Covenant of Mayors
for Climate & Energy

Sustainable Energy and Climate Action Plan (SECAP)

Ialoveni City

2016-2030

Covenant of Mayors
for Climate & Energy

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1. EXECUTIVE SUMMARY

The present Sustainable Energy and Climate Action Plan (SECAP) is a key document of Ialoveni City's vision and commitment in decarbonisation of the territory of the city through improvement of the energy efficiency measures and deployment of renewable energy, as well as strengthening city's capacity to adapt to unavoidable climate change impact. Here are defined mitigation and adaptation actions to achieve the targets together with the time frames and assigned responsibilities.

The Covenant of Mayors is a unique movement that gathered a great number of local and regional authorities to develop action plans and direct investments towards climate change mitigation measures. The new integrated Covenant of Mayors for Climate and Energy was launched by the European Commission on 15 October 2015 during a Ceremony in the European Parliament in Brussels. Now signatories pledge for a minimum 40% CO2 reduction, 27% increase in energy efficiency and renewables, and support the integration of mitigation and adaptation to climate change under a common umbrella.

A Sustainable Energy and Climate Action Plan (SECAP) outlines the key mitigation and adaptation actions Ialoveni City plans to undertake. By implementing proposed measures, the following targets will be achieved:

42% reduction of CO2 emissions (in the limits of the city);

27% energy savings through the implementation of energy efficiency measures;

27% of energy will be produced from renewable energy sources.

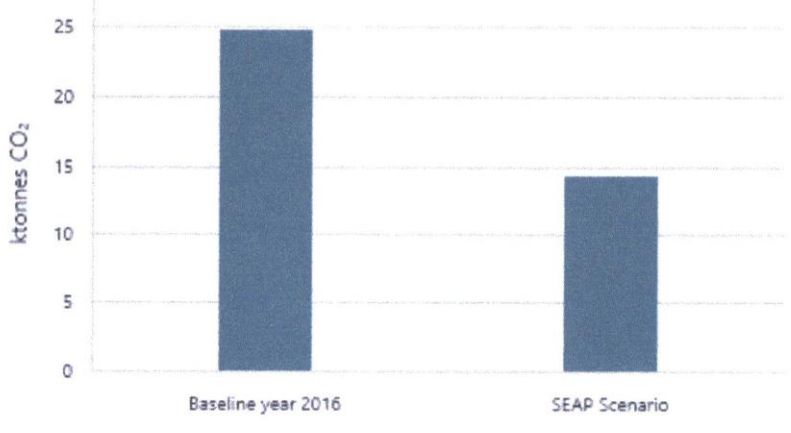

Figure 1. Expected CO2 emissions evolution.

The average level of CO2 equivalent emission per person in Ialoveni will have to be reduced from the current level of about 1,5 tonnes per person to less than 0,3 tonnes per person for the goal to be reached.

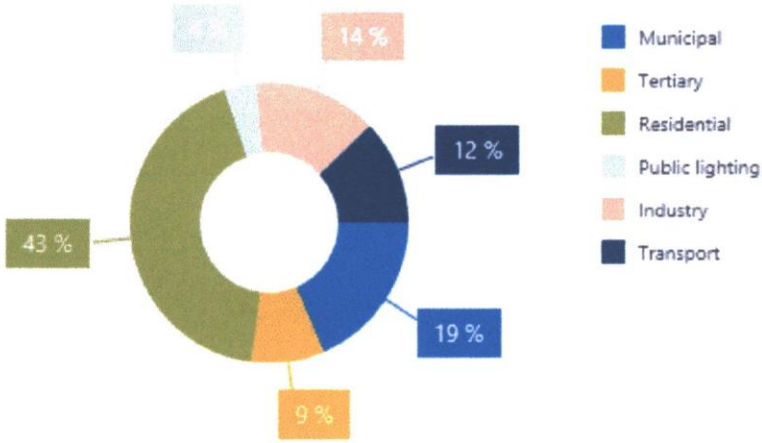

Figure 2. Actual greenhouse gas emissions per sector

The total emissions reduction ratio devided by sectors is presented in Figure 3.

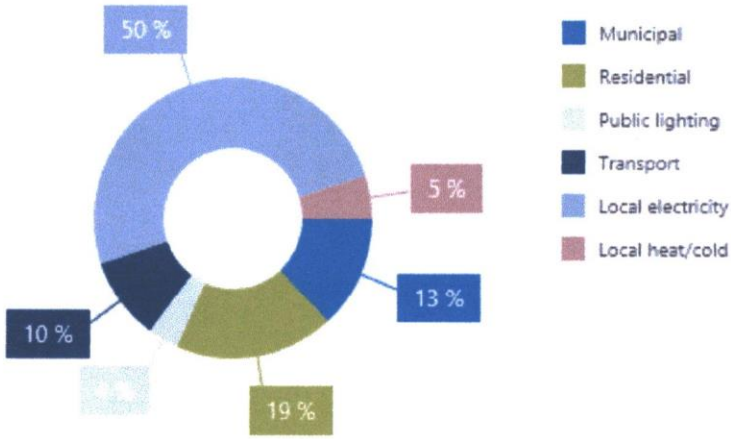

Figure 3. Estimated greenhouse gas emissions reduction per sector in 2030.

Present SECAP describes the measures to be taken in Ialoveni City. Based on collected and analyzed data, Ialoveni City has a great perspective in GHG emission reduction.

A crucial element of the SECAP will be to strengthen community involvement, ongoing engagement with key stakeholders and partners, also great social impact will be achieved.

1.1. IALOVENI CITY OVERVIEW

General characteristics

Ialoveni City is an administrative centre of the Ialoveni District that is located in the central part of the Republic of Moldova (Coordinates: 46°57'N 28°47'E), 12 km from the capital Chisinau, and 35 km from r. Dnestr.

Total area of the city is 31.65 km^2 (68.7% of which is habitable area). [1] From the territorial point of view the city is divided into 9 sectors: Livada, Moldova, Frumusica, Chersacel, Albeni, Petri, Bozu, Fanari, Hutuleuca.

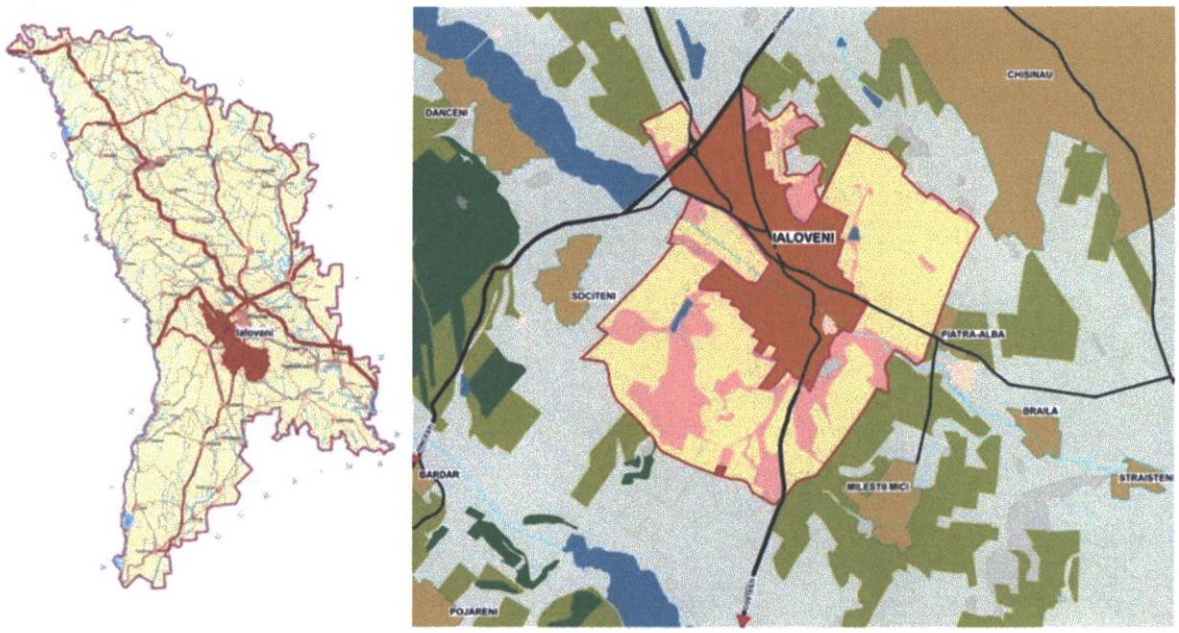

Figure 4. Maps of the Ialoveni District and City

Steppes, hills and valleys form the relief of the area. The floodplain of the river Isnovet is the largest lowland in the city and the highest point equals to 190 meters above the Black Sea level.

