National Sustainable Energy Action Plan of Azerbaijan

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List of abbreviations

BPP	Bio power plant
CO_2	Carbon dioxide
EU	European Union
GDP	Gross domestic product
GW	Gigawatt
HPP	Hydro power plant
H&PP	Heat-and-power plant
Km	Kilometer
kW	Kilowatt
kWh	Kilowatt hour
MMBTU	Million British Thermal Unit
MWh	Megawatt hour
OJSC	Open joint-stock company
PP	Power plant
RES	Renewable energy sources
SCADA	Supervisory Control And Data Acquisition
SHPP	Small hydro power plant
SPP	Solar power plant
USA	United States of America
US doll	United States Dollar
WPP	Wind power plant

Executive Summary

At the moment Azerbaijan's entire energy consumption needs are met with domestic production, based primarily on the use of its own oil and natural gas. Azerbaijan is a net exporter of oil and natural gas. In 2017 the total crude oil production in Azerbaijan amounted to 38.8 million toe, while natural gas touched 17 million toe. (18.2 billion m3). There are a number of promising fields in Azerbaijan that are being developed. An increase in gas production is expected due to the commissioning of the large Shah Deniz-2 gasfield.

Ensuring long-term energy independence is defined as a policy objective for stimulating economic growth. However, since the country has already achieved energy independence and is a net exporter of energy, the driving force for developing renewable energy sources (RES) is apparently the possibility of increasing the volume of energy supplies to global markets.

The ideological basis for the short, medium and long-term development of the Republic of Azerbaijan is laid in the strategic road maps for the national economy and main sectors of the economy. There are 13 documents in total that were approved on December 6, 2016 by the President of the Republic of Azerbaijan.

Strategic roadmaps for the national economy and the main sectors of the economy are designed to ensure the competitiveness of the economy and to assist the social welfare of the population using a sustainable economic developmental model in Azerbaijan.

The strategic roadmap for economic prospects covers the short, medium and long-term, and consists of an economic development strategy and action plan until 2020, a long-term vision for the period until 2025, and a targeted vision for the period after 2025.

The strategic roadmap envisages that public investment will act as a catalyst, and the private sector will be the engine of economic development.

The strategic vision for the development of the national economy by 2020, in the short term focuses on the recovery of Azerbaijan's economy after the negative impact of external shocks. In the medium term the goal is to achieve diversification, applying new driving forces. And by the end of the period - to improve competitiveness through further integration into the global economy.

The strategic review up to 2020 aims to promote the development of fundamentals in building the economy for 2025 and beyond. Along with the preservation of the important role of Azerbaijan in energy security and the development of transport and logistics corridors in Europe, the progressive development of the economy will be ensured in the areas stipulated in the strategic roadmap.

The long-term forecast until 2025 sees the achievement of enhanced competitive potential through the creation of values, under conditions of mutually beneficial cooperation between all participants of the Azerbaijani economy.

The development of a favorable environment for free competition, accompanied by the support of the private sector, will lead to an increase in investment in the national economy and increased access to markets. The growth of the national economy will be ensured by taking into account the main factors in the global and regional context. The basis for development will be integration into global and regional value chains. The fundamental growth strategy for the development of Azerbaijan until 2025 will comprise of ensuring macroeconomic stability, improving business conditions, encouraging investment by the private sector and supporting the public sector.

The review for the period after 2025 envisages the formation of a strong competitive economy based on the development of high technologies and the optimal structure of the economy, ensuring a high level of social security and achieving a high level of human development.

A strong middle class, effective integration into the world economy, national economic security and a developed infrastructure will be the basis of the strategic vision for the period after 2025. Azerbaijan will be committed to taking urgent, decisive and transforming measures that will make it sustainable and strong in line with the United Nations Sustainable Development Goals.

SDGs

Voluntary National Review 2017

SUSTAINABLE DEVELOPMENT IN THE CONTEXT OF AZERBAIJAN NATIONAL DEVELOPMENT AGENDA

1. The core elements for development model in Azerbaijan were formulated in the mid 1990-s and were gradually and consequently implemented by the Government through various integrated national programs. By 1996 economic growth resumed and in 1995-2003 it averaged at the level of 5.9% allowing macroeconomic stability and gradual restoration of industrial capacities, significant growth in employment and incomes of the population, improvement of the fiscal balance.

2. Continuous efforts of the Government, business community and civil society of Azerbaijan resulted in GDP increase 3.4-fold in 2004-2015 (average 10.6% annually) and 2.9-fold per capita GDP growth allowing Azerbaijan to move to the group of upper middle-income countries. Spurred by the oil-revenues, critical investment, both public and private, were mobilized for modernization of infrastructure, support to non-oil sectors, and financing of human development.

3. Starting from 2010 non-oil sector has been a key driving force of economic growth – while in the oil sector averaged 3.0% annually decline was observed in 2010-2014, non-oil sector growth equaled 8.8% annually.

4. Accelerated economic growth, broad institutional reforms aimed at improved public administration, as well as reforms in health, education and social protection resulted in significant improvement of the country's global ratings reflecting its progress in achieving MDGs and pursuing wider national development agenda.

5. Azerbaijan was assessed as a "leading reformer of the world" in 2009 by the World Bank's "Doing Business" Report. Based on the World Economic Forum's "Global Competitiveness Report for 2016-2017" Azerbaijan is now 27 ranks ahead comparing to 2006 and is 37th among 138 countries. In accordance with this report, Azerbaijan is 39th in the world for the quality indicators of macroeconomic environment, 26th for labor market efficiency, 37th for national income to GDP ratio and 55th for infrastructure quality.

6. Poverty has decreased from 49.0% in 2001 to 7.6% in 2011 and further down to 4.9% in 2015. Azerbaijan's food security is similar to that of the developed countries, with malnutrition affecting less than 5 per cent of the population. In recognition of Azerbaijan's outstanding achievements in implementation of the Millennium Development Goals, Azerbaijan received the 2015 South-South Award. Since 2010 Azerbaijan is in the group of countries with high human development (2015 HDI is above the average of 0.759 for countries in Europe and Central Asia).

7. Successful implementation of the oil-boom based development strategies and progress with MDGs allowed Azerbaijan to move to the longer-term development agenda. The visionary "Azerbaijan-2020" formulated by the President of Azerbaijan in 2012, foresees the country as the place where the population's incomes are high, unemployment is minimum, human capital is highly developed, the environment is protected and every citizen has broad opportunities1. Based on the core elements of the concept of sustainable development the Vision reflects the longer-term national aspirations and goals and the key challenges on the way towards those goals.

AZERBAIJAN ON THE WAY TOWARDS SUSTAINABLE DEVELOPMENT

8. Long-lasting peace, security, stability and social cohesion are the major pre-

requisites for sustainable development. However, the military aggression of Armenia against Azerbaijan does not allow achieving any major progress in the region. Despite the resolutions of the United Nations Security Council 822 (1993), 853 (1993), 874 (1993) and 884 (1993), condemning the use of force against Azerbaijan and occupation of its territories, reaffirming the sovereignty and territorial integrity of Azerbaijan and calling for immediate and unconditional withdrawal of the occupying forces from all occupied territories of Azerbaijan, and in flagrant violation of international law, Armenia continues its purposeful efforts towards consolidating the current status-quo of the occupation, strengthening its military build-up in the seized territories and preventing the hundreds of thousands of forcibly displaced Azerbaijanis from returning to their homes and properties in those areas. The resolution of the conflict would not only bring stability and progress to both Armenia and Azerbaijan; it would also ensure peace and justice in the entire region.

9. Building inclusive and resilient growth, ensuring sustainable development would require moving from oil based to more diversified economy, continuing investment in human development, and ensuring greater connectivity to regional and global markets to fully unleash the exporting capacities of Azerbaijan. At the background of existing and emerging externalities, 12 Strategic Road Maps adopted by a Presidential Decree in 2016 outlining the policy measures focused on re-balancing the economy by supporting new “high-end” sectors. The structure of economy will be adjusted through (i) higher growth of non-tradable sector versus tradable sector, (ii) processing versus production, (iii) private business versus public business, (iv) high technology intensive sectors versus low technology intensive sectors, (v) sectors based on highly qualified labor versus low qualified, (vi) high return markets versus low return markets and (vii) high value added generating sectors versus low value added generating sectors2.

10. While the Government will be pursuing ambitious structural reforms program in the coming years, it considers SDGs as a comprehensive framework providing integrated approach for development complementing and reinforcing the Strategic Road Maps.

- Complex nature of SDGs emphasizes the fact that development goals are indivisible and require concerted efforts of all stakeholders, not just the Government;
- Both the Strategic Road Maps and nationalized SDGs processes would require sophisticated system of indicators and improved data collection system for policy formulation process as well as for monitoring and evaluation;
- “Leaving no-one behind” principle fully coincides with priorities of the Government to address issues of balanced spatial/territorial development and reducing inequalities, eliminating all forms of poverty and empowerment of women and youth. This particularly refers to refugees and IDPs.

11. All Government development plans and programs (both ongoing and those yet to be formulated) during the period until 2030 will be revised, harmonized and aligned to support achievement of nationalized SDGs.

NATIONAL SDG PROCESS – INSTITUTIONAL MECHANISMS FOR AN INTEGRATED APPROACH

12. The National Coordination Council for Sustainable Development with its Secretariat in the Ministry of Economy was established according to the Decree of the President of the Republic of Azerbaijan. The NCCSD has full authority to perform its core functions formulated as follow: Ensure broad based and inclusive stakeholder participation; Translate global sustainable development goals, targets and indicators to the national context; Identify of national priorities and sustainable development gaps; Articulate inclusive and rights-based national strategies and policies; Coordinate and promote collaboration among various

government agencies and ministries; Secure coherence among development partners to align with national priorities; Design national reporting and review framework, and links to regional and global reviews; Identify needs and opportunities for capacity development.

13. To support the NCCSD in both nationalization of SDGs and further implementation of respective programs and plans the government established four Thematic Working Groups (TWGs) – Economic Growth and Decent Jobs, Social Development, Environmental Issues, Monitoring and Evaluation. The NCCSD has the power to establish additional TWGs and engage both local and international expertise to support SDG nationalization, planning and implementation of respective policy measures.

14. The State Statistical Committee (SSC) is identified as a key national agency responsible for processing and maintaining effective and responsive database to measure the progress in achievement of nationalized SDGs. The intensive consultations are still in progress for the alignment of SDG goals, targets and indicators to national priorities. All central government agencies and local governments have appointed the focal points to support SSC in its efforts to collect and process data, formulate, pilot and introduce new indicators for SDG monitoring and evaluation. Extensive use of ICT tools will be promoted at all levels of the government to enable innovative approaches in data collection and processing.

BUILDING NATIONAL OWNERSHIP AND PARTICIPATION

15. The Government of Azerbaijan considers the national SDG process as an opportunity to empower a broader range of national stakeholders, promote participative national dialogue and to streamline wider cooperation on the path to sustainable development. Driven by the principle of “leaving no one behind”, which is a core commitment of the SDGs, and determined to engage all stakeholders in achieving the SDGs, the National Coordination Council for Sustainable Development of Azerbaijan Republic partnered with the UN Office in Azerbaijan conducted a panel discussions on SDG implementation which brought together representatives of the different groups of society (academia, civil society, women, youth, parliament). The government, while acting as coordinator for the attainment of nationalized SDGs, will be facilitating and supporting SDG-focused initiatives of civil society institutions, academia, business and professional associations, other stakeholders and partners.

16. To maintain interactive communications with local and international partners the Government will create an interactive web-platform promoting awareness on global and national SDG goals and targets, milestones and indicators. This web-platform would be instrumental for participatory process of consultations on the national SDGs, for monitoring and reporting process.

17. Local mass media and civil society would be engaged as brokers for this on-line and off-line process, securing outreach to all the groups and segments of society. Special emphasis would be made to hear voices of women, youth, disadvantageous, particularly of refugees and IDPs.

NEXT STEPS FOR 2017 AND BEYOND

18. Nationalization of SDGs through aligning those to the national context and to the Azerbaijan’s strategic development priorities would allow to formulate by end of 2017 National Sustainable Development Goals and Targets, strengthen a broad consensus about those.

19. Subsequently, in 2018, Government would convene a National SDG Conference with UN Country Office to discuss the means of implementation of the national SDG Agenda.

The Conference would be instrumental in defining of new drivers of growth and transformation, and the entry points for interventions, which could generate the larger positive spillovers across various sector of the national economy, covering all the part of the country and ensuring that all people of Azerbaijan are engaged to and could ultimately benefit from the SDG process.

20. Success in the implementation of the 2030 Agenda would also require learning on the best international practices, particularly under the South-South Cooperation modality. Azerbaijan would remain committed for sharing its knowledge and experience in formulating and implementing of nationalized SDGs.

21. Government and its development partners would need to elaborate a system of SDG indicators, critical for monitoring and reporting. Data availably, access to data and capacities to both collect, process and disseminate data remain as one of major challenges ahead requiring dedicated efforts both at national and international levels.

22. The Government would continue relying on UNDP as well as other UN agencies on their support and guidance at the different stages of the national SDG process from the nationalization of the goals towards monitoring and reporting.

Voluntary National Review 2019

MAIN MESSAGES FOR THE SECOND VNR OF AZERBAIJAN ON SDGs

Building opportunities for inclusive and sustainable economic growth for all and 'leaving no one behind' is a priority for Azerbaijan and we have demonstrated firm commitment to transitioning to sustainable development and aligning our national development strategy to the SDGs. The National Coordination Council for Sustainable Development facilitated preparations of VNR. Alongside with the series of meetings with all stakeholders a set of guidelines was prepared by the Working Groups of the Council and presented to each line Ministry to identify specific work falling within their respective areas of responsibility that contribute to the 2030 Agenda.

ACHIEVEMENTS TO SHARE

- Thanks to its continuous efforts at establishing a sustainable development model, Government of Azerbaijan approved a strategic roadmap for the social and economic development of the key sectors with short-term (by 2020), medium-term (by 2025) and long-term target outlooks (beyond 2025).
- Azerbaijan was one of the first countries in the region to undertake MAPS mission aimed at creating a roadmap outlining definitive steps to be taken to accelerate the implementation of SDGs.
- Azerbaijan was named among the top ten reformers in World Bank's Ease of Doing Business Report for 2018, allowing the country to secure 25th place as a favorable investment destination among 190 countries.
- Azerbaijan is investing in innovation initiatives and innovative ideas within the spectrum of SDG accelerators. In 2018 alone, the national innovation contest attracted 220 proposals from young Azerbaijani entrepreneurs, researchers and scientists focused on solutions to some of the pressing challenges towards the implementation of the SDGs.
- In October 2018, Azerbaijan hosted the first high-level forum on sustainable development, a platform to discuss practical solutions to challenges involving inclusive economic growth, productive employment, gender equality, youth participation,

peaceful coexistence and justice for all, as well as access to clean resources and tackling climate change.

- Agency for Development of SME was launched in 2018 and has already started the process of drafting regulatory acts to establish SME Development Centers.
- Active labor market policies, and social protection, play a crucial role in the achievement of SDGs. Assuring equal access of all to public and social services, Government established “Sustainable and Operative Social Protection Agency”.

LESSONS LEARNT

- Along with the nationalization of the SDGs, and alignment of the existing strategies with prioritized targets and indicators, we should work on a new development strategy (2020 to 2030) based on predefined SDG accelerators and integrate those in our state budget.
- Ensuring complete and integrated implementation of the SDGs, participation of businesses in the process is indispensable. Awareness raising, more stringent regulation of environmental issues, increasing private sector financing for SDGs and harnessing CSR funding are all therefore impending.

CHALLENGES AND AREAS WHERE SUPPORT IS NEEDED

- Statistical framework and other data-related complexities, remains a significant challenge for the country to define our targets for the prioritized SDG indicators, while we seek beneficial partnerships to increase the impact of our investments and interventions in these areas.
- The Armenia-Azerbaijan Nagorno-Karabakh conflict represents a serious threat to peace, security and cooperation in the South Caucasus. Armenia continues to use military force against Azerbaijan by occupying one fifth of its territory and preventing Azerbaijani internally displaced population from returning to their homes. It disregards the UN Security Council resolutions 822 (1993), 853 (1993), 874 (1993) and 884 (1993), which reaffirm that the Nagorno-Karabakh region is an inalienable part of Azerbaijan and call for immediate, full and unconditional withdrawal of the occupying forces from all occupied territories of Azerbaijan. Addressing the challenges associated with the conflict through its lasting political settlement in accordance with the above-mentioned UN Security Council Resolutions will be a significant contribution to the implementation of SDGs.
- Azerbaijan endeavors to protect and restore its land ecosystems and promote their sustainable use. However, low environmental awareness is one of bottlenecks to progress in fighting climate change and protecting environment.
- Implementation of the SDGs also requires widespread application of the principles of the circular economy – such as efficient and responsible resource consumption, waste management and symbiosis among the major industries currently dominating the country’s economy.

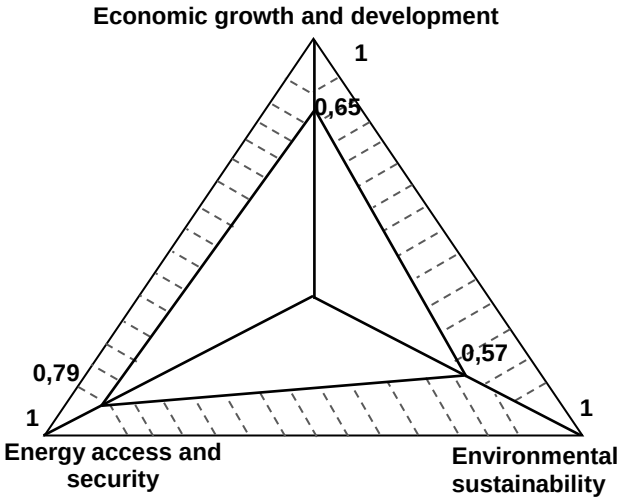
CONCLUSION

Azerbaijan will continue its efforts to implement 2030 Agenda with a view to achieve the SDGs. The country will strive to preserve macroeconomic stability by allocating resources in such a manner as to increase the share of the private sector in the overall economy, reducing economic dependency on oil and gas production thus promoting diversification of the economy, accelerating resource mobilization, and integrating sustainability practices into overall national development strategy.

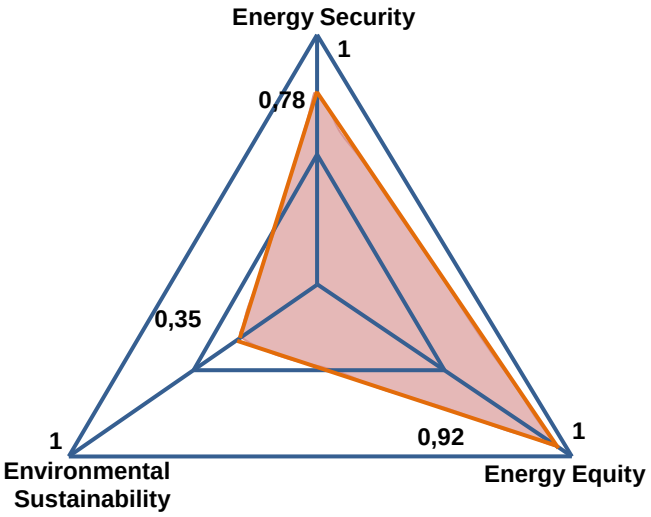
Energy Sustainability Balance and Energy architecture performance index of Azerbaijan

To assess the current situation and determine the prospects of energy economy development the concepts, strategies and programs of development of the energy sector are developed and adopted in many countries, as well as the fundamental works are carried out by such international organizations as World Economic Forum (WEF), World Energy Council (WEC) and the International Energy Agency (IEA) in the field of energy efficiency, energy sustainability, energy security.

According to the methods of World Economic Forum and World Energy Council the energy triangles of effective and sustainable performance of Azerbaijan Republic's energy have been developed by us, and on their basis the potentials of improvement of effective and sustainable performance of Azerbaijan energy for each component have been determined, as it is shown in Figure 1.



Energy architecture performance index of Azerbaijan



Energy Sustainability Balance of Azerbaijan

Figure 1

As it is seen from figure, when calculating the energy sustainability index in Azerbaijan energy triangle the Energy Security component has a better index, Energy Equity has a little worse one, and Environmental Sustainability has the lowest index.

It should be noted, that the results obtained by the presented methods are advisory ones, they can be used for comparative analysis of energy performance and determination of improvement potentials in different world countries, but these results do not always reflect the real situation in energy for specific country. The main parameter for study of the above-mentioned directions of energy performance is a level of fueling of the country.

According to the main performance parameters of the fuel-energy complex, determined according to the methods of World Bank, Azerbaijan belongs to the group of the largest raw hydrocarbons exporting countries

The studies of effective and sustainable performance of energy base on so-called

power triangles, whose peaks for efficiency are–Economic growth and development, Energy access and security, Environmental sustainability, and for sustainability–Energy security, Environmental sustainability, Energy equity. As it is seen, both an energy security, and environmental sustainability are included as the subsystems of effective and sustainable performance of energy, although both the composition of indicators and their weighting factors are different in the first and in second cases.

For Azerbaijan, as exporting raw hydrocarbons country the represented methods of estimation of energy's development sustainability are not quite adequate, as a peak of "energy equity" of energy triangle is not an essential component, the physical affordability of energy today and in the nearest future, is 100% in practice, and a price of energy including electricity is one of the lowest ones. At the same time in the subsystems of assessment of energy sustainability balance the "economic growth and development" is absent, although energy for Azerbaijan is the main energy source of foreign exchange earnings. The only indicator of economy development–energy intensity is included in the composition of indicators of environmental sustainability. On the basis of aforesaid, we have developed the method of study of energy sustainability for exporting countries ¬¬on the basis of energy tetrahedron, a peak of which is contextual performance, and a foundation–energy security, environmental sustainability, economic growth and development.

The indicators of subsystems of effective performance of energy of Azerbaijan–economic growth and development, environmental sustainability and energy access and securityare presented in Table 1.

