The Covenant of Mayors
for sustainable energy
management at a local level

The Commune of the Town of Ustka

Sustainable Energy Action Plan

Ustka, March 2012

Sustainable Energy Action Plan for the Town of Ustka

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I. ABSTRACT

Approved by EU countries so called the Climate Package 3x20 means reducing the emission of greenhouse gases by 20%, reducing electricity consumption by 20% and increasing the share of renewable energy in the energy balance up to the average level of 20% in European Union till the year 2020. Member Countries are to decide on the height of their own purpose in case of the Renewable Energy Sources. Polish energy policy till the year 2030 has proved the plans of fulfilling the Climate Package in respect of reducing the emission of greenhouse gases and energy consumption and for the increase in the share of renewable energy the purpose of 15 % has been determined and 10 % share of biofuel in the transportation fuel sector has been approved by the year 2020. The fulfilment of the state energy policy assumptions should improve the safety of fuel and energy supplies, competitiveness and contribute to creating ecological balance conditions and prevent climate changes.

Taking into consideration the fact that 80% of energy consumption and the emission of CO_2 is connected with the activity of urban areas, it means that local authorities may play an important role in reducing the effects of climate changes. The European idea of the Covenant of Mayors is the support for towns. In order to transfer political commitment into concrete means and projects the Signatories are obliged to prepare the emission inventory which is the reference point and submit - within the year from accession – the sustainable energy action plan. The plan includes key actions which they are going to take.

The effect of actions of signatories it is not only energy saving but also creating permanent workplaces for qualified workers, healthier environment and better quality of life as well as intensified economic competitiveness and greater energy independence.

The Town of Ustka possessing the status of a health-resort is keenly interested in the protection of environment. That is why on 29th March 2012 the Resolution XIX/184/2012 was made on the access of the Commune of the Town of Ustka to the initiative under the name the Covenants of Mayors for the Sustainable Energy Action Plan at a local level.

The participants of the Covenant of Mayors take further actions as presented on the diagram below:

Apart from the Action Plan determining the scope and way of performance of the climate policy the nature of the idea of the Covenant is as wide as possible propagation of the pro-ecological solutions, technologies using renewable energy sources and the possibility to improve the energetic efficiency among a local society. Hence, the signatories of the Covenant are obliged to organize annual so called Energy Days.

This study constituting the Sustainable Energy Action Plan for the Town of Ustka consists of three parts:

- output data and external conditions,
- inventory of fuel and energy consumption, and
- the Sustainable Energy Action Plan.

The Town of Ustka a holiday and health resort is characterized by the increased tourist traffic and lengthening of the season. It causes the essential increase in the demand for energy carriers and increase in the traffic in the town.

The basis data on the Town of Ustka and external conditions having the influence on taking decisions in the scope of energy saving and reduction of greenhouse gases emission were presented in the introduction, a chapter concerning the output data and external conditions.

The inventory of fuel and energy consumption includes all sectors and energy carriers in the Town. The year 1999 was approved as the base year for which believable data could be gathered as far as the balance of energy and fuel consumption was concerned. The data for the year 2010 were used for the analysis of trends in fuel and energy consumption and for verification of the assumptions.

The aspects having the influence on the emission were analysed including consumption of different energy carriers and fuel and their indicators of CO_2 emission. The basic emission of CO_2 on the territory of the Town of Ustka amounted to 45,507 tons/year, emission connected with electric energy consumption 39,996 tons/year and the total emission **85,593** tons/year. The reduction purpose for this base emission is about 17,000 tons/year.

The activities of the town aiming at reduction of CO_2 emission include all sectors on which the Town has a direct or indirect influence. These actions include among others investment activities (thermomodernization of public utility buildings and residential buildings, modernization of the municipal heat-generating plant, modernization of street lighting) and also indirect actions such as education and promotion activities, introduction to tenders for purchase of environmental-friendly energy and monitoring of energy consumption in the Town. For each of the action there were made calculations of the change in energy and fuel consumption and the ultimate emission of CO_2.

These calculations show that it is possible to reduce the emission of CO_2 on the territory of the Town of Ustka to 35,161 tons/year, emission connected with the electric energy consumption to 33,069 tons/year and the total emission to **69,230** tons/year in the year 2020.

The reduction of emission in comparison to the base emission amounts to 17,362 tons/year which corresponds to the reduction by 20.3 %.

II. OUTPUT DATA

Basic data of the subject

1.1. Location, population, urbanization

The town of Ustka is located on the coastal belt - on the Slavonic Coast in the western part of the Pomeranian Voivodeship, at the Baltic Sea, at the mouth of the River Słupia, about 17 km from Słupsk, in Słupsk County.

Since December 1987 the town has possessed the status of a health-resort (Resolution of the Councils of Ministers No. 210 of 23rd December 1987 on recognizing the Town of Ustka a health resort, M.P. No. 38, item 333). The Town authorities are obliged to special care of the environment and to increase the living standards of its inhabitants and visitors. The Health Resort Zone lies within the bordering area of the Town of Ustka and 5 administrative units of the Commune of Ustka neighbouring with the town.

The evidential area of the Town of Ustka amounts to 1,019 ha.

The population - 16,467 people (registered for permanent residency, as of 21st November 2011)

The number of inhabitants being registered for permanent residency in the area of the Town has been showing a slow decrease tendency since the year 2001.

Administratively the Town of Ustka only borders on the Commune of Ustka.

1.2. Environment condition

Ustka is located in the area of great natural interest with landscapes characteristic for the coast and forms of nature constituting the part of the Concept of the National Ecological Network ECONET Polska - a seashore, beaches, dunes, cliffs, coastal lakes, coastal ancient forests, bird sanctuaries, vast high peat bogs etc.

Ustka is also located, from the point of view of protection of environment, an important area so called "Green Ring of the Baltic" of valuable elements on the scale of Europe (a junction area of an international importance), designated for special protection [1]. Within the administrative borders of the town there is a nature reserve "Buczyna nad Słupią" and 2 areas of protected landscape – "The coastal belt east of Ustka" and "The coastal belt west of Ustka". Ustka is located within the borders of the Słupia Valley which constitutes a national wildlife corridor joining the Baltic Coast with the Kashubian Lake District. Planned areas of Natura 2000 run through the land of Ustka. There are four natural monuments in the area of the Town.

Higher standards are set for acceptable air pollution levels in Ustka which result from its health-resort character and the main source of point emission of pollution are centrally located a Thermal Energy Company EMPEC, small processing and service companies and also

[1] The development strategy for the town of Ustka till the year 2020.

individual coal-fired home furnaces. However, pollutants mostly coming from road transportation are the source of unorganized emission.

1.3. Economy, agriculture, forestry

Ustka in the Spatial Development Plan of the Pomeranian Voivodeship of 2009 was qualified to the coastal area (the area from Puck to Ustka) of an agricultural and agroforestry character. The Town is characterised with a considerable stand density – 48%, urban areas take up about 30%, agricultural lands 11%.

A very important natural value of Ustka as a holiday and spa resort are forests. Here are vast, dense forests in a direct neighbourhood of Ustka. They are a hinterland of two beaches. Different forms of dunes and a flat-topped cliff are covered with forests. These are mostly pine forest stands. They are used as a natural walking grounds all year long.

The Town is a fishing port and fulfils a role of a shelter port. The marine economy and fishery are the main industrial branches developing in Ustka. Climate, natural environment, mineral water and limestone have an influence on great recreational and spa potential of Ustka.