Ialoveni city is twinned with the following towns: Force (Italy), Montefortino (Italy), Gmina Lesznowola (Poland), Pocheon (South Korea), Radnevo (Bolgaria), Tomesti (Romania), Topraisar (Romania).

[1] National Bureau of Statistics

Climate

Ialoveni has a moderate continental climate with generally hot summers and mild winters. Temperature in January is within the range - 5.5°C and up to -15°C; while in July the temperature is within the range +20°C and up to +33°C. Annual precipitation varies between 450 and 600 mm.

Hydrography

Urban rivers play several roles and take a great part in the city functioning. The city is crossed by one river- Isnovat, that has a great influence on regional soils characteristics. Together with two pounds it forms aquatic resources of the city. Also the Ialoveni storage reservoir, which was built in the river valley, is used for irrigation.

Not only rivers but also groundwater play an important role in urban resource supply and waste disposal. In Ialoveni there are 22 artesian wells (200m-300m depth, with 22,000 m^3 of water). Partly it supplies with water Botanica sector of Chisinau.

Geology

A seismic condition of the territory is determined by the focal point of Vrancea (Romania), situated at approximately 250km away from the town (at the bottom of the Carpathians). The seismic activity in the area reaches up to 7 magnitude (Richter scale).[2] The specific geological structure cause favourable conditions for broad development of landslides and erosion, represented by various furrows, ravines, canyons and valleys.

Vegetation and agriculture

The vegetation is rich and varied. This variety is caused by many factors: geographical location, relief, climate, water, rocks character. The peculiarities of climate and soil favour the overall development of agriculture, the normal growth of plants. Vegetation period starts from 15 March and lasts till the end of October.

The region is a traditional agricultural area due to the soils characteristics. The main soils are typical chernozems containing significant quantities of rich humus. Thus a wide range of vegetables, all kind of fruit trees and grape vines are cultivated in the area.

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[2]Ilieș, Ion. Sistemul integrat de monotirizare seismică România-Republica Moldova.*Akademos*, nr. 1 (20), martie 2011, p. 62 - 69.

Population

In terms of population, according to the National Bureau of Statistics "Resident population by cities and districts, as of January 1, 2005-2016" the Ialoveni City is in growth.[3] As it is presented in the following table, currently there are 16.4 thousands of people in comparison to 2014 with 16.2 thousands of people.

	2014	2015	2016
Ialoveni city	16.2	16.3	16.4
			(thou. Persons)

According to the "Average age of the population, in territorial aspect, as of January 1, 2007-2016", the demographic situation at the moment is favourable, the median age of men is - 35, and women - 37.[4] Total number of population in Ialoveni City according to "Resident population by districts, areas, and sex, as of January 1, 2007-2016"data is the following:[5]

Age	Male	Female
0-9	865	869
10-19	868	791
20-29	1420	1423
30-39	1734	1731
40-49	1060	1164
50-59	1061	1356
60-69	614	824
70-79	203	231
80+	59	132

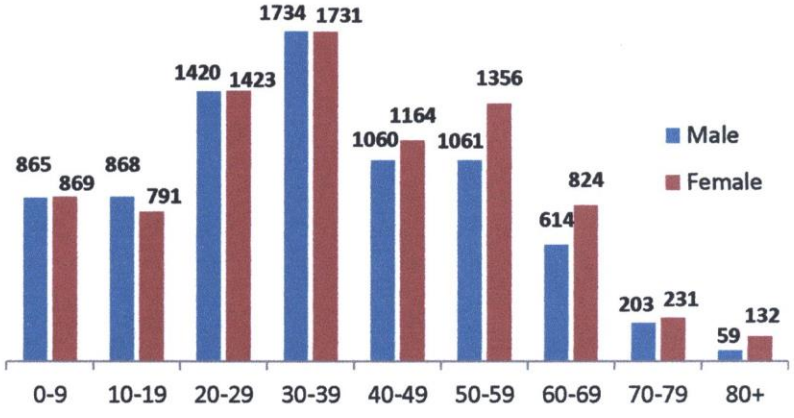

Figure 5. Ialoveni City, Population by sex, age, as of January 2016

As it is seen above, a breakdown of the city population into large age groups highlights both the reproductive capacity of the population and employment potential. Thus, at the moment, there

[3] BNS: Number of resident population in the Republic of Moldova as of 1st January 2016, in territorial aspect.
[4] BNS: Average age of the population, in territorial aspect, as of January 1, 2007-2016
[5] BNS: Resident population by districts, areas, and sex, as of January 1, 2007-2016.

is a relatively favourable situation in population structure. The dominant age groups are in the active working age and equals to approximately 71.8% of the total city population, in comparison to 16.1% of unemployable age.

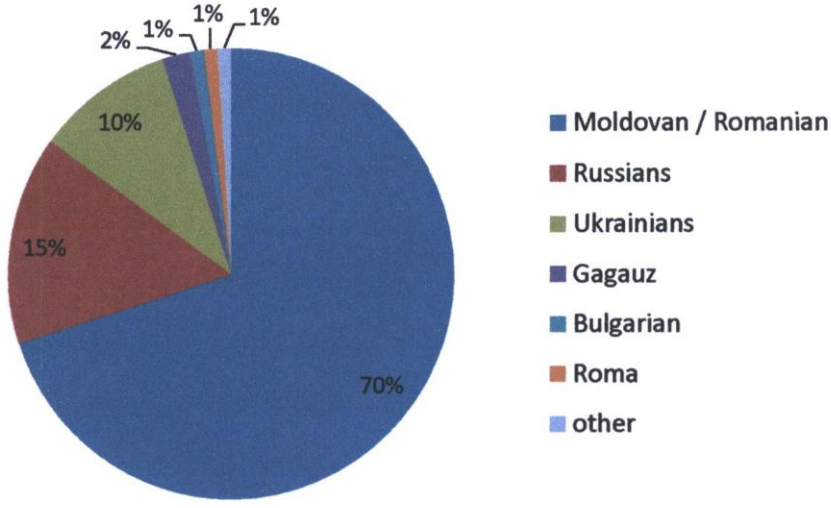

Figure 6. Ethnic Groups in Ialoveni City

Ialoveni has a relatively diversified ethnic structure of the population, thus, according to the last census, 70% represent stable city population that are Moldovans / Romanians, 15% Russians and 10% Ukrainians. Other ethnicities represented a lower percentage: Gagauz (2%), Bulgarians (1%), Roma (1%) and other ethnicities (1%). [6]

Industry and economic agents

Economic activity of the city represents a significant source of income for local government, taking into consideration that 83.4% of the deductions from state taxes are formed from income tax of legal entities. Ialoveni City actively attracts both local and foreign investments that are reflected in *"The Strategy on Socio-Economic Development of Ialoveni City for 2016 – 2020"*.

Ialoveni City has a relatively diversified economy. At the moment, around 457 economic agents are operating in the city. According to the legal arrangement structure, private limited companies prevail (there are about 383 of Ltd.); there are also individual enterprises (about 33 enterprises),

[6] *BNS: Main demographic indicators*

municipal enterprises (3 enterprises), commercial bank branches (around 6 branches) and insurance companies (2 companies).[7]

There are around 169 of business activities. The domain is dynamically developing mainly because it requires smaller investments in comparison to other economic activities. There is a wide range of commercial goods that is produced in this domain (food, beverages, building materials, electrical and household items etc.). There are also a number of civil society organizations (around 13 CSO) operating in the city. The main objective is to provide necessary assistance to socially vulnerable groups of society.

Industry of the city is represented by food enterprises, light industry and construction materials. The most known food industry enterprises in locality are *"Sandriliona"* Ltd. -the ice-cream manufacture which produces 38 types of ice-cream and five types of cake, which are sold all over Moldova and abroad. "*Vinuri-Ialoveni*" JSC. – A winery that was founded in 1953. It is a single vinery in Republic of Moldova that produces a fortified vine Sherry. "*Vinuri-Ialoveni*" vines were exhibited and highly appreciated in different international competitions.

Service sector is represented by a broad spectrum of companies, including two municipal enterprises: Municipal Enterprise of Housing and Utilities Sector and Municipal Enterprise.

