LIFE13 ENV/ES/000725

ewas

Layman's Report

"LIFE EWAS: Efficient & sustainable waste management methodologies using ICT tools enabling GHG emissions reduction"

www.life-ewas.eu

socialplatform.life-ewas.eu


ewas

The LIFE EWAS Project

Life EWAS aims to foster innovation in the area of public and private interest of waste management by demonstrating the potential of new information technologies to optimize current EU waste management operational methodologies and to establish a way forward for the standard adoption of a more sustainable model. More specifically, it will transfer and adapt experiences from successful waste prevention and collection activities with the prospect of gaining knowledge for the wider transferability of such activities in different EU context. EWAS aims to ensure a sustainable management of natural resources and wastes with emphasis on energy efficiency and contributing with the reduction of GHG emissions, noise and traffic congestion during the waste collection and transportation.

The LIFE EWAS project uses ICT tools, namely wireless sensors in bins to monitor waste collection, supported by a social platform to raise awareness in recycling, in order to develop an appropriate environmental and cost effective waste collection methodology so as to:

- Improve of people's quality of life
- Reduce environmental impact comparing with current methodologies
- Reduce investment and operational costs, noise and traffic problems
- Inform citizens about recycling
- Increase waste recycling level and citizens' cooperation
- Interact with citizens about waste management issues.

The Objectives

1. Evaluate EU policy and legislation (Waste Framework Directive) options and opportunities related to waste management collection practices.

2. Contribute on mobilising ICTs to facilitate the transition to an energy-efficient, low-carbon economy waste management methodologies. The overall aim is to contribute with the EU objectives in relation to GHG reduction for 2020 in the waste management sector.

3. Develop appropriate environmental assessment, implementation and monitoring activities related to different waste collection methodologies and the respective benefits to improve current waste management practices.

- Improvement of people's quality of life
- Reduce environmental impact comparing with current methodologies
- Increase waste recycling level and citizens' cooperation
- Reduce investment and operational costs, noise and traffic problems

4. Demonstrate the optimization of waste management practices (Local Action Plans) through the implementation of the EWAS model at a local and sectoral level.

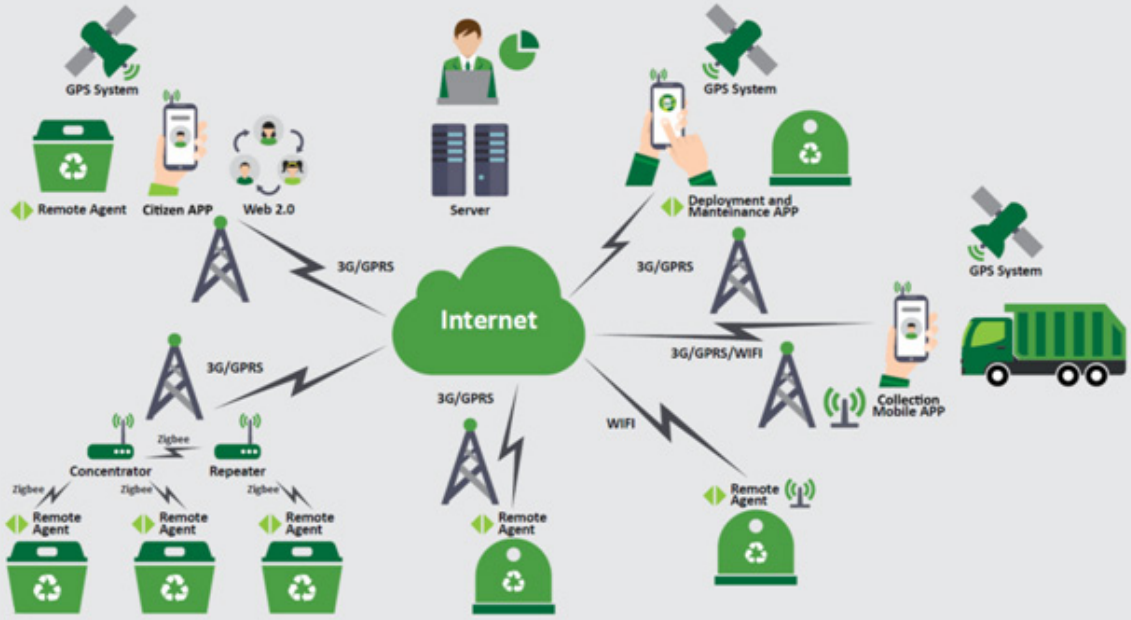
5. Increase the awareness of new waste collection methodologies, provide training and disseminate information for the active participation of local stakeholders.

