ARNHEM

150,828 inhabitants
77,075 households
58% low-rise, 42% high-rise
Household waste is collected by SITA.

Waste tax per household: 244 Euro.
Amount of waste collected in 2014: 74,687 ton/year

(= 495 kg/inhabitant/year)

Recycling: 37,716 t/y (50.50%)

Incineration: 36,934 t/y (49.45%)

Landfill: 36 t/y (0.05%)
Household waste objectives

Waste Management Plan city of Arnhem 2012-2020:
- 52% recycling in 2016
- 60% recycling in 2020

Current objectives at national level:
- 65% recycling in 2015
- 75% recycling in 2020
- 100 kg residual waste in 2020
Our conclusion:

We need a different household waste collection system (better facilities for source separation)

and motivated people, knowing what to do, how to do it, when to do it and why it should be done.

(know-how, attitude, behaviour)
Gentlemen, Please sit down when you pee!
Reversed Waste Collection

“Reversed” indicates a change in direction:
- residual waste is no longer collected from homes;
- residents have to bring residual waste to underground containers located within a walking distance of 100 to 150 metres;
- better facilities for source separation.
Presenting recyclables for collection? Easy!

Presenting residual waste for collection? Less easy!

Reversed Waste Collection

ISWM - Tinos
## Life+ project

**Total cost:** 2,173,617 Euro  
**Contribution EU:** 775,383 Euro (max).

<table>
<thead>
<tr>
<th>Trial areas</th>
<th>Number of households</th>
<th>Percentage high-rise</th>
</tr>
</thead>
<tbody>
<tr>
<td>De Laar-West (mainly low-rise)</td>
<td>2,708</td>
<td>13%</td>
</tr>
<tr>
<td>Over het Lange Water (mainly high-rise)</td>
<td>2,655</td>
<td>51%</td>
</tr>
<tr>
<td>Malburgen Oost-Noord (focus area)</td>
<td>2,190</td>
<td>32%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>7,553</strong></td>
<td></td>
</tr>
</tbody>
</table>
Low-rise area

Old system

New system
High-rise area

Old system

New system
80 new underground containers
Communication

• Letter + flyer
• Walk-in evening meetings in each pilot area
• System + draft locations UC’s
• 300 comments, 10 objections, 1 appeal
• omgekeerdinzamelen@arnhem.nl
• Meetings with affinity groups (elderly, disabled)
• Residents’ feedback groups

Time-consuming!
Afvalambassadeur Raoul aan het woord

Sinds dit jaar is Raoul Alblas één van de gezichten van de campagne 'Afval is grondstof'. Als afvalambassadeur is hij betrokken bij diverse projecten. Zo gaat hij samen met wethouder Margreet van Gastel naar scholen. Doel is om de jeugd te betrekken bij duurzaamheid en gescheiden afvalinzettings.

Raoul: "Ik vind het leuk om aan allerlei projecten mee te doen. Laatst zat ik in de jury van de kinderprogramma 'Gijzelpen van een dag'. Het ging er namelijk om dat je dingen kunt maken met afval. Ik denk dat het een geweldige ervaring was en ik hoop dat ik nog meer kan doen in de toekomst."
Welkom in Malburgen-Oost Noord

**WIJ DOEN AAN OMGEKEERD INZAMELEN!**

![Image of notice boards]

**Notice-boards**

2 per trial area

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**Afval? Laten we er wat van maken**

www.arnhem.nl/omgekeerdinzamelen

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Dit project wordt mede mogelijk gemaakt door een financiële bijdrage van de Europese Unie uit het fonds Life+
Personal approach contributes to behavioural change!
Waste coaches

- 12 coaches, 4 per trial area, 2 teams
- 36 hours per week
- Also in the evening and on Saturdays and Sundays.
- People with limited chances on the labour market.
- After sufficient training and introduction.

60% should find a job!
Waste coaches

- Walking oracle
- Mailman (handing news letters)
- Checking contents of mini-bins
- Extra ears/eyes law enforcement officers
- Clean-up campaigns with schools
- Meet social workers

Availability of waste coaches = precondition for implementation!
Start Reversed Waste Collection

At 3 primary schools

“Waste separation game”
Extensive Monitoring Programme (executed by external agencies)

- Amounts of waste collected in each trial area
- Composition of residual waste
- Pollution of public area
- Residents satisfaction
## Results after 12 months in kg/person/year

