

URBAN EMPATHY – Working Package 3

RESULT INFORMATION FILE – Phase 1

Description of the result to be capitalized in URBAN EMPATHY

1. Partner's description

(Summary information of the partner presenting the result to be capitalized in URBAN EMPATHY)

Name of the institution presenting the result	ARISTOTLE UNIVERSITY OF THESSALONIKI
Type of institution (city, region, agency, tech institute...)	UNIVERSITY
Main contact	Name: Eleni Feleki Position: Operational responsible Telephone: +30 2310 996048 - +30 6974 429459 (cell) Mail: feleki@aix.meng.auth.gr / efeleki@hotmail.com

2. Project description

(Summary information of the project corresponding to the result)

Name of the project	Low Cost Zero Waste Municipality
Acronym of the project	ZERO WASTE
Starting date	2009-05-01
Ending date	2012-04-30
Project status (finished, execution...)	Finished
Project type (standard, targeted, strategic, ...)	Standard
Lead partner of the project	" European Grouping of Territorial Cooperation (EGTC) EFXINI POLI – Network of european cities for sustainable development ¹
Project website	http://www.med-zerowaste.eu
Programme (MED, Interreg...)	MED
Programme Priority	Protection of the environment and promotion of a sustainable territorial development (Axe 2)
Programme Objective	Objective 2.1: Protection and enhancement of

¹This network, with distinguishing title "EGTC Efxini Poli - SolidarCity network" is the adaptation and expansion of the Hellenic cities network "EFXINI POLI – NETWORK OF LOCAL GOVERNMENT ORGANIZATIONS FOR THE SOCIAL, CULTURAL, TOURIST, ENVIRONMENTAL AND AGRICULTURAL DEVELOPMENT" and with distinguishing title "EFXINI POLI", which was founded in 1995 and until the 31/12/2010 there were thirty municipalities participating, into this EGTC in accordance with the EC Regulation 1082/2006. The cities network "EFXINI POLI" is an urban non profit enterprise as provisioned by article 101 of Act 3852/2010 and participates in several transnational cooperation for the implementation of co-funded trans-border, trans-regional or transnational programs, by European funds, for the implementation of its objective.

	natural resources and heritage
EU 2020 Strategy (choose the most suitable one from the following options)	<input type="checkbox"/> Smart growth <input type="checkbox"/> Inclusive growth <input checked="" type="checkbox"/> Sustainable growth <input type="checkbox"/> Economic governance

Description of the **PROJECT**. Main topic and objectives. (300 words approx.) *(Describe in more detail the project's main thematic and objectives, providing relevant information about the contents addressed in it and where does the result to be capitalized come from)*

The general objective of the project was to develop, test and disseminate integrated zero waste management concepts for the participating MED regions, in order to minimize municipal waste production, divert materials from landfilling and maximize resource recovery in a life cycle approach.

The main issues addressed were focused on:

- a) **the creation of a harmonized European zero-waste methodology in local level** (including various segments): a roadmap for municipalities paving into the zero-waste field
- b) **an interactive policy tool box for goal-oriented municipal waste management adaptable in all EU countries**, for a long-term sustainable development.

The impacts of the project (from which the results to be capitalized into URBAN EMPATHY come from) can be summarized as follows:

- Professional development, achieved through the employees' training activities, aiming to maximize their competences towards the employment of a concrete zero waste management methodology and its tools.
- Economic efficiency and stability: the project provided the industry and the public sector (in local, regional and national level) with tools and methodologies to modernize and improve a common solid waste management system primarily for a systematic reduction of waste material that is being discarded on landfill areas and into the environment and secondly for energy recovery and improvement of the local environment due to the reduction of the GHG emissions. Such actions stimulated reuse, recycling, reduction and recovery (4R concept). Furthermore, the project boosted sensitization of the public about separate waste collection with the intention of reusing these sources, and promoted recycling methods which represent one of the driving forces of economic activities, and a fundament for sustainable development in the regions.
- Environmental protection: limiting the environmental pollution through the reduction of waste, recycling and re-use, boosted resource efficiency, energy saving and waste minimization.
- Societal issues and cohesion: the research results undoubtedly helped induce new technologies and products for the existing economy, providing opportunities for the creation of new companies and jobs, related to waste treatment, energy recovery and waste disposal.

In the frame of this European project a tool has been developed for estimating the CO₂ emissions for the management of municipal solid waste at the municipal, regional or national levels with small amounts of input data.