[7] *"Strategia de dezvoltare Socio-economică a oraşului Ialoveni pentru perioada 2016-2020"*

2. OVERALL STRATEGY

By signing up to the new Covenant of Mayors for Climate and Energy, Ialoveni City voluntarily commits to a target of reducing CO2 emissions by at least 40% by 2030, thus sharing a common vision for sustainable future, and committing to develop low-carbon, resilient, energy efficient community. Ialoveni City pledge to take action in those areas, focusing on improving energy efficiency and increasing the use of local renewable energy resources in sectors under their direct influence. To translate Ialoveni City commitment into practice the present Sustainable Energy and Climate Action Plan (SECAP) is submitted and implemented. In what follows the key actions are planned to be undertaken.

2.1 OBJECTIVES AND TARGETS

To shape the climate and sustainable energy future of the Ialoveni City and put the overall strategy into action the following objectives and targets were formulated.

Management area		Target		Measure
Municipal, Residential, Tertiary buildings, equipment/facilities	A1	Building envelope	A11	Thermal insulation of walls, replacement of windows and doors, insulation of roofs in social housing.
		Renewable energy for hot water preparation	A12	Installation of individual vacuum tube solar collectors for HW preparation placed on the social houses façades.
		Energy efficiency in space heating and hot water	A13	Replacement of old heating distribution system with two pipe system, heat meters for each consumer separately (complying with EE Directive 2012/27/EU) in social housing.

				Installation of individual heat substations in social houses in order to be interconnected to biomass heating plants.
		Energy efficient electrical appliances	A15	Incentives for the replacement of kitchen and laundry appliances for new ones in kindergartens and schools.
Public lighting	**A2**	Energy efficiency	A21	Replacing light bulbs and luminaries by efficient ones.
Transport	**A4**	Modal shift to public transport	A43	Improvement of the public transport infrastructure; Improvement of trolleybus lines and Park.
		Road network optimisation	A47	Construction of roundabout in order to reduce congestion.
Local electricity production	**A5**	Photovoltaics	A53	Construction of photovoltaics park with 13.1 MW input.
		Biogass	A57	Construction of biogas power plant; Construction of wastewater treatment plant (supplement to biogas power plant); Construction of waste sorting plant (supplement to biogas power plant).
Local heat/cold production	**A6**	District heating plants	A62	Construction of small scale biomass plants (inside blocks).
		District heating network new.	A63	Construction of small scale (inside blocks) district heating networks.
Other	**A7**	Waste & wastewater management	A72	Rehabilitation of water pump station; Rehabilitation of wastewater pumping station.

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Also the following policy instruments have been defined in order to cover the measures from legislative point of view

Management area	Target		Measure	
Buildings	**B1**	Energy certification	B13	Elaborate and display energy certificates on municipal buildings which have to be retrofitted.
		Grants and subsidies	B16	Partial grants / Subsidies for replacement of old boilers by new biomass boilers for private homeowners
		Grants and subsidies	B16	Incentives for the replacement of domestic appliances for new ones.
Local heat/cold production	**B6**	Awareness raising / training	B61	Training courses for the construction sector on how to integrate local heat production in new buildings.
		Energy suppliers obligations	B62	Installation of district heating systems under energy suppliers obligations.
		Second party financing. PPP	B64	Project development in order to build a small scale district heating system.

2.2 CURRENT FRAMEWORK AND VISION FOR THE FUTURE

Ialoveni City Hall actively works on promoting renewable energy and energy efficiency programs. According to *"The Strategy on Socio-Economic Development of Ialoveni City for 2016 – 2020"*, Local Public Administration of the Ialoveni City has attracted a series of local and foreign refundable and non-refundable investments.[8] The implementation of these projects contribute to the dynamic development of the city as well as implementation of energy efficiency actions. These include projects implemented with the help of Moldova Social Investment Fund (MSIF), National Environmental Fund (NEF), Regional Development Agency Center (RDACenter), U.S. Agency for International development (USAID), etc.

Through the elaboration of the *General City Development Strategy* a number of programs and strategies, promoting energy efficiency, were formulated. Thus according to the *National Environmental Strategy for 2013-2023,* a number of objectives and measures that will ensure the implementation of environmental sector reform, the rational use of natural resources, creation of the smart waste management system and ensure its functioning; reducing the negative impact of economic activity on the environment, etc. were set.

The formulated *Energy Strategy of the Republic of Moldova for 2013-2030* ensures sustainability of the energy sector and means for combating climate change, provides development of the competitive markets and their regional and European integration.

In 2013, with the support of the *USAID Local Government Support Project* (LGSP) and in partnership with *Encon Services International* LLC, the Local Energy Efficiency Program was developed and implemented. Among overall objectives of this programm there are encouragement to use more energy efficiency measures and as a result environmental protection through reduction of greenhouse gas emissions can be obtained.

The analysis carried out revealed that Ialoveni City authorities are actively engaged in a number of actions to support energy efficiency development in the city, aiming for a Smart Energy City

[8] Ialoveni City Hall

with a low carbon economy, that is financially competitive and resource-efficient, innovative and clean with green industries and services.

2.2.1 BUILDINGS

Current framework

Ialoveni city is an administrative center of the Ialoveni District thus a lot of administrative buildings are located in the city. Total area of the Ialoveni City is 31.65 km2 (68.7% of which is habitable area). [9] From the territorial point of view the city is divided into nine sectors: Livada, Moldova, Frumusica, Chersacel, Albeni, Petri, Bozu, Fanari, Hutuleuca.

City structure is strongly influenced by natural and geographical conditions. There has been observed a slow but positive tendency in increasing of the leaving area, since 2010 it increased on 4.9%.[10]

According to the ownership form, the territory of Ialoveni, is the following: Private property land - 1641,12 ha.; Public property of Ialoveni - 35.28 ha.; Land of public property of the state - 55.31 ha or 3.3% of the total land area. [11]

Educational system of the ciy comprises three preschool institutions, one primary school, one secondary school, two Lyceums, one art school, and two public lybraries.

A preschool education is carried out in three (3) preschool institutions, attended by 1049 children, who are assisted by 157 teachers. All three institutions are newly renovated buildings with all necessary infrastructure. The number of children enrolled in preschool institutions in 2015 increased by 22%, compared to 2012.

The further schooling is carried out by one (1) primary school *"Ion Creangă"* that has been operating since 1990, and is attended by 168 chidlren; one (1) secondary school *„Grigore Vieru"*, that has been operating since 1994, and is attended by 198 chidlren; and the rest 1552 children attend two (2) Lyceums, that are marked as one of the best in the raion: *„Andrei Vartic"* (operates since 1962), and *"Petre Ştefănucă"*, operates for 30 years already and is attended by 772 of

[9] National Bureau of Statistics
[10] National Bureau of Statistics
[11] Ialoveni City Hall

children. Tere is also one (1) art school that operates since 1987 and is attended by 240 children. In total, 3,090 children are included in the education system of the town.

During 2012-2014, eight (8) projects (worth 3.26 million. lei.) were implemented in all educational institutions in the locality.

Health care system includes the following institutions: one (1) Town Hospital, one (1) Regional Hospital (within the hospital there is a maternity devision), one (1) Health Centre and one (1) Centre of Family Doctors. The institutions buildings genealy are in a good condition. Hospitals dispose with all nececary infrastructure.

Vision for the future

Buildings are critical in the move to a low carbon economy. The average U value for existing walls and roofs is 1,4÷1,7[W/m2K], for windows U=2,8÷3,2[W/m2K]. Primarily greenhouse gas emissions from this sector come from heating and hot water preparation.

The solutions which have been defined after the real situation analysis are presented in table below.

Table 1. Physical measures for existing building stock.

A1	Municipal, Residential, Tertiary buildings, equipment/facilities	Actions
A11	Building envelope	Thermal insulation of walls, replacement of windows and doors, insulation of roofs in social housing.
A12	Renewable energy for hot water preparation	Installation of individual vacuum tube solar collectors for HW preparation placed on the social houses façades.
A13	Energy efficiency in space heating and hot water	Replacement of old heating distribution system with two pipe system, heat meters for each consumer separately (complying with EE Directive 2012/27/EU) in social housing. Installation of individual heat substations in social houses in order to be interconnected to biomass heating plants.
A14	Energy Efficient lighting systems	Replacement of inefficient electric lighting systems to new one.

