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AZERBAIJAN: STATE AND PROSPECTS FOR USING RENEWABLE ENERGY SOURCES

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LIST OF ABBREVIATIONS

RES	Renewable Energy Sources
OJSC	Open Joint Stock Company
LLC	Limited Liability Company
VAT	Value added tax
EC	European Commission
USAID	United States Agency for International Development
IFC	International Finance Corporation
EBRD	European Bank for Reconstruction and Development
ADB	Asian Development Bank
IEA	International Energy Agency
ECh	European Energy Charter
IRENA	International Renewable Energy Agency
Mw	Megawatt
Kwh	Kilowatt * hour
USD	U.S. dollar
AZN	Azerbaijani monetary unit

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ABSTRACT

This study analyzes the current state of affairs in the use of renewable energy sources in the Republic of Azerbaijan. Historically, the government's first comprehensive program for the use of renewable energy sources was adopted on October 21, 2004.

The following are identified as the main tasks in the State Program: 1) determination of the potential of renewable energy sources in the production of electricity; 2) increasing the efficiency of using the country's energy resources through the use of renewable energy sources; 3) creation of additional jobs due to new areas of electricity production; 4) increasing the existing capacity for the production of energy from renewable energy sources and thereby ensuring a higher level of energy security of the country.

Although the State Program was adopted in 2004, the beginning of the corresponding studies of the possibilities of using RES and the creation of pilot installations date back to earlier dates. Subsequently, the country's government took steps towards the creation of state institutions for renewable energy sources and a regulatory framework.

Among the first concerns of the government in the last two decades was the assessment of the RES potential in the country, which showed that the total potential RES capacity is 26,940 MW. (wind energy - 3,000 MW; solar - 23,040 MW; bioenergy - 380 MW; energy of mountain rivers - 520 MW.). This potential is almost 3.6 times higher than the current installed power generation capacity of 7,516 MW.

In 2020, the country generated 25.8 billion kWh, of which 24.3 billion kWh - at thermal power plants. The remaining 1.5 billion kWh was generated by hydroelectric power plants and renewable energy sources. In total, in 2020, 343.5 million kWh were generated on the basis of renewable energy sources, of which 46.9 thousand kWh at solar stations, 96.1 million kWh at wind farms.

Another 200.6 million kWh was generated using solid waste. Thus, the amount of electricity generated on the basis of renewable energy sources in 2020 amounted to 6% of the total electricity produced.

Nowadays, the main government bodies implementing policy in the energy sectors are: the Ministry of Energy; Energy Regulatory Agency under the Ministry of Energy; Agency for Renewable Energy Sources under the Ministry of Energy; Tariff Council; Energy Service of the Autonomous Republic of Nakhchivan.

Production, transmission, distribution and supply of electricity in Azerbaijan is carried out by the following companies: Azərenerji OJSC (production and transmission of electricity); Azərişiq OJSC (distribution and supply of electricity); Azəristiliktəchizat OJSC (centralized supply of heat energy); SOCAR (production and supply of oil and gas resources); Azalternativenerji LLC; Private small hydroelectric power plants; Private wind farms; "Təmiz şəhər" OJSC (electricity generation from household waste).

In the past two years, the President of the country has signed a number of decrees on the implementation of specific pilot projects based on the use of renewable energy sources:

- 1) construction of a wind farm with a capacity of 240 MW;
- 2) construction of a solar power plant with a capacity of 230 MW.

The implementation of these projects will be carried out by the companies "ACWA Power" of Saudi Arabia and the company "Masdar" of the United Arab Emirates, with which the Ministry of Energy of Azerbaijan has signed relevant contracts. The expected investments in these projects are estimated at about half a billion US dollars.

The government pays great attention to cooperation with international organizations, donors and governments of other countries. Among them: World Bank, International Finance Corporation, European Commission, International Development Agency of the United States, European Bank for Reconstruction and Development, Asian Development Bank, etc.

According to the report of the Ministry of Energy for 2020, it is planned to increase the share of renewable energy sources in the total volume of installed capacities to 30% by 2030. To achieve this goal, it is planned to commission RES-based power plants with a capacity of 440 MW in 2020-2022, 460 MW in 2023-2025, and 600 MW in 2026-2030. The power plants will be built with local and foreign investment.

An analysis of the current state of affairs in the field of renewable energy sources has shown that the urgent tasks for the coming years are: the adoption of a law on renewable energy sources; improvement and simplification of procedures for issuing permits for the use of renewable energy sources; increase in purchasing tariffs for electricity generated on the basis of renewable energy sources; strengthening the stimulating investment policy in the field of renewable energy sources; development and implementation of the network Code; concessional lending through the state Fund for the Development of Entrepreneurship; training and professional development of technical specialists. These recommendations are offered at the conclusion of this study.