6. The final objective of EWAS is to create, implement and demonstrate the impact and increased sustainability of waste collection methodologies by using innovative ICT solution at the same time as it raise awareness about recycling, saves costs and reduces GHG emissions in compliance with the EU 2020 goals.

The Methodology

LIFE EWAS main major modules of the general architecture includes:

- Sensing infrastructure that includes the hardware and communication elements to be installed on the containers in order to be able to monitor the fulfilment level of the containers.
- Waste manager platform, that includes the software that provide the waste managers a platform to visualize on real time the status of every container and that provide reports for an optimal route planning.
- Citizen platform, that includes the software that provide to the citizen a solution with extra added value services related to waste management in its city.
- The cloud hardware infrastructure needed on the cloud to be able to provide the services offered both to the waste managers and citizens and host all the databases.
- A functional architecture of the technical solution is shown in the next figure:



Software Platform

- Software as a Service (SaaS).
- Cloud data repository.
- Dashboard and remote configuration of devices.
- Web application developed with latest technologies.
- Monitoring information.
- Alerts.
- Reports.
- Report

How It Works?

Deployment & Installation

The monitoring device installed inside the containers and completely autonomous and self-sufficient, it is responsible for collecting the data associated with the filling of the container as well as for detecting real-time events associated with temperature alerts and shaking, in this way each container is turned into an active and intelligent element.

Operational deployment carried out autonomously by the installer.

Measurement

Real time data collection through fully autonomous and intelligent sensors installed in the containers turning them into an active and intelligent element.

Analysis & Planning

Sensors communicate with the web platform to send data related to the level of filling and configurable alerts. The devices allow taking data with a resolution that can range from a few minutes to several hours. This measure is reported from these devices wirelessly through a communications solution 2G/3G/4G or LPWA.

Communication

The measurements are stored in a Software data repository and are displayed to the end user through the web service created for this purpose.

The application is offered in SaaS (Software as a Service) mode. This enables container content level evolution monitoring, container and route statistics exporting and optimized collection route development.

The data repository is designed with standard web technologies compatible with most management software used in the SWM (Solid Waste Management) sector to offer a broader package of waste management solutions: GPS truck tracking and control of route deviations, efficient driving, RFID container identification location...

Project Actions / Activities

ACTION 1: Preparatory actions.

- Initial analysis and definition of specific requirement of the implementation actions.
- Creation of an inventory of the methodologies and technologies related with efficient waste management and applicability for real environments.
- Extensive analysis of European and national legislative frameworks as well as comparison between national laws and EU directives to consider under the waste collection methodologies.
- Evaluation of most common waste collection methodologies in Europe with special focus on Mediterranean countries and in particular in the specific areas of implementation of the EWAS model.
- Analysis of the EWAS implementation requirements.
- Definition of monitoring Key Performance Indicators

ACTION 2: Implementation actions.

- Implementation of the new waste management methodologies and best practices using ICT tools for an efficient waste collection.
- Development of waste Management methodologies and best practices using ICT.
- Installation of an efficient ICT tool to optimize waste collection methodologies.
- Demonstration actions which include two pilot areas.
- Creation of maintenance manuals.

ACTION 3: Monitoring the environmental, methodological, social and financial impact in order to demonstrate the effectiveness of EWAS methodologies in waste management.

- Life Cycle Analysis (LCA) for all processes implemented, in terms of energy use and emissions.
- Assessment of the impact of waste collection optimization to conform with the improvements detected.
- Technical, economical and environmental assessment of the practices and processes developed during the project.
- Periodical monitoring and optimization of the demonstration activities.
- Establishment of a set of actions, measures, and means that should be taken by national policy makers to conform to European legislation requirements.