1.4. Energy infrastructure

The municipal company PEC "EMPEC" limited liability company is the biggest energy company in the town dealing with the supply and distribution of thermal energy for Ustka. At the end of 2010 the Company possessed:

- one local boiler house KR-1 (23.26 MW licensed + 11.815 out of the license, amortized in 100% ; total power installed 35.08 MW)
- two local oil boiler houses (0.06 MW in total)

The local boiler house is equipped with 5 boilers of WR-5 type of the power 5.8 MW each fired with fine coal and the boiler KD-6.0 of the power 6 MW fired with natural gas or heating oil. The share of heat from the municipal heat distribution network in the base year (1999) amounted to approximately 30%, at present it reaches approximately 36% and is increasing all the time. It is forecasted that till the year 2020 the share of network heat will amount to 41% of the town's demand.

The remaining sources of heat for the Town are individual boiler rooms fired with wood and coal, heating oil and natural gas. In the central part of the Old Town stoves are used for heating.

Ustka is supplied with methane-rich natural gas GZ 50 due to the connection to the national supply system Koszalin-Sławno-Słupsk-Ustka. The whole area of the town is supplied with gas. Gas is used by approximately 95% of the town's population. Gas is first of all used in households to prepare meals and warm usable water.

The town is powered with electric energy from the substation 110/15 kV located at Darłowska Street – so called the Main Power Supply Point Ustka. The power requirements for the town is 5.0 – 6.0 MW. The total load of the Main Power Supply Point Ustka is 10 MW. The utilization of the Main Power Supply Point power in comparison to the installed power is 30%.

The main electro-energetic lines which supply the town are the lines of 110 kV:

- the substation Słupsk Wierzbięcino – substation 110/15 kV Ustka
- the substation 110/15 kV Darłowo – substation 110/15 kV Ustka.

1.5. Transport infrastructure

The Town is connected with the external transport network through the road and railway system and marine routes; the transportation system of Słupsk[2] is used indirectly. Here the following roads are crossed: the trunk road DK 21 Słupsk-Ustka-Szczecinek, the voivodeship road DW 203 Koszalin-Darłowo-Ustka and the inter-district roads DP 39127 Gąbino-Objazda-Ustka and DP 39109 Duninowo-Modlinek-Ustka.

In Ustka there is a developed network of roads. The network consists of trunk roads, voivodeship roads, inter-district roads, commune and internal roads.

The country bus service is a basic means of public transport in external connections.

The railway line runs along the north-west border of the town.

In summer periods especially at weekends the traffic and parking conditions worsen in Ustka which is a tourist place. In order to improve this situation implementation of the Park&Ride system is being planned in other words building strategic parking lots and creating possibilities of commuting to the Town Centre from parking lots with the use of public bus services.

General Strategy

1.6. National and EU policy

Energy policy of the European Union determine directions of actions out of which the most important are:

- the fight against climatic changes
- stimulation of economic growth and market development
- the increase in energy safety through limitation of dependency on gas and crude oil out of EU.

The policy is supported with directives stimulating the development of production market and final consumer of energy, such as:

1. Directive 2006/32/EC on energy end-use efficiency
2. Directive 2009/28/EC on renewable energy sources
3. Directive 2010/31/EC on the energy performance of buildings
4. Directive 2004/8/EC on the promotion of cogeneration based on a useful heat demand
5. Directive 2010/75/EC – The Industrial Emission Directive on industrial emissions (integrated pollution prevention and control) and application of BAT (Best Available Techniques)
6. Directive 2003/87/EC on ETS – European Emissions Trading Scheme

[2] The development strategy for the town of Ustka till the year 2020.

7. Directive 2009/29/EC on the European Emission Allowance Trading Scheme

In order to keep the climate changes below 2° C the Council of Europe proved on 15th December 2011 the purpose of reducing greenhouse gases by 80-85% in the year 2050 in comparison to the year 1990. So called a Roadmap for a low-carbon competitive economy in 2050 presents a way of achieving the planned reduction:

2020 -25%	1,0%/year	60%	low-carbon power engineering
2030 -40%	1,5%/year	75%	low-carbon power engineering
2040 -60%	2,0%/year	90%	low-carbon power engineering
2050		100%	low-carbon power engineering

The goals are to be achieved thanks to:

- □ diversification of technology,
- □ common application of already existing modern technologies,
- □ development of new technologies (photovoltaic),
- □ central role of renewable energy sources
- □ smart grids

Polish energy policy by the year 2030

The policy determines six basic directions in development of Polish energy. Detailed goals, and actions have been defined for each of the direction and also their exact way of carrying out, in addition the time limits have been set as well as responsible subjects have been chosen.

The matters of improvement of energy effectiveness have been treated in a priority manner in the document. The second direction of Polish energy development in accordance with approved by the government the Energy Policy by the year 2030 means the increase in the safety of fuel and energy supplies. It is to be based on own resources especially hard coal and brown coal.

The Energy Policy by 2030 also assumes the development of utilization of renewable energy sources. The actions will be carried which will help in the development of agricultural biogas plants and wind power plants on land and at sea. The main goals of the energy policy in the field of renewable energy include:

- ➢ the increase in the usage of renewable energy sources in the overall energy balance up to 15% in the year 2020 and 20% in the year 2030,
- ➢ in the year 2020 achieving the 10% share of biofuel in the transportation fuel market and keeping this level during the subsequent years,
- ➢ protection of forests against too much exploitation in order to obtain a biomass and sustainable use of agricultural lands for the renewable energy purposes including

biofuel in order to prevent competitiveness between renewable energy and agriculture.

The main goal of energy policy in the field of production and supply of electric energy and heat is to provide safety of supplies at the same time maintaining competitiveness and sustainable development.

The detailed goals in this field are among others:

- building new generating capacities in order to balance domestic demand and maintain necessary power reserves at the level of minimum 15% of the maximum demand for electric energy,
- building top sources of electricity generation
- extension of distribution network allowing the development of distributed power engineering using local sources of energy
- development of the local mini and micro cogeneration allowing to supply out of those sources at least 10 % of electric energy used in the State by 2020.

Activities for improvement of energy efficiency among others include:

- building generating units of efficiency comparable to the efficiency achieved in the best electric power stations in the European Union's states,
- reducing grid losses in the transmission and distribution by means of modernization of present grids and building new ones, exchanging of low efficiency transformers and developing dispersed generation,
- facilitating the development of cogeneration especially by the means of replacing distributed heat generation with combined energy production by the means of the modified support system in a form of certificates and the appropriate policy of communes,
- creating legal frames for the support system of actions connected with improvement of energy efficiency for example with the use of the system of "white certificates",
- application of obligatory energy performance certificates for buildings and flats while putting them into turnover or renting,
- support of the investment in the scope of energy saving with the use of loans on preferential terms and grants from domestic and European funds including the Act on Support of Thermomodernization and Repairs, the Operational Programme Infrastructure and Environment, regional operational programmes, funds the National Fund for Environmental Protection and Water Management,
- performance of the National Action Plan concerning energy efficiency,
- obligation of the public sector to fulfil an exemplary role in economical management of energy,

- information and educational campaigns promoting efficient usage of energy.

Reducing the impact of energy on the environment was also taken into consideration in the document approved by the government. Due to the obligations resulting from the Climate Package, the methods of emission reduction of CO2, SO2, NOX which will help to fulfil international obligations, have been shown in the energy policy. Obligations resulting from a new European Trading Scheme Directive will be fulfilled as well as disposition of the income from auctions of CO_2 emission allowances will be drawn up. Support of the development of Carbon Capture and Storage Technology (CCS) will be a very important activity direction.

National Action Plan concerning energy efficiency (MG 2007)

The National Action Plan concerning energy efficiency (EEAP - Energy Efficiency Action Plan) constitutes fulfilling the content of art. 14 item 2 of the Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006 concerning the energy end-use efficiency and energy services.

