



**Warsaw  
Energy**

Use Sensibly!



# SUSTAINABLE ENERGY ACTION PLAN FOR WARSAW IN THE PERSPECTIVE OF 2020

## SYNTHESIS

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*Ladies and Gentlemen,*

*The City of Warsaw, aspiring to become the “green metropolis”, sets itself a perspective goal of ensuring a high standard of living for its residents in conditions of sustainable development and respect for the natural environment. Like other cities in our region we approach issues related to climate protection with care because we are aware of the risks coming from the negative effects of progressive climate changes stimulated by civilization development.*

*Bearing in mind that only through joint, coordinated efforts we can contribute to reduction of emission of solid pollutants and greenhouse gases to atmosphere, Warsaw actively participates in projects related to climate protection.*

*In February 2009 Warsaw joined the “Covenant of Mayors”, initiative under the patronage of the European Commission, associating European Local Governments acting on rational management of energy and to limit climate change. Following signing the “Covenant of Mayors”, on September 8th 2011 City of Warsaw adopted a Sustainable Energy Action Plan for Warsaw in the perspective of 2020 (SEAP). It is the first document of this magnitude that presents an integrated approach to energy management at the level of Warsaw local government.*

*Implementation of SEAP shall bring direct and tangible benefits for Warsaw residents. The pursuit to reduce energy consumption and related solid pollutants and GHG emission will improve air quality, greater attention to efficient and rational use of energy will reduce household bills for energy, while strengthening preferences for public transport will be an impulse for developments, which in consequence will allow Warsaw residents to use public transport more comfortably.*

*Transport is one of the key sectors from the perspective of SEAP. A part of the tasks written in *The Transportation System Of Warsaw: Sustainable Development Strategy up to the year 2015 and successive years* are important projects that will contribute to achieving the objectives of SEAP. The strategy assumes that in spite of growing individual transport, a key role in the transportation system of Warsaw will be played by mass rail transportation, and its quality will decide on the proper functioning of agglomeration and in particular its downtown area.*

*The awareness that safe, fast and convenient public transport will be the biggest incentive for the residents of Warsaw to move from their own cars to buses, metro or trams and therefore reduce the harmful effect on environmental and living conditions, is the impulse to the implementation of multiple transport investments.*

*However, we must remember that the key to the success of SEAP are comprehensive and coordinated actions at various levels of management in many areas. The success of actions outlined in the document will be determined by involvement of all stakeholders. It means sound cooperation of city units, external institutions, companies and Warsaw residents, which undoubtedly will be coupled with a significant utilization of funds, including those resulting from the new EU financial perspective 2014-2020.*

*Considering the extent and scale of activities envisaged in SEAP till 2020, Warsaw has the opportunity to become a model of involvement in environmental and climate issues and leader in the implementation of large-scale programs in energy efficiency not only in Poland, but also in Central and Eastern Europe. Warsaw gives a good example to other cities in the contexts of sustainable energy policy, building of effective, environmental-friendly public transportation system and development of prosumer renewable energy on urban areas.*

*It is worth emphasizing that the activity of the City of Warsaw for climate protection and sustainable development is noted and appreciated by international society. It was manifested by entrusting organization of United Nations Climate Change Conference COP19 in Warsaw in November 2013. This world's largest event of this nature provides an excellent opportunity to present attendees a modern and developing not only fast, but also with respect for surrounding environment and principles of City sustainable development.*

*In support of that view Warsaw Integrated Sustainability Report 2013 was created in August 2013 in accordance to the methodology and latest guidelines G4 developed by GRI – The Global Reporting Initiative, which aim to support organizations in determining its objectives, measuring their effectiveness and making changes leading to more sustained effects of their actions.*

*Warsaw Report is the first worldwide document of this rank, that characterizes and assesses local government actions in a comprehensive manner and in which many aspects of actions conducted by and in the city is shown – beginning from the development of infrastructure through projects that have impact on increasing energy efficiency, environmental protection to all kind of practices that make city more sustainable, friendly and close to its inhabitants, tourists and various institutions functioning in its territory. Such a broad approach presents an excellent opportunity to demonstrate transparency and pragmatism in the activities of the City and the fact of creation of municipal document of this nature has become an example of good practices, worthy of wide dissemination among other cities.*

  
Hanna Gronkiewicz-Waltz  
Mayor of Warsaw

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# 1. Introduction

Pursuant to Resolution No. XLIX/1495/2009 of Warsaw City Council dated 5 February 2009, on 10 February 2009, the City of Warsaw joined the “*Covenant of Mayors*” involving European Local Governments in actions aimed at the improvement in the field of energy efficiency and climate protection. The initiative was developed under the patronage of the European Commission, and its main goal is to go beyond the aims set for EU till 2020 of reduction of CO<sub>2</sub> emissions in cities by at least 20% through implementation of Sustainable Energy Action Plans.

The key document developed under this initiative and adopted by the Warsaw City Council on 8 September 2011 is the *Sustainable Energy Action Plan for Warsaw in the perspective of 2020 – SEAP*. Complete document is available in “Dokumenty” section at the website:

[www.infrastruktura.um.warszawa.pl](http://www.infrastruktura.um.warszawa.pl)



The ceremony of signing the Covenant of Mayors, Brussels, 10 February 2009. Phot. Paul O'Driscoll

Its intention is to suggest to the City's institutions, residents of Warsaw and all of the stakeholders functioning in the City potential directions and methods of action, concerning the sustainable energy consumption in Warsaw within a perspective until the year 2020, in connection with the objectives of the EU energy policy of the reduction in the emissions of CO<sub>2</sub>, increasing energy efficiency and increase in the share of RES in energy production.