A15	Energy efficient electrical appliances	Incentives for the replacement of kitchen and laundry appliances for new ones in kindergartens and schools.

A11, A12 and **A13** refers to residential public buildings, mainly apartment blocks that belong to social municipality houses.

A15 refers to public buildings, mainly kindergartens and schools.

The detailed description of defined solutions is presented below:

- **A11. Building envelope. Thermal insulation of walls, replacement of windows and doors, insulation of roofs in social housing.**

The first step which has to be applied in any type of existing engineering system is the reduction of demand. Thus insulation of building envelope and replacement of windows and doors.

The insulation of walls has to be done with Rockwool at least of 100mm thickness and λ=0,041[W/mK] with a density at least of 135[kg/m3] according to SM SR EN 1602 or better.

Insulation of roof has to be done with extruded polystyrene (XPS) at least of 100mm thickness and λ=0,035[W/mK] with a density at least of 300[kg/m3] according to SM SR EN 1602, covered with concrete metal framed tie and water proofing layer from bituminous materials.

In order to comply the rehabilitated buildings, from existing building stock, with local thermal requirments regarding building elements, the Uvalue for walls has to be maximum of 0,22 [W/m^{2}K], and for roofs 0,24 [W/m^{2}K].

Replacement of existing windows and doors to windows and doors with non-recyclable PVC frame, with 7 cameras, reinforced metal U type frame of 1,2mm thickness covered with plastic layer, without thermal bridges. Double glazed low emissivity (Low-e) windows 4-20-4 [mm].

U-value for windows has to be maximum 1,4[W/m^{2}K], and for doors maximum U=1,8[W/m^{2}K].

The selected materials and their technical characteristics are based on good engineering practices, and are in-line with local normative documentation.

Based on previous experience the thermal energy demand can be reduced with 55%.

- **A12. Renewable energy for hot water preparation. Installation of individual vacuum tube solar collectors for HW preparation placed on the social houses façades.**

Taking into account that the city has no district heating system or DHW system, each apartment has its own gas boiler or electricity boiler which generates the hot water.

It is expected that each municipial building apartment will have it's own vacuum tube solar collector, placed on Southern façade of the building, with at least 15 degrees of an angle of inclination. The solar collector itself will be interconnected with an accumulative boiler of 150litres (placed in the bathroom). From the middle of November till the end of February the water in the accumulative boilers will be pre-heated through additional heat exchanger interconnected with individual heat substation.

Based on the local statistics, around 30% from primary energy in city's residential sector, used for heating, goes for hot water preparation. The existing examples in the country show that the energy consumption for hot water preparation can be reduced up to 80% by applying this type of measure.

- **A13. Energy efficiency in space heating and hot water. Replacement of old heating distribution system. Installation of individual heat substations.**

Replacement of old heating distribution system with two pipe system, heat meters for each consumer separately (complying with EE Directive 2012/27/EU).

The internal heating distribution system will be completely re-designed, from vertical type of distribution system to horizontal distribution system interconnected to columns placed at the staircase. In each apartment will be installed manifold valves. Before the manifold, at staircase will be installed a thermal meter for each apartmanet, each apartment owner will be able to manage his expences according to energy consumption. The manifold valves will play a role of distribuitor of demand for heating and hot water preparation for a specific apartment. The hot water pipes will be interconnected with the heat exchanger placed inside the accumulative boiler from solar hot water preparation system, preheating the water in accumulative boiler in winter period.

Installation of individual heat substations in order to be interconnected to biomass heating plants. The individual heat substations will be equipped with a heat meter and with a single heat exchanger in order to separate the internal distribution system from district heating system.

Based on multiple examples up to 10% of energy savings can be achieved through applying this measures.

- **A14. Energy Efficient lighting systems. Replacement of inefficient electric lighting systems to new one.**

Public buildings mainly are lighted with incandescent type bulbs which lead to high energy demand during working hours. It is planned to rehabilitate the entire internal lighting systems in all public buildings. The old system will be replaced to new LED type system, thus 70% of energy can be saved.

- **A15. Energy efficient electrical appliances. Incentives for the replacement of kitchen and laundry appliances for new ones in kindergartens and schools.**

The kitchen equipment is equal by number and typical for all institutions. In total 4 sets of equipment for schools and 3 sets of equipment for kindegartens have to be replaced. Based on multiple energy audits by replacing kitchen equipment the energy consumption, in average, can be reduced with 40%.

In order to raise awareness of the population from private and public residential sectors, the next solutions have been identified.

Table 2. Policy instruments for existing building stock.

B1	Buildings	Actions
B13	Energy certification	Elaborate and display energy certificates on municipal buildings which have to be retrofitted.
B16	Grants and subsidies	Partial grants / Subsidies for replacement of old boilers by new biomass boilers for private homeowners
B16	Grants and subsidies	Incentives for the replacement of domestic appliances for new ones.

Description of the policy instrument is presented below.

- **B13. Energy certification. Elaborate and display energy certificates on municipal buildings which have to be retrofitted.**

Placement of certificates at the entrances of public buildings will raise awareness of the population and produce several positive effects.

Energy certificates displayed on buildings related to residential sector will show the homeowners the actual energy consumption of the building and what will be the consumption after the rehabilitation, also the cost of the measures. The ones who want to buy an apartment may estimate the monthly bills expenses.

As for the public buildings, additionally to above mentioned, the energy certificate can support the administrator of the building in management of energy consumption.

- **B16. Partial grants / Subsidies for replacement of old boilers by new biomass boilers for private homeowners**

Taking into consideration that the biggest part of buildings from the city belongs to private sector, it was decided to facilitate the homeowners to replace their old boilers with new, more efficient one.

It is expected to form a fund which will attract investments from various donor organizations which may cover around 50% of the cost for procurement of new boilers.

All existing boilers mainly use natural gas with a low rate of efficiency, around 90%. The new boilers are expected to use biomass with the efficiency of heat generation, at least 90%. This measure considerably reduces the CO2 emissions. According to the SECAP template the IPCC emission factor for municipal wastes biomass is considered 0 (zero), meaning that by applying this measure, emissions will be excluded completely.

- **B.16. Grants and subsidies. Incentives for the replacement of domestic appliances for new ones.**

This measure stands for replacement of old, inefficient appliances from residential sector (washing machines and refrigerators). To stimulate the citizens to replace the existing equipment from D or E Classes to A+++, a co-financing of measure, up to 30%, is foreseen. It is expected to finance this measure from local taxes, ESCO's or low rate credits and donor organizations. The impact from physical and policy measures in buildings is presented in the table below.

Table 3. The impact of the implemented measures

№	Actions	Estimated investment, [euro]	Calculated reduction of energy consumption [MWh/year]	Calculated CO2 emission reduction [tonnes/year]
A11	Thermal insulation of walls, replacement of windows and doors, insulation of roofs in social housing.	2.370.000	306,49	61.9
A12	Installation of individual vacuum tube solar collectors for HW preparation placed on the social houses façades.	1.640.000	191	38,58
A13	Replacement of old heating distribution system with two pipe system, heat meters for each consumer separately (complying with EE Directive 2012/27/EU) in social housing. Installation of individual heat substations in social houses in order to be interconnected to biomass heating plants.	3.600.000	55,7	11,25
A14	Replacement of inefficient electric lighting systems to new one.	3.550.000	3811.5	2488,9
A15	Incentives for the replacement of kitchen and laundry appliances for new	105.000	84	54,85

	ones in kindergartens and schools.			
B13	Elaborate and display energy certificates on municipal buildings which have to be retrofitted.	15.500	–	–
B16	Partial grants / Subsidies for replacement of old boilers by new biomass boilers for private homeowners	5.700.000	–	1798
B16	Incentives for the replacement of domestic appliances for new ones.	2.820.000	2640	1723,9

Note:

According to "JRC Technical Report Part II. Baseline emissions inventory. Update of emission factors 2014. Table 3." the standard IPCC emission factor for electricity is 0,653 [t·CO_2/MWh].

According to Part II "Baseline emissions inventory", the standard IPCC emission factor for natural gas is 0,202 [t·CO_2/MWh].

According to the SECAP template the IPCC emission factor for municipal wastes biomass is considered 0 (zero)

2.2.2 Public Lighting

Current framework

The location of the city itself states the importance of the city street lighting. As Ialoveni City is located 12km away from the capital, it is also the main route to the famouse local touristic location such as touristic comlex Mileştii Mici. Thus city street lighting plays equally important role for transit vehicles as well as for local citizens. Steady light at the intersection of the roads helps driver in navigation, to see the location of a side road or pedestrians. Street light also makes residential area a safer place providing a safer environment during night-time.