Table 1.Energy Architecture Performance Index

Expand All Pillars	Info	Rank / 126	Score
Energy Architecture Performance Index 0-1 (best)		32	0.7
Economic Growth and Development 0-1 (best)		8	0.65
GDP per unit of energy use PPP $/kg of oil equivalent		37	11.0
Fuel Imports % GDP, adjusted for LCU		8	0.0
Super Gasoline - Level of Price Distortion through subsidy or tax 0-1 (best)		50	0.8
Diesel - Level of Price Distortion through subsidy or tax 0-1 (best)		99	0.4
Electricity Prices for Industry US$/kilowatthour		-	-
Fuel Exports % GDP		10	0.4
Environmental Sustainability 0-1 (best)		84	0.57
Alternative and nuclear energy% total energy use, incl. biomass		110	0.0
Nitrous oxide emissions in energy sectormetric tons of CO2 equivalent/million population		22	15.0
CO2 emissions from electricity production grammes CO2/kWh		76	468.8
Methane Emissions from energy sector metric tons of		111	1208.5

Expand All Pillars	Info	Rank / 126	Score
CO2 equivalent/million population			
Particulate matter (2.5) concentration µg/m3		94	20.8
Average Fuel Economy for passenger cars 0-1 (best)		28	0.7
Energy Access and Security 0-1 (best)		41	0.79
Electrification rate %		1	1.0
Quality of electricity supply 1-7 (best)		60	4.9
Percentage of population using solid fuels for cooking %		66	0.1
Energy imports, net % energy use		8	-3.3
Diversity of TPES (Herfindahl index) 1-0 (best)		92	0.5
Diversification of Import Counterparts (Herfindahl Index) 1-0 (best)		51	0.2

Introduction (State of the national energy sector)

The Republic of Azerbaijan is an energy independent country, with all its needs for basic energy resources being provided from domestic sources. The situation will remain the same in the foreseeable future, and therefore it can be stated with confidence that, in general, the energy security of the Republic of Azerbaijan regarding energy availability is fully ensured.

Currently, of all energy resources existing in the Republic of Azerbaijan, oil and oil products, natural gas and the energy of large rivers (hydroelectric power stations - HPS) have been developed the most. Energy resources such as wind, sun and other renewable energy sources, which Azerbaijan is rich in, will continue to develop, and it is expected that in the next decade there will be a sharp increase in the share of alternative and renewable energy sources in the overall balance of energy consumption due to their universal use.

Background

Azerbaijan, officially the Republic of Azerbaijan, is a country in the South Caucasus region of Eurasia at the crossroads of Eastern Europe and Western Asia. It is bounded by the Caspian Sea to the east, Russia to the north, Georgia to the northwest, Armenia to the west and Iran to the south. The exclave of Nakhchivanis bound by Armenia to the north and east, Iran to the south and west, and has an 11 km long border with Turkey in the northwest.

According to the International Monetary Fund, GDP per capita on PPP was around $ 18,076 in 2018. Its strategic location on the Caspian Sea provides great potential regarding oil and natural gas resources. Azerbaijan is an important oil exporter, abundant with fertile agriculture lands and a well educated labor force. It acts as a transport corridor between Europe and Central Asia.

The population, according to estimates for January 2019, is more than 10 million, the territory amounts to 86,600 km². (By both these indicators Azerbaijan is the largest country in Transcaucasia). Its capital is Baku. The official language is Azerbaijani.

After the restoration of its independence in 1991, the Republic of Azerbaijan began to realize its sovereign rights in the economic field and implemented an independent policy. The main areas of this policy are the organization of the economic system based on different sectors, transition to market economy and integration into the globaleconomy.

Azerbaijan is currently involved in the implementation of huge energy projects. Oil and gas projects are successfully implemented in the Azeri Caspian sector. Azerbaijan is a country, which plays an extremely important role in the Caspian and Caucasian regions, particularly in the development of transport infrastructure in the Caucasus and theimplementation of energy projects. It was the first country in the region to explore its huge energy potential, to form an absolutely new economic model in regional development, and to expand political and economic relations between Europe andAsia.

In the beginning of the economic recovery period, the country lacked oil- exporting infrastructure. In order to fill this gap, in 1996 Azerbaijan signed an agreement that allowed it to export oil via the Baku-Novorossiysk pipeline. In 1999 the new Baku-Supsa pipeline was put into use. Additionally, an agreement was reached on the construction of the Baku- Tbilisi-Ceyhan pipeline, which is currently the major oil-exportingpipeline.

The oil and gas sector has played a dominant role in developing other sectors of the economy. A focused economic policy led to macroeconomic stability and sustainable

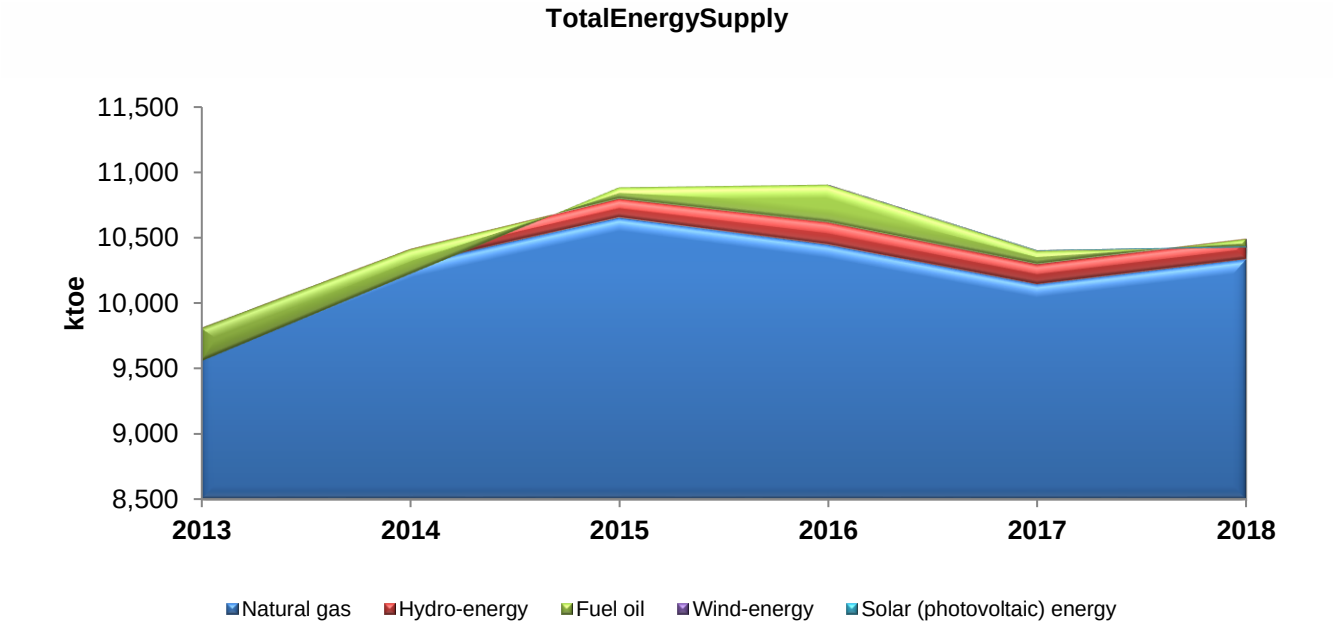
economic growth. As a result of this, reforms were initiated in all economic fields and new measures were taken for the social welfare of the population.

Azerbaijan is a member of the United Nations (UN), Organization of Security and Cooperation in Europe (OSCE), Council of Europe (CE), Commonwealth of Independent States (CIS), GUUAM, Organization of Islamic Conference, Black Sea Economic Collaboration (BSEC), and Organization of Economic Cooperation (OEC). Azerbaijan also actively cooperates with the European Union, NATO, International Monetary Fund, European Bank for Reconstruction and Development, Islamic Development Bank, and other organizations.

Energy Supply

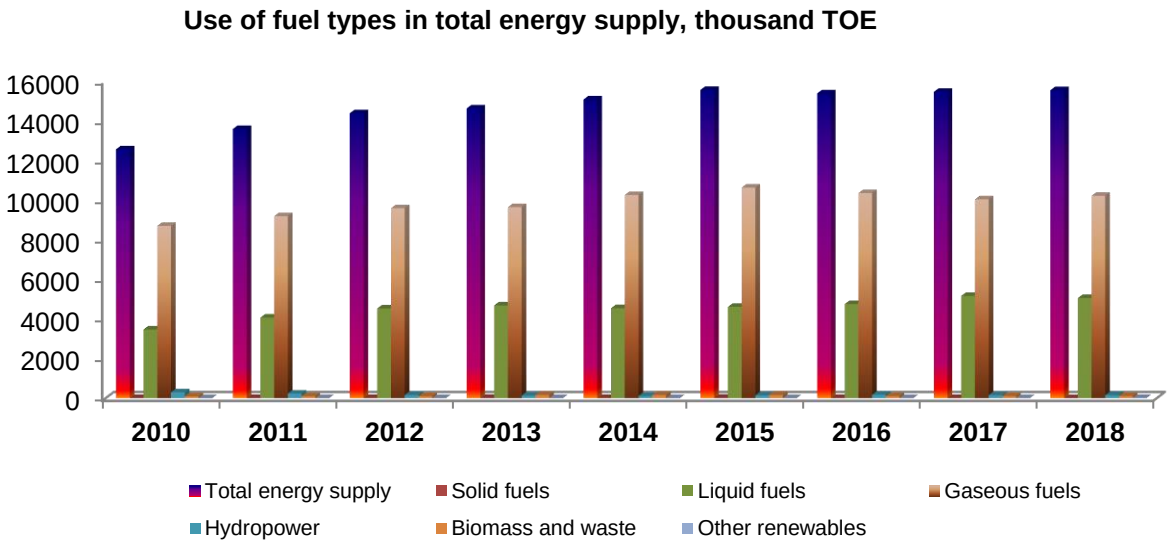
Azerbaijan procures 100 percent of its gross energy consumption from domestic production, which is currently based mainly on the use of its own hydrocarbon reserves, namely oil and natural gas. The energy sector of the country does not depend on foreign energy. Azerbaijan exports oil, natural gas and electricity.

From the early 1990s to the end of 1997, the demand for primary energy decreased. The average growth rate from 1990 to 1997 was –11 percent. The demand for primary energy began to rise again only in 2001, but in the period from 2001 to 2009 the average growth rate remained low. The pace of energy resources has been changing in energy supply since 2010 and is shown in the graphicsbelow.



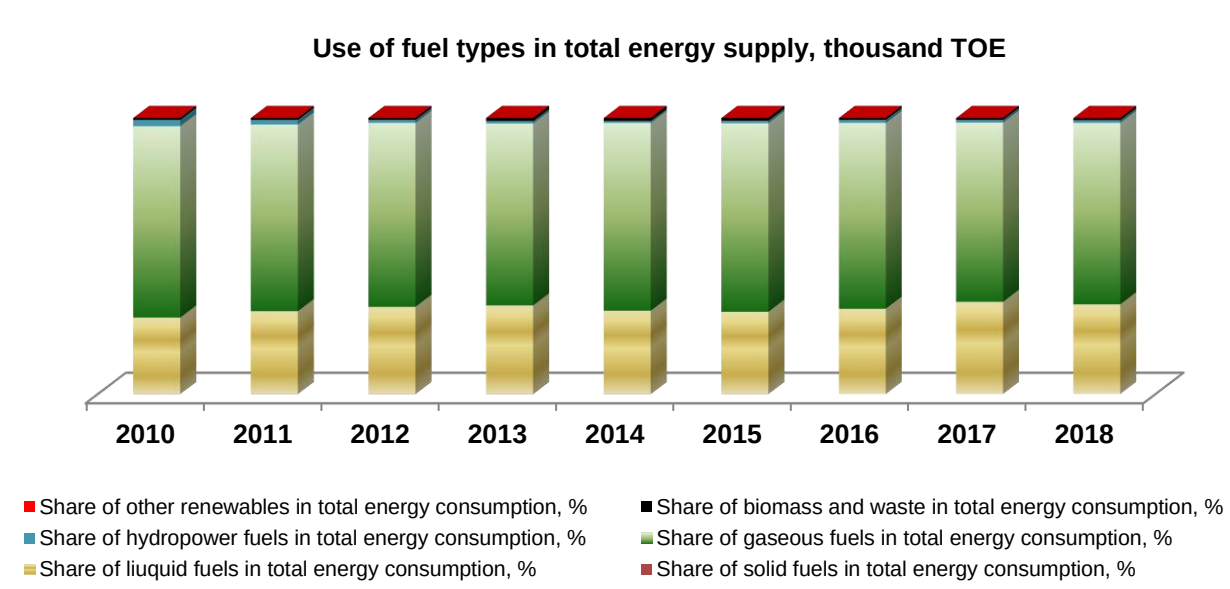
Source: Azerbaijan Statistics,2019

Figure 2



Source: Azerbaijan Statistics,2019

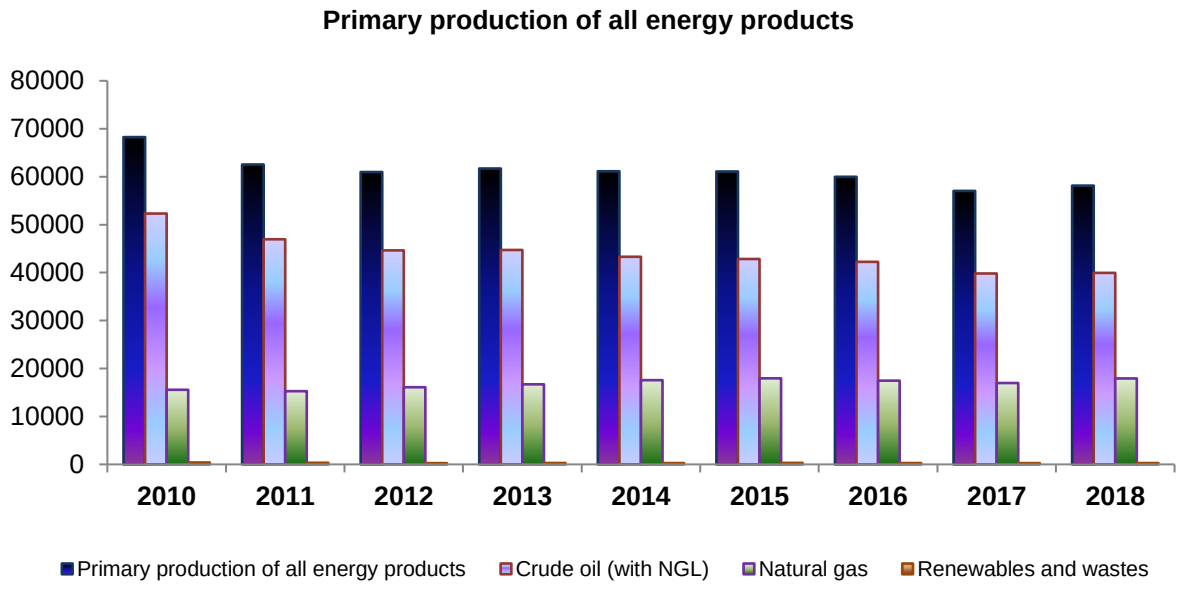
Figure 3



Source: Azerbaijan Statistics, 2019

Figure 4

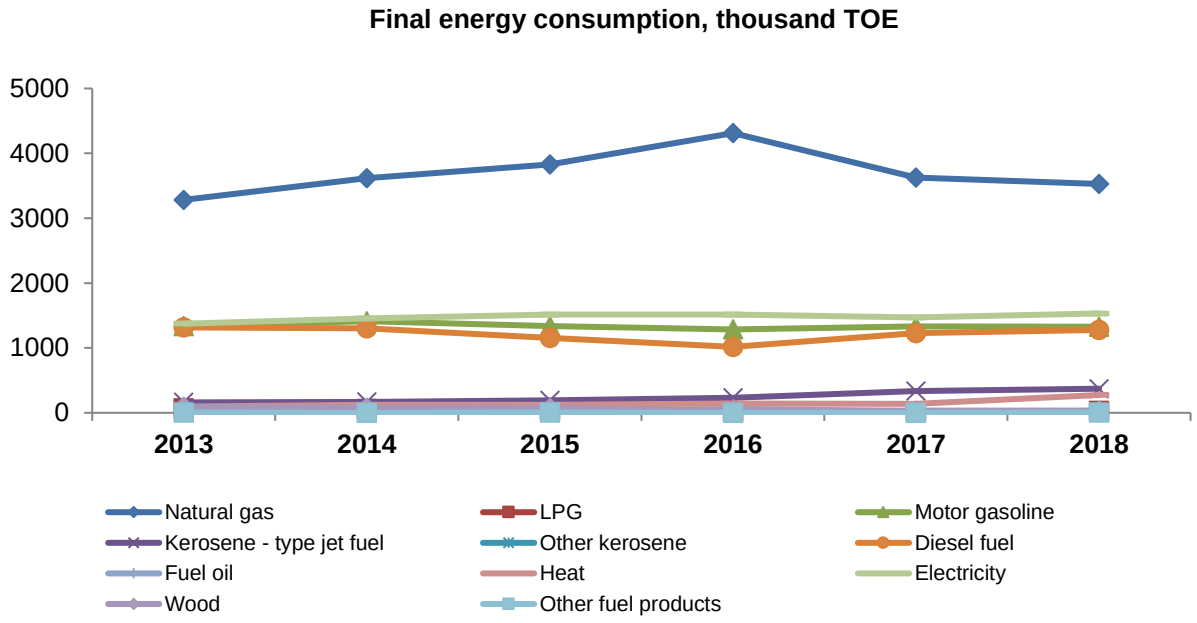
As can be seen from the figures, the main share of the resource base of energy supply is accounted for by petroleum products and natural gas- together they constitute more than 98 percent.



Source: Azerbaijan Statistics, 2019

Figure 5

Oil and natural gas are the main energy resources in the country's energy production. Their share is more than 99 percent. About 80 percent of the oil and gas produced is exported. The figures below show the final consumption of various types of energy. In the balance of final energy consumption natural gas has the biggest share (about 43-50 percent), followed by electricity - about 18 percent, motor gasoline - slightly more than 16 percent and diesel fuel - about 15 percent.



Source: Azerbaijan Statistics, 2019

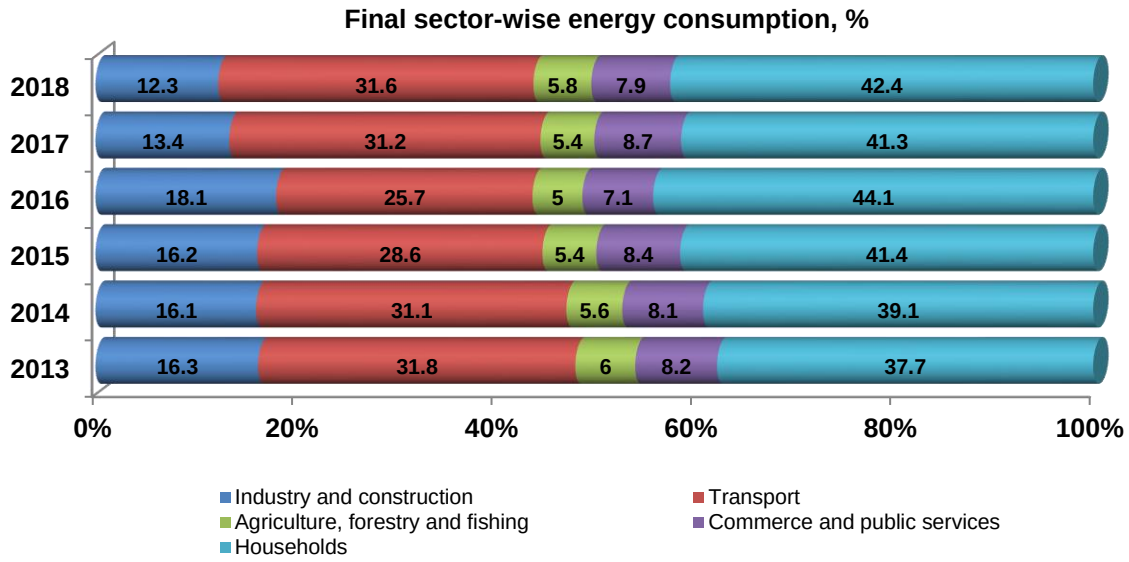
Figure 6

The share of the remaining 7 types of energy carriers in the balance of final energy consumption is insignificant, and in total does not exceed 4 percent.

Energy Demand

Final sector-wise energy consumption

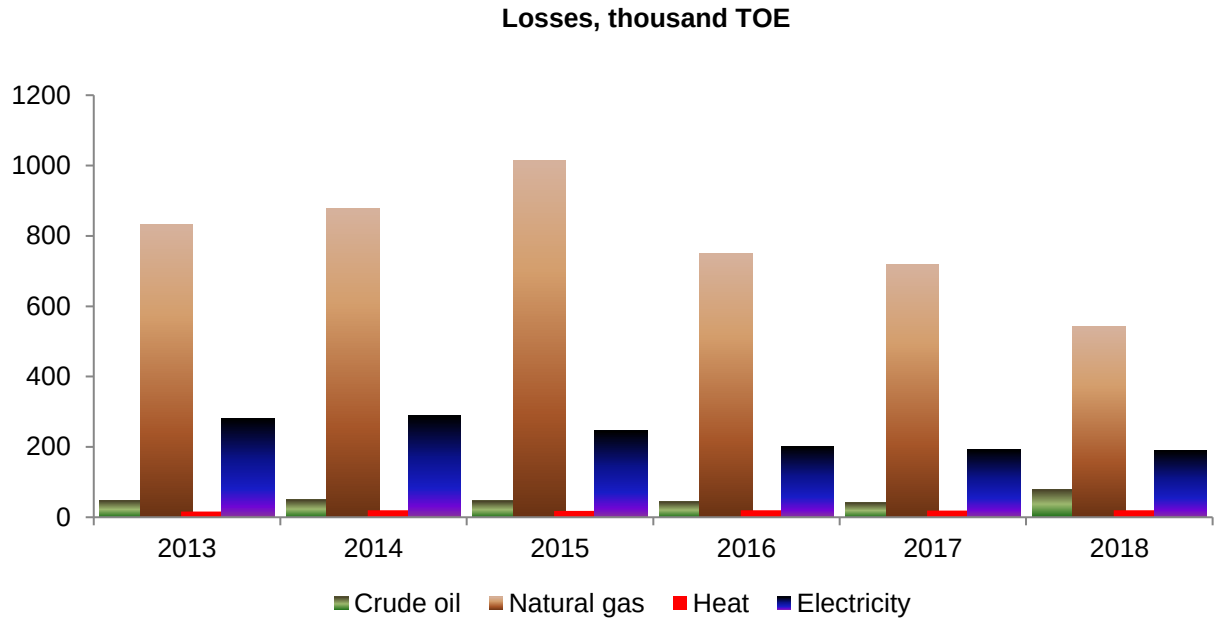
In 2013, the share of consumption in the residential sector was 37.7 percent of the total final energy consumption, in the transport sector - 31.8 percent, in industry - 16.3 percent. Non-energy sector used 6.0 percent and consumption in the commercial sector was about 8.2 percent of the final energy consumption. The following figure shows the dynamics of the share of each sector over the past 6 years. During the period under review, consumption in the industrial sector decreased to 12.3 percent, while in the housing sector it increased significantly and became more than 42 percent.



