THE REPUBLIC OF AZERBAIJAN

MINGACHEVIR CITY

RESOLUTION No. 20/6

December 25, 2019

Approval of the Sustainable Energy and Climate Action Plan of Mingachevir city

By Decision No. 08/1, dated 16.06.2017 of Mingachevir Municipality, taking into account the Mingachevir Municipality joining the initiative of Agreement of Mayors over European Union-funded Climate and Energy, which represents the EU's climate and energy initiative to the countries of Eastern Partnership, the preparation of the Sustainable Energy and Climate Action Plan, joint reference of permanent comissions of "Local social issues" and 'Local environmental issues", opinions of members of Municipality, the general meeting of the Mingachevir Municipality

decides:

1. The Sustainable Energy and Climate Action Plan of Mingachevir city should be approved until 2030.
2. The necessary support to the working group and stakeholders on the implementation of the actions reflected in the plan should be provided.
3. The duration of the implementation of the Plan should be set to 2030 (including the same year).
4. Mustafayev Shahriyar Yolchu is assigned to the head of the working group to oversee the implementation of the decision.

The Chairman: /signed/ J.A.ABDULLAYEV
Seal is available

Sustainable Energy and Climate Action Plan of Mingechevir city (SECAP) for period of 2020-2030

AZERBAIJAN – 2019

Contents

Abbreviations

CoM	Covenant of Mayors
EE	Energy Efficiency
ETS	Emission Trade Systems
EV	Electric Vehicles
GHG	Greenhouse Gases
GoA	Government of Azerbaijan
HPP	Hydro Power Plant
IDP	Internally Displaced People
KV	Kilovolt
KW	Kilowatt
MOE	Ministry of Energy
MWh	Mega Watt Hours
PTL	Power Transmission Line
RE	Renewable Energy
SECAP	Sustainable Energy and Climate Action Plan
SOCAR	State Oil Company of Azerbaijan Republic
STP	Sewage Treatment Plant
TPP	Thermal Power Plant
TOE	Ton Oil Equivalent

Introduction

Mingechevir City Municipality has started negotiations on co-operation with Covenant of Mayors Agreement since 2017. In the frame of negotiations, the Council of Mingechevir Municipality, investigating the details of the Agreement has adopted a decision about joining the Agreement dated on June 16, 2017, and the Agreement has been duly signed on the same day.

According to the Agreement Mingechevir Municipality will work out the SECAP of the city covering the period from 2020 till 2030. For preparation of such plan an International and local advisor have been involved and it is planned to be completed by the end of 2019.

After having signed the Agreement the Municipal and Executive Power organizations have participated in some events. Information about these events are given below:

Baku, Azerbaijan 03.07.2018

Covenant of Mayors East. “Municipality Leaders’ initiative: *From the fulfilment of liabilities to the realization – Training.*

A Training on developing the SECAP, the tools of calculating of emission levels, expected problems and the ways of solution were discussed in the training.

Tbilisi, Georgia, 25-26.09.2018

Objective of training was to establish effective relationship with citizens, to inform them about the new agreement and its objective, to understand SECAP application on local level and evaluate, a seminar for representatives of Azerbaijani and Georgian Mayors’ Agreement who signed Agreement in Tbilisi

The aim of the seminar is described as following:

- To get closely acquainted with EU initiatives (CoM East)'s encouraging aims and their impact on their local sustainable Energy and Climatic development policy
- To inform the local communities about the benefits of PACEK's implementation on regional and local level
- Strengthening of communication on New Eastern Partnership and Eastern Partnership Convention in Eastern Partnership Countries

Kiyev, Ukraine 22-23.11.2018

Mayor's Agreement East: High level conference on sustainable energy sources

City municipalities whose projects have been implemented have presented their achievements for review and discussion. Successful municipalities were rewarded, and they shared their difficulties they met and the ways out the problems and their work practice.

The activities suggested in the SECAP will play an important role in sustainable development of Mingechevir city

Section1. Analysis of Current situation

Mingechevir city is situated in the north of Ajinohur chains, proluvial-alluvial plain covering Bozdagh chains in the North. Total area of the city is 130 sq. km-s. Population is 105,139 as per the census held on 01.12.2018

Mingechevir is the fourth largest city of Azerbaijan. İt is situated in 17 km from Mingechevir railway station, in the North West of Baku-Tbilisi-Ganja rail road in both sides of the river Kur. The distance between Mingechevir and Baku is 275 km.

According to its economic potential Mingechevir is considered to be the fourth city of the country and is the main center of energy, industry, science, education and culture.

The landmark of the city- Water reservoir was built during the construction of Mingechevir Dam. The territory of the reservoir is 605 sq.km, capacity 16,1 million cubic km, length 70 km and width 18 km. average depth is 27 meters. The deepest point of 75 m was filled in 1953-1959. The main purpose of the reservoir was development of energy, agriculture, water transport regulation of lower streams of the river Kur and avoid the floods in the mentioned territories. The water level of Mingechevir reservoir is changing in the range of 15 m. The shores are high and upright. Upper Karabakh Channel(172 km), Upper Shirvan channel (123 km) intake water from the reservoir. Local people symbolically call the reservoir as "Mingechevir Sea". There are numerous clean beaches lying along the coastal area.

Beaches at Mingachevir Reservoir

Mingechevir Hydro Power station was constructed on the river Kur near the city Mingechevir. The power station was commissioned in 1954 with installed power of 420 MW.

Azerbaijan State Regional Power station is the biggest thermal power station of the country. Its installed power is 2400 MW.

1.1. The History of Mingechevir city

There was only one settlement in the territory of the city at the feet of Bozdagh mountain, in both sides of the river Kur there is the largest in the Caucasus Archeological complex with 4 living settlements and 3 cemeteries there are specific graves and tombs with the most ancient samples of history belonging to the III millennium BC. These graves belong to Kur-Araz , i.e Eneolit culture dating to the end of the II century- start of the 1 millennium. Significant number of burial complexes belong to early Iron age (VII-II centuries).

The name of the city is connected with the name of commander of Arab Khalifate and administrator Mingiçovr –al Fargani.

Two settlements belonging to the III-XIII centuries and one settlement belonging to the XIV-XVII centuries have been discovered and proved to be medieval monuments They include Albanian Christian Churches, Christian and Muslim burials and other items, stone forms for cross, and ceramic candles with Albanian writings on them.

1.1.1. Geological and hydrological structure of the city

Mingechevir city is situated in the north of Acinohur chains, proluvial-alluvial plain covering Bozdagh chains in the North. The city is situated in both sides of the river Kur. The river runs through the mountain chains along deep valleys and flows into Caspian

Sea. Surface waters from southern feet comes out and forms the surface relief. The relief of the territory in the main part of the city has swamps in the south eastern direction and chains of sheer slopes (Bozdağ chains) which connects Bozdagh mountain chains to the Mingechevir reservoir in the northern part of the city.

Map1. Geographical Location of Mingechevir city

1.1.2. Demographic indicators

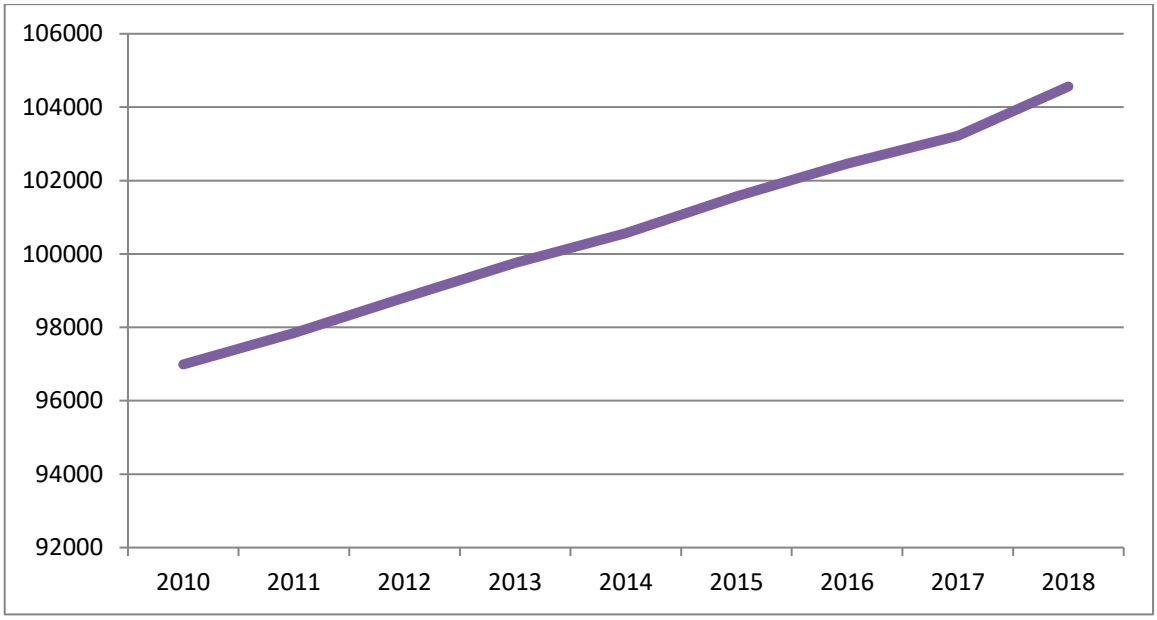
The population of Mingechevir city is 105,435 as of 2019 increasing at the rate of %1.3 per year. %48,1 or 50,714 of total population are men and % 51.9 or 54,721 of population were women. In addition, 20,363 internally displaced people have been settled in the city. %20,6 of the city population are 0-14 year old, %73,3 are 15-64 year old and %6,1 are 65 year old and over. The following table shows the demographic indicators of the city.

Table 4. Population growth from 2010-to 2018

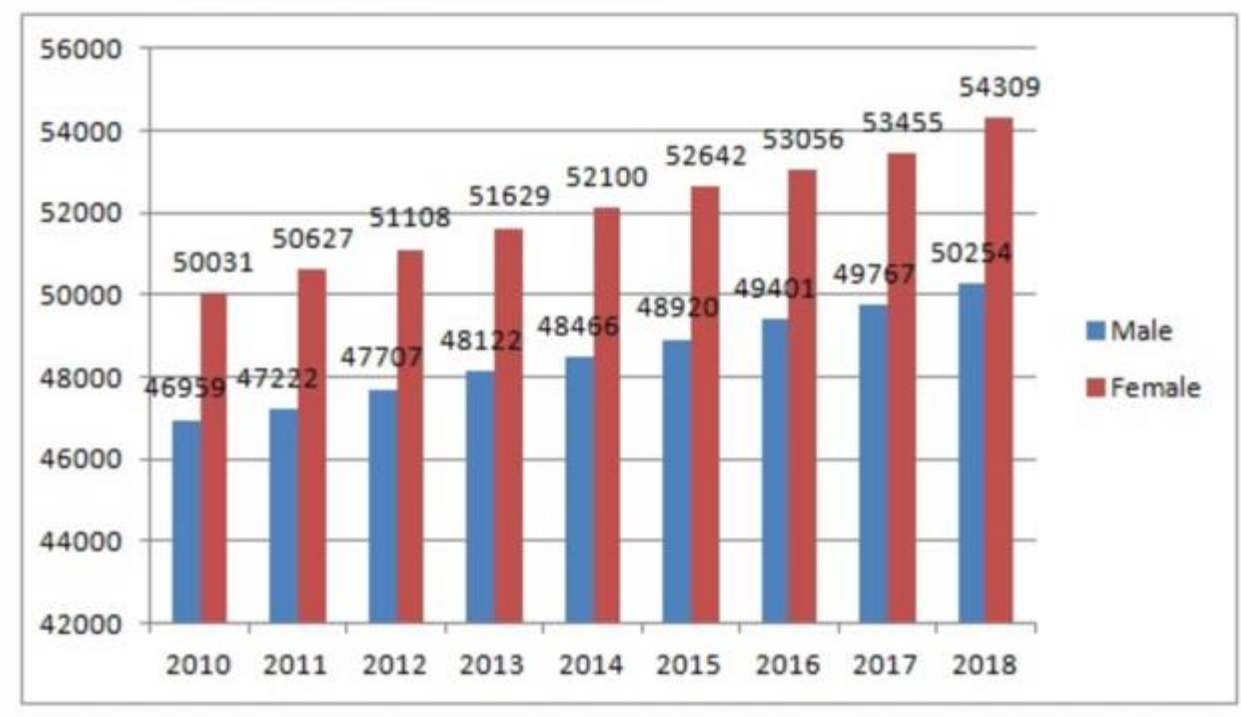
	2010	*2011*	*2012*	*2013*	**2014**	**2015**	**2016**	**2017**	**2018**
Population	*96990*	*97849*	*98815*	*99751*	100566	101566	102457	103222	104563
Men	46959	47222	47707	48122	48466	48920	49401	49767	50254
Women	50031	50627	51108	51629	52100	52642	53056	53455	54309

The following diagram shows the dynamics in increase of population from 2010- to 2018

Diagram 1. *Number of population by years*



Diaqram2. Population by gender



Internally displaced people

There are over million Internally Displaced People (IDPs) as a result of occupation of Nagorno Karabakh by Armenian military forces in 1992-1993. There 20,2 thousand IDPs in Mingechevir city.

Table 5. *Number of Internally Displaced people*

Initial settlement of IDPs	*Families*	*Number of people*
Agdam region	3444	13408
Djabrail region	121	393
Fizuli region	65	249
Khodjali region	98	332
Xodjavend region	44	147
Kelbedjan region	1137	3914
Qubadlı region	101	313
Lachin region	247	919
Shusha region	178	575
Zengilan region	8	23
Total:	5443	20273

1.2. State Programs and Projects of Mingechevir city

In addition to the programs implemented in national level, the five year development programs are also prepared and implemented at local level. The programs reflecting national development targets are implemented by the local Executive Power structures. The following table presents the five year development program for Mingechevir city reflecting the main activities for the period from 2019 to 2023.

Table 6. Five year development program of Mingechevir city (*2019 – 2023)*

N-	The Activities considered to be implemented	Date	Executors
1	*Activities to improve Electrical energy supply:* • Construction of 3 units (with one enter) for 10-6 Kvt complex transformers; • Construction of 1,5 km length 10-6 Kvt cable lines; • Rehabilitation of 3,5 km length 10-6 Kvt air cable lines;	2019-2023	*“Azer Energy” OSC*

	• Construction of 2,6 km length 0,4 Kvt cable lines		*"Azer İşıq" OSC*
2	*Activities to improve Gas Supply, i.e* • Gasification of settlement so called "Borchali" in Mingechevir city	2019-2023	*SOCAR*
3	*To continue activities in drinking water supply and drainage system, i.e* • Reconstruction of water supply and drainage systems in Mingechevir city	2019-2023	*"Azersu" OSC* *Local Executive Power*
4	Continue the activities on taking measures for preventing streams and floods	2019-2023	*MEA, AMST OSC, Local Executive Power*
5	*İmprovement of living conditions and renovation – reconstruction works, i.e* Strengthening of material-technical basis of lift service in multistoried houses.	2019-2023	Local Executive Power
6	Overhaul and construction of Medical Institutions	2019-2023	*Ministry of Health and Local Executive power*
7	Overhaul and construction of Health and sport institutions	2019-2023	*Ministry of Youth and Sport and Local Executive Power*
8	Overhaul *and Construction of Educational Institutions, i.e.* • Overhaul of secondary school No 2 • Overhaul and construction of school No 6 • Overhaul, rehabilitation school No 8 • Overhaul of secondary school school No 12 • Overhaul and rehabilitation of school No 13 • Overhaul and construction of school No 16 • Overhaul and construction of school No 17 • Overhaul and rehabilitation of school No 18 • Training on Integration and Overhaul of gymnasium of boarding school type • Reconstruction of Vocational school named after E.Guliyev	2019-2023	Ministry of Education *Local Executive Power*

Section 2. Analysis of Energy and Water resources

In 2018 87,5 % of energy products with total production volume of 66,4 rnillion tons of oil equivalent made up the primary energy products, 8,8 % - oil processing products, 3,7 % - heat and electricity. 68,7 % of all primary energy products made crude oil (including gas condensate), 30,8 % - natural gas, 0,5 % - energy products produced on renewable energy sources.

Azerbaijan is a crude oil exporting country along with natural gas and oil products. In 2018 volume of export in the country made 44,3 rnillion tons of oil equivalent of which 75,9 % was crude oil, 20,9 % -natural gas, 2,9 % - oil products and 0,3 % - electricity.

In 2018 energy supply has increased by % 0,5 to 15,6 million tons of oil equivalent (TOE). % 26 of total energy supply accounted for energy transformation processes, % 6,3% losses, 7.4% was used in auxiliary consumption of energy sector and 59,9% was consumed by the end users.

The electrical power in Azerbaijan is mainly (92%) generated by the gas powered Thermal Power stations. Total electricity generation in 2018 was 25,229 million KWh of which 224 million KWh (1%) accounted for renewable energy sources excluding large scale hydro power stations. Non fossil electricity generation makes almost 8 % of total generation. The energy produced in the country is exceeding the demand and is exported to the neighboring countries (Turkey, Georgia and Iran). According to the 2018 data provided by the State Statistic Committee of the Azerbaijan Republic 1,3 billion of electricity exported to neighboring countries.

In 2019 the total installed generation power in Azerbaijan was 7141 MW 86 % of which was Thermal Power Stations and 14 % in Hydro Power and Renewables.

Losses in energy transmitting system remains comparably high. It was acknowledged in the Road Map on development of communal services published in 2016 where it aims to reduce the losses from 8,5% to 7% in Baku and from 12% to 8% in the regions (For comparison losses in EU countries is 5-6 %)

In addition, the whole power system is under the government control and is supported with government subsidies. To make Azerbaijan electrical energy system stable and financially independent reforms are planned.

The activities in this direction are fulfilled in the frame of EU4 Energy Program to develop the sustainable energy policy. The Program has got 21 billion euros budget and is financed by European Union to continue until 2020.

The ongoing urbanization process in the world is also observed in Azerbaijan. According to statistics 53% of population live in the cities. The cities consume the greater part of electrical energy as main industrial enterprises are located in the cities. This trend will continue in the future which will necessitate the efficient use of energy in cities.

2.1. Potential of Renewable Energy

Azerbaijan Republic has adopted a state program for renewable energy resources in 2004. The aim of the State Program is to extend the energy production from environmentally clean sources tapping on the potential of the country and to ensure efficient consumption of hydrocarbon resources.

Wind energy. Wind energy is the one of the most affordable energy sources among all other renewable sources like solar, hydroenergetic, geothermal and biomass energy sources for its least cost, ecologically cleanness and uninteerrupted supply. The practice shows that the application of wind energy facilities in the regions of Azerbaijan has great perspectives. İt is estimated that country has about 3000 MW wind energy resources. As of 2019 the wind energy has a share of 66 MVT in total installed power, i.e. 2% of general potential of 3 000 MVT. Absheron peninsula , Aran region, the Caspian Coast, the Caspian Aquatoire and Nakhichevan Autonomous are potential sites for investments in renewable energy.

