GREENHOUSE EMISSIONS REPORT

Comune di Padova

MUNICIPALITY of Padova

BASELINE YEAR : 2004

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Comune di Padova

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Introduction

The Greenhouse Gas Emission report is one of the main deliverable of the local application of partners as it has been developed to account all the main greenhouse gas emissions generated by the municipality in order to build a baseline to develop reduction strategies.

The LAKS Climate Accountability System is a 3-phase process. Each phase produces a specific tool and involves a specific level of competence in the Municipality, as described below:

1. Emissions Inventory: each city will complete a greenhouse emissions report based on an inventory of all the GHG emissions of the municipality.
2. Mitigation actions: the climate accountability system includes a specific phase to develop a strategy plan, including relevant actions that the Municipality will implement to reduce GHG emissions.
3. Measurement of GHG emissions reduction: the last phase of the climate accountability system foresees the measurement of emissions reduction obtained through the mitigation actions, in order to develop a "climate balance". This balance will account for action implemented, GHG reduction, and cost of the investment.

This report is developed to be an useful tool to communicate both internally and externally which are the main greenhouse gas sources of the municipality.

The inventory is divided in two main segments:

A. Government operation emissions: refers to all the emissions for which is directly responsible the Municipality

B. Community based emissions: refers to all emissions generated within the administrative bourder of the municipality.

Each macro category is divided in sub-sectors as described below. This report will sum up all the main data collected by each municipality and the entire inventory that collect all the disaggregated information.

I. Methodology

I.1 The methodology and the structure

The LAKs Inventory Tool has been developed to provide a cost-effective and easy-to-use mechanism to support local governments develop their emissions inventory and quantify the size of their community emissions footprint. The development of this tool for the partners in the LAKs project followed an international review of tools and methods by ARPA Emilia-Romagna[1], after which "ICLEI International Local Government GHG Emissions Analysis Protocol[2]" and the "ICLEI Cities for Climate Protection (CCP) 5-milestone methodology[3]" were selected to define a clear and effective framework in addressing local government climate protection with a general urban sustainability perspective. The tool has been developed by ICLEI, taking into account comments and suggestion from the whole partnership.

The LAKs Inventory Tool is an easy-to-use spreadsheet which assists local government staff to complete an inventory in a timely and cost-effective manner. It operates by converting the energy and waste input data (fuel used, electricity used and waste materials produced) into GHG emissions using nationally acceptable emission factors. Tool users do not need to be "climate experts" to use the Inventory Tool. The results are measured in tonnes (t) of carbon dioxide equivalent (CO2e), or "tCO2e". CO2e is the internationally accepted unit for measuring the equivalent climate change impacts from CO2 and other greenhouse gases.

The Inventory Tool is divided into two segments: a Government Operations emissions segment and a Community emissions segment, and each of these segments is sub-divided into sectors appropriate for local government (see box below for a list of the sectors). Other worksheets have been added to assist with calculation of emissions from agricultural activities and from local energy generation sources, as the partners suggested that these would help in their reporting to the Covenant of Mayors.

Local Government Sectors included in each Segment

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 for developing a Government Operations Emissions Inventory involves collecting energy usage data (mainly from energy invoices paid by the municipality) plus records of quantities of waste disposed from Council facilities, and then entering this data into the tool spreadsheet. The process for developing a Community Emissions Analysis involves collecting community energy usage data plus waste-to-landfill disposal data and entering all this into the tool.

The "LAKs Inventory Manual" accompanies the tool and provides municipal staff with comprehensive advice and instructions for the use of the LAKs Emissions Inventory Tool. It also comprises a growing annex of Frequently Asked Questions (FAQ), some guidance on extracting data for reporting to the Covenant of Mayors and a Glossary of Terms related to GHGs, protocols and inventories.

1.2 Boundaries

In order to compile an emission inventory the selection of boundaries, what to include as source of GHG emissions, is crucial. Here a general overview on the rational above the boundaries selected. For more detailed information on that, please see Annex II, *Specific boundaries selected.*

The two boundaries that were applied to local administration are:

- **Organizational Boundary**: consisting of functions directly under local government control, consistent with private sector reporting. In cases where certain functions are shared, a proportional share approach may be needed;
- **Geopolitical Boundary** – consisting of the physical area or region over which a local government has jurisdictional authority.

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 in the geopolitical area.