3. Result description

(Summary information of the result to be capitalized in URBAN EMPATHY)

Name of the result to be capitalized in URBAN EMPATHY	Decision support tool for municipalities to select the best available sustainable waste management technique according to specific parameters, supported by calculation tool and theoretical background.
Type of result (operational tool, recommendations, good practices, guideline, ...)	Operational tool
Current status of the result (under development, completed, not started...)	Completed
Type of deliverable (document, website, database, ...)	<ol style="list-style-type: none"> 1) Theoretical database on waste management 2) Tool to calculate GHG emissions from waste (CO2ZW)
Specific URL link	http://www.med-zero Waste.eu/deliverables/DST_Final/index.htm
Publication date	
Language	English

Description of the chosen **RESULT** to be capitalized in URBAN EMPATHY. Result objectives. Utility and purpose. (200 words approx.) *(Brief description of the result's most relevant characteristics, pointing out the main objectives and purpose.)*

The result is a decision support tool, consisting in a theoretical database (providing info on waste management legislation per partner country, characterization methodology for waste streams) and by an online tool: CO2WM.eu for the calculation of the greenhouse gas (GHG) emissions (in CO₂ equivalents) emanating from the waste operations of European municipalities. The tool in this version is an Excel® based calculator which, with the input of municipality specific waste data (or national data as a default), permits the user to obtain a municipality level carbon footprint of waste treatments (infrastructures are not included).

The user will be able to use this calculator to support GHG monitoring and reporting initiatives as well as to provide an estimation of potential GHG reductions (or additions) associated with management and technological changes in local waste operations. The CO2ZW tool allows the users to monitor GHG emissions from municipal solid waste following the IPCC guidelines for national inventories and the principles of life cycle assessment (LCA).

The calculator includes the key stages and parameters for calculating GHG emissions and includes several advantages regarding the implementation of the default values of the Mediterranean European countries, an improvement in accessibility (online free access) and two approaches for calculating GHG emissions from landfills. According to the paper: CO2ZW: Carbon footprint tool for municipal solid waste management for policy options in Europe. Inventory of Mediterranean countries (E. Sevigne´ Itoiz, C.MGasol, R.Farreny, J.Rieradevall, X.Gabarrell) for countries with medium and high rates of deposition, implementation of the European policies limiting waste in landfills can contribute to mitigate climate change in a remarkable way.

The tool is easy to use, because it needs small data input, and because the multiple and variable scenarios that exist in the field of waste management have been simplified with accuracy, so the tool is intended to provide a first approach to waste management assessment. Indirectly, it can give hints for the assessment of consumer behaviour in terms of solid waste management. To further advance on the analysis of waste fluxes and the different parts of waste cycle management, other tools would be required; more technical and based only on local data (instead of national averages), and thus suitable only for specialists (waste technicians or waste managers).

With the CO2ZW tool, it is possible to orientate waste management choices depending on waste management infrastructures and waste policies, along with the quantification of GHG emissions from MSW management, which is essential to guide waste policy options and climate change solutions.

List of keywords related to the result (10 words max.) *(Please provide a short list of keywords related to the result to be capitalized in Urban Empathy, e.g.: urban planning, sustainable growth, mobility, energy efficiency, renewable energies, governance...)*

GHG emissions, Climate change mitigation, Municipal Solid Waste Management policies.

Describe the potential benefits or improvements that the result may generate through the capitalisation process (200 words approx.) *(Describe improvements either in your result or those that it may generate due to the capitalisation process)*

The key benefit from the capitalization process, is the use of the results by beneficiaries:

1. urban empathy partners
2. urban empathy external partners
3. urban empathy target audience

Therefore, given that we have identified the results to be capitalized, the 2nd most important step is to define the potential beneficiaries (either within or in the "greater environment" of urban empathy) and define a "strategy": matrix between results and beneficiaries and a roadmap of maximization of the use of the results.

Improvements that Zero Waste result could generate to the beneficiaries are related to the provision of guiding policies in waste management at local level. It can be addressed to policy makers and environmental technicians that need a first approach to:

- a. Seek information on waste legislation (EU, Greek, Italian, Slovenian, Spanish and Catalanian)
- b. Seek information on system characterization, based on 5 aspects (Municipal Solid Waste streams, Waste collection systems, Waste treatment, Economic instruments for waste management, System flow diagrams)
- c. Seek for a methodological approach for the existing waste management techniques
- d. Need information on the studies that are needed to apply zero waste in municipal level
- e. Need support to calculate first estimations on GHG emissions and report initiatives as well as to provide an estimation of potential GHG reductions (or additions) associated with management and technological changes in local waste operations.

