline in Energy and Water Sectors approved with Ordinance N893 dated March 25, 2002; Presidential Decree N4 on Furtherance of Socio-Economic Development in Azerbaijan Republic dated November 24, 2003; State Program on Socio-Economic Development of Regions of Azerbaijan Republic for 2004-2008 approved with Presidential Decree N24 dated February 11, 2004; Presidential Decree N458 on Establishment of Ministry of Fuel and Energy dated April 18, 2001; and other normative-legal acts.

21. The objective of State Program is to promote the power generation from renewable and environmentally sound sources and to more efficiently utilize hydrocarbon energy sources.

The major tasks of State Program include:

- define the potential of alternative (renewable) energy sources for electric power generation;
- raise the efficiency of utilization of country's energy sources by developing renewable energy sources;
- ensure the opening of additional jobs with creation of new energy production sites;
- Given the existing total capacity of traditional energy sources in Azerbaijan, increase the energy capacities at the expense of alternative energy sources and therefore, achieve the country's energy security.

In Azerbaijan a capacity of hydro-energy composes 11 % of common production structure of the fuel energy balance. Azerbaijan traditionally has been applying wind energy. Calculations suggest that Azerbaijan has about 800 MW annual wind power capacities due to its geographical location, nature and economic infrastructure. This reserve means 2.4 billion kWh of electricity, according to rough calculations. This would imply the saving up 1 million tons of conditional fuel, more importantly, prevention of emitting large quantity of wastes including ozone cracking carbon dioxide.

There are some developments in the field of application of bio-gas settings in rural areas.

Kazakhstan

22. The implementation of the energy efficiency policy is currently one of the main tools of advancing economic modernization goals of Kazakhstan. Successful policy of energy saving and energy efficiency leads to a greater energy and environmental security of the country. In addition, ensuring energy efficiency stimulates introduction of new innovative technologies and solutions, which in turn stimulates active interaction of science and technology transfer.

23. Address of the President of the Republic of Kazakhstan to the Nation of Kazakhstan in January 29, 2010 on "New Decade - New Economic Growth - New Opportunities of Kazakhstan" and the State Program on Accelerated Forced Industrial-Innovative Development of Kazakhstan for 2010 - 2014 set targets for sustainable and balanced growth of the economy. In the field of energy saving task is to reduce the energy intensity of gross domestic product at least by 10% by 2015 and 25% by 2020.

24. In addition, the President of the Republic of Kazakhstan in January 23, 2013 instructed the Government of the Republic of Kazakhstan to maintain electricity consumption savings by an annual 10 percent reduction in energy intensity of the economy during 2013 - 2015.

25. Thus, energy is related to the strategic objectives of the state. To achieve these goals it is necessary to increase energy efficiency in all sectors and all regions of the country as a whole.

26. Kazakhstan possesses sufficiently large potential of renewable energy resources. For example, according to several studies, the gross hydro-potential of the Republic of Kazakhstan is roughly estimated at 170 billion kWh/year, technically possible to implement is 62 billion.

27. The Law of the Republic of Kazakhstan "On supporting the use of renewable energy sources", adopted in 2009 established the legal, economic and organizational basis for promoting the use of the renewable energy sources for electricity and thermal energy production and determined the measures of their support.

28. In particular, the law provides for the granting of investment preferences for RES projects, prioritizes the use of "clean" electricity on the market and its transmission over the networks, as well as support through the certification system which is controlled by the state.

29. Kazakhstan taken a major step forward in the development of a renewable energy market. The government of Kazakhstan aims to increase significantly the share of electricity generated from renewable energies. In accordance with the State Program for the Accelerated Industrial-Innovative Development of Kazakhstan, the share of the

alternative energy sources in the total energy consumption should reach 1.5% by 2015 and the national program for transition to sustainable development calls for increasing renewables' share in Kazakhstan's energy balance to 5 percent by 2024. The priorities of the State Program for the Accelerated Industrial-Innovative Development of Kazakhstan in 2010-14 provide for the output volume of the electricity generated by renewable energy sources in 2014 at the level of 1 billion kWh / year. According to the Electrical Power Development Program in the Republic of Kazakhstan for 2010-14, the electricity generation in 2014 will reach 97.9 billion kW / h at the forecast consumption of 96.8 billion kW / h.

30. Kazakhstan has excellent potential for wind power generation. The highest wind energy potential is concentrated in the vast territories of steppes and in the mountains. Similarly, hydro potential is quite large. Solar potential is also reasonable. The highest solar potential is in the southern regions.

Nowadays the competent bodies of the Government of Kazakhstan, which are in charge of development of the renewable energy sources, have carried out considerable work in the legislative improvement so to attract investors. On 4th of July, 2009 in compliance with the law of Kazakhstan "On the Use of Renewable Energy Sources" a financial calculation centre was established and legal documents relating to fixed tariffs for the use of renewable energy were prepared.

Approved normative and legal documents will increase the attractiveness of Kazakhstan's renewable energy market for the investors.

Following technical measures are envisaged to develop existing energy sector in Kazakhstan:

- in order to achieve modern standards of the industrial waste levels at the existing electricity generating stations by 2020 to renovate coal powered electricity stations with the accumulated capacity of 8.3 GWt; in order to achieve this objective dust and gas cleaning equipment, which collect dust, waste from sulphur dioxide and nitrogen oxide, will be installed;
- construction of renewable wind and solar power stations (accordingly WPS

and SPS) with the aim to develop renewable energy;

- to increase the share of electricity generated at WPS and SPS in the total amount of electricity in the country up to 3 per cent by 2020, and, by achieving 10% of the share of electricity generated at WPS and SPS by 2030 it would be possible to achieve 50% share of alternative and renewable energy if to combine the electricity generated at wind, solar, hydro power stations together.

