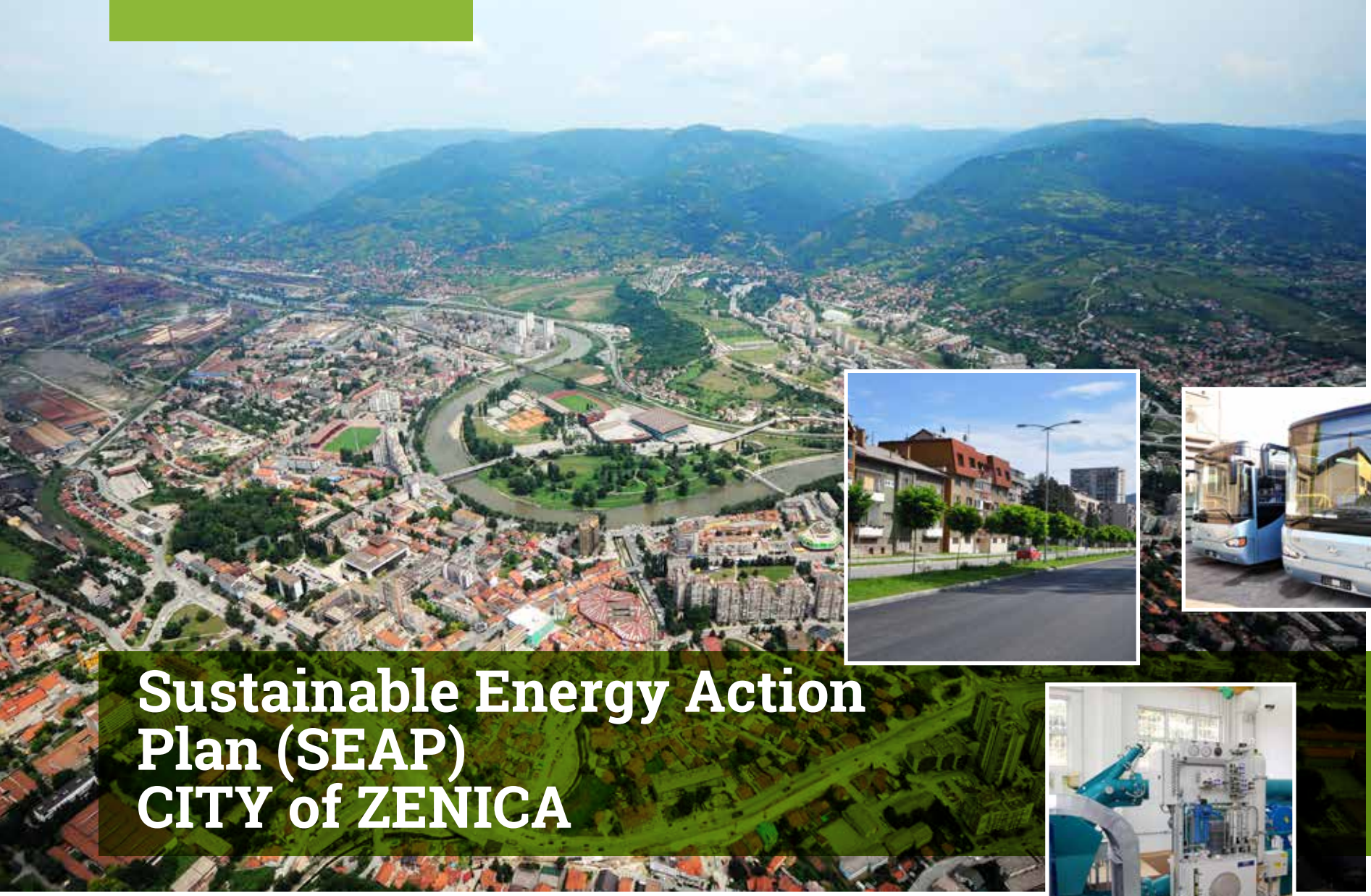
CITY OF ZENICA



Sustainable Energy Action Plan (SEAP) CITY of ZENICA

SEAP

ZENICA DEVELOPEMENT AGENCY

german cooperation
DEUTSCHE ZUSAMMENARBEIT

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Covenant of Mayors
Committed to local sustainable energy

“Library of Sustainable Energy Action Plans (SEAP) of local communities in Bosnia and Herzegovina”

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Mayor of City of Zenica
Husejin Smajlovic

Dear reader,

I am aware that raising costs of energy supply present a huge burden for citizens of our city. Creating better and more efficient ways of using energy sources as well as preventing its loss is the only right solution of this problem. Therefore, Zenica was among the first cities in Federation of Bosnia and Herzegovina that joined Covenant of Mayors - European initiative for improvement of energy efficiency at the local level whose goal is to accomplish the vision of Zenica as energy efficient city.

Zenica has already started making large steps towards realization of this vision by implementing projects such as construction of gas power plant, biomass boiler at Nemila, procurement of high quality saving lamps for public lighting and construction of the city's main highway. The aforementioned should also contribute to job creation, economic development and promotion of sustainable development in our city.

By adopting the energy efficiency principles, we will begin an endless story of success. That story will also include the organisation of various events such as Energy days that will, year after year, evolve and have wider dimension.

“Zenica has already made big strides towards realization of this vision ...”