Source: Azerbaijan Statistics, 2019

Figure 7

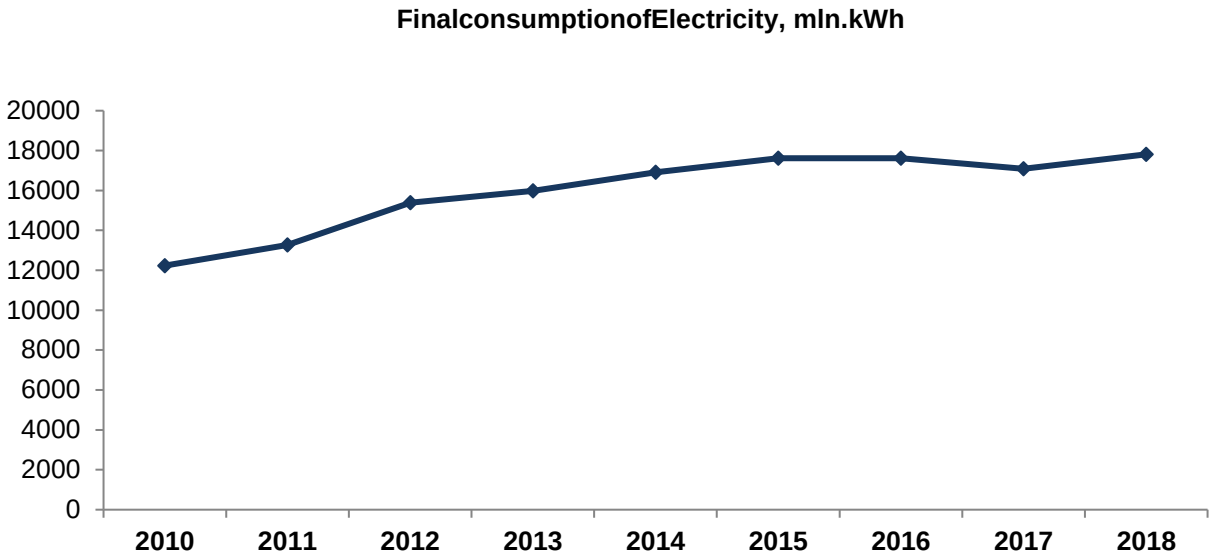
The figures below present values of energy loss over the last 6 years. It can be seen that a significant part of all losses is related to the loss of natural gas and, therefore, improving the business environment of the gas sector will lead to an appreciable increase in energy efficiency.



Source: Azerbaijan Statistics, 2019

Figure 8

Electricity

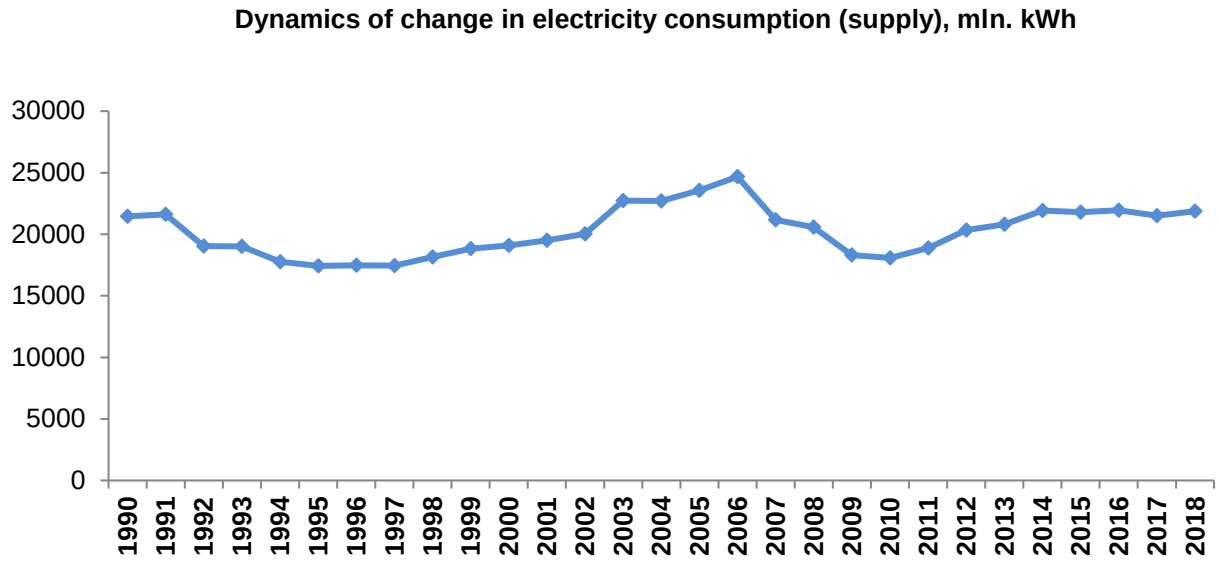


Source: Azerbaijan Statistics, 2019

Figure 9

The time history of electric energy consumption in Azerbaijan Republic over 1990-2018 is shown in Figure 10.

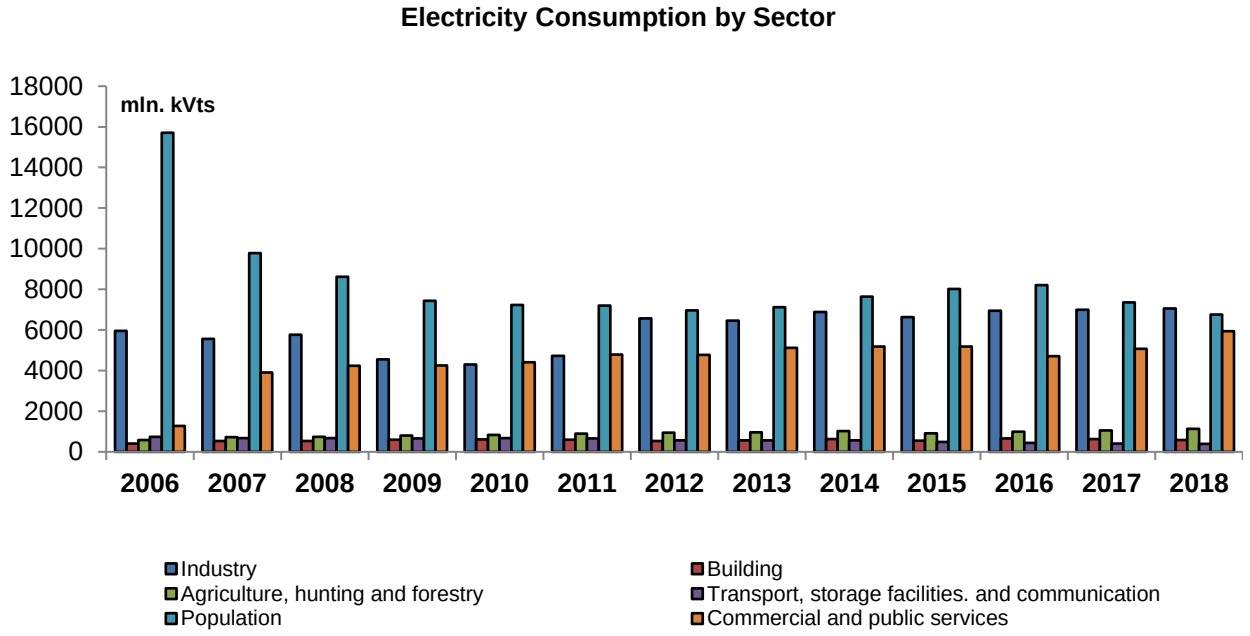
As it is seen from the figure of electric energy consumption, there are two explicit reductions of electric energy consumption in Azerbaijan over the period under consideration. The first depression of electric energy consumption, having a long duration, fell on 90s of the last century and was associated with the disruptions of economic relations between independent countries, formed as a result of collapse of Soviet Union, and decline of the economy including the electric energy industry. After 2006 the second decrease of electric energy consumption did not last relatively long (2008-2011) and was due to several factors, such as a threefold increase of electricity tariff, the installation of electricity meters was almost completed, heating supply system in the big cities was rehabilitated and others. High energy consumption in 2006 was mainly connected with high electric energy consumption by the population (≈64%). Due to the uneven nature of energy consumption over the last 20 years, for drawing up a forecast of energy consumption as an information base it is possible to make forecasts of electric energy consumption with using different methods with taking not all data series, but some periods of the dynamics of electric energy consumption change.



Source: Azerbaijan Statistics, 2019

Figure 10

The graphs of electric energy consumption over 2007-2018 for 6 economy subsystems (industry; construction; agriculture, hunting and forestry; transport, barn farm and communications; population; commercial and public services) are shown in Figure 11.



Source: Azerbaijan Statistics, 2019

Figure 11

As it is seen from the figure 10, the largest variability of electric energy consumption in theperiodsince 2006 is observed for a population group over 10 years, in this field electric energy consumption decreased by 50%.

Percentage changes of electric energy consumption on branches of industry are shown in Table 2.

Table 2.

%	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Industry	26,3	28,0	24,8	23,8	25,1	32,3	31,1	31,4	30,4	31,6	32,5	32,3
Building	2,5	2,6	3,2	3,4	3,2	2,6	2,7	2,8	2,5	3,0	2,9	2,7
Transport, storage facilities. and communication	3,2	3,2	3,6	3,8	3,5	2,8	2,7	2,6	2,2	2,0	1,9	1,8
Agriculture, hunting and forestry	3,4	3,6	4,4	4,6	4,8	4,7	4,6	4,7	4,2	4,5	4,9	5,2
Commercial and public services	18,4	20,6	23,3	24,4	25,4	23,4	24,6	23,6	23,8	21,4	23,6	27,2
Population	46,2	41,9	40,6	40,0	38,1	34,2	34,2	34,9	36,8	37,4	34,2	30,9

As it is seen from the table over 2007-2018 the major changes have occurred in the electric energy consumption structure. Thus, the share of commercial and public services, industry and population in the structure of consumption has significantly changed. The share of commercial and public services increased by 8.8%, the share of industry increased by 6%, and the share of household decreased by 15.3%. However, the share of commercial and public services over the last three years did not practically changed and amounted to 27.2%, the share of industry grew relatively slowly, there are no significant changes in other sectors.

To make a forecast of electric energy consumption on the subsystems' economy on the basis of retrospective data on electric energy consumption of subsystems, the approximating functional dependencies with using the least-squares method have been obtained.

Based on the shown dependencies, the electric energy consumption on economy subsystems up to 2030 was predicted.

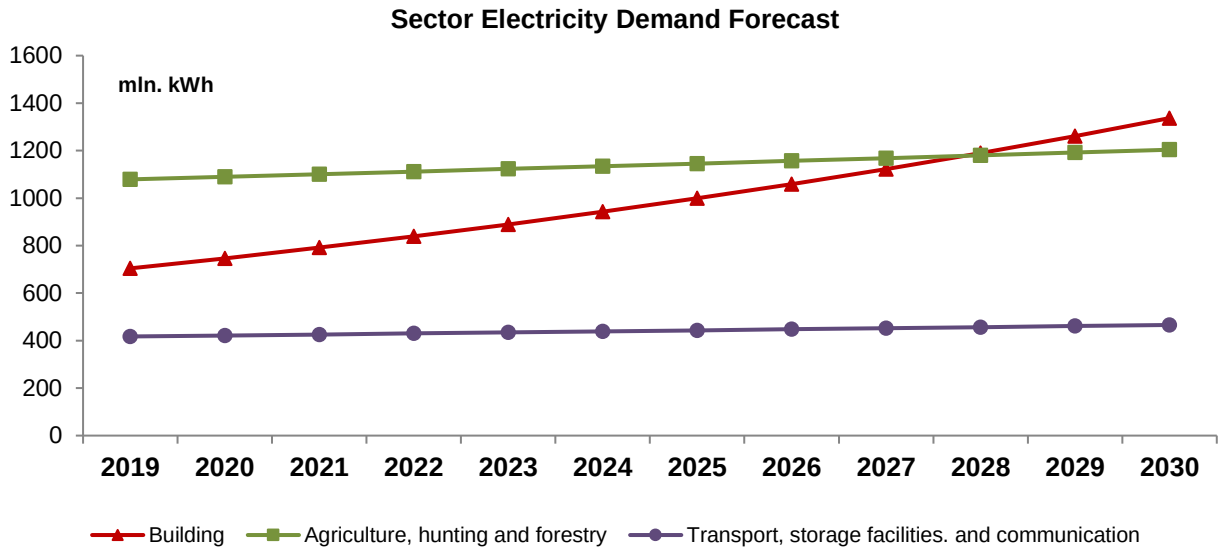


Figure 12

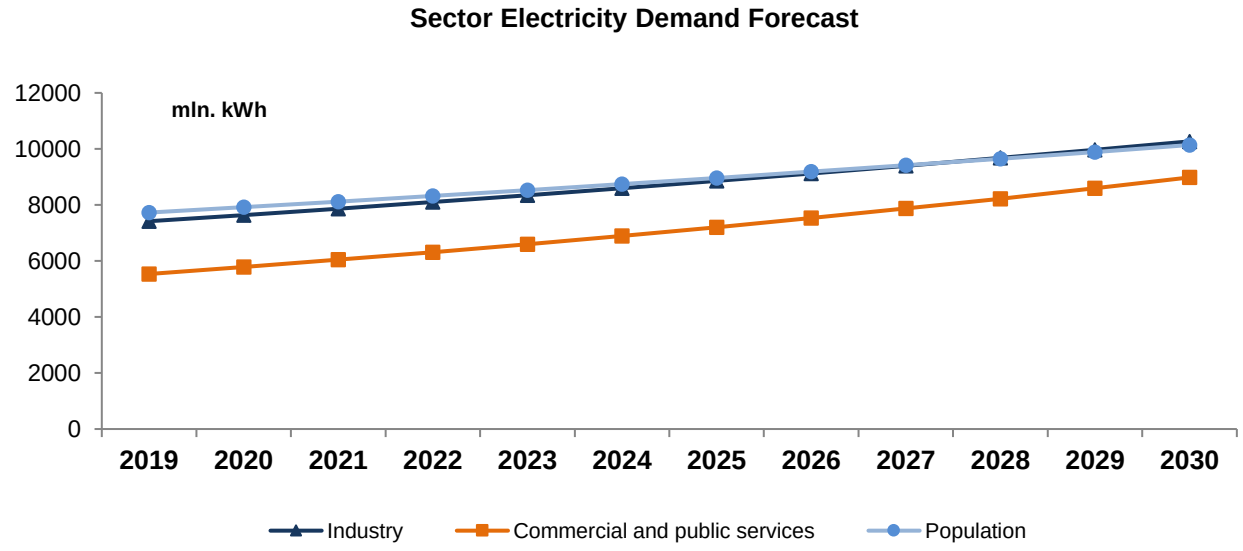


Figure 13

On the basis of retrospective data the forecast of electric energy demand by 2030 is shown in Figure 14.

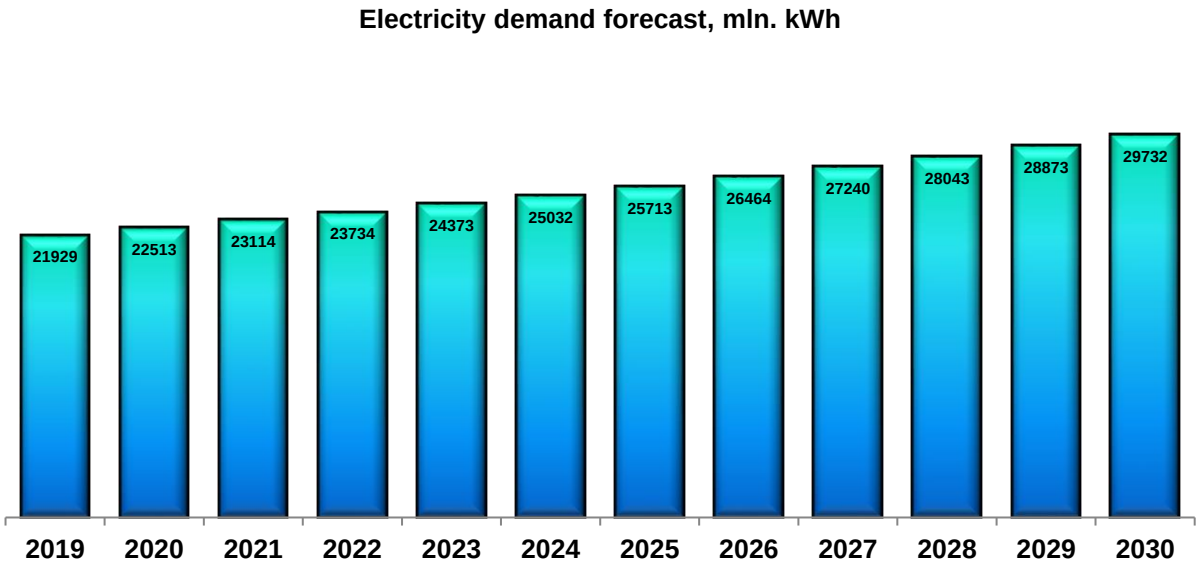
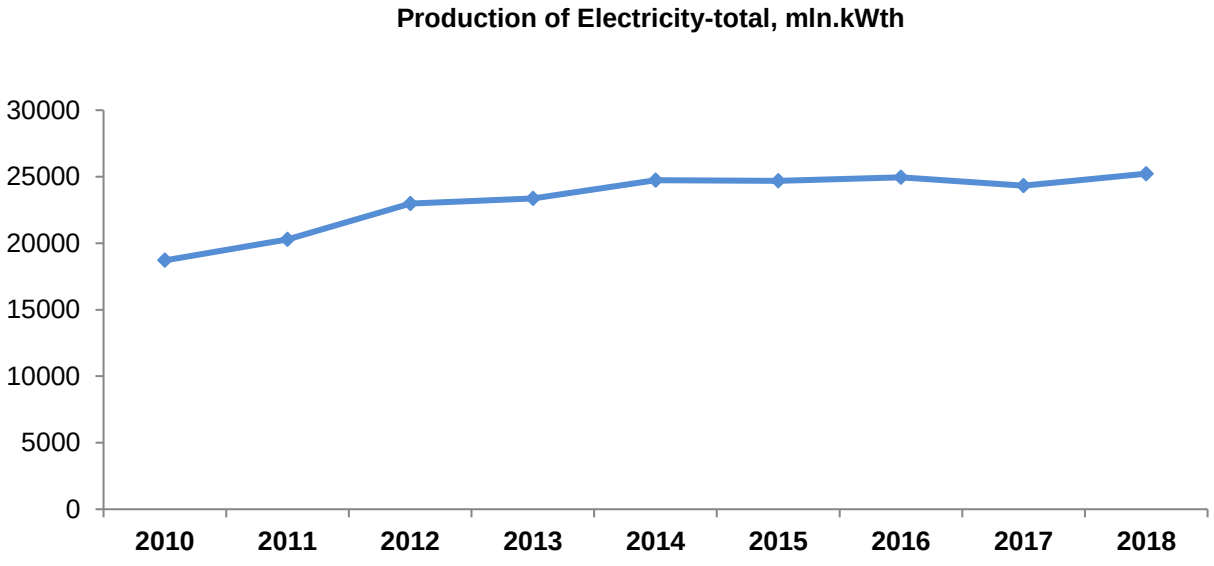


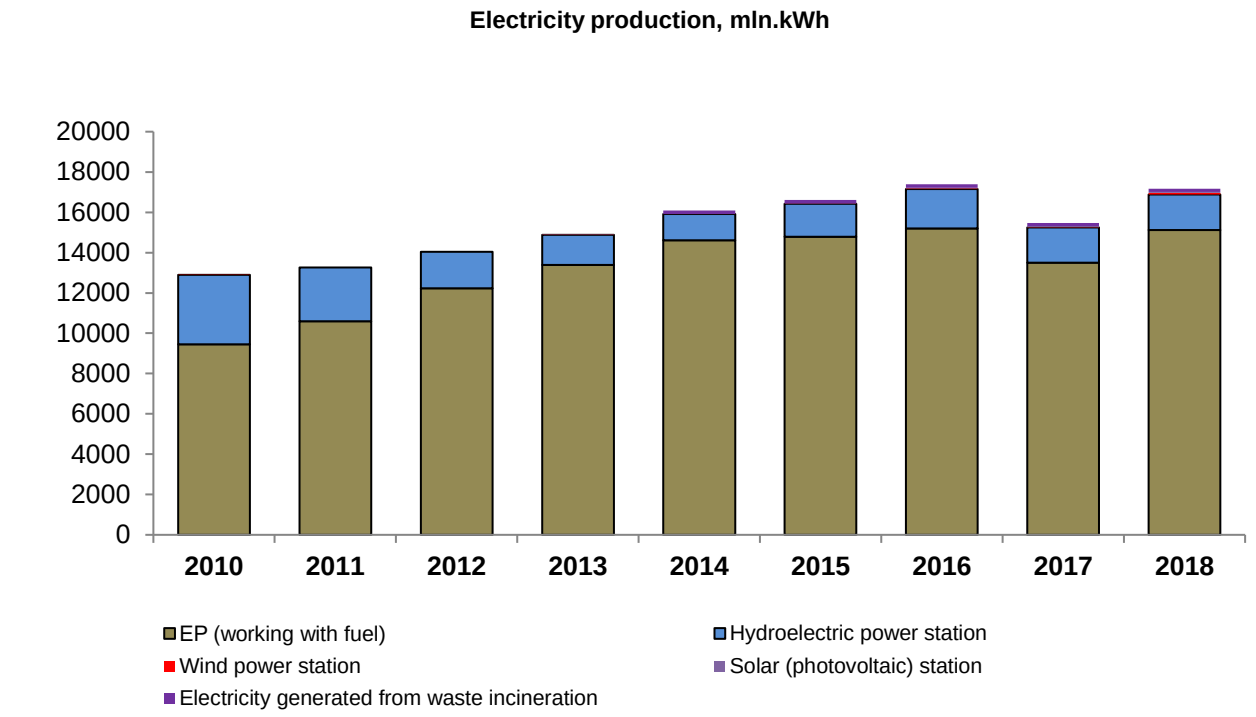
Figure 14

In the assumed basic version of forecast of electric energy consumption, the annual growth of electric energy consumption corresponds to 3.4%, which with a determined elasticity coefficient corresponds to a growth of non-petroleum sector of the economy.



