

# Electrical Industry of the Republic of Azerbaijan REPORT



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LEF network Azerbaijan

This market research has been made as a part of the LEF network Azerbaijan project.

**The project LEF network Azerbaijan's vision** is to increase innovations and the bio-economy of the region by exporting services, know-how and goods to Azerbaijan. As a result, the Central Baltic region will be more sustainable and competitive. The joint challenge is that Azerbaijan is specific due to market needs, language and business culture. For enterprises market entry individually is much harder than cooperating jointly with other enterprises and business support organisations. As a result export to the 3rd countries will be achieved faster and more effectively.

**The project LEF network Azerbaijan aims to achieve 10 sales agreements** during 36 months between Finland's, Estonia's and Latvia's mature SMEs and Azerbaijan. Based on small research matching demand and offers are the ICT sector, Green technologies, education - higher and lifelong, interior design as a service and interior design products.

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**Project partners:**

- Latvian Chamber of Commerce and Industry (Latvia)
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- Satakunta University of Applied Science (Finland)
- Caspian Energy Club (Azerbaijan)

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*This market research does not present any official EU opinion.*

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## 1. Regulation of Electrical Industry in Azerbaijan

In Azerbaijan, the field of energy, including electric power, is regulated by the Ministry of Energy of the Republic of Azerbaijan. The main energy producers in the country, as well as the companies that distribute and sell electricity, also belong to the state (or state controls the package of its shares).

Activity in the field of energy, including electric energy, is regulated by a number of legislative acts (laws, orders and rules approved by the Cabinet of Ministers, etc.) and is related to the implementation of goals and objectives arising from the currently implemented state strategies and programs.

### List of the main normative-legal acts regulating electrical power industry:

- *Law of the Republic of Azerbaijan on energy;*
- *Law of the Republic of Azerbaijan on electric power engineering;*
- *Decree of the President of the Republic of Azerbaijan on approval of Strategic Road Maps on the national economy and key sectors of the economy;*
- *"First state program on the Great Return to Azerbaijan's liberated territories";*
- *"Action Plan for the establishment of "green energy" zone in the liberated territories of the Republic of Azerbaijan in 2022-2026;*
- *Strategic Roadmap for the development of utility services (power and thermal energy, water and gas) in the Republic of Azerbaijan;*
- *Law of the Republic of Azerbaijan on power and thermal stations;*
- *Law of the Republic of Azerbaijan on the use of energy resources;*
- *Law of the Republic of Azerbaijan on production and household waste;*

- *Law of the Republic of Azerbaijan on subsoil;*
- *Law of the Republic of Azerbaijan on protection of foreign investments;*
- *Decision on approval of "regulations for the use of electricity";*
- *Rules for issuing specifications for consumers to receive electricity (power) and connecting to the power supply network.*

## ***The main institutions covering the field of electric power***

Operational management of the power system is carried out by the operator of the system - the Central Dispatch Office (CDO). The main goal of the central dispatch office is to ensure stable and reliable electricity supply, including quality indicators of electricity in the republic in accordance with the requirements of technical regulations and other normative acts with uninterrupted management of electricity generation and transmission. The activities of the CDO include the following main directions:

- Short-term planning and operational management of the regimes of the Azerbaijani energy system;
- Participation in the development of long-term and perspective plans taking into account the concept of development of the electric power system of Azerbaijan;
- Participation in the implementation of control over the technical condition of electric power facilities;
- Development of an automated dispatch management system;
- Ensuring synchronous operation and coordinated power supply with the energy systems of neighboring states (Russian Federation, Islamic Republic of Iran and Georgia) ;
- Provision of system services (frequency and voltage regulation, reserve power maintenance and power balance control, accident elimination, etc.) to all economic entities;
- Transit of electricity (power) and implementation of cross-border trade;
- Participation in wholesale electricity sales and energy markets of other states;

The dispatch management system of Azerbaijan energy system - SCADA/EMS/telecommunication/energy accounting system was implemented within the framework of the project "Development of electric power transmission system" in 2007-2011.

SCADA/EMS/Telecommunications system has the ability to continuously control and manage the state, technological processes and changes of the power plants, substations and system-organizing power transmission lines under the balance of Azerenerji OJSC based on real-time telemeters, and currently covers 46 energy facilities. This system enables implementation of automated dispatch management through the Central Dispatch Point, the reserve dispatch center operating in Stand-by Mode in parallel, and five Regional monitoring centers.

The SCADA / EMS system provides the exchange of technological-dispatching information of the country's energy system with the relevant systems of neighboring states using international communication protocols (ICCP). The telephone-communication equipment system consists of telephone stations established over the fibro-optical network and fully updated, providing numerous subscribers with fast, breakeven and reliable communication in the power system. The SCADA / EMS system has an open structure and provides a technical opportunity to integrate new facilities into the system. The operation of the CDO is carried out on the basis of a modern technological platform.