OUR VISIONS

My city **SAVES ENERGY**

My city **PROTECTS ENVIRONMENT**

My city **CONSIDER ITS OWN GOOD**

Zenica, city where the energy is managed with hospitality

Zenica, city that cares about proper consumption of own natural resources

Zenica as the “steel green city” builds healthy and wealthy future for the children on the grounds of its cultural and industrial heritage

Zenica as the leading city in the region by the use of renewable energy sources

ABOUT THIS DOCUMENT?

It is indisputable fact that energy, or rather availability of cost-effective energy, is the key precondition for economical and social development of each society. Furthermore, energy generation and consumption have significant impacts on environment, influencing local and regional pollution as well as global warming and climate changes.
By including energy efficiency and consumption of renewable energy sources in the strategies for sustainable energy and environment protection, our country adjusts its own legal framework in accordance to the European Union guidelines and commits to undertake recommended actions.

On 29 January 2008, European Commission launched a large networking initiative of city mayors who recognized the relevance of energy efficiency actions, with the goal of exchange of experience in implementation of measures for improvement of energy efficiency.

Covenant of Mayors was the response of the developed European cities and towns on global climate changes and the first and the most ambitious European Commission’s initiative directly aimed on local authorities and citizens to actively participate in the prevention of global warming. By signing the Covenant of Mayors, the Signatories commit to conduct concrete energy efficiency measures in order to reduce CO_2 emissions in their respective towns and cities for at least 20% till 2020.

In the energy policy, European Union defined that by the 2020 will reach the goal 20-20-20 , i. e. to reduce the level of greenhouse emissions for 20% , to increase the use of renewable energy sources within the global energy consumption for 20 % in relation to the conventional sources and to increase energy efficiency consumption for 20%.

City of Zenica is one of **17** cities and municipalities in **Bosnia and Herzegovina** which have joined the initiative for realization of **Sustainable Energy Action Plan - SEAP**

WHAT IS COVENANT OF MAYORS?

On December 29th of 2010, mayor of City of Zenica signed the Covenant of Mayors Initiative. Accordingly the mayor authorized Zenica's Development Agency ZEDA to act as coordinator and implementor of all project activities for SEAP – Sustainable Energy Action Plan (hereinafter: Action plan). An expert working team was formed to work closely with representatives of GIZ (German International Cooperation) bilateral project "Consultancy for energy efficiency in B&H", to elaborate on the Action Plan and monitor its further implementation. Aforementioned project is implemented by consortium GFA Consulting GmbH and Integration Umwelt & Energie GmbH, funded by Bundesministerium Für Wirtschaftliche Zusammenarbeit (BMZ) through GIZ (Deutsche Gasellschaft fur Internationale Zusammenarbeit GmbH) organisation.

If we consider the sole benefits of local community joining the Covenant than they are as follows:

- Local community has Sustainable Energy Action Plan (SEAP) with the clearly outlined objectives for the reduction of CO_2 emissions for 20% till 2020 by increasing the energy efficiency for 20% and the use of renewable energy sources for 20%;
- Local community has clearly defined measures, namely projects for achievement of objectives 20-20-20;
- Local community owns a completed document ready for the selected investments and available loans;
- Local community becomes equal with other Signatories and has direct access to up-to date information within the framework of the Covenant;
- Local community has access to various programmes for co-funding or loan funding of projects elaborated in the Action Plan;
- Local community is enabled to be recognized as the proactive by international companies and foreign investors;
- Local community engages citizens, companies and organizations from the community in participation through informative activities which are integrated in the Action Plan and
- Local community is enabled to use the networking opportunities with other cities and municipalities.

By end of January of 2015, Covenant of Mayors was signed by 6,274 signatories from all over the Europe counting 193,566.399 people. Regarding Bosnia and Herzegovina, 17 cities and municipalities joined the initiative so far and in the future, this number, will increase for sure. We are pleased as we have already become a part of this network.

SEAP- Sustainable Energy Action Plan

SEAP- Sustainable Energy Action Plan is the key document that shows how the Covenant signatories will reach its commitments by 2020.
It uses the results of the Baseline Emission Inventory to identify the best fields of action and opportunities for reaching the local authority's CO_2 reduction target. It defines concrete reduction measures, together with time frames and assigned responsibilities, which translate the long-term strategy into concrete action.
Action Plan should not be regarded as fixed and rigid document as circumstances change, and, as ongoing actions provide results and experience, it may be useful/necessary to revise the plan.
Action Plan covers the entire geographical territory of the local administration, including rural areas and therefore, apart from the public refers to the private sector as well.
On 29 December 2011 Sustainable Energy Action Plan of the City of Zenica was passed by the Municipal Council by which the municipality got a strategic document in the field of energy efficiency.

Actors - you and we, together

Process of design and the implementation of the Action Plan was accompanied with the significant activities aimed on informing and including of all interested actors in the elaboration of Action Plan and decision-making process. Representatives of local city administration, city departments, institutes, agencies, municipal trade associations, entrepreneurs / Chamber of Commerce / business associations, university-faculties and high schools, other educational institutions, NGOs and consumer associations participated in the aforementioned activities.

The aim of including our community in this process was to inform our citizens and other key actors on the current situation in the field of energy consumption in City of Zenica, to help them understand vision of the Action Plan, change behavior and thereby increase public awareness on the need for energy saving.

