

# **AZERBAIJAN: CURRENT STATE AND PROSPECTS FOR THE USE OF RENEWABLE ENERGY SOURCES**

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## LIST OF ACRONYMS

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	Megawatts
kW*h	Kilowatt*hour
USD	US Dollar
AZN	Azerbaijani currency

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## SUMMARY

This study analyzes the current state of affairs in the use of renewable energy sources in the Republic of Azerbaijan. Historically, the **first comprehensive government program** on the use of RES was adopted on 21 October 2004. The following are defined as the main goals in the State Program: 1) to determine the RES potential in the production of electricity; 2) to enhance the efficiency of the country's energy resources through the use of RES; 3) to create additional jobs through new areas of electricity production; 4) to increase the existing energy production capacities through RES, thereby ensuring a higher level of energy security of the country.

Although the State Program was adopted in 2004, the start of relevant studies on the possibilities of using RES and creation of pilot installations **dates back earlier**. Subsequently, the government took steps to create state institutions for renewable energy sources and develop a regulatory framework.

Among the first concerns of the government in the last two decades was an assessment of the renewable energy potential in the country, which showed that the **total potential renewable energy 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 kW\*h**, of which 24.3 billion kW\*h at thermal power plants. The remaining 1.5 billion kW\*h was generated by hydroelectric power plants and RES. **In total, 343.5 million kW\*h were generated on the basis of RES in 2020, including 46,900 kW\*h by solar stations and 96.1 million kW\*h by wind farms**. Another 200.6 million kW\*h was generated using solid waste. Thus, the amount of electricity generated on the basis of RES in 2020 amounted to 1.3 percent of the total generated electricity.

The main government bodies implementing state policy in the energy sector are: **the Ministry of Energy; the Agency for the Regulation of Energy Matters under the Ministry of Energy; the Agency for Renewable Energy Sources under the Ministry of Energy; the Tariff Council; the Energy Service of the Nakhchivan Autonomous Republic**.

Production, transmission, distribution and supply of electricity in Azerbaijan is carried out by the following companies: **"AzerEnerji"** OJSC (production and transmission of electricity); **"AzerIshiq"** OJSC (distribution and supply of electricity); **"AzerIntilikTajhizat"** OJSC (centralized supply of heat energy); SOCAR (production and supply of oil and gas resources); **"AzAlternativEnerji"** LLC; small private hydroelectric power plants; private wind farms; **"Tamiz shahar"** OJSC (electricity generation using household waste).

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 RES: 1) construction of a wind power plant 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 “ACWA Power” of Saudi Arabia and “Masdar” of the United Arab Emirates, with which the Ministry of Energy of Azerbaijan has signed relevant agreements. Investment in these projects is estimated at about half a billion US dollars.

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

According to the report of the Ministry of Energy for 2020, there are plans to increase the share of RES in the total installed capacity to 30 percent by 2030. To achieve this goal, the plan is to put into operation 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 use of RES shows that the urgent tasks for the coming years include the adoption of a law on RES; improvement and simplification of procedures for issuing permits for the use of RES; increasing the purchasing tariffs for electricity generated on the basis of RES; strengthening the stimulating investment policy in the field of RES; 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 provided in 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 sources<sup>1</sup>:

- Wind energy 3 000 MW;
- Solar energy 23 040 MW;