The document determines the indicative goal in the scope of energy saving for the year 2016 expressed in an absolute unit which is to be achieved within nine years starting from the year 2008 in accordance with art. 4 of the above mentioned Directive.

The means and activities proposed in the scope of the National Action Plan concerning energy efficiency (EEAP) aim at:

- achieving the indicative energy saving target in accordance with the requirements of the Directive 2006/32/EU which is 9% in the year 2016,
- achieving the indirect target of 2% in the year 2010.

The National Action Plan includes the list of means aiming at improvement of energy efficiency in all sectors of economy.

1.7. Strategies and regional plans

Development strategy for the Pomeranian Voivodeship by 2020

The strategy was approved by the Resolution No. 587/XXXV/05 of the Regional Legislature of the Pomeranian Voivodeship of 18 July 2005. The strategic target No. 2 is:

- Improvement of the functioning of technology and information technology infrastructure systems which among others include:
  - improvement of energy infrastructure and facilitation of energy supply system;
  - increase in the access to different energy carriers
  - improvement of energy efficiency; support of usage of renewable energy sources and creating local fuel and energy markets.

The spatial development plan for the Pomeranian Voivodeship (2009)

The spatial development plan was approved by the Resolution No. 1004/XXXIX/09 of the Regional Legislature of the Pomeranian Voivodeship of 26.10.2009.

With reference to energy resources it is stated that the best conditions to use wind energy are in the northern part of the voivodeship. The best conditions to use solar energy also occur in this part of the region and biomass resources in the voivodeship could cover 25% of the heat demand.

In the fuel structure for heating purposes the high share – 70% of coal is maintained and individual boilers and stoves in the voivodeship constitute 30% in towns and 60% in the villages.

Due to the low state of energy safety of our voivodeship one of the most important actions should be building new sources of electric energy.

Building of a nuclear power plant or a gas power plant in the region of Żarnowiec is taken into consideration as well as building of peaking gas power plants and dispersed cogeneration objects with the use of renewable sources of energy in connection with building intelligent grids.

One of the purposes of the spatial policy of the voivodeship is the sustainable usage of natural resources, energy saving and limitation of the amount of waste.

The directions in the development of energy management should take into consideration the rules of sustainable development in order to achieve the targets of European Union 3x20. The necessity of thermomodernization of the buildings and other actions connected with saving of energy are stressed.

The development of dispersed generation of energy should first of all take place on the basis of biomass (agricultural bio-gas and made of lignocellulosic plants). The development of solar-power systems for the purpose of preparing warm usable water is intended as well as geothermal energy and also limitation of using coal for the benefit of biomass and systemic gas.

Regional Strategy of Transport Development in the Pomeranian Voivodeship for the years 2007-2020.

The Regional Strategy of Transport Development in the Pomeranian Voivodeship for the years 2007-2020 was approved on 29th September 2008. The document is valid till 2020 and constitutes a basis for implementation of individual transportation branches in the voivodeship and also it enables to achieve cohesion of the development of transport network with the development of the whole region. The purpose of this strategy is to increase effectiveness of planning of transport development system, facilitating the process of making planning and performance decisions and showing priority action areas aiming at increasing the effectiveness of transport system in the Pomerania.

Forecasts (from the year 2007) provided that till the year 2020 further motorization might contribute to the increase in the share of the individual transport share up to 60-70% and the decrease in the share of the public transport by 20-25% and it would be necessary to

take preventative measures including creating conditions for the development of public and rail transport.

For the road No. 210 on the route from Słupsk to Ustka the forecasted increase in the road traffic was by 135% till the year 2015 and 160% till the year 2020 in comparison to the base year of 2000.

With reference to the rail transport the state policy predicts the increase in the demand for the transport of goods by 21-34% (the base year 2003).

The attention is paid to the fact that the increase in motor transport may have an unfavourable influence on the environment including the area of the road No. 2010 Słupsk-Ustka.

The Strategy assumes the investment directions which among others include the necessity of modernization of access roads to ports and recreation and tourist areas and also modernization / revitalisation of railway lines which include 405 the Słupsk-Ustka trains and the expansion of bus lines. Building of bicycle routes in particular towns is also intended.

The development of tourist functions of small ports thanks to maintaining connections with other ports and harbours is planned in reference to water transport.

The program of development of electrical power engineering with consideration of the renewable sources in the Pomeranian Voivodeship by the year 2025 (2010)

The programme includes a suggestion of building new conventional and nuclear power stations in the Pomeranian Voivodeship:

1. A thermal-electric power station / electric power station in Gdynia: building of two new power blocks with the power of 800 -900 MWe each
2. A commercial coal power plant in the Vistula Valley – building of two power blocks of the power of 800 – 1000 MWe each
3. A new gas thermal power plant for the needs of a refinery LOTOS with the power of 200 MW
4. A new gas power plant within the area of the Pomeranian Voivodeship with the total power of 800 MW
5. A nuclear power station in the area of Żarnowiec

And also an evaluation of the possibility to use renewable sources of energy:

6. Building wind power plants
7. Building cogeneration aggregates on the basis of agricultural biogas
8. Using solid biomass to produce electric energy
9. According to the programme solar exposure conditions in the District of Słupsk are the best and the value of sun exposure is 1189 kWh/m2* a year. Solar collectors for

heating usable water and small installations of photovoltaic cells for generating electric energy are shown as potential possibilities of using solar energy.

The intended investments also include modernization and extension of power grids 400 and 220 kV and building of the Main Power Supply Points.

Several development scenarios were analyzed in the programme. It was proposed to choose a scenario so called the Sustainable Development of Energy Sector with 13 % share of renewable energy sources in the production of electric energy in the year 2025.

Program of Environmental Protection for Słupsk County (the year 2010 – updating of the Program of Environmental Protection of 2007)

The development of the County will take place in accordance with the rules of sustainable development. The Program of Environmental Protection for Słupsk County and Communes of the County set the following so called essential goals among of which are:

- taking actions in order to use new techniques and technologies in the processing of local natural resources and the base of raw materials in the scope of:
  - agricultural fuel,
  - wind and water energy,
  - bioenergy
  - ecological education.

Development strategy for the town of Ustka by the year 2020 (2008)

The development directions and strategic goals have been determined in the Strategy. The issues of spatial development, environment and technical infrastructure have been included in the field "area". The attention should be paid to the town of Ustka which is surrounded by protected sites of the Słowiński National Park and a landscape park "the Słupia Valley" .

Touristic and fishing functions are basis of the Town development. Due to this fact important are the actions among others aiming at limitation of air pollution, increasing the ecological consciousness of local society, promotion of renewable energy and rules of sustainable development and also development of technical infrastructure. As strategic goals have been determined among others modernization of existing housing stock, revitalization of degraded areas and thermomodernization of buildings.

In reference to technical infrastructure the following actions have to be taken:

- in the transportation sector – aiming at redevelopment of communication system and reactivation of rail transport; building of bicycle routes, building of alternative communication for example a narrow gauge railway along the coast.
- in the heat supply sector – modernization and development of the heat distribution network especially in the areas of single-family housing with simultaneous eliminating low emission, improvement of air quality by using renewable energy and desires for relocation of the local boiler house.

Assumptions for the plan of heat, electric energy and gas fuel supply for the town of Ustka (2012)

In the assumptions for the plan of heat supply it is intended to replace hard coal with biogas in low and medium power devices, development of dispersed cogeneration sources, maintenance and development of heat distribution systems. Intensive development of solar energy and usage of solar panels to prepare warm usable water especially in recreation buildings which are used in summer are assumed. The development of photovoltaics and consumption of those sources of energy to cover the demands of households and holiday cabins are taken into consideration. Further necessity of thermomodernization of buildings and other actions connected with energy saving are also stressed as well as building of energy-saving houses are also taken into consideration in planned actions.