The plan includes, in particular, a list of activities undertaken in the following areas:

- construction, including new and exhaustively retrofitted buildings,
- city infrastructure, i.e. heat distribution networks, street lighting systems, etc.
- land management and urban planning,
- renewable energy sources,
- transportation policy,
- civil, in the area of the involvement of residents,
- the pro-efficiency behaviour of residents, consumers and enterprises.

The implementation of actions contained in the *SEAP* will bring direct benefits to the residents of Warsaw among others in the form of:

- improvement in comfort and reduction in travel time in the means of public transport due to the priority role given for public transport in the City,
- improvement of air quality by reducing emissions of gases and solid pollutants in energy facilities and public transport as a result of the transition to alternative fuels and the use of renewable energy sources (RES),
- increase in the degree of energy security of the City and a significant reduction in maintenance costs of residential buildings and public buildings by reducing energy consumption as a result of comprehensive thermal retrofit activities, modernization and replacement of lightning, office equipment and household appliances and the introduction of energy consumption processes management.

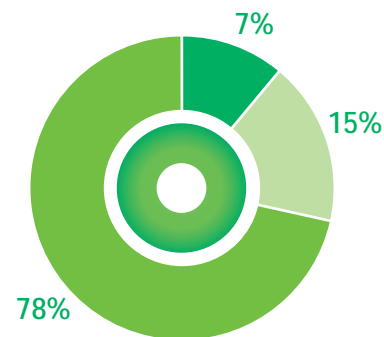
## 2. Warsaw today

The main source of greenhouse gas emissions in Warsaw is the energy sector, which represents 78% of the share in the total emissions. Emissions from transport accounts for 15% of the total greenhouse gas emissions in Warsaw. Passenger cars have the largest share of emissions from transport. In Warsaw 40% of all travel takes place within individual transport. This type of transport generates nearly 60% of pollution on a global basis and nearly 80% of the pollution emitted locally. Trucks and vans have little impact on the level of emissions in Warsaw. 32% of travels occurs by buses. The emission of pollution caused by buses is at a level below 6%, taking into account global emissions, and 7.5% in the structure of local emissions. Other travels, whose share is estimated at 28%, take place in the rail transportation like trams, metro and trains. The smallest share of the total greenhouse gas emissions is from the municipal waste management sector and the municipal wastewater treatment process – in 2007, just over 7%. This is the only area where there has been a gradual reduction in greenhouse gas emissions. This is mainly due to the investments implemented in this sector – the expansion of the “Radiowo” compost plant and the construction of Municipal Solid Waste Incineration Plant (former ZUSOK, now OUZ 2). The following chart shows the shares of major sectors of greenhouse gas emissions in Warsaw.



Municipal Solid Waste Incineration Plant Phot. from the archives of the Municipal Solid Waste Incineration Plant.

- Waste management and the wastewater treatment process
- Transport
- Production of electricity and heat



Total emissions of greenhouse gases in Warsaw

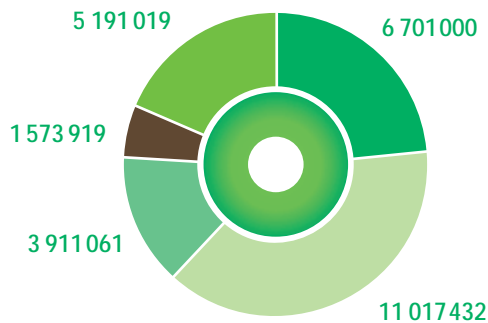


### 3. The objective of the *SEAP* for the improvement of energy efficiency and reduction in greenhouse gas emissions

Determining the value of the objective of the *SEAP* for the improvement in energy efficiency and reduction in greenhouse gas emissions, the base year 2007 has been adopted as the basis for the *SEAP*. The value of the environmental objective that cannot be exceeded in 2020, in *Sustainable Energy Action Plan for Warsaw in the perspective of 2020*, was estimated at 80% of CO<sub>2</sub> emissions in the base year 2007, that is – 10 362 387 Mg CO<sub>2</sub>/year. Additionally adopted auxiliary indicative objective of 80% of energy consumption in 2007 means that the maximum energy consumption in 2020 should not exceed 22 715 545 MWh/year.

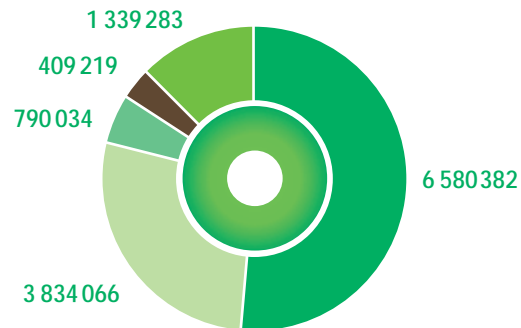
Energy consumption and carbon dioxide emissions for the base year 2007 are shown on the charts below divided by type of energy carriers.