ACTION 4: Communication and dissemination

- Integrated communication and dissemination Plan.
- Increase the awareness of the stakeholders of the improvement of current methodologies using new technological advances.
- Increase the awareness of recycling to the citizens.
- Alignment with other initiatives in the same area to approach the common European objective.

ACTION 5: Project management and monitoring of the project progress

- Project Management for administrative, technical and financial issues.
- Report to the European Commission
- Networking with other LIFE+ projects
- After-LIFE Communication Plan

The Pilots

The case of Seville

Urban area

268 containers (Paper - Glass)

More than 120km

In present the waste collection service in the city of Seville covers an area of 14 square km and 1.077 lineal km through 13.000 containers and 461 trucks. For glass collection, there are 1.856 containers installed, of which 760 are lateral collection. The total amount of routes is 11.

Sevilla
693.000
Inhabitants

Number of deployed devices	Population served	Routes monitored	Monitoring started
268	82.781	3	01/02/2016

The case of Chania

Tourist area

355 containers (Paper - Plastic - Metal - Glass)

More than 150km

DEDISA SA provides collection and disposal services in 19 of the 23 municipalities of the Prefecture of Chania. Collected waste is delivered for further treatment in a Mechanical Recycling- Composting Plan, and residuals are disposed in a landfill site. For the collection of the stream of recyclables about 2,033 blue containers of 1100lt have been distributed throughout the Prefecture of Chania. The collection is performed by 8 trucks within 9 routes.

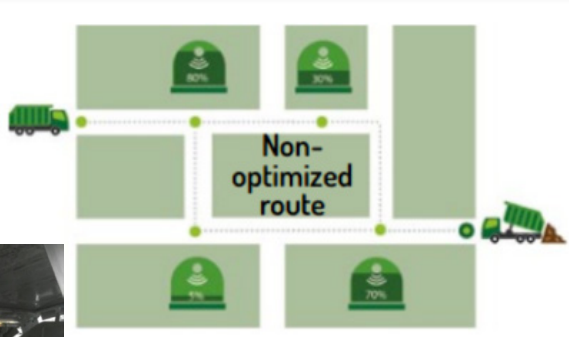
Chania
300.000
Inhabitants

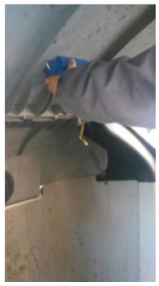
Number of deployed devices	Population served	Routes monitored	Monitoring started
355	2	5	01/03/2016

The Implementation

• Monitoring phase: January to June 2016

Installation of the sensors and obtention of the fisrt measurements level of fullfilment





Deployment of 215 sensors

2 operators

7 working days

30 sensors/day

5 minutes to install a sensor

Blue container

295 containers

2 crews

4 operators

15 working days

20 sensors per day

Yellow container

60 containers

1 operators

2 working days

Permanent monitoring and adjustment of routes depending on fill level

• Adjustment phase 1: July to December 2016

Data gathered in Monitoring phase is used as an auditing service to re-plan routes based on theoretical model of fullfilment

• Adjusment phase 2: January 2017 onwards

Incorporation to the real time data collected by the system to follow the recommendations made by the platform

The Results

Seville

The pilot has been carried out in the city centre and has shown very good results (reduction of 66% of collection costs). This is the area where collection is more difficult because of traffic.

These results have created a lot of interest for the replication of the experience in other routes.

Glass Routes	Data prior deployment	Current Data	Reduction
No.Routes	3	1	66%
No. Annual Services	10	34	
No. Hours of service	700	255	

	Service Unit	Data prior to deployment (100 services)	Current Data (34 services	Savings
Cost (PM, Maintenance, Management)	460€	46.070€	15.642€	30.364€
Km Distance	107 km	10.700 km	3.638 km	7.062 km
Consumption (litres)	56 l	5.600 l	1.904 l	3.696 l