RENEWABLE ENERGY SOURCES IN THE COUNTRY AND THEIR USE

According to the Ministry of Energy, the country has high potential in the use of renewable energy sources¹:

- wind energy 3,000 MW;
- solar energy 23,040 MW;
- bioenergy 380 MW;
- energy of mountain rivers 520 MW.

Thus, the total potential capacity of renewable energy sources is 26,940 MW. This is almost 3.6 times the current installed power generation capacity of 7,516 MW. The total capacity of power plants based on renewable energy sources and hydroelectric power plants today is 1278 MW. (i.e. 17% of the total power).

The total capacity of plants using renewable energy sources is 168.3 MW, or 2.2% of the total capacity of all plants in the country. There are 22 hydroelectric power plants in the country (12 of them are small) with a total capacity of 1135 MW. The capacity of 5 wind farms is 66 MW.

The power of 9 solar stations (one of them is hybrid) is 40 MW. There are also 2 biofuel stations (one of them is hybrid) with a capacity of 38 MW.²

In 2020, the country generated 25.8 billion kWh, of which 24.3 billion kWh - at thermal power plants. The remaining 1.5 billion kWh was generated by hydroelectric power plants and renewable energy sources. In total, in 2020, 343.5 million kWh were generated on the basis of renewable energy sources, of which 46.9 thousand kWh at solar stations, 96.1 million kWh at wind farms. Another 200.6 million kWh was generated using solid waste. Thus, the amount of electricity generated on the basis of renewable energy sources in 2020 amounted to 6% of the total electricity produced.

¹ <https://minenergy.gov.az/az/alternativ-ve-berpa-olunan-enerji/azerbaycanda-berpa-olunan-enerji-menbelerinden-istifade>

² <https://minenergy.gov.az/az/alternativ-ve-berpa-olunan-enerji/azerbaycanda-berpa-olunan-enerji-menbelerinden-istifade>

The figure below shows the location of all power plants of all types³ as of 2018 (excluding wind farms):



GOVERNMENT RESPONDING POLICY

An analysis of government decisions and the activities of government bodies allows us to highlight the following aspects of government policy in the field of using renewable energy sources:

- Development of goals, long-term planning;
- Institutional reforms;
- Formation of the legal and regulatory framework;
- Stimulating the development of renewable energy sources;
- Attracting investments;
- Cooperation with donors;
- Participation in international organizations and programs;
- Tariff policy;

³ <https://minenergy.gov.az/az/elektroenergetika/musteqillik-elde-edildikden-sonra-elektroenergetikanin-inkisafi>

- Creation of standards;
- Professional development of employees;
- Other aspects.

The government's first comprehensive program of historic importance about the use of renewable energy sources was adopted on October 21, 2004. It was the Resolution of the President of the country on the approval of the State Program for the Use of Alternative and Renewable Energy Sources⁴. The following are defined as the main tasks in the State Program:

- determination of the potential of renewable energy sources in electricity production;
- increasing the efficiency of using the country's energy resources through the use of renewable energy sources;
- creation of additional jobs due to new areas of electricity production;
- increasing the existing capacity for energy production using renewable energy sources and thereby ensuring a higher level of energy security in the country.

Although the State Program was adopted in 2004, the start of relevant studies on the use of renewable energy sources and the creation of pilot installations date back to earlier dates. For example, in 1999, the Japanese company "Tomen", together with the local energy research institute, began relevant work on the preparation of a feasibility study for wind power plants.

The above-mentioned State Program provided for the implementation of 20 activities, including the development and improvement of legislation, the study of foreign experience in the use of renewable energy sources, the development of motivation mechanisms, the training of specialists, consumer education, the creation of methodologies and a center for the effective use of renewable energy sources, the study of the potential of renewable energy sources, acceleration privatization of small hydroelectric power plants, etc.

Unfortunately, the assessment of the quality of the implementation of the State Program is not possible due to the lack of relevant indicators in the program for many planned activities. Moreover, as regards the measures, it is indicated that their implementation should be permanent. Since in subsequent years the new program was not adopted, these provisions of the program remain in force. These are the following activities:

- study and implementation of foreign experience in the use of renewable energy sources;

⁴ <https://minenergy.gov.az/az/alternativ-ve-berpa-olunan-enerji/azerbaycanda-berpa-olunan-enerji-menbelerinden-istifade>

- implementation of measures to stimulate the use of renewable energy sources;
- training of specialists in the field of renewable energy sources;
- consumer education;
- carrying out research work to determine the potential of renewable energy sources;
- the use of geothermal sources for heating greenhouses in the autumn-winter periods.

