GREENHOUSE GASES EMISSIONS REPORT

MUNICIPALITY of BYDGOSZCZ

BASELINE YEAR: 2005

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Tomasz Pawelec
Project Manager

Contents

List of Abbreviations

ETS	Emissions Trading Scheme
GHG	Greenhouse Gases
GUS	Central Statistics Office (**G**łówny **U**rząd **S**tatystyczny)
GWP	Global Warming Potential
NAETS	National Administration of the Emissions Trading Scheme (**K**rajowy **A**dministrator **S**ystemu **H**andlu **U**prawnieniami do **E**misji)
NEIC	National Emissions Inventory Centre (**K**rajowe **C**entrum **I**nwentaryzacji **E**misji)
NEAAP	National Emissions Allowance Allocation Plan
NIR	National Inventory Report (submitted to the UNFCCC secretariat)
UNFCCC	United Nations Framework Convention on Climate Change

"Bottom-up" method – methods based on collecting data at source. Data that were collected at source are aggregated to give a complete picture for a larger population or area. Problematic aspects of the methodology include a large amount of data sources, which may result in errors and large uncertainty as to whether the entire population of interest was included in the data collection process.

"Top-down" method – methods based on collection of aggregated data that represent an entire population or area. Data quality is generally better, because the amount of data sources is limited. If the data collected are not representative of the population or area of interest (e.g. the scope is too big), the data can be modified to better represent the object of study. Because of the small resolution of data, trends that would otherwise be present at larger resolutions, do not emerge.

Introduction

This Greenhouse Gases (GHG) emissions report is one of the main outcomes produced by the participants of the LAKs programme. The emission inventory it contains was conducted in order to account for all the main greenhouse gases emitted by the municipality. The main purpose of the inventory is to provide a baseline that will serve as a reference point in establishing a reduction goal. The report itself will serve as an initial framework for the development of GHG reduction strategies.

Implementation of the LAKs Climate Accountability System is a 3-phase process. Each phase delivers a tool for the subsequent phase and requires the municipality to undertake certain actions:

PHASE I **Emissions inventory:** each city will complete a GHG emissions report based on an inventory of all of the GHG emissions related to the operations and activities of the municipality and its citizens.

PHASE II **Mitigation actions:** each city develops a strategic plan containing measures to reduce GHG emissions.

PHASE III **Assessment of the GHG emissions reduction:** in this last phase of the climate accountability system, municipalities assess the amount of emissions reduced achieved through the implementation of the measures in Phase II. The aim of this phase is to evaluate the project in terms of a "climatic balance". The evaluation will take into account impact of the measures implemented in Phase II and the level of investment required to achieve the reduction goal.

This report is developed as an internal and external communication tool, containing information about the main greenhouse gas sources within the municipality.

The inventory is divided into two parts:

A. **Government operations emissions**: refers to the emissions for which the municipality is directly responsible (City Council, Municipal Units, companies partly owned by the municipality)

B. **Community based emissions:** refers to all emissions generated within the administrative borders of the municipality and related to the activities of the society and businesses (Residential, Commercial and Institutional, Industrial, Transportation, Waste, Agriculture, Local Energy Production)

Each emission category is divided into emissions sectors (described below). The report summarizes all the data collected by the municipality and serves as an input for the subsequent stages of implementation of the LAKs Climate Accountability System.

I. Methodology

1.1 Methodology and report outline

The LAKs Emissions Inventory Tool was developed to provide a cost-effective and easy-to-use instrument to support local governments in the development of a GHG emissions inventory and quantify the size of community emissions footprint. The development of this tool was preceded by an international review of available tools and methods by ARPA Emilia-Romagna[1]. For the purpose of the LAKs project the "ICLEI International Local Government GHG Emissions Analysis Protocol[2]" and the "ICLEI Cities for Climate Protection (CCP) 5-milestone methodology"[3] were selected. ICLEI's protocol and methodology provide a clear and effective framework in addressing local government climate protection issues from the perspective of urban sustainability.

Following a consultation process between partner cities, the LAKs Emissions Inventory Tool was developed by ICLEI. The consultation process provided feedback to shape the tool to suit specific local factors. The LAKs Emissions Inventory Tool is an easy-to-use spreadsheet which supports the local government staff in compiling an emission inventory, and at the same time reducing costs and time invested in the process. The spreadsheets convert the energy and waste input data (consumption of fuels and electricity, waste production) into GHG emissions using nationally adjusted emission factors. Tool users do not need to be "climate experts" to use the Inventory Tool. The results are expressed in tonnes (t) of carbon dioxide equivalent (CO_2e), or "tCO_2e". The unit of CO_2 equivalent is an internationally accepted unit for measuring the climate change impact from all greenhouse gases and the reference gas of choice is CO_2. Various greenhouse gases have varying global warming potential (GWP). For example, one molecule of methane has a global warming effect of 21 molecules of CO_2. The factors to convert warming potential of different greenhouse gases are provided by the UNFCCC secretariat.

The LAKs Emissions Inventory Tool is divided into two parts: Government Operations emissions and Community emissions. Every part is further sub-divided into sectors to facilitate data collection and entry (see box below for a list of the sectors). Additional worksheets are added to assist with the calculation of emissions from agricultural activities and local energy generation. This had been suggested by the partners as this would help in their reporting to the Covenant of Mayors.

A. Government Operations Sectors
Buildings
Vehicle Fleet
Public Lighting
Water/Sewage
Waste

[1] http://www.municipio.re.it/sottositi/Laks.nsf/PESIdDoc/450302B1A306EBEBC12575E80059FE39/$file/report_arpa_international_review.pdf
[2] www.iclei.org/ghgprotocol
[3] www.iclei.org/ccp

B. Community Segment
Residential
Commercial and Institutional
Industrial
Transportation
Waste
Agriculture
Local Energy Production

The process of developing an inventory of emissions can be broadly described in two steps: collecting data on energy and fuel consumption and quantities of waste produced and then entering them into the appropriate spreadsheet of the inventory tool. For Government Operations inventory, the sources of data will include mainly invoices for energy, fuel and waste collection services. For Community Emissions inventory, data sources will vary and will include the power and heat suppliers, landfill operators as well as expert estimates.

The "LAKs Inventory Manual" forms a part of the tool and provides municipal staff with comprehensive guidance and instructions on the use of the LAKs Emissions Inventory Tool. The manual also contains a continuously updated section with Frequently Asked Questions (FAQ), which provides some guidance on extracting data for reporting to the Covenant of Mayors and a glossary of terms related to GHGs, protocols and inventories. To assist the implementation of the tool within the municipality of Bydgoszcz, detailed instructions for spreadsheet handling and data entry were developed and attached to the inventory tool ("Data Entry Manual").

The overarching aim of the emissions inventory is to define the GHG emissions level of the city in order to be able to design suitable reduction measures. This report contains a more detailed account of the Government Operations emissions, as the local authorities have a greater influence over activities in this sector (sectors where local policies can realistically influence emission levels). Similar guidelines apply to the municipalities participating in the Covenant of Mayors.