The State Agency for Renewable Energy Sources under the Ministry of Energy of the Republic of Azerbaijan was established by the Decree of the President of the Republic dated September 22, 2020. By the decree "Azalternativenergy" LLC was transferred to the subordination of the State Agency for Renewable Energy Sources. According to the regulation, the State Agency is the body involved in the formation and implementation of state policy in the field of renewable energy sources and their rational use.

The state agency takes measures to organize, regulate, coordinate activities in the field of renewable energy sources and their effective use, and at the same time increase the investment attractiveness of the relevant industry.

The main goals of the state agency are to increase the share of renewable energy sources in the installed capacity of electricity in Azerbaijan to 30% by 2030, to transform the territories freed from occupation into "Green Energy" Zones, and to ensure the participation of the private sector in this field.

## 2. Energy balance of Azerbaijan in 2022

Energy balance conducts record indicators' system for collection and coordination of data on all energy products imported to the country, exported and consumed during a definite period.

In 2022 in the country 88,0% of energy products with total production volume of 75,5 million tons of oil equivalent made primary energy products, 8,3% - oil products, 3,7% - heat and electricity. 50,5% of all primary energy products made crude oil (including gas condensate), 49,1% - natural gas, 0,4% - energy products produced on renewable energy sources. Azerbaijan is a country exporting crude oil, natural gas and oil products. In 2022 volume of export in the country made 49,6 million tons of oil equivalent of which 55,2% - crude oil, 42,5% - natural gas, 2,0% - oil products, 0,3% - electricity.

## Plant capacity, MW

Years	Plant capacity for the end of the year	including:					
		Electric and CHP plants working with fuel - total	Hydro-electric plants	Wind plants	Solar plants	Solid domestic waste plant	Biogas electric plants
2005	5,157.1	4,187.0	970.1	-	-	-	-
2010	6,397.7	5,401.0	995.0	1.7	-	-	-
2014	7,353.4	6,233.4	1,077.9	2.7	2.4	37.0	-
2015	7,806.7	6,652.8	1,103.4	7.7	4.8	37.0	1.0
2018	7,828.9	6,552.2	1,130.8	66.0	34.9	44.0	1.0
2019	7,641.6	6,350.3	1,144.8	66.1	35.4	44.0	1.0
2020	7,621.6	6,326.1	1,149.4	66.0	35.1	44.0	1.0
2021	7,965.2	6,649.4	1,157.2	66.0	47.9	44.0	0.7
2022	7,976.9	6,652.3	1,164.7	64.0	51.2	44.0	0.7

In 2022, electricity production increased by 1129.0 mln. kWh (4,1%) compared to 2021 (27,875.3 million kWh) and reached 29,004.3 million kWh. In 2022, electricity production amounted to 27,059.1 million kWh at TPPs and 1,595.7 million kWh at HPPs, 349.5 million kWh for other sources, including 83.3 million kWh in WPPs, 60.9 million kWh in SPPs, 205.3 million kWh in bio PPs.

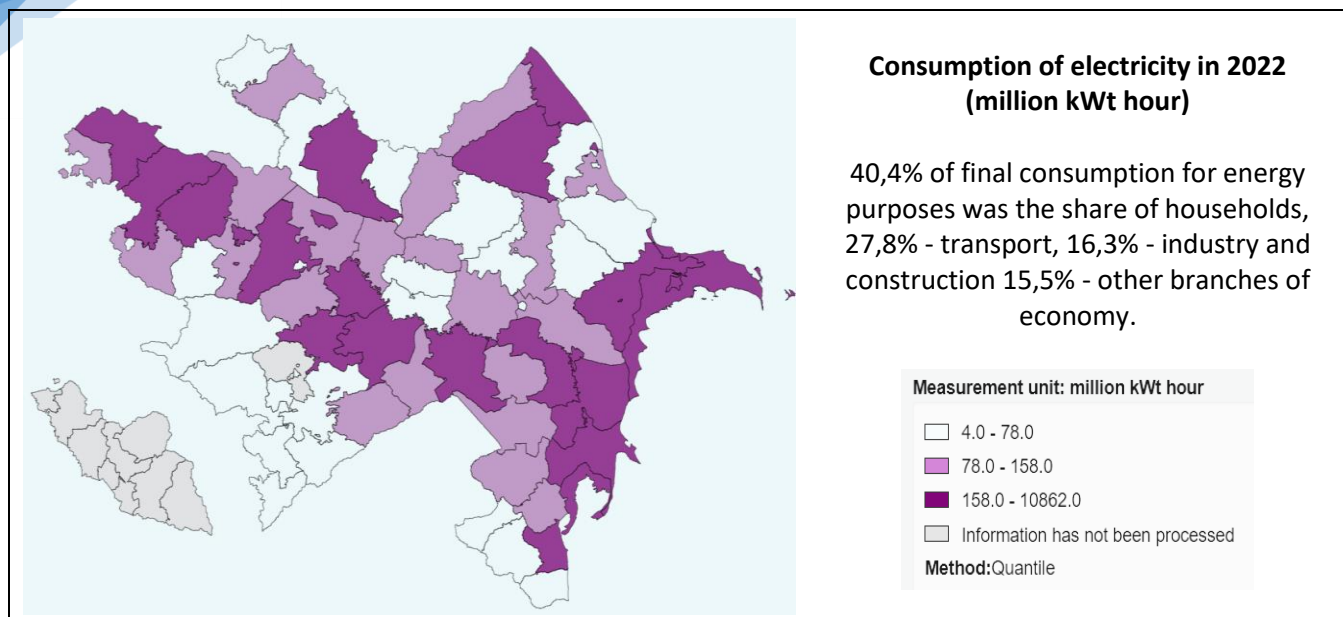
In 2022, the production of electricity by "Azerenergy" OJSC amounted to 26,186.9 mln kWh (24,708.2 mln kWh in TPPs, 1478.7 mln kWh in HPPs), 474.8 mln kWh by State Energy Service of Nakhchivan AR (315.9 mln kWh in TPPs, 102.5 mln kWh at HPPs, 56.4 mln kWh in solar PPs), 62.6 mln kWh at wind power plants of "Azerishig" OJSC, 2280.0 mln. kWh at independent power plants.