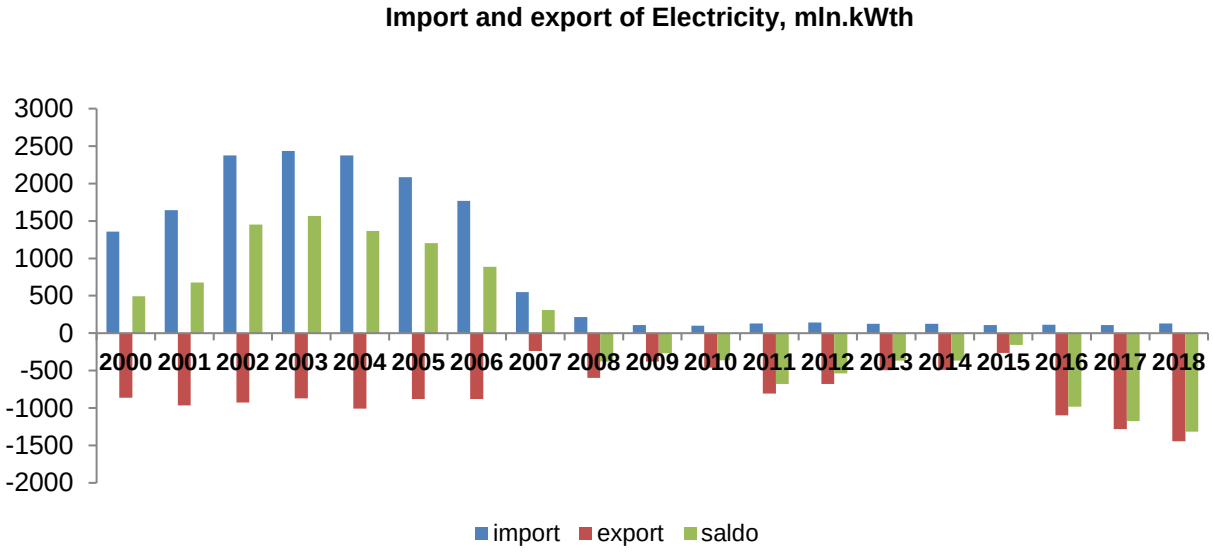
Source: Azerbaijan Statistics, 2019

Figure 15



Source: Azerbaijan Statistics, 2019

Figure 16



Source: Azerbaijan Statistics, 2019

Figure 17

The table below shows the new generating capacity of the energy system of Azerbaijan.

Table 3.

№	Power Plants	Unit	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
I	New capacity-total:	**MW**	**785**	**785**	**1007**	**1089**	**1171**	**1713**	**1795**	**2567**	**2879**	**2891**	**2903**	**3515**
1	Shimal PP (CCP-2)	MW	400	400	400	400	400	400	400	400	400	400	400	400
2	Ag Sheher TPP	MW								300	300	300	300	300
3	Sheki PP	MW												200
4	Astara (Masalli) PP-2	MW												200
5	HacmazPP-2	MW												200
6	Shirvan 2 TPP	MW									300	300	300	300
7	SangacalPP 2	MW	385	385	385	385	385	385	385	385	385	385	385	385
8	Yashma PP	MW						460	460	920	920	920	920	920
TOTALPP		MW	**785**	**785**	**785**	**785**	**785**	**1245**	**1245**	**2005**	**2305**	**2305**	**2305**	**2905**
9	HudaferinHPP	MW			100	100	100	100	100	100	100	100	100	100
10	Gizgalasi HPP	MW			40	40	40	40	40	40	40	40	40	40
11	Small HPPs	MW			12	24	36	48	60	72	84	96	108	120
TOTAL HPP		MW			**152**	**164**	**176**	**188**	**200**	**212**	**224**	**236**	**248**	**260**
12	APP (wind, solar)	MW			70	140	210	280	350	350	350	350	350	350

As can be seen from the table, by 2030 more than 3,500 MW of capacity will beintroduced into the Azerbaijani energy system, which will be about 40% of installed capacity.

Table 4 presentsgas share in fuel in % and fuel consumption per 1kWh.

Table 4.

	2010	2011	2012	2013	2014	2015	2016	2017	2018
Gas share in fuel, %	99.93	97.87	97.75	99.97	99.91	91.06	85.45	92.74	100
Fuel consumption per 1kWh, gr/kWh	318.7	313.98	314.94	304.43	293.76	292.18	285.91	296.3	279.78

Economic conditions

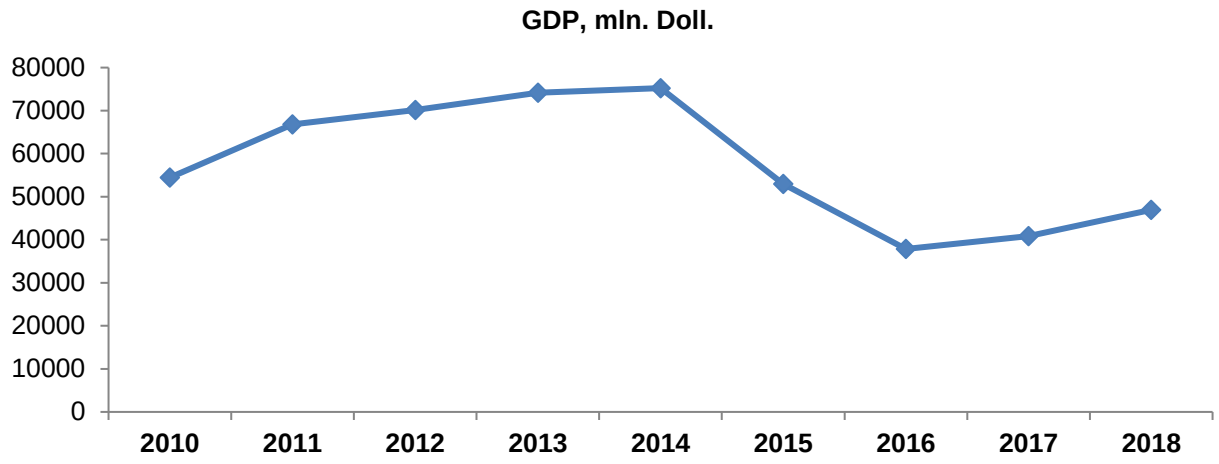
Since gaining independence the economic development of the country can be divided into two main periods. During the first period, from 1991 to 1995, the economy underwent chaos. Azerbaijan faced a lot of political, military and economic problems, which were making the situation even more complicated. The second period is characterized by macroeconomic stability and dynamic development of the economy staring in 1996.

Due to the large-scale fundamental reforms undertaken in the economy since that time, the country has achieved significant results. The extraction and export of oil and gas are the main factors driving the growth of the Azerbaijani economy. The agreements on joint activities for the extraction of oil and gas, signed on September 20, 1994 with large

companies representing the most developed countries of the world, stimulated the rapid development of the oil and gas sector. The production volume increased due to noticeable progress in all industries, including oil and gas, chemical and petrochemical, engineering, metalworking industries, building materials industry andconstruction.

Over the past few years, the Government of Azerbaijan has been working to integrate the country into the world economy, attract foreign investment, diversify the economy and reduce the impact of external shocks on economic development. The large-scale economic reforms that have been carried out in Azerbaijan over the past five years have achieved notable progress in improving regulation and promoting the diversification of the national economy, especially in sectors such as agriculture, tourism and information and communication technologies. In particular, the significant economic reforms of 2007 and 2008 gave grounds for including Azerbaijan into the World Bank's ranking of the 10 most successful countries in the field of economic reforms in the framework of the annual Ease of Doing Business report in 2009. Azerbaijan has achieved significant success in diversifying the economy and developing other sectors besides energy. .

In 2011 the share of non-oil sectors increased by almost 10 percent, while in the energy sector the growth rates did not change. In 2000–2005, the average annual GDP growth rate was about 10 percent, in 2005–2007, the growth rate increased almost 3 times and reached an average of 28 percent, then decreased and in 2008–2009 it was 10 percent per year. The following figure 18 shows the dynamics of absolute indicators and GDP growth rates for Azerbaijan in 2010-2018.



Source: Azerbaijan Statistics, 2019

Figure 18

That change in GDP is related mainly to external conditions - the price of oil. Following the devaluation of the Azerbaijani Manat in 2015, 2016 was the worst year in economic terms in the last ten years, due to the fact that the price of oil decreased more than threefold and, accordingly, the inflow of currency from hydrocarbon exports decreasedtoo.

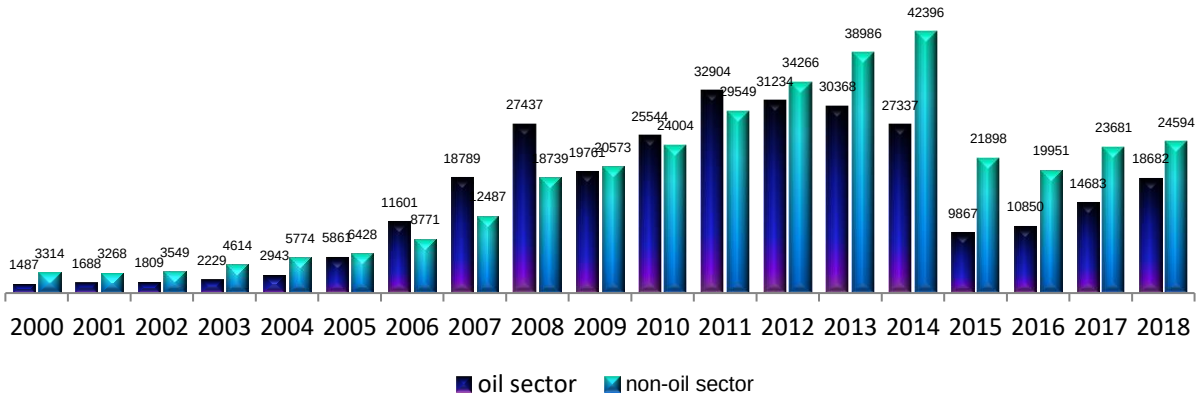
With a decrease in exports of Azerbaijani hydrocarbons, the situation with investments in the economy, including in the oil and gas sector of the country, is deteriorating, while the volume of foreign investment compared to domestic investment has decreased slightly. The maximum annual volumes of foreign investment since the beginning of the implementation of the Contract of the Century fell on 2014, when USD 11,697.7 million was invested in the economy of Azerbaijan. Already in 2017, the volume of foreign investment decreased by 22%

and amounted to $ 9,120.5 million. During the period under review, total investments in the economy of Azerbaijan have decreased by approximately two times. So, if in 2014, total investments amounted to $ 27,907.5 million, then in 2017, $ 13,851.2 million was invested. Indicators on domestic investment have deteriorated significantly in recent years, so in 2016, these investments compared to 2014 decreased by almost 4 times and amounted to US $ 4,730.7 million. As for investments in the oil and gas sector of Azerbaijan, the decline in investment here compared to the non-oil sector is small. If the volume of foreign investments in the oil sector of Azerbaijan in 2014 was approximately 6,730.7 million US dollars, over the same 2016 this figure decreased by about 27% and amounted to 4,900.8 million US dollars. This decrease in investment is mainly due to the practical completion of capital works within infrastructure projects, for example, in 2018, the construction of three important components of the South Gas Corridor was completed.

With the increase in oil prices, 2017 has become a year of stabilization in the economy and since the beginning of 2018 there has been a real growth in the economy. In the first quarter Azerbaijan's economy grew by 2.3 percent, while growth in the non-oil sector was about 3 percent, industrial production increased by 2 percent, and non-oil industry - by about 10 percent. $ 3.5 billion was invested in the country's economy during the first quarter, and a significant part of this comprises of forown investments.

Foreign-exchange reserves increased by $ 2.2 billion and now are equal to $ 44.2 billion, foreign trade turnover grew by 31 percent, non-oil exports increased by 37 percent, total exports grew by 24 percent.

The figure 19 shows the GDP of the oil and non-oil sectors. Since 2011, the non-oil sector has dominated the oil sector due to the policy of diversification of the economy carried out by the leadership of Azerbaijan.



Source: Azerbaijan Statistics, 2019

Figure 19

Below is a graph of the forecast for GDP growth in Azerbaijan until 2030.

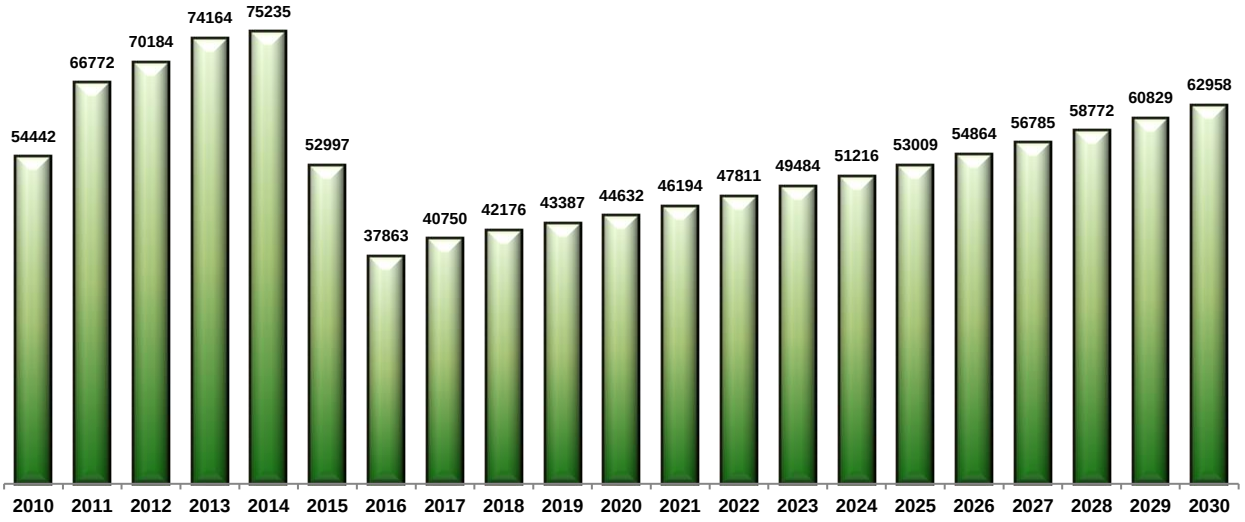


Figure 20

Below is a graph of the change in Azerbaijan's GDP since its independence. As can be seen from the graph over the years of independence, the GDP of Azerbaijan has grown significantly due mainly to the oil industry.

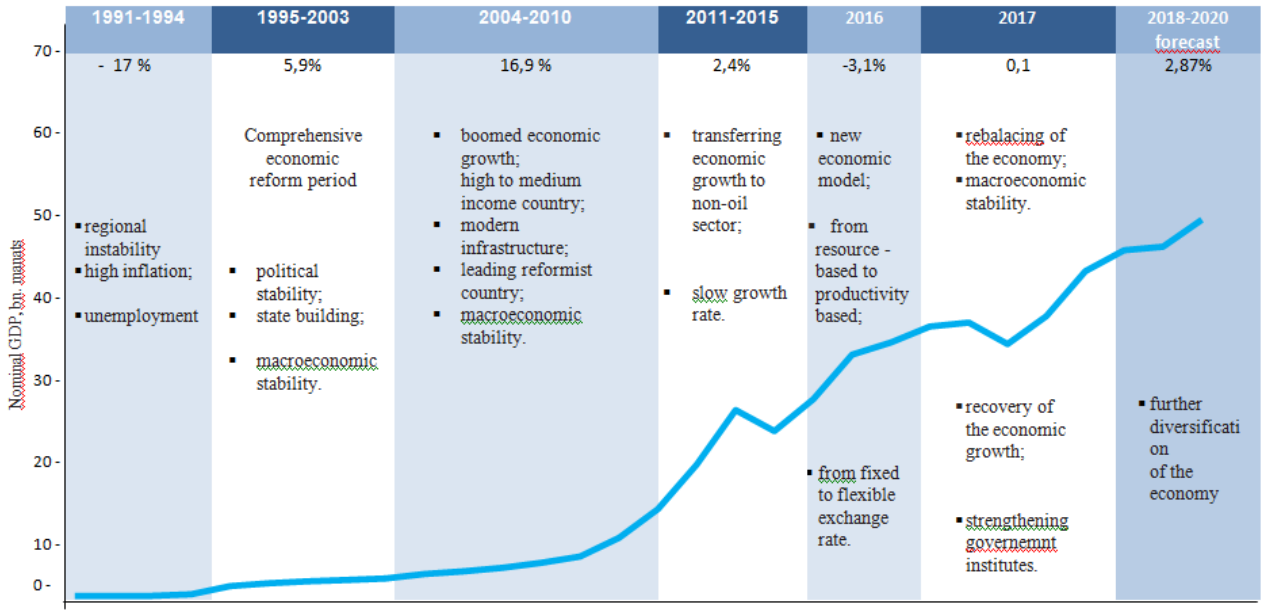


Figure 21

Market structure

Electricity

The main function of "**Azerenergy" JSC**is to manage the production and transmission of electricity of the Republic of Azerbaijan. In addition, the joint-stock company distributes electricity in the city of Baku, its districts, and in other areas of the country, except the Nakhchivan Autonomous Republic.

Introducing new technologies, it increases power generation and the reconstruction of high-voltage power lines in the country. At the same time, it supplies electricity to foreign countries.

The Energy Supervision Authority was launched in the central office of the company. There will be departments of audit, energy sales, consumption analysis and forecast, energy supervision service, installation of meters, operation and maintenance of networks, and inspections for operationsupervision.

The service for maintenance and repair of transmission lines, substations, and connecting new consumers works in the Bureau of Electricity Transmission.

"Azerishiq" OJSC provides reliable, safe and efficient supply of electricity to consumers on the territory of the Republic of Azerbaijan. Introducing new technologies, the company ensures the modernization of the material-technical base and its rational use, and also performs other development work in this area.

The Cabinet of Ministers was entrusted with the task of transferring the authority to provide consumers with the authority to provide consumers with electric power to Azerishiq JSC. This was previously executed by Azerenergy OJS. In addition, Azerishig JSC was tasked with taking the necessary measures to transfer property and other equipment of Azerenergy JSC that was necessary for supplying consumers with electricity.

TheState Agency for Alternative and Renewable Energy Sources of Azerbaijan is a government agency under the Ministry of Industry and Energy. It acts as the main regulatory institution in the field of alternative and renewable energy sources in the Republic of Azerbaijan.

The main tasks of the agency are evaluation of sustainable potential energy, formation of appropriate policies, including tariff policies, development and enforcement of relevant procedures, such as the issuance of special permits for public and private entities for the construction of power facilities, increasing the share of energy, which is produced by alternative and renewable energy sources, in the energy balance, ensuring uninterrupted power supply to consumers, and reduction of technical and technological losses through the creation of generation sources in areas close to consumers. Efficient management of available resources is one of the priorities of reforms undertaken in the electricitysector.

Heating

"Azeristeliktechizat" OJSC executes the functions of production, transmission, distribution, sale and maintenance of thermal energy, and also provides heat supply to residential buildings and structures, educational, medical institutions and other social facilities in the city and in the regions of the republic.

Natural gas

Azerigas carries out production, processing, storage, transportation, and distribution of gas, as well as the construction, use, control, testing and certification of industrial and consumer devices.

It also handles the supply of gas over long distances through a pipeline, for the purpose of import-export and gas transit between producers, distributors, and consumers.

Azerbaijan has a large number of oil and gas fields and prospective structures in the Caspian Sea. The proven oil reserves in Azerbaijan amount to 7 billion barrels, natural gas- 2.6 trillion m3, and the estimated reserves for oil are 10 billion barrels, natural gas- 3-4 trl.m3. Among the Caspian fields, the most significant is the Azeri-Chirag-Gunashli (ACG) oil and gas field, its proven oil reserves are estimated at 1.2 billion tons, gas - 360 billion m3.

Another large field, gas condensate, is the Shah Deniz. Its reserves are estimated attrillion. m3. According to forecasts in the second stage of this field, gas production can be increased to 24 billion m3 per year. Another 600 billion m3 of gas - in fields such as Absheron, Umid, Ashrafi, and Karabakh. In addition to the abovementioned fields, there are five more promising structures with a total stock of 2.2 trillion m3 of gas (Babek - 400 billion m3, Nakhchivan - 300 billion m3, Zafer-Mashal - 300 billion m3, Araz-Alov-Sharg - 700 billion m3 and Shafag-Asiman - 500 billion m3).

The development of oil and gas fields in the Caspian Sea became possible after the signing in 1994 of the “Contract of the Century” and the subsequent inflow of large investments. The project participants comprised of 13 companies, including BP (35.8 percent), SOCAR (11.6 percent), Chevron (11 percent), Statoil (8.6 percent), and others. After signing the “Contract of the Century” 26 agreements were signed with 41 oil companies from 19 countries.

Since 1997, within 20 years, 460 million tons of oil and 140 billion m3 of gas have been extracted from theACG.

For the implementation of large oil and gas projects, the following pipelines were built or reconstructed:

Baku-Tbilisi-Ceyhan (oil - to the Mediterranean Sea), Baku-Supsa (oil - to the Black Sea), Baku-Erzurum (gas pipeline), Baku-Novorossiysk (oil).

In 2018, the construction of three important components of the Southern Gas Corridor was completed:

Shah Deniz-2, South Caucasus gas pipeline (through Georgia) and TANAR (gas transportation to Turkey).

By 2020, the construction of the 878 km TAP gas pipeline will be completed, as a continuation of the TANAR gas pipeline to Europe (Greece - 550 km, Albania - 215 km, Italy- 8 km).

By 2020, the length of the gas pipeline to Europe will be 3,500 km.

The cost of TANAR is $ 7.9 billion, throughput is 16 billion m3 (to Turkey - 6 billion m3), (to Europe - 10 billionm3).

Oil

The State Oil Company of the Republic of Azerbaijan (SOCAR) is involved in a wide range of activities in the territory of the Republic of Azerbaijan. This includes the exploration

of onshore and offshore oil fields, preparation, use, and transportation of oil, gas, condensate and their byproducts, processing, sales, providing for the stable demand of consumers for relevant energy, and ensuring the receipt of adequate compensation for their services.