Organizational Boundary – The Government Operations Analysis

The local government's own organizational greenhouse gas emissions analysis includes emissions arising from the use of all significant assets and services. 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 what 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.

Activities that occur within the community boundary can be controlled or influenced by jurisdictional policies, educational programs and establishing a precedent. Although some local governments may have only limited influence over the level of emissions from some activities, every effort have been made to compile a complete analysis of all activities that result in the emission of greenhouse gases. There may be instances where boundaries overlap such as, for example, when a regional government and a city within its borders conduct separate analyses. In these cases, overlapping jurisdictions were encouraged to collaborate on the data collection and other tasks.

II. Results

2.1 Summary results

2.1.1. Country's emissions (if relevant)

Italy	
Population	60.340.328
Geophysical area (km2)	301.33
Total GHG emissions (tCO2e) in Italy	226.368.773

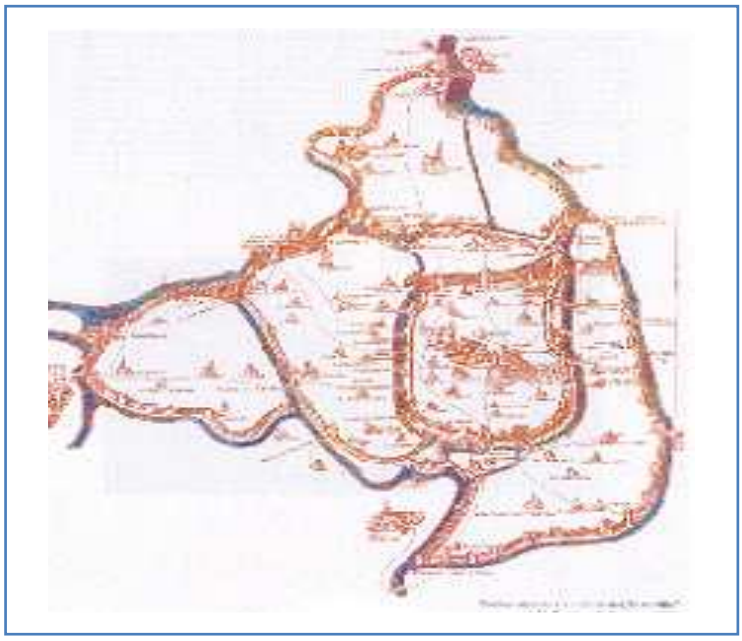
Data source:

2.1.2 Municipality's information

Table 1. General information

Municipality of Padova	
Population	211.936
Geophysical area (km²)	92,85
Baseline year selected for Government Operation emissions	2004
Baseline year selected for Community emissions	2005

Data source:



2.1.3 Municipality's emissions

This table sums up all the total greenhouse gas emissions of the municipality, the total Community emissions includes also the most specific data Government operation emissions, these two sections are kept divided to highlight for which part the Municipality direct operations are responsible for total GHG emissions of the territory.

Table 2. Total municipality' emissions

Municipality of PADOVA	
Total GHG community emissions (tCO_2e)	1.892.158
Government operations GHG emissions (tCO_2e)	53.809

Data source:

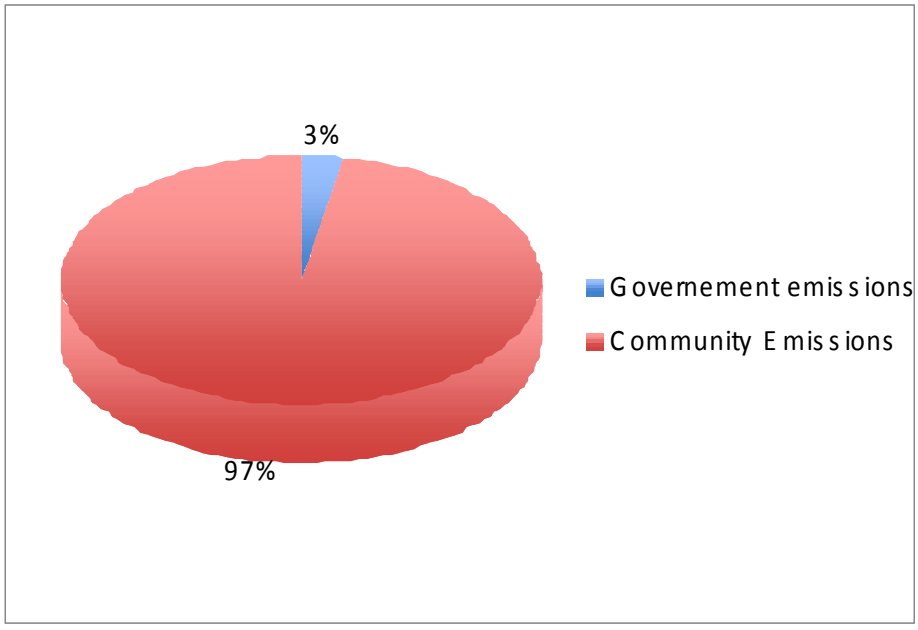


Figure 1. Total municipality's emissions

Data source: Direct Data, Province of Padova, Ministry of Productive Activities, Regione Veneto, Annuario Statistico Comunale,. ACI

0,84%

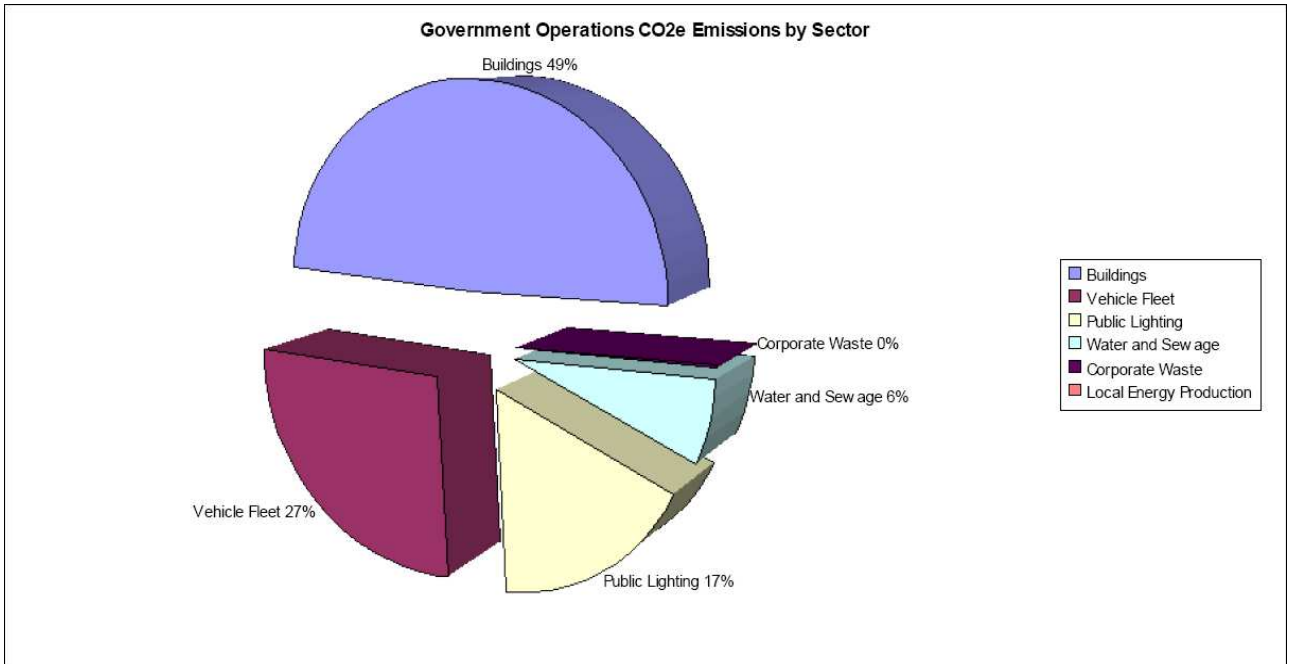
Percentage of municipality's emissions on total national emissions

2.1.3 **Citizen's Carbon Footprint**

This data shows how much CO_2 is on average generated by each inhabitant of the municipality in the year selected

tCO_2e per inhabitant in year 2005 is: 8,94

2.2.Government operation emissions



In this section are summed up the main data related to government operation emissions divided by each sector included in the inventory

Figure 2. Total Government operations emissions divided by sector

Total tCO_2e from Buildings is:

26.382

Data source: Internal

tCO_2e per inhabitant for building sector is:

0.12

Building sector This sector includes all the emissions generated by energy consuption due to functioning of municipality's owned buildings including schools, offices, historical bulding etc.