Solar energy

Azerbaijan climate has got great opportunities to use solar energy and increase production of heat energy. Thus, annual the average number of sunny hours in the USA and Middle Asian countries 2500-3000 hours, in Russia 500-2000 hours In Azerbaijan 2400-3200 hours.

Solar energy is potential of the country stands at 23,000 MW which is greater than any other renewable source. Average number of sunny hours in Baku changes between 2000-2800 hours. This level is considered to be satisfactory level for production of solar energy. The Kur Araz lowland where the average capacity of solar energy prevails 1400-1800 KVT, Absheron Peninsula and and Nakhichevan Autonomous Republic id are the most favourable places to invest into the production of solar energy.

Small hydropower stattions

The country has got great opportunities to use unused hydroenergetic resources. Estimated potential of small hydropower in the country in 520 MW whuch can generate 5 billion kvt.

Bio mass energy.

Rapid development of industrial, agricultural and and social services in Azerbaijan provided additional opportunities to use energy from biomass. Estimated potential of energy from biomass is 380 MW. But, it may be increasing as the agricultural sector grows. The development of agriculture, especially cotton growing and and grain manufacturing shall increase the potential of biomass energy.

The researches show that most ingredients of production waste in many industrial fields consists biomass. It is very effective to produce biogas and also liquid and hard biomass which can be used in production of electrical energy.

Mingechevir city has huge potential to produce solar energy. Having 200 and more sunny days and having mild climate are the main positive factors to increase that potential.

Declining price for photovoltaic energy has made it a good alternative to fossil fuels. In order to achieve the widespread application of solar energy it requires the government support and public awareness efforts.

2.2. Energy consumption in different sectors

The following table gives us statistical information on consumption of various fuels and energy in transport, home economy and industrial fields in 2008-2017.

Table 7. Energy consumption in Transport *min NET*

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Diluted oil gases	12,8	21.8	21.5	26.1	26.6	26.3	25.0	24.0	8.6	7.3
Automobile gasoline	960.8	999.0	1,050	1,170	1,268	1,326.	1,400	1,326	1,273	1,327
Diesel	553.5	336.9	487.2	630.1	723.6	909.2	914.7	781.3	665.8	859.0
Mazut	2.1	0,8	1,3	0.7	0.7	1.6	0.1	1.4	0.5	0.3
Lubricates	46,5	35,8	29,5	40.2	39.8	42.8	44.8	44.4	29.9	47.3
Natural gas	-	-	-	-	-	0.4	0.4	4.1	1.0	1.1
Electrical energy	49.6	44.8	46.8	46.9	45.0	45.7	46.0	41.5	36.8	34.2
Wood	0.1	0.1	0.1	0.2	0.2	0.3	0.2	0.2	0.1	0.1
Total:	1566	1381	1585	1889	2078	2326	2407	2199	2008	2270

Source: State Statistic Committee

Table 8. *Consumption of Energy products in Industry min NET*

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Automobile gasoline	1.0	0,5	-	-	-	-	-	-	-	
kerosene type Reactive engine fuel	8,6	-	5.9	1.7	7.8	8.2	7.2	6.5	5.5	7.9
Types of Kerosene	25,8	3,2	0,1	0.1	17.6	23.5	3.9	10.3	13.5	2.1
Diesel	44.7	25.6	14.6	14.2	13.4	15.5	15.0	14.2	31.5	24.6
Mazut	655.8	220.1	59.0	120.7	123.2	21.1	13.6	403.8	652.5	324.6
Natural qas	6,370	5,275.2	4,847.8	5,516	6,320	6,417.7	6,697.2	6,721	6,438	6,445
Heat energy	89.6	47.3	23.7	20.7	19.5	18.9	22.2	14.7	12.0	1.0
Electrical power	427.9	307.6	295.1	334.4	527.4	524.6	565.2	564.0	587.1	583.3
Wood	0.1	0.1	0.1	0.1	0.2	9.1	9.8	10.0	4.0	1.7
Total:	7588.7	5875.9	5246.2	6008	7029	7038.6	7334	7744	7743	7390

Source: State Statistic Committee

Table 9. Consumption of energy products at home economy *min NET*

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Diluted oil gases	94,7	65,0	60.9	48.2	42.4	36.3	29.6	20.6	11.3	6.5
car fuel	1,4	1,3	1,2	1.0	1.1	0.9	0.7	0.4	0.6	0.7
Other types of kerosene	7,9	2,9	1,5	0.5	0.5	0.6	0.4	0.3	0.1	0.1
Diesel	15,8	12,5	12,6	12.8	13.0	12.2	10.7	9.7	9.2	8.7
Natural gases	2,867.8	2,602.5	2,685.1	2,712.2	2,229.1	2,152.4	2,403.4	2,566.4	2,973.4	2,637.1
Heat energy	29.4	31.3	33.1	49.1	58.8	70.6	94.8	102.9	116.3	114.2
Electrical energy	640.2	502.9	495.0	508.8	559.1	577.5	627.1	682.7	694.2	613.6
Wood	65.7	53.4	72.7	76.6	77.9	68.6	55.3	49.3	11.5	13.2
Total	3,603.1	3,190.1	3,285.9	3,346.7	2,924.9	2,869	3,180.6	3,401	3,795.4	3,378.1

Source: State Statistic Committee

2.3. Legislation on Energetics and State Policy

Energy activities in Azerbaijan is mainly regulated by the Law on Electroenergetics of the Azerbaijan Republic adopted in 1998. Additionally, the Law on the Use of Energy Resource of the Azerbaijan Republic (1996) and The Law on electric and Thermal Power stations (1999) are in force.

EU supported drafting of the laws on the energy efficiency and on Renewable energy is being prepared and these laws are expected to be adopted in 2020.

On the road map of the development of communal services approved by the Presidential Decree of the Azerbaijan Republic dated on December 6, 2018 (electrical, heat energy and gas) the following strategic target have been set:

Production of Electrical Energy:

To establish provision of fully diversified and ecologically clean energy that meets the average world efficiency and quality standards.

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Gas supply:

- To establish useful and efficient infrastructure for gas distribution

Water utility:

- Establishment of high level water management structure
- To reduce the losses in water supply and provide efficiency

To achieve these strategic targets the Ministry of Energetics is preparing plan of Activities.
Alongside with national programs implemented at National level a 5 years Plan of Activities also is being prepared and implemented at local level. These programs reflecting national development targets is implemented by the local Executive Power. The following is the 5 year Plan of Activities having been implemented in 2014-2018 in Mingechevir city.

- Establishment of Industrial Park
- Sustainable activities for improvement of electricity supply including Construction and renovation of electricity lines
- Continuation of activities on improvement of heating system
- Carry out appropriate activities the gas supply of the city
- Carry out appropriate activities to improve the communication and information services
- To continue melioration activities in order to improve supply of irrigation water
- Continuation of repair work in the city
- Overhaul and construction of Medical institutions, capital repair and renovation of Mingechevir Central City hospital and make it a diversified medical Centre.
- To continue capital repair and restoration of the objects of history, Culture and Architecture
- Capital repair and construction of sport and medical institutions

- Overhaul and construction of educational institutions

2.4. Electrical Energy supply

Production of electrical energy in the country was 25.2 billion kwh in 2018. 21.2 billion kWh energy was generated by the thermal power stations and 1.75 billion kwh electrical energy has been produced by Hydro Power Stations. During the same year the Wind Power stations has produced 82,7 million kwh energy which is 3,7 times more than the indicators of 2017. Last year the solar electrical stations have produced 39 million kwh solar electrical energy which is 5,6% more than of 2017.

The transmission network of the country consists of 110, 220, 330 and 500 KV of high voltage lines and transmission network belong high voltage transmission net. The length of high voltage transmission net is more than 7600 km.

"Azerenergy PC (Public Corporation)" Is the biggest producer of electrical energy "Azerishiq PC" is responsible for distribution and sale of energy. Both are state Companies. Mingechevir city is supplied with energy by "Azerenergy". The biggest in Azerbaijan Regional Heat Power Station is located in Mingechevir. There are 8 turbo electricity generators working on mainly natural gas and heavy oil fuel (reserve).

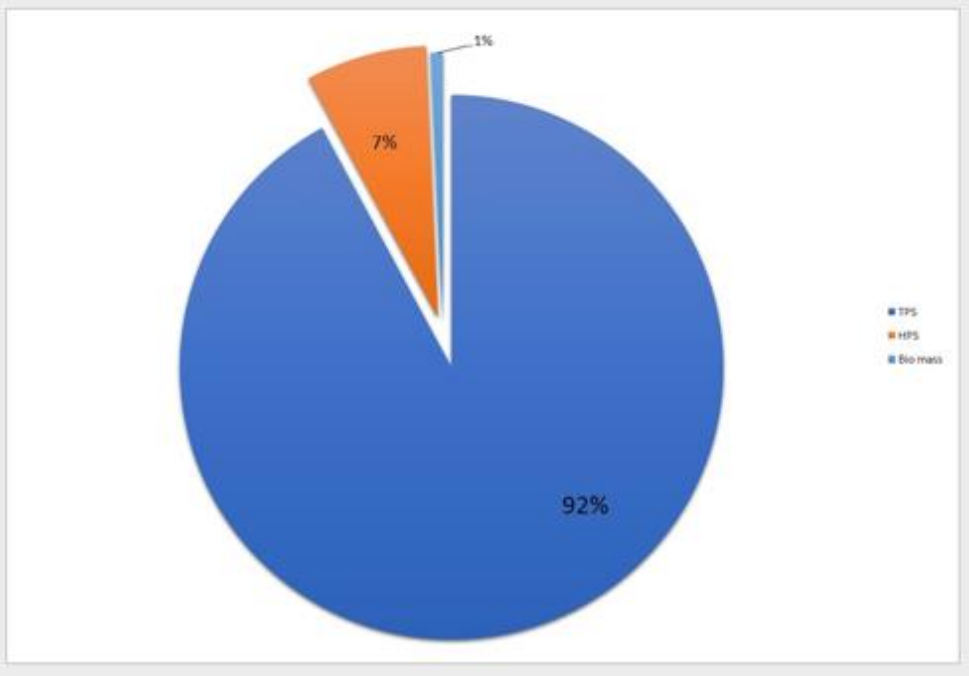
According to the information given by State Statistic Committee the production of electrical energy produced during the last 9 years was as in the following table.

Table10. Production of Electrical Energy mln *kw- hour*
Source: State Statistics Committee

Years	*Production of electrical energy*	*That is*					
		Production by TPPs	*Production by Hydro power stations*	*Production of energy in the stations for auxiliary use*	*Production of energy by wind power*	*Solar Power*	*Electrical energy received from the waste incineration*
2009	18,869	16,289	2,308	269.2	2.1	-	-
2010	18,710	15,003	3,446	259.7	0.5	-	-
2011	20,294	17,317	2,676	301.0	-	-	-
2012	22,988	19,537	1,821	1,630	-	-	-
2013	23,354.4	20,065.6	1,489.1	1,664.0	0.8	0.8	134.1
2014	24,727.7	21,401.2	1,299.7	1,848.1	2.3	2.9	173.5
2015	24,688.4	20,904.6	1,637.5	1,955.3	4.6	4.6	181.8
2016	24,952.9	20,699.0	1,959.3	2,062.0	22.8	35.3	174.5
2017	24,320.9	20,445.4	1,746.4	1,899.5	22.1	37.2	170.3

The electricity supply of the city is provided by the grid where all power plants are connected. Hence, it is not possible to estimate how much electricity is supplied to the city from its power plants located in its territory. The energy produced in the city is much more than it consumes.

Diagram 3. Energy Mix -2017



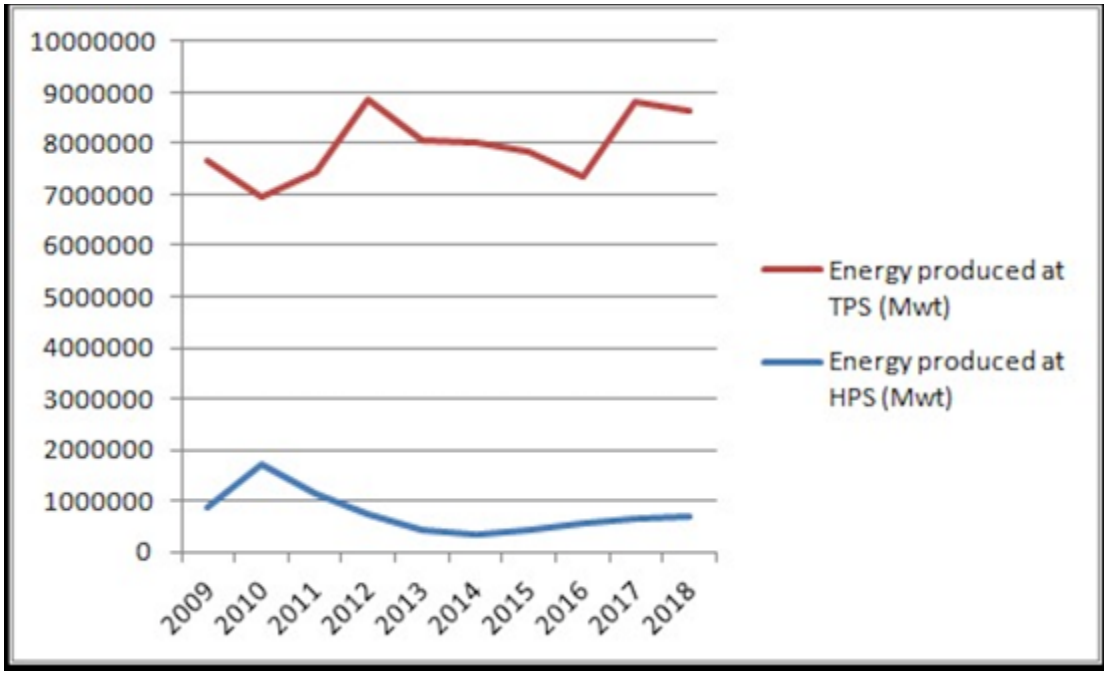
Since the figures of Wind and Solar energy are very small, they haven't been included in the diagram.

The information about the electricity supply of Mingechevir city has been submitted by "Azerenergy PC" "Mingechevir Electricity network of Mingechevir REN". Power supply of the city is provided by three sub stations:

- electricity substation "Shahar- (city)" with one 63MVA and 40,5 MVA transformer with 110/35/6kv voltage constructed in 1967
- "Azerbaijan HES" substation with 2 transformers each 10MVA and 110/6kvt. The load of transformers is 38% and 24% constructed in 1963 and reconstructed in 1990.
- 35/6 kv "Karkhana" substation with 16 MVA and 10MVA transformers. Load of transformers are %62 and 63%.

The following table shows the production of electrical energy in Mingechevir city.

Diagram 4. Production of electrical energy in Mingechevir city-Mwh

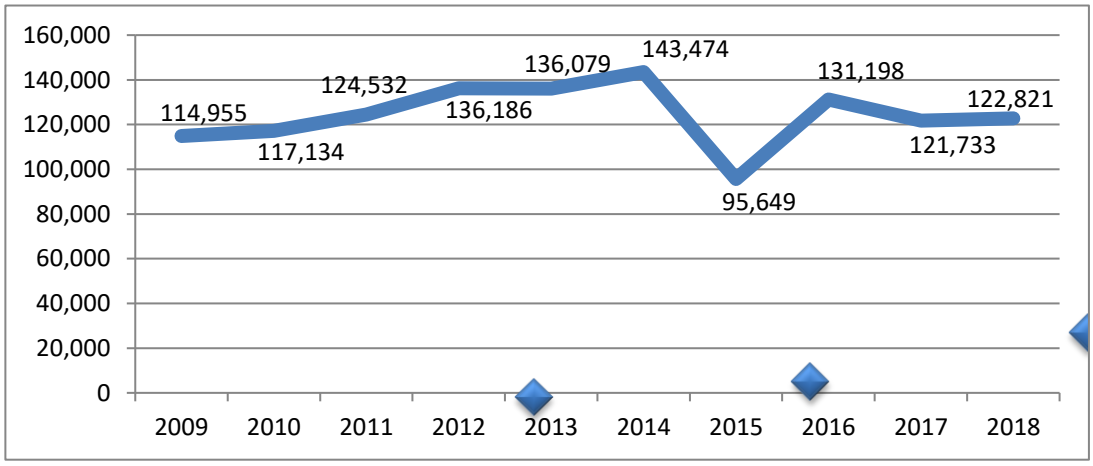


Additionally,220 kV, 330 kV and 500 kV overhead transmission lines pass through the territory of the city all of which have protection zones.

The biggest in the country TPP Azerbaijan is located in the territory of Mingechevir city and produces more than 7 billion KWh electrical energy. Mainly gas and very seldom heavy fuel oil is used in production of the energy in this plant.

According to the information provided by Azerishiq (power distribution company) 7% technical loss is allowed in distribution of electrical energy. Azerishiq has considered some measures against these losses and for the development of the regions during 2019-2023. One of the reasons for losses is old switchboards in the residential blocks.

Diagram 5. *Electrical energy consumption in Mingechevir city., in MWh*



As it is seen from the diagram there is a significant fall in consumption of energy in 2015. The reason for this is that the Ministry of Ecology stopped the exploitation of

several sand quarries, Azercable factory, “Dormash” factory because of illegal use of Kur basin. İn addition, the rise of the tariffs for elerical energy by the Tariff Council made the population to be more concsious in energy consumtion.

In order to discover and report gas leaking in the distribution network “Clean Gas OSJC” was founded in 2014. There is the Regional Center of “Clean Gas PC” in Mingechevir city. “Clean Gas” reports leakages to Azerigas (gas utility company) and they immediately fix it. Monthly indicators of the city show that there are 25-30 leaking points of high level detected in city’s network. The cause for leaking is rusted joints in old gas pipelines in the network. The reports also indicate that number of leakages declined by 40% since 2014.

2.6.Gas supply- National Qas production of the country

Azerbaijan Republic is one of the Natural gas producing countries. This natural resource is an important resource for economic development, business activity and public consumption. Gas production consists of assosiated gas captured from oil fields and pure natural gas both in the offshore and onshore.

Table 11. Natural Gas production, *milion* m^3

Years	Natural Gas	Assosiated Gas	Natural Gas
2008	16 336	12 401	3 935
2009	16 325	5 220	11106
2010	16 673	4 798	11875
2011	16,361	4,449	11913
2012	17,242	4,483	12759
2013	17,895	3,294	14601
2014	18,827	3,837	14990
2015	19,236	4,341	14895
2016	18,718	3,917	14801
2017	18,186	4,112	14,074

The greater part of existiing gas supply system in Azerbaijan Republic was constructed with Soviet standards in 1960-1980 and the losses of natural gas in the network is big because the system mainly consists of old equipment. The dynamic increase in the gas consumption of population and industry, acceleration of gasification system and inability of the existing old system to meet needs, makes the existing system unable to meet the demands, create additional difficulties in regulation of gas supply rejimes, and disorders in communication and increase of losses in gas supply. In 2015 during the distribution of natural gas general losses were 1,07 billion cubic meter. The level of

losses were less than previous years, but it was 18,6 % of all gas that “Azerigas PU” purchased in 2015.