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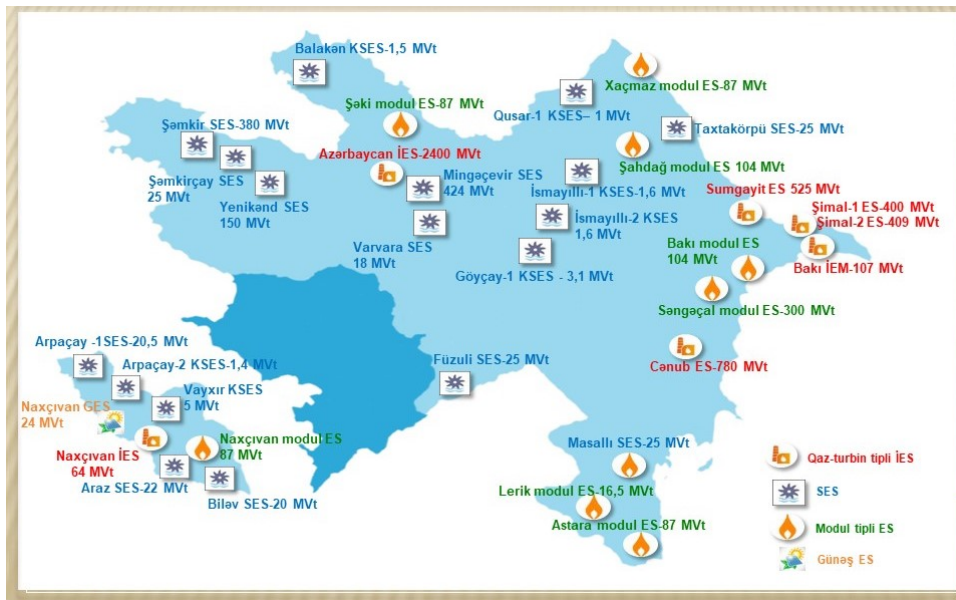
<sup>1</sup> <https://minenergy.gov.az/az/alternativ-ve-berpa-olunan-enerji/azerbaycanda-berpa-olunan-enerji-menbelerinden-istifade>

- Bioenergy 380 MW;
- Energy of mountain rivers 520 MW.

Thus, the total potential capacity of RES 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 RES and hydroelectric power plants today is 1,278 MW (i.e. 17 percent of the total capacity). The total capacity of plants using RES is 168.3 MW, or 2.2 percent of the total capacity of all plants in the country. There are 22 hydroelectric power plants in the country (of which 12 are small) with a total capacity of 1,135 MW. The capacity of 5 wind farms is 66 MW. The capacity of 9 solar stations (one of them hybrid) is 40 MW. There are also 2 biofuel stations (one of them hybrid) with a capacity of 38 MW<sup>2</sup>.

In 2020, the country generated 25.8 billion kW\*h, of which 24.3 billion kW\*h by thermal power plants. The remaining 1.5 billion kW\*h were generated by hydroelectric power plants and RES. In total, in 2020, 343.5 million kW\*h were generated on the basis of RES, of which 46,900 kW\*h at solar stations and 96.1 million kW\*h at wind farms. Another 200.6 million kW\*h was generated using solid waste. Thus, the amount of electricity generated on the basis of RES in 2020 accounted for 6 percent of the total electricity produced.

The figure below shows the location of all power plants of all types as of 2018 (excluding wind farms)<sup>3</sup>:



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

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

## GOVERNMENT POLICY IN THE FIELD OF RES

An analysis of government decisions and the activities of government bodies allows us the opportunity to identify the following aspects of government policy in the field of RES:

- Development of goals, long-term planning;
- Institutional reforms;
- Formation of the legal and regulatory framework;
- Stimulating the development of RES;
- Attracting investment;
- Cooperation with donors;
- Participation in international organizations and programs;
- Tariff policy;
- Creation of standards;
- Professional development of employees;
- Other aspects.

Historically, the government's first comprehensive program on the use of RES was adopted on 21 October 2004. It was the Decree of the President of the country on the approval of the State Program for the Use of Alternative and Renewable Energy Sources<sup>4</sup>. The following are defined as the main objectives of the State Program:

- To determine the RES potential in electricity production;
- To enhance the efficiency of the country's energy resources through the use of RES;
- To create additional jobs due to new areas of electricity production;
- To increase the existing capacity for energy production using RES and thereby ensure a higher level of energy security in the country.

Although the State Program was adopted in 2004, relevant studies of the possibilities of using RES and creating pilot installations dates back to earlier dates. In particular, in 1999, the Japanese company "Tomen", together with the local research institute of energy, 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

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

experience in the use of RES, the development of motivation mechanisms, the training of specialists, consumer education, the creation of methodologies and a center for the effective use of RES, the study of the RES potential, the accelerated 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, in terms of activities, it is indicated that their implementation should be permanent. Since a new program was not adopted in subsequent years, these provisions of the program remain in force. The activities include:

- study and application of foreign experience in the use of RES;
- implementation of measures to stimulate the use of RES;
- training of specialists in the field of RES;
- consumer education;
- research work to determine the RES potential;
- use of geothermal sources for heating greenhouses in the fall-winter season.