The emission inventory includes all GHG emissions arising as a result of final energy consumption within the area of the municipality. Final energy consumption is defined as:

- Fossil fuel consumption (for household and business purposes, transportation and industrial)
- District heating consumption
- Electricity consumption
- Consumption of energy from renewable sources

Emission factors

Emission factors included in the LAKs Emissions Inventory Tool were used to calculate the emissions from the municipality (annex II: Inventory tool)

Some emission factors had to be adjusted in order to better reflect the local conditions. These changes include:

- for fossil fuels (coal, lignite, coke, fuel oil, gas) – Emissions Trading Scheme (ETS) emission factors were used. These emission factors were verified for 2005;
- for liquid fuels used in transportation sector (petroleum, diesel) – latest emission factors published in the NIR 2010. The emission factors account for emissions of CO_2, CH_4 and Nitric oxide (N_2O);
- for electricity - an emission factor of 0,982 t CO_2/MWh was used (representative for coal and lignite based electricity generation with a limited share of biomass in the fuel mix, defined for 2005, source: NAETS). The emission factor was calculated for 2005 and it is assumed that it will not change for the consecutive inventory years, despite a small increase in the biomass share in the fuel mix;
- for district heating – an emission factor of 0,324 tCO_2/MWh calculated by NAETS was used. This emission factor is deemed to be representative for a city such as Bydgoszcz;
- for waste – an emission factor of 0,646 tCO_2e/t was used. This emission factor was calculated taking into account specific characteristics of the landfill and its equipment.

Data sources

To complete this report, the following data was necessary:

- electricity consumption,
- consumption of district heating,
- fossil fuel consumption (coal, gas, fuel oil and others),
- fuels used in vehicles,
- biomass and renewable energy sources,
- municipal solid waste production and disposal,
- water and sewage management.

Two methodologies were used in the data collection process: “top-down” and “bottom-up”. The data was obtained from the internal documents of the city council, statistical data of the Central Statistics Office and planning and strategic analyses of the city council (Air Protection Programme, Waste Management Programme). Data sources are listed in annex I: Specification of boundaries selected.

Government Operations (“bottom-up”):

- electricity consumption data was obtained from the electricity invoices from all of the municipal units;
- district heating consumption data was obtained from heating invoices provided by the municipal units;
- gas consumption was estimated based on invoices from municipal units;
- liquid fuels – all liquid fuel consumption data were available from the invoices paid by the municipal units;
- a quantity of waste produced was estimated based on provision in the contracts for waste collection services.

Community Activity ("top-down")

- electricity consumption – community electricity consumption was estimated based on data provided by electricity supplier, ENEA Operator. The aggregated data was sub-divided into sectors (residential, commercial and institutional) based on energy consumption of a city with similar characteristics;
- gas consumption – data on gas consumption in Bydgoszcz for the period 2005 - 2009 was provided by gas supplier (PGNiG S.A. Pomorski Oddział Obrotu Gazem, Gazownia Bydgoska);
- fuel oil and coal – estimated level of fuel oil and coal consumption was based on the assumption that these fuels are used solely for heating purposes. Due to the fact that obtaining data on fuel oil and coal consumption by households and businesses is difficult, usage of these fuels the period 2006-2009 was based on the inventory conducted for the purposes of the Air Protection Programme for the Bydgoszcz Agglomeration (2005)[4]. The assessment of the varying level of heat demand in the city was based on data provided by the heat supplier (Komunalne Przedsiębiorstwo Energetyki Cieplnej sp. z o.o.). Other data taken into account included the length of the heating season and assumption of the effect of thermal insulation of buildings in the period 2005-2009. Due to the lack of detailed data on insulation of residential buildings in the city, it was assumed that 41%[5] of the residential buildings were insulated, resulting in 20% energy saving;
- district heating – data on district heating energy consumption was provided by the heat supplier (Komunalne Przedsiębiorstwo Energetyki Cieplnej sp. z o.o.) for the period 2005-2009;
- consumption of liquid fuels in transportation – estimate based on data of vehicles registered in the Bydgoszcz area (source: Bydgoszcz City Council, Department of Transportation), structure of vehicle fleet in Poland (source: Central Statistics Office), average distance travelled within Bydgoszcz (source: estimate based on data from Motor Transport Institute). Transit intensity through Bydgoszcz was calculated based on General Directorate for National Roads and Motorways data and methodology (transit intensity measurements conducted in 2005) including the forecasted increase in transit intensity for the period 2005-2009;
- heat production in solar systems – due to lack of detailed data on the amount of solar installations in the city, the amount of solar systems installed on the roofs was estimated using satellite and aerial photographs[6] of the area. The amount of energy produced in these systems was calculated based on average efficiency of solar panels of 30-35% and average density of solar radiation;

[4] The Air Protection Programme was based on "Guidelines on conducting emissions inventory for district air protection programmes" of the Ministry of the Environment and General Inspectorate for Environmental Protection from 2003. Fuel consumption and their share in heat and hot water demand coverage was estimated based on data collected separately for households, services and municipal buildings. Gas consumption and its share in satisfying the heating demand of the city were estimated based on data provided by the gas supplier (Pomorska Spółka Gazownictwa sp. z o.o. Oddział w Bydgoszczy – data provided for varying tariffs) and data from Central Statistics Office). The shares of other fuels (coal and fuel oil) in satisfying the heating demand were estimated using data from "Strategy for heat supply in Bydgoszcz until 2010" and method A (Austrian Methodology) described in the above-mentioned "Guidelines...". The Austrian methodology is based on calculation of the level of pollutant emitted to the atmosphere from data relating to the characteristics of the heating equipment, known energy consumption and fuel type. Calculations were conducted for theoretical (TZE), practical (PZE) and final (FZE) energy consumption. Input data included heat transfer coefficient, heating degree days and heat usage coefficient, obtained from the "Guidelines on conducting emissions inventory for district air protection programmes". Final energy consumption of residential sector was added to the energy used to satisfy the heat water demand and the aggregate heat usage was presented by areas/source (apartment block areas).

[5] The estimate of the amount of residential buildings insulated was based on national trends in thermal insulation investment and data obtained from the Central Statistics Office.

[6] This method was deemed to be the only suitable method given the constraints of the project. Because of the fact that some solar panels might be installed in places other than the roof and the quality of the photos, the actual amount of solar panels might vary from the estimate. Thus the estimated amount of solar panels should be considered as a lower-end estiamte.

- heat production from geothermal sources – estimation of geothermal energy production in individual sources was based on the assumption that a heat pump always works in a system with conventional heat source and that the heat pump can cover 80% of the heat demand. Data on the amount of heat pumps working in Bydgoszcz was provided by Department of Public Utilities and Environment. Data was obtained from building permits issued in 2007-2009. It was assumed that the heat demand of private buildings fitted with a heat pump conforms to the PN-91/B02020 standard;
- energy produced in small hydro power plants was estimated based on data provided by Energy Regulatory Office;
- waste – the amount of waste disposed in landfills was obtained from the municipal units servicing the landfills and strategic documents of the city council (Waste Management Programme for Bydgoszcz and neighbouring municipalities);
- agriculture – data relating the amount of animals and animal husbandry business in the municipality of Bydgoszcz were provided by The Agency for the Restructuring and Modernisation of Agriculture. Data on the amount of horses in the area were provided by the Association of Horse Breeders (Kujawsko-Pomorski Związek Hodowców Koni w Bydgoszczy).

1.2 Inventory Boundaries

Compiling an emission inventory requires careful selection of the inventory boundaries. Definition of the inventory boundaries will have an impact on the final result of the inventory, as the process influences the choice of emissions sources that will be included in the inventory. This section presents the rationale behind the choice of boundaries. Annex II, *Specification of boundaries selected,* contains more details about the boundaries selected.