Thus, City of Zenica organized the event "Energy days Zenica 2012" whose organization was entrusted to Zenica's Development Agency ZEDA". On 20 September 2012 a conference "Zenica Energy Efficient City," a three-day event, which was held in Zenica. The conference was attended by more than 200 visitors, of which many took part in the discussions. Within the Energy Days, which lasted until 22 September, several events were organized, including "Energy EXPO" in the Trade Center "Džananovic" where citizens could

inform themselves about energy efficiency projects implemented by the city administration. In addition, during the period from 10th-19th September of 2012, 41 interactive presentations were held in 21 Zenica elementary schools on the theme "Youth Education - How to save energy at home and school? ". Within this activity a competition for the best literary work on the subject "How to become an energy champion?" was conducted and each school received appropriate gifts.

It is very important to note that our city made another important step towards our energy efficient future by opening Energy Efficiency Info Center in the premises of Agency ZEDA in Zenica on September 21st of 2012. On that occasion, a festive ceremony was organized in the Agency ZEDA attended by Mayor of City of Zenica Husejin Smajlovic and representatives of the German International Cooperation GIZ that funded the establishment of the center. Energy Efficiency Info Centre is a place where interested citizens and investors can gather information and answers on energy efficiency and use of renewable energy sources. At this point the citizens and investors can obtain informational and promotional material, brochures and instructions for new technological solutions on how to save energy, examples of good practices etc. As energy efficiency is necessity and process of the future, City of Zenica in cooperation with economic development agency ZEDA and public utility companies, at the beginning of 2014 has established Center for Energy Efficiency. In the Fall of 2014, City of Zenica with Agency ZEDA, public utility companies and financial support of German International Cooperation GIZ has organized, within international fair "ZEPS", "Energy Days of 2014". This event was used for promotion of Center for Energy Efficiency, software for energy management ENMASOFT and important projects of City of Zenica in regards to energy efficiency.

WHERE CAN WE ACT?

Facing challenges and definition of causes for inefficient energy management will help local community to have proper energy management and reduction of bad effects on environment. In accordance with the recommendations of European Commission, main sectors addressed by our actions will be:

- **buildings sector,**
- **transport sector,**
- **public lighting sector.**

As the majority of municipalities in B&H are in a very specific situation in regards to the availability and relevance of data, City of Zenica chose 2006 year as the baseline year. Selection criteria was based on reference regarding the available databases and a real energy state of the municipality considering that B&H since 1990 to 2000 underwent a major social, infrastructure and energy changes.

BUILDINGS SECTOR

According to the numerous criteria on consumption and potential energy savings, the main sectors were classified in our Action Plan. Buildings sector was divided into the following three subsectors:

- public buildings owned by the City of Zenica;
- public buildings not owned by the City of Zenica;
- residential buildings in the territory of the City of Zenica.

Data was collected based on prepared questionnaires for public buildings, which were distributed by Agency ZEDA and city administration services. Through Agency ZEDA, City of Zenica also organized the collection of questionnaires and, when necessary, rechecked them.

Table 1 Overview of energy consumption and CO_2 emissions in 2006 for the buildings sector on the territory of City of Zenica

Buildings sector	Subsectors						Total	
	Public buildings owned by the City of Zenica		Public buildings not owned by the City of Zenica		Residential Buildings			
Surface, m^2	92,616		226,023		2,404,440		2,723,079	
Energy sources	MWh	tCO_2	MWh	tCO_2	MWh	tCO_2	MWh	tCO_2
Electricity	5,290	4,036	14,645	11,174	101,749	77,635	121,685	92,845
District heating	12,209	4,005	27,739	9,099	201,011	65,932	240,960	79,035
Heating oil	107	30	5,008	1,397	0	0	5,115	1,427
Coal	1,456	516	19,606	6,941	82,232	29,110	103,294	36,566
Biomass (wood)	974	0	1,225	0	155,327	0	157,526	0
Total	**20,036**	**8,587**	**68,224**	**28,611**	**540,319**	**172,676**	**628,580**	**209,874**

Total surface of buildings in the buildings sector is 2,723,079 m^2. The highest energy consumption was made by residential buildings, namely 540,319 MWh.
When it comes to CO_2 emissions in this sector, the total emissions from energy sources is 209,874 tCO_2. The largest emissions were produced by electricity consumption.

Energy consumption and CO_2 emissions in the buildings sector

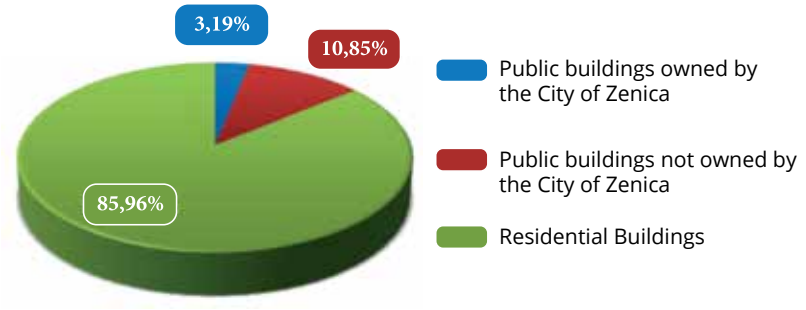
Relevant data on energy consumption within the buildings sector on the territory of City of Zenica are extracted from the existing databases and collected through direct interviews with authorized departments, public companies and local communities as well as existing strategic and urban planning documentation. As already stated, within this sector, the following subsectors were defined: public buildings owned by the City of Zenica, public buildings not owned by the City of Zenica and residential buildings.