The current Illumination was installed in 1970 and since no modifications were made. From 1993 Ialoveni got larger and street lighting doesn't doesn't cover all city needs. At the moment mainly gas-discharge lamps of 250W power provide street lighting. In total, around 56% of streets are covered by street lighting. The street lighting in average works 3877 hours per year.

To solve the current problem and to improve living standards and citizen's safety Local Public Administrtation applied to Energy Efficinecy Fund (EEF) and received financing. Thus with the help of Energy Efficinecy Fund (EEF) and contribution from Local Public Authorities, the rehabilitation of street lighting in 8 main streets will be implemented till the end of the year.

Vision for the future

To ensure road safety and a safer, more energy-efficient street lighting, the following measure is proposed to be emplemented:

Table 4. Energy efficient measures in public lighting.

A2	Public lighting	Actions
A21	Energy efficiency	Replacing light bulbs and luminaries by efficient ones.

The detailed description of defined solution is presented below:

- **A21. Energy efficiency. Replacing light bulbs and luminaries by efficient ones.**

Taking into consideration that the streets proposed for rehabilitation class is- S4, and the average requirement for street lighting is- 5lx, the installation of 30W lamps based on LED technology was foreseen.

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Calculations have been performed considering that the light output emitted by the luminaire should comprise 2/3 of the distance between the pillars so that 1/3 of the distance both light streams interpenetrate. The distance between new placed pillars is considered to be 30m one from each other and they will be installed from one side of the street. In total, 2534 luminaires based on LED technologies will be installed, from which 1419 old ones will be replaced.

The impact of applying this measure is presented in the table below.

Table 5.Impact of energy efficient measures in public lighting.

№	Actions	Estimated investment, [euro]	Calculated reduction of energy consumption [MWh/year]	Calculated CO2 emission reduction [tonnes/year]
A21	Replacing light bulbs and luminaries by efficient ones.	3.040.000	1080,63	705,65

Note:

According to "JRC Technical Report Part II. Baseline emissions inventory. Update of emission factors 2014. Table 3." the standard IPCC emission factor for electricity is 0,653 [t·CO_2/MWh].

2.2.3 Transport

Current framework

The transport sector has an important role in everyday life by providing access to different destinations while creating the conditions to support economic growth.

Due to lack of roundabout road the central road of Ialoveni is crawded, especially during peak hours because it is located in the suburbs of Chisinau (Capital of Moldova) and a large part of Ialoveni citizens and nearest villages daily travel to the capital. One of the most important and most visited tourist destinations in the Republic of Moldova, which is the Milestii Mici is located near Ialoveni. Thus, the high transport flow provides air pollution in the City center.

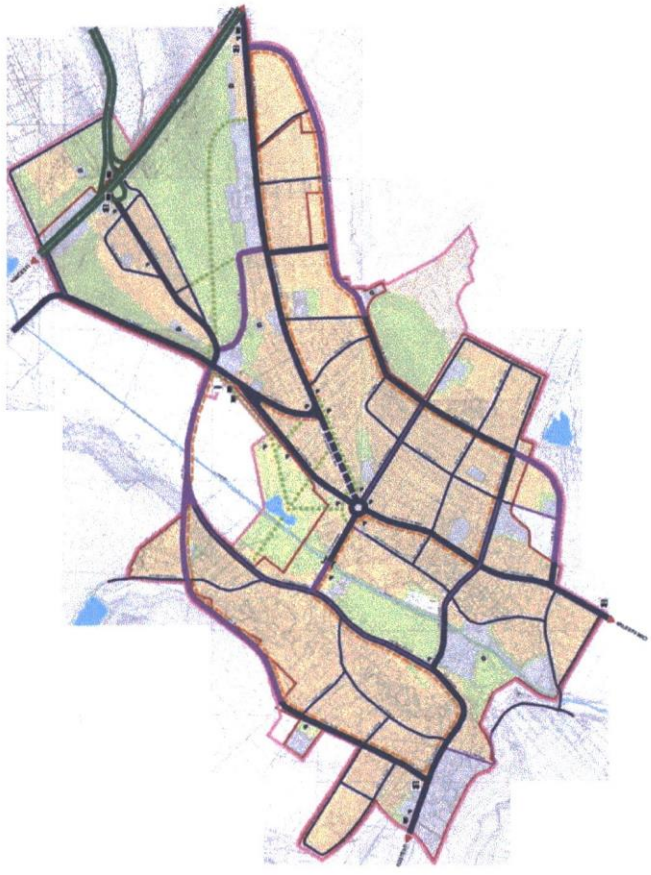

Figure 7. Roads, streets and transport plan of Ialoveni City

The road network of Ialoveni City is in a relatively good condition although a poor road is also met. Over the last years, millions of lei were spent from the local budget to repair and asphalt roads, to construct the sidewalks.

Ialoveni city has a Private Transport Network (minibuses). But the cityzens are not satisfied with the current transport. In locality, considering it's neighborwhood with the capital, has only 3 transport routes, including 2 local routes and an interurban route. Minibuses are constantly crowded, sistimaticaly is late. Thus in accordance with "The Strategy on Socio-Economic Development of Ialoveni City for the 2016 – 2020" one of the solutions of existing situation is to prolonge existing trolley line Chisinau-Ialoveni.

Vision for the future

In order to ensure adequate conditions for travelling the next measures have been identified

Table 6. Transport measures

A4	Transport	Actions
A43	Modal shift to public transport	Improvement of the public transport infrastructure; Improvement of trolleybus lines and Park.
A47	Road network optimisation	Construction of roundabout in order to reduce congestion.

The detailed description of defined solutions is presented below:

- **A43. Modal shift to public transport. Improvement of the public transport infrastructure; Improvement of trolleybus lines and Park.**

Ialoveni City Hall has decided to create a Public Transport Network by creating a trolleybus park. The trolleybus park is expected to be formed from 10 trolleybuses. In order to reduce the necessary investments, it was decided that the trolleybuses will be equipped with accumulative batteries and will travel through the City without contact network. From Chisinau contact network up to the farest distance point in Ialoveni City it is around 5.7km, the total expected travel distance without contact network is around 18 km. The accumulative batteries can maintain autonomy for a distance of 55km. The battery can be fully charged in 25 minutes. Sametime, infrastructure has to be adopted, by reniewing 22 trolleybus stations.

This solution can exclude the use of private mini-buses which annualy burn in limits of the City around 67000 litres of diesel, equal to 670MWh.

- **A47. Road network optimisation. Construction of roundabout in order to reduce congestion.**

The Mayor of the Ialoveni City has come with an initiative to finish the roundabout road in order to reduce traffic jam. The necessary length of rehabilitation is around 1500 meters with the 6 meters width.

By applying this measure, passing-by transport will avoid the City, where the speed limit is 50km per hour and will use the roundabout, which total length is smaller than the actual road, and where the speed limit is 90km per hour and no traffic lights and pedestrian crossings.

This solution can reduce 365000 litres of diesel equal to 3650 MWh, and 318000 litres of gasoline equal to 2925,6 MWh.

The impact of the proposed measures is presented in the table below.

Table 7.Impact of the measures for road network optimisation.

№	Actions	Estimated investment, [euro]	Calculated reduction of energy consumption [MWh/year]	Calculated CO2 emission reduction [tonnes/year]
A43	Improvement of the public transport infrastructure; Improvement of trolleybus lines and Park.	2.343.000	670	178,9
A47	Construction of roundabout in order to reduce congestion.	1.200.000	6575,6	1703

Note:

According to Part II "Baseline emissions inventory", the standard IPCC emission factor for diesel is 0,267 [t·CO_2/MWh], and for gasoline is 0,249 [t·CO_2/MWh].

2.2.4 Energy

ELECTRIC POWER

Current framework

The power supply of the city is conducted by the National Electric Power System through the power distribution company "RED Union Fenosa S.A.". RED Union Fenosa S.A. annually does rehabilitation works in transmission and distribution networks.

Vision for the future

In order to ensure the state energy security and provide additional income to local budget, was decided to produce electricity localy, through renewable energy sources. Defined solutions are presented in table below.

Table 8. Physical measures for local electricity production.