- Electricity
- Network heat
- Heat from natural gas
- Heat from burning other energy carriers
- Transport – liquid fuels



Energy consumption in Warsaw in 2007 [MWh/year]

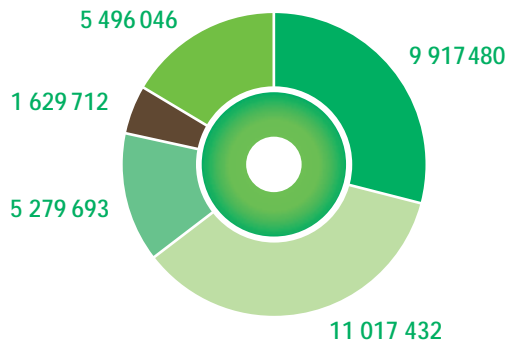
- Electricity
- Network heat
- Heat from natural gas
- Heat from burning other energy carriers
- Transport – liquid fuels



CO<sub>2</sub> emissions in Warsaw in 2007 [Mg/year]

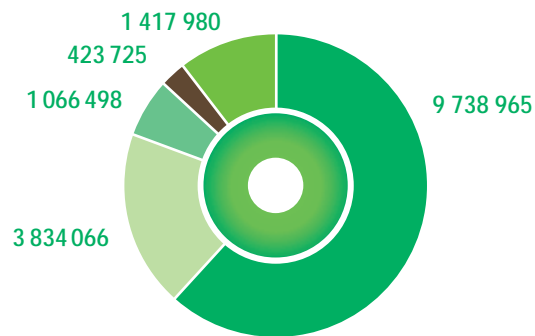
The following charts show the scenario of energy consumption and CO<sub>2</sub> emissions for 2020 which meets the price requirements of 2007 for energy carriers and, as existing in 2007, support mechanisms of the energy efficiency increase and renewable energy sources applications (“business as usual” – i.e. when not taking any corrective actions).

- Electricity
- Network heat
- Heat from natural gas
- Heat from burning other energy carriers
- Transport – liquid fuels



The scenario of energy consumption in 2020 not taking into account the activities included in *SEAP* (“business as usual”) [MWh/year]

- Electricity
- Network heat
- Heat from natural gas
- Heat from burning other energy carriers
- Transport – liquid fuels



The scenario of CO<sub>2</sub> consumption in 2020 not taking into account the activities included in *SEAP* (“business as usual”) [Mg/year]

## 4. Activities for the improvement in energy efficiency and the reduction in greenhouse gases emissions

In order to fulfil the commitments of Warsaw under the “*Covenant of Mayors*”, CO<sub>2</sub> emissions should be significantly reduced by 6 118 995 Mg per year. Additionally for the implementation of the *SEAP* a wide range of actions on energy efficiency should be taken, which as a result allow to obtain savings in energy consumption of 10 538 185 MWh per year.

The success of the *Sustainable Energy Action Plan for Warsaw in the perspective of 2020* will depend on the appropriate stimulation of investments through information campaigns and the financial commitment of the City in such a way as to be able to launch these investments, which will result in budget savings to be used in subsequent years of the *SEAP* implementation. Bearing it in mind, the City will draw special attention to launching potential in the fields of transport and building construction.

### 4.1. Activities in the housing sector

The housing sector is very important from the standpoint of *SEAP*. According to Central Statistical Office data at the end of 2012 the housing stock of Warsaw consists of almost 873 thousand apartments. Households are largely responsible for CO<sub>2</sub> emissions from the City, *inter alia*, due to a high demand of this sector for heat and electricity.

Expenditures associated with the maintenance of buildings in Poland are much higher than in most European Union countries. This results not only from the rising prices of electricity and heat, but also from the fact that a large part of housing resources in Warsaw are buildings constructed in inefficient technologies, in particular panel buildings constructed of pre-fabricated concrete, built at a time when energy costs were not high, so nobody paid attention to the use of solutions that would result in the more efficient use of energy.

Given the above, it can be concluded that there is a significant potential for reducing CO<sub>2</sub> emissions in the housing sector which can be utilized through complex thermal retrofitting activities, replacement of indoor lighting, and also replacement of equipment used at home with more energy efficient units. These activities, in addition to the fulfilment of the assumptions of the *SEAP*, will give direct benefits to the residents of Warsaw in the form of lower bills for energy.

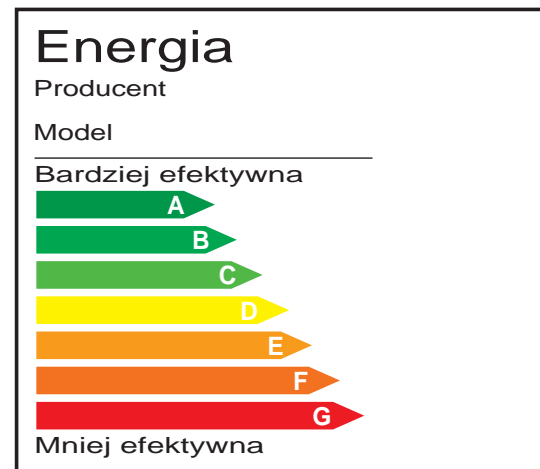


Works on thermal retrofit (insulation) of a residential building.  
Phot. from the archives of the Infrastructure Department.

It should be noted that to obtain the desired effect, the most important activity in this sector, which is the thermal retrofit of buildings, should be carried out comprehensively, so it should involve not only the insulation of walls, roofs, floors, foundations, etc., but also the improvement of the ventilation system, the replacement of external doors, windows, the modernization of the heating system and, where possible, the use of equipment using energy from renewable resources and Energy Management Systems.

Activities in the housing sector should include:

- comprehensive thermal retrofit of all residential buildings to the extent and in standard close to the Thermal Retrofit Act,
- modernization of heat sources and distribution networks (e.g. the replacement of the local heat source by a source with a higher efficiency),
- modernization of indoor lighting,
- replacement of electronic equipment, ITC, household appliances: "cold" (refrigerator-freezers), "wet" (washing machines) and "hot" (electric ovens),
- reduction in heat demand for the preparation of hot tap water by increasing the efficiency of its preparation systems.