The boundaries that were applied to the local administration are:

- **Organizational Boundary**: this boundary encompasses all activities that are directly under the influence of the local government. The community activity boundary starts where the government operations boundaries end. In cases where certain activities are shared, a proportional share approach was used (i.e. the emissions were apportioned to the private and governmental sector according to percentage share in the ownership of an entity that is responsible for the emissions).
- **Geopolitical Boundary** – is the administrative borders of the city.

Additional boundaries:

- **Temporal Boundary** – every local government should choose the temporal boundaries of their inventories based on the local factors. The inventory should contain at least a baseline year (to establish a reference level for emissions reduction) and an inventory for current year to establish the current level of emissions.

A complete local government greenhouse gas emissions inventory should separately account for emissions associated with the operations of the government and all activities that occur within the geopolitical area.

Organizational Boundary – The Government Operations Analysis

The local government's operations greenhouse gas emissions analysis includes emissions arising from the use of all significant assets owned and services provided by the local government. All emissions that are a consequence of the local government's operations are included, regardless of where those emissions occur. In some cases, notably electricity use and waste disposal, emissions arising as a consequence of the operations often occur outside the geopolitical boundary of the local government. The physical location of the site where emissions occur is not relevant to the decision regarding which emissions should be included in the analysis.

Geopolitical Boundary – The Community Analysis

The community-scale emissions analysis includes all greenhouse gas emissions associated with activity occurring within the local government's geopolitical boundary, but arise as a consequence of societal activities.
Activities that occur within the community boundary can be controlled or influenced by local government policies, educational programs and promotion of more sustainable behavioural patterns among citizens. Local governments will have limited influence over some societal activities. Nevertheless, these emissions will also be included in the emissions inventory to give a complete picture of the GHG emissions from the city.

Boundaries for the emissions inventory in Bydgoszcz

The scope of the emissions inventory in Bydgoszcz includes the whole administrative area of the city (175.98 km^2). The inventory is carried out annually, beginning in 2005. A detailed account of the scope of the inventory is presented in annex I.

The baseline year is set to 2005 and the reference year is 2009. The intermediate years are 2006, 2007 and 2008.

II. Results

2.1 Results summary

2.1.1. Country emissions

National emissions from the territory of Poland show a clear upward tendency that is connected to general economic development (GDP growth), which is related to an increased demand for final energy consumption. The ever-rising amount of vehicles and rising transport intensity are the two main reasons behind the raising emissions. Emissions from industry covered by the ETS change only slightly. A significant factor contributing to the national trends of rising emissions are also increased demand for energy consumption by households (change in lifestyle), services (economic development) and industry.

Table 1 – National GHG emissions

POLAND		
	2005	**2009**
Population*	38 157 055	38 167 329
Area (km^2) **	312 685	
National GHG emissions (tCO_2e)	**386 608 040*** **	**393 557 250**** **

Data source:
**GUS, Ludność. Stan i struktura w przekroju terytorialnym. data for 31.12 of each year,*
***Powierzchnia i ludność w przekroju terytorialnym – data for 31.12 of each year,*
**** excluding 5 –LULUCF, National Inventory Report 2007,NCEI, May 2009*
***** excluding 5 – LULUCF, National Inventory Report 2008, NCEI, March 2010*

2.1.2 Municipality information

Bydgoszcz is a city situated in Kujawsko-Pomorskie district on the river Wisła and Brda. Its the 10th largest city measured by population size. City area covers 175.85 km^2, of which 39% is an urban area, 31% is covered by forests and green areas and 20% agricultural area.
The residential sector is dominated by multifamily buildings (apartment buildings and blocks of flats, especially from 1945 – 1989). Nonetheless, single-family housing forms a significant part of the urban space.
The city hosts a highly developed service and commercial industry. Many industrial plats present within the city boundaries have been fundamentally modernized over the past several years.
Bydgoszcz is an important transportation hub, where national roads no. 25 and 80 meet. The city infrastructure also possesses train lines, water transportation routes and an airport.

The table below summarizes the most important information about the city.

Table 2 – General information about the city

BYDGOSZCZ					
	2005	**2006**	**2007**	**2008**	**2009**
Population*	366 074	363 468	361 222	358 928	357 650
Geophysical area (km^2)**	175,98	175,98	175,98	175,98	175,98
Baseline year selected for Government Operation emissions	2005	2006	2007	2008	2009
Baseline year selected for Community emissions	2005	2006	2007	2008	2009

Data source:

** actual place of residence, GUS, Ludność. Stan i struktura w przekroju terytorialnym. Data representative for 31.12 of each year.*

***Powierzchnia i ludność w przekroju terytorialnym - 2005 r.*

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2.1.3 Municipality emissions

Table 3 below shows the total emissions from the city of Bydgoszcz. Total emissions from the city also includes the government operations emissions. Government operations emissions are deliberately kept separate throughout the report. This way, the emissions for which the local government is directly responsible are clearly distinguished.

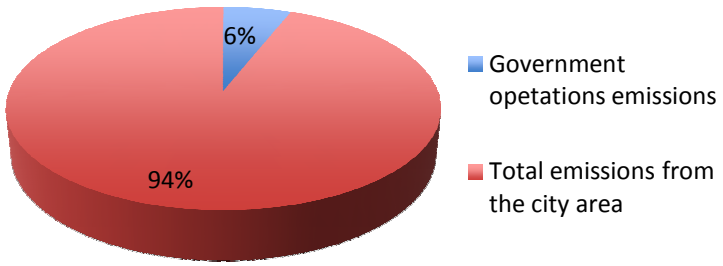
Table 3. Total emissions of greenhouse gases from the city area [tCO_2e]

Bydgoszcz					
	2005	**2006**	**2007**	**2008**	**2009**
Total emissions from municipality	3 175 378	3 339 123	3 409 814	3 525 976	3 600 539
Including:					
Government Operations emissions	206 754	196 737	198 045	234 866	232 236

Data source: own calculations.

GHG emission from the city are show a constant upward trend, which is consistent with the national trends. In the period 2005 – 2009 GHG emission increased by 425 161 tonnes, which constitutes a 13.4% increase in relation to the baseline year (2005). Also consistent with the national emissions trends is the fact, that the emission increase in Bydgoszcz is caused mainly by an increase in energy demand and transportation (increased amount of vehicles and transport intensity).

Figure 1. Emissions arising from the government operations as a share of total emissions from the city.



Data source: own calculations

The share of Government operations emissions in the total emissions from the city decrease slightly (Community emissions rise faster than the government operations emissions). The emissions from the whole city expressed as a share in national emissions grow very fast. (in 2005 – 0,82% and in 2009 – 0,93%). One possible reason is that the raising emissions are mainly arising from transportation and increase in energy demand. In a large city these trends are especially apparent and hence the share of emissions from Bydgoszcz in the national emissions grow disproportionately fast.

0,82% (2005)	Municipality emissions as a percentage of the total national emissions	0,93% (2009)

2.1.4 Citizen's Carbon Footprint

The citizen's carbon footprint shows the average amount of CO_2 emissions generated by each citizen of the city. The data shown here show the carbon footprint for 2005 and 2009. In 2005 the carbon footprint of Bydgoszcz citizen was at a level of 8,76 t CO_2e (below national average), while in 2009, the carbon footprint reached 10,07 t CO_2e (close to the national average).

t CO_2e per citizen in 2005: 8,67		t CO_2e per citizen in 2009: 10,07

Carbon footprint was calculated from the total emissions from the city area and the city's population size in the year in question.