A5	Local electricity production	Actions
A53	Photovoltaics	Construction of photovoltaics park with 13,1 MW input.
A57	Biogass	Construction of biogas power plant; Construction of wastewater treatment plant (supplement to biogas power plant); Construction of waste sorting plant (supplement to biogas power plant).

The detailed description of defined solutions is presented below:

- **A53. Photovoltaics. Construction of photovoltaics park with 13,1 MW input.**

In order to create additional income to local budget, the Mayor of the City has come with the initiative to construct a pv park to be completely managed by municipality. Thus, for that purpose the land was allocated where 13,1MW of installed electrical power may be placed which can produce annually up to 14885MWh/year.

- **A57. Biogass. Construction of biogas power plant; Construction of wastewater treatment plant (supplement to biogas power plant); Construction of waste sorting plant (supplement to biogas power plant).**

This measure consists from construction of several objects according to their destination (wastewater treatment plant, semi-automatic waste sorting plant and a biogas station), but together forming a system.

The raw material for biogas production will serve sludge from wastewater and organic wastes from waste sorting plant.

Produced biomethane will be burned to produce electricity, which will be sold directly into the electricity grid.

In average, this type of system stations produces 9kWh of electricity per year, per 1 inhabitant. The expected production of electricity is 147,6 MWh/year.

Sametime, the City Hall has obtained a grant for procurement of a briquette production line which is already bought. It is considered that this briquette line will cover the planned needs of the City, and, also produce additional income for local budget. Annually around 50 m^3 of biomass (hard wood) is collected around the City territory, which may serve as raw material for briquette production. In average, the collected wood has around 25% of moisture, which leads to very low efficiency of heat generation through burning and reduces considerably the lifetime period of boilers. Before producing briquettes, the wood has to be dried, in order the moisture content to be not more than 7%. Drying process through drum dryer requires high temperatures which lead to high energy consumption in production process.

In order to exclude completely the energy consumption for drying the raw material in briquette production, is expected to construct a closed space for drying the raw material. This closed space will be interconnected with air channels to the gas evacuation tube of electricity generator at the biogas station, and produced hot air will be injected directly into the closed space where the biomass will be dried. In order to evacuate the hot air together with the humidity, from the opposite side from the entrance of the hot air inlet channels, in the top of the wall, several valves will be placed which will be opened automatically due to difference of pressure.

It is expected to produce annually around 29 tonnes of briquettes, in average 5,8 kWh/t of electricity is used to dry one tone of raw material from 25% to 5%, by applying this solution additional 0,17 MWh/year of electricity can be saved.The impact of the proposed measures is presented in the table below.

Table 9. Proposed measures for local electricity production.

№	Actions	Estimated investment, [euro]	Calculated reduction of energy consumption [MWh/year]	Calculated CO2 emission reduction [tonnes/year]
A53	Construction of photovoltaics park with 13.1 MW input.	17.030.000	14885	9720
A57	Construction of biogas power plant; Construction of wastewater treatment plant (supplement to biogas power plant); Construction of waste sorting plant (supplement to biogas power plant).	4.300.000	147,6	96,38

Note:
According to "JRC Technical Report Part II. Baseline emissions inventory. Update of emission factors 2014. Table 3." the standard IPCC emission factor for electricity is 0,653 [t·CO_2/MWh].

THERMAL ENERGY

Current framework

During the Soviet period the city had a centralized heat supply system, which provided heat to public institutions, house blocks and economic agents. However, the system was closed more than ten years ago due to several economic, technical and regulatory issues. Thus, at the moment, the city uses self supporting heating in both public and private institutions. For heating

the city uses natural gas, that is provided through the "*Ialoveni-Gaz*" company (part of the Moldovagaz SA). Buildings are heated through autonomous natural gas boilers.

Vision for the future

It is planned to construct biomass heating plants; each biomass heating plant will provide thermal energy for several nearby buildings. The solutions which have been defined after the real situation analysis are presented in table below.

Table 10. Physical measures for local heat production.

A6	Local heat/cold production	Actions
A62	District heating plants	Construction of small scale biomass plants (inside blocks).
A63	District heating network new.	Construction of small scale (inside blocks) district heating networks.

The detailed description of defined solutions is presented below:

- **A62. District heating plants. Construction of small scale biomass plants (inside blocks); A63. District heating network new. Construction of small scale (inside blocks) district heating networks.**

Both measures are parts of a single system, and cannot be implemented separately.

Biomass heating plants will serve several nearly placed buildings. Each heating plant will cover at least 3 high level buildings and not more than 1 block.

District heating network will interconnect the biomass plants with the heat substations placed in the buildings (please see measure A13).

It is expected to construct up to 9 district heating plants with the total installed thermal power up to 14 MW. This measure will help to exclude the use of natural gas, for heating and hot water preparation, completely by replacing it with biomass. In total, is expected to reduce natural gas consumption by 89% from the total natural gas consumption related to this sector. According to the SECAP template the IPCC emission factor for municipal wastes biomass is considered 0 (zero), meaning that by applying this measure emissions will be excluded completely.

In order to implement measures related to thermal performance the next solutions have been identified.

Table 11. Policy instruments for local heat production.

B6	Local heat/cold production	Actions
B61	Awareness raising / training	Training courses for the construction sector on how to integrate local heat production in new buildings.
B62	Energy suppliers obligations	Installation of district heating systems under energy suppliers obligations.
B64	Second party financing. PPP	Project development in order to build a small scale district heating system.

Description of policy instruments is presented below:

- **B61. Awareness raising / training. Training courses for the construction sector on how to integrate local heat production in new buildings.**

This measure comes out of measure B64. Meaning that, trainings will be provided under the developed Project. Trainings will be provided to the construction companies selected based on tenders for the implementation of works. The main focus will be made on technical and legislative aspects regarding the execution of works which comes from the expected final results related to energy generation and final energy consumption.

- **B62. Energy suppliers obligations. Installation of district heating systems under energy suppliers obligations.**

This measure comes out of measure B64. Under the developed Project will be drafted local normative acts related to energy suppliers obligations in the region, afterwords approved by local council through voting. The aim of this measure is to oblige the energy suppliers under the law to implement a fully functional system by connecting it to the engineering systems of the buildings.

- **B64. Second party financing. PPP. Project development in order to build a small scale district heating system.**

The purpose of this measure is to establish a Project responsible for the implementation of PPPs in the City with the total duration of 3 years. The role of the Project will be: to find potential investors which are interested in investments for a long term and low risks, to provide technical assistance to energy suppliers and energy consumers. To achieve transparency and success in implementation the Project will be managed by the board of directors (City Hall representative, National Agency for Energy Regulation representative and Donor's representative).

The impact from physical and policy measures is presented in the table below.

Table 12. Thermal energy measures impact

№	Actions	Estimated investment, [euro]	Calculated reduction of energy consumption [MWh/year]	Calculated CO2 emission reduction [tonnes/year]
A62, A63	Construction of small scale biomass plants (inside blocks). Construction of small scale (inside blocks) district heating networks.	4.900.000	–	978,9
B61	Training courses for the construction sector on how to integrate local heat production in new buildings.	18.000	–	–
B62	Installation of district heating systems under energy suppliers obligations.	4.000	–	–
B64	Project development in order to build a	1.200.000	–	–

	small scale district heating system.			

Note:

According to Part II "Baseline emissions inventory", the standard IPCC emission factor for natural gas is 0,202 [t·CO_2/MWh].

According to the SECAP template the IPCC emission factor for municipal wastes biomass is considered 0 (zero)

2.2.5 Water & Wastewater

Current framework

The city is crossed by one river- Isnovat and together with two pounds it forms aquatic resources of the city. Not only rivers but also groundwater play an important role in urban resource supply and waste disposal. In Ialoveni there are 22 artesian wells (200m-300m depth, with 22,000 m3 of water).

The water supply and wastewater service in the city is provided by the Joint Stock Company "Apă-Canal Chișinău", who is responsible for water supply service and related infrastructure. It covers water use (e.g. by households, industry, energy production, agriculture, etc.) and wastewater and rainwater management system including sewers, drainage and treatment systems.