In 2009, following a presidential decree of 16 July, the State Agency for Alternative and Renewable Energy Sources was established under the Ministry of Industry and Energy<sup>5</sup>. In the same year, the Decree of the President of November 10 approved the Regulations on this Agency. However, in 2012, by a presidential decree of June 1, the Agency was liquidated and the State Company for Alternative and Renewable Energy Sources was created on its basis<sup>6</sup>.

Institutional transformations did not stop there. By a presidential decree of February 1, 2013 on additional measures in the field of RES, the State Agency for Alternative and Renewable Energy Sources was re-established (without subordination to any ministry) and the Regulation on this Agency, its structure and personnel numbers were approved<sup>7</sup>. According to the same decree, the State Company for Alternative and Renewable Energy Sources was reorganized into the “AzAlternativEnerji” Limited Liability Company and transferred to the jurisdiction of the new Agency. The decree also establishes the areas of activity of “AzAlternativEnerji”: exploration of RES, energy production, transportation and distribution, design of facilities and equipment, etc.

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

<sup>6</sup>

[https://azertag.az/xeber/Azərbaycan\\_Respublikasının\\_Alternativ\\_ve\\_Berpa\\_Olunan\\_Enerji\\_Menbeleri\\_uzre\\_Dovlet\\_Sirketinin\\_yaradılması\\_haqqında\\_Azərbaycan\\_Respublikası\\_Prezidentinin\\_Fermanı-13191](https://azertag.az/xeber/Azərbaycan_Respublikasının_Alternativ_ve_Berpa_Olunan_Enerji_Menbeleri_uzre_Dovlet_Sirketinin_yaradılması_haqqında_Azərbaycan_Respublikası_Prezidentinin_Fermanı-13191)

<sup>7</sup> <http://e-qanun.az/framework/25200>



Subsequently, by the Decree of the President of September 22, 2020, new Regulations on the State Agency for Alternative and Renewable Energy Sources were approved<sup>8</sup>. This document lists 32 tasks of the Agency in the field of RES, the most important of which are summarized as follows:

- Participation in the formation of the regulatory framework, concepts and programs for the development of RES. Participation in the implementation of these programs;
- Preparation of proposals for the implementation of projects;
- Coordination of 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 for their use;
- Collection and processing of information on RES and creation of an electronic information system;
- Forecasting the production and consumption of RES;
- Implementation and support of research, engineering and design work, preparation of feasibility studies;
- Ensuring the efficiency of the use of RES;
- 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;
- Encouragement and attraction of investments.

The government policy in the field of renewable energy is also reflected in the 2016 Strategic Roadmap for public services (Action Plan, paragraph 2.2.)<sup>9</sup> and in the State Program for the Development of Regions for 2019-2023<sup>10</sup>. It provides for the implementation of the following measures:

- Construction of power plants based on RES;
- Determination of biomass potential in rural areas and implementation of pilot projects to provide agricultural enterprises with electricity and fuel generated from biomass;

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[https://azertag.az/store/files/Strateji\\_yol\\_xeritesi/ Kommunal\\_xidm%C9%99tl%C9%99rin\\_inki%C5%9Faf%C4%B1n\\_a\\_dair\\_Strateji\\_Yol\\_X%C9%99rit%C9%99si\\_.pdf](https://azertag.az/store/files/Strateji_yol_xeritesi/ Kommunal_xidm%C9%99tl%C9%99rin_inki%C5%9Faf%C4%B1n_a_dair_Strateji_Yol_X%C9%99rit%C9%99si_.pdf)

<sup>10</sup> <http://e-qanun.az/framework/41320>

- Implementation of irrigation projects based on the use of RES;
- Support for projects on the use of biofuels and solar collectors to provide thermal energy;
- Encouragement of projects for the provision of agricultural estates with energy resources generated from the waste of these enterprises.