Table 3. Bulding sector main categories emissions tCO_2e (if relevant, you can add here sub-groups you think are relevant or useful in your context)

Bulding sector main categories emissions tCO2e	
Schools	13.807
Offices	7.560
Sport facilities	4.497

Data source: Internal source (Settore provveditorato)

Vehicle Fleet

This sector includes all emissions related to the municipal vehicle fleet, public transport and depending on municipality's competencies also Utilities companies.

Table 4. Vehicle fleet main categories emissions tCO_2e (if relevant, you can add here sub-groups you think are relevant or useful in your context)

Vehicle fleet main categories emissions tCO2e	
Municipality's fleet	762
Public transport	13.695
Utilities' fleets	Not available

Data source: Internal Source, Internal, APS Mobilità

Public Lighting

This sector account for all energy used to enlighten streets, squares or other public services (e.g municipality's events, cemetery etc.)

Total tCO_2e from Public lighting is:

9.364

Data source: Internal, Settore Provveditorato, Settore manutenzioni

tCO_2e per inhabitant for public lighting is:

0.044

Table 5. Public lighting main categories emissions tCO_2e (if relevant, you can add here sub-groups you think are relevant or useful in your context)

Vehicle fleet main categories emissions tCO2e	
Public lighting for street	8.345
Events	17
Other public lighting	1.002 (traffic lights mainly)

Data source: Internal, Settore Provveditorato, Settore manutenzioni

Water and sewage

This part includes all emissions generated by energy used for pumping and distributing water in the municipality.

Total tCO_2e from Water and sewage is:

3.496

Data source: Acegas APS Servizio Acqua

tCO_2e per inhabitant for water and sewage is:

0.016

Waste

This part includes all the GHG emissions due to waste produced directly by government operations (offices, schools etc.)

Total tCO_2e from government operation Waste is:

109

Data source: Internal Elaboration

tCO_2e per municipal employee for government operation waste is:

0.057

Green electricity public purchase (if relevant)

-- %

Percentage of renewable energy on total government operation energy consumption

Data source: Not Available for 2004

Comments on Governemnt operation emissions

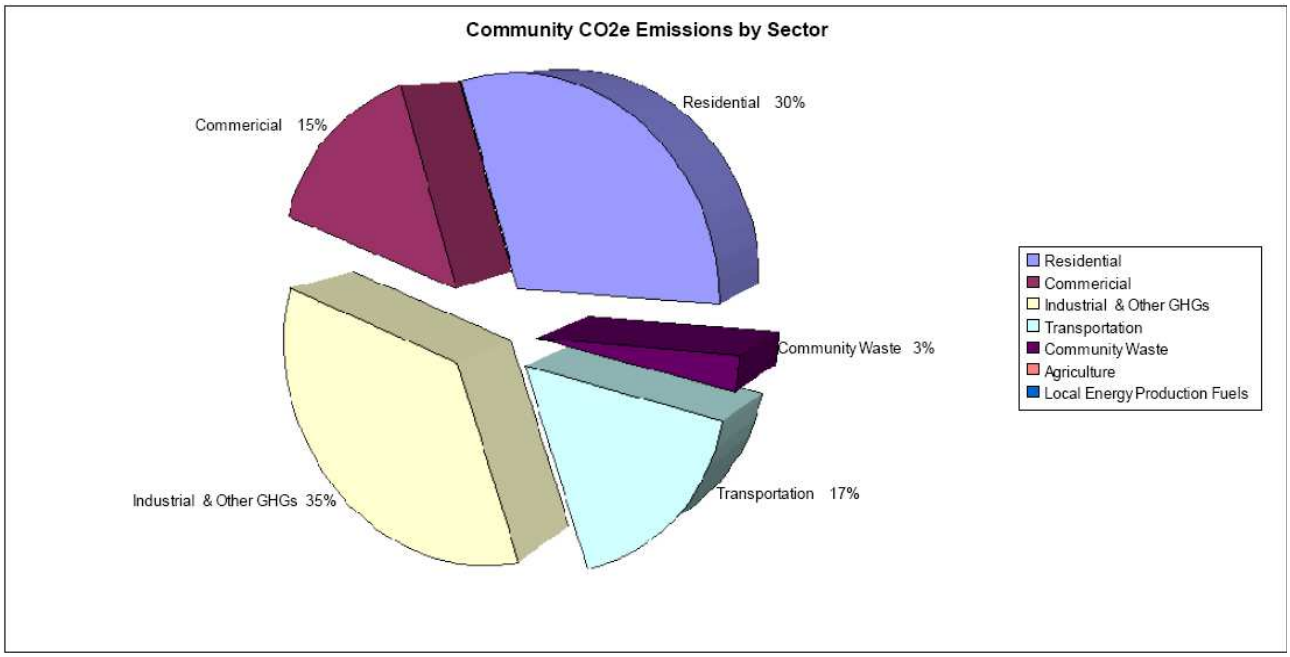
In 2004 the Body started the implementation of its Energy Efficiency Plan, that touches among others, public lighting and vehicle fleet.