Chania

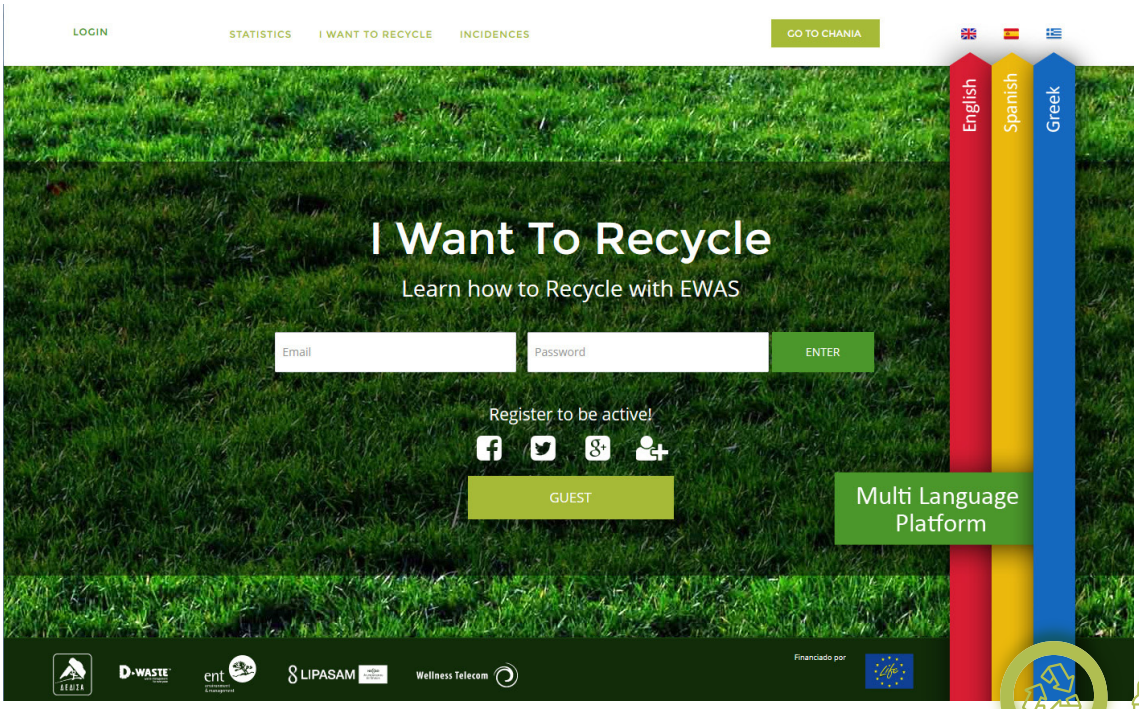
The pilot has been carried out in the Region of Chania and has shown very good results (reduction of 30% of collection costs of glass).

These results have created a lot of interest for the replication of the experience in other routes.

Glass Routes			
	Number of routes	Routes per week	Reduction
Monitoring state	1	5	Aprox. 30%
After the monitoring	1	3 to 4	

Recyclables Routes (blue bin)				
		Number of routes	Routes per week	Reduction
Summer period	Monitoring state	3	5	Approx.0%
	After the monitoring	3	5	
Winter Period	Monitoring state	3	5	Approx.30%
	After the monitoring	2	5	