Electricity exports reached 2997.5 mln kWh in 2022, increased by 1324.1 mln kWh as compared to 2021 (1673.4 mln kWh) and imports reduced by 14,4 mln kWh to 137.2 mln kWh as compared 2021 (151.6 mln kWh). Thus, exported 2997.5 mln kWh electricity is shared by Iran with 103.5 mln kWh, Turkey with 1531.7 mln kWh, Russia with 100.1 mln kWh, and Georgia with 1262.2 mln kWh. Imported 137.2 mln kWh electricity is shared by Iran with 32.0 mln kWh, by Russia with 96.4 mln kWh and Georgia by 8.8 mln kWh.

In general, in 2022, 5494.0 million m<sup>3</sup> natural gas has been spent for the production of electricity at thermal power plants owned by "Azerenergy" OJSC and the State Energy Service of Nakhchivan AR.

During 2022, the specific consumption of fuel per 1 kWh of electricity output compared to 2021 decreased from 259.8 g/kWh to 259.3 g/kWh (0.5 g/kWh), which means savings of 12.5 thousand tons of conventional fuel.

Electricity consumption in the republic in 2022 amounted to 23,191.2 million kWh which is reduced by 244.4 million kWh compared to 2021 (23,435.6 million kWh).



90% of electricity in Azerbaijan is produced at thermal and hydroelectric power plants. Such a large share of TPPs in the production of electricity is traditionally due to the large volume and accessibility of oil and gas production. Currently, 21 hydro and 14 thermal power plants of large, medium and small volumes operate within the electric power system of Azerbaijan.

Hydroelectric power plants	Station capacity (MW)	Location
Araz Hydroelectric Power Station	Babek	22
Arpachay-1, Arpachay-2 Hydroelectric Power Stations	Sharur	21.9
Bilav Hydroelectric Power Station	Ordubad	22
Fuzuli Hydroelectric Power Station	Fuzuli	25
Mingachevir Hydroelectric Power Station	Mingachevir	424.6
Shamkir Hydroelectric Power Station	Shamkir	380
Shamkirchay Hydroelectric Power Station	Shamkir	24.42
Takhtakorpu Hydroelectric Power Station	Shabran	25
Varvara Hydroelectric Power Station	Yevlakh, Mingachevir, Goygol	17
Yenikend Hydroelectric Power Station	Yenikend	150
Vaykhir	Babek	5
Goychay	Goychay	3.1
Ismayilli-1, Ismayilli-2	Ismayilli	1,6/1,6
Balakan-1	Balakan	1.44



Oghuz-1, Oghuz-2, Oghuz-3	Oghuz	1.341/1.34/10.894
Gusar	Gusar	0.96
Masalli	Masalli	0.3
Astara	Astara	0.26

Thermal power plants	Station capacity (MW)	Location
Astara Thermal Power Station	Astara	87
Azerbaijan Thermal Power Station	Mingachevir	2.400
Baku TPP	Baku	106
Baku Thermal Power Station	Baku	105
Southern Power Station	Shirvan	780
Nakhchivan Thermal Power Station	Nakhchivan	87
Nakhchivan gas-turbine power station	Nakhchivan	64
Shahdag Thermal Power Station	Guba	105
Sheki Thermal Power Station	Sheki	87
Sangachal Thermal Power Station	Sangachal	300
Northern Thermal Power Plant	Baku	409
Shirvan Thermal Power Station	Shirvan	1050
Sumgayit Thermal Power Station	Sumgayit	525
Khachmaz Thermal Power Station	Khachmaz	87

At the same time, there are also several power plants operating on the basis of solar energy.