Revitalization Program of the Commune of the Town of Ustka

Revitalization will be carried out by combining technical actions and economic and social development based on integrated plans of the town development and/or revitalization programs. Technical actions will also include renovations and modernization of existing multi-family housing and also adaptation of existing buildings for housing purposes for low income households or people with special needs.

1.8. Purposes for Sustainable Energy Action Plan

a) Priority fields of action

Due to the fact that Ustka is a health resort, the limitation of CO_2 emission should be a priority action especially in the following sectors:

- heat generation in the central source of heat, liquidation of local boiler houses and connecting receivers to the municipal heat distribution network
- housing construction especially sources located in the old part of the Town of Ustka
- transport

b) Main tendencies in respect of CO_2 emission in Ustka

Thanks to successively carried out thermomodernization of public utility and residential buildings as well as modernization of the main source of heat which is the heating company there takes place the decrease in the emission of this gas into the atmosphere. However a considerable reduction will take place only at the moment of total elimination of coal and/or relocation of the thermal power station out of the town centre to its suburbs. Such actions are connected with the change in the price for heating as well as high investment costs and decisions must be made on the basis of thorough analysis.

A great challenge may also be introducing no-emission means of transport – for example electric cars or cars run on biofuel.

A role of Ustka as a health resort town and holiday town is increasing. More and more big holiday centres guarantee a year long stay. The demand for energy is increasing especially in the scope of heating purposes, preparation of warm, usable water and vehicle traffic.

1. General purpose of the reduction of CO_2 emission.

The general purpose concerns the reduction of CO_2 emission by at least **20%** till the year 2020 in comparison to the base year 1999.

2. Sectoral purposes

Purposes are not made for particular sectors. Measures will be taken in order to reduce the emission of CO_2 maximally in each sector.

III. INVENTORY OF ENERGY AND EMISSION

Inventory of greenhouse gases emission

1.9. Initial inventory of emission

The initial year for the inventory is the year 1999. For the already mentioned year it is possible to gather the most complex and reliable data.

The data for the year 2010 are used for verification of evolution of fuel, energy and emission consumption.

1.9.1. Balance of energy and fuel consumption

1.9.1.1. Energy consumption in the municipal heating system.

The thermal company EMPEC Sp. z o.o. is the greatest supplier of heat in the town.

In the previous years the municipal thermal company EMPEC fulfilled many tasks aiming at streamlining of energy consumption at its receivers. In the years 1993-1998 the weather automatic control system was installed in all heat distribution centres belonging to this Company. In the years 1998-2000 funds from PHARE and ECOFUND were obtained through a competitive process along with housing associations in order to finance the development of the network in the western part of the Town (elimination of law emission), insulation of buildings belonging to the association, installation of heat counters, heat cost allocators and thermostatic valves.

In the following years the Company took a lot of actions aiming at streamlining of energy consumption by its receivers. The Company also exchanged long sections of the pipe network for the preinsulated pipe network and because of this reduced the losses in heat transfer.

The table below presents the evolution of selling of heat, the area heated by the municipal thermal power station and the heat demand ratio E[kWh/m$^{2]}$. The selling was converted into the conditions of a standard year in order to eliminate the influence of changeable climatic conditions.

Year	Selling of heat	Selling of heat in the conditions of a standard year	Centrally heated areas	Demand for heat Energy ratio
	GJ	GJ	m^2	kWh/m^2
1997	197 884	182 613	200 387	253
1998	195 166	196 627	213 500	256
1999	195 464	190 822	214 894	247
2000	160 586	175 163	224 318	217
2001	179 908	166 931	236 908	196
2002	155 041	161 324	220 104	204
2003	141 220	142 294	226 722	174
2004	132 950	131 605	261 787	140
2005	133 910	136 543	282 846	134
2006	137 253	143 736	296 332	135
2007	134 026	139 925	305 290	127
2008	138 713	147 802	321 916	128
2009	141 900	138 580	334 118	115
2010	172 825	151 722	346 783	122

2011	146 568	147 848	350 673	117

The diagram below presents the influence of actions taken by EMPEC and receivers in order to lower the heat energy ratio

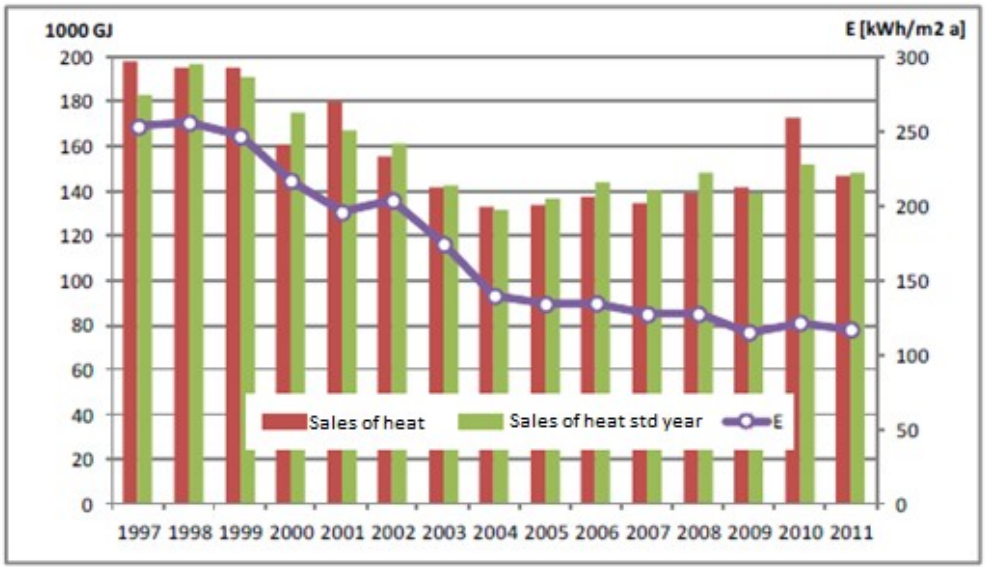

Fig. 1 The decrease in the heat demand in the Town of Ustka in the years 1997-2011

1.9.1.2. Energy consumption in residential buildings

Individual energy consumption in residential buildings is decreasing thanks to actions taken by inhabitants. It is supported by different funds including the Act on Supporting Thermomodernization and Repairs.

1.9.1.3. Energy consumption in public utility buildings and residential buildings

Systematic actions are taken in order to decrease energy consumption in public utility buildings.

Common actions of the Town and TBS Sp. z o.o. are taken in the scope of revitalization of buildings of Old Ustka. Till February 2012 fifteen properties were reconstructed which included nineteen buildings: 5 Findera, 5,5a,22 and 22a Kosynierów, 8,8a,30,76,78,78a Marynarki Polskiej, 1 Mała, 2 Sprzymierzeńców, 3 Beniowskiego, 5 Kaszubska, 23 Marynarki Polskiej, 14 Beniowskiego, 15 Kosynierów. The building at 11 Kosynirów St. is now being built and the documentation is being prepared for the next four buildings at: 1 Kosynierów, 7 Kosynierów, 4 Kaszubska.

Fig. 2 The building at 22 Kosynierów St. before and after revitalization

In the years 2010-2011 thermomodernization of the building of Primary School No 2 was performed along with connection to the municipal heat distribution network of Dunina housing estate. A subsidy from European Union was obtained in the amount of 75 % in order to carry out the undertaking. Investments concerning the improvement of energy efficiency of buildings can also be supported from the Thermomodernization Fund and also from structural funds or target programs performed by National Fund for Environmental Protection and Water Management for example in the Green Investments Program.