Energy efficiency classes for household appliances.

## 4.2. Activities in the construction sector

Due to the continuous influx of people who want to live and work in Warsaw, the construction sector is one of the fastest-growing areas in the City.

Construction investments are currently carried out in better technologies. Nevertheless, all advances in technology should be used to enrich construction sector, among others:

- passive houses,
- low-energy houses,
- energy-efficient houses.



Environmentally-friendly building RONDO 1, Warsaw, UN roundabout, Phot. Z. Panów ([www.um.warszawa.pl](http://www.um.warszawa.pl))

## 4.3. Activities in the public sector of the City of Warsaw

The City of Warsaw has been promoting sustainable development in all areas of its activities. Therefore, it is vital to use for the *SEAP* realization the potential inherent in investments in the public sector and in energy management in public buildings.

The comprehensive thermal retrofit of both public facilities (schools, hospitals, offices, etc.), and the resources of municipal residential buildings, will not only reduce energy consumption and thereby CO<sub>2</sub> emissions and electricity costs, but will also be an example to other investors.

Energy management takes place through the monitoring of energy consumption and expenditures carried out using conventional methods and remote IT systems.

The activities in the public sector should include:

- comprehensive thermal retrofit of municipal residential buildings and public buildings to the extent and in standard close to the Thermal Retrofit Act for facilities maintained by the City,
- energy management,
- modernization of the means of heat supply (e.g. the replacement of the local heat source by a source with a higher efficiency),
- modernization of indoor lighting,
- modernization of street and outdoor lightning,
- replacement of office equipment,
- reduction of heat demand for the preparation of hot tap water by increasing the efficiency of its preparation systems,
- organisation of educational and information campaigns.



Luminaries with energy efficient, high pressure sodium lights. Their share in the total number of all light sources in Warsaw is nearly 78%. Phot. A. Sobieraj (The Municipal Roads Authority).

## 4.4. Activities in the transport sector

Transport is a key sector in terms of the *SEAP*. Reducing CO<sub>2</sub> emissions in this sector requires the involvement of the City authorities, business and the residents of Warsaw. The implementation of part of the tasks listed in *The Transportation System Of Warsaw: Sustainable Development Strategy up to the year 2015 and successive years* are important ventures contributing to the fulfilment of the objectives of the *SEAP*.

The *Strategy*, which includes "The Sustainable Development Plan for Warsaw's Public Mass Transit System", was adopted by Warsaw City Council by the Resolution No. LVIII/0749/2009 of 9 July 2009. The *Strategy* assumes that in spite of development of individual motorization, mass rail transport will play the key role in the Warsaw transportation system and its quality will define the efficient functioning of the agglomeration (metropolitan area), especially its downtown area.



Modern PESA tram. Phot. Z. Panów  
([www.um.warszawa.pl](http://www.um.warszawa.pl))



The Warsaw metro. Phot. S. Sadowski  
(the Roads and Public Transportation Department archives)





Traffic Management Center in Warsaw City Hall. Phot. S. Sadowski (the Roads and Public Transportation Department archives)



Solaris Urbino 18 Hybrid  
phot by. Mirosław Kaźmierczak (ZTM)

The recipients of the *Strategy* are:

- inhabitants of Warsaw and its metropolitan area using an individual and/or public transportation system,
- business entities in Warsaw and its agglomeration (currently operating and considering to operate in agglomeration area) using the Warsaw transport system to achieve their economic goals,
- local authorities, municipal entities, including municipal companies, for which the *Strategy* will set the program for the development of the transport system and influence on decisions concerning development of spatial planning,
- planners and designers of the transportation system for which the *Strategy* will set the rules for creating different subsystems and the way to solve their individual elements,
- economic entities having an impact on the transportation system (responsible for the subsystems such as rail), for which the *Strategy* will be one of the factors in the decision making for the development of this subsystem.



Urban Rapid Rail (Warsaw Public Transport Authority archives)

The aim of the *Strategy* is to meet the expectations of the inhabitants of Warsaw on the improvement of living standards, the development of the capital city and preservation of values of natural and historical environment. Meeting these expectations is realized with the ever-increasing mobility of society, with the regard to the need to:

- make Warsaw the city competitive with other Polish and European cities,
- adapt transport system to a dynamic spatial and demographic transformations,
- maintain a high economic growth rate of the City,
- reduce the negative impact of transport on the environment and living conditions,
- ensure the transport and personal safety of Warsaw inhabitants.

The main tasks performed by the Warsaw authorities are not only to modernize transport and road system, including public transport, cycling and pedestrian traffic, but also to lead to the change in the use of the transport system by the citizens of Warsaw in such a way that it moves to grow a number of people moving on foot or using public transport and bicycle instead of a car.

Implementation of these tasks will ensure the development of Warsaw in the long term, while restoring the quality of urban space, especially in the downtown area. This will also cause the positive influence of the transport system on the health of residents and the environment.



Bus lane. (Warsaw Public Transport Authority archives)

It should be noted that ensuring the efficient functioning of the transportation system depends not only on the decisions and actions of the authorities of Warsaw, but also on the decisions taken in its surroundings (neighboring municipalities and counties and authorities of Mazovian Voivodship) and at national and European level. Hence *The Transportation System Of Warsaw: Sustainable Development Strategy up to the year 2015 and successive years* and its goals and means of implementation are in line with the Mazovian Voivodship Development Strategy, National Cohesion Strategy and the policies and programs of the European Union. The *Strategy* refers to the basic documents of the European Union concerning transport (“European Transport Policy for 2010: Time to Decide”, the Sustainable Urban Transport Plans (SUTPs) and urban environment: Policies, effects, and simulations) and reports of Expert Working Group on Sustainable Urban Transport Plans. It takes into account both the need for modernization and development of public transport, as well as rationalizing the environmentally sustainable use of private car transport.