Solar power plants	Station capacity (MW)	Location
Surakhani Solar Power Station	Surakhani	1.2
Nakhchivan Solar Power Station	Babek	20

### 3. Energy system infrastructure and its management

Currently, consisting of Main and Reserve Dispatch Control Center, 8 Regional monitoring centers, 114 power facilities, 21 large power plants, 93 high-voltage substations, 394 Power transmission lines (285 units belonging to “Azerenergy” OJSC and 109 units belonging to “Azerishig” OJSC) are connected to the new SCADA system and

operated in real-time mode. The Garabagh Regional Digital Management Center was established for the first time in our country.

In total, the high-voltage transmission network in the country consists of substations and transmission lines with voltages of 110, 220, 330 and 500 kV. The total length of high-voltage transmission lines exceeds 7600 km.

Voltage class	Number of lines	Line length (km)	Number of substations	Substation power (MVA)
<b>110 kV</b>	189	4 325	70	5 335
<b>120 kV</b>	29	1 505	13	5 223
<b>230 kV</b>	1	31	0	0
<b>330 kV</b>	24	1 542	8	3 745
<b>500 kV</b>	3	477	2	3 745
<b>Total</b>	<b>246</b>	<b>477</b>	<b>93</b>	<b>1496</b>

During the reporting period, local digital control systems installed in Gobu PS, 330 kV Yashma, 220 kV Nizami, Gala, 110 kV Ramani, Jabrayil, Zangilan, Gubadli, Fizuli, Aghdam-1, Aghdam-2, Aghjabadi, Khirdalan substations were functionally tested and these facilities were integrated into the central SCADA system. After reconstruction of 330 kV Aghjabadi, 220 kV Hovsan, 110 kV City, 110 kV Sabirabad substations, SCADA circuits were transferred to new panels and tested and integrated into the central SCADA system via digital IEC 60-870-5-104 protocol. In 1 unit 500 kV, 5 units 330 kV, 9 units 220 kV, 29 units 110 kV substations and 6 units of thermal and hydroelectric power station, border and balance meters are integrated into the centralized meter system.

During 2022, the main equipment of "Azerbaijan thermal power plant", "Southern" PP, "Sumgayit" PP, "Northern" PP, "Baku" thermal power center, as well as their auxiliary equipment were repaired, the identified defects were eliminated. In addition, current repair works were carried out in Gobu, Baku, Khachmaz, Astara, Lerik, Sheki, Sangachal, Shahdag modular power plants, Mingachevir, Shamkir, Yenikend, Varvara, Shamkirchay, Fuzuli, Takhtakorpu hydroelectric power stations and small hydroelectric power plants.

On February 11, 2022, 4x250 MVA 330/220/110/10 kV Gobu substation and on February 6 the 3x250 MVA 330/220/110/10 kV Yashma substation were commissioned. In addition, in 2022, the "Aghjabedi" substation of 110/35/10 kilovolts with the capacity of 1x40 MVA+1x63 MVA was commissioned after reconstruction. Reconstruction of 110/35/6 kV "Gala" substation by converting it to 220/110/35/10-6 kV substation and 110/20/6 kV "Ramani" substation to 110/35/6 kV substation have been completed.

"Azerenergy" OJSC is taking appropriate measures to integrate the 230 MW solar power plant and the 240 MW wind power plant founded on the Absheron peninsula into the energy system. Thus, for the

integration of the wind power plant into the energy system, the installation of 1 unit of 220 kV sockets in each of the substations "Gobu" and "Yashma", the construction of 80 km long 220 kV transmission lines, for the integration of solar power plant, installation of 1 GIS-type socket and construction of 330 kV power transmission line with a length of 55 km is planned in "Southern" PP. At present, 15 anchors and 42 intermediate supports, 612 reinforced concrete foundations have been installed on 330 kV overhead line connecting the newly built Alat SPP with "Southern" PP.

In order to reduce energy losses in the networks in 2022, "Azerishiq" OJSC, which is responsible for supplying consumers with high-quality, stable and uninterrupted electricity in the territory of the republic, 893 complete transformer substations of various capacities were installed, 192.1 km of 35 kV, 285.5 km of 10 and 6 kV, 257.3 km of 0.4 kV cable lines, 65.1 km 35 kV, 781.5 km of 10 and 6 kV overhead lines, 2618.4 km of 0.4 kV, and 138.7 km of 35 kV overhead lines were laid from self-supporting insulated wires in Baku city and regions.

Substations "Basgal" with a capacity of 35/10 kV 2x6.3 MVA in Ismayilli district, "Shakarli" with a capacity of 35/10 kV 6.3 MVA in Aghstafa district, "Hajimelik" with a capacity of 35/6 kV 4 MVA in Goygol district, "Agropark" with a capacity of 35/10 kV 2x6.3 MVA in Shamakhi district, "Chovdar" with a capacity of 35/6 kV 16 MVA in Dashkasan district, substation No 362 with a capacity of 35/6 kV 2x6.3 MVA in Surakhani district were built.