In 2009, by the Presidential Decree of July 16, the State Agency for Alternative and Renewable Energy Sources was created under the Ministry of Industry and Energy⁵. In the same year, by the Presidential Decree of November 10, the Statute on this Agency was approved. However, in 2012, by the Presidential Decree of June 1, the Agency was liquidated and on its basis a State Company for Alternative and Renewable Energy Sources was established⁶.

Institutional transformations did not stop there. By the Presidential Decree of February 1, 2013 on additional measures in the field of renewable energy, the State Agency for Alternative and Renewable Energy Sources was re-established (without subordination to any ministry), the Regulation on this Agency, its structure and number were approved⁷. By the same Decree, the State Company for Alternative and Renewable Energy Sources is transformed the Limited Liability Company “Azalternativenerji”, which is transferred to the jurisdiction of the newly created Agency. The decree also establishes the areas of activity of "Azalternativenerji": exploration of renewable energy sources, energy production, transportation, distribution, design of facilities and equipment, etc.

Subsequently, by the Decree of the President of September 22, 2020, a new Regulation on the State Agency for Alternative and Renewable Energy Sources was approved. This document lists 32 tasks of the Agency in the field of renewable energy sources, the most important of which are summarized as follows:

- Participation in the formation of the regulatory framework, concepts and programs for the development of renewable energy sources. Participation in the implementation of these programs;
- Preparation of proposals for the implementation of projects;

⁵ <http://www.e-qanun.az/framework/18085>

⁶ https://azertag.az/xeber/Azərbaycan_Respublikasının_Alternativ_ve_Berpa_Olunan_Enerji_Menbeleri_uzre_Dovlet_Sirketinin_yaradılması_haqqındaAzərbaycan_Respublikası_Prezidentinin_Fermanı-13191

⁷ <http://e-qanun.az/framework/25200>

- Coordination of the activities of state bodies and local authorities;
- Ensuring the implementation of the country's obligations under international agreements;
- Determination of RES potential by regions of the country and directions of their use;
- Collection and processing of information on renewable energy sources and creation of an electronic information system;
- Forecasting the production and consumption of renewable energy sources;
- Implementation and support of research, engineering and prospecting and design work, preparation of feasibility studies;
- Ensuring the efficiency of the use of renewable energy sources;
- Participation in the formation and implementation of the tariff policy;
- Ensuring environmental safety when using RES;
- Encouragement and support of innovative projects;
- Introduction of advanced international experience;
- Promotion and attraction of investments.

The government's policy in the field of renewable energy is also reflected in the State Program for the Development of Regions for 2019-2023⁸. It provides for the implementation of the following measures:

- construction of power plants based on renewable energy sources;
- Identification of potential for biomass in rural areas and implementation of pilot projects to provide agricultural enterprises with electricity and fuel generated from biomass;
- implementation of irrigation projects based on the use of renewable energy sources;
- support for projects on the use of biofuels and solar collectors to provide energy with thermal energy;
- Encouragement of projects for the provision of agricultural complexes with energy resources generated from the waste of these enterprises.

On December 5, 2019, the President of the country signs a decree on measures to implement pilot projects on the use of renewable energy sources. This decree established a government commission for the implementation of pilot projects, chaired by the Minister of Energy.

⁸ <http://e-qanun.az/framework/41320>

The commission was charged with selecting suitable land participants, providing government guarantees to investors, attracting a foreign consultant, implementing measures to implement pilot projects and other instructions.

In the past two years, the President of the country has signed a number of resolutions on the implementation of specific pilot projects based on the use of renewable energy sources:

- 1) Construction of a wind farm with a capacity of 240 MW⁹;
- 2) Construction of a solar power plant with a capacity of 230 MW¹⁰.

The government's policy in relation to the "green economy" and, naturally, on the use of renewable energy sources was reflected in the decree recently signed by the president of the country: "Azerbaijan 2030: national priorities for socio-economic development"¹¹. The priorities are as follows:

- Steadily growing competitive economy;
- A dynamic society based on the principles of inclusiveness and social justice;
- Environment of competitive human capital and innovation;
- Great return to the territories liberated from occupation;
- Clean environment and green growth country.