2.2. Government operations emissions

This section contains an account of the emissions related to the operations of the local government divided by sectors which were used throughout the process of compiling the inventory. This sector is of particular interest, as it represents the share of city's emission which can be influenced by the local government directly. The emission sectors within the local government control include: municipal buildings, education outfits, public utility companies and others.

Each sector of emissions is briefly described below.

Building sector

This sector contains emission from buildings (heating, electricity, hot water) that are owned or operated by the city council, such as:

1. Administration buildings
2. Buildings owned or operated by municipal units or units where the municipality is a partial owner
3. Kindergartens, schools, community halls, etc.
4. Sport facilities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Total GHG emission from buildings [t CO_2e]:	
2005:	71 447
2009:	71 407

Source: own calculations

Total GHG emission from buildings per citizen:	
2005:	0,20
2009:	0,20

Source: own calculations

Within the buildings sector, the largest share of emissions can be attributed to educational institutions (kindergartens, schools, etc.). This is because, educational institutions are typically housed in big buildings that use large amounts of energy. A slight decrease in emission levels is due to investment in insulation of the buildings. Another large source of emissions in this sector is sport facilities, but because these facilities are used with different intensities their emission levels vary greatly throughout the years.

Buildings operated by other entities, in which the local government has shares also influence the emission level in the building sector. Especially worth noting are buildings that house the administration of the district heating operator (Komunalne Przedsiębiorstwo Energetyki Cieplnej sp. z o.o.) and the public utilities company (Miejskie Zakłady Komunalne sp. z o.o.). Buildings that are directly administered by the local government are responsible for a very small percentage of emissions from the buildings sector and account for only 3% of these emissions.

Cumulative emissions from the buildings sector shows little changes throughout the years (similar mode of use, small changes in the amount of buildings). Variation in emissions can be broadly explained by a changing length of the heating season and any permanent changes to emission levels are attributable to insulation of the buildings or discontinuation of use.

Table 4. Emissions from the building sector sub-divided by building type

Building sector emissions [tCO_2e]					
	2005	**2006**	**2007**	**2008**	**2009**
Administration buildings	2 223	2 236	2 377	2 107	2 421
Buildings owned or operated by municipal units or units where the municipality is a partial owner	36 074	35 485	34 822	35 702	35 701
Sport facilities	4 756	5 280	5 024	6 206	8 289

Data source: own calculations

Vehicle Fleet

Vehicles used by the local government are mainly passenger cars used by the local government staff for business travel, but also buses used by the public transport operator as well as special vehicles used by companies partially owned by the local government. the vehicle fleet sector was divided into the following groups: passenger vehicles, delivery trucks and lorries, buses and trams, other vehicles (construction site vehicles, special vehicles, etc.).

Total emissions arising as a result of fuel combustion in the engines of vehicles is presented below.

Total emissions from vehicle fleet [t CO_2e]:

2005: 37 965

2009: 38 193

Source: own calculations.

Over 90% of emissions from the vehicle fleet sector can be attributed to the public transportation (buses and trams, characterized by similar emission levels). Electricity used by trams is characterized by a high emission factor (0,982 t CO_2e/MWh). Other vehicles account for a relatively small share of emissions. A drop in emissions from passenger vehicles and lorries is a result of exchange of old vehicles for new, more fuel- efficient ones.

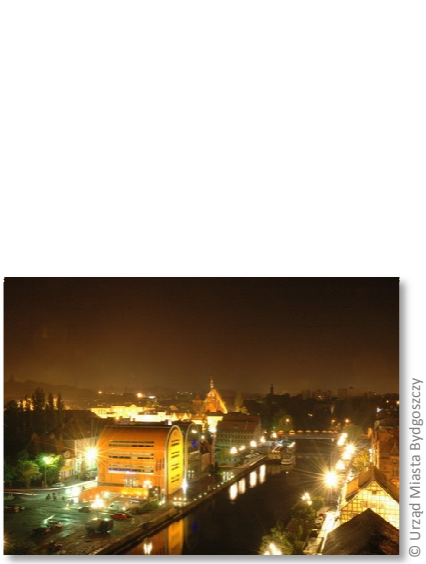
Table 5. Vehicle fleet emissions divided by type of vehicle

Vehicle fleet emissions [t CO_2e]					
	2005	**2006**	**2007**	**2008**	**2009**
Passenger cars, trucks and lorries	1 813	1 815	1 228	1 420	1 494
Buses and trams	35 143	36 029	37 867	35 598	35 949
Other vehicles	1 009	932	1 014	2 214	750

Data source: own calculations

Public Lighting

This sector accounts for energy used to for the purpose of lighting public spaces, municipal buildings and traffic lights.



Total public lighting GHG emissions:

2005: **21 237**

2009: **22 485**

Source: own calculations.

Public lighting GHG emissions per citizen:

2005: **0,058**

2009: **0,063**

Source: own calculations.

Emission levels in this sector do not vary significantly for lighting of public spaces and buildings, despite an increase in the amount of light sources. Newly installed and modernizes light sources are characterized by a relatively small energy usage and small electricity losses. Regardless of the increase in the amount of light sources, the total emissions decrease.

A significant decrease in the in the emissions from traffic lights is cause by modernization of the traffic lights. The emission halves over the 2005-2009 period, despite an increase in the amount of traffic lights installed within the city area.

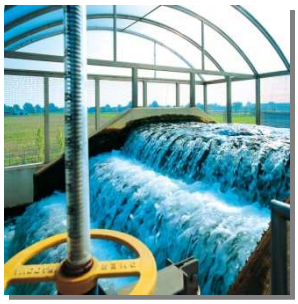
Table 6. GHG emissions from public lighting

GHG emissions from public lighting [t CO_2e]					
	2005	**2006**	**2007**	**2008**	**2009**
Public spaces	20 498	20 542	21 205	19 721	22 149
Traffic lights	740	717	554	520	336

Data source: own calculations

Water and sewage

The water and sewage section includes the total energy consumption of water pumps, sewage treatment facilities, and the administration buildings used by the operators of the facilities. Total emissions from this sector remain at similar levels throughout the inventory years.



Total emissions from water and sewage [t CO_2e]:

2005: **26 141**

2009: **26 461**

Source: own calculations

Emissions from water and sewage per citizen [t CO_2e]:

2005: **0,071**

2009: **0,074**

Source: own calculations

The water treatment facilities in the city recycle the biogas produced as a result of decomposition of sediments. The biogas is burnt to produce electricity, which is used for own purposes of the water treatment facilities.

Waste

This part includes the GHG emissions due to waste produced directly by government operations (offices, schools etc.). Emission levels were established based on data on the amount of waste directed to landfills. If the waste was treated in a different way than landfill deposition, it was not included in the total emissions (e.g. sediments from the water treatment plants, other recycling). This has a large impact on the emissions from this sector. The variation in emissions from the different inventory years can be largely attributed to the varying amount of waste directed to the landfill by 3 companies with local government shares: the sewage treatment plant operator (SW Kapuściska), the Public Works company and the landfill operator (Międzygminny Kompleks Unieszkodliwiania Odpadów Pro Natura).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Total tCO2e from government operation waste is [t CO_2e]:

2005: 11 625

2009: 5 060

Source: own calculations

Green electricity public purchase

Based on the data provided by the city council, the local government does not purchase any green electricity.