Newly constructed 110/35/6 kV 2x40 MVA "Dashkasan" substation and 110 kV 1st and 2nd "Dashkasan" overhead lines were connected to the network.

Reconstruction works were carried out at 12 transformer stations in Narimanov District, 4 in Nasimi District, 5 in Sumgayit city, 6/0, 4 kV "Flag Square" transformer station was built in Sabail district.

Reconstruction works were carried out in 10 and 0.4 kV power networks that have completed their service life to reduce electricity losses in the regions, to keep accurate electricity records, these works covered 100 villages and settlements, work was completed in 53 villages during the reporting period, and work in this direction is continued in 47 villages. 285 complete transformer stations, 63 911 10 and 0.4 kV supports, 991.6 km self-supporting isolation wires were installed in the villages where reconstruction works are underway.

16 transformer stations of various capacities and about 21.2 km of power transmission lines were installed and commissioned for power supply of "pit stop" stops built in the territory of the Republic. Inspection and testing works have been performed in the power supply networks of 112 state-important facilities belonging to a special category across the Republic.

During 2022, a total of 230,882 units were restored, including 195,802 units for population consumers and 35,080 units for non-population consumers. As a result of the work done, the volume of useful electricity sold to consumers amounted to 18.4 million.kWh, total collection level reached 97%.

61.2 mln. kWh of electricity was produced and transmitted to the power grids at the Wind Power Stations located in Yeni Yashma and Shurabad settlements.

### On State Energy Service of Nakhchivan Autonomous Republic:

During 2022, the State Energy Service of the Nakhchivan Autonomous Republic carried out major and ongoing repair works in power plants, high and low voltage power transmission lines, transformer substations of various voltages based on the schedule, implementation of complex measures has been continued in the fields of improvement of electricity supply to consumers, installation of new transformer substations for power supply of residential areas, schools, social facilities, military units, pumping substations and artesian wells, construction of power transmission lines of different voltages, replacement of existing overhead power transmission lines with cable lines in the city of Nakhchivan and in the regional centers.

A new solar power plant with a capacity of 3 MW was commissioned in Sharur district, at the same time, construction and installation works of another solar power plant with a capacity of 3 MW were started in this area.

On the territory of Ordubad region, the construction and installation works of the derivation-type Ordubad Hydroelectric Power Station with a capacity of 36 MW and the Tivi Hydroelectric Power Station with a capacity of 15.6 MW have been continued, at the same time, measuring devices were installed and necessary measurement works were carried out for feasibility study of the operation of wind turbines in Ordubad region in the future.

The installation of new 10 wind turbines with capacity of 30 kW in Julfa district has been completed and the station was launched.

In total, during 2022, 23 new transformer substations of 10/0.4 kV and 35/0.4 kV were installed in the territory of the autonomous republic, 320 units of 10/0.4 kV transformer substations were repaired, 42.5 km long 10 and 0.4 kV power transmission lines were laid, 251.8 km long 10 and 0.4 kV power transmission lines were repaired, 16.9 km long 35 kV and low voltage overhead power transmission lines were replaced with underground cable lines.

The number of all types of electric meters installed in the Nakhchivan Autonomous Republic as of 01.01.2023 was 97,832 units.

## **4. Attracting international cooperation and private investment in the field of electric power**

In 2022, the qualification request (Request for Qualification – RFQ) documents prepared by KPMG were sent to 37 companies interested in the project. Qualification documents on the project were submitted by 11 companies and consortia (16 companies in total). On July 14, 2022, a notice was sent to the companies and consortia that met qualification conditions.

Discussions were held with “Azerenergy” OJSC, “State Oil Company of the Republic of Azerbaijan” and “Azerbaijan Melioration and Water Management” OJSC for preparation of specifications for connection of the project to electricity, gas and water supply networks, and preliminary versions of specifications were prepared and added to the project documents.

Work was continued in order to implement the measures provided for in Article 2 of the Agreement "On cooperation between the Government of the Republic of Azerbaijan and the Government of the Islamic Republic of Iran in the field of the continuation of construction, operation, and use of energy and water resources of the Khudafarin and Giz Galasi hydroelectric stations on the Araz River".

In order to implement the measures provided for in Article 10 of the "Agreement between the Government of the Republic of Azerbaijan and the Government of the Islamic Republic of Iran on the construction and operation of the "Ordubad" and "Marazad" hydroelectric power stations, mutual discussions with the Iranian side have been continued.

Within the framework of the construction work carried out so far on the "Ordubad" hydroelectric power station, the construction works on the part of the water regulator unit belonging to the Azerbaijani side were completed, the gates were installed and made ready for operation.

