

## OPTIMIZATION OF COLLECTION ROUTES



### Background (REF:1)

Most of the budget dedicated by municipalities and waste management companies for waste management goes to collection and transport. This is clearly an area for municipalities to evaluate for cost saving measures. Therefore, the municipalities should be very interested to implement more efficient truck routes (e.g. monitor filling levels of containers which avoid picking up empty containers and predict the future collection needs, efficient driving, plan the collection routes properly) to reduce its overall costs for collecting municipal solid waste and recyclables from residential homes and bring banks.

### ACTION

Implementation of an optimization tool which will plan the routes of the collecting trucks and would reduce the overall travel cost of municipal waste and recyclables collection

Related GP:  
"Control of the filling level of containers"

### Examples of good practice implemented

#### LIFE EWAS project- Seville (Spain) (REF:2)



**Life EWAS project** aims the innovation in the area of public of waste management by demonstrating the potential of new information technologies to optimize current EU waste management operational methodologies and to establish the "**Quamtra system**" to optimize collection routes by constantly monitoring the content level of waste containers.

Figure-1. Quamtra system outline

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By installing sensors in the containers, it is possible to receive **real-time alerts** for collection based on container content level, temperature variation (fires) or movement (shaking) enabling a reduction in damage liability and response time.

The implementation of "**Quamtra system**" lets savings more than 60% as compared with the system implemented before.

#### SENSdumpster in Barcelona (Spain) (REF:3)

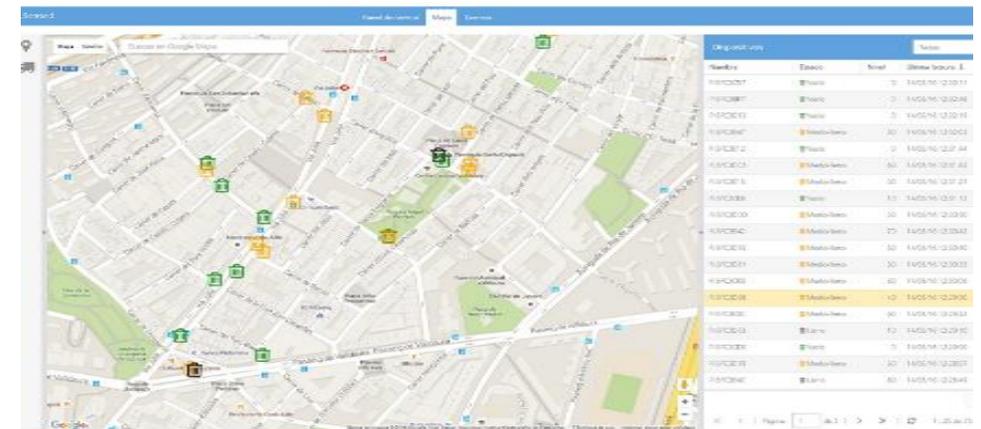


Figure-2. SENSdumpster software implemented in Barcelona (Spain). Source: SAYME

Barcelona Municipality has installed a technology solution named "**SENSdumpster**" based on networks of wireless sensors of ultra-low consumption in 107 paper bring banks on the city. This technology uses **real-time monitoring** of the bring banks and daily calculation of the **most efficient collection routes** which allows to achieve efficiency improvements in the processes of urban waste collection with the aim of offering better service to the citizens. This technology includes the control of the filling level of containers through sensors.

**Savings up to 50% in waste collection costs and filling level status monitoring (among others).**

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## Keep in mind that...

- ⚠ Initial investment for the software required.
- ⚠ Geography of the area of waste collection should be considered
- ⚠ Market research should be done for the most appropriate technology.
- ⚠ The system is currently helpful for bring banks. For individual (blue) bins, which are put to the curb by citizens, it is not necessary.

## How to start? (REF:5)

- ✓ Look for a competent company able to inform and install the system.
- ✓ Train the employees that are going to use the software, to achieve maximum profit of the tool.
- ✓ Start with the software for few trucks and/or few containers as a trial in small city districts.
- ✓ Make regular checks of the results and the characteristics which should be improved.
- ✓ Finally implement the system in the entire city.



EN 16157  
EN ISO 15008  
EN ISO 14825  
EN ISO 15005  
EN ISO 15007  
EN ISO 17287  
EN ISO 17262 - 17264

## Potential benefits (REF: 5, 6)

### Municipalities

			
Operational cost reduction by up to 35%	●		●
Reduction collection cost by optimizing routes and fuel	●	●	
Real time filling stated of containers	●	●	●
Container location monitoring	●		●
ROI < 2 years	●		
Emission reduction through optimization routes		●	●
Better quality of service and street cleaning		●	●
Civic awareness			●

### Waste management companies

			
Easy installation and deployment	●		●
Remote configuration of dispositives	●		●
Route and fuel optimization	●	●	
Integrable with client waste management solutions	●		●
ROI < 2 years			●
Installable in wide range of existing containers in the markets	●	●	



### References:

1. ECOTEC (2003): Costs for Municipal Waste Management in the EU
2. LIFE EWAS PROJECT (2016): Seville study case
3. SAYME (2017): Sensdumpster for smart cities
4. UNIVERSITY OF REDLANDS (2013): Example case software on optimization of collection routes in Redlands (California) based on GIS data
5. AMCS WASTE PLANNER (2017): Improving waste collection and transportation efficiency
6. QUAMTRA SYSTEM (2016): Waste Management Solutions