On the fifth priority, the document states that "On the basis of scientific and technological advances by increasing the share of renewable energy sources in energy consumption in all spheres of the economy, the effects of climate change should be reduced".

Most recent government decision concerns the development of smart city and smart village concepts¹².

According to the report of the Ministry of Energy for 2020, by 2030, bring the share of renewable energy sources in the total installed capacity to 30%¹³. To achieve this goal, it is planned to commission RES-based power plants with a capacity of 440 MW in 2020-2022, 460 MW in 2023-

⁹ Decree 28.12.2020, <http://e-qanun.az/framework/46557>

¹⁰ Decree of 02.04.2021, <http://e-qanun.az/framework/47151>

¹¹ <http://e-qanun.az/framework/46813>

¹² <http://e-qanun.az/framework/47263>

¹³ The Ministry Report for 2020,

https://minenergy.gov.az/uploads/Hesabatlar/Nazirlik%20ve%20qurumlar%20%C3%BCzre%20hesabat%202020_SON_CA_%C6%8FH_OH_v2.pdf

2025, and 600 MW in 2026-2030.¹⁴ The power plants will be built with local and foreign investment.

An important event will also be the adoption of the Law on the Use of Renewable Energy Sources in Electricity Production (under consideration by the Milli Mejlis). Along with local experts, foreign specialists also took part in the preparation of the draft law (German company DNV GL Energy Advisory GmbH)¹⁵.

INSTITUTIONS

- State bodies implementing policy in the energy sector are primarily:
- Ministry of Energy;
- Energy Regulatory Agency;
- Agency for Renewable Energy Sources;
- Tariff Council;
- Energy Service of the Autonomous Republic of Nakhchivan.

The production, transmission and distribution of electricity is carried out by the following companies:

- "Azərenerji" OJSC - production and transmission of electricity;
- "Azərişiq OJSC - distribution and supply of electricity;
- "Azəristiliktəchizat" OJSC - centralized supply of heat energy;
- SOCAR - state enterprise - production and supply of oil and gas resources;
- "Azalternativenerji" LLC;
- Private small hydroelectric power plants;
- Private wind farms;
- "Təmiz şəhər" OJSC - electricity generation from household waste.

¹⁴ <https://minenergy.gov.az/az/alternativ-ve-berpa-olunan-enerji/azerbaycanda-berpa-olunan-enerji-menbelerinden-istifade>

¹⁵ <https://nangs.org/news/renewables/germanskaya-dnv-gl-energy-advisory-gmbh-usovershenstvuet-zakonodatelynuyu-bazu-po-alyternativnoy-energetike-azerbaydzhana>

TARIFFS

Electricity tariffs are approved by the Tariff Council¹⁶. Tariffs are shown in the table below.

№	Name of service	Tariffs (incl/VAT, Qapik ¹⁷ / кВт*ч)
I	II	III
1.	Purchase from the manufacturer	
1.1.	For private small hydropower plants	5,0
1.2.	For wind power plants	5,5
1.3.	For other renewable energy sources	5,7
2.	Wholesale trade	5,7
2.1.	Enterprises of the chemical and aluminum industry with a stable daily load, with an average monthly demand of at least 5 million kWh, with power supply through 35 and 110 kV lines, mining and steel industry enterprises, information centers for the collection, processing and transmission of information	
2.1.1.	Daytime (from 08.00 to 22.00)	5,8
2.1.2.	Night time (from 22.00 to 08.00)	2,8
3.	Electricity transit	0,2
4.	Retail sales	
4.1.	Population	
4.1.1.	Monthly consumption ≤ 300 kwh	7,0
4.1.2.	Monthly consumption > 300 kWh	11,0
4.2.	Other consumers (not population)	9,0

As you can see, in comparison with hydroelectric power plants, the purchase price for wind power plants is 10% higher. For other renewable energy sources, purchase prices are 14% higher. Thus, tariffs for electricity generated from renewable energy sources stimulate production to some extent.

INVESTMENT PROJECTS

¹⁶ <http://tariff.gov.az/?/az/content/70/>

¹⁷ Qapik = 0.01 AZN

On January 9, 2020, the Ministry of Energy of Azerbaijan signed contracts with ACWA Power of Saudi Arabia and with Masdar of the United Arab Emirates for the implementation of two pilot renewable energy projects.

According to the contract with ACWA Power, the company will build a wind farm with a capacity of 240 MW¹⁸. The company "Masdar" undertakes to build a solar station with a capacity of 230 MW¹⁹.