Bicycle path. Phot. M. Utkin (the Roads and Public Transportation Department)



Bicycle stand. Phot. S. Sadowski (Roads and Public Transportation Department archives)

The *Strategy* stipulates the implementation of the following eight tasks, which are of fundamental importance to Warsaw public transportation system development:

1. The establishing of an institution managing and coordinating public transportation system within the area of the Warsaw agglomeration,
2. Modernization and development of the tramway system,
3. Continuation of subway system development,
4. Improvement of railroad transportation efficiency improvement,
5. Transportation system integration,
6. Improvement of urban and suburban bus transportation,
7. Rolling stock replacement, and
8. Rationalization of public transportation routes (routing).

Warsaw has a relatively well-developed rail network. The largest passenger flows are observed on the directions to the city center, where extensive system of tram (3 routes on the east-west and four routes on the north-south), metro and rail routes is created. The quality of the system and thus its competitiveness in relation to the individual transport is regularly improved.

Public transport, organized by the Public Transport Authority, carries out more than a billion passengers a year. Rail systems: rail, metro and most of all trams transport more than 40 million passengers per month – 48% of all passengers transported by Public Transport Authority.

The share of individual systems is as follows:

1. Warsaw Tramways – 22.2 million (24.6%)
2. Warsaw Metro 16.5 – million (18.3%)
3. Urban Rapid Rail – 1.4 million (1.5%)
4. Mazovian Rail and Warsaw Suburban Railroad (WKD) within the common ticket zone, respectively: 2.7 million (3%) and 356 thousand passengers (0.4%)
5. The remaining 52.2% – 47.2 million passengers per month carrying city buses.



Map of the P&R car park localizations, from the archives of Warsaw Public Transport Authority



P&R car park. Phot. S. Sadowski (the Roads and Public Transportation Department)



"Veturilo" public bike stand. "Warsaw bicycle report 2012" (the Roads and Public Transportation Department archives)

As previously mentioned City attaches great importance to the leading role of public transport in the lives of the inhabitants of Warsaw. Awareness of the authorities that having safe, fast and convenient public transport will be the biggest incentive for Warsaw inhabitants to change their own cars to the bus, metro or tram, and thus reduce the harmful impact on the environment and living conditions, is the impulse for the implementation of many investments in transport sector.

Activities persuading residents of Warsaw to choose public transport are: the exchange of rolling stock, the development of the metro, expansion of "Park & Ride" car parks and associated transport nodes, common ticket for public transport means.

Already metro rolling stock and its infrastructure, Urban Rapid Rail (SKM) trains, almost 100% of the bus fleet and 40% of the tram is tailored to the needs of people with disabilities. Also used on rolling stock solutions for engines and propulsion systems allow to meet the increasingly demanding standards of energy.

However, in order to reduce CO<sub>2</sub> emissions, one step further should be made. The improvement in the Integrated Traffic Management System and road investments associated with it, the training of professional drivers and users of private cars in eco-driving and the dissemination of alternative fuels are all measures that will enhance the implementation of the *SEAP*.



"Veturilo" public bike. (Warsaw Public Transport Authority archives)

Effective actions involving the influence on the reduction of transport fuel consumption and pollution emissions from transport in Warsaw include:

- Integrated Traffic Management System (ITMS),
- Urban Transport Management System,
- replacement of vehicular and rolling stock (e.g. by buses using alternative fuels),
- precedence of public transport vehicles by setting bus-only lanes,
- creation of transport nodes,
- development of Park & Ride car park systems,
- construction of the second metro line,
- development of the bicycle lanes system,
- training of drivers in eco-driving,
- promotion of public transport, e.g. "The Car-Free Day", "Public Transport Days", "European Sustainable Transport Week"

## 4.5. Activities in the trade, industry and services sectors

The activities in the trade, industry and services sectors largely overlap with the activities that have been planned in the housing and public sectors. Similarly, huge potential lies in the comprehensive thermal retrofit of buildings, the modernisation of lighting and the replacement of office equipment.

It should be noted that in order to achieve results in this sector, the city should inform and educate entrepreneurs and owners of buildings, making them aware that the changes they should introduce are beneficial and in the long run they will have a positive impact on their budget, although they require financial contributions. Thanks to these types of effort they will consume less energy, so they will pay smaller bills and will be able to show that they work for climate protection.

The tasks to be implemented in the trade, services and industry sectors include:

- comprehensive thermal retrofit of all buildings to the extent and in standard close to the Thermal Retrofit Act,
- modernization of the means of heat supply (e.g. the replacement of the local heat source with a source with a higher efficiency),
- modernization of indoor lighting,
- replacement of office equipment,
- replacement of propulsion and control and basic equipment with energy efficient installations,
- reduction in heat demand for the production of hot tap water by increasing the efficiency of its preparation systems.



Computer monitors – the replacement of office equipment with new one. Phot. from the archives of the Infrastructure Department



## 4.6. Activities in the transmission and distribution of energy sector

Energy production in Poland is still largely based on the use of traditional energy sources, such as hard coal and brown coal, with a small percentage of electricity generated by hydropower plants. Renewable energy is just beginning to be applied on a larger scale. In recent years the awareness of the environmental damages caused by conventional energy has significantly increased, so striving for the following improvements is conscious:

- reduction in electricity and heat consumption due to, among others, utilization of new technologies,
- use of RES for generation of electricity and heat,
- modernization of the heating network
- adaption of the grid to work with the RES
- prosumer energetics development.