PUBLIC TRANSPORT

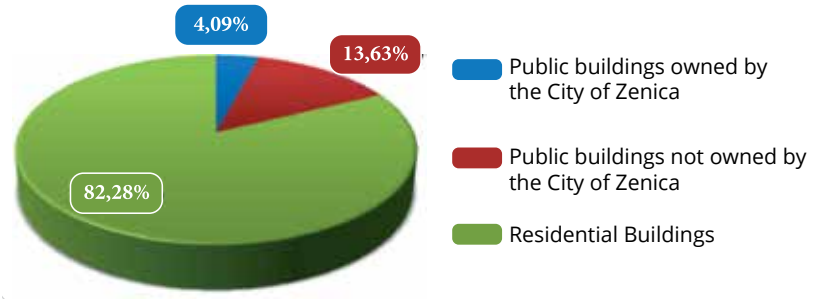
Vehicles in the transport sector on the territory of the City of Zenica are divided to:

- fleet vehicles owned by local authorities,
- public transport vehicles (public bus transportation, taxi and railway transportation) and
- Private and commercial vehicles (local and remote transportation).

In addition, vehicles are divided, based on the fuel they use, to: gasoline, diesel and coal fuel engine driven vehicles.
Transport energy consumption data are collected from the following data sources: Ministry of Internal Affairs of Zenica-Doboj Canton, public utility companies owned by City of Zenica, public institutes and other public institutions owned by City of Zenica;
Zenica has a convenient structure and road density consisting of the orthogonal and radial network. Due to increasing traffic intensity in Zenica, in mid-2007, the City of Zenica prepared a Study of the traffic network system of the City of Zenica with analysis and forecasts of traffic by 2027. The most



Graph 1 Share of energy consumption in 2006 in buildings sector on the territory of the City of Zenica



Graph 2 Share of CO_2 emissions in 2006 in buildings sector on the territory of City of Zenica

effective way to solve traffic congestion in the city center is the construction of the city's main road in Zenica, including interventions on the city network.
Graph 3 and 4 show evident dominance of private and commercial vehicles in energy consumption which automatically reflects on its dominance in CO_2 emissions. Energy consumption and CO_2 emissions of private commercial vehicles have a large percentage compared to other two sectors, over 80%.

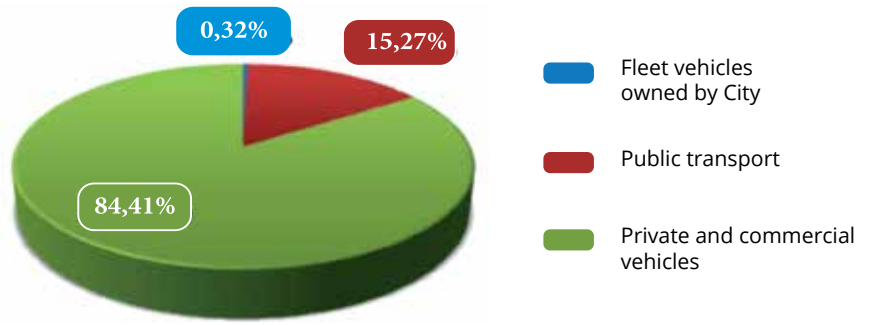
PUBLIC LIGHTING

Public lighting sector refers to the public lighting electricity grid on the territory of City of Zenica. On the territory of the City of Zenica 5.500 luminaries are installed of average age over 30 years, out of which majority are in poor condition.

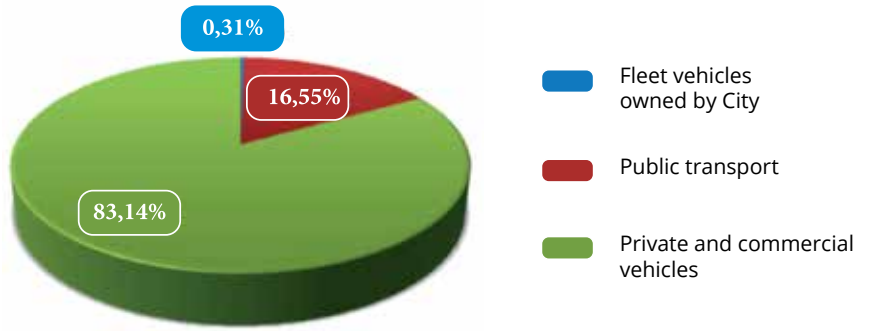
Table 2 Overview of energy consumption and CO_2 emissions in 2006 in the transport sector

Transport sector	Subsectors						Total	
	Fleet vehicles owned by City of Zenica		Public transport		Private and commercial vehicles			
Number of vehicles	22		n.p.		11,220			
Energy sources	MWh	tCO_2	MWh	tCO_2	MWh	tCO_2	MWh	tCO_2
Gasoline	216	54	62	15	32,527	8,099	32,805	8,168
Diesel	124	33	12,475	3,331	57,278	15,293	69,877	18,657
Coal	0	0	3,709	1,310	0	0	3,709	1,310
Total	**340**	**87**	**16,246**	**4,656**	**89,805**	**23,392**	**106,391**	**28,135**

Final analysis shows that fuel consumption in the transport sector on the territory of the municipality is the highestin the subsectors of private and commercial vehicles, and diesel fuel is more used than gasoline and coal. Total energy consumption in transport sector is 106.391 MWh. On the territory of our municipality the highest CO_2 emissions are made by private and commercial vehicles. Total emissions is 28.136 tCO_2 and the highest one were made by diesel in comparison to gasoline vehicles.



