



Case Study



Finland: Waste collection using Smart City Management Tools

Problem to resolve: Until now, garbage collection services empty containers regularly whether they are full or not. This unnecessarily increases the cost and energy balance for the service.

Response: Use of smart technologies to program the collection route for emptying only full or near-to-full containers



Until now collecting waste has been done using static routes and schedules where containers are collected every day or every week regardless if they are full or not. It is now possible to change this by using smart wireless sensors to gather fill-level data from waste containers directly. Based upon the data send from the individual waste container, the system can automatically generate collection schedules and optimise routes based several parameters (future fill-level projections, truck availability, traffic information, road restrictions etc.). Collection based this type of smart planning tools can significantly reduce costs, emissions, road wear, vehicle wear, noise pollution and work hours.

How does it work?

	<p>1. Fill level measurement</p> <p>A small battery powered wireless sensor in each container, monitors fill level in real time.</p> <p>The sensors are firmly attached and hidden away out of sight inside the container.</p> <p>Waste monitoring works with any type of container and any type of waste (mixed, paper, glass, bio, metals and fluids such as oils and waste water etc.).</p>
	<p>2. Analysis and modelling</p> <p>The data from each container are sent over wireless cellular networks to the server for analysis and immediately is following displayed:</p> <ul style="list-style-type: none"> ▪ Real time fill level status ▪ Alerts for abnormal events (such as high temperature and movement) ▪ Predicted fill-up dates ▪ Statistics
	<p>1. Forward to route planning</p> <p>You can automatically provide a list of containers, schedules and routes to your drivers through your existing fleet management system.</p>

BENEFITS

	<ol style="list-style-type: none"> 1. Lower costs 2. Fewer collections 3. Fewer trucks needed 4. Less fuel needed 5. Less time used (labour cost) 6. Lower servicing costs 7. Lower cleanup 		<ol style="list-style-type: none"> 1. Better environmental efficiency 2. Less CO₂ and other emissions 3. No overfull containers 4. Less scattered waste 5. Better hygiene <p>Furthermore, it is possible also for the municipal supervisors to monitor the activities of the Contractors for waste Collection</p>
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DRAWBACKS

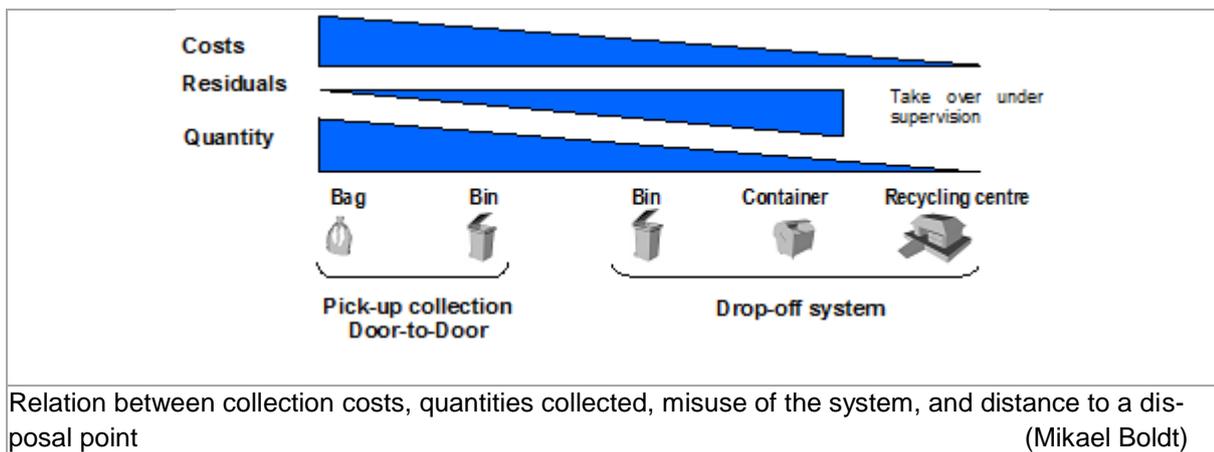
These kinds of systems are only sufficient in bigger collection district where the collection is organised with several vehicles inside the same organisation. (Several means: The activity involves so many vehicles that the collection company has a logistic department.)

The electronic sensor in each container has to be maintained. (Batteries must be changed, sensors tested, etc.)

Risk of theft of the electronic sensor for other purposes. (The first traffic speed cameras in Europe contained a cell phone circuit board with a SIM card used for transmitting the pictures to the traffic control centre. By stealing these SIM cards it was possible to make private calls for free – until the system was changed.)

Containers and Drop off Points

Collection and transport of waste and recyclable material is a costly business and many new systems have been developed in order to lower the operation costs. One way of lowering the cost is by establishing drop off points as an alternative to door-to-door collection but, as illustrated in **Error! Reference source not found.** the quantity and quality of the recyclable materials becomes less and poorer.



Households, who do not sort their waste, are also the ones least likely to bring their waste to anywhere but to the nearest container. It is therefore important to underline that the collection system for residual mixed waste must be better than the collection of recyclable materials and special waste, otherwise the recycle waste will be contaminated. (By easier to use is meant: a waste collection system with easier access, with containers closer to the point of generation, with a higher collection frequency, and with sufficient container-volume...)

Another issue is also how to establish enough space for the containers for the various materials. The more fractions we want the public to sort their waste into, the more bins do we need. And if we want to make savings on the collection cost larger volume is required

Credentials

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References

¹ Source: Waste Collection for Smart Cities <http://www.enevo.com/> (Retrieved 6. July 2015)