4. Result evaluation

According to your own criteria, which are the main strong points of your result?
Which are the weak ones? (300 words approx.) *(Describe the strengths and weaknesses of the result to be capitalized in Urban Empathy)*

The strong and weak points that follow derive from a deep operational review of CO2ZW compared with other European tools based on the information available in Eriksson and Bisailon (2011), Tunesi (2011), Gentil et al. (2010), Den Boer et al. (2007).

Strong points:

- Available on line
- Freely accessible so that any user can download and start using it
- Developed in Excel, providing an interface that is easy understand,
- The tool is based on IPCC methodology, the best considered and most used worldwide.
- Based on collected and incorporated default data from Spain, Slovenia, Greece and Italy in an attempt to facilitate the calculations for Mediterranean European countries. However, the European averages are also included.
- The calculations of three performance indicators have been incorporated, which could be useful in evaluating and guiding local and national policies on waste management
- The inclusion of two approaches of GHG calculations from landfills

Weak points:

- There is a lack of complementary assessments to the environmental performance. However, another similar tool, the "LCA-IWM" includes social and economic assessments, whereas the tools "EASYWASTE" and "ORWARE" include economic evaluations for the waste management process.
- The tool only evaluates CO₂, which is the main and most direct GHG emissions indicator, but not the only one.
- Default values and legislation need to be updated.
- Benchmarks would be required to better evaluate and understand the considered waste management system.
- Potentially weak point: lack of data². Even when the required data inputs are small compared with other waste calculators, they have to be correctly provided. For many

² The following checklist provides an indication of the data required as inputs for the calculator:

- Total amount of waste generated for the desired study year (or alternatively the population within the study area for the same year);
- The typical composition of municipal solid waste (MSW) generated within the study area
- The fractions of source-separated glass, plastic, metals, paper and cardboard, and organic material (as a percentage of the total for each respective material within the total MSW stream) that have been collected separately and processed in appropriate facilities
- The percentage of impurities typically found within the source-separated organic fraction

of these items, default values for the Zerowaste project partners' countries (Greece, Italy, Slovenia, Spain) are automatically provided and should be used if more specific data for the study area is unavailable for the user. For users seeking to apply this calculator within a country external to the Zerowaste project; it is advisable to use local specific data where available: a good simulation requires concrete data. Otherwise, default values based on European averages have also been provided.

- The amount of biogas captured from landfills
- The emission factor for the local electricity mix.

How do you think your result can affect the main aspects to be considered in a sustainable urban model?

(300 words approx.) (Describe the capacity of the result to fulfil the sustainable urban model main principles)

Cross - cutting aspects

- Territorial management and urban design
- Social and Economic cohesion

Sectorial aspects

- Sustainable mobility
- Energy efficiency

The result can affect the cross-cutting aspects (territorial management and urban design and the social and economic cohesion) due to the ability that it offers to quantify local emissions deriving from municipal solid waste management helping thus the urban decision makers to orientate the choice of the appropriate/ most suitable method of waste management and giving them a general view to develop the appropriate policies to reduce their total GHG emissions.

Additionally, the tool aims to improve public services sustainable mobility in the field of waste transport and it gives a first approach on waste transport evaluation. More analytically, default emissions factors are provided and reflect the entire life cycle impacts of the waste transportation, which are differentiated based on waste collection and waste transport. These factors account for the emissions related to the operation of the vehicles (fuel consumption and the extraction and refining of these fuels) as well as for the emissions implicated in the vehicle and road construction and maintenance (Spielmann et al., 2007). The data required for the user is the amount of tons/kilometre (t/km) for urban waste collection and inter-urban waste transportation. The results of the GHG emissions from these stages are provided as separate results with the intention to provide the user with the opportunity to include them in the entire calculation, depending on the availability of data.

In the same way, the the tool affects energy efficiency, as it seeks the most efficient waste management system, with GHG emissions (and consequently, energy consumption) as the main indicator. Energy savings can be achieved by improving waste transport or waste treatment techniques. For example, anaerobic treatment plants produce biogas that is used for energy production. TheCO2ZW tool identifies and evaluates different waste treatment plants.

What influence do you consider that your project result could have on environmental governance and what could be its impact on urban policies? At which level? (Local, regional, national, MED or European level...) (300 words approx.) *(Describe the level of influence of the result and its applicability on EU policies)*

Three parameters are calculated in the tool to provide information to the user on the performance of the municipalities with the following targets prescribed in the European waste management framework: 1. the overall rate of recycling, 2. the content of biodegradables in the landfill and 3. the mixed waste sent without treatment to landfills. (These parameters are derived from the Directive 2008/98/EC (European Commission, 2008) and the Landfill Directive 99/31/EC (European Commission, 1999). - This legislation states that the overall rate of recycling must be above 50%, the content of biodegradables in landfills is limited and no waste can be sent without treatment to landfills).