The company carries out the following main activities, as defined by law:

- Drafting and preparation of long-term programs for the development of the industry, and targeted comprehensive scientific, technical, economic and socialprograms.
- Increasing production efficiency, implementing a policy of saving energy and material reserves, and creating profitable production-technological and economic ties between enterprises in theindustry.
- Ensuring regular interaction between the Company and the relevant state authorities in determining the development prospects of theindustry.
- Development of the industrial and social base of the industry, modernization of the enterprises included in the company, their expansion, reconstruction, and investment activity in providing them with the latest equipment and technology in a form defined by law.
- Conducting exploration works using modern construction technology and technical means, increasing the efficiency of field exploitation, accelerating the construction of oil and gas wells, as well as using the subsoil of the earth, improving the quality and accelerating the preparation of fields for exploitation, and observing the current legislation on environmentalprotection.
- Improvement of economic methods and forms, and the introduction of the latest scientific achievements into production.
- Attracting adequate finance from banks, including foreign banks and other sources for the implementation of economic and production-technicalprograms.
- Implementation of a human resources policy and training and development of personnel in the republic andabroad.
- Creation of favorable conditions for the social development of enterprises by ensuring they are adequately funded.
- Interrelated activity with government agencies, foreign companies and entrepreneurs.
- Enabling and facilitating geophysical and geological exploration, and arranging relevantapprovals.
- Making decisions for new fields to be developed, development and approval of pilot operations of fields by enterprises, and technological schemes, and projects to develop oil, gas and gas condensate fields.
- Approval of the annual work programs for oil and gas companies, and, their annual budgetary funds.
- Organization of transportation of extracted crude oil and natural gas, ensuring payments to the transporting enterprises for theservice.
- Organization of the processing of crude oil and natural gas and ensuring payment to service providers.
- Organization of the sales of crude oil, natural gas and petroleum products, and payment of supply costs in a systematic manner.
- Taking the necessary measures for land reclamation and environmentalprotection, Establishment of foreign economic relations in accordance with the procedure established bylaw.

SOCAR Azerbaijan has a 10 percent stake in the consortium to develop the Shah Deniz gas and condensate field. SOCAR also has a 25 percent stake in the Baku-Tbilisi- Ceyhan pipeline and 10 percent stake in the Azeri-Chirag-Guneshli oil project. Currently, SOCAR is actively expanding the development of markets in other countries.

Institutional framework

The Ministry of Energy of Azerbaijan is responsible for regulation of activities in the mining and energy industries of the Republic of Azerbaijan.

The Ministry regulates the activities of the industrial and energy sectors. The State Oil Company of Azerbaijan (SOCAR), Azerkimya State Company, Azerigaz, Azerenerji OJSC, Azneftkimyamash JSC are owned by the ministry. The main functions of the Ministry include identifying promising niches to draft state and regional programs and ensuring their implementation, forecasting the production of various energy sources, participation in international cooperation agreements in the energy sector, monitoring energy supply activities for all industrial sectors in accordance with norms and laws, creating favorable conditions for external and domestic investment in this sector issuing licenses, ensuring sufficient energy in the domestic market, research and development in the field of energy, the application of international standards and experiences within the country, the preparation of measures aimed to reduce potential losses in the process of production, transportation, distribution and use of energy resources, preparation of energy security programs for the Republic of Azerbaijan, and preparation of energy efficiency programs.

The Ministry of Energy of the Republic of Azerbaijan has agreements and cooperates with the European Energy Charter, the Black Sea Economic Cooperation Organization, the CIS Executive Committee, the Energy Council, the Economic Cooperation Organization, the US Agency for International Development, the European Commission of the European Union (INOGATE, TACIS, TRACECA), the United Nations Economic Commission for Europe (UNECE), the International Atomic Energy Agency, Coordinating Council for the Development of the and in the framework of GUAM, the World Trade Organization, the Working Group on cooperation with NATO, the International Monetary Fund, the World Bank, the European Bank for Reconstruction and Development, The German Development Bank (The KfW), the Islamic Development Bank, the Asian Development Bank, and the Japan Bank for International Cooperation.

The main purpose of creating the **Energy Regulatory Agency** under the Ministry of Energy of Azerbaijan is to bring the quality of public services in line with the requirements of a market economy, and ensure the further development of the industry, transparency and flexibility of the energy supply system, and the availability of these services for entrepreneurs.

The agency was established under the State Energy Control Directorate and the State Gas Control Directorate of the Ministry of Energy. Its main goal is to align the provision of utilities with market rules, as well as to improve control mechanisms, and thereby achieve sustainable development in this area. In addition, the Agency was created to ensure transparency and efficiency in the supply of energy resources, as well as make this process was more accessible to entrepreneurs.

The Azerbaijan Energy Regulatory Agency (AERA) is a member of The Energy Regulators Regional Association (ERRA).

Energy policy framework

The Government of Azerbaijan adopted the State Program for the Development of the Fuel and Energy Sector for 2005-2015, which defined development goals for various segments of the energy sector, as well as a package of special measures aimed at achieving these goals within 10 years. The overall aim of the State Program was to ensure the complete meeting of the demand of the population and the economy for electricity, gas and other energy sources through the continuous development of the fuel and energy complex - and this goal was achieved in time.

The specific objectives of the State Program such as

- Defining developmental priorities for the fuel and energy sector of Azerbaijan in accordance with best practices and modern international standards.
- Implementation of relevant scientific and institutional measures aimed at improving the operational efficiency of various sectors of the fuel and energy sector.
- Ensuring the implementation of appropriate technical measures in order to increase the level of production, processing, transportation, storage, accounting and consumption of energy resources.
- Promoting the integration of environmental protection measures in the development of the fuel and energy sector.
- Increasing investment in the development of the fuel and energy sector.
- Ensuring environmental safety of the fuel and energy sector.
- Ensuring improved collection of payments for fuel and energy (electricity and natural gas). In the following years, in order to develop the country's fuel and energy sector further, when it comes to oil and gas production, the following measures are envisaged:
- Search and exploration of new fields.
- Start of full-scale development of discovered fields.
- Drilling new wells and reconstructing inactive wells at active fields.
- Introduction of new equipment and technologies at active fields to increase oil recovery ratio.
- Construction, reconstruction and modernization of systems for the extraction, transportation and processing of oil and gas, as well as the widespread use of science and innovation technologies and best practices were fulfilled or partly fulfilled. The only fundamental task of the state program - the introduction of full-fledged involvement of market forces in the energy sector, has not been fulfilled. To solve this and other pressing problems of the energy sector and the economy as a whole, the President of the Republic of Azerbaijan signed 13 documents of strategic roadmaps for the national economy and major sectors of the economy.

Legislative Basis

The Parliament passed the following laws regulating activities in the energy sector:

Table 5.

Name of Legislation / Policy	Brief	Status of adoption / implementation

Law “On Energy”	This Law determines the legal fundamentals for generation, transportation, distribution, purchase, sale and consumption of electric and heating energy. The main purpose of this Law is to ensure the rational use of energy resources and socio-economic advisability of energy generation, taking care of the environment, and delivery it to an energy market with taking into account the interests of consumers.	Baku, November 24, 1998, No. 541-IQ
Law "On Subsoil"	This Law regulates the relations connected with study (search, exploration), rational use and protection of subsoil in the territory of Azerbaijan Republic, including the sector of Caspian Sea (lake) belonging to Azerbaijan Republic, as well as the relations connected with the safety of performed works, provides a protection of interests of the state, citizens and subsoil users.	Baku, February 13, 1998, No. 439-IG
Law “On the Use of Energy Resources”	This Law determines the legal, economic and social fundamentals of state policy in the field of use of energy resources, as well as the main directions of its implementation, regulates the relations arising in this field between the state and legal and individual persons.	Baku, May 30, 1996
Law “On electric and heating stations”	This Law establishes, in accordance with the legislation of Azerbaijan Republic, the legal fundamentals for design, construction, operation and use of permanent installations (further - electric stations) generated electric and heating energy. The law considers the energy production units, located in a single (indivisible) space and technologically connected, as a single electric station.	Baku, December 28, 1999, No. 84-IG
Law "On Gas Supply”	This Law regulates the activity on production, processing, transportation, storage, distribution, sale and use of all types of gases (including the natural gases) (hereinafter - “gas”) consumed as an energy carrier in a gaseous and liquefied state. The law is based on the basic principles of energy industry legislation and reflects the features of gas activity. Activity, connected with the discovery, working out, development of natural gas fields and extraction, primary processing, preparation for transportation of natural gas, its accumulation and transportation to the point of supply, as well as use and transportation of gas, used in motors as a fuel, is regulated by other laws .	Baku, June 30, 1998, No. 513-IG
Law “On Environmental Safety”	This law regulates the relations in the field of environmental safety, when an activity is carried out by legal and individual persons, state authorities and local bodies, their officials. The purpose of this law is to establish the legal fundamentals for protection of life and health of person, society, their material and moral values, environment, including atmospheric air, cosmos space, water bodies, Earth subsoil, land, natural landscape, flora and fauna from the danger arising from influence of natural and anthropogenic factors.	Baku, August 4, 1999, No. 172
Law “On	This law determines the legal, economic and social	Baku, August 4,

Environmental Protection”	fundamentals of environmental protection. The purpose of law is to ensure an environmental safety in the field of protection of ecological balance of environment, elimination of harmful effect of economical and other activity on natural ecological systems, preserve the biological diversity and rational organization of nature management. This law regulates the relationship between society and nature in order to strengthen the legality and legal rules in the field of environmental quality improvement, rational use and restoration of the natural resources, environmental protection.	1999, No. 173

The Law “On the Use of Energy Resources”, adopted on May 30, 1996, defines the legal, economic and social foundations of state policy in the use of energy resources, as well as the general measures in policy implementation.

The Law “On Energy” ensures the regulation of the exploration, development, production, processing, storage, transportation, distribution, and use of all “energy materials and products”, including gas. In fact, the Law “On Energy” is a “framework” law in the sector of energy regulation. Any person planning to carry out energy activities prior to the commencement of such activities must obtain special permission from the Ministry of Industry and Energy on the basis of an energy contract or by submitting an application to this ministry.

The legal basis for regulating relations in the oil and gas sector in Azerbaijan was created by adopting the Law "On Subsoil". The Law "On Subsoil" regulates the issues of exploration, use, protection, safety and control in the field of the use of mineral resources, including oil reserves, located in Azerbaijan and the Azerbaijani sector on the shelf of the Caspian Sea. In accordance with the Law “On Subsoil,” no natural or legal person may carry out activities in the sector of exploration and production of oil or gas without a license.

The Law on “Gas Supply” regulates the production, processing, transportation, storage, distribution, sale and use of all types of gas (including natural gas). In Azerbaijan, there is no network code and no access for third parties to pipeline networks. Access to the networks is controlled by Azerigaz.

The main legislative acts regulating the electric power sector include the Law “On the Use of Energy Resources”, the Law “On Electric Power Industry” and the Law “On Electricity and Heating Plants”. Under the Law “On Electric Power Industry”, natural persons or legal persons are required to obtain a special permit to conduct activities in the field of production, transportation and distribution of electricity, unless otherwise specified bylaw.

Political and legislative basis

The Strategic Road Map on the development of the municipal sector in Azerbaijan has developed measures to improve the energy efficiency of the Azerbaijani economy, in particular the electricity, gas and heat supply sectors. There are plans to improve regulatory laws and other documents related to the above-mentioned sectors of the economy. The implementation of the following targets to improve the efficiency of the above sectors is envisaged:

• Reduction of electric power losses in the networks of Baku city from 8.5 percent from to 7 percent, and in the regions from 12 percent to 8 percent (the goal is to approach the level of similar indicators of Europeancountries).

• Reduction of technical losses in gas distribution up to 8 percent (currently, losses in thegasdistributionsystemareexorbitantlyhigh-18.6percent).Aninvestmentof

1.515 billion manat will be required to achieve this goal.

• Increasing the production of heat energy to 1767 thousand Gcalperyear,

• By 2020, building new generating capacities in the total volume of 1,900 MW (these generating capacities are for heating and hydroelectric power plants) 1.95 billion manat in investments are envisaged for this purpose.

• By 2020, building and connecting to the power grids 420 MW of generating capacities based on renewable energy sources.

• Decreasing expenses for own needs at thermal power plants up to 2 percent (currently this figure is 3.6percent),

• Increasing the efficiency of combined-cycle power plants to 50 percent against the current 47 percent. 1.075 billion manat in investments will be required for the implementation of the last three targets.

• Elimination of subsidies in electricity sales,

• Use of differentiated tariffs for electricity for different times of the day.

• Monitoring to assess the efficiency of the use of energy resources in the supply of heating to residential and non-residential complexes in Azerbaijan and to develop measures to prevent the inefficient use of energy resources.

• Increasing the efficiency of using fuel (natural gas) for the production of thermal energy.

• Implementation of stimulating measures for the introduction of technologies to improve energy conservation and energy efficiency in the heat supply system.

• Taking measures to reduce and eliminate heat energy losses in the heating supply system of residential and non-residential buildings,

• Analysis of the possibility of using heat meters and suggesting options for theiruse.

As a result of the implementation of measures envisaged in the strategic roadmap only in the field of public services by 2020, GDP growth will amount to 832 million manat, at the same time it is predicted that 6,645 new jobs will be created. For the implementation of the planned activities funds from public and private sources totaling 8.15 billion manat will be used.

The strategic roadmap for the development of the municipal sector of Azerbaijan provides for the implementation of a number of important activities including:

• Increasing the National GenerationPortfolio.

• Diversification of the National GenerationPortfolio.

• The consideration of increasing electricity exports to neighboring countries, if feasible.

• Increasing the efficiency of power plants and the effective use of existing capacity.

• Reducing energy losses and increasing the quality of transmission and distribution of electric energy.

• Using optimal mechanisms to improve energyefficiency.

• Reducing all types of natural gas losses associated with its distribution.

• Expanding the optimal heating system in thecountry.

By order of the President of Azerbaijan dated June 8, 2005, "Azeristilktechizat"JSC was established which was engaged in heat supply from 2005 to 2016. 166 heat sources in Baku and in regions of the Republic were created by "Azeristiliktechizat" JSC, 108 boiler houses

were reconstructed, 271 gasification projects were completed, heating systems were restored in 1828 residential buildings and 350 educational and medical buildings. As a result of the work performed, the efficiency of heat supply has been significantly improved. Compared to 2011, the production of heat increased by 1.9 times in 2016 and amounted to 1235 thousand Qkal, the loss of heat energy decreased by 4.5 percent, the gas consumption for the production of 1 Qkal of heat energy decreased by 5.9 m3 / Qkal, and thus conditionally saved 7.4 million m3 of naturalgas.

In order to increase energy efficiency in the electricity sector, market relations will be introduced and all areas of activity will be separated in accordance with electricity production management, transmission, distribution, and electricity sales. There are plans to open the wholesale electricity market for foreign investment, which will increase the competitiveness and efficiency of thesector.

In the Republic of Azerbaijan, for industry and some groups of the population, it is envisaged to expand the production and operation of electrical panels (alongside with solar panels installed on the roofs of houses, to build small thermal and electrical power plants, and small wind turbines). Universal use of solar panels is planned. There are also plans to replace the use of natural gas with electrical energy in order to improve production efficiency. To increase the efficiency of electricity production, two ways of development are envisaged:

- Complete modernization of existing thermal power plants and hydropowerplants.
- The use of modern power generation plants with the highest rates of efficiency. To increase efficiency in the transmission of electricity there are twoways:
- Reduction of electricity losses in the transmission and distribution of electricity to the level of European countries.
- Using the experience of advanced countries to eliminate weaknesses in the energy sector.

In the area of electricity retail there are two goals:

- Achieving the level of energy efficiency equal to European countries in industry and commerce - the government is expected to stimulate various energy efficiency methodologies (for example, to promote energy efficient buildings andgoods);
- Building infrastructure for cars that use electricity to replacefuel.

Energy market liberalization

In accordance with the State Privatization Program, the President of Azerbaijan, on the proposal of the State Committee for Property Affairs, makes decisions on allowing foreign investors to participate in the privatization of facilities and enterprises in the energy sector. However, till now there has been no noticeable activity in this area, with the exception of the privatization of two small hydropower plants. Meetings with government officials and companies confirmed the absence of short-term plans for privatization and the separation of state-owned companies in the oil, natural gas and electricitysectors.

Competition is limited due to existing monopolies in the natural gas and electricity sectors. The electricity market of Azerbaijan is not yet open and there are no official deadlines for its opening. The legislation does not consider the separation of activities for the transmission and distribution of electricity from its production, nor the creation of separate operators for transmission and distribution of electricity. Separation at the accounting level, functional or management level is not carried out and is not considered by law. Nevertheless, a partial separation was carried out: some mini power plants were privatized and one

independent regional distribution company was created. The principles of non-discriminatory access to network infrastructure are established by law, but in practice this is not implemented due to the current marketstructure.

All organizations in the natural gas sector are still state-owned, and there are no plans to change this in the near future. The President of Azerbaijan issued Decree No. 310 “On improving the rules for issuing special permits (licenses) for certain types of activities in Azerbaijan” dated March 28, 2000, which was subsequently amended. In accordance with the decree, only state-owned enterprises or joint-stock companies, whose controlling stake is owned by the state, can carry out oil production and refining. In accordance with the Law “On Subsoil,” the right to conduct exploration and production activities can be issued in accordance with a special permit (license) to citizens and organizations of Azerbaijan, as well as foreign citizens and legal entities. Consumers cannot buy natural gas directly from producers, for example, from AIOC. "Azerenergy" JSC purchases natural gas for power plants from SOCAR in accordance with the agreement. There is no access for third parties to the networks. Access to the networks is controlled by "Azerigaz" OJSC.

After the signing of the “Memorandum on strategic cooperation between Azerbaijan and the European Union in the energy sector” on November 7, 2006, this industry started to move closer to international standards. The Memorandum envisages the rapprochement and compliance of the legislative base of Azerbaijan with the European Parliament Directives and the European Union Regulation in the energy sector. For this purpose the Ministry of Industry and Energy conducted twinning programs together with the Federal Ministry of Technology and Economics of Germany.

The reform in the energy sector, included in the strategic roadmaps, envisages the creation of a market based on the experience of European countries, when the reforms improve the efficiency, level and quality of service.

Analysis of best practices in sustainable energy in Azerbaijan

Energy efficiency

The level of efficiency is influenced both by the costs of extraction of the energy carrier and losses during its transportation. In different countries, the cost of oil production varies, for example, in Kuwait it is $ 8.5 per barrel of oil, in Saudi Arabia - $ 9.9, in Iran - $ 12.6, in Russia - $ 17.2, in Azerbaijan on ACG (the Azeri field Chirag-Guneshli ") - $ 15. SOCAR puts its cost at $ 25 per barrel of oil. The relatively high costs of oil production in Azerbaijan are mainly related to the conditions of production (deep-water areas of the Caspian Sea).

Global experience shows that building the economy on the principles of energy efficiency and energy saving, the widespread use of modern technical means, norms and standards in this area are important means of solving the country's socio-economic, environmental and energy problems.

In Europe, the main document on energy efficiency problems is the Strategy 2020, which envisages the transition to an economy with sustainable and comprehensive development and efficient use of energy resources.

On May 30, 1996, the Republic of Azerbaijan adopted a law on the efficient use of energy resources, where the main areas for energy saving and energy efficiency are as follows:

• The increase in the efficiency of traditional sources of electricity generation (according to "Azerenergy" JSC for 2015, the average efficiency was 40 percentorforeachkWhofelectricitytheconsumptionofstandardfuelwas292.2 grams, compared to 2014 this figure decreased by 1.6 grams according to the state program, the target value of this indicator is 260 g /kWh).

• Reduction of electricity losses for transmission and distribution of electricity (over the past 15 years, this figure has decreased from 40 percent to 12 percent).

• Utilization of secondary heat and powerresources.

• increase energy efficiency in industry, construction, agriculture and government agencies.

• Reduction of energy consumption in the domesticsector.

• The intensification of the creation of new energy-efficient technologies, equipmentandmaterials.

• Increased producers interest in energyefficiency.

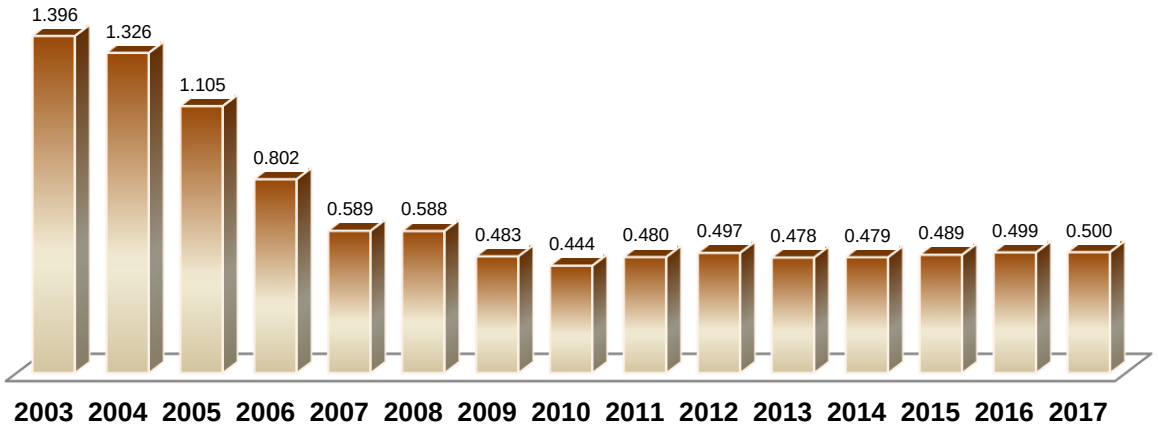
• Stimulation of energy saving and efficient use of energyresources.

• The use of advanced international experience in the field ofenergy conservation and energy efficiencypractices.

• Monitoring of the complex of performedactivities.

Studies show that the cost of saving a unit of an energy resource is on average 2-3 times cheaper than the cost of its production. To assess the effective use of energyresources by the International Energy Agency and other institutions, an indicator of the energy intensity of a country's GDP is used. In other words, this is the amount of energy consumed to produce $ 1000 of GDP. The dynamics of changes in the energy intensity of Azerbaijan's GDP is shown in the figure below.

Dynamics of energy intensity of GDP, TOE/ ths $, PPP 2005



Source: Azerbaijan Statistics, 2018

Figure 22

The energy intensity of Azerbaijan's GDP over the past 15 years shows a tendency to decrease and today it is 500 kg of oil equivalent per $ 1000 of GDP. This indicator is almosttimes higher than the world average of 156 kg AD per $ 1000 and 6 times higher than the average value of EU countries. According to this indicator, Azerbaijan ranks 120th among 180 countries of theworld.

The energy efficiency of the structure consists of 2 components (technological component - measured by the energy for the production of goods and the structural component - the production of which product prevails). The experience of advanced countries shows that with a change in the technological component, energy efficiency can be improved by 20-30 percent, and by improving the structure of production of goods, energy efficiency can be achieved several times. Energy saving is mainly achieved by reducing losses at all stages of energy transformation (from production to consumption) and by increasing the share of alternative and renewable energy sources in the energy balance.

The share of renewable energy in the production of electricity on average worldwide in 2014 was 30 percent, and for the CIS countries 17.2 percent. In Azerbaijan, this figure, depending on the operating modes of large hydropower plants, varies within 6 percent (2014) and 18 percent (2010).