Graph 3 Share of energy consumption in the transport sector on the territory of the City according to the ownership vehicle structure in 2006



Graph 4 Share of CO_2 emissions in the transport sector on the territory of the municipality according to the ownership vehicle structure in 2006.

Energy consumption and CO_2 emissions in the public lighting sector

The increase in the energy consumption was recorded in 2006 for 9,66% in comparison to the previous year, namely in the city center for 4,85% (illumination of pedestrian bridges, walkways along the river Bosna, Tito street, etc.) and in the suburbs for 37,07%. Electricity consumption by traffic lights, displays and fountains slightly increased.

Total annual costs for the sector of public lighting in 2006 amounted to 1,114,887.00 BAM, out of which the cost of electricity consumption amounted to 752,117.00 BAM and the remains refer to maintenance costs. Due to the high costs allocated for the public lighting operation and maintenance, we decided to deal with the causes rather than the consequences. Specifically, we have planned a number of projects in this sector in the future, which should be implemented and thus reduce CO_2 emissions from public lighting which in 2006 amounted to 3,137 tCO_2.

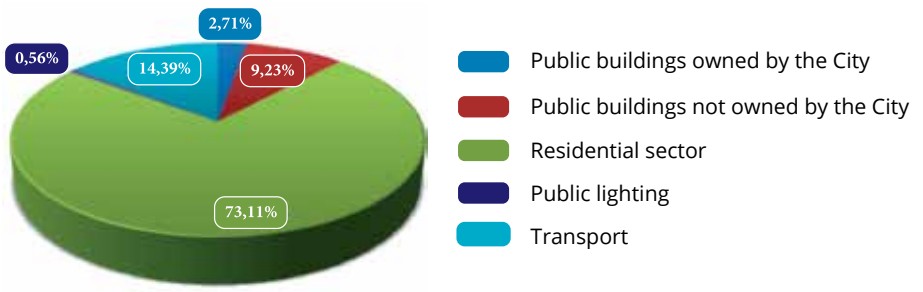
Table 3 Electricity consumption per consumer groups in 2006

Consumers	Electricity consumption, kWh
City and suburban areas	3,230,676
Villages	721,567
Traffic lights	53,288
City displays	86,287
City fountains	18,462
TOTAL	**4,110,280**

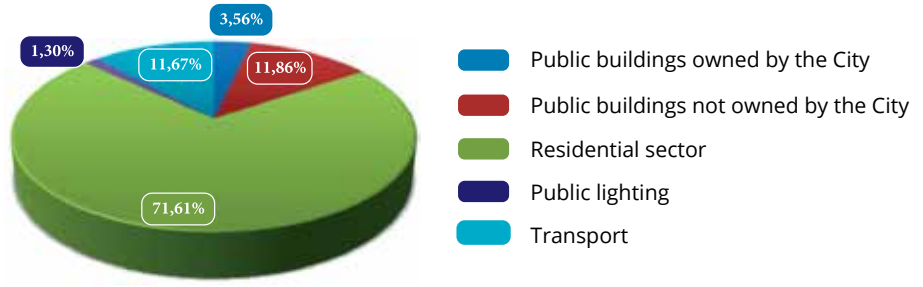
IT IS **IMPORTANT** TO KNOW...

Total energy consumption and CO_2 emissions on the territory of the City of Zenica

According to collected data and the use of different types of energy sources, in the City of Zenica in 2006, the total consumed energy was 739,021 MWh / year or an average per capita electricity consumption was 5,79 MWh / yr. Table 4 shows that the highest energy consumption in the whole territory of the City of Zenica in year of 2006 had buildings sector with 73% of total energy consumption, followed by transport with 14.39% and public lighting with 0.56%. Looking at sectors, the highest CO_2 emissions were from the buildings sector with the 209,874 tCO_2/year, followed by the transport and public lighting sectors.



Graph 5 Share of energy consumption in relation to the total energy consumption in 2006.



Graph 6 Share of CO_2 emissions in relation to the total emissions in 2006.

Table 4 Total energy consumption and CO_2 emissions per sectors on the territory of the City of Zenica according to the analysis conducted in 2008.

SECTORS	MWh/god.	tCO_2/god
Public buildings owned by the City	20,037	8,587
ublic buildings not owned by the City	68,224	28,611
Residential sector	540,319	172,676
Public lighting	4,111	3,137
Transport	106,391	28,136
Total	**739,083**	**241,146**

Strides that **we made**

BUILDINGS SECTOR

Biomass heating plant

Renewable energy project for the district heating system in Nemila in 2013 was implemented as part of co-operation between the City of Zenica and the Czech Development Agency. As a result of the project biomass heating plant, hot water network were built along with connections of objects to the newly built heating system. Biomass heating plant consists of boiler power 3MW, closed storage for wooden chips and intermediate storage with movable hydraulic floor for automatic delivery of chips into the boiler. Four large objects of social importance (primary school, hospital, police station and community center) as well as 90 individual residential and commercial buildings are now connected to district heating system in Nemila. Each object has its own thermal substation with automatic control via its own room thermostat. Also, each user has its own device for heat measuring - calorimeter, on the basis of which the payment of service for district heating services in Nemila is paid.