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>Goal</th>
<th>After 12 months</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Over het Lange Water</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paper/cardboard</td>
<td>26</td>
<td>35</td>
<td>43</td>
</tr>
<tr>
<td>Plastic packaging</td>
<td>4</td>
<td>12</td>
<td>18</td>
</tr>
<tr>
<td>Residual waste</td>
<td>206</td>
<td>186</td>
<td>205</td>
</tr>
<tr>
<td><strong>De Laar-West</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paper/cardboard</td>
<td>31</td>
<td>43</td>
<td>61</td>
</tr>
<tr>
<td>Plastic packaging</td>
<td>5</td>
<td>17</td>
<td>22</td>
</tr>
<tr>
<td>Residual waste</td>
<td>270</td>
<td>238</td>
<td>212</td>
</tr>
<tr>
<td><strong>Malburgen Oost-Noord</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paper/cardboard</td>
<td>26</td>
<td>35</td>
<td>36</td>
</tr>
<tr>
<td>Plastic packaging</td>
<td>2</td>
<td>6</td>
<td>18</td>
</tr>
<tr>
<td>Residual waste</td>
<td>305</td>
<td>287</td>
<td>225</td>
</tr>
</tbody>
</table>

*Only waste in mini-bins and UC’s!*
<table>
<thead>
<tr>
<th>Item</th>
<th>Arnhem 2011</th>
<th>Trial areas average 2014</th>
<th>Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plastic packaging</td>
<td>5,0</td>
<td>19,4</td>
<td>288%</td>
</tr>
<tr>
<td>Paper and cardboard</td>
<td>42,0</td>
<td>49,5</td>
<td>17,9%</td>
</tr>
<tr>
<td>Residual waste</td>
<td>247,0</td>
<td>213,6</td>
<td>-13,5%</td>
</tr>
<tr>
<td></td>
<td>Arnhem 2011</td>
<td>Low-rise trial area 2014</td>
<td>Increase</td>
</tr>
<tr>
<td>--------------------------</td>
<td>-------------</td>
<td>--------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>Plastic packaging</td>
<td>5,0</td>
<td>21,6</td>
<td>332%</td>
</tr>
<tr>
<td>Paper and cardboard</td>
<td>42,0</td>
<td>63,5</td>
<td>51,2%</td>
</tr>
<tr>
<td>Residual waste</td>
<td>247,0</td>
<td>211,8</td>
<td>-14,3%</td>
</tr>
</tbody>
</table>
Pollution of public area

(monitoring every container 2 x per week)
## Quality levels

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>No waste next to UC.</td>
</tr>
<tr>
<td>A</td>
<td>Little waste next to UC (1 item).</td>
</tr>
<tr>
<td>B</td>
<td>Relatively large amount of waste next to UC (3 items maximum).</td>
</tr>
<tr>
<td>C</td>
<td>Large amount of waste next to UC (5 items maximum).</td>
</tr>
<tr>
<td>D</td>
<td>Very large amount of waste next to UC (more than 5 items).</td>
</tr>
<tr>
<td>Results 2014</td>
<td>Quality level</td>
</tr>
<tr>
<td>----------------------</td>
<td>---------------</td>
</tr>
<tr>
<td></td>
<td>A+</td>
</tr>
<tr>
<td>Over het Lange Water</td>
<td>93.8%</td>
</tr>
<tr>
<td>De Laar-West</td>
<td>93.0%</td>
</tr>
<tr>
<td>Malburgen Oost-Noord</td>
<td>86.3%</td>
</tr>
<tr>
<td>Average of 3 trial areas</td>
<td>91.4%</td>
</tr>
</tbody>
</table>
Residents satisfaction survey

Prior to start, after 6 and after 12 months

Representative sample
(3,000 households)

After 12 months: every household.

People with reduced mobility!

Group discussions!
Opinion about Reversed Waste Collection

- positief
- neutraal
- negatief

0-meting

t-meting

eindmeting

%
Marks for old system and for Reversed Waste Collection

- Restafval: 7.8, 6.3
- GFT: 7.2, 7.0
- Papier: 7.3, 8.0
- Plastic: 7.5, 6.3

Legend:
- oude systeem
- Omgekeerd Inzamelen
Financial evaluation:

- WMP estimate: investment costs are about 7 million Euro for underground containers, access control systems, waste cards and mini-containers.

- Current estimate: 6.4 million Euro.

- Lower annual net costs for waste collection and processing after about 5 years!
Conclusions

• More source separation!

• Increasing residents satisfaction!

• Costs lower than expected!

• Little pollution of public areas!
Should we roll out ReWaCo across the entire city?

More information on: www.arnhem.nl/rewaco

Thank you for your attention!