The length of the water supply networks in the Ialoveni city is 120 km. Water supply system networks provide 6270 households (24/7) with water. Around 89% of households are connected to the aqueduct. For the last three years the share of connected to the central aqueduct network dwellings equals to 96% and it did not change since.[12]

Currently to the Ialoveni City centralised wastewater system are connected around 7,426 domestic consumers (that is about 42% connection rate). The city wastewater system consists of separate sewerage network, that collects and disposes through at least two networks of the domestic wastewater, industrial wastewater and storm water. The main facilities of the wastewater system of the city are gravity and pressure sewerage networks; three local wastewater pumping stations (WWPS-1 located in the 3, Testimiteanu street, WWPS-2 located in the 2A, Toma Ciorba street and WWPS-3 located in the 2, Basarabia street); Chisinau wastewater treatment plant (WWTP). The Ialoveni city also has a sewerage network. The total length of gravity sewerage network is about 63km. [13]

[12] *The Socio-Economic Development Strategy of Ialoveni City for 2016-2020*
[13] Ialoveni City Hall

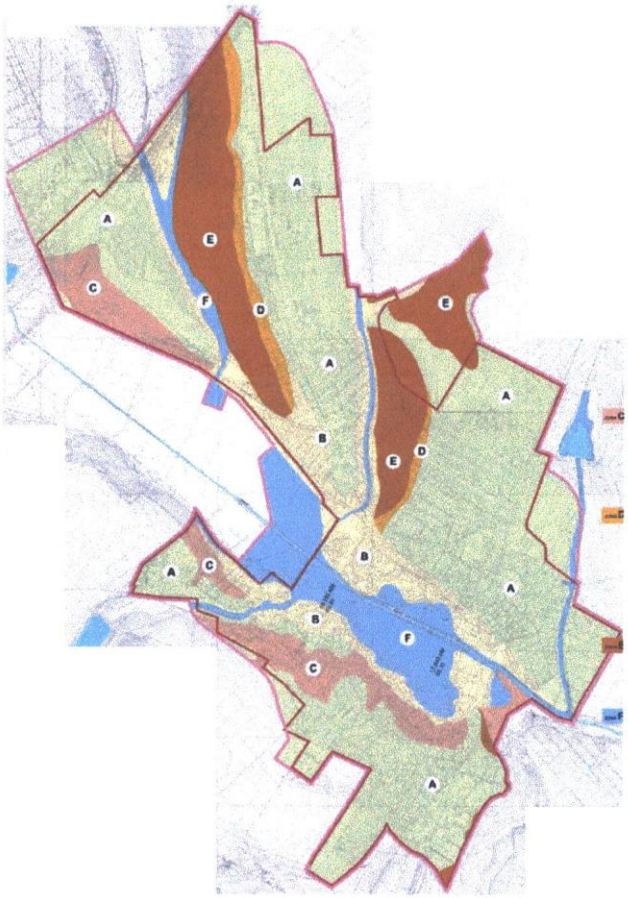

Figure 8. Hydrotechnical situation

To expand water supply system and to ensure a good quality of water a number of studies were made. Thus the city has elaborated a Water Service Development Strategy to attract a number of investments in the sector. In 2016 ,with the help of Regional Development Agency Center (RDA Center), has developed a feasibility study on Improvement of Water Supply Services in the Ialoveni District for 2017-2020.[14]

Also in 2016 a feasibility study for *„Improving water supply and sanitation services in the raion of Ialoveni"* was elaborated. According to this study, it is recommended to optimize the network operation and it is planed to construct a water distribution network in Testimiteanu – Grigore Vieru streets of Ialoveni city, also the construction of water transmission from the Ialoveni City to Milestii Mici locality and construction of water distribution network in Milestii Mici locality.

The study showed that the quality of the raw water in Ialoveni water intake do not comply with the standards of the Republic of Moldova (Government Decision No.934 of 15.08.2007 on the

[14] *ADR*

estab-lishment of Automated Information System "S*tate register of natural mineral water, drinking water and bottled non-alcoholic beverages*") for the following indicators: smell, total hardness, ammonia and ammonium ion. Currently, the Water Supply and Sanitation (WSS) sector is characterised by an inadequate midterm financial planning and a lack of a coordinated systemic approach to the development of a pipeline of priority projects. Based on the WSS sector development directions and criteria defined in the WSS RSP, a list of possible project concepts were defined.[15]

Ialoveni city has also a strategy of sewerage service development, and a lot of investments with the help of Ecological Fund, USAID, etc. were attracted [16]

Vision for the future

The solution which has been defined after the real situation analysis is presented in table below.

Table 13. Physical measure for rehabilitation of water supply and sanitation systems.

A7	Other	Actions
A72	Waste & wastewater management	Rehabilitation of water pump station; Rehabilitation of wastewater pumping station.

The detailed description of defined solutions is presented below:

- **Waste & wastewater management. Rehabilitation of water pump station; Rehabilitation of wastewater pumping station.**

Based on the existing study, in order to finalyze the works related to water supply and sanitation systems, is necessary to obtain additional 200000 euro (two hundred thousand euro) which will improve the living conditions of additional 328 households.

[15] *"Improving water supply and sanitation services in the raion of Ialoveni"* p.9
[16] Ialoveni City Hall

The impact from implementation of the measure is presented in the table below.

Table 14. Impact of waste and wastewater management measures.

№	Actions	Estimated investment, [euro]	Calculated reduction of energy consumption [MWh/year]	Calculated CO2 emission reduction [tonnes/year]
A72	Rehabilitation of water pump station; Rehabilitation of wastewater pumping station.	200.000	–	–

2.2.6 Waste

Current framework

The city management of the wastes is performed by a municipal enterprise that is in charge of domestic garbage collection and maintenance of green spaces. There are 1600 dumpsters and 45 garbage cans registered on the city streets. About 87% of households (2814 houses, 100% on contract basis, 1729 apartments, 100% on total contract basis) benefit from sanitation service.

The burning of the wastes is still practiced in the city that greatly pollutes the air The burning wastes generates a number of polluting factors triggering some of the harmful effects on the people health.

Vision for the future

In order to solve this issue, it is planned to construct a semi-automatic waste sorting plant which will be a supplement to the biogas power plant (please see Measure A57). The waste sorting plant will have the capacity of waste treatment at least 50000m3/year.

3. Organisational and financial aspect

Ialoveni City Hall has signed an agreement with AVENSA NGO for the investment attraction. On behalf of City Hall the AVENSA NGO will apply for finance to various sources in order to achieve the targets of the SECAP with the preliminary approval from the City Hall. Also the organisational and data assistance will be carried out by the City Hall. The City Hall has a full time appointed professional that is responsible for conducting and developing the energy efficiency and renewable energy projects in urban area.

Overall estimated budget up to 2030 is 54.035.500 euro.

Several financing sources have been defined:

- Local donors: National State Budget, Local Budget of Ialoveni City, Energy Efficiency Fund, Ecological Fund.

- External donors: Sweden (SIDA), Germany (GIZ), SUDEP, Horizon 2020, USAID, International Climate Initiative (IKI), etc.

Technical supervision of works execution will be provided by local consulting companies contracted by City Hall of Ialoveni. The submission of reports regarding the implementation and monitoring will be done by the City Hall appointed person.

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4. Baseline Emission Inventory (BEI)

Baseline Emission Inventory		
1) Inventory year	2016	
2) Number of inhabitants in the inventory year	16400	
3) Emission factors	☑	IPCC
	☐	LCA (Life Cycle Assessment)
4) Emission reporting unit	☑	tonnes CO_2
	☐	tonnes CO_2 equivalent

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Table 15. Final energy consumption.

Sector		FINAL ENERGY CONSUMPTION [MWh]					
		Electricity	Heat/cold	Fossil fuels			Total
				Natural gas	Diesel	Gasoline	
BUILDINGS, EQUIPMENT/FACILITIES AND INDUSTRIES							
Municipal buildings, equipment/facilities		5319		5445			10764
Tertiary (non municipal) buildings, equipment/facilities		3068		483			3551
Residential buildings		13110		9698			22808
Public lighting		1375					1375
Industry	Non-ETS	5021		1433			**6454**
Subtotal		27893	0	17059	0	0	44952
TRANSPORT							
Private and commercial transport					7620	3810	**11430**
Subtotal		0	0	0	7620	3810	11430
OTHER				1			
Agriculture, Forestry, Fisheries							**0**
TOTAL		**27893**	**0**	**17059**	**7620**	**3810**	**56382**

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Table 16. Adopted CO2 emission factor[t/MWh].

Electricity		Heat/cold	Fossil fuels		
National	Local		Natural gas	Diesel	Gasoline
0,653			0,202	0,267	0,249

Table 17. Emission inventory.