In the strategic road map of development of communal services In the Azerbaijan Republic (electrical energy, water and gas) approved in 2015 the following target indicators have been determined

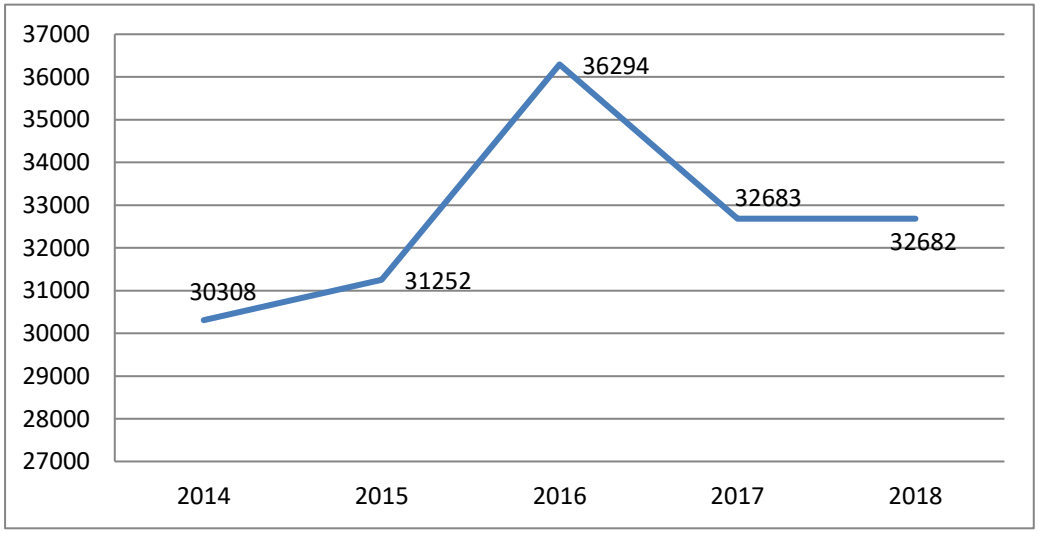
- Reduction of the technical loss level up to 8% in gas distribution system in all regions
- To develop by modernizing the the natural gas supply system according to requirements of İnternational Standards;
- To provide reliable gas supply for increasing gas needs of consumers;
- To simplify the estimation of gas consumption and discover the losses in the system;
- To solve existing serious technical problems in natural gas supply and eliminate them;
- To export natural gas gained from the saving to Europe by TAP /TANAP pipelines

2.6.1. Natural Gas Supply in Mingechevir city

The city is supplied with gas from gas distributing station (GDS) in Ganja prospect. Gas is transmitted by 820-1225 mm gas pipeline. The main gas consumers in the city are Azerbaijan Heat Electric Station and ç industrial objects and the population.

There is a 820 mm gas pipeline to transmit gas into Azerbaijan Thermal Power Plant. Gas is supplied by medium pressure gas transmitting pipeline along the streets to population and to the central heating facilities. People use gas for cooking and for heating with boilers or other heating systems.The following diagram show gas consumption in Mingechevir city.

Diagram 6. Capacity of Consumed natural gas *(thousand m³)*



There are 2 gas filling stations in the city. These stations refill the gas tubes used by some households.

It is planned to supply gas to non-gasified parts of the city and central Heating facilities in future. Additionally, it is also planned to reconstruct a part of gas distribution network by using polyethylene pipes.

Major gas consumers are:

- Residential buildings and private houses
- Industry and commercial users
- District heating

At the moment existing gas pipelines are renovated to transmit gas to " Azerbaijan HES" PC. In order to provide reliable gas supply a number of measures are required to deliver.

Measures connected with reporting period are as following:

- To replace old gas pipelines with polyethylene pipes;
- To build gas pipeline to 4 new central heating facilities on the right bank
- To put gas distributing pipeline with gas regulating points for new households.

2.7. Heat supply

2.7.1. District heating supply in Azerbaijan

District heating services nationwide is provided by the state owned enterprise " Azeristiliktejhizat". Important steps have been made in reconstruction and development of heating supply since 2005 by Azeristiliktejhizat. Thus, the work fulfilled in the frame of restoration and improvement has made significant changes in the development dynamics and caused increase of number of living houses with heating, education and health institutions. District heating at national level includes 531 central heating boilers, supplying heat to 3,568 residential buildings, 276 schools, 154 kindergartens, 151 health objects and 603 other social enterprises. In comparison with 2004-2005 number of district heating plants increased by 365 units or 3,2 times, the residential buildings supplied with heating increased by 2580 or 3,6 times, number of schools by 130 or 1,9 times, hospitals by 90 or 2,4 times, and other public service buildings by 512 or 6,6 times.

Table 12. *Development District Heating supply system*

№	Season by year	Heat	Residential	Schools	Kindergarten	Health	Other

	Indicators	source	buildings			facilities	facilities
1	2004-2005	166	988	146	84	61	91
2	2005-2006	202	1519	176	111	78	112
3	2006-2007	234	1750	218	124	97	131
4	2007-2008	312	1933	277	123	127	203
5	2008-2009	310	2072	242	141	126	225
6	2009-2010	329	2184	244	153	133	265
7	2010-2011	347	2357	260	163	135	306
8	2011-2012	362	2561	266	158	129	310
9	2012-2013	425	2819	267	146	134	350
10	2013-2014	508	3142	275	156	147	428
11	2014-2015	525	3450	286	160	157	553
12	2015-2016	531	3568	276	154	151	603
13	2016-2017	545	3700	275	155	150	780
14	2017-2018	545	3750	285	150	160	1200
15	2018-2019	550	3800	291	150	159	1300

Due to the excessive exploitation of heating supply system it became obsolete and out of order and others do not meet necessary parameters of modern requirements , the existing system is considered to be inefficient. The current Tariffs not reflecting the full costs and low level of collection of payment led to losses.

Additionally, complex plan of activities on restoration and development of heat supply systems have been prepared in the recent years, significant work has been done in renovation and reconstruction of heating systems in residential buildings and the work is being continued. However, there are still problems in the system which has negative effect on the efficiency of heating systems due to low tariffs and heat loss in the system.

2.7.2. Heating supply of Mingechevir city

Central heating system of Mingechevir currently consists of 23 central Heating facilities but only 6 of them is operational. One of the facilities is working on diesel fuel and others are on natural gas.

Heat supply of living Central Heating point N-45/3 in 20 January street, houses and administrative buildings is fulfilled by 4 central heating plants. Central heating plant N-45/5 in A.Vahid street. Another Central Heating point N-45/20 in IDP settlement and Central Heating point N-45/21 in in 12, Ganja highway.

Central Heating point N-45/3 in 20 January street was commissioned in 1988. 3 boilers in the central heating plant are operational. Each of them gives 60 000 kkal/ hour of heat. The heating supply is transmitted by underground pipes.

Central Heating Point n- 45/5 in A.Vahid street was given to exploitation in 2012. Three boilers operating on gas made by Turkish manufacturer “ERENSAN” installed in the facility. The power of one of them is 1 250 000 kkal/hour, the other two units each have 1 000 000 kkal/hour capacity. The heat is transmitted by underground pipeline.

District heating unit N-45/20 in “IDP settlement” was commissioned in 2013. 3 units of “Baima” type boilers are in operational in the facility. The power of each of them is 2 million kkal/hours.

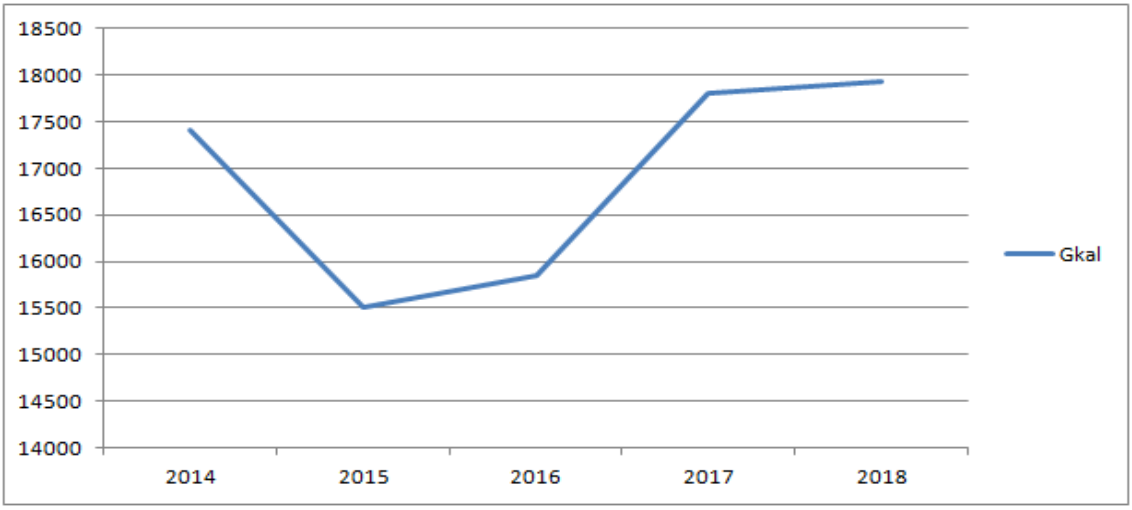
The central heating point N- 45/21 in Ganja avenue. Was given to exploitation in 2012. 2 pots of “NOTO” type in the central heating point are in working condition. Each of them has got 60 000 kkal / hour power . The heat is transmitted by underground channel. Central Heat point works on gas.

On right bank of the city cooling water from TPP is supplied to households of IDPs for heating purpose. Only 2 pipelines are transmitting heat to the settlement.

Local government is considering the replacement of old heating system with new one and connect more residential building to the central heating network.

The capacity of new boilers installed by Azeristilik is 8 m^3 but old ones were only 6 m^3. For 1 hour of operation the old boilers use 100-120 m^3 of gas. But new, modern boilers use only 70 m^3 gas per hour. The temperature of water is distributed with 50 C and received back with 40 C.

Diagram 7. Heat energy produced in the city in different years, Giga Cal



The Central Heating Points buy gas at discounted 20 qapik per m^3 from Azerigas and heat energy is sold to population at 15 qapiks per m^3. Only in 5 of 21 primary schools in Mingechevir there is central heating system. These are the schools NN- 2,12,13,17,and 18. The overhaul of these schools have been included in 2019-2023 State program. One of schools central Heating point is functioning with 2 boilers, Only the central heating system of the school N-20 uses diesel. All other heating facilities are functioning with gas. Since July 2017 gas price has been 20 qapiks per cubic meters. All the central heating points at school are under the maintenance and management of the Ministry of Education.

Gas consumption in School central heating facilities was 1.05 mln cubic meters in 2014, but it is increased to 3,0 mln m^3 in 2018. The reason for it was the repair and renovation and commissioning the central heating facilities in 3 more schools.

2.8. Water Supply

2.8.1. Water supply in the country

Taking into consideration that more than 70% the water resources of the country is formed by transborder water streams, efficient use and protection of the existing water basins is utmost important. The Government has made large investments to the modernization of water and drainage services . Thus, more than 2,7 billion manats (US$ 3 billion) allocated for this purpose in 2011-2014.

"Azersu" open joint stock company owned by government that nationwide supplies the consumers with water and drainage services. The Joint Stock Company ensures intake the water from the sources, its procession, transmission and sales and cleaning of the sewage water. The company also fulfills the duty of projecting, construction and exploitation of water cleaning equipment, stores, pump stations, water pipes and drainage collectors. It also provides technical services. It is vertically integrated water utility company.

"Azersu JSC" provides 1,434, 738 users with potable water supply: 1,277,702 of them are households and 57, 036 commercial and public users.

There is 18,244 km water pipes and 3,507 km drainage and rain water pipes in operation by the company.

2.8.2. Water supply of Mingechevir city

According to the information given from "Azersu JSC" the water supply of Mingechevir city is provided from 3 sources:

1. Mingechevir Water Reservoir – 637 cubic m./hour
2. The river Kur- 450 cubic m/hour
3. Upper Karabagh Channel 1050 cubic meter/hour

The length of magistral water system is 22, 8 km, diameter of the pipes is ranging from 219 mm to 800 mm. Azerbaijan TPP uses the water received from Upper Karabagh

Cannel. The length of water pipes of the city 205 km, the diameter of the pipes are from 76 mm to 820 mm. The water supply of the city is provided by 3 main pump stations and distributed by 13 small size pumps. Consumption of drinking water of the city is 15000 m^3 per hour for population . There is old sewage treatment plan (STP) with capacity of 15000 m^3 per hour commissioned in 1985. But currently it is not operating. New STP is planned Water supply of industrial enterprises is provided from central water pipes that are in the balance of Mingechevir Water Channel of "Azersu OSC".

Physical –Chemical characteristics of the water given to the city.:

- temperature 20 C;
- Purity > 30 sm;
- smell 0;
- Taste 0;
- PH – 7.5;
- alkalescence 3,4 mq ekv/l;
- general roughness 4,4 mq ekv/l.

There is no information about the use of underground waters in water supply of the city. In the frame of the implementation of the State Program of social economic development of the regions in 2009-2013 most of the work of reconstruction water supply and drainage system have been completed. At the moment the water for city is taken from the pipeline of 5 m diameter. The water is transmitted to water cleaning system 800 meters to south east by 1000 mm water pipe. In the cleaning system the water is chloritized and is transmitted to the water store. From the store the water enters the water supply system of the city. The water from that source will also enter to Yevlakh city water system. At the moment the construction of the first shift water cleaning equipment has been completed. The city is being supplied with water from new source. In the frame of project implementation of "Azersu OSC" the renovation work in the water supply system has been completed by 01.09.2015. %80 of water pipes has been renovated. In order to provide the consumers non-interrupted service the construction of new water store commenced.

Since the existing water supply system of Mingechevir city has been used for a very long time it cannot meet all modern requirements . According to the State Program on social-economic development of the regions of the Azerbaijan Republic full restoration of water supply system of the city must be implemented.

Table 13. Indicators of Water Consumption *(million m^3)*

	2009	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*
The water consumed	857	660	790	1011	939	948	914	835	1002
Household and drinking water	10	6	7	6,1	1,56	5,28	6,14	6,7	5,4
Production	844	652	781	1005	937	942	908	826	996
Watering, irrigation	3,5	1,3	0,9	0,18	0,24	0,12	0,12	1,82	0,64
Other purposes	0,3	0,8	0,8	0,29	0	0,29	0	0	0
Uncleaned sewage water	3,3	9,4	8,6	1,9	1,67	6	6	6	7,2

Source: Statistics office, statistics periodical

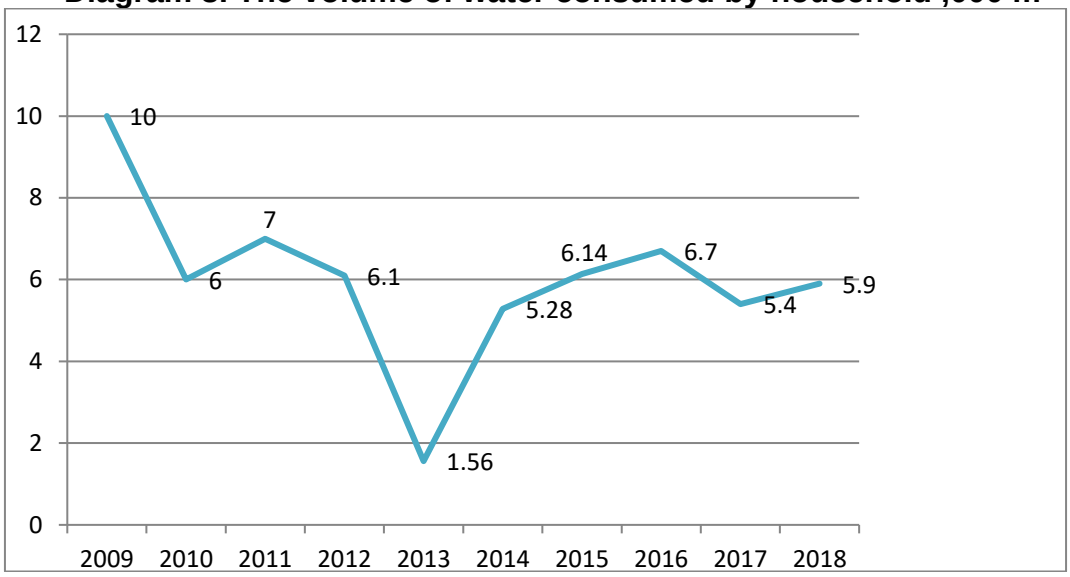
Map 2. Water supply scheme of Mingechevir city

The losses during the transmission of water is commercial losses. There are 12 million cubic meters water losses. These losses has been reduced from 62% to 57% and we are intending to reduce this figure up to 22-30 %.The city is on top of the list for water losses in Azerbaijan.

One of the main reasons is the 200-250 thousand m^3 water used in 26 hostels where refugees and IDP –s settled. There is no metering in these dwellings and no control as such for each user.

On the other side, Mingechevir city sanitary and greening department uses 300 thousand cubic meters water for irrigation of the parks and other green masses. These are also serious factors for water losses. Local government has prioritized this issue and seeks for immediate solution to alternative sources of irrigation.

Diagram 8. The volume of water consumed by household ,000 m³



The activities on reconstruction of network according to the "State program for development of regions In the Azerbaijan Republic in 2009-2013" is underway. Completion of the work on STP will enable Mingechevir and Yevlakh city and neighboring villages to access more potable water. Establishment of water supply system in new construction sites are provided by connecting the existing water pipes.

2.8.3. Central Sewage system

There is Central Drainage system in the city. According to the information given by "Azersu OSC" the length of the drainage system of the city is 146 km and the diameter of the pipes are from 150mm to 1000mm.

The drainage system and cleaning equipment of the city has been exploited for a long time and doesn't meet modern requirements. 80 % of the equipment are very old. In addition, the equipment overloaded and needs renovation of equipment in drainage system.

Azersu operates 5 pumping stations for sewage system:.

- Islam Islamzad' street- 450 cubic meters /hour

- 20 January street-800 cubic meters/hour.
- Mingechevir village-450 cubic meters/hour
- Qachaq nabi street-800 cubic meters/hour
- Ganja Highway-3 items, 800 cubic meters/hour

Diameter of pressure collector which is being exploited at the moment-600 mm

There are 2 functioning water cleaning equipment (DWCE) Dirty Water Cleaning Equipment in the balance of the Azersu. DWCE N1 has been given to exploitation and its capacity is 3600 m^3 per hour, DWCE N2 was given to exploitation and its power id 10 000 cubic m^3 per hour.
Industrial waste from the objects are let out by water drainage system. According to the "State Program for social economic development in the regions of The Azerbaijan in 2019-2023 renovation work of drainage system and equipment has started and a project of water supply and drainage system of Mingechevir has been implemented. In the framework of the project implementation 300 km pipeline has been installed and 30 000 m^3 /hour sewage treatment plant shall be constructed.