1.9.1.4. Energy consumption in public utility and service facilities

The service sector in Ustka is developing that is why there is a more intense utilization of already existing and building new public utility and service facilities. In spite of this increase the energy consumption in comparison to the base year is decreasing due to energy efficiency actions and closing inefficient industrial and service facilities and relocation of fish processing industry beyond the borders of the Town of Ustka.

1.9.1.5. Energy consumption in street lighting

At the turn of the years 2009/2010 a feasibility study was performed for identification of possible actions and choosing an optimal scope of street lighting modernization. Directions of street lighting modernization of the town of Ustka were presented.

Since 2004 the Town of Ustka has been carrying out gradual modernization works for street lighting which is its property. So far 473 lighting fittings have been modernized. New lighting has been installed with the use of energy saving technologies – 284 lighting fittings till March 2012.

1.9.1.6. Energy consumption in transport

The analysis of a mobility state was carried out in a municipal transport study for the Town of Ustka.

The forecast of the traffic forecast was presented below.

Year	Population	LZC [%]	Mobility	By cars [%]
2007	17067	67.1	2.20	25
2010	17010	66.6	2.30	27

It was found out that in summer the traffic is much bigger than the average traffic but the transit traffic is two times smaller. It results from the above that Ustka is a destination for tourists.

Below the authors of the Study presented simulation of transport activity in the Town prepared by the authors of the study.

Transport activity (local) in Ustka

Item	**Transport**	1999	2010
		mln pass-km	mln pass-km
1	Passenger cars	20.0	22.5
2	Trucks	0.40	0.42

3	Buses	0.55	0.58

The increased of transport activity is visible (in million of passenger kilometres pass-km).

Transportation activity allows to determine the consumption and emission of fuel.

Fuel consumption (tons / year)

Item	**Years**	Petrol	ON	LPG
1	1999	768	406	128
2	2010	675	532	162

1.9.1.7. Production and distribution of energy in the area of the Commune

At present the Commune of the Town of Ustka has an influence on supplying the Town with the network heat. The tasks of supplying the Town with the network heat are accomplished by the Thermal Energy Company EMPEC in Ustka.

1.9.1.8. Utilization of renewable energy sources in the Commune

At present in the housing stock solar panels are used in a slight amount to prepare warm usable water and biomass for heating purposes.

1.9.1.9. Energy and fuel consumption balance

Energy and fuel consumption balance was presented in the Appendix to the study.

Energy and fuel base balance was presented below.

	Heat, fuel	Electric energy
	MWh	MWh
Buildings	94 172	40 400
Transport	16 121	
Local heat-generating plant	52 784	
Total	**163 076**	**40 400**

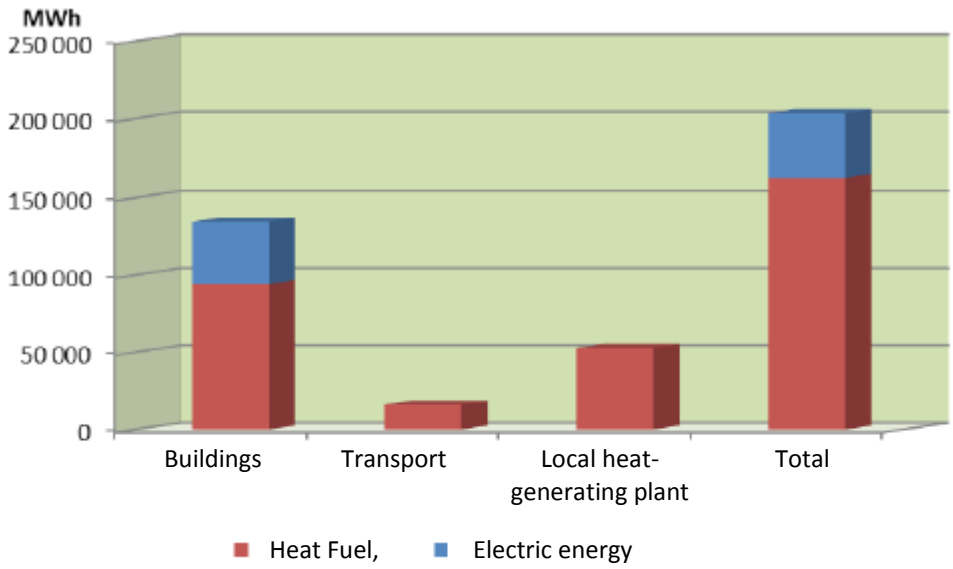

Fig.3 Energy and fuel basic balance (the year 1999)

1.9.2. Greenhouse gases emission balance

1.9.2.1. CO_2 base balance

The CO_2 balance was presented in the Appendix to the study.

The CO_2 base balance was presented below.

	Electric energy	Heat, fuel
	tons/year	tons/year
Buildings	39 996	23 214
Transport		4 034
Local heat-generating plant		18 348
Total	**39 996**	**45 597**
Altogether	**85 593**	

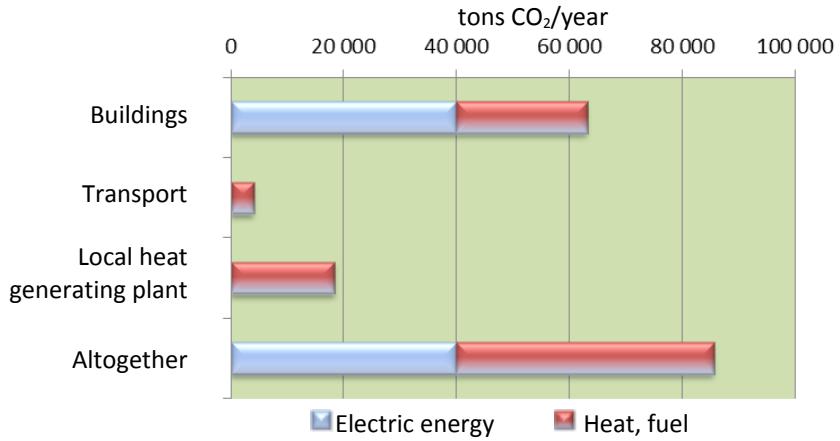

Fig.4 CO_2 basic balance of the Town of Ustka (the year 1999)

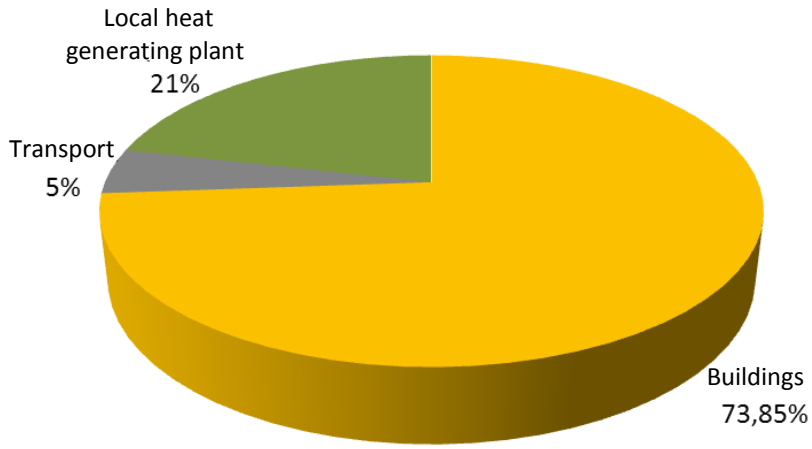

Fig. 5 Percentage share of CO_2 emission in individual sectors (the year 1999)

1.9.2.2. Determining of the base line

Without taking dedicated actions, CO_2 emission will result only from the behaviour of energy and fuel receivers who take actions mostly to lower the costs of energy and fuel utilization.