Renewable energy produced in the water treatment facilities is used for the facilities' own needs.

0%

Percentage of renewable energy as a share of total government operation energy consumption

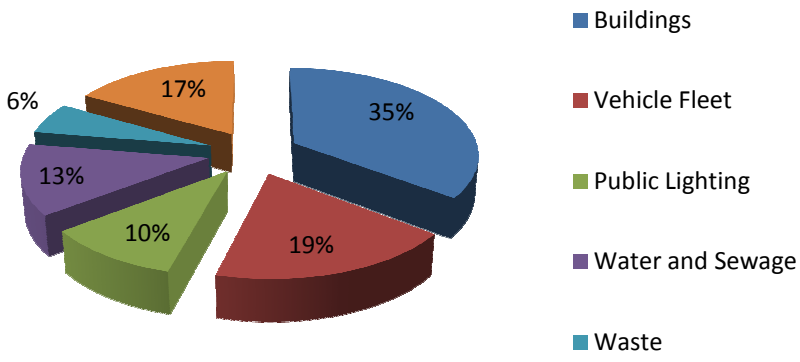
Comments on Government operation emissions

Total government operations emissions in 2005 amounted to 206 754 t CO_2e and increased to reach a level of 232 236 t CO_2e in 2009 (table 3). Emissions in the area of government emissions tend to change very little, unless there are major changes in the city structures. This is one of the reason for the increase in emission levels over the past 5 years. During this period the percentage of shares owned by the local government in the district heating company increased from 40 to nearly 90. A proportional share of emissions was attributed to the government operations emissions and therefore emissions from district heating assigned to the government operations doubled (figure 2 and 3). Other emissions (buildings, transport, public lighting, water and sewage, waste) show relatively small changes, which are related to normal variations in weather (e.g. length of heating season) and modernization (e.g. insulation of buildings, renovation of street lamps). Additionally, an important factor in the government operation emissions level is the amount of waste disposed of in the landfill by the municipal units.

Buildings are responsible for over 30 % of emissions from the government operations. In 2009, the second largest emission source of the government operations is the local energy production (due to the shares owned in the district heating operator). The third largest emission source is vehicle fleet, where public

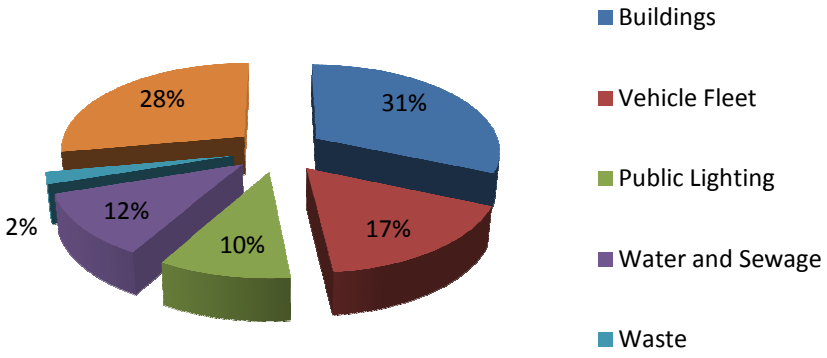
transportation is responsible for 90% of emissions. Other sectors have a smaller impact on the amount of emissions in the government operations emissions. Waste disposal has relatively smallest share in these emissions.

Figure 2. Emissions attributable to particular sector of government operations, 2005



Source: own calculations

Figure 3. Emissions attributable to particular sector of government operations, 2009



Source: own calculations

Table below shows a summary of the emissions related to local government operations.

Table 7. Summary of emissions from the local government operations

Summary of emissions from the local government operations (tCO_2e)					
	2005	**2006**	**2007**	**2008**	**2009**
Buildings	71 447	65 265	65 056	69 483	71 407
Vehicle Fleet	37 965	38 776	40 109	39 232	38 193
Public Lighting	21 237	21 259	21 758	20 241	22 485
Water and Sewage	26 141	30 815	26 885	30 081	26 461
Corporate Waste to Landfill	11 625	7 358	6 600	8 012	5 060
Local Renewable Energy Production (city share)	4 607	5 117	5 012	4 856	5 418
Local Non-Renewable Energy Production (share)	33 733	33 970	32 625	62 962	63 212
Total	**206 754**	**202 560**	**198 045**	**234 867**	**232 236**

Source: own calculations

2.3 Community based emissions

This section contains the results of the inventory of emissions generated by the activity of the population residing within the administrative boundaries of Bydgoszcz. Community activity section was sub-divided into the following sectors: residential, commerce and services, industrial, transport, waste agriculture and local energy production.

Residential sector

This sector includes all of the residential buildings situated within the boudaries of the municipality – both multifamily and single-family housing. The main contributor to the emissions from the residential sector is the amount of electricity and heat consumed by the buildings (district heating, fossil fuels). District heating represents a significant share of the total emissions from the residential sector, becaus of the fact that the district heating network is well developped withing the municipal boudaries. The absolute level of emissions from district heating is comperable to the emissions from electricity and gas consumption (relatively, each of these energy carriers accounts for about 25-30% of the total emissions, while emissions arisid due to electricity consumption increase slightly faster). Coal consumption is responsible for about 17% of the residential sector emissions. Fuel oil account for a very small share of the total emissions (about 1%).

A characteristic feature of the residential sector is a constant increase in the electricity consumption, which is responsible for the rising emissions from this sector. Relative changes in the year-on-year emission level are due to large demand for district heating, which is coal based. The lenght of the heating season determines the emissions from residential sector to a large extent, which is the primary reason behind the decrease in emission levels from 2005 to 2009, despite a rising demand for energy. Variations in emissions attrbutable to the length of the heating season are partly offset by investments in thermal insulation of the residential buildings.

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Total emissions from the residential sector [t CO_2e]:	
2005:	1 006 755
2009:	989 547

Emissions from the residential sector per citizen:	
2005:	2,75
2009:	2,77

Source: own calculations

Commerce and services sector

Commerce and services sector includes all commercial activities within the municipality area. In this sector over 40% of emissions are attributed to electricity consumption and this share shows a rising tendency (the share rises from 2005 – 2009). The two other contributors – gas and heat consumption, have similar shares in the total emissions from the commerce and services sector. While gas shows a rising tendency in the shares of emission, there is no apparent trend for heat consumption. Other sources of emission have a minimal share in total emissions (about 1%).

Increase in the electricity and gas consumption is connected to the economic development of the city, while heat consumption is strictly related to the length of the heating season.

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Total emissions from the commerce and services sector [t CO_2e]:	
2005:	306 846
2009:	347 089

Emissions from the commerce and services sector per citizen:	
2005:	0,84
2009:	0,97

Source: own calculations

Industrial sector

This sector covers all emissions generated by energy consumption by industries operating within the city's territory. The dominant source of emissions in industry is electricity consumption, which is responsible for about 83% of total emissions. The second biggest contributor to total emissions is gas consumption, which has a 10% share in total emissions. Other sources account for the remaining emissions (district heating, fuel oil, coal, coke). Because of the fundamental modernization of the industry in the period 1990-2005, the industrial sector does not show the tendency to reduce emissions. Rising production leads to higher emissions due to greater consumption of electricity and gas. Emissions from the industrial sector increased by 28,3% in 2009 in relation to the baseline year.