An initial visit to Azerbaijan was organized as part of the start period of the technical assistance (Phase III) phase of EU Covenant of Mayors for Climate & Energy initiative. During the visit, meetings were held with the Ministry of Energy, the EU Delegation and international donors (EBRD, ADB and UNDP). At the same time, an initial training seminar was held for municipal representatives who had just joined the initiative to prepare a Sustainable Energy and Climate Action Plan (SECAP). On 04.08.2022, a webinar on the collection of initial base data on the preparation of SECAP was held for the Working Groups on the preparation of SECAP and the three municipalities (Sheki, Khirdalan and Nizami district municipality of Ganja) that approved the relevant work schedule. Khirdalan municipality also participated in the official award ceremony held in Tbilisi in November 2022 for municipalities that have newly joined the initiative within the framework of the high-level conference "10th anniversary of the Covenant of Mayors in the Eastern Partnership region". Representatives of the Ministry of Energy, EU Delegation to Azerbaijan, Sheki, Mingachevir, Ganja (Nizami district) municipalities also attended the event.

Within the framework of the "Support for increasing energy efficiency in Azerbaijan" project, support was provided in the preparation of relevant normative acts related to energy efficiency in buildings, energy labeling of products and ecodesign, 2 seminars on international experience in these fields were held in June for representatives of relevant state institutions, and training and public awareness events were held for 10 engineers on determining energy efficiency in buildings in October.

"Memorandum of Understanding on technical support for the development of the electric power sector of the Republic of Azerbaijan" was signed between the Ministry of Energy and the European Bank for Reconstruction and Development. In the framework of the Memorandum of Understanding, it is planned to implement the project “low-carbon solutions in the electric power sector of Azerbaijan” as the first project. Within the framework of the project, modeling of ways to reduce greenhouse gas emissions in Azerbaijan until

2050 will be carried out, roadmap including a set of recommendations on strategies, technologies, normative-legal framework and norms, institutional issues, capacity building, socio-economic measures and investments that will guide the decarbonization of the country's electric power sector will be developed and capacity building measures will be taken.

Work on the 500 MW gas-turbine power plant project planned for construction in the Yashma area has been continued.

## 5. On renewable energy sources:

In 2022, the groundbreaking ceremony of "Khizi-Absheron" Wind Power Plant" was held. Within the framework of the groundbreaking ceremony, the Ministry of Energy and "ACWA Power" company of the Kingdom of Saudi Arabia signed a Memorandum of Understanding on cooperation in the field of offshore wind energy.

The Memorandum provides for cooperation in determining the basic principles of cooperation in the field of offshore wind energy, assessing the potential and creating conditions for profitable investment in renewable energy projects in Azerbaijan. In addition, in 2022, a document "Environmental Impact Assessment" and "Interaction Plan with Stakeholders" of the project on the 240 MW "Khizi-Absheron" Wind Power Plant, which will be built in Azerbaijan, was prepared and presented. The project is being implemented in Absheron-Khizi territory near Pirakashkul and Sitalchay. Starting from March 2020, within 2 years, 7 measurement-observation stations were established at a height of 100 m, topography and preliminary geodesy works were carried out, environmental impact assessment was completed in accordance with international standards.

During the current period, meetings were held with the counterparty to discuss the remaining open issues related to the Garadagh Solar Power Plant with a capacity of 230 MW. The groundbreaking ceremony of the 230 MW Garadagh Solar Power Plant to be built in Azerbaijan by "Masdar" company was held on March 15, 2022. In addition, on August 2, a decision was made to allocate a loan package by International Financial Institutions in the amount of 114.2 million US dollars for the 230 MW Garadagh Project to be built in Azerbaijan by the "Masdar" company. Allocation of a loan at amount of USD 21.4 million by EBRD, USD 50 million by ADFD, USD 21.4 million by JICA and USD 21.4 million by ADB is envisaged. In addition, assessment works are underway to strengthen the energy network of our country between Masdar, TAQA TRANSCO and Azerenergy. On November 2, 2022, the Decree of the President of the Republic of Azerbaijan was signed on the approval of the "Direct Agreement on Investment Contract between the Government of the Republic of Azerbaijan, Masdar Azerbaijan Energy" Limited Liability Company and "AccessBank" Closed Joint Stock Company.