There is lack of internal factors stimulating the decrease in CO_2 emission by receivers.

The Thermal Energy Company EMPEC is included in the European Union Emission Trading System – ETS will take actions to lower CO_2 emission.

1.9.2.3. Potential of reduction of CO_2 emission

Potential of reduction of CO_2 emission results from the specificity of sectors and includes:

- increasing the efficiency of the conversion of fuel and energy,
- thermomodernization of buildings,
- lowering the losses in industry and distribution of heat and energy,
- increasing the efficiency of energy and fuel consumption,
- lighting modernization,
- changing fuel of high CO_2 emission ratio for renewable sources of energy and fuel of lower CO_2 emission ratio.

In order to achieve reduction of emission by 20% in comparison to the base year it is necessary to reduce CO_2 emission by over 17000 tons/year till 2020.

IV. SUSTAINABLE ENERGY ACTION PLAN

Sustainable Energy Action Plan

1.10. Assumptions, ratios

Actions included in this study may be divided into three types.

The first type concerns actions whose final effect is improvement of energy efficiency so as a consequence reducing the amount of used energy and fuel carriers.

The second type of actions aims at changing local energy structure for such structure in which the final effect of decreasing emission is obtained by changing the way of generation of used energy. The actions of the second type consider taking advantage of renewable energy sources and also sources emitting less greenhouses gases than the gases used at present.

The third type includes conducting actions aiming at the increase of social consciousness as far as the influence of the power industry on the environment and the change of inhabitants' behaviour are concerned.

The intended actions were presented for individual sectors.

1.11. Elements of the Sustainable Energy Action Plan

1.11.1. Sectors and action areas

1.11.1.1. Energy consumption in a municipal heat distribution network

The Thermal Energy Company EMPEC Sp. z o.o. is successively increasing and will be increasing its share in the heat market in Ustka.

EMPEC is planning to continue actins aiming at the improvement of the efficiency of supplying the heat to the receiver and reducing the heat loss in the network.

It is forecasted that modernization of the thermal power station will take place in two stages:

- during the first stage (by the year 2020) a new boiler for biomass (wood) will have been installed which will cover the demand of municipal network for warm usable water all year long,
- during the second stage (by the year 2030) it is forecasted that the whole coal in the heat source will have been eliminated because of building an associated system fed with natural gas or its mixture (with biogas). This system will be supplemented by installation of the peak gas boilers.

The Company forecasts financing development investments in the scope of modernization of the source and new connections from its own financial means which is from the profit and from depreciation.

1.11.1.2. Energy consumption in residential buildings.

Individual heat consumption in residential buildings will decrease.

Actions will be continued to increase energy efficiency of the existing structure (thermomodernization, utilization of more efficient systems of generating and transmitting heat) which should have a contribution to lower the demand for heat of minimum 25% to the value of 0.25GJ/m^2.

The demand for heat of newly designed buildings should be considerably lower due to considerable technological progress both in production of materials of high thermal protection factor and constructional solutions themselves. In accordance with the Directive 2010/31/EC on the energy performance of buildings, starting from the year 2021 all new residential building will have to meet the conditions consistent with the buildings with nearly zero energy requirements.

The law will force designers and planners to consider each time the economic profitability of low energy buildings to minimize energy consumption.

1.11.1.3. Energy consumption in public utility buildings (public housing)

Actions will be continued in order to lower the heat consumption and energy consumption in public utility buildings. In accordance with the Directive 2010/31/EC on the energy performance of buildings, starting from 2019 all new public utility buildings will have to meet the conditions consistent with the buildings with nearly zero energy requirements.

1.11.1.4. Energy consumption in public utility and service facilities.

The service sector is developing in Ustka and it will still be developing with the increase in efficiency of energy and fuel consumption. This trend is expected to be continued.

1.11.1.5. Energy consumption in street lighting

It was determined in the feasibility study that in case of carrying out modernization of street lighting along with the changing the control system for the intelligent one, the energy consumption will decrease in comparison to the situation before modernization by more than 70% and at the same time the costs of maintenance of the lighting system will be considerably lower.

The expenditures in the optimal variant amount to 990 thousand zlotys.

The plan is in the works.

1.11.1.6. Energy consumption in transport

In the municipal transport study for the Town of Ustka the state of mobility in the town was analysed and the traffic forecast by the year 2030 was presented.

The traffic forecast in the Town by the year 2030 was presented below:

Year	Population	LZC [%]	Mobility	By cars [%]
2007	17 067	67.1	2.20	25
2010	17 010	66.6	2.30	27
2015	17 004	62.3	2.40	31
2020	16 953	58.1	2.55	36
2025	16 953	56.1	2.65	39
2030	16 641	56.1	2.78	43

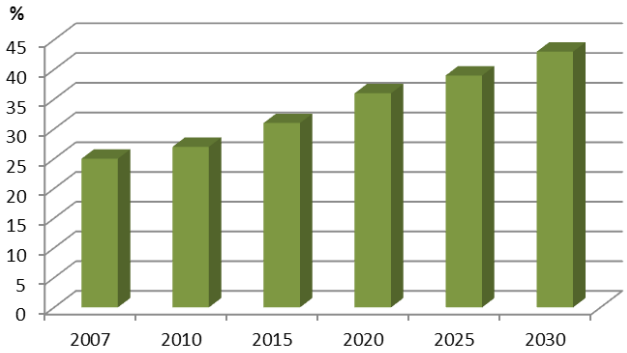

Fig. 6 Changes in car traffic in the Town of Ustka

Below the authors of the Study presented simulation of transport activity in the Town

The transport activity (local) in Ustka

Item	**Transport**	1999	2010	2020
		mln pass-km	mln pass-km	
1	Passenger cars	20.0	22.5	31.63
2	Trucks	0.40	0.42	0.59
3	Buses	0.55	0.58	0.81

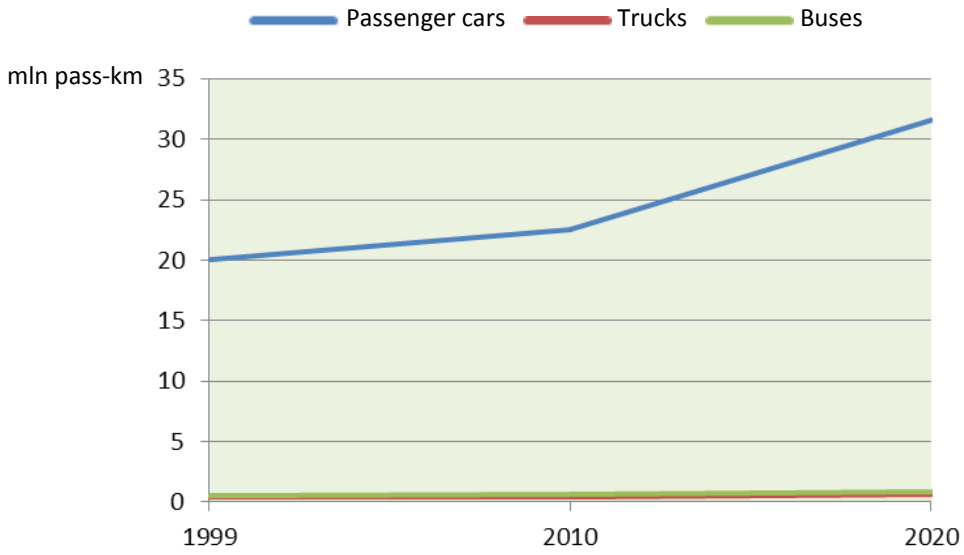

Fig 7 Simulation of transport activity in the Town of Ustka by the year 2020

The increased of transport activity is visible (in million of passenger kilometres pass-km) the decrease in the individual emission from transport vehicles will take place at the same time.