In this regard, if to take into consideration Kazakhstan's capacity for generation of wind power, there are great prospects to utilise wind power sources of steppe and mountainous regions. Besides that, it is necessary to utilise hydro power potential and in the southern regions of Kazakhstan solar energy generating capacity.

Kyrgyzstan

31. The significant breakthrough in the given area was the adoption of the Law on renewable energy in 2008. The law represents only general principles for regulation of RES the so-called framework law. According to this law hydropower stations with an installed capacity of more than 30 MW are referred to as conventional energy, therefore are not subject for regulation under this law. Some advantages of this law are:

- No custom duties for either import or export of equipment for renewable energy technologies;
- Energy extracted from RES is a subject for procurement by energy companies in an obligatory manner;
- RES energy tariffs should ensure the payback of the RES project in less than 8 years

32. The ideas of this law are aimed at stimulating the RES field. To enact this law it is necessary to continue the harmonization and agreement processes of this legislature with other juridical acts. In particular the main provisions of this law are reflected in codes, legislative and other bylaws and legal acts..

33. In 2009 the Kyrgyz government has signed a resolution on "The order of building, commissioning and technological connection of small hydro-power stations to power

grid”, thereby has for the first time created a legislative platform for all beneficiaries. This resolution regulates the order and procedures for legalization the construction and technological connection of small hydro power stations to power grids. Also it determines the order of launching into operation.

34. Small hydropower stations always offered a very good perspective for Kyrgyzstan, due to availability of a huge amount of small rivers. In 2009 the national program on development of small hydropower stations in Kyrgyz Republic was developed. According to this program the first significant step towards development was taken on rehabilitation of existing small hydro power stations in the republic. There are about 41 small hydropower stations, with installed capacity of about 23 MW. About 62 new small power stations, with a total capacity of 180,77 MW can be constructed.

35. In **Kyrgyzstan** electricity generation is dominated by large hydroelectric facilities, contributing to over 90 percent of total electric capacity. Due to in-country know-how and available resources, hydro appears to be the most promising resource for renewable energy project development. There is however, a concern to increase reliability in dry years when hydro power output is significantly reduced.

36. Although Kyrgyzstan is in a somewhat favourable climate for solar development, it does not seem likely that there will be an emphasis on solar development in the near future due to its relatively high costs. Kyrgyzstan is rich with hydro resources. At present, only 35 % of them are used to generate electricity. Numerous new hydro-power stations ranging from hundreds of KW to 2000 MW can be built.

Turkey

37. **Turkey** is unique amongst other member-countries in having abundant endowment of renewable energy sources with more than 8000 km of coastline and many of its coastal regions enjoying constant breezes. Unexploited hydro resources alone could provide an equivalent amount of electricity capacity as installed today. Now both the private and state-owned banking sectors are to make loans available to qualified private

sponsors of renewable energy generation projects. Country has also good potential for wind generated power.

38. In Turkey a law on renewable energy sources aimed at their application in electricity sector was adopted on 18 May 2005. Law embraces possible areas of application of the RES, including such aspects, as exposure and protection of the RES, determination of the stable price policy concerning energy sector in terms of the RES application etc. Besides huge hydro resources, Turkey has a perspective potential for the development of the wind energy, geothermal energy and biomass. Investments to these types of the RES have already been started.

39. Turkey actualizes both legal infrastructure works and comprehensive works that will actuate the sector in order to increase the share of renewable energy sources in energy supply. The law concerning the Use of Renewable Energy Sources for Electric Energy Generation, enabled the electric energy generation from renewable sources by means of private sector.

40. After the law concerning the Use of Renewable Energy Sources for Electric Energy Generation was entered into force, significant boom has been occurred in renewable energy resources. Between the period 2003-2013, electricity production from geothermal and wind has been increased 59 times, from 150 GWh to 8.792 GWh (amendment of Turkish delegation).

41. The total installed capacity has reached to 64038 by the beginning of 2014 and;

- 474 2760 MW of them wind,
- 816,622289 MW of them hydraulic,
- 17311 MW of them geothermal,
- 3868517 MW of them landfill gas and biogas sourced electricity generating power plants

IV. ENERGY COOPERATION OUTLOOK

Traditional energy resources

42. Cooperation in the field of traditional energy carriers will retain its importance, since the traditional energy resources are expected in the at least mid-term perspective to play the main and prevailing part in the energy generation. Therefore, further efforts need to be made in achieving highest targets in energy saving and energy efficiency, environmentally friendly development of hydrocarbon fields, further improvement of infrastructure in the traditional energy market;

43. The governments need to set long-term targets in energy savings and efficiency with introduction of state-of-the-art technologies;

44. Environmental impact of ongoing and projected energy developments have to be assessed and timely measures need to be taken in order to protect the flora and fauna of project development sites;

45. Regular improvement and diversification of the traditional energy market infrastructure as pipelines and other means of delivery and supply ensure regional as well as global energy security.

Renewable energy sources (RES)

46. EXPO-2017 to be held in Astana is dedicated to the development of green economy and alternative energy sources, therefore it is expected to lead to brisk and speedy development of green energy in the TurkPA member-countries as well as in the world;

47. It would be significantly productive for TurkPA member-states to hold various events and actions as a show of support to EXPO-2017, particularly, holding of joint seminars or conferences;

48. Against the backdrop of EXPO-2017 TurkPA member-states could highlight their efforts in developing renewable energy sources (RES).

Relevant legislation and accumulation of expert potential

49) It is important *to share* information and experience so to ensure a harmonized approach to energy development policies as well as better regional coordination in this field;

50) It is also quite significant *to improve* the gathering, dissemination and exchange of energy-related information by involving the Turkic structures and to encourage co-operation and exchange of experiences among scientists and technicians in the member-states.