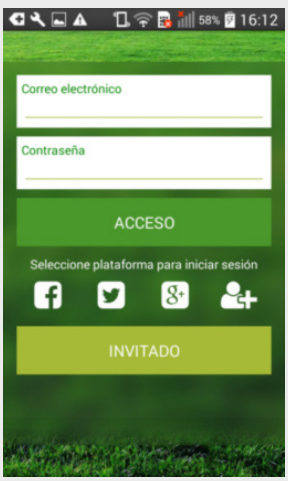
The Social Platform

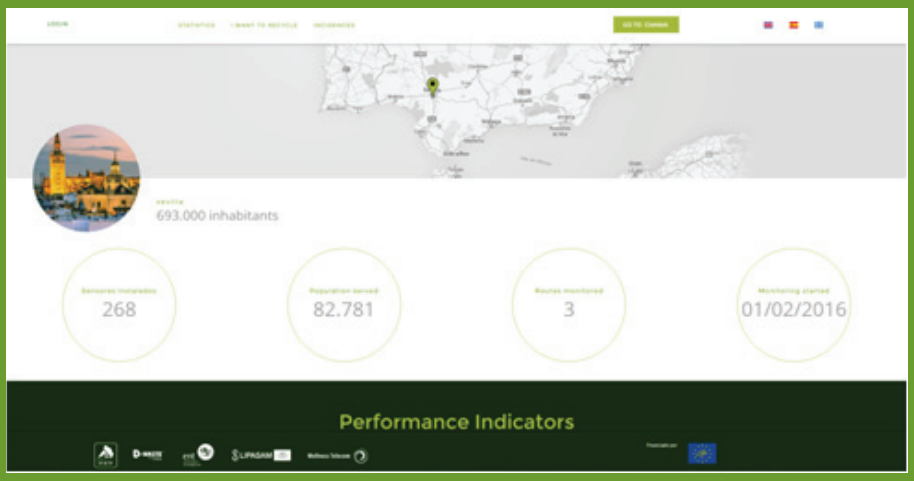


The social platform is a web based online platform also available for smartphones, that:

- informs citizens about the project's methodology and its performance
- increases citizens' awareness on recycling and sustainable waste management
- and engages citizens in local SWM action plans

Mobile Application





Brief presentation of the program's results and performance

indicators in graphs.

- General Facts with images and short text.
- A list of waste to learn how to recycle them
- General information

about waste and their processing

- Tailored made tips for

the improvement of local recycling.

• Short description

about the waste

• In which bin should be disposed

• Where it is led after collec-
tion (sorting plant, recycling
plant, incinerator)

• What finally happen with the
product (recycled, disposed,

reused, etc.).

• Ability to report the

status of the bin:

Empty bin, half-full bin,
full bin, fire in the

bin, broken bin, fallen
bin, misplaced

bin, waste out of the bin, other.

Future Challenges: Action Plans

Local Action Plan for Sevvile

The pilot has been carried out in the city centre and has shown very good results (reduction of 66% of collection costs). This is the area where collection is more difficult because of traffic. These results have created a lot of interest for the replication of the experience in other routes.
Since the waste manager is a public company, the optimisation of costs in the glass collection routes will allow the municipality to improve the service in other routes and fractions, providing an enhanced service.

The target

The proposed action plans aims at:
- extending the sensorisation in all glass collection routes
- reducing the operation costs of glass collection
- creating savings that can be invested in improving the overall collection service

The Plan

The local action plan for Seville introduces the deployment of the EWAS methdology in all glass routes of the city.

Glass	
Area Served	City of Seville
Population Served	690.566
Traffic	NO
Starting Date	01/09/2017
Containers type/color	Side-loading / Igloo
Container volume (lt)	3 m³
Containers (with Sensors)	1.844
Average Collection Distance (km)	90 km/route
Average Collection Time (h)	6 hours/route
Personnel- Driver per track	1
Personnel Crew per track	0
Average Fuel Consumption	5,64 lt/route
Costs	170.000 Û
Savings	111.000 Û

Local Action Plan for Chania

The target

The proposed waste collection and transport methodology targets in:
- Reducing the o verall amount of kilometers driven to c ollect and transport glass containers.
- Lessen the o verall v ehicle drive time to collect and transport glass containers.
- Decrease environmental footprint of waste collection and transport in the C hania P refecture i n terms of CO2 production

The Plan

The Local Action Plan for Chania introduces the deployment o f the EWAS LIFE project ICT methodology for the collection of the waste stream o f glass i n the R egion of Chania.

Glass	
Area Served	Akrotiri (Remote Area)
Population Served	136.306
Traffic	NO
Starting Date	1/6/2014
Containers type/color	Belt/Metallic
Container volume (lt)	1250
Containers (with Sensors)	96
Average Collection Distance (km)	98
Average Collection Time (h)	6,5
Personnel- Driver per track	1
Personnel Crew per track	2
Average Fuel Consumption	97,5
Costs	52,65
Savings	32%

ewas

Layman's Report

LIFE13 ENV/ES/000725

www.life-ewas.eu

socialplatform.life-ewas.eu