Solar panels on the building of the Schools Complex No. 113 with Bilingual Sections at Olgierda St. in Warsaw. Phot. from the archives of the Infrastructure Department



A biomass storage in the Żerań Heat and Power Plant. Phot. from the archives of Vattenfall

## 5. Guidelines for institutions on the activities relating to the implementation of the *Sustainable Energy Action Plan for Warsaw in the perspective of 2020*

All municipal institutions, regardless of the degree of involvement in the implementation of the *Sustainable Energy Action Plan for Warsaw in the perspective of 2020*, should be guided by the following principles:



Bicycle stand in front of the Warsaw City Hall. Phot. M. Utkin (the Roads and Public Transportation Department)

- utilization of green public procurement procedures in the purchase of equipment, vehicles and services,
- implementation of energy management systems in the institutions' buildings,
- introducing procedural and investment facilitation for investors in the field of energy conservation and RES,
- cooperation with organisations dealing with energy conservation and renewable energy sources,
- carrying out informational activities among the employees and visitors to the institutions through the deployment of instructions and posters on energy conservation in public places,
- gathering and providing information relating to the tasks arising from the implementation of the *SEAP* in order to carry out integrated informational activities,
- introducing environmentally-friendly solutions in the institutions (bicycle stands, two-sided printing of the documents, etc.).

## 6. Financing activities included in *SEAP*

Financing the investments included in the *SEAP* depends on who is the implementing party of the given measure.

The sources of financing energy efficient investments can be generally divided into two categories:

1. own resources of the owners of the elements of infrastructure or its equipment,
2. external funds which can be obtained in the following most common forms:
  - commercial loans,
  - loans on preferential repayment conditions,
  - non-repayable grants,
  - guarantees,
  - contracts on the repayment of investments from obtained savings (ESCO).

While as a financial instrument can be understood a term meaning a pattern of spending funds referred to above, aimed at achieving the intended objective.

In the context of this study financial instruments are presented which will be used to achieve the objectives related to reducing greenhouse gas emissions to the atmosphere.

Table 1. The methods of financing projects in the years 2010-2020

NO.	ACTIVITY	CAPITAL EXPENDITURE (PLN)	METHOD OF FINANCING *)
1.	The comprehensive thermal retrofit of municipal residential buildings and public buildings to the extent and in standard close to the Thermal Retrofit Act	155 000 000	<ol style="list-style-type: none"> <li>1. Own resources of the given entity</li> <li>2. Contributions of Dalkia Warszawa S.A. and PGNiG Termika S.A. according to the currently-adopted patterns of action implemented under the project "Network heat in municipal buildings"</li> <li>3. Thermal retrofit loans with a premium from the Thermal Retrofit and Renovation Fund</li> </ol>
2.	The comprehensive thermal retrofit of public buildings to the extent and in standard close to the Thermal Retrofit Act for facilities utilised by the City	764 873 000	<ol style="list-style-type: none"> <li>1. Own resources of the given entity</li> <li>2. The European Union instrument ELENA, providing up to 4.5% of the planned expenditures for the purpose of the preparation of investments in buildings, i.e. conducting energy audits, elaboration of tender, technical and project documentation and the creation of a database on the technical condition of buildings and energy consumption by them, wherein the investment in this area has to start within 3 years from the date of signing the agreement on co-funding from ELENA instrument.</li> <li>3. Funds from the National Fund for Environmental Protection and Water Management in the form of 30% non-repayable grant (according to the current rules of the Green Investment Scheme, GIS, Priority Programme 1: Energy management in public buildings)</li> <li>4. Funds from the National Fund for Environmental Protection and Water Management in the form of a loan covering 60% of the capital expenditure, which can be obtained for a period of 15 years with a grace period for the repayment of capital instalments of up to 18 months (according to the current rules of the Green Investment Scheme, GIS, Priority Programme 1: Energy Management in public buildings)</li> <li>5. A thermal retrofit loan with a thermal retrofit premium from the Thermal Retrofit and Renovation Fund (not more than 16% of the expenditure, 20% of the loan and 2 times the annual cost savings of heat)</li> </ol>

3.	The modernisation of indoor lighting	4 000 000	<ol style="list-style-type: none"> <li>1. Own resources of the given entity</li> <li>2. Loans, bonds</li> </ol>
4.	The modernisation of street lighting	161 040 000	<ol style="list-style-type: none"> <li>1. Own resources of the given entity</li> <li>2. The European Union instrument ELENA, providing up to 4.5% of the planned expenditures for the purpose of the preparation of the investment, i.e. preparation of the feasibility study, technical and tender documentation, wherein the investment in this area has to start within 3 years from the date of signing the agreement on co-funding from ELENA instrument</li> <li>3. The implementation of the investment in the ESCO system, from the funds of the contractor of the investment, repaid by the disposer from the savings obtained</li> </ol>
5	The replacement of office equipment	2 000 000	<ol style="list-style-type: none"> <li>1. Own resources of the given entity</li> <li>2. Loans, bonds</li> </ol>
6.	The implementation of part of the tasks listed in the <i>The Transportation System Of Warsaw: Sustainable Development Strategy up to the year 2015 and successive years</i>	3 844 600 000	<ol style="list-style-type: none"> <li>1. Own resources of the given entity</li> <li>2. From the funds of the European Union programmes</li> </ol>
7.	Informational campaign	650 000	<ol style="list-style-type: none"> <li>1. Own resources of the given entity</li> <li>2. From the funds of the European Union programmes</li> </ol>
	Total	4 932 163 000	

\*) The method of financing is given as an example in the conditions existing in the first half of 2013.