The transport activity allows to determine the consumption of fuel and emission.

Fuel consumption (tons/year).

Item	**Years**	Petrol	ON	LPG
1	1999	768	406	128
2	2010	675	532	162
3	2020	797	767	230

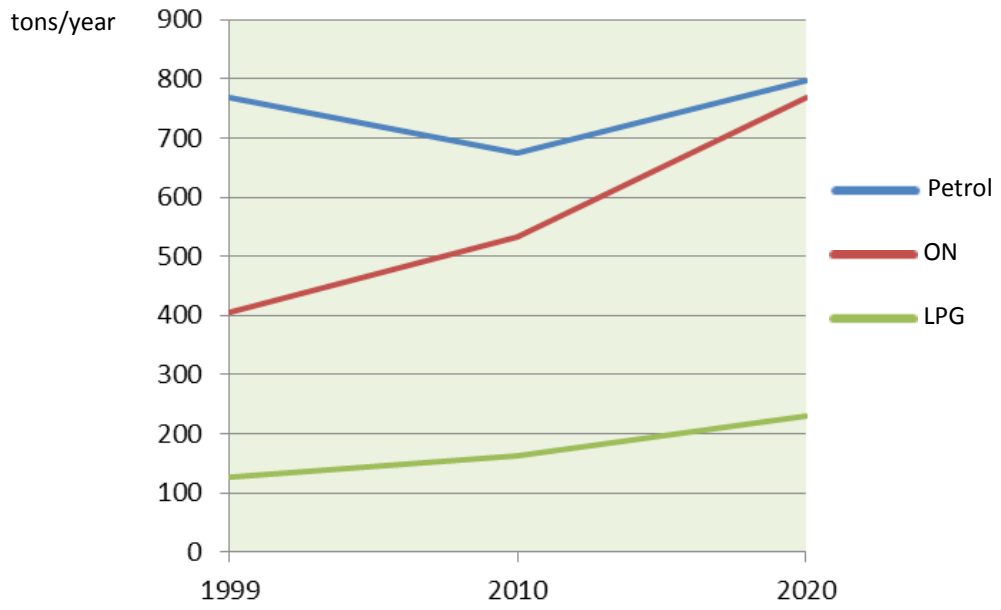

Fig. 8 Consumption of different types of fuel in the Town of Ustka by the year 2020.

1.11.1.7. Energy production and distribution in the area of commune

After intended in the future starting cogeneration in the municipal thermal power station, the municipal company will become an active participant in the market of generation and distribution of energy.

During the purchase of electric energy the Town will, apart from the price, aim at the structure of fuel in generating energy and CO_2 emission ratio WE[kg/kWh] by particular companies offering energy. Below there were presented ratios for particular energy suppliers. The energy law reinforces higher and higher ratio from renewable sources in the volume of energy supplied to the final receivers.

	Share [%]		
Fuel	**PGE**	**ENEA**	**ENERGA**
Hard coal	25.2%	54.7%	49.1%
Brown coal	68.9%	28.3%	31.7%
Natural gas	3.4%	3.4%	3.0%
Other	21.0%	2.1%	1.3%
Renewable energy sources	**2.3%**	**11.5%**	**14.9%**
WE [kg/kWh]	**0.980**	**0.816**	**0.799**

1.11.1.8. Utilization of renewable energy sources in the Commune

It is planned to use biomass in the source supplying the municipal heat network.

It is promoted and will be promoted to use solar energy in a form of solar panels (heat) and photovoltaic cells (electric energy).

1.11.1.9. Balance of energy and fuel utilization

The balance of energy and fuel utilization was presented in the Appendix to this study.

The fuel and energy base balance as well as forecasted changes by 2020 were presented below.

	1999		2020	
	Electric energy	Heat, fuel	Electric energy	Heat, fuel
	MWh	MWh	MWh	MWh
Buildings	40 400	94 172	41 860	64 268
Transport		16 121		22 175
Local heat-generating plant		52 784		58 744
Total	**40 400**	**163 076**	**41 860**	**145 186**
Altogether		**203 476**		**187 046**
Reduction				**16 430**
				8.1%

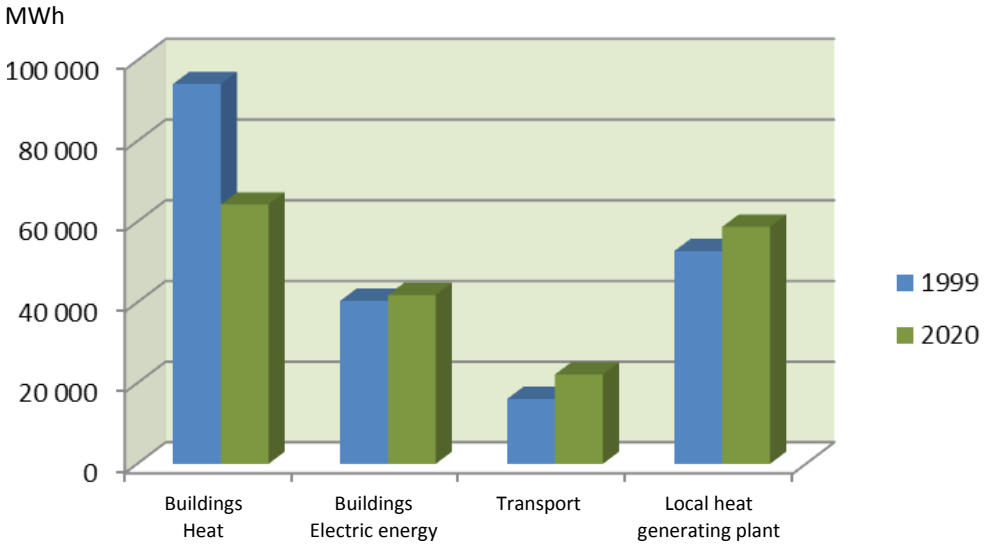

Fig. 9 The base and forecasted balance of fuel and energy for the Town of Ustka

1.11.2. Action schedule

1.11.2.1. Thermomodernization of public utility services

The estimated effect of the reduction of CO_2 emission: 1298 tons/year

The result considers lowering energy consumption in present buildings and construction of new buildings of low energy demand.

1.11.2.2. Thermomodernization of residential buildings

The estimated effect of the reduction of CO_2 emission: 7566 tons/year

The result considers thermomodernization of existing buildings and the increase in the heated area in the town.

1.11.2.3. Modernization of the energy source

The estimated effect of the reduction of CO_2 emission: 845 tons/year

The result considers the increase in production and supplying the heat to the receivers due to the increase in the share of the district heating in the balance of the coverage of receivers' needs.

1.11.2.4. Modernization of the street lighting

The estimated effect of the reduction of CO_2 emission: 924 tons/year

It will be conducted in accordance with the approved optimal scope of actions.

1.11.2.5. Introduction to the tenders for the purchase of environmental energy

The estimated effect of the reduction of CO_2 emission: indirect effect

The purchase of electric energy from the supplier of a big share of energy from renewable sources will cause that the emission resulting from generating this energy will decrease in spite of the increase in the consumption of electric energy.