On 5 December 2019, the President of the country signed a decree on measures to implement pilot projects on the use of RES. The decree established a government commission for the implementation of pilot projects chaired by the Minister of Energy. The commission was authorized to select suitable land plots, provide government guarantees to investors, attract a foreign consultant, take measures to implement pilot projects, etc.

Over the past two years, the President of the country signed a number of decrees on the implementation of specific pilot projects based on the use of RES: 1) construction of a wind farm with a capacity of 240 MW<sup>11</sup>; 2) construction of a solar power plant with a capacity of 230 MW<sup>12</sup>.

The government's policy in relation to the "green economy" and on the use of RES is reflected in a decree signed by the President on February 5, 2021: "Azerbaijan 2030: national priorities for socioeconomic development"<sup>13</sup>. The priorities are as follows:

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

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

The most recent government decision concerns the development of smart city and smart village concepts<sup>14</sup>.

According to the report of the Ministry of Energy for 2020, there are plans to bring the

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<sup>11</sup> Постановление от 28.12.2020, <http://e-qanun.az/framework/46557>

<sup>12</sup> Постановление от 02.04.2021, <http://e-qanun.az/framework/47151>

<sup>13</sup> <http://e-qanun.az/framework/46813>

<sup>14</sup> <http://e-qanun.az/framework/47263>

share of renewable energy sources in the total installed capacity to 30 percent by 2030<sup>15</sup>. It is planned to put into operation RES-based power plants with a capacity of 440 MW in 2020-2022, 460 MW in 2023-2025, and 600 MW in 2026-2030<sup>16</sup>. The power plants will be built with local and foreign investment.

Another important development was the adoption of the Law on the Use of Renewable Energy Sources in Electricity Generation<sup>17</sup>. Foreign experts (the German company DNV GL Energy Advisory GmbH)<sup>18</sup> took part in the preparation of the draft law along with local experts. The law was adopted in 2021 and implies the following:

- attraction of private investments by direct and auction method;
- application of a guaranteed tariff for electricity generated from RES;
- expanding the use of RES (low power) by individuals (active consumers - prosumers), etc.

The Ministry is currently working on by-laws.

It should also be noted the Decree of the President on the establishment of a green energy zone in the liberated territories<sup>19</sup>.

## INSTITUTIONS

State bodies implementing public policy in the energy sector are primarily as follows:

- Ministry of Energy;
- Agency for the Regulation of Energy Matters;
- Agency for Renewable Energy Sources;
- Tariff Council;
- Energy Service of the Nakhchivan Autonomous Republic.

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

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<sup>15</sup> 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](https://minenergy.gov.az/uploads/Hesabatlar/Nazirlik%20ve%20qurumlar%20%C3%BCzre%20hesabat%202020%20SON%20CA%20%C6%8FH%20OH%20v2.pdf)

<sup>16</sup> <https://minenergy.gov.az/az/alternativ-ve-berpa-olunan-enerji/azerbaycanda-berpa-olunan-enerji-menbelerinden-istifade>

<sup>17</sup> <http://www.e-qanun.az/framework/47842>

<sup>18</sup> <https://nangs.org/news/renewables/germanskaya-dnv-gl-energy-advisory-gmbh-usovershenstvuet-zakonodatelnuyu-bazu-po-alyternativnoy-energetike-azerbaydzhana>

<sup>19</sup> <http://e-qanun.az/framework/47397>

companies:

- “AzerEnerji” OJSC – production and transmission of electricity;
- “AzerIshiq” OJSC – distribution and supply of electricity;
- “AzerIstilikTejhizat” OJSC – centralized supply of heat energy;
- SOCAR – state enterprise – production and delivery of oil and gas;
- “AzAlternativEnerji” LLC;
- Primate small hydroelectric stations;
- Private wins power stations;
- “Tamiz Shahar” OJSC – production of electricity from domestic waste

## TARIFFS

Electricity tariffs are approved by the Tariff Council<sup>20</sup>. Tariffs are shown in the table below.