## 7. Information and education

One of the most important actions which the authorities of Warsaw may put into motion are information and educational activities that aim at familiarising the residents with the *SEAP*, its objectives, actions, impact and the benefits from its implementation, so that the residents would become more environmentally conscious.

Changing behaviour as far as energy efficiency is concerned, by raising awareness among the residents of Warsaw on this subject, is essential for achieving the objectives of the *SEAP*. Promoting knowledge on energy efficiency, the dissemination of information on the need for pro-environmental behaviour (using energy-efficient devices, products and technologies) and shaping attitudes and behaviour towards the rational use of energy in everyday life – all these activities will help Warsaw to achieve a 20% reduction in CO<sub>2</sub> emission by 2020 comparing to the base year 2007.

Information campaigns aimed at the residents, investors, public transportation employees and City officials, as well as educational campaigns for children, youth and adults, will increase awareness and allow to form good habits among Warsaw citizens related to efficient use of energy and choices of the means of transport and purchasing energy-efficient devices for their households.



An electric vehicle presented during Picnic with Climate. Photo from the archives of the Infrastructure Department.

For many years the City of Warsaw has been organising and actively participating in many actions, campaigns, pro-environmental events in which the residents are being educated on climate changes, environmental protection and sustainable development.

Such actions include:

- A Picnic with Climate, an event organized within the framework of the “Partnership for Climate” – a platform of cooperation for common actions preventing climate changes and to highlight the threats connected with them, created under patronage of the Ministry of Environment and continued by the City of Warsaw. This event has been organized in Warsaw since 2008. Adults and children can among others take part in discussions about climate, in numerous quizzes and family competitions. There is also a presentation on green products. The Picnic is organized by the City of Warsaw, with a support from the Partners for Climate – organizations and institutions representing diverse environments, among others government and local government entities, embassies, NGOs and institutions for which climate protection is one of the priority. Picnic with Climate is held every year on the last Sunday of vacation;



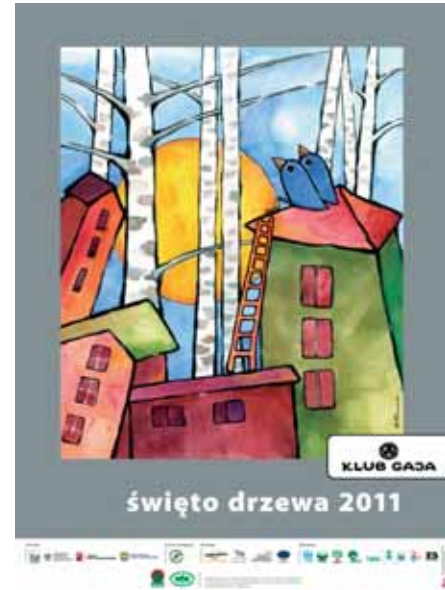
Poster of Picnic with Climate.



Contests and games on Picnic with Climate. Photo from the archives of Infrastructure Department.



The participants of the Tree Day in Warsaw. Photo from the archives of the Infrastructure Department.



The poster of Tree Day ([www.klubgaja.pl](http://www.klubgaja.pl))

- Tree Day – is an environmental educational programme of NGO Klub Gaja held annually since 2003. The joint tree planting that is carried out under the programme helps to increase the forest coverage and contributes to reducing the effects of global warming. The programme is based on local people’s activity, especially of children and youth, with wide society participation, including representatives of local authorities. Annual Tree Day inauguration takes place on 10<sup>th</sup> of October;
- Earth Hour – a worldwide initiative of the international environmental organization WWF. Warsaw has been actively taking part in this event since 2008. This action involves turning off the lights for one hour, both by individuals and companies, but also by cities, where the lighting of the largest buildings is turned off. Turning off the lights for one hour by people from all around the world is one of the loudest messages on the urgent need for global actions against excessive climate warming that the public has addressed so far to the policy makers. Earth Hour is organised annually in the last days of March;





Earth Hour Logo

- Warsaw Recycling Days – an annual educational event taking place since 2006, whose main purpose is to promote environmental awareness and to disseminate idea of the selective collection and recycling of secondary raw materials among the residents of Warsaw. During Recycling Days the residents can exchange recyclable materials for “green presents” such as herbs, flowers and the seedlings of trees and shrubs. Warsaw Recycling Days are held in May and June;



Recycling Days poster

- Car-Free Day – has been celebrated in Poland since 2002. This campaign aims to disseminate information on the negative effects of using private cars, to persuade people to use alternative means of transport, to promote public transport and to show that living in the city without a car is not only possible, but also much more pleasant. The campaign helps to reduce noise and air pollution, which affects the quality of life in cities. Across Europe, Car-Free Day is celebrated on 22 September, as a part of European Sustainable Transport Week;