Sector		CO_2 emissions [t] / CO_2 eq. emissions [t]					
		Electricity	Heat/cold	Fossil fuels			Total
				Natural gas	Diesel	Gasoline	
BUILDINGS, EQUIPMENT/FACILITIES AND INDUSTRIES							
Municipal buildings, equipment/facilities		3473	0	1100	0	0	**4573**
Tertiary (non municipal) buildings, equipment/facilities		2003	0	98	0	0	**2101**
Residential buildings		8561	0	1959	0	0	**10520**
Public lighting		898	0	0	0	0	**898**
Industry	Non-ETS	3279	0	289	0	0	**3568**
Subtotal		18214	0	3446	0	0	**21660**
TRANSPORT							
Private and commercial transport		0	0	0	2035	949	**2983**
Subtotal		0	0	0	2035	949	**2983**

OTHER						
Agriculture, Forestry, Fisheries	0	0	0	0	0	**0**
OTHER NON-ENERGY RELATED						
Waste management						**0**
Waste water management						**0**
Other non-energy related						**0**
TOTAL	**18214**	**0**	**3446**	**2035**	**949**	**24643**

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5. Climate Risks and Vulnerabilities Assessment(s) (RVAs)

As there were no climate disasters which led to harmful consequences, no risk and vulnerability assessment studies or LPA's decisions have been developed for the urban area. In case of occurance of any risks the appropriate measures will be taken.

The possible hazard risks and their indicators related to the region are presented in the table below.

Table 18. Hazard Risks and Indicators.

	<< Current Risks >>	<< Anticipated Risks >>		
Climate Hazard Type	Current hazard risk level	Expected change in intensity	Expected change in frequency	Timeframe
Extreme Heat	Low	Not known	Not known	Short-term
Extreme Cold	Low	Not known	Not known	Short-term
Extreme Precipitation	Low	Not known	Not known	Short-term
Floods	Low	Not known	Not known	Short-term
Droughts	Low	Not known	Not known	Not known
Storms	Moderate	Not known	Not known	Short-term
Landslides	Low	No change	No change	Short-term
Other [please specify]	[Drop-Down]	[Drop-Down]	[Drop-Down]	[Drop-Down]

Table 19.Other Risks and Indicators.

Impacted Policy Sector	Expected Impact(s)	Likelihood of Occurrence	Expected Impact Level	Timeframe
Buildings	Increased costs for maintenance of the buildings.	Likely	Moderate	Long-term
Transport	The new designed road maybe damaged by heavy vehicles	Possible	Moderate	Long-term
Energy	Strong wind may affect electrical distribution network.	Possible	Low	Short-term
Water	Droughts	Unlikely	Low	Not known
Waste	Waste management fail	Unlikely	Moderate	Short-term
Land Use Planning	Wrong planning (floods)	Unlikely	Low	Short-term
Environment & Biodiversity	ecosystem degradation	Unlikely	Not Known	Not known

	Health	Increasing mortality rate	Unlikely	Low	Long-term
	Civil Protection & Emergency	Reduction of the civil protection and emergency services	Unlikely	Not Known	Not known
Other	[please specify]		[Drop-Down]	[Drop-Down]	[Drop-Down]

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6. Key Actions for the full duration of the plan (2030)

Key Actions	Area of intervention	Policy instrument	Origin of the action	Responsible body	Implementation timeframe		Implementation cost	Estimates in 2030			Action also affecting adaptation
					Start	End	€	Energy savings MWh/a	Renewable energy production MWh/a	CO_2 reduction t CO_2/a	
MUNICIPAL BUILDINGS, EQUIPMENT/FACILITIES							**3655000**	**3895,5**	**0**	**2543,75**	
Initiatives for the replacement of kitchen and laundry appliances on new ones in kindergartens and schools.	Energy efficient electrical appliances		Other (national, regional,...)	Ialoveni City Hall	2019	2024	105000	84		54,85	
Replacement of inefficient electric lighting systems to new one.	Energy efficient lighting systems		Other (national, regional,...)	Ialoveni City Hall	2018	2030	3550000	3811,5		2488,9	
Estimated reduction not associated with any reported actions							0	0	0	0	
RESIDENTIAL BUILDINGS							**16145500**	**3002,19**	**191**	**3633,63**	

Partial grants / Subsidies for replacement of old boilers by new biomass boilers for private homeowners	Renewable energy for space heating and hot water	Grants and subsidies	Other (national, regional,...)	Ialoveni City Hall	2019	2030	5700000			1798	x
Thermal insulation of walls, replacement of windows and doors, insulation of roofs in social housing.	Building envelope		Other (national, regional,...)	Ialoveni City Hall	2021	2024	2370000	306,49		61,9	x
Installation of individual vacuum tube solar collectors for HW preparation placed on the social houses façades.	Renewable energy for space heating and hot water		Other (national, regional,...)	Ialoveni City Hall	2019	2024	1640000		191	38,58	x
Replacement of old heating distribution system with two pipe system, heat	Energy efficiency in space heating and hot water		Other (national, regional,...)	Ialoveni City Hall	2019	2021	3600000	55,7		11,25	x

meters for each consumer separately (complying with EE Directive 2012/27/EU) in social housing. Installation of individual heat substations in social houses in order to be interconnected to biomass heating plants.											
Elaborate and display energy certificates on municipal buildings which have to be retrofitted.	Integrated action (all above)	Energy certification / labelling	Other (national, regional,...)	Ialoveni City Hall	2018	2019	15500				
Incentives for the replacement of domestic appliances for new ones.	Energy efficient electrical appliances	Grants and subsidies	Other (national, regional,...)	Ialoveni City Hall	2018	2030	2820000	2640		1723,9	
Estimated reduction not associated with any reported actions							0	0	0	0	

PUBLIC LIGHTING							3040000	1080,63		705,65	
Replacing light bulbs and luminaries by efficient ones.	Energy efficiency		Local authority	Ialoveni City Hall	2017	2025	3040000	1080,63		705,65	
Estimated reduction not associated with any reported actions							0	0	0	0	
TRANSPORT							**3543000**	**7245,6**		**1881,9**	
Improvement of the public transport infrastructure; Improvement of trolleybus lines and Park.	Modal shift to public transport		Local authority	Ialoveni City Hall	2017	2025	2343000	670		178,9	x
Construction of roundabout in order to reduce congestion.	Road network optimisation		Local authority	Ialoveni City Hall	2018	2020	1200000	6575,6		1703	x
Estimated reduction not associated with any reported actions							0	0	0	0	
LOCAL ELECTRICITY PRODUCTION							**21330000**		**15032,6**	**9816,38**	
Construction of biogas power plant; Construction of wastewater treatment plant (supplement	Biomass power plant		Other (national, regional,...)	Ialoveni City Hall	2018	2030	4300000		147,6	96,38	x

to biogas power plant); Construction of waste sorting plant (supplement to biogas power plant).											
Construction of photovoltaics park with 13,1 MW input.	Photovoltaics		Local authority	Ialoveni City Hall	2019	2030	17030000		14885	9720	
Estimated reduction not associated with any reported actions							0	0	0	0	
LOCAL HEAT/COLD PRODUCTION							**6122000**			**978,9**	
Construction of small scale biomass plants (inside blocks). Construction of small scale (inside blocks) district heating networks.	District heating/cooling plant		Local authority	Ialoveni City Hall	2019	2021	4900000			978,9	x
Training courses for the construction sector on how to integrate local heat	District heating/cooling plant	Awareness raising / training	Other (national, regional,...)	Ialoveni City Hall	2019	2021	18000				

production in new buildings.											
Installation of district heating systems under energy suppliers obligations.	District heating/cooling network (new, expansion, refurbishment)	Energy suppliers obligations	Other (national, regional,...)	Ialoveni City Hall	2019	2021	4000				
Project development in order to build a small scale district heating system.	District heating/cooling plant	Third party financing. PPP	Other (national, regional,...)	Ialoveni City Hall	2019	2021	1200000				
Estimated reduction not associated with any reported actions							0	0	0	0	
OTHERS							**200000**				
Rehabilitation of water pump station; Rehabilitation of wastewater pumping station.	Waste & wastewater management		Local authority	Ialoveni City Hall	2018	2020	200000				
Estimated reduction not associated with any reported actions							0	0	0	0	
TOTAL							**54035500**	**15223,92**	**15223,6**	**19560,21**	