Waste waters from the industrial objects of the city has been %80 of the consumed water. We are considering improving central drainage system by connecting new draining system to the existing ones. According to the "State Program for social economic development in the regions of The Azerbaijan in 2019-2023: new activities in renovation of drainage systems and equipment are being carried out.

Sharing activities have been done to dirty waters from living, administrative houses and industrial objects are running to their own cleaning equipment and but rain waters are running through the cleaning system of rain waters. When necessary, running water with their volume and frequency , according to the depth drainage pump stations (DPS) are constructed. Drainage pump stations are polypropylene device closed with hermetic lid. Thus, all the harmful steams remain in that construction.

Different industrial waste water must go to initial cleaning. Physically old and not meeting modern requirements must be repaired of fully replaced.

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2.8.4. Rainwater drainage system

A 1500 mm diameter rain collector has been laid near living houses in Nizami street, left bank of the city. It collects all the waters discharged from nearby objects and rain waters and transmits to pump station (It is located near the territory of waste cleaning facility.) From the pump station the rain waters are drained to Varvara Water Reservoir over New havarli Dam. In addition, There are local rain collectors in Baku street, M.A.Rasulzade prospect, R.Rza street, Uzeyir Hadjibeyli street. Additionally, there is rain collector near Tabriz street, too. The old collectors are full of sand. It cannot regulate side waters coming from Bazdagh chains. As a result, rainfall specially in snow melting period leads to flooding in Left bank of city.

2.9. Fuel

2.9.1. Fuel consumption the Republic

Most frequently used fuel product by the industry in Azerbaijan is natural gas. Natural gas is used in steel manufacturing and in production of electrical energy. The following table reflects the nationwide gas consumption. The demand for natural gas is fully provided by internal resources.

Table 14. Natural Gas consumption in the country, *mln m^3*

Natural Gas Consumption							
	2012	2013	2014	2015	2016	2017	2018
Thermal Power Stations	2,779	2,911	3,029	3,562	3,552	3,275	3,470
Combined Heat and Power stations	2,433	2,385	2,455	1,885	1,488	2,185	2,481
District Heating	134	148	185	185	211	202	210
Gas Processing factories	10.8	8.7	8.3	7.0	8.0	5.5	5.3
Industry	986	993	1,059	1,074	1,208	750	530
Transport	-	0.4	0.4	4.4	1.1	1.2	1.1
Agriculture, forestry and Fish farming	38	45	49	56	72	61	82
Commerce and public services	161	174	192	220	154	251	115
Households	2,389	2,307	2,576	2,751	3,187	2,827	3,055

Gasoline is most widely used in transport sector. But after the rise of prices of gasoline in 2017 the consumption of diesel has increased.

Table 15. Fuel consumed by means of transport in the country, thousand ton

Years	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*
Gasoline	1285	1357	1285	1234	1286	1279
Diesel	856	861	735	618	787	827

2.9.2. Fuel consumption of Mingechevir city

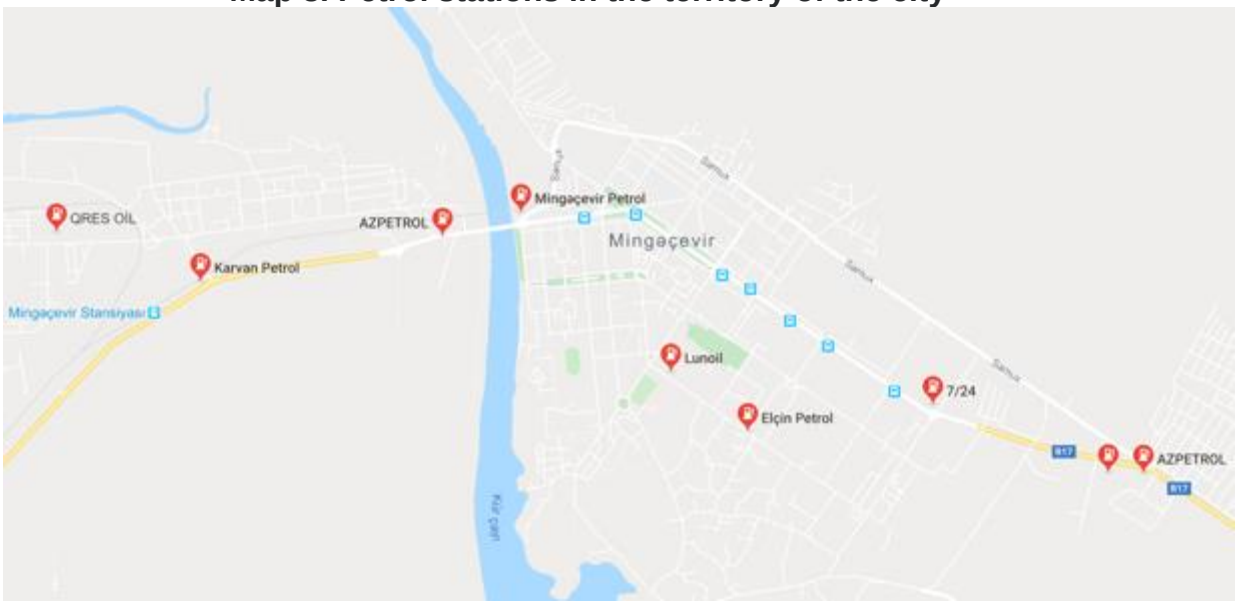
The greater part of fuel consumtion of the city maily belongs to the transport sector. There are 7 petrol filling station in the city. The main petrol stations belong to AzPetrol Company. Mainly transit, Executive Power and Municipality cars and many local cars use the services of these stations. Other petrol stations serve other transport means of the city.

Table16. Fuel consumption of Mingechevir city, Tons

Years	Diezel	Gasoline
2014	*6939*	*9332*
2015	*6107*	*8928*
2016	*5321*	*8575*
2017	*7168*	*8935*
2018	*7392*	*8821*

Reason for reduction of Gasoline consumption and increase of diesel consumption is the spike of tariff for gasoline in January, 2015 by 50% while diesel prices remained stable.

Map 3. Petrol stations in the territory of the city

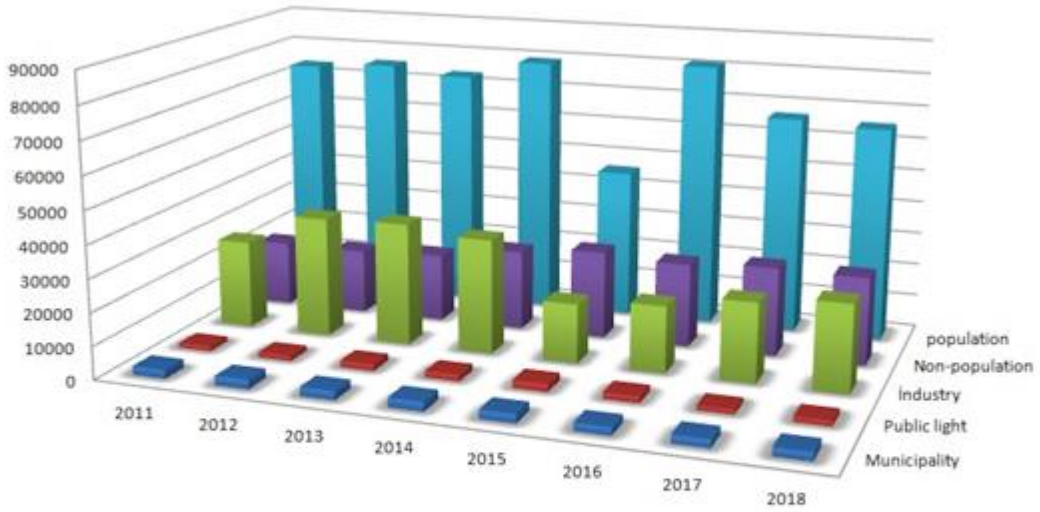


2.10. Analysis of Mingechevir Urban economy by Sectors

Main energy consumers of Mingechevir city are households, local administrative bodies or offices and enterprises, commercial entities, plants and factories. Gasification rate is 99% in Mingechevir city where as water access is 98%, access to drainage system 98,4% and district heating 27,6%.

51% of energy consumption belong to households, 24% to commercial bodies, 21% to plants and factories, 3% local administrative bodies and offices 1% to the street lighting of the city.

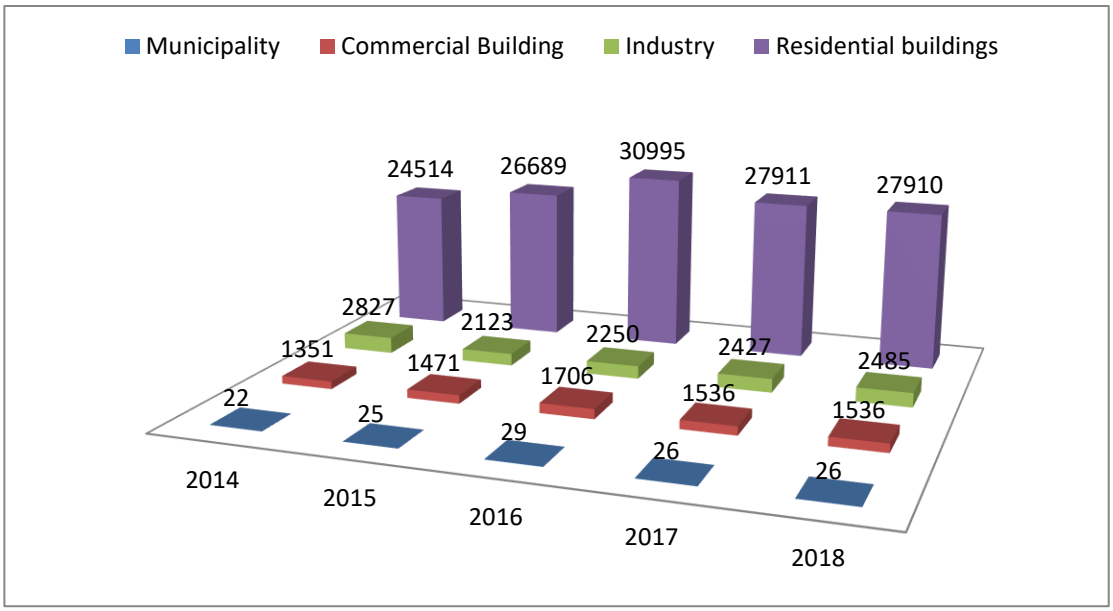
Diagram 9. Consumption of electrical energy in the city, MWh



	2011	2012	2013	2014	2015	2016	2017	2018
Municipality	2654	2845	2698	2867	2689	2366	2507	2561
Public light	1473	1554	2005	1963	2380	1934	1424	1588
Industry	26926	36707	37395	35014	18094	20290	24177	26602
Non-population	19912	19744	20802	24499	26816	25589	27082	26798
population	73567	75336	73179	79131	45671	81019	66542	65272

Consumption of gas according to consumer category is shown in the diagram below:

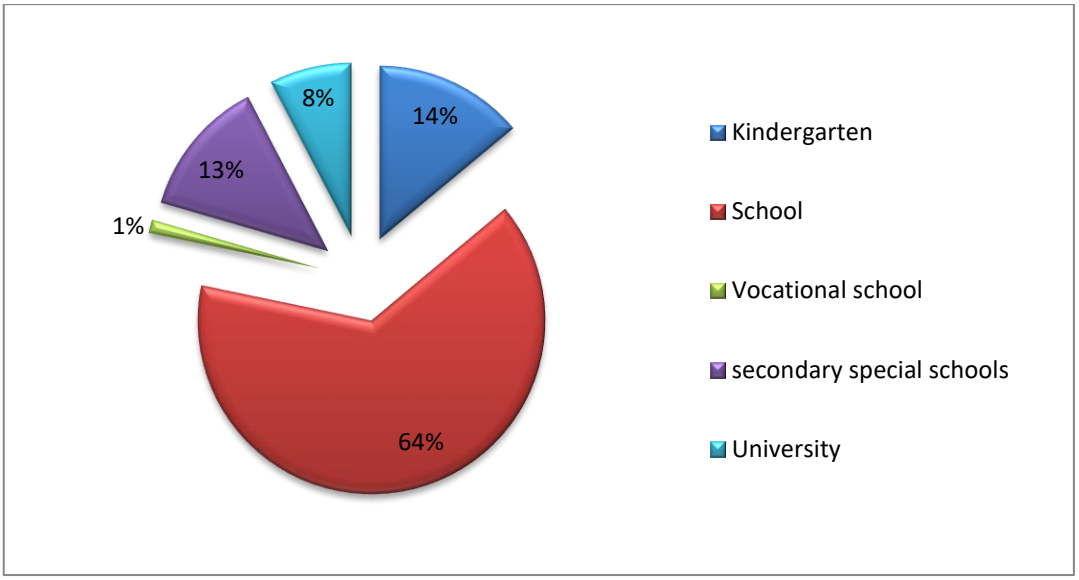
Diagram 10. Natural Gas consumption of the city (thousand m^3)



2.10.1. Educational institutions

Mingechevir is the fourth largest city and has many educational institutions. There are 21 kindergartens, 22 secondary schools, one apprentice school and 2 colleges, 1 University, 2 cultural center and 12 different sport institutions. About 25,000 people study in these institutions.

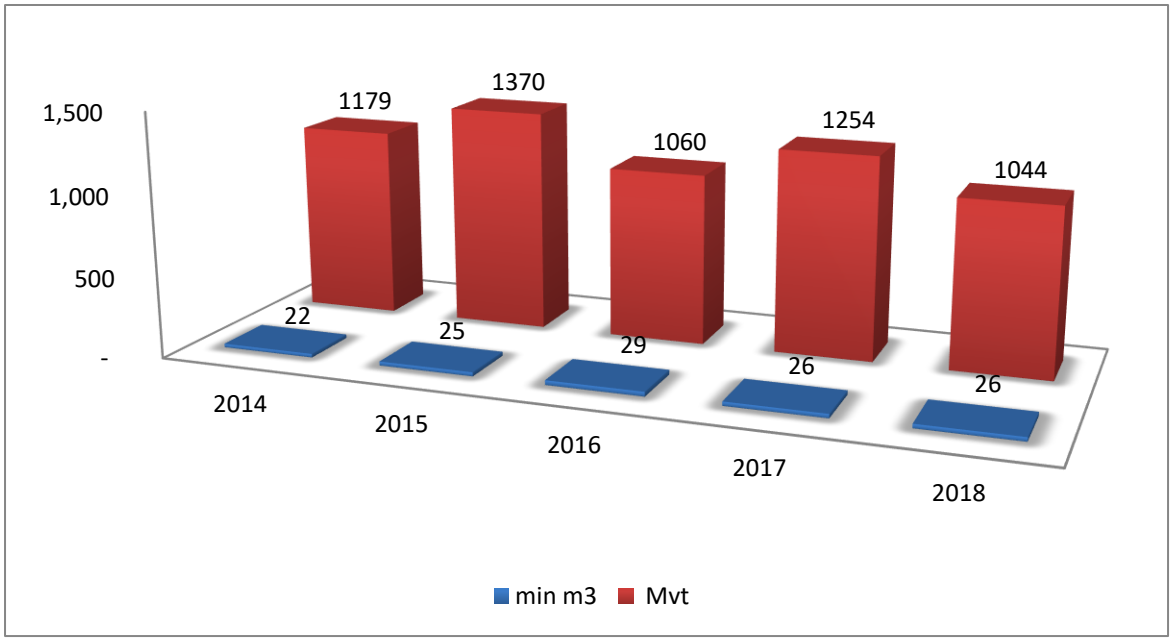
Diagram 11. Distribution of schooling by type of Institutions



In 4 out of 21 kindergartens there are central heating boilers, others have no central heating systems. 4 of the kindergarten are in a very poor condition. 15 of them need overhaul.

The following diagram shows the amount of energy and gas consumption in pre-school institutions.

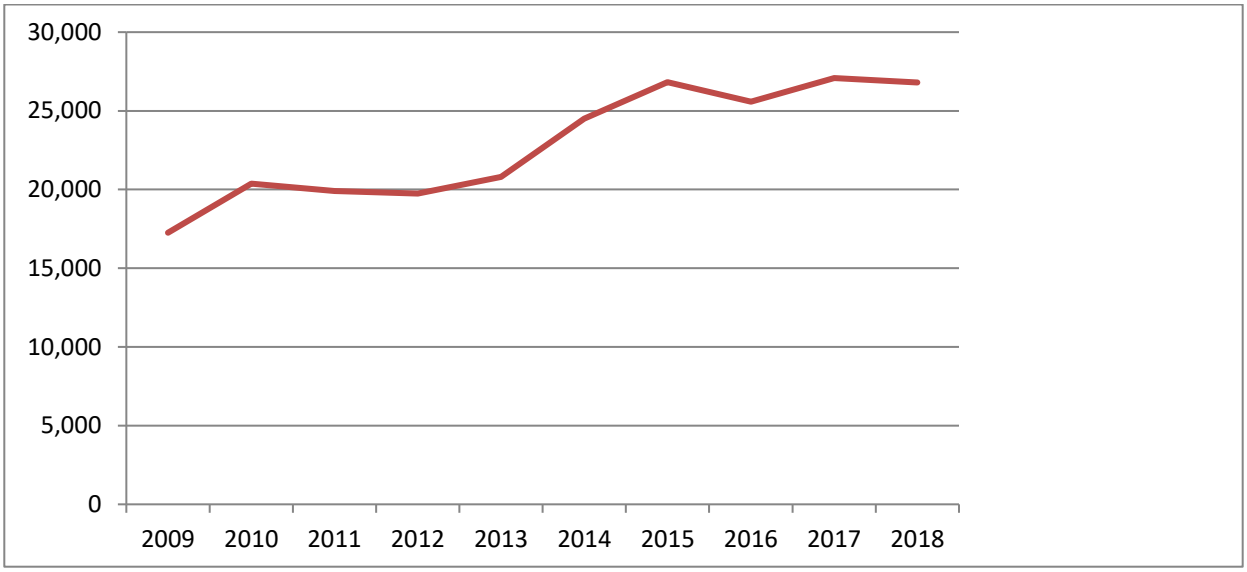
Diagram 12. Energy and gas consumption by preschool institutions



2.10.2. Commercial institutions

Location of city by the Kura river makes it attractive destination for tourists. There are 132 restaurants, 8 hotels, 11 large halls for weddings and other functions, 1,106 shops operating in the city. Retail turnover in 2018 was 333,6 mln manats. Consumption of electricity by commercial users in Mingechevir is provided below:

Diagram 13. Consumption of electricity by commercial users, MWh



2.10.3. Residential Buildings

According to the statistic information of 2017 from 103 222 people 87,844 lived in residential blocks (flats) and 15 378 of them lived in private houses.