Car-free Day poster

- World Water Day – celebrated annually on 22<sup>nd</sup> of March and established in 1992 by United Nations; the aim of the Day is to raise awareness on the importance of water by ecologic education of Warsaw citizens;
- “Letters for Earth” ecological campaign – the inauguration has taken place on 15<sup>th</sup> of April 2013. Main element of the campaign, organized by ARKA Foundation and supported by the City of Warsaw, is writing by young people thematic letters that are addressed to adults. In 2013 letters will cover the theme of waste management and recycling. The aim of the campaign is to support municipalities in their duties of organizing education and promotion activities related to the new Law on waste management. Writing letters will be preceded by thematic lessons in schools. The letters, written by young people, will be given to adults (parents, grandparents). Together they will undertake simple pro-environmental activities and then they will send descriptions of these activities to ARKA Foundation. This way children can educate adults and the campaign will reach more participants. The letters will be individual children’s works, but they will include simple substantial information on the actions that can be taken in every household, for example segregation of wastes. The campaign will be accompanied, among others, by contests, exhibitions of most interesting letters and external activities like writing the letters in public space. The media will be invited to the events, while selected letters will be send to newspapers. The reading of the letters in radio and TV will be organized. Additionally there will be organized happenings, exhibitions, educational marches, special installations and actions in the fields of collection of raw materials and cleaning the world.
- Earth Day – is the biggest ecological celebration on Earth, celebrated on the Spring Equinox on northern hemisphere from 1970, at present in 192 countries of the world. In Poland the beginning of the celebration is dated on 1990; in Warsaw Earth Day is organized by Foundation for Center Environmental Education. The tradition of the Earth Day is the final festival on Mokotów Field in Warsaw, which gathers thousands of participants to whom the idea of environmental protection is important. The festival is interdisciplinary and many municipal and governmental institutions, universities, units of the State Forests and NGOs are presenting their achievements. During Earth Day appropriate treatment of electric and electronic waste is being disseminated, the participants are encouraged to introduce sorting of waste and informed about benefits from recycling and recovery of old electric and electronic equipment. Traditionally during the festival the collection of electric and electronic waste is organized. In exchange for such waste participants receive seedlings and seeds of ornamental plants.

- Adopt a River – nationwide ecological education programme, organized by NGO Klub Gaja and realized in particular by educational units with participation of local communities, institutions and municipalities. The activities that will be conducted within the programme include presentation in Warsaw of an exhibition “Adopt a River”, conducting classes related to ecological education and participation in European event BIG JUMP devoted to the active education for clear waters.
- Eco-tricks brochure – a guide in which one can find ideas on how to maintain the quality of living without increasing spending and level of consumption, how to take care of the house without using detergents, how to store food so that it would not be wasted, how to re-use things that seem to be no longer usable. In the brochure interesting ideas on how to simultaneously save our health, money and reduce greenhouse gas emissions, which may be useful for people interested in everyday pro-environmental actions, irrespective of their place of living are presented.
- Eco-tricks in garden – in the brochure one can find answers to the questions like: Is the garden without “chemicals” and fertilizers possible? How to minimize expenses on gardening? What is really going on in the composter? Can we become fond of the weeds and how can we use them?

Brochures can be downloaded from the website: [www.zielona.um.warszawa.pl/baza-wiedzy](http://www.zielona.um.warszawa.pl/baza-wiedzy).

- Energy-tricks – Clean energy guide – next brochure from the series “Eco-tricks” in which Warsaw citizens can find information on how to use energy rationally at home, work or while travelling and thus help to reduce CO<sub>2</sub> emissions.

The brochure can be downloaded from the website:

[www.infrastruktura.um.warszawa.pl](http://www.infrastruktura.um.warszawa.pl) or [www.zielona.um.warszawa.pl/baza-wiedzy](http://www.zielona.um.warszawa.pl/baza-wiedzy)

- Environmental board game – educational cooperative game, requiring the skills of tactic thinking and strategic planning. Players take on the role of “Eco-elves”, living in the house with householders and an “Impish-elf”. They try to teach householders eco-behaviour and react together to different situations to survive till the end of the game with more and more limited amount of resources.



The cover of the brochure for keeping the house in an environmentally-friendly way.



The cover of the brochure eco-tricks in garden



The cover of the brochure Energy-tricks

## 8. The monitoring of conducted actions

The assessment of the implementation of the *Sustainable Energy Action Plan for Warsaw in the perspective of 2020* will mainly involve the monitoring, i.e. observation of changes in many interrelated areas of the operation in the City (administrative, economic, social, environmental, etc.).

The monitoring system that is currently implemented includes the following activities:

- systematic collection of numerical data and information on the implementation of specific tasks included in the Plan – these actions will produce empirical material which forms the basis for analysis and evaluation,
- ordering, processing and analysis of empirical data; the material obtained will be used to prepare reports,
- preparation of reports on the implementation of tasks included in *SEAP*;
- comparative analysis of the results obtained with *SEAP* assumptions; determining the degree of implementation of the provisions adopted in the Plan and the identification of any possible discrepancies,
- analysis of causes for deviations and identifying corrective actions involving modification of existing support measures and possible introduction of new support measures carrying out the planned corrective actions.

For the purposes of reporting following quantitative indicators to assess the effects obtained, based on the end of each two-year period, were adopted:

- level of final energy consumption by Warsaw in MWh/year,
- level of CO<sub>2</sub> emission by Warsaw in Mg CO<sub>2</sub>/year,
- level of consumption of energy produced from RES.

The first report is prepared for the years 2011-2012.

Every two years, it is proposed to carry out a public opinion survey on a representative sample of the residents of Warsaw that would serve as a qualitative indicator of state of improvement in energy efficiency and renewable energy use and an evaluation of the city's policy in this regard.

*Warsaw Integrated Sustainability Report*, created in August 2013 according to the latest standards GRI – The Global Reporting Initiative (G4 indicators system), provides significant support for the monitoring of actions related to the sustainable development of the city and projects in the field of energy efficiency and environmental and climate protection. The Report is available at the website [www.infrastruktura.um.warszawa.pl](http://www.infrastruktura.um.warszawa.pl) in "Dokumenty" section.

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