No	Service	Tariff (including VAT, gapik <sup>21</sup> / kW*h)
I	II	III
1.	Purchase from the manufacturer	
1.1.	For small private 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 via 35 and 110 kV lines, mining and steel industry enterprises,	

<sup>20</sup> <http://tariff.gov.az/?/az/content/70/>

<sup>21</sup> Gapik = 0.01 AZN

	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.	Nighttime (from 22.00 to 08.00)	2.8
3.	Electricity transit	0.2
4.	Retail	
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 (non-population)	9.0

As is evident, in comparison with hydroelectric power plants, the purchase price for wind power plants is 10 percent higher. For other RES, purchase prices are 14 percent higher. Thus, tariffs for electricity generated from RES somewhat stimulate production.

## INVESTMENT PROJECTS

On January 9, 2020, the Ministry of Energy of Azerbaijan signed contracts with “ACWA Power” of Saudi Arabia and “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 MW<sup>22</sup>. “Masdar” is committed to build a 230 MW solar power plant<sup>23</sup>.

On December 30, 2020, the Ministry of Energy of Azerbaijan and ACWA Power signed the "Investment Contract", "Purchase and Sale of Energy Contract" and "Contract for Connection to the Transmission Network". Signing of more contracts "On land lease" and "On an independent engineer" is to be signed. Similar contracts are to be signed with Masdar<sup>24</sup>.

The cost of the wind farm project is estimated at USD 300 million<sup>25</sup>. The cost of the solar

<sup>22</sup> <https://www.acwapower.com/en/projects/azerbaijan-wind-ipp/>

<sup>23</sup> <https://minenergy.gov.az/az/xeberler-arxivi/masdar-sirketi-ile-qoyulus-gucu-230-mvt-olan-gunes-elektrik-stansiyasi-layihesi-uzre-muqavileler-imzalanib>

<sup>24</sup> <https://minenergy.gov.az/az/alternativ-ve-berpa-olunan-enerji/azerbaycanda-berpa-olunan-enerji-menbelerinden-istifade>

<sup>25</sup> <https://www.acwapower.com/en/projects/azerbaijan-wind-ipp/>

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 set up to prepare a Master Plan for de-carbonization of the 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 areas<sup>26</sup>.

Work has also begun to assess the potential for the use of RES in the liberated regions of Azerbaijan. Eight promising areas with a total capacity of over 4000 MW have already been identified for the implementation of solar power projects. Wind power plants will also be built in areas with a potential exceeding 500 MW.

In the field of hydrogen energy development, the government is taking steps to study the prospects and also to train personnel<sup>27</sup>.

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

## DONORS AND PROJECT GOALS

The table below provides information on donors that have participated in the implementation of various renewable energy projects:

Donor	Project goal
EuC, EU4ENERGY, ECh Secretariat	Development of a long-term energy strategy
USAID	Development of a draft law on the energy market (according to the 3 <sup>rd</sup> Energy Package). The draft law is under consideration in parliament (Milli Majlis)

<sup>26</sup> <https://minenergy.gov.az/az/xeberler-arxivi/energetika-nazirliyi-bp-ile-zengilancebrayil-zonasinda-240-mvt-gucunde-gunes-enerjisi-layihesi-uzre-emekdasliga-baslayir>

<sup>27</sup> <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>

EBRD	Assistance in the creation and development of an independent regulator and the development of a draft law. An independent regulator has been established, but the draft law is still at the stage of approval in various government agencies
EBRD	Facilitation of 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 creation 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 kW
ADB	Development of a financial recovery plan for the energy sector
ADB	Development of proposals for improving the climate in the electricity sector for private companies
ADB	Development of the grid code

The government also cooperates with a number of international organizations and consulting companies. Among them is also the International Renewable Energy Agency (IRENA), which has developed a special report on Azerbaijan<sup>28</sup>.

## RECOMMENDATIONS

- Improvement and simplification of procedures for issuing permits for the use of RES;
- Increasing the purchase tariffs for electricity generated on the basis of RES;
- Strengthening the incentive investment policy in the field of RES;
- Development and implementation of the Network Code;
- Preferential lending through the state Fund for the Development of

<sup>28</sup> <https://www.irena.org/publications/2019/Dec/RRA-Republic-of-Azerbaijan>

Entrepreneurship;

- Advanced training of technical specialists.