The transport sector has a significant share in the country's energy consumption. The main share in the energy consumption of transport accounted for automobile gasoline. Number of cars in Azerbaijan is increased from 400,000 in 1990 to 1.29 million in 2014, 60-65 percent of them are concentrated in Baku. About 60 percent of the cars in Azerbaijan are manufactured in the CIS countries. These cars consume 30-40 percent more fuel than European-madecars.In2014,theCabinetofMinistersofAzerbaijanadoptedaresolutionon the mandatory compliance of imported cars with the environmental requirements of Euro-4. Dynamics of consumption of gasoline is shown in the table 6.

Table 6.

Year	2007	2008	2009	2010	2011	2012	2013	2014
Petroleum use	768	931	968	1018	1034	1229	1285	1357

Source: Azerbaijan Statistics, 2016

As another parameter of energy efficiency, indicator of the level of technological development is used - it is an integral parameter of energy efficiency and is defined as the ratio of final electricity consumption to total final energy consumption. Despite some increase in this parameter - 8.33 in 2010 against 5.25 in 1990, it is still noticeably less than in such neighboring countries as Georgia (13.55), Ukraine (10.08), and Kazakhstan (10.99), Russia (10.2). Azerbaijan ranks 143 among 180 countries of the world on this indicator, the average global value of this indicator is 12.36.

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At present, the law “On the efficient use of energy resources and energy efficiency”, developed by the Ministry of Electric power industry with the involvement of interested parties (independent experts, "Azerenergy" JSC, "Azerishiq" OJSC, SOCAR, Ministry of Emergency Situations, etc.), is under approval of Azerbaijan Republic.

The law consists of 9 chapters and 24 articles. The first chapter considers the general provisions, where 3 articles are collected - the purpose and scope of the law, the basic concepts used in the law and the legislation of Azerbaijan Republic in the field of efficient use of energy resources and energy efficiency.

The second chapter is devoted to state policy in the field of efficient use and energy efficiency, where two articles are combined - the main goal and directions of state policy in the field of efficient use and energy efficiency and public administration and control in the field of efficient use and energy efficiency.

In the third chapter the national goals and action plans for efficient use and energy efficiency are discussed.

The fourth chapter is devoted to energy audit, energy management and energy control system (manager). There are 5 articles in this chapter - energy audit articles, accreditation of energy auditors, rule of energy audits, energy management and energy control system (manager).

The fifth chapter is dedicated to energy efficiency services.

The sixth chapter is about calculation of consumed energy and informing consumers.

In the seventh chapter the issues of production efficiency, conservation, transmission, distribution and supply of energy are considered. Here, in the 15th article, the assessment of efficiency potential and energy efficiency commitments are considered.

The eighth chapter discusses the issues of economic and financial propaganda mechanisms in the field of efficient use and energy efficiency. It also considers the creation of an energy efficiency fund and its functioning.

Finally, the ninth chapter is devoted to issues of information support, scientific and technical support, personnel training and international cooperation in the field of efficient use and energy efficiency.

It should be noted, that national goals, action plans in the field of efficient use of energy resources and energy efficiency are drawn up with taking into account primary and final

energy consumption, energy saving and energy efficiency. When determining the goal of energy efficiency, the following factors are taken into account:

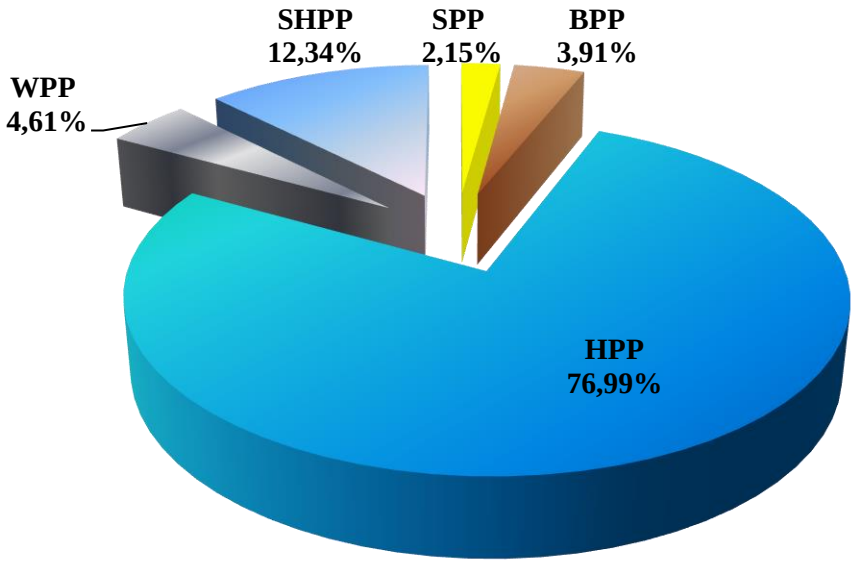
- Cost-effective energy efficiency potential
- GDP dynamics and its forecast
- Increase in the number and displacement of population.
- Forecast of the production, consumption, import and export of energy products
- Indicators of renewable energy sources using and their forecast

Based on the above mentioned factors, national action plans on energy efficiency of the parties for 5 years are drawn up, where the following provisions are reflected.

Renewable energy

There is a huge potential for renewable energy in Azerbaijan and there is a political will to use it everywhere. The use of renewable energy sources leads to an increase in the level of security of electricity supply, a reduction in the total costs of electricity generation, saving natural resources, creating new jobs and has a positive effect on environmental protection. Currently, technologies based on such renewable energy sources as water, wind, and solar energy have found the greatest application in Azerbaijan. The use of renewable energy sources is low compared to their potential (if you do not take into account large hydropower plants), therefore, in order to diversify the production of electricity, widespread use of renewable energy sources is planned, especially the use of large potentials of wind and solarenergy.

The share of generated energy from renewable energy sources by resources (2014)



Source: The State Agency on Alternative and Renewable Energy Sources of the Republic of Azerbaijan, 2015

Figure 23

Electricity production in the Republic of Azerbaijan is mainly carried out on two types of sources. Currently, 94 percent of electricity is produced using natural gas, the remaining 6 percent is produced at hydroelectric power stations and other power plants. At the same time, 55 percent of electrical energy is produced at three thermal power plants using natural gas. If one of these three power plants is under repair (or is shut down), there may be serious risks in the power supply. From this point of view, the diversification of sources of production of electric energy is an important task and its solution will minimize the risks of powersupply.

In addition, using less costly energy sources (including sources based on renewable energy) will lead to a decrease in the average cost of electricity production. Despite the fact that the cost of gas for each MW·hour of electricity is in the range of $ 30 - $ 40 and this makes the use of natural gas one of the most cost-effective options for generating electricity, even today the costs of generating electricity based on wind and solar energy can compete with it. Continuous improvement of technology reduces production costs of electricity based on wind and sun. For example, the prices of electrical energy from the sun in April 2016 in various parts of the world were $ 29.9 per MW. If we take into account the fact that in the country electricity is produced from two types of sources, then the use of wind and solar energy for the electricity production can help to reduce the average cost of electricityproduction.

The State Agency on Alternative and Renewable Energy Sources of the Republic of Azerbaijan was established by the Decree of the President of Azerbaijan dated February 1, 2013, to improve the management system in the field of alternative and renewable energy.

The State Agency has drafted a strategy for alternative and renewable energy resources until 2020. The Azerbaijan 2020: Vision of the Future development concept includes provisions on the alternative and renewable energy sector. On December 29, 2011 the head of state signed a resolution on the preparation of a State Strategy on the Use of Alternative and Renewable Energy in the Republic of Azerbaijan for the period 2012 to 2020.

Azerbaijan currently hopes to triple its renewable energy capacity from 830 MW this year to 2500 MW by 2020. The program specifically calls to increase wind energy capacity from 240 MW to 800 MW and solar photovoltaic's will increase from 290 MW to 600 MW all by 2020. Given the added potential of solar thermal systems, solar energy is the most promising form of alternative energy, as experts expect it will provide country with 950 MW of capacity by 2020.

In other segments, biogas will grow from 25 MW to 125 MW, geothermal from 15 MW to 150 MW, and small hydropower from 80 MW to 150 MW, al following the same timeline. The total investments for these projects will be about $2.5–3.5 billion.

Azerbaijan has remarkable renewable energy resources. It has the potential for wind power, which blows more than 250 days per year and may generate over 2.4 billion kWh of electricity annually, and it offers 2400-3200 hours of sunshine per year. Azerbaijan therefore has promising potential for solar electricity and heat generation, however, hydro power is currently its most developed renewable energysource.

Table 7.

Types of energy	Power (MW)
Solar energy	>5000
Wind energy	>4500

Bio energy	>1500
Geothermal	>800
Small hydroelectric power plants	>350

Source: The State Agency on Alternative and Renewable Energy Sources of the Republic of Azerbaijan, 2015

Solar energy

A solar panel is one of the most favorable sources in the world, and it is especially promising for sunny areas. The natural climate of Azerbaijan provides extensive opportunities to increase the production of electricity and thermal energy by utilizing solar energy. Since the amount of sunny hours is 2400–3200 hours in Azerbaijan during the year, this means that the amount of solar rays falling on the territory of Azerbaijan is superior when compared to other countries and this can be estimated as one of the efficiency criteria for attracting investments in the use of solar energy. The development of utilization of solar energy can partly solve energy problems in several regions of Azerbaijan.

Wind energy

Azerbaijan is one of those countries where windmills could be a perfect fit due to its geographical location. In particular, the Absheron peninsula, coastline of the Caspian Sea and islands in the northwestern part of the Caspian Sea, the Ganja-Dashkesan zone in the west of Azerbaijan and the Sharur-Julfa area of the Nakhchivan Autonomous Republic are favorable areas. In 1999, Japan's Tomen Company, together with the Azerbaijan Scientific Research Institute of Power Engineering and Energy, installed two towers of 30 and 40 meters in Absheron. The average annual wind speed was determined to be 7.9-8.1 m/sec. A feasibility study about the installation of windmills with a total capacity of 30 MW has been prepared in Qobustan region.

Water Energy

From the ecological point of view, water is the purest energy in the world. The production of electricity from this source is being increased since 1990. The specific share of production power of hydroelectric power plants is currently 17.8 percent in the total energy system of the Republic. There are wide opportunities for mastering hydropower resources that have not been used so far in the country. As a result of the construction of hydroelectric power plants, floodwater is regulated, electricity is ecologically produced, and new irrigation systems are created. The rivers in the territory of Azerbaijan are favorable for small hydropowerstations.

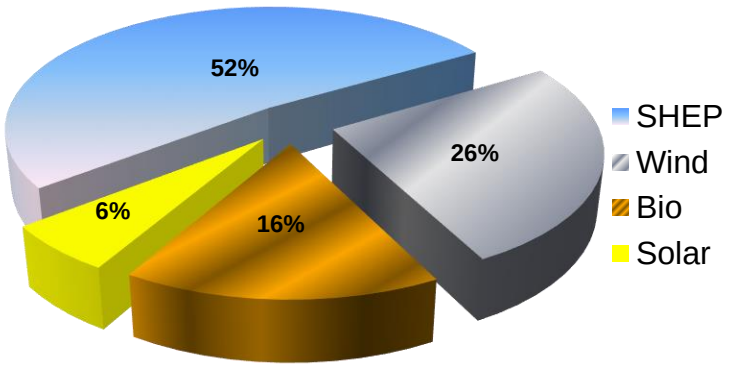
Biomass energy

Biomass is also an alternative source of energy. There are several sources of biomass in Azerbaijan: industrial waste, wastes from forestry and wood processing, agricultural crops and organic compounding wastes, wastes of household and communal areas, wastes from areas polluted by oil and oilproducts.

According to research, most waste is composed of biomass products in all sectors of

the economy. It is possible to obtain gas, liquid and solid biomass, which are used in electricity generation from those biomass substances. Thus, more than 2.0 million tons of solid and industrial wastes were thrown to neutralization zones every year in Azerbaijan. Solid and industrial waste processing can partially eliminate the difficulties of warming up of public buildings in Baku and major industrial cities of the country.

The underground temperature is widely used in many countries in industry, agriculture, household and communal fields and in medicine. The territory of Azerbaijan is rich in thermal waters. They cover large areas such as the Greater and Lesser Caucasus Mountains, the Absheron peninsula, the Talysh mountain-slope zone, the Kura basin and territories around the Caspian Sea and Guba region. It is possible to cover part of thermal energy needs in household and other areas by utilizing thermal waters in the mentioned areas.



Source: The State Agency on Alternative and Renewable Energy Sources of the Republic of Azerbaijan, 2015

Figure 24

During the next 5-10 years, in order to increase the generation capacity by 1000 MW, investments will be made for supplying sufficient amount of electricity in addition to planned investments. We expect 420 MW capacity at the expense of renewable energy sources (350 MW wind, 50 MW solar, 20 MW bioenergy) up to 2020.

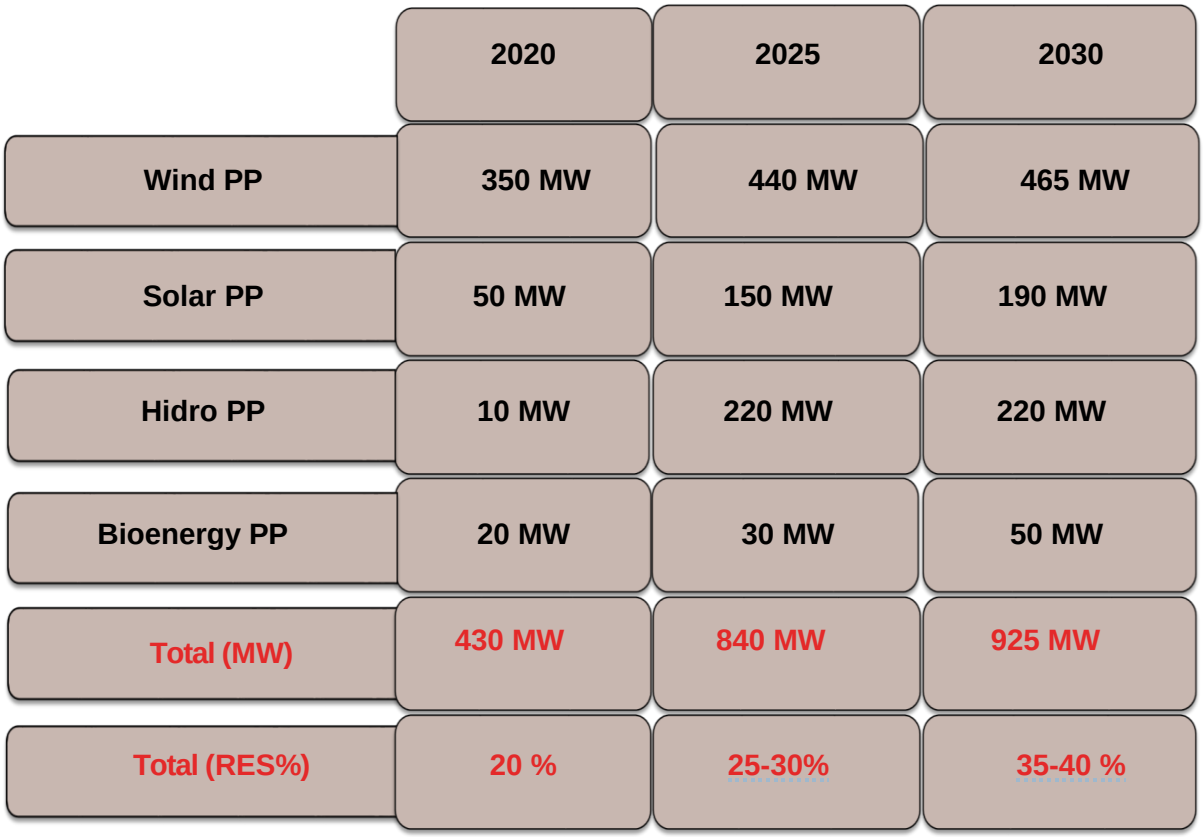
Expected result and result indicators

Through implementing the priority on renewable energy in the national production portfolio, 70 million AZN increase in GDP (50 million AZN directly, 20 million AZN indirectly) and creation of 270 new jobs are projected until 2020.

Key Performance Indicators:

- Investment in 350 MW wind energy, 50 MW solar energy and 20 MW bioenergy to diversify energyportfolio;
- Export of saved natural gas to Europe via Trans Adriatic Pipeline and Trans Anatolian Pipeline (as a result of actions taken in this area.

Power installation up to 2030



Distribution of RES investments by year 2018-2020 due to implementation of "Strategic road map for the development of utilities (electricity and thermal energy, water and gas) in the Republic of Azerbaijan".

Table8.

Project title	Power, MW	Required investments for 2018-2020, mln. manats	including:					
			2018		2019		2020	
			%	million manats	%	million manats	%	million manats
TOTAL	420.0	1153.4	37.6%	434.1	44.5%	513.0	17.9%	206.3
Wind Power Plants - total	350.0	944.1	36.5%	345.0	44.5%	419.9	19.0%	179.2
Solar power plant - total	50.0	107.2	66.5%	71.3	33.5%	35.9	0.0%	0.0
Bioenergy plants - total	20.0	5.8	10.0%	0.6	90.0%	5.2		

Total economic and technical indicators of 420 MW ARES Capacity

Table 9.

Indicators	Unit
Total cost of the project, million AZN	1,153.4
The cost of 1 MW installed capacity, million AZN	2.7

Average annual net production, million kWh	1,192.5			
Capacity factor	0.33			
Annual operation and maintenance costs, million AZN	10.4			
Operation and maintenance costs per kWh of energy production, kopecks	4.7			
Natural gas released by RE electricity generation, million cubic meters				
during 1 year	303.3			
during 25 year	7,583.7			
The number of new temporary jobs	3,179			
The number of new permanent jobs	270			
Wholesale tariff of 1 kWh of electricity, kopecks	**Current tariff**	**Scenario 1**	**Scenario 2**	**Scenario 3***
Wind PP	5,5	9,0	11,0	14,1
Solar PP	5,7	9,0	11,0	13,4
Bio PP	5,7	9,0	11,0	14,4
Sales price of 1 kWh of electricity, kopecks	73,5	114,8	138,6	175,6
Cash flow from the sale of electricity during the year (on average)				
Project payback period, year	20,6	12,5	10,2	7,9
excluding discount	39,4	23,9	19,5	15,1

*Inclusive of current tariffs of energy by source and earnings from the export of natural gas saved

Existing and planned until 2030 installed capacities of alternative and renewable energy sources in the Republic of Azerbaijan, MW

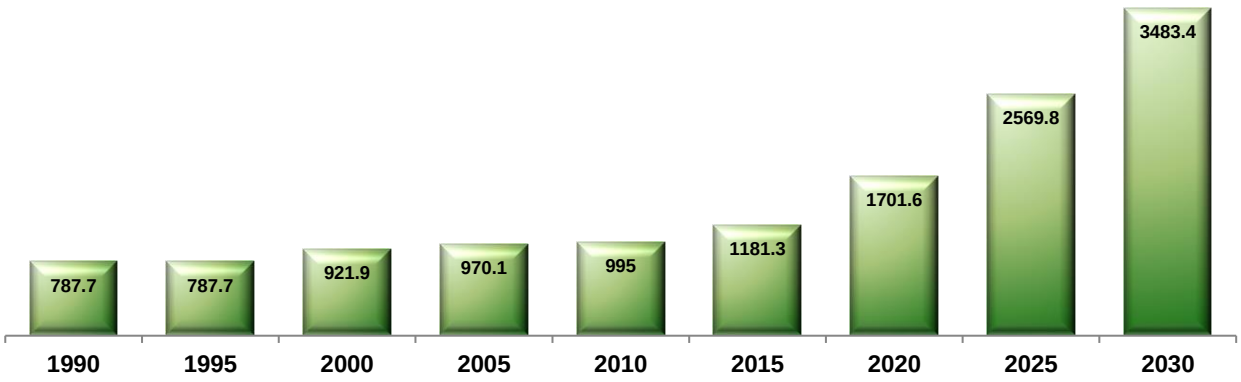


Figure 25

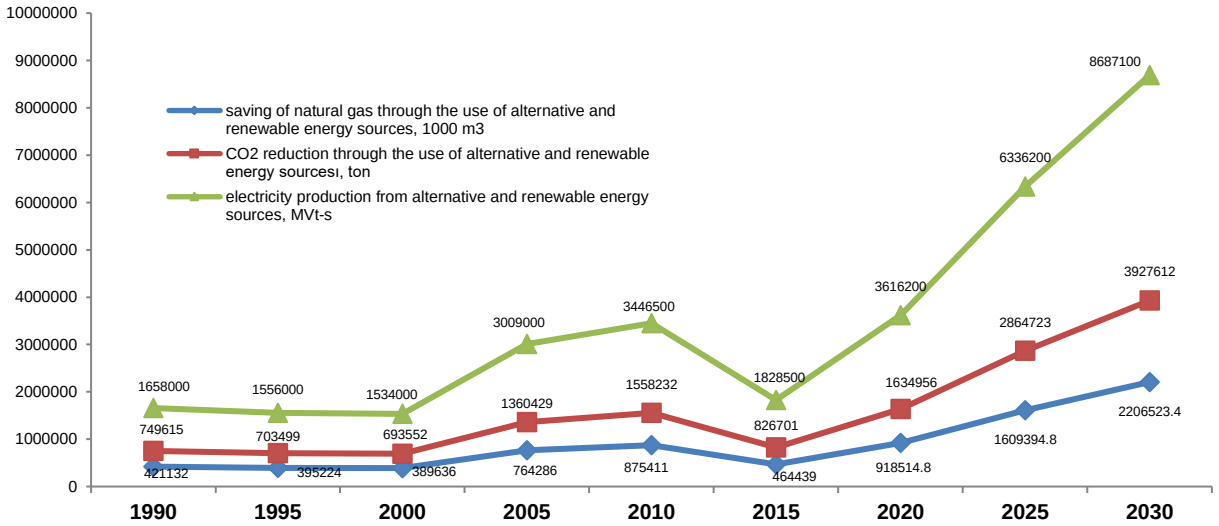
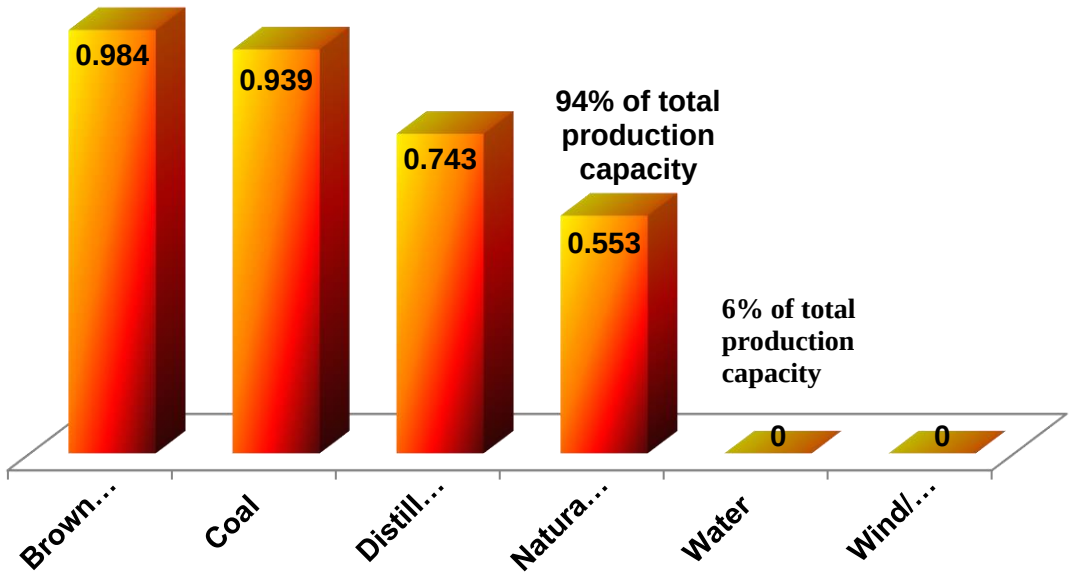


Figure 26

GHG emissions and climate policy

Increasing the use of renewable energy has a positive effect on the ecosystem. Compared with natural gas and water sources when using wind and solar energy to produce electricity, the level of CO2 emitted into the atmosphere is much lower. This increases the attractiveness of these types of energy in terms ofecology.