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Total emissions from the industrial sector [t CO_2e]:	
2005:	889 287
2009:	1 141 545

Source: own calculations

Emissions from the industrial sector per citizen:	
2005:	2,43
2009:	3,19

Source: own calculations

Transportation sector

This sector covers the emissions due to fuel consumption of vehicles travelling throughout the territory of the municipality. Local transportation as well as transit are included in the inventory. Consistent with the national trends, the amount of vehicles and intensity of transportation rises, which results in increasing emissions. Emissions from transportation in Bydgoszcz increased by 20,7% in 2009 in relation to the baselines year. The average age of vehicles in Poland did not change in the recent years, because of a large amount of second had vehicles imported from the EU-15 countries (the trend is apparent in the vehicle fleet structure in the city). This phenomenon causes the average fuel consumption to be relatively high, which is related to rising emission levels over the years. Petrol accounts for the highest share of emissions, but the proportions change towards diesel over the period 2005-2009.

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Total emission from the transportation sector is [t CO_2e]:	
2005:	569 927
2009:	688 243

Source: own calculations

Emissions from thetransportation sector per citizen:	
2005:	1,56
2009:	1,92

Source: own calculations

Table 8 shows the break-down of total emissions from transportation by vehicle type. Passenger cars are responsible for the highest share of emissions, which is due to increasing living standards of the citizens.

Table 8. Emissions from transportation

Main transportation emission sources [tCO_2e]					
	2005	**2006**	**2007**	**2008**	**2009**
LOCAL Transport:	**542 188**	**569 449**	**604 616**	**642 743**	**656 131**
Passenger vehicles	381 336	403 240	431 071	462 118	469 713
Lorries	136 284	139 674	144 432	149 868	155 064
Buses	16 689	17 431	17 910	18 064	18 646
Tractors	5 377	6 484	8 384	9 632	9 340
Motorcycles and Motorbikes	2 503	2 621	2 819	3 062	3 367
TRANSIT	**48 480**	**48 191**	**50 228**	**51 778**	**51 987**

Data source: own calculations

Community Waste sector

This sector includes emissions due to waste production within the city and directed to the landfills. The landfill is utilized by 3 municipalities – Bydgoszcz, Białe Błota and Solec Kujawski. The share of waste present on the landfill that arises in Bydgoszcz was established on the basis on statistical data contained in the Waste Management Programme at 93% of total waste deposited on the landfill. This sector does not account for recycling, waste incineration or any other kind of waste treatment. The amount of waste directed to landfill increases steadily as the life standard of citizens increases and this trend is consistent with national trends in Poland.

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Total emission from the waste sector is [t CO_2e]:

2005: 42 754

2009: 65 004

Source: own calculations

Agriculture sector

This sector includes all emissions generated by the agriculture in the territory including animal husbandry and municipal green areas. The main greenhouse gas emitted in this sector is methane, which is characterized by a high global warming potential. This is the main reason for the relatively large share of agricultural emissions in total city emissions. Animal husbandry has a 30% share in agricultural emissions. The total emission was estimated based on emission factors provided in the LAKs Inventory Tool.

Agricultural emissions show little tendency to change over the years. Changes are a result of varying numbers of animals in the area, especially cattle and horses.


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Total emission from the agricultural sector is [t CO_2e]:	
2005:	68 730
2009:	65 762

Source: own calculations

Emissions from the agricultural sector per citizen:	
2005:	0,19
2009:	0,18

Source: own calculations

Local Energy Production

This section does not contain any consumption data, but instead includes data relating to the production of energy within the city area. The aim here is to monitor the amount of energy produced from renewable resources and relate this information to the total amount of energy produced from conventional resources. The main energy supplier in the city (PGE Zespół Elektrociepłowni Bydgoszcz) was omitted for the purposes of this sector (it is participating in the ETS).

Renewable resources energy produced within the city includes:

- Solar panels
- Heat pumps
- PV panels
- Small hydropower plants
- Biogas reactors

Renewable energy production shows a rising trend, especially in the amount of solar panels and heat pumps installed by home owners. It should also be noted that Bydgoszcz plays host to the biggest solar power plant in Poland (power: 90,3 kW), installed on the roof of FROSTA production plant.

Conventional sources included in the inventory were the local gas district heating plants and two larger coal plants operated by Przedsiębiorstwo Energetyki Cieplnej Sp. z o.o.

Total amount of energy produced from renewable resources [MWh]:

2005:	**31 798**
2009:	**35 706**

Source: own calculations

1,43 %
2009

Percentage of renewable energy as a share of total energy consumption

Comments on Community based emissions

Total emissions from the community activity sector totalled 2 968 524 t CO_2e, whereas in 2009 the emissions increased to 3 368 302 t CO_2e. A clear rising trend is apparent in emissions from community activities. Emissions from Bydgoszcz area are characteristic for urban areas in general (figures 4 and 5). The mains sources of emissions include: industry, residential buildings, transportation and services.

Energy consumption in industrial sector is rising sharply and this is reflected in the fact that the industry is the biggest contributor to emissions arising in the city. The share of industrial emissions in rose from 30% of the total in 2005 to 34% in 2009. The main determinant of this trend is the general economic development (GDP level).

Residential sector is the second biggest contributor to the emissions levels in Bydgoszcz. Residential buildings accounted for 34% of emissions in 2005 and its share dropped to 29% of the total in 2009, mainly because of the relative increase in emissions from industry and transportation. Emissions from residential buildings are largely dependent on the length of the heating season, which in turn is dependent on the weather and severity of winter season. Lower temperatures during winter are directly related to increased demand for district heating (mainly coal fired) and fossil fuels used for heating purposes. This is the main reason behind variations in emissions from residential sector in the analysed period. A drop in emissions due to investments in insulation of residential buildings is also apparent in this sector.

Emissions from transportations also increase significantly, reaching a 20% increase in 2009 compared to the baseline year. National trends are clearly visible also in Bydgoszcz – a rise in GHG emissions due to increased amount of vehicles and increased transport intensity. Low vehicle engine efficiency due to rising average age of vehicle fleet further adds to the emissions in Bydgoszcz.

Commerce and services is the third biggest source of emissions in Bydgoszcz, accounting for a relatively stable, 10% share of total emissions. Increase in emissions can be attributed to rise in final energy consumption (electricity, gas).

Agriculture, waste management and local energy production make up the remaining emission arising in the city and they represent about 6% of the total emissions. Relatively small share of renewable energy production in the inventory is due to exclusion of the heat plants (Zespół Elektrociepłowni Bydgoszcz) from the inventory and assigning the emissions of the district heating operator (Komunalne Przedsiębiorstwo Energetyki Cieplnej) to government operation emissions. Emissions from other combustion plants producing heat mainly for industrial purposes (mainly gas fired) were include in the industrial sector.

Agricultural emissions are relatively small compared to other sources, as the agricultural land accounts for only about 20% of the municipal area. The amount of animals reared within the municipality area is small and stable throughout the analysed period.

As the living standards of the citizens increase, so is the amount of waste produced and GHG emissions level. Emission from this sector increase due to an increasing amount of waste directed to landfills.

The analysed period also features a 10-fold increase in the amount of energy produced from renewable resources. Alternatives to fossil fuels seem to become ever more popular means to satisfy energy demand of citizens. The city also houses a 90,3 kW photovoltaic power plant.