The sensitivity assessment conducted with the Spanish default values and the evaluation of several alternative strategies for Spain has shown that the main stages affecting the GHG emissions are recycling and landfills.

Considering the results for Spain, it can be derived that there is high potential for climate change mitigation at the European level through the complementary solutions of incineration, biological treatments and the increase of selective fractions, along with diminishing levels of landfills, especially for countries in the second and third groups, which are mainly the East and Southern European countries. (recent reports from the European Environment Agency (EEA) on "The road from landfilling to recycling: common destination, different routes" evaluates the waste management choices of the EU countries depending on the existing waste management facilities, the infrastructure and the governance structures and establishes three groups of countries defined by a diversion strategy for MSW (European Environment Agency (EEA), 2007): low (Denmark), medium (Spain) and high (Greece) levels of landfills).

From the short analysis presented above, it can be concluded that this tool is suitable for guiding policies in waste management, and it has been developed by and for studies and policy makers that need to evaluate the GHG emissions at the municipal, regional or national levels with a small amount of required input data. In addition, quick calculations can be performed with the support of graphical information.

Finally, from the application of the tool it was concluded that despite its low position on the waste hierarchy, landfills remain the predominant method of solid waste disposal in Spain due to their inexpensive cost (Bovea and Powel, 2006); therefore, the policies and strategies of the European Commission are key in limiting waste dumping in landfills and can help to mitigate the climate change significantly.

What is the main target group the result is addressing to? (public administration, public sector, private sector, research groups, ...) How does it enhance public participation? (200 words approx.) *(Describe the target audience that could use the result and if citizen participation processes have been considered)*

This tool is suitable for guiding policies in waste management, and it has been developed by and for studies and policy makers that need to evaluate the GHG emissions at the municipal, regional or national levels with a small amount of required input data. In addition, quick calculations can be performed with the support of graphical information.

Mainly the tool has been designed to be used by Municipalities, but it can also be used by regions and nations.

The participation of the citizens was achieved through information and sensitization actions, mainly information campaigns.

Is the result currently in use in the Europe/MED area? (150 words approx.) *(Please provide further information on the usability of the result, pointing out if it has already been implemented or in use)*

The Zero Waste DST is available to everyone (individual or municipality) who seeks to find information regarding rational waste management: from the legislative framework until the selection of the most suitable technology for the elimination of GHG emissions, as analytically described in the previous paragraph.

Both the theoretical and the calculation tool are currently in use and their usage is recorded by the Autonomous University of Barcelona. According to the developers, more than 250 people from 20 countries, including municipalities, have visited the result but its actual usage is not controlled. Comments and suggestions are received and seminars as well as actions to promote its use are continuously being elaborated. There is no analysis of the comments and suggestions up to now.

According to your own criteria, what are the main innovative aspects of the result? (150 words approx.) *(Please provide further information on the level of innovation achieved by the result to be capitalized in URBAN EMPATHY: new methodologies, etc...)*

The innovative aspect of the tool is related to its free of charge usage by employees and decision makers.

How do you think your result could be implemented? Through which means? Do you think it is easily transferable? Estimated costs, resources, time needed for implementation, key actors involved... Please include any other relevant criteria you may consider important (300 words aprox.) *(Please provide further information on implementation and transferability requirements of the result)*

The result is very easily transferable through training activities. Such activities have already taken in place during the implementation of Zero Waste. One seminar to municipal employees has taken in place in every participating partner. Almost 40 participants followed the seminar.

The attendants of the seminars had the opportunity to receive key information about the implementation of WM rational schemes. Examples of multiple municipalities from worldwide that have adopted such schemes were presented, while guidelines for successful programmes by avoiding usually faced obstacles were provided to the servants. The latest could get in touch with the partners of the project for questions and help. The innovation of these seminars was that municipal servants received practical knowledge about rational waste management schemes and actual guidelines to implement such schemes in the right way.

The result could be applied by new members of the target group of the same countries as those that participated to Zero Waste through the same training activities. For users seeking to apply the calculator within a country external to the Zerowaste project, it is advisable to use location specific data where available. Otherwise, default values based on European averages have also been provided.

The only mean that is necessary is the man-hours (approximately 4-5) of the trainer.