Modernization of district heating systems

The entire hot water pipeline in the district heating system is made of steel pipes in concrete channels. These installations are due to long periods of use, largely dilapidated and as such a cause for a big heat losses. Reconstruction of existing distribution network involves replacement of steel pipes in concrete channels with pre-insulated pipes which have a much longer life and a much higher resistance to external factors, especially on impacts of groundwater. The layout of pre-insulated pipes with a system for detecting leakage losses of hot water, which are currently at the level of around 60m^3/hr, would minimize future losses. Estimated value of the first phase of reconstruction of existing distribution network is about 35 million BAM, with planned completion period from 5 to 7 years.

The long term goal of public utility company PC "Grijanje" is to replace existing heat substations in the district heating system with a modern compact heat substations with indirect heat exchange. This measure will increase operational reliability which will balance out the hydrodynamic and temperature regime in a hot water pipeline and provide more even distribution of thermal energy to consumers.

An initiative regarding installation of heat measuring devices-calorimeters, in the near future, has been launched so that payment for the heat is based on the actual amount of thermal energy that has been delivered to the final consumer.

What did **we do** in a mean time?

TRANSPORT SECTOR

CONSTRUCTION OF THE CRR IN ZENICA

City Ring Road is main measure for transport sector in the Action Plan. Implementation of this project will significantly improve the transport sector in City of Zenica and lead to reduction of CO_2 emissions. City Ring Road (CRR) is longitudinal urban-suburban highway intended to connect incoming and outcoming directions.

Function of the CRR is to ensure fast and undisturbed traffic, and to connect primary and secondary road network with incoming and outcoming directions, particularly with road on corridor V-c, and to ensure the city ring road. CRR is intended for public transport, load transport, local and remote transport with characteristics of urban highway in section from Blatuša-Bojin vir (3.25km), or suburban highway in section from Bojin vir-Perin Han (4.6km). Construction of CRR includes reconstruction and partial relocation of communal infrastructure from the highway and planting of grass and trees on the road area based on a horticulture project.

Construction works on urban section of CRR have officially started in March of 2012 and are being carried out on a timely schedule. Estimated reduction in CO_2 emissions after project implementation is 4,972 tCO_2.

Locomotive

At the beginning of 2015, the coal mine in Zenica RMU "Zenica" put into the use a maneuver diesel locomotive, procured by PC "Elektroprivreda" BiH. The value of investment is 935,500 without VAT. The new locomotive MDD 3-00 with two Caterpillar diesel engines CAT C6.6 ACERT and power of 300 kW, has replaced the old steam locomotive, which was significant polluter of environment. New diesel locomotive will provide reliable transportation of coal, increase capacity, and reliability of the technological process, reduce maintenance time and costs, and negative impact on the environment.

PUBLIC TRANSPORT

Public transport services are carried out by PUC "Zenicatrans-Prevoz Putnika" company. Public transport services in 2013 were used by 5,735,296 passengers covering 3,674,372km. Within the short period from 2011-2013 the company has invested into 15 new buses out of which 10 buses (capacity 50 seats) were procured for the suburban areas and 5 bus (capacity 37 seats) were procured for public transportation in urban areas. These new buses, in addition to improvement of the quality of passenger transportation, have significantly lower fuel consumption and therefore annually reduce emissions by 500 tCO_2.

PUC "Zenicatrans-Prevoz Putnika" Zenica in 2010 has established a quality management system according to ISO 9001: 2008. The main goals was to raise the quality of service and increase customer satisfaction of public transport services.
Back in 2007 the company introduced a system of electronic ticketing (chip cards), which contributed to more efficient operation of the company but has also reduced emissions of CO_2. The new system has enabled a much faster entry and exit of passengers, which significantly reduced downtime of buses at the designated stops. Shorter retention has contributed to significant savings in fuel consumption and reduction of CO_2 emissions.