Figure 4. Community activity emissions, 2005

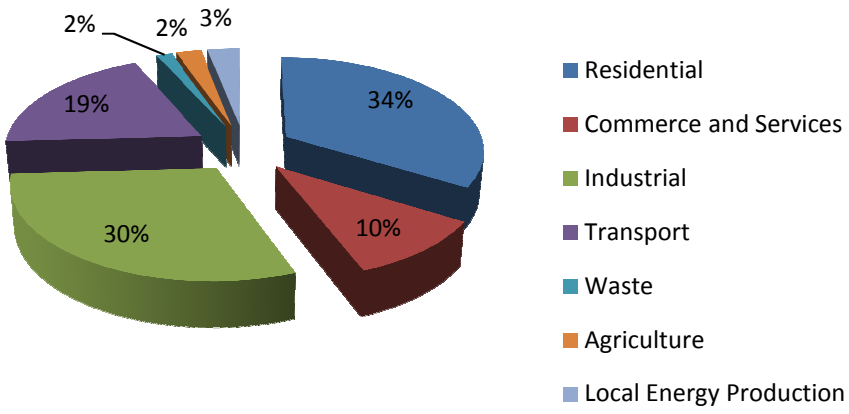
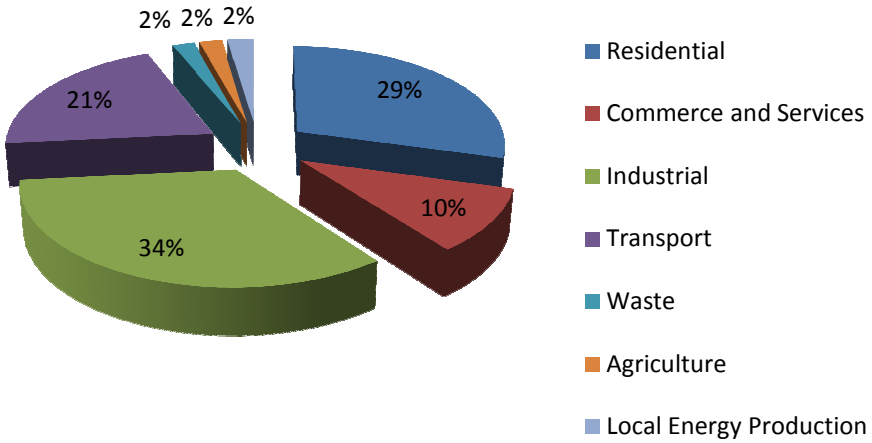


Figure 5. Community activity emissions, 2009



A summary of the emissions from the city area that arise as a result of community activity is presented in the table below.

Table 9. A summary of community activity emissions in the period 2005-2009

Total Community emissions by sec tors [tCO_2e]					
Sector	**2005**	**2006**	**2007**	**2008**	**2009**
Residential buildings	1 006 755	981 282	979 279	964 121	989 547
Commerce and services	306 846	323 340	316 086	345 975	347 089
Industry	889 287	993 402	1 021 659	1 020 222	1 141 545
Transportation	569 927	617 640	654 845	694 521	688 243
Waste	42 754	62 370	67 390	96 527	65 004
Agricultire	68 730	79 427	90 947	98 998	65 762
Local energy production (conventional resources)	88 932	90 042	86 575	75 600	76 531
Local energy production (renewable resources)	-4 607	-5 117	-5 012	-4 856	-5 418
Total Community Activity Emissions	**2 968 624**	**3 142 386**	**3 211 769**	**3 291 109**	**3 368 302**

III. Conclusions

GHG emissions from Bydgoszcz show a characteristic pattern comparable to other developed European cities. The results of the analysis can be summarized as follows:

- A share of the government operations emissions in the total emissions from the city is relatively small and accounts for about 6.5%. Furthermore this share shows signs of decrease. Nevertheless it is a sector of emissions which is directly under control of the City Council and can be significantly reduced. The local government should have a very clear policy towards reducing emissions and set a positive example to follow for the citizens;
- Industry is responsible for over a third of emissions arising in the city. At the same time it is outside of control of the City Council. This leaves a very limited scope for the City Council to halt the rising tendency of industrial emissions, which are going to increase together with the GDP. Unless national policies will change, local government cannot make a real difference to reduce emissions arising in the industry;
- Residential buildings are the second biggest contributor to the emissions from the city. It is also a sector which has a significant potential to reduce energy consumption and hence GHG emissions. Local government can have a considerable influence over the behaviour of citizens through educational programmes, financial incentives and promotion of best practices. This sector already shows signs of decreasing emissions and this decrease can be further expanded through appropriate measures and strategies of the city council;
- Emission from transportation show a dynamic increase and this trend will most likely continue in the years to come. However, an appropriate local government policy towards transportation has the potential to limit emissions from this sector. Despite an increase in the amount of vehicles, emissions from transportation within the municipal area can be significantly reduced;
- Local government has no formal means to influence emissions from commerce and services sector. Nevertheless, through cooperation with the local entrepreneurs, the rising trend of emissions can be stopped and reversed. Reduction potential in this group is strong, especially through efficiency increases;
- Waste management policies should focus on limiting the amount of waste directed to landfills. This is possible if measures such as educational programmes or building incineration plant will be implemented;
- Agriculture and local energy productions produce relatively little emissions and the influence of the local government within this sector is very limited. The focus here should be promotion of renewable energy.

Reduction of GHG emissions related to the government operations is possible to achieve through consequent implementation of a clearly defined policy within the municipal units (both investment and soft, educational measures). Emissions related to community activities can be effectively limited through appropriate strategies – for example public campaigns and appropriate transportation policies. Even though there is a lack of legal instruments to do so, the citizens should receive as much support and financial incentives to use renewable energy and carry out insulation of the buildings they live in.

Measures should be implemented in areas where the reduction potential is large and the implemented measures can bring the largest possible emissions reductions. Economic, ecologic and societal efficiency should be a consideration at every step of implementation of emission reduction measures.

IV. Bibliography

This report was based on the following sources:

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- Climate Change 2007. Synopsis report. Intergovernmental Panel on Climate Change
- Decision No 406/2009/EC of the European Parliament and of the Council of 23 April 2009 on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020
- Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC (Text with EEA relevance)
- Directive 2004/101/EC of the European Parliament and of the Council of 27 October 2004 amending Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading within the Community, in respect of the Kyoto Protocol's project mechanismsText with EEA relevance
- Emissions Trading Scheme Act of 22 December 2004 (O.J. from 2004, no. 281, item 2784, as amended).
- Environmental Protection Act of 27 April 2001 (consolidated text – O.J. from 2008, no. 25, item 150, as amended).
- Executive Act of the Council of Ministers of 20 October 2009: Types of programmes and projects allowed under the National Green Investment fund (O.J. from 2009, no. 187, item 1445)
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- Management of Greenhouse Gases Emissions and Other Substances Emitted to the Atmosphere Act of 17 July 2009 (O.J. from 2009, no. 130, item 1070, as amended)
- National Emission Allowance Allocation Plan for 2008-2012 (draft), Ministry of the Environment, May 2007.
- National Inventory Report 2007, National Inventory Submission to the UNFCCC, National Administration of the Emissions Trading Scheme, National Emissions Inventory Centre, May 2009 (Krzysztof Olendrzyński, Iwona Kargulewicz, Jacek Skośkiewicz, Bogusław Dębski, Joanna Cieślińska, Anna Olecka, Monika Kanafa, Katarzyna Kania, Paweł Sałek)
- Poland's climate policy. The Strategies for Greenhouse Gas Emission Reduction in Poland until 2020, Ministry of the Environment, Warsaw, October 2003, Document adopted by the Council of Ministers in the 4th of November 2003.
- Regulation (EC) No 614/2007 of the European Parliament and of the Council of 23 May 2007 concerning the Financial Instrument for the Environment (LIFE+)
- United Nations Framework Convention on Climate Change, done at New York on the 9th of May 1992 (O.J. from 1996, no. 53, item 238)
- Update for the Waste Management Programme for Białe Błota Municipality for 2008-2012 with a perspective for 2012 – 2015 – Part B,
- Waste Management Programme for Bydgoszcz for 2005 – 2012