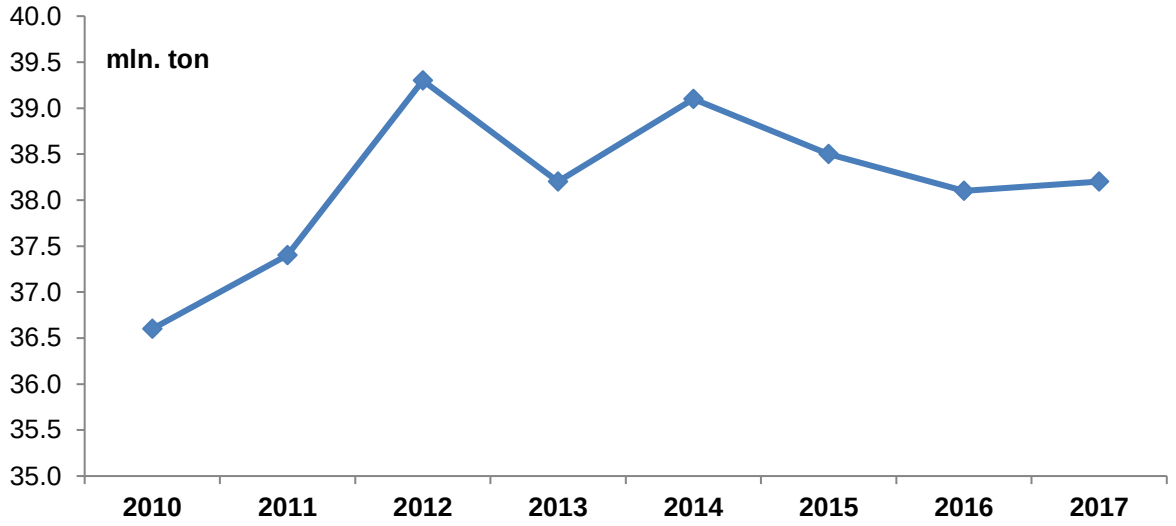
The amount of CO_2 pollution from the production of 1 MW hour of electrical / thermal energy (in tons, 2016)



Source: Strategic roadmap for the development of the utility sector in Azerbaijan

Figure 27

The dynamics of changes in greenhouse gases emitted into the atmosphere as a result of the activities of the energy sector is shown in the figure below.



Source: Azerbaijan Statistics, 2019

Figure 28

The figure shows that the amount of greenhouse gases emitted into the atmosphere as a result of the activities of the energy sector in recent years has stabilized at 38 million tons, which is associated with stabilization of the level of natural gas in the overall balance of energy consumption.

It was determined according to the calculations, that 24% of greenhouse gases emitted into the atmosphere in Azerbaijan fall on the energy sector.

A significant part of the greenhouse gases emitted into the atmosphere in the energy sector falls on the electric power industry, which in turn depends on the ratio of fuel burned (natural gas and fuel oil). The graphs of the ratio of combusted fuel and specific fuel consumption per kWh of electric energy are shown in Figure.

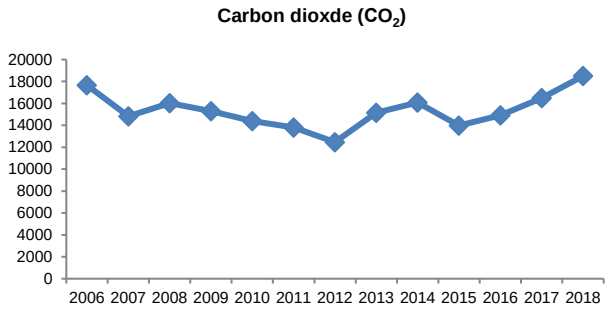
It is planned that by 2030, the specific fuel consumption per unit of electric power will significantly reduce by commissioning of new generating capacities of approximately 2,400 MW and decommissioning of old electric stations, which will lead to a reduction in the volume of greenhouse gases emitted into the atmosphere. An increase in the share of renewable energy sources in the overall balance of energy consumption will also lead to a decrease in the volume of greenhouse gases. The reduction of electric energy losses in electric networks to 7% in Baku and up to 8% in the regions, which is provided for in the strategic roadmap, will allow saving natural gas (with an increase in gas exports) and also reduce the volume of greenhouse gases.

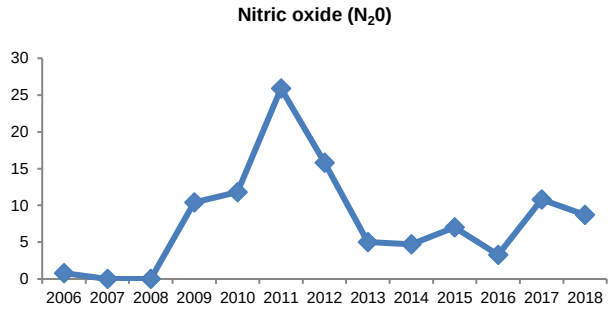
Some targets for improving the environment and reducing the volume of greenhouse gases are given in Table 8 and in the figures 26.

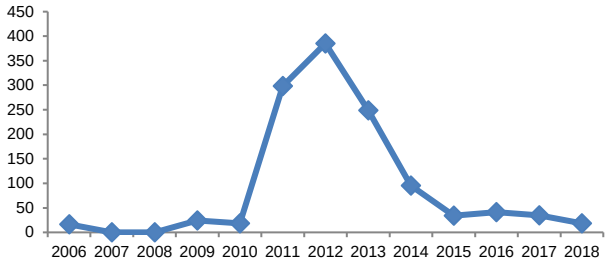
It should be noted that until 2030 a significant increase in the volume of renewable energy sources is planned, which will lead to a corresponding decrease in the amount of CO_2.

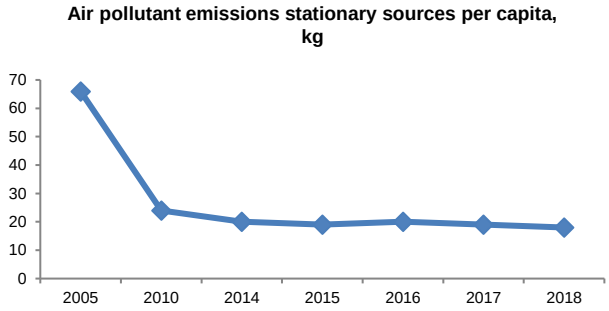
As it can be seen from the figure, by 2030 with the commissioning of more than 2200 MW of power based on renewable energy sources, more than 3000 thousand tons of CO_2 will be prevented, which will have a significant role in the fulfillment by Azerbaijan of voluntary obligations under the Paris Climate Agreement.

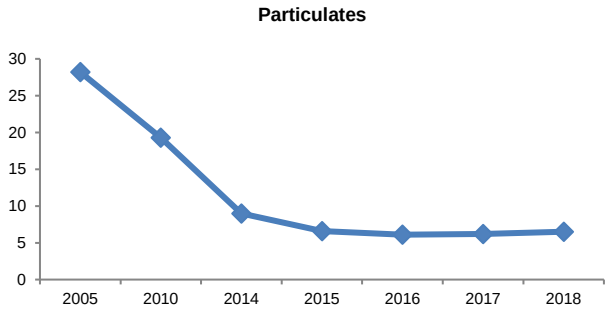
Air pollutant emissions generated greenhouse gases from stationary sources, (thsd. ton)

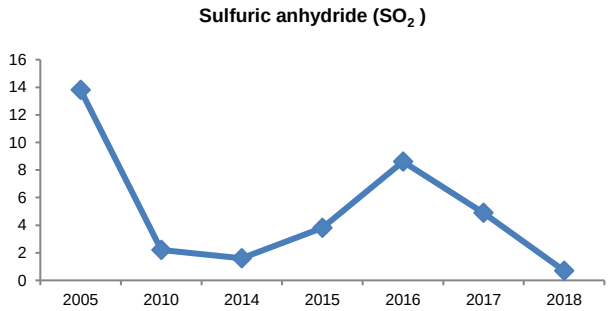


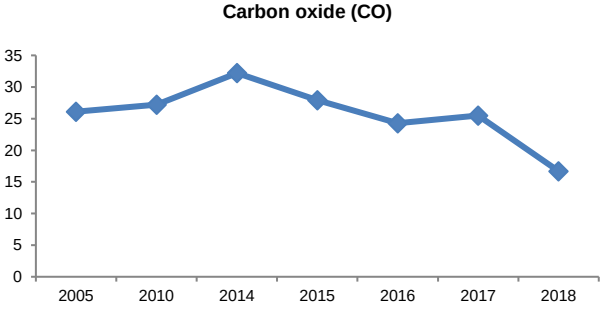


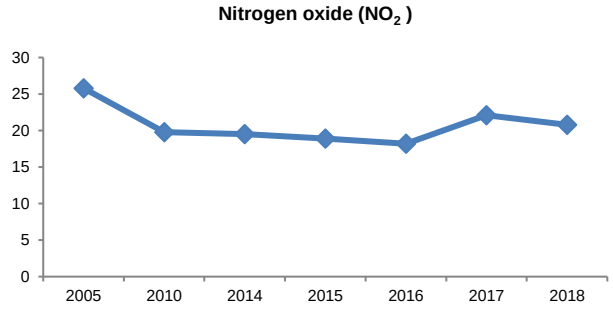


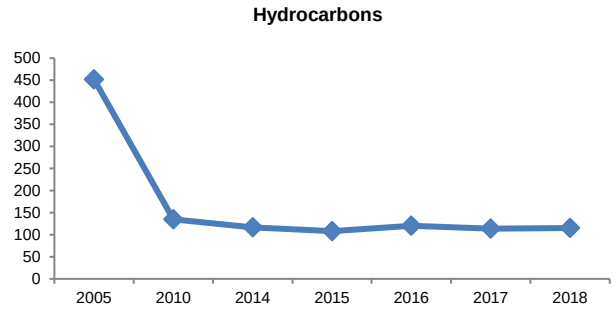












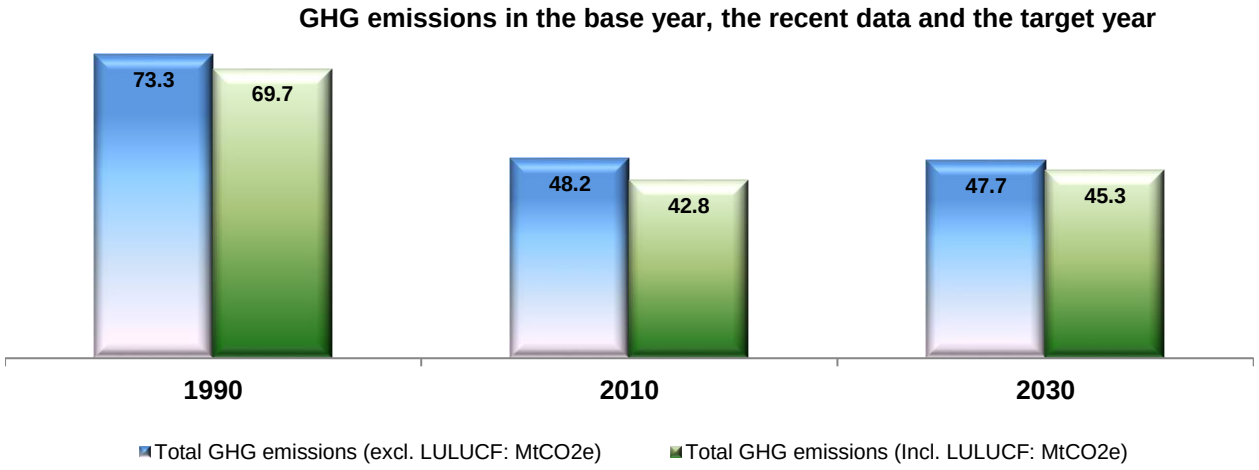
Source: Azerbaijan Statistics, 2019

Figure 29

As can be seen from the graphs of greenhouse gases from stationary sources, almost all of them in recent years have a tendency to decrease.

Targets and priority areas for climate actions

Azerbaijan has submitted its intended nationally determined contribution (INDC) to the UNFCCC. Its total aggregate quantitative contribution to GHG mitigation is a 35% reduction in the level of GHG emissions by 2030, compared to 1990 (GoA, 2015) (See figure 1). The contribution covers CO2, CH4, N2O, HFC and CF4 emissions from the energy, agriculture and waste sectors as well as land use and land use change and forestry (LULUCF).



Source: Financing Climate Action in Azerbaijan, 2016

Figure 30

Analysis of gaps in implementing energy efficiency practices and existing challenges for their implementation in Azerbaijan

Energy and energy efficiency sector

Azerbaijan has adopted strategic road maps for economic development and economic subsectors, which set development goals for various segments of the energy sector, as well

as a package of special measures aimed at achieving those goals in accordance with the established deadlines over the next fifteen years.

At present, the model of the electricity market in Azerbaijan is an incomplete model, where there is the main producer of electricity, represented by AzerEnergy, and one single buyer-seller of electricity, Azerishig. The strategic road maps envisage the separation of energy activities: generation of electricity, transmission, distribution and sale of electricity and the creation of separate transmission and distribution system operators. Today, there is a positive experience in the separation of energy activities in the generation of electricity; some mini power plants have been privatized.

At present, the Ministry of Energy and various structures are developing 5 fundamental documents, where issues of energy efficiency are raised,in various aspects. Among these documents is the law “On the efficient use of energy resources and energy efficiency”, which will determine the main goals and deadlines for the implementation of energy efficiency objectives. It is the most important document when it comes to energy efficiency matters.

Renewable energy sector

Since 2009, Azerbaijan has been a member of the International Renewable Energy Agency (IRENA). The country had established the State Agency for Alternative and Renewable Energy (SAARES). SAARES and the Ministry of Industry and Energy prepared the National Strategy on the Use of Alternative and Renewable Energy Sources for the Period 2012-20, including the Law on Renewable Energy Sources. In June 2012, SAARES was abolished, and in its place was launched the State Company of the Republic of Azerbaijan on alternative and renewable energy sources.

Despite the increase in the wholesale electricity price in 2016 - 2.94 cents / kWh for small hydropower plants, 3.24 cents / kWh for wind generators, 3.35 cents / kWh for solar power plants, relatively low tariffs for electricity is a major obstacle to the development of the renewable energy sector. Another obstacle is the absence of legally established connection rules. Overcoming these barriers to the development of renewable energy in Azerbaijan should be ensured by twoprojects:

- Preparation and implementation of the Action Plan in the field of renewable energy and energyefficiency.
- Improving legislation in the field of renewable energy and energy efficiency and ensuring compliance with the legislation of the European Union. Azerbaijan is seeking solutions to problems in the field of environmental protection and rational use of natural resources. To achieve the goals in the field of environmental protection in Azerbaijan, a number of important laws, legislative documents and government programs aimed at improving the environmental situation in the country have been developed andapproved.

General evaluation of progress

In accordance with the Action Plan for 2011-15, approved by the President for the implementation of the State Program titled "Poverty Reduction and Sustainable Development in the Republic of Azerbaijan in 2008-15" (approved by Decree No. 3043 of September 15, 2008), the country should start the privatization of enterprises of the fuel and energy complex. However, there still has not been any noticeable activity in this area, with the exception of the privatization of several small hydropower plants. Despite the target

objectives of introducing market relations in the energy sector, as envisaged in the strategic road maps, there are still no short-term plans for privatization and separation of state- owned companies in the oil, natural gas and electricity sectors. Azerbaijan has no strategy, action plan, or legislation in the field of energy efficiency. In addition, the only measures implemented in the field of energy efficiency are those financed by the EU or through projects of donor organizations, and only a few non-governmental organizations carry out activities in the field of energy efficiency. The creation of an institutional infrastructure in the field of energy efficiency in Azerbaijan is at a very early stage. Institutional developmentshould be based on an understanding of short-term, medium-term and long-term tasks, highlighting those tasks that require urgent and special attention from the Azerbaijani authorities.

The electricity (and gas) market in Azerbaijan is still a vertically integrated monopoly. The Tariff Council can set wholesale and retail prices for electricity. In December 2016, retail electricity prices were raised to 4.12 cents /kWh, they are still subsidized to a cost- reflective level - 7.5 cents / kWh. This tariff continued in effect in 2012 (and again this tariff does not reflect the costs). According to estimates, the potential of renewable energy sources in Azerbaijan exceeds 12 GW, which today is almost twice the installed capacity. Using renewable energy, the amount of electricity generated by gas-fired power plants could be significantly reduced. This would be a factor for a more sustainable and long-term growth of GDP, which is currently achieved through the export of oil andgas.

Outline of possible solutions for applying the best practices from other countries

Azerbaijan sent the IEC a request for assistance in developing a long-term energy strategy in accordance with the objectives reflected in the Road Maps adopted in December 2016. According to experts of IEC, the leadership of Azerbaijan understands that oil and gas reserves are irreplaceable and, therefore, limited. In addition, the Paris Agreement on the reduction of carbon dioxide emissions into the atmosphere will gradually affect global approaches to the development of energy resources. Thus, Azerbaijan should be ready for new challenges and is willing to reflect its new intentions in the long-term energy strategy, covering the issues of hydrocarbon production, efficiency of distribution of energy sources and their exports, as well as the management of the energysector.

In Azerbaijan, a process of real unification of the fuel and energy complex (FEC) has emerged into a single mechanism, since oil, gas and electricity are interrelated.

There is still inefficient use of energy in Azerbaijan. While today this is somehow justified by the presence of large reserves of energy resources, for long-term periods the irrational and inefficient use of energy resources must be stopped. To implement this goal, the law “On the efficient use of energy resources and energy efficiency” is being developed together with IEC experts.

By today there are contours of this law, and there is a lot of work ahead to coordinate all energy efficiency issues between different departments involved in the process so that a result is achieved across the country.

Many of the energy efficiency measures are associated with the State Oil Company of Azerbaijan (SOCAR), which supplies both fuel for power generation andtransport.

IEC experts believe that private investors will not be able to enter Azerbaijan’s power industry unless the country specifies its tariff policy.

The task of the state is to create a balance between the interests of the investor and social aspects. If the cost of electricity generation is higher than the tariffs for its sale to the

population, or state facilities and are not compensated in any way, then the investor will not come, since no establishment will want to work at a loss.

It is necessary to determine whether there will be some compensation mechanism for investors, or a change in tariff components (in terms of taxes or other aspects), or a financial burden, that is, real market prices falling on the consumersthemselves.

Currently, large energy-saving potential is non-existent in the energy sector, but does exist in other sectors of the economy such construction and transport.

Among the problems of energy efficiency, an important place is occupied by the issue of reducing energy losses in the housing and utilities sector and in the construction or reconstruction of buildings. Buildings need to be built in a new way so that they are energy efficient. Yes, such buildings will cost more and pay off a little later, but we need to think about the future, about generations, about interests across the state.

The concept of an "energy-saving house" or, as it is sometimes said, "passive house", became a household name in 1970s, along with the advent of new technologies in construction.

The term “energy saving” implies a reduction in maintenance costs for items such as electricity, heat, water, sewage, and ventilation.

"Passive House" is a standard of energy efficiency in construction, which allows for the resident to maintain the comfort of living, while being economically and environmentally friendly. The consumption of heat energy by them is so low that either there is no need to install a separate heating system, or its power and size are small. Energy consumption for the needs of heating, hot water and electricity supply of an energy-efficient house for the total year does not exceed 120 kilowatt-hours per unit area. At the same time, consumption for heating is 10-15 kilowatt-hours per unitarea.

One of the characteristics of an energy efficient house is the energy balance between ventilation or transmission loss of heat and its supply with solar energy, internal heat sources and heating.

In fact, the ideal “passive house” is a thermos-house without heating.

An important role in the creation of such houses is played by modern building materials, technologies and progressive thinking.

Among the advantages of such buildings there is a special engineering system that constantly maintains a pleasant microclimate, fresh air, balanced room temperature, no air leaks, humidity controls, and the cost of operating its power supply remains low even with the rising cost of energy.

It should be noted that totally 70 percent of heat is lost through the walls and windows of an ordinary house, and 25 percent through the roof.

By now, tens of thousands of “passive houses” have been built around the world, and such facilities have become widespread in Europe, in particular, in Germany, Finland, and Sweden.

As for energy saving in transport, since January 2015, environmentally friendly Tesla cars have been sold in Azerbaijan, which can be purchased at the “Green Car” electric vehicle sales center.

This project is being implemented by Green Car LLC with the support of the Azerbaijan Automobile Federation and the International Dialogue for Environmental Action (IDEA).

In June 2015, for the first time in Europe, a presentation of the Detroit Electric SP: 01

sports car took place in Azerbaijan (also the project Green Car LLC and IDEA).

Detroit Electric SP: 01 is the world's fastest serial electric car, which was created by the American electric vehicle manufacturer DetroitElectric.

From 0 to 100 kilometers per hour, the car accelerates in 3.7 seconds, and its maximum speed is 249 kilometers per hour. The electric tricycle Epic EV TORQ Roadster dials a “hundred” four seconds after the start, and the Tesla Model S sedan accelerates to 96 kilometers per hour in 5.4 seconds.