Table 17. *Number of Population in Mingechevir city*

Years	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*	*2017*	*2018*
Population	96990	97849	98815	99751	100566	101566	102457	103222	104563
Flats	84417	84925	85483	85983	86533	86995	87625	87844	88201
Houses	12573	12924	13332	13768	14033	14571	14832	15378	16362

According to the statistics of 2018 the housing inventory was 1,702,000 m^2 82% of which account to private housing fund and the other 18% public and government housing cooperatives. 99,1% of houses have been provided with gas, 98,9 % with water access and 98,4% with drainage.

Table 1818. *Number of living houses and types*

Type and No. of Residential Buildings				
No. of Floors	**Type of Buildings**			
	Concrete	*Stone*	*Wood*	*Total:*
2 floor	0	52	5	57
3 floor	19	28	0	47
4 floor	19	30	0	49
5 floor	238	36	0	274
9 floor	25	0	0	25
12 floor	2	0	0	2
Total:	**303**	**146**	**5**	**454**

Annual gas consumption by residential buildings in the city is reflected in the following diagram.

Diagram 14. Electricity consumption by the residential buildings, MWh

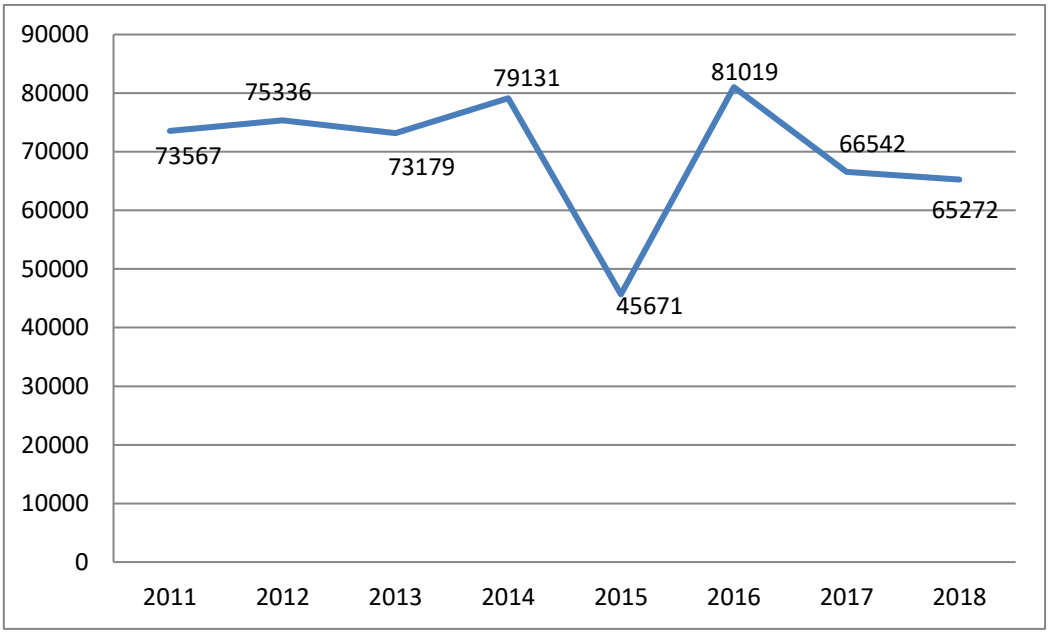
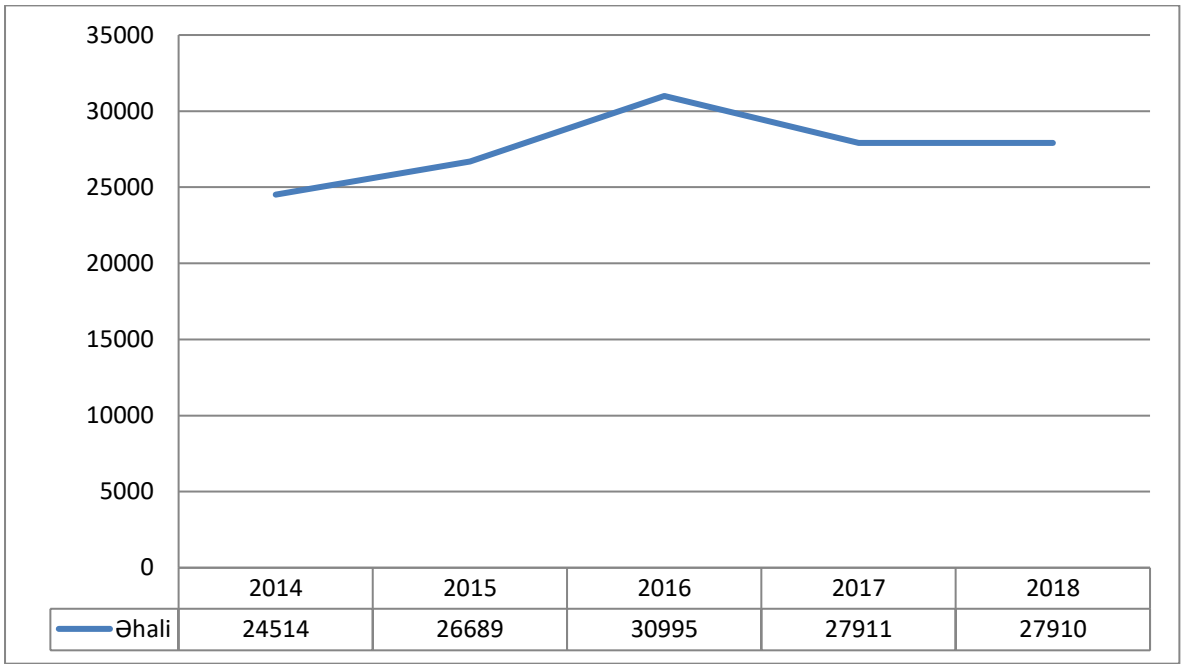
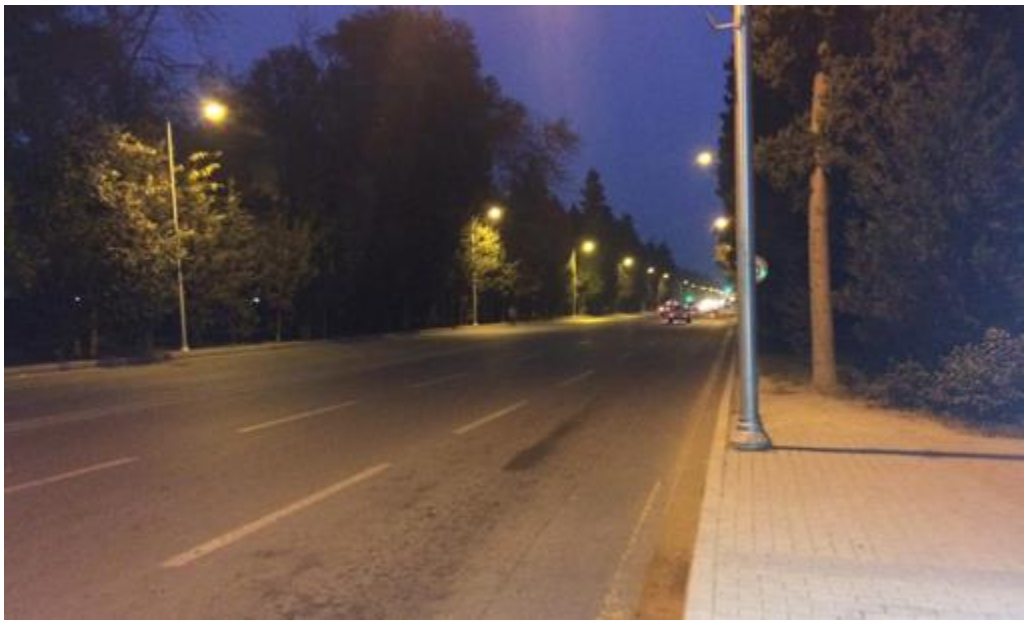


Diagram 15. The amount of gas consumed by households, thousand m^3



2.10.4. Street Lighting of the city

The street lighting office of Mingechevir city was established in 1990 and is totally financed by Mingechevir Executive power (local budget). It provides the lighting of streets, parks and squares.



Map 4. Schematic description of lighting network

The bulbs used in lightening of Mingechevir city and their types shown in in the table below

Table 19. The bulbs used in lightening of Mingechevir city

Type of the bulbs	Power of bulb (W)	Quantity
Light (LED) bulbs	300	1
	37	16
	28	312
	20	43

	18	25
	12	16
	10	34
Bulbs of high Pressure		
Metal-halogene	250	2271
	400	1307
Mercury - steam	250	2590
	70	89
Bulbs of low pressure:		
-fluorescent (economy)	20-65	1469
	70-120	718
	125-200	48
Total		**8939**

Diagram 16. The electrical energy used in streets lighting, MWh

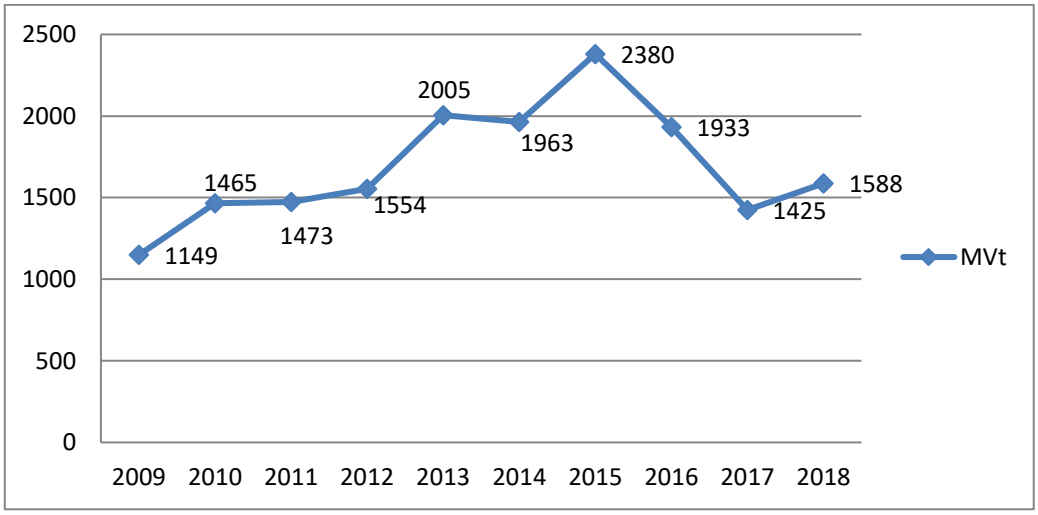
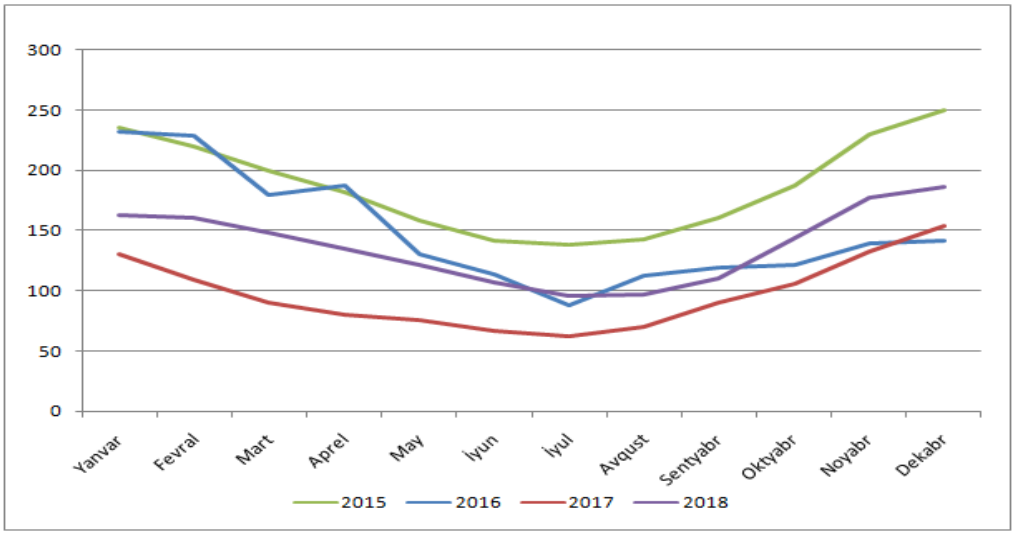


Diagram 17. Street lighting energy by years , Mwh



2.10.5. İndustry

Mingechevir is not only the city of energy but also a city of industry. The industrial quarries, iron and concrete factories are industrial objects Most of these factories have remained from soviet times and hasn't been replaced. The last industrial object constructed during the years of independence is Mingechevir industrial park built in 2017. The park is specialized in weaving and textile.

İn general, the plants and factories of the city has been able to provide 12 846 citizens with work. The enrgy and the natural gas the plants and factories have consumed is given in the following table.

Diagram 18. The electric energy and natural gas consumed by the industry

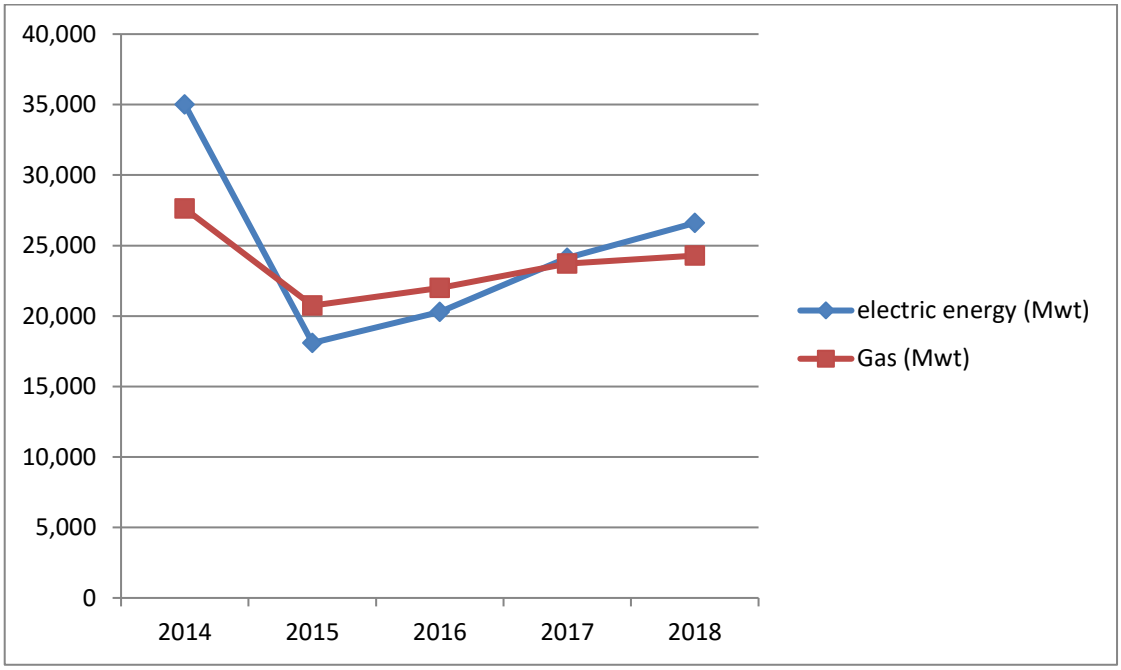
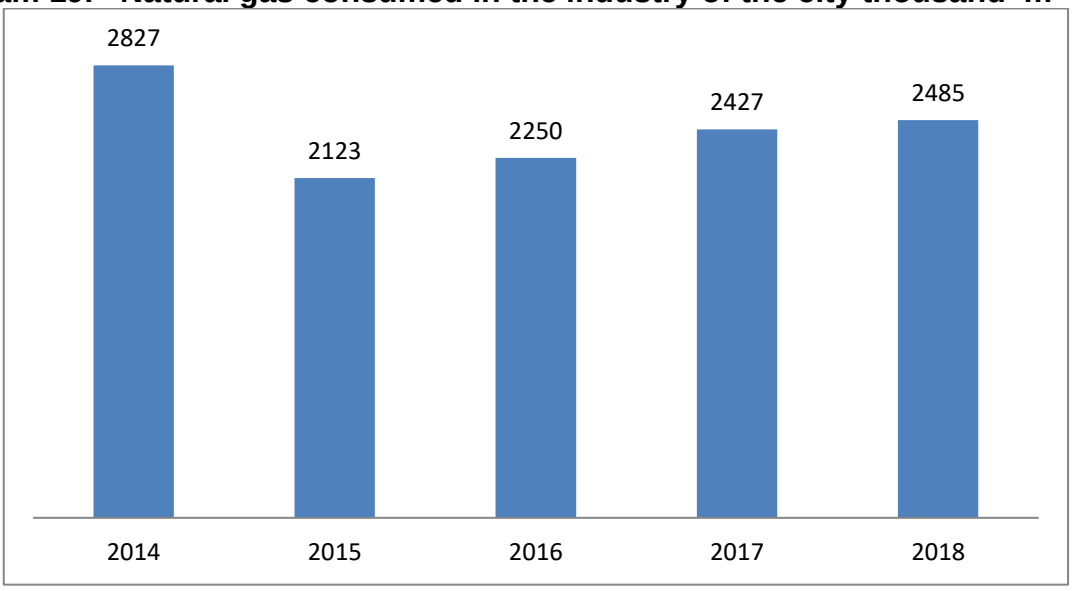


Diagram 19. Natural gas consumed in the industry of the city thousand m^3

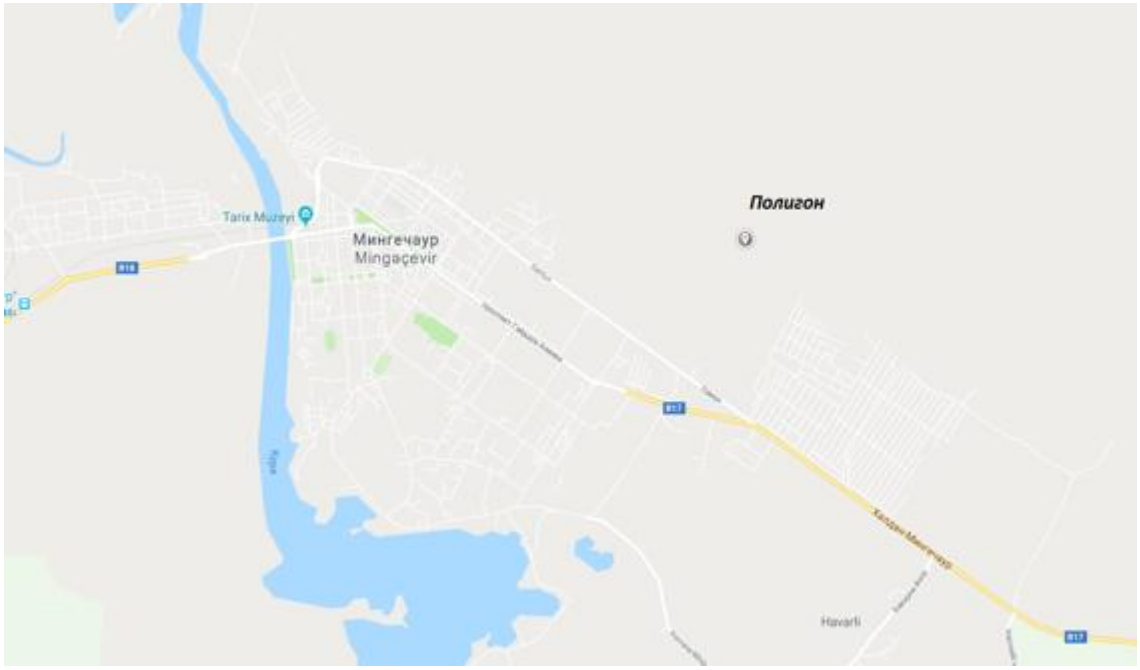


As it is seen from the table, there is serious fall in consumption of electrical energy and gas in 2015. Two main reasons are devaluation of national currency and the rise of tariffs by the Tariff Council which made people save the energy and be more conscious about consumption. In addition, the other reason is temporary closure of the biggest industrial enterprises, like Sand Quarries, Amerceable factory, Road machine plant by the decision of Ecology Ministry “Illegal Exploitation of the basin of the river Kur”.