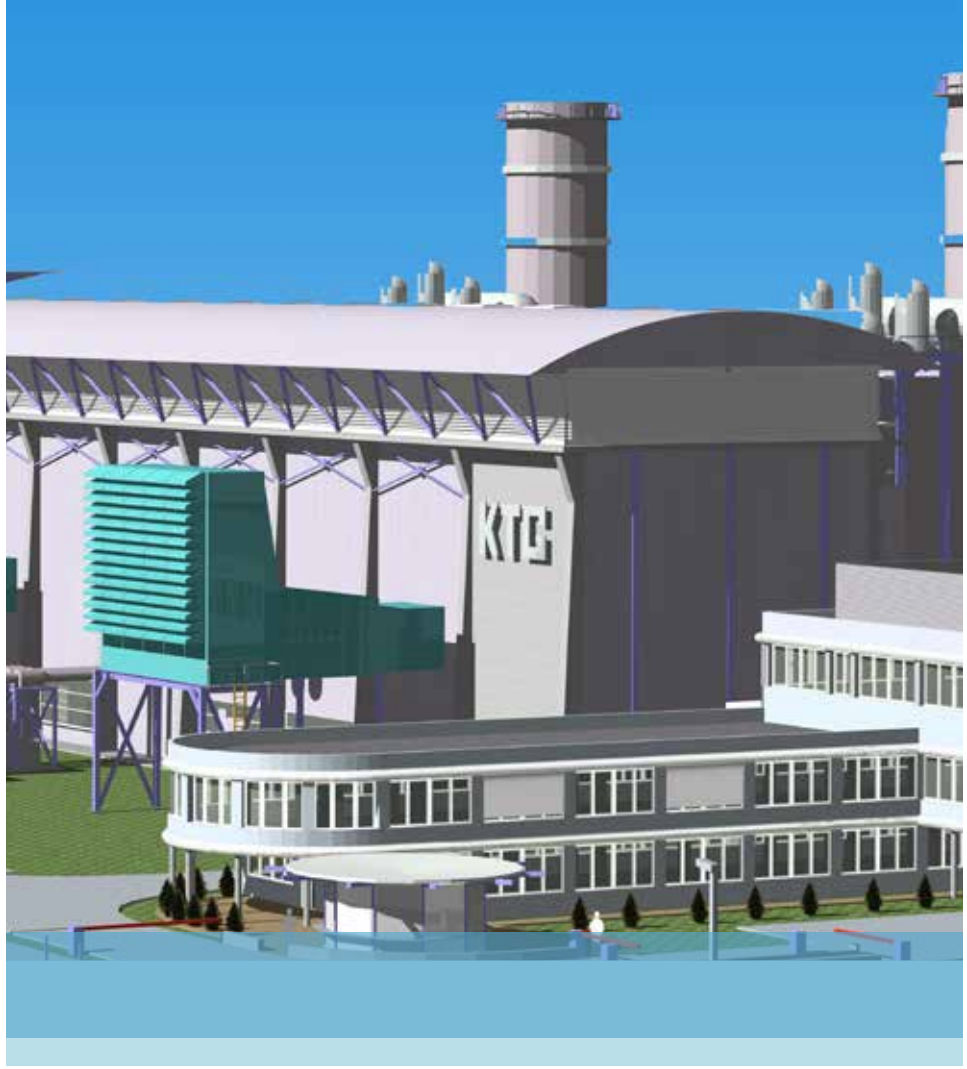
MODERNIZATION OF PUBLIC LIGHTING

Public company for regional planning and development of the City of Zenica in the first half of 2014 has started the project of reconstruction and modernization of public lighting in the City of Zenica. Reconstruction of public lighting system is divided into urban area (24 streets) and suburban area (65 villages and suburban areas of the city). Selection of locations for the project of reconstruction and modernization of public lighting in urban area was based on: analysis of age of luminaires (over 20 years), frequency of malfunction of luminaires and electricity consumption. Urban area of reconstruction and modernization of public lighting includes sites on which the existing lighting is older than 35 years, while streets which are important for the visual identity of the city were given the priority status. The power of old lamps is 520 kW while the power of new lamps is 305kW. Around 60% of the project of modernization of public lighting has been completed in 2014 and generates annual savings in electricity with amount of 162,000 BAM and savings in maintenance of street lighting with amount of 150,000 BAM. Return on investment on project of reconstruction and modernization of public lighting is 5.5 years. The estimated reduction in CO_2 emissions after the implementation of the entire project is 1,255 CO_2.

First hydro plant on drinkable water in B&H

Mini hydro plant on drinkable water

Hydro power plant "Čajdraš" with installed power of 450 kW was designed and built to operate in automatic mode and unmanned. The system of supervision and management is carried out from telemetry center of public utility company for water and sewerage, PC "Vodovod i Kanalizacija". The total investment based on the project documentation was estimated at 2,000,000 BAM. However, due to a good management and highs skills of the employees in public utility company, the actual value of the investment upon completion of all works was 1,200,000 BAM. The planned annual electricity production of 3,200 MWh generates annual revenues of approximately 400,000 BAM. This means that with the maintenance costs of 20,000 BAM / year, the payback period for this investment is 3.2 years.
The plant was built on the idea and project solution of project task management in public utility company for water and sewerage, JP "Vodovod i Kanalizacija". The entire project was financed solely by financial resources of the company, without the loan and any other debt. Public utility company plans to build a second mini hydro power plant in the settlement Kasapovići with the power 200 kW and estimated annual production of 1,400 MWh of electricity. These two mini hydroplants will contribute to estimated reduction of 3,815 tCO_2. This is the first company in B&H which has used a drinkable water for electricity production. It can serve as an example of good practice for other communities. Mini-hydro plant "Čajdraš" started to operate in September of 2012.



VISA FOR THE FUTURE?!

There is a difference between conventional and renewable energy sources in regards to the storage and transport, required investments for the setting up of an adequate plants as well as maintenance and operating costs. During last couple of years, renewable sources became more significant in the global energy generation. Although some of them are well known and being used for a long time, (wind energy, water energy, etc.), renewable energy sources "came into the spotlight" in the time of energy crisis. Reserves of oil, coal and other fossil fuels are being reduced and their prices are everyday increasing. Their combustion causes polluting emissions, has bad effects on the environment and directly affects the climate changes. Renewable energy sources are biomass, solar energy, wind energy, water and geothermal energy.

BIOMASS

On the territory of our city the biomass is extensively used. A resource can be a byproduct of forest exploitation, wood processing and agricultural industries. Biomass as an energy source has certain advantages over the more traditional energy sources, such as the relatively low cost, less dependency on climate change, promotion of the regional economy, etc. According to Study of the Energy Sector in B&H, the use of biomass as firewood or charcoal coal is increasing in Bosnia and Herzegovina.