On December 30, 2020, the Ministry of Energy of Azerbaijan and ACWA Power signed an Investment Contract, an Energy Purchase and Sale Contract and a Transmission Network Connection Contract. The signing of more contracts "On land lease" and "On an independent engineer" is to be signed. Similar contracts are to be signed with Masdar²⁰.

The cost of the wind farm project is estimated at USD 300 million²¹. The cost of the solar station project is estimated at USD 200 million.

On February 22, 2021, the Ministry of Energy of Azerbaijan and BP signed a Memorandum of Understanding on large-scale carbon-free and integrated energy and transport systems, including an assessment of the potential and conditions required for the implementation of renewable energy projects in the regions and cities of Azerbaijan.

According to the Memorandum, a "Steering Committee" and a "Working Group" will be created, which will prepare a "Master Plan" for de-carbonization of regions and cities of Azerbaijan. The "Master Plan" will cover projects on clean energy, low-carbon transport, green buildings, waste management, clean industry, climate solutions, and other areas²².

The works have also started to assess the potential for the use of renewable energy sources in the liberated regions of Azerbaijan. Eight promising territories with a total capacity of over 4000 MW have already been identified, where solar plant projects will be implemented. Wind farms will also be built in areas with a potential exceeding 500 MW.

¹⁸ <https://www.acwapower.com/en/projects/azerbaijan-wind-ipp/>

¹⁹ <https://minenergy.gov.az/az/xeberler-arxivi/masdar-sirketi-ile-qoyulus-gucu-230-mvt-olan-gunes-elektrik-stansiyasi-layihesi-uzre-mugavileler-imzalanib>

²⁰ <https://minenergy.gov.az/az/alternativ-ve-berpa-olunan-enerji/azerbaycanda-berpa-olunan-enerji-menbelerinden-istifade>

²¹ <https://www.acwapower.com/en/projects/azerbaijan-wind-ipp/>

²² <https://minenergy.gov.az/az/xeberler-arxivi/energetika-nazirliyi-bp-ile-zengilancebrayil-zonasinda-240-mvt-gucunde-gunes-enerjisi-layihesi-uzre-emekdasliga-baslavir>

In the field of hydrogen energy development, the government is taking steps to study the prospects and to train personnel²³.

It should be emphasized that since 2016, Azerbaijan has created mechanisms to stimulate investments in a number of sectors of the economy, including in the use of renewable energy sources (a 50% reduction in income / income taxes, exemption from land tax, customs duties, VAT and property tax).

DONORS AND GOALS OF THEIR PROJECTS

The table below provides information on donors who have taken and are participating in the implementation of various renewable energy projects:

Donor	Project Goal
EuC, EU4ENERGY, ECh	Development of a long-term energy strategy
USAID	Development of a draft law on the energy market (according to the 3rd Energy Package). The project is under consideration in parliament (Milli Majlis);
EBRD	Assistance in the creation and development of an independent regulator and the development of a draft law. An independent regulator has been created, but the draft law is still at the stage of approval in various government agencies;
EBRD	Assistance in holding auctions for the implementation of renewable energy projects (development of rules for holding auctions, qualification requirements, requirements for proposals);
IFC	Development of a strategic roadmap for the establishment of a wind farm in the Caspian Sea;
EC, IEA	Assistance in the improvement of the energy statistics system;
ADB	Assistance in the development and implementation of a pilot project of floating solar panels on Lake Boyukshor with a capacity of 100 kwt;
ADB	Development of a financial recovery plan for the energy sector;
ADB	Development of a financial recovery plan for the energy sector;
ADB	Development of the power grid code.

²³ <https://minenergy.gov.az/az/xeberler-arxivi/energetika-nazirliyi-ve-masdar-sirketi-hidrogen-istehsali-uzre-birge-seminar-kecirib>

<https://minenergy.gov.az/az/xeberler-arxivi/hidrogen-enerjisi-uzre-britaniya-tecrubesi-oyrenilir>

The government also cooperates with a number of international organizations and consulting companies. Among them, there is also the International Renewable Energy Agency (IRENA), which has developed a special report on Azerbaijan²⁴.

RECOMMENDATIONS

- Adoption of the law on renewable energy sources;
- Improvement and simplification of procedures for issuing permits for the use of renewable energy sources;
- Increase in purchasing tariffs for electricity generated on the basis of renewable energy sources;
- Strengthening incentive investment policy in the field of renewable energy sources;
- Development and implementation of the Network Code;
- Concessional lending through the state Fund for the Development of Entrepreneurship;
- Advanced training of technical specialists.

²⁴

<https://www.irena.org/publications/2019/Dec/RRA-Republic-of-Azerbaijan>