On June 4, 2022, within the framework of the special session of "Baku Energy Week" held in Shusha,

"Executive Agreement on the evaluation, development and implementation of 1 GW solar and 1 GW wind energy projects on an industrial scale on land in the Republic of Azerbaijan" and "Executive Agreement for the evaluation, development and implementation of 2 GW integrated offshore wind and green hydrogen projects" were signed between the Ministry of Energy and the UAE company "Masdar". As part of the implementation contracts signed, 6 territories with wind energy potential and 3 areas with solar energy potential were selected. Relevant opinions were received from the State Urban Planning and Architecture Committee, the Ministries of Ecology and Natural Resources, Economy and Agriculture regarding the selected areas. At the next stage, a letter was addressed to the Cabinet of Ministers of the Republic of Azerbaijan in order to adopt an appropriate decision on the determination of the selected areas as areas of renewable energy sources in accordance with Article 6.6 of the Law "On the use of renewable energy sources in the production of electricity". Relevant bodies and executive authorities were instructed by the Cabinet of Ministers to approve the selected areas as renewable energy sources. The selected areas located in Absheron, Garadagh, Gobustan, Neftchala, Gakh districts and Alat settlement were examined as part of the implementation of the task, together with the experts of "Masdar" company, who were sent to Baku on October 2-5, 2022. Finally, for the solar energy project, Banka settlement of Neftchala district, Pirsaat settlement of Garadagh district and Bilasuvar district, for onshore wind energy project, Jangi-Gobustan of Absheron district, Dashdidagh-Garaheybat of Garadagh district, Gobustan-Babajan of Absheron district and respective territories of Lachin district were agreed with the relevant institutions.

On December 15, 2022, the Ministry of Energy and Australia's Fortescue Future Industries (FFI) signed a Framework Agreement on joint cooperation on the study and development of renewable energy projects and the potential of "green hydrogen" in Azerbaijan. The contract provides for the study and implementation of projects for the production of renewable energy and "green hydrogen" in Azerbaijan with a total capacity of up to 12 GW.

Within the framework of cooperation between the Ministry of Energy and Asian Development Bank, the work on the pilot project "Knowledge exchange and technical assistance support for the development of the floating solar panel system" implemented within the framework of the regional project "Development of Floating Solar Energy Systems" financed by the Asian Development Bank continues. Investigations are underway within the framework of the relevant project for the implementation of large-scale projects on water basins in the future. Within the framework of the project, a feasibility study was prepared on the development of floating solar (PV) panels in the territory of Azerbaijan, and a database of water basins was created using a methodology based on the Geographic Information System (GIS). At the same time, as another component of the project, a feasibility study of a floating solar photovoltaic plant with a capacity of 50 MW on Boyukshor Lake has been prepared and issuing a specification for connection has been discussed with "Azerenergy" OJSC. Within the framework of the project, the construction of a floating solar plant with a total capacity of 100 kW (95 kW on water and 5 kW on land) is being carried out on Boyukshor Lake.

## 6. "Establishment of the "green energy zone":

In order to ensure the implementation of part 3 of the Decree No. 2620 of the President of the Republic of Azerbaijan dated May 3, 2021 "On measures related to the establishment of a "green energy" zone in the liberated territories of the Republic of Azerbaijan" the "Action Plan for the establishment of a "green energy" zone in the liberated territories of the Republic of Azerbaijan in 2022-2026" was approved by the Order No. 357s of the Cabinet of Ministers of the Republic of Azerbaijan dated June 21, 2022.

By Order of the Cabinet of Ministers of the Republic of Azerbaijan dated August 3, 2022, No. 459s, the "Working Group for coordination and monitoring on the application of green technologies and energy efficiency requirements in the liberated territories of the Republic of Azerbaijan" was established. The Monitoring Plan for the implementation of the "Action Plan for the establishment of a "green energy" zone in the liberated territories of the Republic of Azerbaijan in 2022-2026" was prepared and approved by the Working Group.

## 7. Restoration of electric power infrastructure in the liberated territories of Azerbaijan

Extensive work is underway within the framework of special state programs to restore the electrical power infrastructure in the territories of the Garabagh and Eastern Zangazur Economic Zones, which Azerbaijan liberated from occupation in 2020.

Electric power infrastructure is being developed by "Azerenergy" OJSC. The strategy envisages the construction of 110-kilovolt substations in each district and their integration into the power system through high-voltage lines. Immediately after the end of the war, several - 8 megawatt "Gulabird" Hydroelectric Power Station, 110/35/10-kilovolt Shusha, Fuzuli and Shukurbayli substations were launched. Also in Tartar, small hydroelectric power plants "Sugovushan-1" and "Sugovushan-2" were put into operation after reconstruction. The total capacity of hydroelectric power plants is 7.8 megawatts. 13.8 million kilowatt/hours of electricity are produced in "Sugovushan-1" small hydropower station and 8.7 million kilowatt/hours in "Sugovushan-2" station. In total, the construction or reconstruction of 13 energy facilities has been started in 2021. In addition, the construction of "Shusha" substation was completed in 2021, "Aghdam-1" and "Aghdam-2" substations built in Aghdam, as well as the "Garabagh" Regional Digital Control Center were completed in June. Each of the substations commissioned in



Garabagh and East Zangezur has been connected to the common energy system of Azerbaijan and fully digitized. At the same time, a high-voltage 110-kilovolt power transmission line was laid in 10 directions at a distance of 365 kilometers in these areas.