There are wide opportunities to create new production facilities in other sectors of the processing industry in Azerbaijan, in recent years, many competitive enterprises have been created in the country using advanced technologies, mainly in the food, light, and furniture industries as well in construction materials production. Along with the expansion of production in these sectors, measures should be continued to create new processingenterprises in other areas, including chemistry, metallurgy, machinery and equipment, alternative power plants and equipment, and defense. When creating new industrial enterprises, the focus should be on using energy-saving technologies that meet high environmental standards.

The Republic of Azerbaijan is the biggest of the three countries of the Caucasus in terms of its size, population and available energy resources. At present country’s energy needs are met almost entirely with its gas and oil resources. However the country’s energy efficiency is very low and it has the highest energy intensity index in the Caucasus region. The potential of energy efficiency is evaluated to be about 30% of total energy consumption. The issue of energy efficiency in Azerbaijan is directly linked to energy efficiency in buildings.

According to some estimates, 55% of energy consumption in Azerbaijan accounts for buildings.

in Azerbaijan were completed a number of projects to support the development and the enforcement of energy efficiency-related regulatory base in the building sector including drafting of building standards and codes, as well as the promotion of regional harmonization of policies and regulatory practices.

Furthermore, the project focused on assessing the needs for strengthening capacity in energy auditing, building technologies and design, and providing appropriate capacity building, training and networking programmes. In addition to internationally supported initiatives, Azerbaijan has recently made important steps at the national level, which aimed at creating conditions for an extensive development of energy saving and energy efficiency. One of the examples is the programme “City planning and construction code for Azerbaijan” that was adopted in September 2012. This programme served as a basis for energy saving and energy efficiency at the stage of designing and construction of new facilities by developing relevant norms and regulations.

A number of other State programmes aimed at socio-economic development of the Republic of Azerbaijan and Strategic roadmap for the prospects of the national economy of the Republic of Azerbaijan contain important provisions for energy sector improvements.

However, along with the current achievements in energy policy implementation, Azerbaijan needs to overcome many obstacles that hinder the improvement of energy efficiency in the energy sector. Still relatively uncompetitive environment and insufficient investments are the results of the existing structure of the energy sector, which is marked by a low degree of private sector involvement. This happens because only a handful of major energy operating companies dominate the energy sector in the country. All of them are State-owned and vertically integrated with full monopoly in energy production and supply.

The current level of both national and foreign investments in the energy sector is not sufficient to overcome low energy efficiency caused by a high proportion of obsolete facilities in the energy sector, energy losses during production, transmission, distribution and use of energy resources and insufficient use of energy efficient technologies.

On the legal and regulatory side, even though all major energy-related legislation, including by-laws were adopted in Azerbaijan in the late 1990s, there are still some old legal and normative acts in place, which need to be updated so that they correspond to the current situation and as a result can facilitate the implementation of current energy policy needs.

Furthermore, many provisions of energy legislation in Azerbaijan have a general character and are not duly applied in practice.

In general, current efforts of some Governmental bodies and other stakeholders to increase energy efficiency in Azerbaijan have been fragmented and dispersed. In order to achieve long-term energy sustainability the focus of policy makers should be placed on developing an integrated strategy and plan of actions, as well as improving the legal framework that would take into account regulatory, legislative and financial dimensions of energy policy reform.

The Government of Azerbaijan should make further steps to increase energy efficiency and reduce the negative environmental impact of energy use by developing appropriate and sustainable policy framework in the area of energy efficiency. The energy efficiency policy formulation should be based on short-term, medium-term and long-term objectives, as shown in table.

As it was shown above, the main problems of energy efficiency in the energy branch of Azerbaijan are related to its structure, where only a few large energy enterprises dominate the country's electric power industry. All of them are state-owned and have a vertically integrated structure with a complete monopoly on the production and supply of electric energy. To reform the electric energy sector, a normative-legal basis is created with updating of laws, by-laws related to the electric power industry codes adopted in the late 1990s.

Along with the law “On the efficient use of energy resources and energy efficiency”, a new law on electric power industry is under negotiation, which should replace the 1998 law on electric power industry. The new law on electric power industry defines state policy, management and regulation in the electric power industry in the new conditions, market relations in the electric power industry of Regulatory Authority institution, its functions are defined, the rights and obligations of electric energy market entities (electric energy producer, transmission company - transmission system operator, central operative - dispatch control, electric energy distributor - distributing system operator, electric energy consumers), organizing the electric energy market and its functioning, the market operator, the wholesale electric energy market, the balancing market, market of support services and other energy market issues are defined. The plans for transition to the electric energy market are presented in Table8 .

The new law on electric power industry envisages a three-stage transition to market relations, as a result of which a competition in the electric power industry will be introduced, and cross subsidies will be eliminated. Monitoring the implementation of the conditions of each stage and its goal is carried out by the relevant executive body together with the Regulatory Authority.

The stages of the transition to market relations in the electric power industry are presented in Table8 .

Table 10.PLAN OF MEASURES

№	Name of measure	Main performer	Expected results	Implementation period
1. Creation of an independent regulatory body and trust fund, formation of effective service and mechanisms for the collection, staffing				
1.1	Continuation of measures to improve the level of public utilities	State Agency for Citizen Service and Social Innovations		2017-2020
1.2	Improving a staff capability in the communal public sector	Minister of Labour and Social Protection of Population		2017-2020
2. Ensuring a fully diversified and ecologically friendly electric energy generation				
2.1	The creation of additional production capacity	Ministry of Energy		2017-2020
3. Improving the efficiency of electric stations and efficient use of existing capacity				
3.1	Ensuring the efficient use of the potential of electric stations	"Azerenerji"JSC	● Increase of real GDP by 75 million manats to 2020 with direct 70 million manat and indirect 45 million manats; ● Increase net fuel efficiency (ratio of electric energy generated to fuel consumed) for individual combined cycle gas turbine stations; ● Investment of a maximum of 300 thousand US dollars for modernization of 1 MW of a natural gas electric station; ● Export of saved by increasing efficiency, of natural gas (from natural gas installations) to Europe under the TAP / TANAP projects.	2017-2020
3.2	Considering the opportunity of electric stations privatization	State Property Committee		2017-2020
3.1. Reducing power losses, improving transmission and distribution quality				
3.1.1	Prioritization of projects on losses reduction	"Azerenerji" JSC "Azerishiq" OJSC		2017-2020
3.2. Use of optimal mechanisms to increase a consumption efficiency				
3.2.1	Review of determining optimal prices to coordinate the interests of consumers and producers	Tariff Council	• Increase of real GDP by170 million manats to 2020 with direct 125 million manats and indirect 45 million manats; ● Export of natural gas to Europe under the TAP / TANAP projects, saved by increasing of efficiency of energy use.	2017-2020
3.3. Creation of effective regulatory and auction mechanisms				
3.3.1	Creation of wholesale market	Regulatory authority	● Creation of a new improved legislative framework; ● Implementation of sectoral liberalization;	2017-2020
3.3.2	Priority of production assets for privatization	Regulatory authority		2017-2020
3.3.3	Creation of mechanisms	Regulatory authority		2017-2020

	of state-private partnership		● Creation of mechanisms of state-private partnership.	
4. Minimization of all losses associated with the distribution of natural gas				
4.1	Comprehensive assessment of the existing network and elaboration of a development plan	State Oil Company of Azerbaijan Republic	● Increase of real GDP by 90 million manats to 2020 with direct 85 million manats and indirect 5 million manats; ● Creation of 340 new workplaces; ● Reduction of technical losses to 8% when distributing natural gas to all regions (if the level of losses in any region is below 8%, then it is likely to remain unchanged); ● Upgrading to improve the gas supply system in accordance with international standards; ● Reliable provision of dynamically growing demand for natural gas, consumers; ● Simplification of forecasting natural gas consumption and short-term detection of possible losses in the network; ● Elimination of technical problems in the field of gas supply;● Export of natural gas to Europe under the TAP / TANAP projects, saved by improving the efficiency of use.	
5. Creation of a stable and reliable heat supply infrastructure				
5.1. Expansion of optimal heating and hot water supply systems in the country with taking into account geographical, social and economic features				
5.1.1	Creation, restoration and reconstruction of heat sources	"Azeristiliktechizat" JSC	● Increase of real GDP by 12 million manats to 2020; ● Creation of 950 new workplaces; ● Considering efficiency, increase heat energy production by 427 thousand Gcal compared to 2015 and bring it to 1767 thousand Gcal●Increase the number of heated buildings by 50.4% and bring them to 5689 ● Overhaul of a	2017-2020
5.1.2	Use of alternative and renewable energy sources	Ministry of Energy		2017-2020
5.1.3	Taking measures to protect the environment when using heat energy	"Azeristiliktechizat" JSC		2017-2020

			technically faulty heating system in approximately 550 residential buildings and improvement of heat supply	
5.2. Improving the normative-legal basis, taking institutional measures and optimizing heat tariffs				
5.2.1	Improving the normative basis in the field of heat supply	Ministry of Energy	● Providing a reliable and stable heat supply infrastructure	
5.2.2	Implementation of institutional measures in the field of heat supply	Ministry of Energy		2017-2020
5.2.3	Overview of heat tariffs	Tariff Council		2017-2020
5.3. Assessment and elimination of existing problems in a centralized heating system, ensuring system efficiency				
5.3.1	Ensuring efficiency in the heating system	"Azeristiliktechizat" JSC	● Increase of incomes of heat facilities in general by 5.1 million manats.	2017-2020
6. Energy Efficiency Action Plan				
6.1	The Government of Azerbaijan should also aim at establishing a legal framework for energy efficiency, which needs to be full-fledged with accompanying well-formulated secondary legislation and in compliance with international standards.	Cabinet of Ministers		2020
6.2	The Government should increase the budget flexibility and autonomy to improve the efficiency of Government-funded organizations and budgeting principles base on full-cycle costing in order to capture the benefits of long-term investments	Cabinet of Ministers		2020
6.3	Engage energy audit mechanisms	Cabinet of Ministers		2020
6.4	The establishment of a dedicated Governmental entity to coordinate the activities related to energy efficiency projects can facilitate the processes and procedures for projects' approval, public procurement and tendering.	Cabinet of Ministers		2020-2021
6.5	The Government should encourage development and use of new energy efficiency models based on international "best practices" by cooperation with international experts	Cabinet of Ministers		2020-2021

	and institutions.			
6.6	The Government should develop and adopt new standards, norms and regulatory acts on energy performance, and simultaneously establish institutional and financial mechanisms of their management. That should encompass the development of economic incentives for energy efficiency projects and programmes.	Cabinet of Ministers		2021-2022
6.7	Create of public funds with a focus on the sectors and technologies where energy saving and energy efficiency potential is the greatest. When national funds are limited or not available foreign investment should be attracted by creating favourable investment environment.	Cabinet of Ministers		2021-2022
6.8	National treatment should be provided to foreign investors by ensuring nondiscriminative conditions compared to national investors	Cabinet of Ministers		2021-2022
6.9	The Government should aim at restructuring tariff policy by adjusting tariff levels and design, taking into account customer classification so that tariffs reflect the true cost of production and internalize environmental costs.	Cabinet of Ministers		2022-2024
6.10	The Government should ensure regular monitoring of policy implementation, *inter alia* by establishing a system of energy audits, and communicate results to all concerned stakeholders	Cabinet of Ministers		2022-2024
6.11	To deal with the issue of limited awareness and lack of experience in energy efficiency project development and implementation, the Government should establish wide-scale awareness raising programmes at the	Cabinet of Ministers		2022-2024

	national and local levels with the purpose of training specialists in sustainable use of energy resources			
6.12	Establish and increase efficiency of Energy Management Systems	Ministry of Energy Ministry of Ecology and Natural Resources of the Republic of Azerbaijan		
6.13	Support energy efficiency projects through energy efficiency contest	Ministry of Energy Ministry of Ecology and Natural Resources of the Republic of Azerbaijan		
6.14	Develop a National Financing Mechanism for Energy Efficiency	Ministry of Energy Ministry of Ecology and Natural Resources of the Republic of Azerbaijan		
6.15	Develop guides, standard contracts and similar bases containing technical, legal and financial aspects for energy efficiency projects	Ministry of Energy Ministry of Ecology and Natural Resources of the Republic of Azerbaijan		
6.16	Develop registration, database and reporting systems for energy efficiency activities	Ministry of Energy Ministry of Ecology and Natural Resources of the Republic of Azerbaijan		
6.17	Improve the facilities and effectiveness, ensure coordination and control of the international energy efficiency financing scheme	Ministry of Energy Ministry of Ecology and Natural Resources of the Republic of Azerbaijan		
6.18	Implement efficiency standards for natural gas infrastructure	Ministry of Energy Ministry of Ecology and Natural Resources of the Republic of Azerbaijan		
6.19	Presenting customers with comparable and detailed bills; create an energy data platform for smart management of measurement data	Regulatory authority		
6.20	Identify and share best practices on materials and technology in the construction sector	Ministry of Ecology and Natural Resources of the Republic of Azerbaijan		
6.21	Create a database for building energy consumption data	Ministry of Ecology and Natural Resources of the Republic of Azerbaijan		
6.22	Increase the energy performance certificate ownership ratio of existing buildings	Ministry of Ecology and Natural Resources of the Republic of Azerbaijan		
6.23	Promote energy	Ministry of Ecology and		

	efficiency in new buildings	Natural Resources of the Republic of Azerbaijan		
6.24	Improve energy performance of existing public buildings	Ministry of Ecology and Natural Resources of the Republic of Azerbaijan		
6.25	Scale up the use of renewable energy and cogeneration systems in buildings	Ministry of Ecology and Natural Resources of the Republic of Azerbaijan		
6.26	Scale up cogeneration systems in large industrial facilities using heat	Ministry of Energy Ministry of Ecology and Natural Resources of the Republic of Azerbaijan		
6.27	Set energy saving targets for public buildings	Ministry of Energy Ministry of Ecology and Natural Resources of the Republic of Azerbaijan		
6.28	Improve energy efficiency municipal services	Municipalities		
6.29	Develop benchmarking on alternative fuels and new technologies	Ministry of Transport of Azerbaijan		
6.30	Promote public transport	Ministry of Interior, Municipalities		
6.31	Develop and implement institutional restructuring for urban transport	Ministry of Interior, Municipalities		
6.32	Promote the replacement of tractors and harvesters with energy-efficient ones	Ministry of Agriculture of Azerbaijan		
6.33	Switch to energy-efficient irrigation methods	Ministry of Agriculture of Azerbaijan		
7. Transition to market relations in the electric power industry				
7.1	Obtaining the permits for activities by electric energy market entities	Ministry of Energy		2021
7.2	Application of economic optimization of electric energy production by a specialized subdivision of the central operative - dispatch service of the transmission system operator	Ministry of Energy Regulatory authority		2021
7.3	Creating the conditions for competition between electric energy suppliers, as well as ensuring the functional distribution of activity on the distribution and supply of electric energy	Ministry of Energy		2021
7.4	Introduction by the regulatory body of a price (tariff) on the electric energy market, including regulation of prices	Ministry of Energy Tariff Council		2021

	(tariffs) for all consumers			
7.5	Preparation for the second stage of electric energy market, including the approval of necessary normative-legal acts, as well as the conclusion of contracts of second stage	Ministry of Energy		2021
7.6	Creation of a transmission system operator by an appropriate executive authority and the legal separation of electric energy production and transmission	Ministry of Energy		2021
7.7	Availability of a specialized subdivision (of market operator) as part of a system transmission operator, which manages the wholesale electric energy market on the basis of temporary market rules approved by the regulatory body	Ministry of Energy		2022
7.8	Purchase of electric energy by the market operator from all electric energy producers (except for producers that produce electric energy from renewable energy sources and sell to the Guaranteed Buyer)	Ministry of Energy		2022
7.9	Sale of electric energy by a market operator to all electric energy suppliers	Ministry of Energy		2022
7.10	Provision of electric energy transmission (distribution) services by transmission and distribution systems operators in accordance with the Network Code and the Market Provisional Rules	Ministry of Energy		2022
7.11	The right of all consumers, connected to the electric power transmission network, including consumers with a connection capacity of more than 5 MW, to choose a supplier	Ministry of Energy		2022
7.12	Regulation of prices (tariffs) on the electric energy market by the regulatory body, including tariffs for the transmission	Ministry of Energy		2022

	and distribution of electric energy, as well as retail tariffs for electric energy suppliers working in the supply and distribution sector			
7.13	Application of special conditions to the entities of electric power industry	Ministry of Energy		2025
7.14	Creation of market relations in the field of electric power industry	Ministry of Energy		2025
7.15	Participation in the balancing market and support services market, as well as being responsible for the balance in accordance with the Balancing Rules	Ministry of Energy		2025
7.16	Purchase and sale of electric energy on the wholesale market	Ministry of Energy		2025
7.17	Ensuring a functioning of the balancing market, as well as the market for support services	Ministry of Energy		2025
7.18	Creation of a closed distribution network	Ministry of Energy		2025
7.19	Become a member of the wholesale electric energy market in accordance with market and balancing rules with the condition of obtaining a permit for electric energy supply, and participate in trade in this market	Ministry of Energy		2025
7.20	Organizing a market operator	Ministry of Energy		2025
7.21	Organizing a market for bilateral agreements	Ministry of Energy		2025
7.22	Creating a balancing electric energy market	Ministry of Energy		2025
7.23	Creating a market of support services	Ministry of Energy		2025
7.24	Creating an electric energy supplier	Ministry of Energy		2025
8. Improvingenvironmentalperformance				
8.1	In accordance with the document “Plan for the reduction of associated gas in SOCAR projects in 2017-2022”, it needs to reduce the volume of associated gas to 95 million m^3/year. According to the plan, a number of documents on the management of CO_2 and associated gas have been prepared	SOCAR		2022

8.2	The works on modernization of the H.Aliyev oil refinery are continued, upon completion of which the quality of the produced fuel will correspond to Euro-5 standards, and the oil processing depth will reach to 90%.	SOCAR		2022

Volume of investments required for realization of Strategic roadmap and the expected results.

Table 11.

№	Priority Name	Impact on real GDP (in million of manats, 2020)	Employment (number of workers, 2020)	Investments (mln. manat)
1	Increase in reserves of the national production portfolio	215	5085	1950
2	Diversification of the national production portfolio	70	270	1040
3	Consideration of opportunities of electric energy net export in near-term outlook for excess energy supply	115	–	–
4	Improving of efficiency of electric stations and efficient use of existing potential	75	–	1075
5	Reducing of electric energy losses, improving of quality of electric energy transmission and distribution	25	–	400
6	Using of optimal mechanisms for increase of consumption efficiency	170	–	–
7	Minimization of all losses, connected with distribution of natural gas	90	340	1515
8	Expanding of drinking and waste water infrastructure using	40	–	1135
9	Minimization of losses, optimization of water tariffs and increasing of efficiency of water use by attracting of investments in necessary infrastructure	20	–	845
10	Widening of optimal heating and hot-water supply systems in the country with taking into account	12	950	190

	the geographical, social and economic features			

Note 1. This table indicates the priorities, which will allow increasing the real GDP in 2020 by more than 10 million manats, or creating more than 100 workplaces. Other priorities play a supplementary role in achieving of the intended results.

Note 2. These figures are intended to give a clear picture of priorities impact. It is necessary to conduct a comprehensive feasibility study and specify the numbers for each priority when implementation of the actions.

Conclusions and recommendations

General recommendations

• Energy policy in the country should take into account the potential contribution of energy efficiency for increasing fuel exports, promoting economic growth and protecting the environment.

• High priority should be given to energy efficiency and renewable energy. A future energy policy should be supported by a detailed analysis of the economic potential of energy efficiency in all sectors of the economy, as well as an analysis of the obstacles hindering the realization of this potential.

• Reconstruction of assets in the segments of production, transmission and distribution in the power industry should be continued. This will maximize fuel efficiency and minimize technical losses during transmission and distribution.

• It is necessary to develop laws and secondary legislation in the field of energy efficiency and renewable energy.

• Special energy efficiency programs should be developed in different sectors of the economy, including specific targets and monitoring systems for continuous evaluation of program implementation.

• It is necessary to intensify the interdepartmental interaction of the energy sector and other government agencies in order to coordinate objectives in the field of the environment, in the field of energy efficiency of transport, in the housing sector and in industry.

• The government should support the efforts of various stakeholders, including local authorities, universities, research centers and non-governmental organizations, and promote their activity to improve energy efficiency in Azerbaijan.

Energy market and tariff formation

• It is necessary to consider the introduction of market principles in the energy sector and the corresponding regulatory framework, taking into account international experience.

• To ensure the implementation of energy efficiency measures, the existing tariffs for electricity, heat and gas should be revised. It is necessary to take into account the need for differentiation of tariffs by types of consumers, the introduction of block tariffs, as well as the issues of affordability of tariffs for the population.

• The government should allocate sufficient financial resources for the purpose of improving the energy efficiency of public and state buildings and public lighting systems, and at the same time introduce incentive systems for private and housing sector initiatives in energy efficiency and renewable energy sources.

• The government should ensure continuous dialogue with international financial organizations and the donor community to increase attention to energy efficiency and renewable energy.

Programs and measures in the energy efficiency sector

• High efficiency standards for new buildings under construction, energy efficiency labeling, and minimum energy efficiency standards for electrical equipment should be adopted and compliance procedures and application rights should be inplace.

• It is necessary to introduce energy auditing and energy management systems for large industrial consumers.

• Energy efficiency issues should be an element of an integrated approach in the planning and provision of transport services.

• Implementation of programs for the reconstruction of district heating systems should be continued to reduce losses and attract new consumers and to encourage the introduction of individual metering devices, where possible.

• The government should promote the need to improve energy efficiency and raise awareness of energy efficiency issues among local communities, citizens, small and medium businesses.

• Azerbaijan should continue to participate in various international initiatives, such as the Green Building Council and the International Renewable Energy Agency in Abu Dhabi (IRENA) to ensure the exchange of information and best practices for successful energy efficiency and renewable energy projects in other countries.

Renewable energy sources

• The development of renewable energy sources should remain a priority for Azerbaijan.

• Efforts should continue to focus on the use of the potential of solar and wind energy, as well as to assess the possibility of using waste for energy purposes.

• Part of the revenues from oil and gas should be directed to the development of renewable energy sources. A fund for renewable energy issues should also be established.

• It is necessary to develop network connection rules, a tariff setting method and incentives for attracting investments in the renewable energy sector.

• The role of the State Agency for Alternative and Renewable Energy Sources should be enhanced to ensure the leading role of the organization in the field of renewable energy development in Azerbaijan.

• A project database should be created to ensure the monitoring of achieved results in all areas of activity in Azerbaijan aimed at improving energy efficiency.

• The existing building fund statistics should be used to support policy development and an assessment of the potential for energy savings in the building sector.

• In order to monitor the potential for energy conservation, an energy audit should be a mandatory starting point for large buildings. This should be the basis for the development of an Action Plan for the implementation of energy saving potential.

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