2.10.6. Waste management

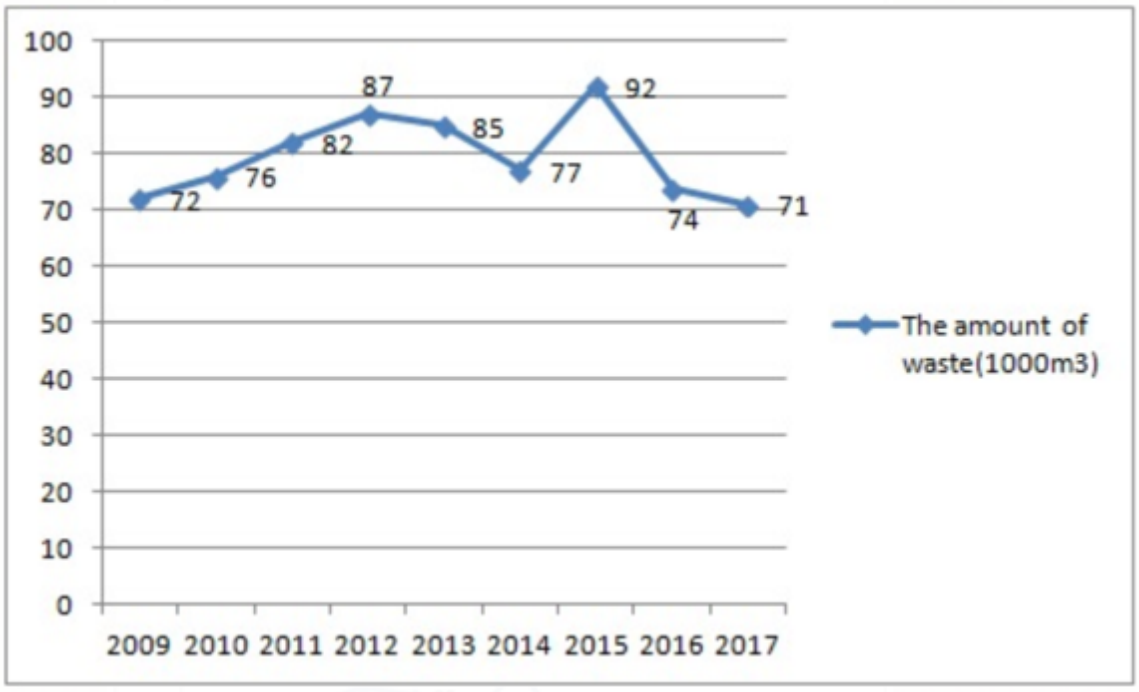
The collection and and contamination of the waste is controlled by department of Greening and Sanitary of Mingechevir city. Collected household waste are transported to the Landfill 5 km East from the city territory and contaminated there. In different months of the year sometimes the waste flares up. That üaste are leaves and branches from the cut of the trees.

Map 5. Location of landfill



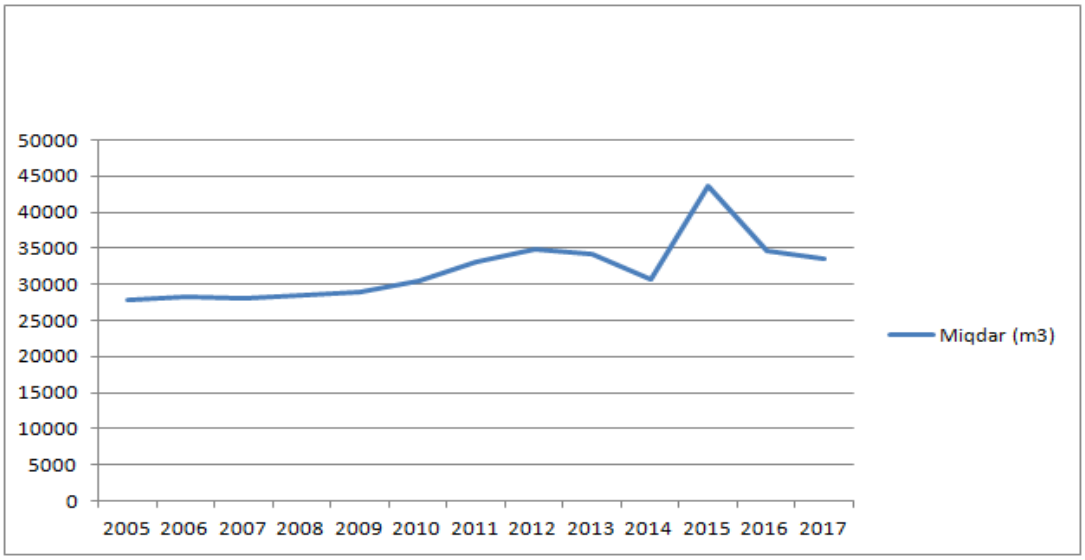
The main part of the waste brought to the landfill (about %90) is municipal waste and only %10 is industrial waste having permission to mix with municipal waste. The average calculation indicators show that the waste brought to the landfill consist of : Paper cardboard 38%, food waste 30%, wood 1,5%, clothes 5,5%, Leather-rubber 1,3%, Polymer materials 5,5% , Bones 0,7%, Black metal 2,5%, ferrous metal 2.3%, nonferrous metal 0.5%, glass 4.3%, Ceramics %1,4 granulated material with less than 8.8%, organic materials 70% (dry weight)

Diagram 20. The waste collected in Mingechevir city, 2009-2017,thousand m^3



The following diagram shows the amount of leaves and cut of the trees collected in Mingechevir city

Diagram 21. The amount of waste (dry leaves and budding of trees), m3



According to the decision of Tariff Council the cost of collection, transportation and contamination of firm household waste has been approved. According to the decision collection and Transportation and contamination of household waste has been determined 30 gepiks per person. For commercial users has been determined 10 manat for 1 cubic meter, 45,5 manat is for 1 ton, Firm household waste is 1 manat 20 gepik for 1 cubic meter, and 5,5 manat for 1 ton.

Greening and sanitary cleaning department has 23 trucks. 13 of the trucks collect garbage (they are special trucks for collecting garbage) 9 of them are dump trucks, 1 is a tractor with trailer. The working hours of all the trucks are from 07 a.m to 03 pm. All garbage trucks consume 72 tons of diezel each year.

2.10.7. City Drainage system

There exists central drainage system in the city. Azersu OSC report says the total length of city drainage system was 147 km in 01.01.2013. The diameter of the pipes is from 150 mm to 1000mm.

The drainage system of Mingechevir city has been exploited for a very long period and now doesn't meet the modern requirements. The average waging of the system is %80. In addition, the devices are overloaded twice more than possible. Therefore, the drainage system needs renovation.

Before the implementation of the project on renovation of water supply and drainage system the existing system of drainage and its technical characteristics was as following:

a) 5 drainage Pump Stations are functioning in the balance of the office.

- Islam Islamzade street - 450 m^3/hour
- 20 January street - 800 m^3/ hour
- Mingechevir village - 450 m^3/ hour
- Qashqai Nabi street - 800 m^3/ hour;
- Ganja Highway - 3 pieces, 800 m^3/ hour

b) The diameter of the exploited pressure collector – 600 mm;

c) 2 dirty water cleaning devices in the balance of the office (DWCD) are functioning.

DWCD № 1 was given to exploitation in 1949-, Power- 3 600 m^3/h., DWCD № 2 was given to exploitation in 1984, power is 10 000 m^3/h

Discharge of the industrial waste from industrial objects is fulfilled by the city drainage system. According to the "State Program for social economic development in the regions of The Azerbaijan in 2019-2023 the work on repair and renovation activities have already started including project on water supply and drainage system of the city.

According to the Project 300 m drainage line has been laid and a new cleaning device with 30 000 cubic meters/hour shall be installed.

The amount of the waters from industrial objects to the city drainage system is 80% of all the consumed water. The city administration considers the development of new drainage system by connecting the new living houses to the existing drainage system.

According to the “State Program for social economic development in the regions of The Azerbaijan in 2019-2023 the work on development of drainage system is being carried out.

The drainage system has been divided into several directions: waste running from household living and public objects and from industrial objects flows into their cleaning system, rain waters are running into cleaning devices of the system. When necessary, for concrete type of running waters are let into drainage –pump stations. Such stations are constructed due to the depth of the collector. Drainage pump stations are devices closed with hermetic lids: Therefore, all the harmful steams remain in that construction.

The production waste that doesn’t meet the same cleaning requirement s must go initial cleaning. All of them are physically old drainage systems need repairing or replacement;

2.10.8. Transport system

As Mingechevir city is the third city for its territory and Fourth for its population %0,5 of all transport means are here. The following table reflects the number of the means of transport.

Table 20. The number of means of transport according to the types of fuel consumed

	Cars			Buses			Trucks		
	Gasoline	***Diesel***	***Total***	***Gasoline***	***Diesel***	***Total***	***Gasoline***	***Diesel***	***Total***
2014	6382	709	7091	105	187	292	327	606	933
2015	6972	775	7747	93	216	309	341	634	975
2016	7242	805	8047	94	248	342	343	636	979
2017	7594	844	8438	87	270	357	338	627	965
2018	7812	876	8588	83	289	372	332	632	964

The length of automobile roads is 396 km. This infrastructure includes 1 underground passage, and 142 striped crossing for pedestrians. The automobiles going to Agdash-Ganja and Sheki-Ganja pass through the city. The number of daily buses passing the city is 36. Traffic in the city is not congested.

There are not e-vehicles and busses with electric engines. In addition, there are not vehicles working on gas. The number of the users of bicycles per thousands of populations in Mingachevir is more than in any other city of the country. But since there are no special roads for bicycles there is no constant use of bicycles in the city.

The following map shows the main directions of main, pedestrian and bicycle road.

2.10.8.1. Transport of Local Administration

5 public offices are functioning supported by the local budget of Mingechevir city. These offices have got 47 automobiles in working condition. The annual consumption of diesel is 47 tons and gasoline 23 tons.

2.10.8.2. Public Transport

101 buses and micro buses are functioning in 12 routes in Mingechevir city.The operators are private companies. The Bus Park consists of buses more than 20 years old using mainly diesel fuel.

Map 7. Scheme of bus routes

Table 21. The fuel consumed by city buses and amount of *CO2*

The fuel consumed by city buses and amount of *CO2 emitted*							
Number of buses	**Unit**	**Daily route passed**	**Length of route (km)**	**General fuel and amount of CO_2**			
				Daily		*Annual*	
				General fuel consumed	**CO_2 Capacity (kg)**	**General fuel consumption (Ton)**	**CO_2 (ton)**
2	1	350	14	42	133	15	48
3	2	220	10	59	187	22	68
4	2	220	10	82	261	30	95
5	3	384	12	101	321	37	1 171
6	2	168	8	94	299	34	109
7	46	728	30	1631	5 182	595	1 892
8	36	1020	36	1302	4137	475	1 510
9	2	260	12	80	254	29	93
12	2	306	11	80	254	29	93
15	2	208	8	82	261	30	95
20	1	334	15	42	133	15	49
21	2	288	16	74	235	27	86
Total:	**101**		**182**	**3 669**	**11 657**	**1 339**	**5 309**

2.10.8.3. Private transport

62% of private cars of the city consists of Russian or USSR made cars.

Table22. Fuel consumption by vehicles in Mingechevir city, 2014-2018 (ton)

Years	Vehichles		Buses		Lorries	
	Gasoline	*Diesel*	*Gasoline*	*Diesel*	*Gasoline*	*Diesel*
2014	8,929	2,954	190	754	380	2,577
2015	8,455	2,577	90	698	450	2,094
2016	8,120	2,194	86	686	432	1,691
2017	8,552	3,344	90	1,092	360	2,388
2018	8,223	3,352	87	1,086	382	2,137

Section 3. Baseline Emission Inventory (BEI)

Sustainable Energy and Climate Action Plan of Mingechevir city is a strategic document reflecting the raise of efficiency of energy consumption in public organizations, residential buildings, public lighting system, transport and communal facilities. Within 5 years (2014-2018) the situation and dynamics of consumption of energy was analyzed for the main sectors such as municipality building, plants, transport, heating, local administration, transport and industry.

“Azerbaijan TPP”, the biggest heat electrical Power station in the country located in the territory of the city (2400 MV) not included in the BEI. The TPP transmits the produced energy to the general electricity network. İt is impossible to estimate the share of this stattion in electricity supply of the city. Taking into account all these Azerbaijan TPP not included in BEI.

Table 23. Baseline Emission Inventory *(2014)*

Sector		Emission CO_2 [т] / CO_2 ekv. [т]								
		Electrical energy	Heat energy	Fossil fuel						Total
				Natural gas	Liquid gas	Mazo ot	Diesel	Gasoline	Solar energy	
Building, Equipment /Objects. Industry										
Municipal houses, Equipments/devices		1981	220	42	0	0	0	0	0	**2806**
Third type (non municipal) houses Equipment houses		16929	0	2666	0	0	0	0	0	**22662**
Living houses		54680	5427	48379	0	0	0	0	0	**76282**
Lightening of the city		1356	0	0	0	0	0	0	0	**1816**
Industry	Non ESS	24195	0	5580	0	0	0	0	0	**34385**
	ETS(not recommended	0	0	0	0	0	0	0	0	**0**
Total		99141	5646	56666	0	0	0	0	0	**137949**
Transport										
Municipal park		0	0	0	0	0	310	73	0	**383**
Public Transport		0	0	0	0	0	4162	0	0	**4162**
Private and commercial		0	0	0	0	0	17577	28511	0	**46088**
Total:		0	0	0	0	0	22049	28584	0	**50633**
Others										
Agriculture/forest, Fish farming		0	0	0	0	0	0	0	0	**0**
Other sectors not connected with other sectors										
Waste management										**0**
Management of waste waters										**0**
Other sources										**0**
Total:		**99141**	**5646**	**56666**	**0**	**0**	**22049**	**28584**	**0**	**212086**

Having analyzed the period of 2009-2014, the year 2014 was selected as the most optimal option for baseline year. As of 2019 3% decrease of emissions is recorded compared to the baseline year of 2014.

The amount of CO_2 emissions were estimated in tons, it was decreasing since 2014. The following diagram describes the consumption of electrical energy in sectors

Diagram 22 Consumption of electrical energy in sectors at baseline year 2014 (MWh)