1.11.2.6. Changes of inhabitants' behaviour through promotion and education actions

The estimated effect of the reduction of CO_2 emission: indirect effect

Promotion and information campaign will cause the increase of the activity of inhabitants, administrators and owners of the buildings in the scope of thermomodernization of buildings and decrease in the energy carriers consumption.

1.11.2.7. Monitoring of energy consumption

The estimated effect of the reduction of CO_2 emission: indirect effect

The Town will monitor the energy consumption in the next years and take correct actions if the case arises.

1.11.2.8. CO_2 emission balance in the year 2020

The CO_2 balance was presented in the Appendix to this study.

The base balance of CO_2 and the balance for the year 2020 were presented below.

	1999		2020	
	Electric energy	Heat, fuel	Electric energy	Heat, fuel
	tons/year	tons/year	tons/year	tons/year
Buildings	39 996	23 214	33 069	12 580
Transport		4 034		5 078
Local heat-generating plant		18 348		17 503
Total	**39 996**	**45 597**	**33 069**	**35 161**
Altogether		**85 593**		**68 230**
Reduction				**17 362**
				20.3%

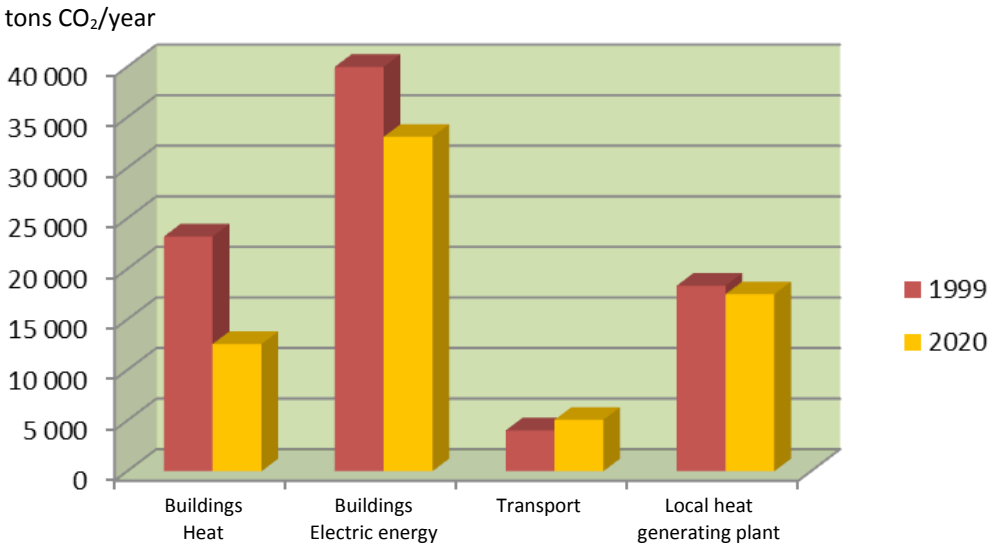

Fig. 10 Base and forecasted CO_2 emission balance of the Town of Ustka

The intended actions will lead to the decrease in the CO_2 emission by **17 362 tons / year** which gives **20.3%** in comparison to the base year.

In addition to this the Town of Ustka will conduct campaigns to propagate technologies using renewable sources of energy and improvement of energy efficiency through organizing annual Energy Days (seminars, contest at schools, brochures, information of the web page of the Town of Ustka). Such actions will for sure contribute to the decrease in the emission into the atmosphere, however due to the fact that the estimation of the amount of this reduction is difficult and it would be burdened with a big error , the influence of those actions was omitted in the calculation of ecological effect.

Summary of expenditures and effects

SECTORS and fields of actions	MAIN actions/measures per field of action	Responsible department, person or company (in case of involvement of third parties)	Estimated costs per action/measure	Expected reduction of CO_2 emission per measure [t/ar]	Goal in the scope of reduction of CO_2 emission per sector [t] in 2020
BUILDINGS, EQUIPMENT/DEVICES					15561
Buildings, equipment / municipal devices	Thermomodernization	Commune of the Town of Ustka Department of Municipal Infrastructure and Environmental Protection, Social Housing Association of Ustka	2453294	1298	
Buildings, equipment / service devices (non-municipal)	Thermomodernization	owners	n/a	0	
Residential buildings	Thermomodernization	inhabitants	2160000	7566	
Municipal public lighting	Modernization	Commune of the Town of Ustka Department of Municipal Infrastructure and Environmental Protection	990000	924	
Industry (excluding plants included in the European Emission Allowance Trading Scheme – ETS) services and Small and Medium Companies.		companies	n/a	5773	
TRANSPORT:					-1044
Public transport	park&ride	Commune of the Town of Ustka Department of Municipal Infrastructure and Environmental Protection	600000	6	
Private and commercial transport		owners		-1049	
LOCAL HEAT ENGINEERING / REFRIGERATING ENGINEERING MUNICIPAL , COGENERATION:					845
Municipal heat-generating plant	Connecting local boiler houses to the network	EMPEC + the Town of Ustka	5500000	845	
SPATIAL DEVELOPMENT:					
Strategic spatial management		The Commune of the Town of Ustka Department of Spatial Management			
Transport /mobility planning		The Commune of the Town of Ustka – Department of Local Development and European Integration			
PUBLIC TENDERS FOR PRODUCTS AND SERVICES:					2000
Requirements / norms in the scope of energy efficiency		The Commune of the Town of Ustka – Department of Municipal Infrastructure and Environmental Protection			
Requirements / norms in the scope of renewable energy		The Commune of the Town of Ustka – Department of Municipal Infrastructure and Environmental Protection		2000	
COOPERATION WITH CITIZENS AND PARTIES CONCERNED:					
Advisory services		The Commune of the Town of Ustka – Department of Local Development and European Integration			
Financial support and subsidies		The Commune of the town of Ustka – Department of Local Development and European Integration and Department of Municipal Infrastructure and Environmental Protection			
Increasing consciousness and creating local network of contacts		The Commune of the Town of Ustka – Department of Local Development and European Integration			
Training and education		The Commune of the Town of Ustka – Department of Local Development and European Integration			
Organization of Energy Days		The Commune of the Town of Ustka – Department of Local Development and European Integration	10000		
		Costs on the part of the Town of Ustka and EMPEC	6 213 294.00	TOTAL:	17362
		Costs on the part of inhabitants	2 160 000.00		

Monitoring and evaluation of actions implementation

It is proposed to carry out monitoring and evaluation of implementation of the Action Plan every 3 years along with the Updating of the Assumptions to the heat, electric energy and gas fuel supply scheme in accordance with the provisions of the Energy Law. Such an approach is justified both in an economic and organizational way.

Literature and sources

1. The spatial Development Plan of the Pomeranian Voivodeship (the year 2009)
2. The development strategy for the Town of Ustka by the year 2020 (the year 2008).
3. The tourism development strategy for the Commune of the Town of Ustka for the years 2007-2013 (the year 2006)
4. Draft guidelines for heat, energy and gas fuel supply plan for the Town of Ustka (the year 2011)
5. The feasibility study for the investment task: Complex modernization of the street and road lighting in the Town of Ustka (the year 2011)
6. The transport study of the Town of Ustka
7. The long term investment plan for the Town of Ustka
8. The data obtained from the Town of Ustka Office and EMPEC company
9. The energy policy for Poland by the year 2030
10. The National Action Plan concerning energy efficiency (2007)
11. The Directive 2006/32/EC on energy efficiency
12. The Directive 2009/28/EC on Renewable Energy Sources
13. The Directive 2010/31/EC on energy performance of buildings
14. The Covenant of Mayors – Toolbox of Methodologies on Climate and Energy