2.3 Community based emissions

In this section are summed up all the data coming from emissions generated by the entire territory on which the municipality has its own jurisdiction. It relates to the municipality, district or regional geopolitical area covered by the local government, i.e. the area within the local authority boundaries. The Community Segment includes the following sectors: residential, commercial, industrial, transport, waste and other (including agriculture).

The following table shows all community based emissions divided by sector considered

Figure 3. Total Government operations emissions divided by sector



Residential sector

This part includes all emissions coming from energy consumption in private households in the municipality's territory.

Total tCO2e from Residential sector is:

565.380

Data source: Terna, Istat, Ministero dello Sviluppo Economico, ENEA

tCO2e per inhabitant for residential sector is:

2,67

Commercial sector

It covers all emissions generated by commercial and tertiary sector in the Muncipality's jurisdiction

Total tCO2e from Commercial and Institutional sector is:

293.160

Data source: Data source: Terna, Istat, Ministero dello Sviluppo Economico, ENEA

…

tCO2e per inhabitant for commercial and institutional sector is:

1.38

Industrial sector

It covers all emissions generated by energy consumption by industries operating in the territory

Total tCO2e from Industrial sector is:

670.080

Data source: Data source: Terna, Istat, Ministero dello Sviluppo Economico, ENEA

tCO2e per inhabitant for industrial sector is:

3.16

Transportation sector

This sector covers all the emissions due to fuel consumption of all vehicles circulating within the municipality.

Total tCO2e from transportation sector is:

324.629

Data source: Ministero dello sviluppo economico, Annuario Statistico Comune di Padova

tCO2e per inhabitant for industrial sector is:

1.53

Table 5. Transportation main categories emissions tCO2e At the moment not available

Vehicle fleet main categories emissions tCO2e	
Cars	--
Commercial vehicles	--
Trucks	--

Community Waste sector

This data include all the emissions due to total waste produced within the territory and treated in landfills. It does not include recycling, incinerators or any other kind of waste treatment.

Total tCO2e from Community based sector is:

49.962

Data source: Comune di Padova

tCO2e per inhabitant for waste sector is:

0.24

Agriculture sector

This sector includes all emissions generated by the agriculture in the territory including animals and green areas

Padova Inventory at the moment doesn't account for this sector.

Local Energy Production

This sector is the only part of the inventory that does not include consumption data but data coming from the emissions of energy plant production within the territory. The objective is to monitor the percentage of energy coming from renewable sources and traditional fuels.

Total MWh of Energy produced from renewable sources is:

5.000

Data source: Produzione media idroelettrico Voltabarozzo di proprietà C.E.V. Srl (attivo dal 2001). Dati S.T.E. Energy spa

Percentage of renewable energy on total energy consumption

%

Total MWh of Energy produced from traditional sources is: *

*** Regional and National data required to know the share of renewables. The comune itself buys a share of Green Electicity (data to be collected)**

Comments on Community based emissions

Informations are given from a Provincial level with a top-down process: a municipal level will be soon available.
The Provincial Energy Agency (Agenzia per l'Energia) will be soon issuing a work in which all sources of primary energy are evaluated according all the available databases: the work has a big statistical robustness and gives informations about energy for all the municipalities of the Province.

Data about transportation need more studies since data are underestimated and many informations are missing (i.e. the Methane consumption is not given)

Data about renewables are underestimated too and will be studied in Padova's Energy Plan.

Annex I: Specific boundaries selected

The Government inventory does not include energy consumption (both for buildings and vehicles) deriving from Utilities and participated societies: collecting such informations requires more time and will be one of the actions of our sustainable action plan.

Building consumption do not cover Social Housing (difficult to check consumptions) and buildings owned by the Comune but outside of its boundaries.

Annex II: Inventory tool