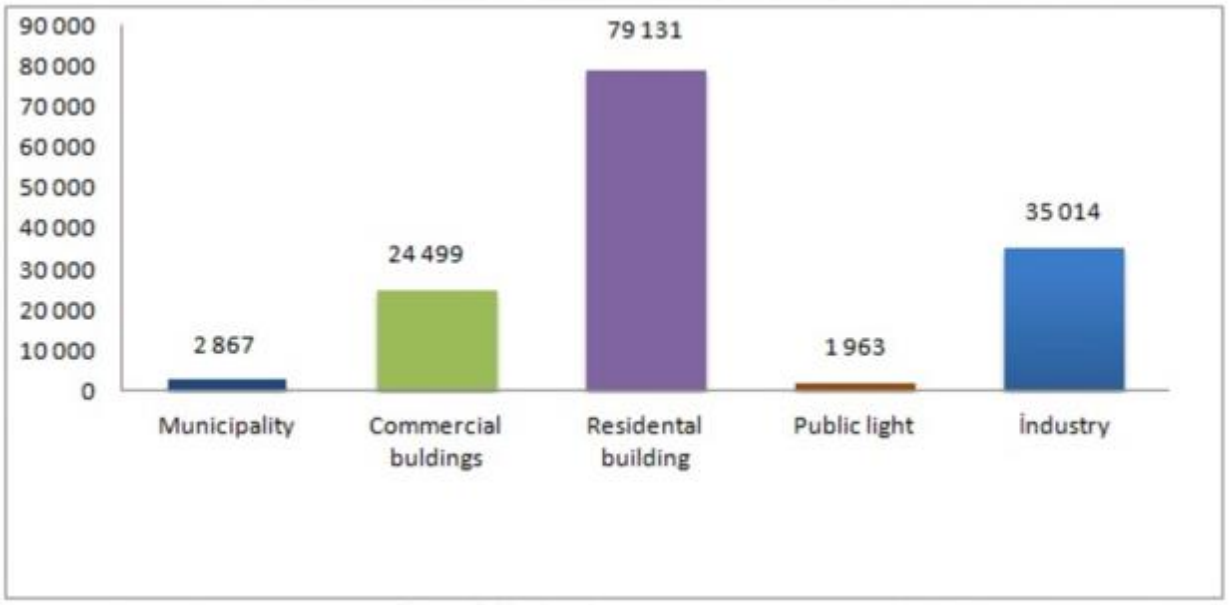
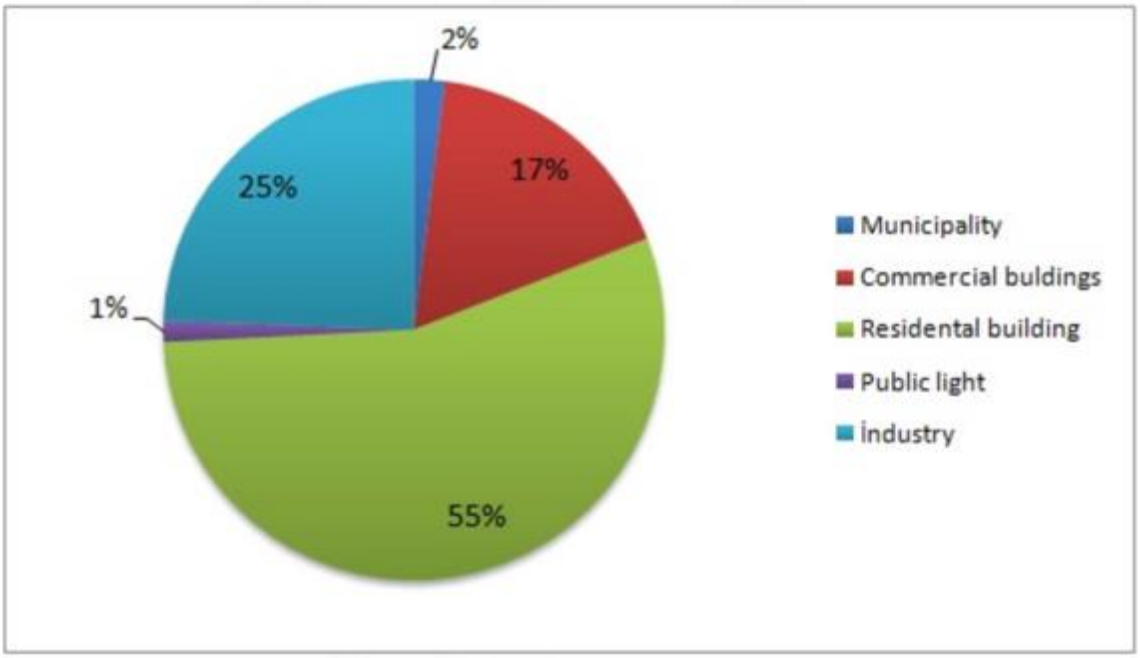
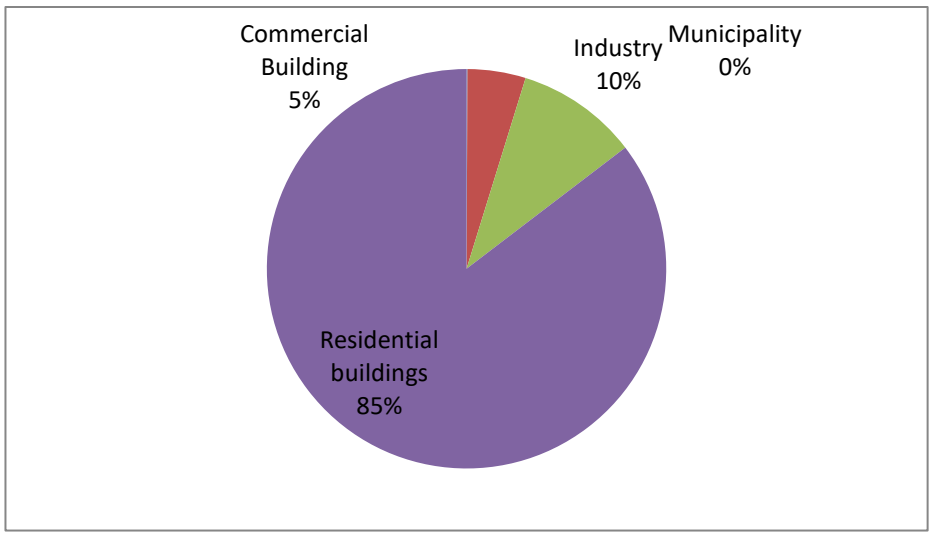


Diagram 23. Energy consumption by sectors, 2014 in %



Gas consumption of the city accounts for 4 sectors The share of gas consumption by these sectors is given in the following diagram.

Diagram 24. Gas consumption by sectors, 2014, %



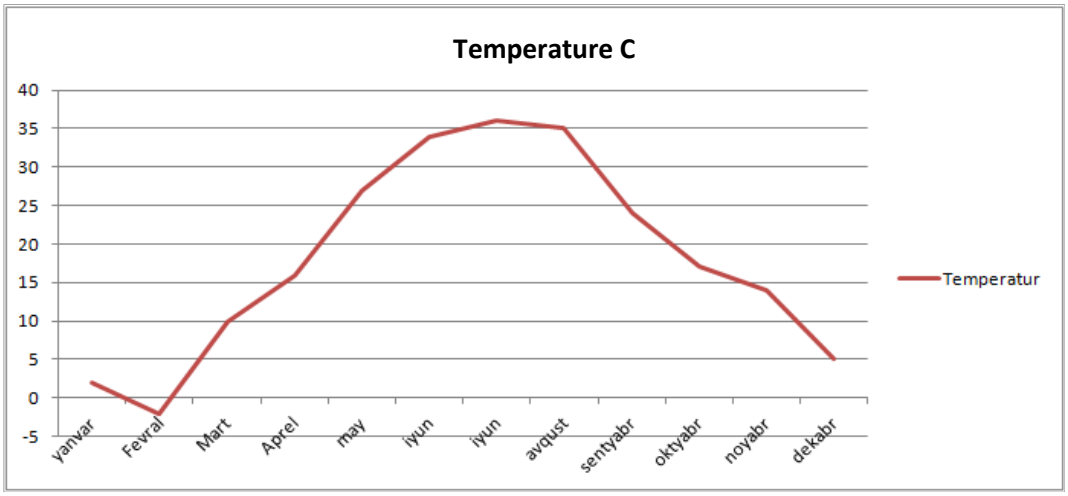
During the improvement of electricity management in Mingechevir city, some suggestions with the involvement of representatives of civil society and experts received. The financial opportunities for reduction of CO_2 emissions were considered in the context of financial resources to implement the proposed ideas. The local administration will contribute its financial resources and leverage them with international donors' financial resources such as grants and concessional loans.

Section 4. Sustainability of Mingechevir city to Climatic Changes

4.1. Characteristics of Climatic Conditions

In summer season 40°C heat is common to observe and it causes more consumption of water by irrigation of parks and households. The following diagram reflects temperature changes in the city throughout the year.

Diagram 25. Average temperature in 2018



The winds blow mainly from the South, South East and eastern sides, on average 2-3 m/second of speed. Atmosphere pressure is 763 mercury columns, humidity is 64%,

annual cloudiness 52%, annual rainfall is 418 mm and average temperature for January is 3,90, for July 27,90.

240 days in a year is sunny in the city. Snowy days are rare in this area. The last snow was observed in 2016. There are 90-110 rainy days in a year. The danger of flooding after rain is very high. The channels for protection from flooding is regularly cleaned and is in good condition.

4.2. Risks connected with water resources

Mingechevir city is located around the biggest water reservoir of the country. The foundation of the city is connected with the construction of the biggest in the country Hydro power station . The amount of water that reservoir receives upstream is getting less and less during the last 5 years. It is evident that water shortage can be a risk for foreseeable future.

4.2.1. Water consumption in parks and avenues in the city

The territory of the parks and alleys is 322,378 m^2. Azersu Company supplies the city parks with potable water. Annual water consumption by parks and alleys is 2 million m^3. The water used for irrigation is drinking water because old pipeline which was supplying parks till 2013 is out of order. Because of it is chlorine content water badly effects the growth of plantation. Many trees dry in summer times.

4.2.2. Water tariffs

The following table reflects Water tariffs for water supply, drainage services approved by decision N-6, dated to May 13, 2016

Table 24. *Water consumption tariffs, 2019*

№	Type of the service (Consumer groups)	Unit	Tariffs (with VAT, AZN)
1	Water supply		
1.1	Population		
1.1.1	Baku, Sumgayit, Khirdalan and Absheron	m^3	0,35
1.1.2	Other administrative territory units	m^3	0,30
1.2	Non population	m^3	1,00
2	Drainage of waste waters		
2.1	Population	m^3	0,15
2.2	Non population	m^3	1,00

4.2.3. Water resources

It is estimated that by 2050 as a result of expected climatic changes the water scarcity will be major challenge. Surface water resources will decrease by 23% and be only 22,5 km^3. Azerbaijan is considered poorest country by availability of water resources in South Caucasus. Taking into account that 70% of its water resources is formed in neighboring countries it will worsen the situation in this field. The climatic changes in neighboring countries will cause shortage of water and it will increase the demand and control over the water. In the future the sensitive fields like agriculture, water supply of population will stay sensitive. All these factors will affect negatively human development. Since more than %40 of population are occupied in agriculture the problems of water supply is undesirable for the agriculture. In addition, the problems arising in water supply may cause decrease in hydro energy potential and it may delay the human development in the country.

Sometimes surface waters are used as water supply sourse in households. Physico-Chemical analyses of the water given to the water supply of the city is analysed. For the assessment of the water 6 components of the water polution is the Water Polution Index (WPI) is determined. The level of the water pollution level is determined according to 7 score scale .

The condition of the surface waters is characterized as not – satisfactory. It is explained as joining of polluted üaters into the system. In addition, some industrial and communal water waste also flows into the river KUR. The main pollutants of the river KUR are oil products phenols, synthetical materials hard metals various organic materials pesticides as the water supply and drainage system cleaning devices has been used for very long time now, they cannot meet all the requirements and are out of order or unfit for exploitation. Many water cleaning devices has stopped functioning since 1985. Polluted drainage waters are not cleaned enough flows into the basin of the river KUR. Reconstruction of water supply and construction works have started according to the “State Program on social-economic development of the regions in the Azerbaijan Republic for 2009-2013”. But all these will solve only a part of these problems. At the moment there is no cleaning devices of many functioning industrial objects, cleaning mechanism rain and polluted water and it affects negatively the condition of surface waters.

4.2.4. Floods and streams

Cases of floods and streams have increased in Mingechevir. Floods followed by intense rain on May 11, 2016 filled the ground floors of private houses and blocked the traffic in streets in “Guneshli” settlement.

The floods coming after the rain from Bozdagh badly damaged more than 120 private houses. The houses were in waters and they were surrounded by ponds and thick layer of clay in the yards and streets. The floods damaged a lot of vegetable crops and poultry in the yards.

Flood as a result of heavy rain on July 5, 2013 in “Guneshli” and “Baghlar settlements” damaged 150 houses which were filled with water and mud, the plantation and vegetables wsshed away by the water. More than 300 chickens lost by the floods. Walls around the yards and fences were destroyed. The floods also damaged the household farms of 26 IDP-s settled in the area. Floods filled the IDP houses, food stock of housholds damaged.

İnstead of the complex of measures against erosion and sliding constructing of some mountain ditches, and the difference between the upper and lower water levels makes it necessary to plant trees and bushes on the slopes, establishment of surface water streams by means of melioration work is suggested.

To regulate water streams in the places where water is collected, planning and construction a complex of engineering protection against the floods must be approved following the study of hydro geological characteristics of flood streams in potetentially dangerous areas of the slope.

4.3. Risks of the temperature rise

Average annual temperature in the territory of Azerbaijan during the last century rose by 0,4- 1,3. The rise of temperature is distributed unequally in in the territory of the country depending on the regions. Thus, in high mountainous territories of the Caucasus it has been observed like 1,1-1,3. During the last decades the number of floods and overflows have been increased. The reason for it was the increase of rainfall norms in a short period. As a result of floods in the rivers KUR and ARAZ in 2003-2017 in many villages it washed away agricultural crops and plantations. After the strong winds during the same period electrical and communication wires were damaged and became out of order.

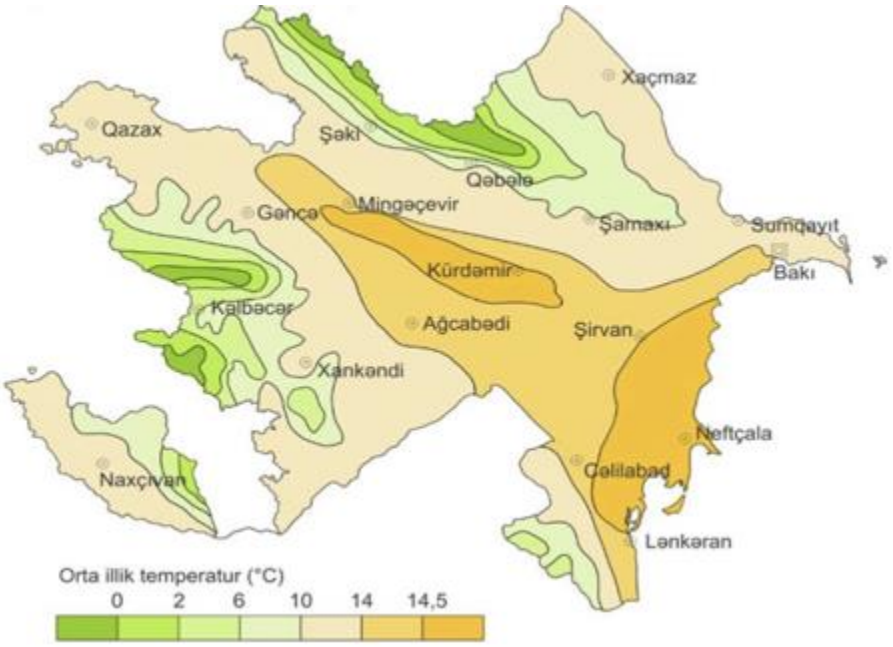
The following table reflects the increase of temperature in the territory of the country.

Table 25. Recorded temperature in the territory of the country

Years	2003	2008	2013	2014	2015	2016	2017	2018
Temperature in the country (C)								
Average temperature in 1961-1990-ci	12.3							
Average annual	12.2	13.0	13.4	13.4	13.6	13.0	13.5	15.0
Average monthly	24.7	25.4	25.7	28.5	24.7	24.7	26.6	28.4
Minimum average	2.1	-3.7	3.6	2.9	2.6	2.4	1.5	3.6

Temperature in Baku city (C)								
Average in 1961-1990	14.7							
Average annual	14.0	14.9	15.6	15.5	15.6	15.2	15.5	16.0
mum (the highest) average monthly	26.4	27.6	26.3	29.0	27.6	28.8	27.6	29.6
Minimum (the lowest) average monthly	3.0	0.4	5.5	4.0	4.9	4.5	7.5	4.7

Map 8. Average annual temperature according to the areas



4.4. Risks connected with Desertification

The process of desertification occurs mainly in foothills, plain and oval territories especially as a result of antropogen factors. The average amount of rainfall in these territories is about 150-400 mm, surface evaporation is 3-4 times more than the rainfalls. Climate is semi desert. Desertification process is more characteristic for the KUR-ARAZ lowland. The increase of population, settlement of İDP-s and refugees in these areas, the rise of demand for cattle farming, shortage of electrical and gas energy, extensive use of soil and plantation led to the growing desertification processes.

The desertification process is more intense in Shirvan desert. The researches carried show that the desertification or degradation of soil, its direction and intensity is caused by ecological condition (relief, plantation and soil and diversity of anthropogenic factors.) From this point of view the area may be divided into the following sectors.:

The degradation of TUGAY forests along the river KUR occured after the use of forest lands ans pastures and intensive use of forest lands in agriculture. Desertification in this area goes in the direction of drying land and some salination.

In the irrigated areas of lowland parts of of the region the main reasons causing desertification is lack of drainage –collector system and irrigation activities. İn this region desertification processes lead to salination and swamping. In the foothills of the region desertification is connected with destruction of plantation layer, intensive use of the land as pastures and not following of agricultural standards.

Section 5. Sustainable Energy and Climate Action Plan (SECAP)

5.1. The Main Aims and Objectives of SECAP

The main aims and objectives of SECAP is to reduce CO_2 emissions by 30% until 2030 in comparison with 2014 baseline year and raise the efficency in water supply system of the city. In order to reach this goal a number of projects covering energy, water supply and households designed. The main criteria for selecting the projects was cost effectiveness i.e. higher emission reductions per the unit of investment. The priority was to the projects that will result in higher reductions of CO_2. Most of the projects cover energy, transport, irrigation and water sectors.

5.1.2 Classification of the projects

According to their focus the projects may be classified as following:

1. Awareness Raisning and skills transfer projects
2. Projects for energy efficency, efficeint transport and water supply system
3. Projects for adaptation to the Climate changes

First group of projects include awareness projects about efficient use of energy and water and activities for communicating climate changes and its negative effects. For this purpose number of public meetings, workshops and consultations will be held, appropriate promotion activities using outdoor advertising will be implemented. Target groups are considered to be internally displaced people, pupils, students and houswives.

For the improvement of skills of the representatives of municipality, certified trainings shall be provided for them and for the staff of energy supply companies. Training will cover energy audit and energy and water management.

Second group projects include projects that will deliver tangible benefits in energy and transport sector. These include installation of LED bulbs for street lighting, bricket and pellets produce for district heating from biomass, construction of solar water heating systems and home insulation.

Third group projects include the projects on adaptation to climatic changes, these are mainly enlightening and infrastructure projects. Restoration of water supply pipe for irrigation of parks and avenues has been included as a priority project.

5.1.3. Project implementation period

According to implementation period the projects are divided into two groups.:

1) The projects to be implemented in 2020-2035
2) The projects to be implemented in 2025-2030

First group projects include:

- Restoration of irrigation of parks and avenues
- Raise of energy efficency in lighting in the city
- Energy efficiency for homes
- Promotion, enlightenment and campaign about discount sale of small scale solar and wind energy devices

Second group of projects include:

- Raise of energy efficiency in public transport
- Energy efficiency in the public buildings
- Promotion for use of electrical energy in Public transport
- Construction of heating system for the office building of Executive Power

5.1.4. Project Descriptions[1]

Project title: Project of efficient irrigation System for parks and avenues in the city

Aim: Construct efficient water supply system with drip irrigation covering 32 ha area of the city

Target: To reduce the existing water consumption in parks and avenues by 70%
Estimated Budget**: EUR 600,000**

Partners: Local Executive Power

Potable water supply and irrigation needs of Mingechevir city provided from Mingechevir water reservoir till 2014. İt was established seprate pipeline. Since the line has finished its exploitation period it became useless causing constant accidents and water leakages. Since 2014 according to the State Program the activities of construction of drinking water line started, new water cleaning system has been constructed and new lines installed. The city administration is considering the reconstruction of drinking water supply and use the old lines for providing technical water for irrigation purpose. Water supply for parks and avenues is provided from the same network of potable water by AZERSU. It is expensive and not appropriate for plantations because of its chorine content. Since there is not metering of water supply for parks irrigation there are great losses in in water lines. According to AZERSU's estimation the

[1]The projects with estimated budget

loss is 2-2,5 million m^3 per year. On this background serious water deficiency is observed in the area. From this point of view prevention of such losses puts forward new challenges on local Executive Power and the Municipality.

The water supplied by AzerSu OSC being chlorinated and kept in reservoir and then pumped to the network which also requires additional energy. There were reported cases of dried trees after irrigation with chlorinated water i.e. potable water.