On October 4, 2021, 110/35/10 kilovolt "Jabrayil" substation was built and commissioned in Jabrayil district. The 110 kilovolt double-circuit 1st and 2nd "Jabrayil" overhead lines with a total length of 31 kilometers were built from the "Shukurbeyli" substation in Fuzuli, Jabrayil region. A 110 kilovolt Open Switchgear was built in this new substation. All technically necessary conditions have been established at the substations in order to connect the double-cycle transmission lines laid from Jabrayil to supply the substations "Gubadli" and "Zangilan". According to the general urban planning concept of the district, "Jabrayil" substation will provide all facilities, villages and settlements of the city of Jabrayil and the district in general with stable, high-quality electricity.

Large-scale measures are being taken in the direction of the development of renewable energy types in this region. Thus, it is planned to build a new 240-megawatt solar station in Jabrayil district. 140 megawatts of electricity will be obtained from "Khudaferin" and "Giz Galasi" hydroelectric power stations in a short time. The electricity industry is also being rebuilt in the Garabagh and Eastern Zangezur economic regions.

Sarsang hydroelectric power station, built on the Tartar River in the territory of the Tartar region, which came under control in 2023, was commissioned in 1977 and has two RO115/697-V120 radial-axial (Francis system) water turbines, each of which has a capacity of 25 MW. In 2023, the electricity grid of the liberated territories will be fully integrated into the country's general electricity grid.



Regions with a large potential for renewable energy in the liberated territories were considered separately during the investigation, and in order to determine the exact potential for wind and solar

energy in those regions, work is being carried out on the installation of measuring observation stations, evaluation of technical capabilities and economic efficiency.

In Kalbajar, Lachin, Gubadli, Zangilan, Jabrayil, Fuzuli regions, 8 potential areas with a total area of 14,427 ha with high solar energy potential were selected. Although it seems possible to place a total of 7,214 MW of solar power plants in these areas, the total potential here is estimated higher than 4,000 MW, taking into account that part of the southern areas may be used for agriculture. Taking into account the fact that 25% of local water resources in Azerbaijan are formed in Garabagh, the perspective of using the main rivers such as Tartar, Bazarchay, Hakari and their tributaries for the purpose of electricity generation is considered.

The potential of wind, solar and hydropower plants here exceeds 10 gigawatts. Work has begun to develop this important potential. It is known that Garabagh and East Zangazur were also declared as "green energy" zones, which are the embodiment of modern global challenges and an approach to the development strategy. In addition, one of the projects that will give impetus to the "green energy" zone will be the implementation of wind power plants with a capacity of up to 100 MW in Lachin and Kalbajar. Currently, power plants, transformers, substations are being built in both Garabagh and East Zangezur, and 12 hydroelectric power plants destroyed in Lachin and Kalbajar are being restored. 7 of them are already in use. All this will increase the energy potential of our country, as well as production and export. Currently, works on the construction of 5 small hydropower plants with a total capacity of 26.9 MW - "Chirag-1", "Chirag-2", "Gamishli", "Meydan" and "Soyugbulag" are being continued. Along with this, restoration work was carried out at two hydroelectric power plants with a total capacity of 6.5 MW. Thus, the restoration of 11 small hydroelectric power plants here during two years gives the energy system a production capacity of about 54 MW.

Laying the foundations of 35 kilovolt substations and Digital Control Centers of "Azerishiq" OJSC in Jabrayil and Gubadli regions has been realized. "Azerenergy" OJSC has issued a Specification for the integration of the 240 MW solar power plant to be built in Jabrayil region by BP.

During the visit, the head of state also got acquainted with the progress of construction at the 330/110-kilovolt "Jabrayil" junction substation. The construction of the "Jabrayil" substation is a very important event. The main goal is to provide the Garabagh and Eastern Zangezur regions with sustainable electricity, to increase the export potential of our country by obtaining an additional and more favorable opportunity with access to the European energy market through the Jabrayil-Nakhchivan-Aghri (Türkiye) substations, and from there through the Turkish energy system. In addition, after many years it will be possible to connect Nakhchivan to the common energy system of Azerbaijan.

Digital Control Center to be built in Jabrayil city is supplied from 110/35/10 kv "Jabrayil" substation. The center will provide a part of the electricity demand of Jabrayil city with 2x2500 KVA transformers, and at the same time, it will allow to manage other power centers planned to be built over a digital platform.

The Digital Control Center has a circular connection with other substations and will provide stable and uninterrupted power supply to a part of the city of Jabrayil.

Digital Control Center to be built in Gubadli city is supplied from 110/35/10 kv "Gubadli" substation. The center will provide a part of Gubadli city's electricity demand through transformers, and at the same time, it will enable the management of other power centers to be built over a digital platform. By establishing connection lines between "Gubadli" city 35/0.4 kv substation and Digital Control Center and "Jabrayil city" substation, and by constructing a double-circuit cable line designed between "Hadrut" junction substations, mutual energy exchange of Gubadli and Jabrayil cities will be ensured.