Annex I: Specification of boundaries selected

Unless otherwise specified, all the data in the inventory are representative for 31st of December of given year in the period 2005-2009

The government operations emission inventory included the municipal units that are entirely owned by the City Council, or where the City Council has a substantial share of ownership. The waste collection service operator, REMONDIS Bydgoszcz Sp. z o.o. was excluded from the government operations inventory as the city has only a 1,17% share in the company. The following municipal units provided data for the inventory:

- Administracja Domów Miejskich "ADM" Sp. z o.o.,
- Bydgoski Fundusz Poręczeń Kredytowych Sp. z o.o.,
- Bydgoski Klub Sportowy Chemik,
- Bydgoski Ośrodek Rehabilitacji ,Terapii Uzależnień i Profilaktyki "BORPA",
- Bydgoski Park Przemysłowy Sp. z o.o.,
- Bydgoskie Towarzystwo Budownictwa Społecznego Sp. z o.o.,
- Cywilno Wojskowy Związek Sportowy Zawisza Bydgoszcz,
- Galeria Miejska BWA,
- Hala Sportowo-Widowiskowa Łuczniczka Bydgoszcz,
- Izba Wytrzeźwień w Bydgoszczy,
- Komunalne Przedsiębiorstwo Energetyki Cieplnej Sp. z o.o.,
- Leśny Park Kultury i Wypoczynku "Myślęcinek" Sp. z o.o.,
- Łuczniczka Bydgoszcz SA.
- Miejska Pracownia Geodezyjna w Bydgoszczy,
- Miejski Ośrodek Kultury w Bydgoszczy
- Miejski Ośrodek Pomocy Społecznej z jednostkami podległymi
- Miejskie Wodociągi i Kanalizacja Sp. z o.o.
- Miejskie Zakłady Komunikacyjne Sp. z o.o. w Bydgoszczy,
- Międzygminny Kompleks Unieszkodliwiania Odpadów ProNatura,
- Muzeum Okręgowe im. Leona Wyczółkowskiego w Bydgoszczy,
- Port Lotniczy Bydgoszcz S.A.,
- Powiatowy Urząd Pracy w Bydgoszczy,
- Schronisko dla Zwierząt w Bydgoszczy,
- Spółka Wodna Kapuściska w Bydgoszczy,
- Straż Miejska w Bydgoszczy,
- Teatr Polski im. Hieronima Konieczki w Bydgoszczy,
- Tramwaj Fordon Sp. z o.o.,
- Wielospecjalistyczny Szpital Miejski im. dr Emila Warmińskiego SPZOZ w Bydgoszczy,
- Wojewódzka i Miejska Biblioteka Publiczna im. dr Witolda Bełzy w Bydgoszczy,
- Wydział Administracji Budowlanej, Urząd Miasta Bydgoszczy,

- Wydział Edukacji, Urząd Miasta Bydgoszczy z jednostkami podległymi - bursy, schroniska, gimnazja, inne szkoły, MDK, ośrodki, poradnie, przedszkola, szkoły podstawowe, zespoły szkół,
- Wydział Gospodarki Komunalnej i Ochrony Środowiska, Urząd Miasta Bydgoszczy,
- Wydział Obsługi Urzędu, Urząd Miasta Bydgoszczy,
- Wydział Sportu i Turystyki, Urząd Miasta Bydgoszczy,
- Zakład Robót Publicznych,
- Zarząd Dróg Miejskich i Komunikacji Publicznej w Bydgoszczy,
- Zespół Żłobków Miejskich,
- Żużlowy Klub Sportowy Polonia Bydgoszcz S.A.,

The remaining emissions that were not subject to government emissions inventory, were included in the community activities inventory. Aggregated data for the entire city are were provided by:

- Agencja Restrukturyzacji i Modernizacji Rolnictwa, Kujawsko-Pomorski Oddział Regionalny ARMIR w Toruniu (The Agency for the Restructuring and Modernisation of Agriculture),
- Kujawsko - Pomorski Związek Hodowców Koni w Bydgoszczy (Association of Horse Breeders),
- ENEA Operator Sp. z o.o., Oddział w Bydgoszczy (electricity supplier),
- Pomorska Spółka Gazownictwa Sp. z o.o., Gazownia Bydgoska (gas supplier),
- Urząd Regulacji Energetyki (Energy Regulatory Office).

The boundaries of the inventory were set to exclude the installations participating in the Emissions Trading Scheme. Emissions Trading Scheme is a tool to reduce industrial emissions and here it is not necessary to include them in the reduction strategy. The district heating operator (Komunalnego Przedsiębiorstwa Energetyki Cieplnej) is an exception to this rule, as it is entirely owned by the City Council and hence the municipality has a substantial influence on the company.

Installations participating in the Emissions Trading Scheme within the area of the city of Bydgoszcz are:

- Zespół Elektrociepłowni Bydgoszcz S.A. I - (ETS no. PL-0100-05) –GHG emissions according to the National emissions allowance allocation plan: 62 746 Mg CO2,
- Zespół Elektrociepłowni Bydgoszcz S.A. II - (ETS no. PL-0101-05) – GHG emissions according to the National emissions allowance allocation plan: 1 092 499 Mg CO2,
- Zespół Elektrociepłowni Bydgoszcz S.A. II - (ETS no. PL-0099-05) – GHG emissions according to the National emissions allowance allocation plan: 7 Mg CO2,
- Komunalne Przedsiębiorstwo Energetyki Cieplnej, Ciepłownia - (ETS no. PL-0159-05) – GHG emissions according to the National emissions allowance allocation plan: 15 387 Mg CO2,
- Komunalne Przedsiębiorstwo Energetyki Cieplnej, Ciepłownia - (ETS no. PL-0160-05) – GHG emissions according to the National emissions allowance allocation plan: 10 685 Mg CO2,
- Bydgoskie Zakłady Elektromechaniczne „Belma", Kotłownia – (ETS no. PL-0499-05) – GHG emissions according to the National emissions allowance allocation plan: 3 943 Mg CO2,
- Cegielnie Polskie Sp. z o.o., Produkcja Materiałów Ceramicznych – (ETS no. PL-0791-05) – GHG emissions according to the National emissions allowance allocation plan: 3 819 Mg CO2.

Direct emissions resulting from fuel combustion in PGE ZEC Bydgoszcz S.A. (electricity producer) is not included in the inventory. Because of the fact that these two installations are the main heat source in the city, the emissions from the installations were indirectly included in the inventory on account of the district heating emission factor used.

The inventory includes sources producing energy from renewable resources, although their operations are emission neutral.

Annex II: Inventory tool

Emission inventory files are enclosed on an attached CD.