This project proposal suggests the use of existing new 600 mm 6km length line which would provide the flow of water from Kur river on its own flow without the need for pumps. Local Executive Power is thinking to spend 200 000 AZN for the repair of the line in 2020. The local Executive Power already spent 150 000 AZN for construction of connecting pipelines. The project considers replacing the metallic pipes with low diameters of plastic pipes, construction of new water pipes and establish drip irrigation in the parks. Drip irrigation shall be provided with automatic management program to provide each tree with necessary amount of water. The local Executive Power in addition to its financial sources will contribute to this project with local man power and necessary equipment.

Project title: Transition to LED type bulbs.

Aim: Raise awareness of efficient lighting for households and public organizations

Target: 20% reduction of energy costs for lighting in target groups

Estimated budget: EUR 170,000

Partners: (City inhabitants, students, volunteers and Municipality)

The project considers purchasing 100 000 bulbs of LED type and their distribution to population at discounted prices. By involving the volunteers, the project considers reaching the families and replace the existing bulbs with those of LED type bulbs. The efficiency of LED bulbs will be monitored, and the saving will be calculated. According to the estimations the annual consumption of the electrical energy can be reduced annually by 11 million kwh. Mainly the 100-150 W old style bulbs will be replaced with modern 40-50 watt LED type bulbs.

Project title: Energy efficiency in street lighting of Mingechevir

Aim: Replacement of 8,492 lighting fixtures with led bulbs

Target: To achieve 60% reduction in lighting the streets of the city

Estimated budget: EUR 490 000

Partners: Local Executive Power and İnternational donors

The lighting of the streets of Mingechevir city is provided by 8939 lighting fixtures. There are 447 LED bulbs among them and these are used for lighting of monuments and memorials. Replacement of the existing bulbs with LED ones will enable the city to save in lighting costs in the budget. In the result of replacement of the existing bulbs city can save 1,178 MWh energy each year. 60 % of the saved financial resource will be spent for the purchase of new LED bulbs. İt will enable the administration to reconstruct lighting network in other streets. Local municipality will provide workforce to support activities.

Project title: Promotion and discounted sale of small scale solar and wind energy units

Aim: To raise the level of awareness on economic benefits of renewable energy amongst city population

Target: To realize the discounted sale of small scale solar and wind energy devices with 200 W power to population.

Estimated budget: EUR 500 000

There is not a single solar energy unit in the city. To change the situation a pilot project will construct energy panels on the private and public buildings. The interested groups of population and commercial organizations will be able to purchase them at discounted prices and pay in installments. According to the estimations they will be able to produce 2000 Kwahu energy and it will enable to reduce 520 tons of CO_2 . In frame of project implementation 100 (200 l) solar collectors, 100 solar panels (PV) and 50 wind turbines will be sold to population at discounted prices. They will be demonstrated in public places, near the schools, parks, in central streets and advertised.

Project title: Building bicycle lane in the streets of Mingechevir city

Aim: To build 30 km of safe Bicycle lane in the city

Target: To achieve 20% reduction of CO_2 in private transport

Estimated budget: EUR 840 000

Partners: İnternational Donors and Local Executive Power

There has never been a bicycle road in Mingechevir**.** In 2019 at the entrance part of the city the foundation of a bicycle lane was built. This road is only one km, but it is expected to be extended. A 30 km bicycle road would help the city to reduce 7220,43 tons of CO_2

In estimations of the basic year, average number of sunny, rainy, windy days, number of vehicles in the transport means fuel saving of 36,733 l per year and 20 % reduction of CO_2 is estimated. The local administrative body is going to assist in laying 2 km of bicycle road with work power and technical assistance.

Project Title: Energy efficient residential buildings

Aim: Project aims to deliver insulation work in 113 340 m^2 space of living houses (12 of them 9 floored, 70 of them 5 floor brick laid and 51 of them 5 storied concrete prefabricated panel construction). Construction of district heating system for 30 living houses insulation and repair of roofs in 68 buildings.

Target: To achieve 15% energy saving for residential buildings and 4 %reduction of CO_2 for the city.

Estimated Budget: EUR 3 400 200 (for insulation work) insulation of 70 residential blocks (ceiling, facade), excluding district heating cost.

Partners: İnternational Donors and Local Executive Power

Mingechevir city Executive Power has changed the roof cover of 377 living houses, has repaired entrance of 61 different floor buildings. But there haven't been done any insulation work. In general, there are 70 houses in need of repairing the roof and entrances to the houses. The Executive Power of the city has planned to repair the roofs of 9 houses and entrances of 68 houses. In the plan of activities for the next year insulation work hasn't been considered. Lack of central heating system in %90 of residential buildings and insulation works in these houses is the main reason of increase in electricity and gas consumption. Taking into account the above mentioned activities it is possible to achieve %15-20 reduction in energy and gas consumption.

Project title: Overhaul of 4 kindergartens which are in critical conditions

Total area of 4 kindergartens needing urgent repair is 12172 m^2 . Annual energy consumption of the kindergarten is 105 MWh, but annual gas consumption is 10872 m^3. In the frame of overhaul repair, the heating systems in the building will be installed, the insulation works will be fulfilled, , only LED type bulbs will be used. The local Executive Power has planned capital repair of 2 kindergartens and the construction of heating system in 2 kindergartens. In addition with financial support, local administration will support with additional man power and equipment.

Aim : To achieve energy efficiency in 4 kindergartens (Kindergartens Nos-5,6,8,9) as a result of overhaul repair

Target: Achieve 22% energy saving in the mentioned kindergartens after the repair

Estimated Budget: To be estimated.

Partners: İnternational Donors and Local Executive Power

Project Title: Awareness raising on Energy and Water efficiency

Since 2016, after the devaluation of national currency the costs of communal services has risen the citizens began to use the electrical energy and water more efficently. To inform people about the measures of effectiveness, to establish placards about measures of efficency in the parks, to hold trainings on these topics, to convince the population about the safety of alternative energy systems, propaganda of more widely use of LED type bulbs and other measures would enable population to achieve %8-10 reduction of energy consumption. In the frame of implementation of this project the local administration will support with work power and technical assistance. Still, %55 loss is being observed in water consumption. On the background of climatic changes water deficiency risk is still remaining. The goal is to inform people to be more responsible in water consumption;

Aim: Reduction of energy and Water Consumption by raising awareness and sharing best practices

Target : To achieve 5 % energy saving and 10 % water saving by residents.

Estimated Budget: EUR 20 000

Partners: Local Executive Power

5.1.5. Funding of the projects

The projects will be funded by state budget and donors' assistance. The local government will support projects financially as well as will contribute with man power and equipment.

The Private sector and the owners of private houses will contribute for purchase of solar and wind energy equipment. So, 50 % of equipment will be paid by the project and %50 will be paid by the buyers.

The projects will be funded by the donors and the State budget. Total estimated cost of all projects is EUR 9,000,000. The information about all projects are given in Appendix 1.

Section 6. Monitoring

6.1. Working group

The Municipality, Executive Power and some Non-Governmental Organizations have taken an active part in the preparation of SECAP. The following list shows the names of people who directly contributed to the preparation of the SECAP:

1. Joshgun Abdullayev - Chair of Municipality
2. Shahryar Mustafayev - Chief of MKT production Unit
3. Vuqar Agayi – Computer operator of MKT Production Unit
4. George Abulashvili – Expert over Azerbaijan and Georgia (EU)
5. Jahangir Efendiyev – Local Expert (EU)
6. Oleksandr Dey - International expert (EU)
7. Huseynov Azer - Member of Eco Committee within Mingachevir Municipality
8. Chingiz Orudjov – Local Expert (EU)
9. Chingiz Nazarov – Environmental Expert

Fot the monitoring purpose the municipality will set up the working group, which within its responsibilities:

- Forms the concept of energy policy of the city;

- Works out suggestions on improvement energy management system and submits it;
- Submits and gets necessary information about all types of property functioning in the enterprises, organization and units of the city energy sector
- Works out plan of susyainable energy and climate;
- Controls the necessary measures taken and prepares reports for the development of sustainable energy;
- Monitors the sustainable energy indicators of the SECAP
- Informs the community about the issues on its activities and energy efficiency

6.2. Monitoring and evaluation

Using appropriate indicators and following SECAP enables us to assess the probability of reaching the targets and making necessary corrections. According to the rules of reporting on sustainable energy development and plan of monitoring, Monitoring is considered to have the following stages: Activiti report and full report.

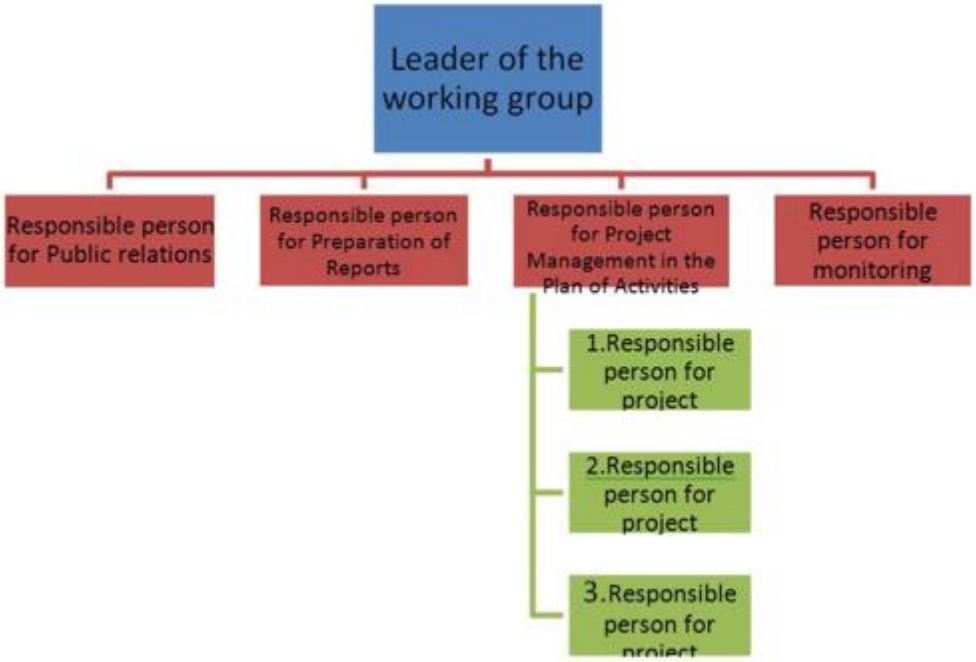
SECAP activity report is submitted two years after it is accepted. General SECAP strategy is directed to the implementation of considered activities.

Monitoring of chief strategy considers any changes in general strategy and submits the updated information on reuse of the staff and financial sources of the staff/ Monitoring of planned activities describes situation in implementation, the problems they face during activities. SECAP must prepare inventory of emission monitoring 4 years after it has been accepted

In order to reach the indicated goals the sustainable monitoring system of fuel and energy resources shall be established.

Monitoring activities will be implemented by a responsible group for monitoring.

Diagram 23. Organizational structure of Monitoring Group



The monitoring will be carried to track and report on the following indicators:

Electricity consumption and appropriate carbon emissions from

- Municipal houses
- Street Lighting of the city
- Industry
- Commercial houses

Gas consumption and appropriate carbon emission

- Population
- Industry

Transport and appropriate carbon emission

a) Municipal cars
b) Public transport
c) Private transport

Appropriate carbon emission in heat energy

a) Municipal buildings
b) Living houses

Climate Adaptation measures

- Water consumption
- No. trees planted

Table 26. *Indicators for monitoring*

	Indicator	Information to be collected	frequency	Responsible organization
1	Electrical energy consumption	• Consumption of population • Industry • Budget organizations	Once a year	Municipality
2	Gas consumption	• Consumption of population • Industry • Budget organizations	Once a year	Municipality
3	Heat energy consumption	• Consumption of population Budget organizations	Once a year	Municipality
4	Fuel consumption in transport	• Fuel consumption in public transport • Fuel consumption in private transport	Once a year	Municipality
4	Water consumption in greening	• Annual water consumption • Average quantity of the water given to each tree	Once a year	Municipality
5	Coeficient of carbon emission	• Coeficient of Emission in energy consumtion in in energy system of the country	Once a year	Municipality
6	Water usage	• Consumptionof water for parks irrigation	Once a year	Municipality
7	Trees planting	• No. Trees planted in reporting period	Once a year	Municipality

The monitoring in 2014-2018 will be carried out on the basis of post factum reports. But the reports of 2019-2030 will be compiled according to actual indicators of each year. Annual reports will be submitted to the local Executive Power, Ministry of Energetics, and appropriate bodies of European Commission.

Mingechevir city as a partner of Mayors' Agreement as a rule, once every 2 years after the SECAP is submitted is obliged to submit report about ongoing implementation of the plan to Joint Research Centre of European Commission. The report is submitted to check the coincidence of targets for considered reduction of CO_2.

In addition, once in every 4 years after the SECAP is submitted, report on the work done together with the Monitoring of Baseline Emission Inventory shall be submitted. The report will capture the progress and challenges during the reporting period by suggesting solution and corrections for the future interventions. Monitoring team shall collect information about ongoing SECAP activities and make corrections when necessary based on the analysis of the situation.

The first results gained will be evaluated and the percentage of achievements of the targets will be reported.

Appendix

Appendix 1 Projects included to the plan of Activities

№	Name of the activity	Description of the activity	Funding sources	Period of the activity	Finance (euro)	Energy saving MVt-saat/il	Renewable energy Mvt/yr	CO_2 Reduction (ton/yr)	Relation to the base year %
	Activities for the adaptation to Climate Changes								
1	Restoration of watering system of parks and avenues of the city Project	Restoration of old water pipe from the KUR, and establishment of efficient irrigation system (drip watering)	Local Budget and International donors	2020-2022	600,000				
2	Greening of Boz Dagh slopes	30 hectares of green zone will be laid and it will prevent land slides in the slopes of the mountains. In the result of it protection of Mingechevir water reservoire and adaptation to climatic changes will be provided	Local Budget and International donors	2025-2030	100,000			200	0.1
	Projects for the raise of efficiency in energy, transport and water supply sections								
3	Overhaul of the kindergartens	Reconstruction of 4 kindergartens , Insulation (floor, ceiling external insulation), renovation of doors and windows, installation of LED bulbs	Local Budget and International donors	2020-2023	400,000	30	12	27	
4	Increase the energy efficiency in consumption	Insulation of the floors and ceilings in the kindergartens	Local Budget and International donors	2025-2028	100,000	300		280	
5	Achieve energy efficiency in living houses	Construction of heating system in 30 living houses, construction of isolation system in 70 living houses (floor, ceiling and external insolation system)	Local Budget and International donors	2020-2025	3,400,200			2380	1.2

6	**Heating hot water systems in the kindergartens with renewable energy**	**Construction of solar panels to provide hot water system**	**Local Budget and International donors**	**2025 -2028**	**100,000**				
7	**Raise of energy efficiency in the houses of municipality and Budget organizations**	**To supply the houses of budget organizations of the city and house of Municipality with solar and Photovoltic energy**	**Local Budget and International donors**	**2025-2027**	**100,000**	**1000**		**900**	
8	**Establishment of enterprise for energy services**	**Establishment of of an enterprise or a centre in Mingechevir that would help people to economy energy consumption, assist new technologies. This enterprise would be able to gain additional income. New business model ESCO would change a part of economied energy into income and that would enable him to finance its own activities The project also considers to train project people and purchase new equipment**	**International donors**	**2020-2023**	**100,000**	**2000**		**1,430**	**0.6**
9	**Bycycle road**	**To lay 30 km of two stripes of bycycle road on both sides of the road in the central street of the city.**	**Local Budget and International donors**	**2020-2022**	**840 000**	**28185**		**7220**	**3.5**
10	**Construction and insulation of Executive Power Office**	**Construction of boiler rooms and economy in the consumtion of electrical energy, heating of new boiler room wirh bricket energy Will enable us to achieve maximum reduction of CO_2.**	**Local Budget and International donors**	**2025-2030**	**300,000**	**90**	**90**		

11	**Energy Efficient public transport**	**The project considers to change 10 buses of public transport into electrical energy and /or to open a new route with electrical energy consumption and achieve reduction of CO_2 in city**	**International donors**	**2025-2030**	**2,000,000**			**200**	
12	**Energy Efficient Public Buildings**	In order to raise energy efficiency in the houses of budget organizations insulation works in houses (floor, ceiling, and facade) will be carried out	**Local Budget and International donors**	**2025-2030**		**400,000**			
13	**Energy Efficient lighting of the streets of Mingechevir city**	To replace old lighting fixtures with 8492 LED type ones in the streets of the city	**Local Budget and International donors**	**2021-2023**	**490 000**	**1178**		**842**	**0.4**
14	**The use of Bio mass in in construction of alternative heating system of the city**	About 30,000 M^3 leaves and wood cut from the trees are collected and thrown as waste each year. The project considers using this waste to produce bricket or pellets and use it in district heating boilers .	**International donors**	**2020-2025**	**200,000**			**110**	
15	**Promotion of the use of electrical vehicles in transport**	In order to provide the needs of Transport with electrical energy for energy consuming cars, i.e private cars with energy,to construct 2 energy filling stations	**Local Budget and International donors**	**2025-2030**					
16	**Propaganda of small scale solar and wind energy devices and their discounted sale to population**	There is not any device working on solar or wind energy. The project considers carrying out propaganda activities among population and discounted sale of 100 (200 liters) solar collectors 100 solar panels(PV), and 50 wind turbines	**Local Budget and International donors**	**2020-2023**	**500,000**		**2000**	**520**	**0.3**

17	**Distribution of LED type bulbs to the population**	Purchase of 100,000 LED type bulbs organize discounted sale to population and non population groups	**International donors**	**2022-2023**	**170,000**	**11,000**		**7,865**	**3.6**
	Awareness raising and Skills Development projects								
18	**To improve the skills of Mingechevir Municipality Team**	To organize seminars to raise the knowledge and skills of Mingechevir working group. To organize certified seminars and trainings for energy audits and energy Managers , water management professionals.	**International donors**	**2021-2022**	**100,000**				
19	**Raising awareness about benefits of the energy and water efficency.**	By engaging volunteers, youth organizations and NGOs to run the awareness campaign about importance of energy and water efficency. Workshops, marathon and flashmobs will be organized in the public places.	**International donors**	**2021-2023**	**100,000**				

Appendix 2. References

1. State program for the development of the regions in 2014-2018
2. State program on the development of the regions in 2019-2023
3. Compilation of State Statistics Committee
4. Mingechevir city Statistics Office 2012-2018
5. İnformation about RESS of Mingechevir city for 2009-2018
6. İnformation from Tartar Regional office of Gas Supply for 2009-2018
7. İnformation from Mingechevir city Greening and Sanitary Cleaning Office for 2009-2018
8. How to work out Plan of Activities For the Development of Sustainable Energy and Climate in the Countries of Eastern Partnerships, 2013
9. Руководство по вопросам отчетности Соглашению мэров по климату и энергии, 2013