BIODIESEL

In order to reduce the emission of polluting gases, an analysis should be conducted in the future in order to consider the possibility of using biodiesel as a fuel for vehicles in urban and suburban traffic in the City of Zenica, and to increase public interest in the wider production and use of biodiesel. Biodiesel is produced by refining vegetable oils (rapeseed or sunflower seeds), edible oils and animal fats and used in diesel engines as fuel mixture or as a separate fuel.

SOLAR ENERGY

Numerous analyses showed that the City of Zenica has the potential for the application of solar energy. Due to the economic characteristics of these systems, their application can be enhanced by appropriate measures, such as encouraging education of contractors and installers of this equipment, an educational campaign for potential buyers, creating an environment where such systems are considered as usual solution for provision of domestic hot water or reheating facilities, as well as the establishment of an institutional and legislative framework.

HYDRO POTENTIAL

In the following period, construction of hydroelectricity plant Vranduk in the City of Zenica is planned, which would contribute to a reliable supply of electricity in the Federation of Bosnia and Herzegovina, and in reducing the pollutant emissions of fossil fuels combustion and contribution to environment protection.

It is planned that HE plant will be located in the City of Zenica, between the city of Zenica and settlement Nemila very closely to the settlement Vranduk, encompassing the area stretched along the left bank of the river Bosna. Estimated construction time is 5 years. Construction project of HE plant Vranduk is based on utilization of water flow as renewable energy source, which will contribute to the reduction of CO_2 emissions into the atmosphere.

ROAD AHEAD OF US

Models of financing

Based on the Baseline Emission Inventory, assessment of the current state of energy consumption and required future necessities, considering potentials of City of Zenica, Action Plan Elaboration Team proposed measures and actions divided by sectors and subsectors. In order to have a document that will not be just another piece of paper, we integrated some of the funding models in order to find the resources for the implementation of our projects. Funding sources could be local (from local budget, citizens and companies) and external (from the FB&H entity and B&H state budgets, European Union funds, international funding institutions, investors and commercial banks). It is important to mention the model of public-private partnership (PPP) which represents joint actions of public and private sectors where all parties jointly invest their resources in order to provide public services or produce public products. ESCO (Energy service companies) models are a model of public-private partnership in the sector of energy services. ESCO provides energy services or other measures for improvement of energy efficiency. This new type of service provision will become one of the models for solving many issues in the energy sector.

According to the Action Plan design methodology, the Plan of priority measures and actions for reduction of CO_2 emissions by 2020 contains measures from different sectors: buildings, district heating system, public lighting, transport, urban planning measures, the lo- cal electricity production and work with the public and other interested parties.

HERE WE ARE IN 2020 YEAR!

Analysis of energy consumption for the base year and plan of priority measures and actions that will lead to achieving the goals of reducing CO_2 emissions by 2020 showed the following results: total emission reduction potential of all measures is around 116 thousand tons of CO_2, or about 48% of CO_2 emissions from 2006, which is more than the planned target. For this reason, achievement of the goal does not require the implementation of all measures analyzed; it is possible to choose specific measures according to their feasibility specifics (time frame, organization and funding).

The most significant reduction in CO_2 emissions could be achieved by implementation of the district heating system measures that enables reduction of CO_2 emissions by 27% and significant energy savings, even over 7%, compared to the baseline 2006 year.

Measures and actions for buildings in the City of Zenica also enable a possible significant reduction in CO_2 emissions, approximately 11%, and reduction of energy consumption for approximately 8.5%.

A very important sector of action is a work with citizens and stakeholders whereby a low investment measures could reduce CO_2 emissions around 5.5% and enable energy savings up to 6%.

Sectors of the transport and public lighting accounts for a small percentage of the overall reduction in CO_2 emissions and energy savings, however due to the fact that these sectors represent the lowest consumers in relation to the total energy consumption, possible savings through planned measures are important if these consumers are considered individually.

TO CONCLUDE ...

Energy efficiency is very important, and in the future will be even more important. To achieve energy efficiency, we must adapt to new energy sources and new ways of saving them. Energy efficiency includes energy savings that would not cause certain sacrifices and thus undermine the quality of life. Energy efficiency implies efficient production of energy and its rational consumption.

Impacts we would like to accomplish

The main objectives of elaboration and implementation of the Action Plan are:

- Improvement of electricity infrastructure, that will be directed towards the promotion of energy efficiency and wider usage of renewable energy sourc es resulting in the reduction of CO_2 emissions in all sectors;
- Reduce of energy consumption in buildings sector by thermal insulation and replacement of existing joinery and frames with the new ones accompanied with the thermal insulated glaze; and through installation of solar collectors, where feasible;
- Introduce the economically sustainable and environment – friendly system of public lighting through new technologies that will reduce the CO_2 emissions and consumption of electricity, improve the luminous efficiency of streets, roads, crossroads, parks and similar;
- Development and improvement of road infrastructure – to increase the share of public urban and semi-urban transport, increase the number of vehicles and certain number of buses on gas and usage of alternative transport modes, such as cycling;
- Raising public awareness on energy efficient management and importance of the fight against climate changes.

DON'T FORGET...

Nature provides a free lunch
only if we control our appetites!