EIP-SCC
European Innovation Partnership on Smart Cities and Communities
EIP – AC ‘Business Models’
Lessons learned from City-zen
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## City-zen: key facts

**CALL**
FP7 Energy.2013.8.8.1
Demonstration of optimised energy systems for high performance-energy districts

**DEMONSTRATION CITIES**
Amsterdam and Grenoble

**DURATION**
2014 - 2019

**PARTNERS**
25

**WEBSITE**
http://www.cityzen-smartcity.eu/
Cooling buildings with drinking water in Amsterdam

Summer - cooling

Winter - heating

Aquifer

Cold well

Hot well

Cold well

Hot well

8-12 °C

16-20 °C

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Cooling buildings with drinking water in Amsterdam: unraveling the business case

<table>
<thead>
<tr>
<th>Parties involved</th>
<th>Service delivered/used</th>
</tr>
</thead>
<tbody>
<tr>
<td>public drinking water company Waternet</td>
<td>delivers cold through a main water transportation pipeline connected through a heat exchanging installation</td>
</tr>
<tr>
<td>Blood bank/pharmaceutics company Sanquin</td>
<td>uses cold from water pipes for cooling of primary processes</td>
</tr>
<tr>
<td>End user</td>
<td>Warmer water in winter</td>
</tr>
</tbody>
</table>
## Benefits and costs

<table>
<thead>
<tr>
<th>Benefits and costs</th>
<th>Benefits and costs</th>
<th>Benefits End-user</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drinking Water Company</td>
<td>Bloodbank</td>
<td>Bloodbank</td>
</tr>
<tr>
<td><strong>Benefits</strong></td>
<td><strong>Costs</strong></td>
<td><strong>Benefits End-user</strong></td>
</tr>
<tr>
<td>Extraction of cold in winter -&gt; higher temperature of the water -&gt; less pre-heating</td>
<td>Considerable initial investment</td>
<td>Less heating of the water in winter</td>
</tr>
<tr>
<td><strong>Summer:</strong> Cold from ATES can be used</td>
<td>30% lower total cost of ownership compared to traditional electric cooling (based on installation’s foreseen lifetime of 30 years)</td>
<td></td>
</tr>
<tr>
<td>Considerable initial investment 1.8 Mio (cold exchanger + building + piping + automation)(earned back)</td>
<td>Considerable initial investment 1.3 Mio + yearly fixed charge of 6,000 EUR/yr Avoided investments in peak electrical power (and thus emergency power)</td>
<td></td>
</tr>
<tr>
<td>Variable costs: additional variable component per GJ (not fixed; depending on Waternet income; current GJ price around 30% of normal cost); initial volume at least 20,000 GJ/ year, growing to 40,000 GJ.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental benefits: CO2 reduction, space savings in buildings, noise reduction</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
REPLICATION POTENTIAL - SUCCESS FACTORS

- Geographical conditions: along drinking water pipes throughout EU (or in a broader perspective next to rivers)
- Clients at little distance from DW pipelines
- Availability of seasonal storage
- Large customer to use large-scale system
- Transparency between business partners
# Surface water regeneration for comfort cooling (Houthaven - Amsterdam)

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<tbody>
<tr>
<td>Westpoort Warmte (joint venture AEB Waste-to-Energy company and Nuon)</td>
<td>Extracts cold from river ‘IJ’ Stores cold in ATES Delivers cold in summer Combined heating and cooling installation in dwellings</td>
</tr>
<tr>
<td>Residential newly built dwellings, offices and schools</td>
<td>Obliged combined cold/heat connection</td>
</tr>
</tbody>
</table>
## COOLING BUILDINGS WITH DRINKING WATER IN AMSTERDAM – COSTS AND BENEFITS FOR EACH PARTY

<table>
<thead>
<tr>
<th>Company delivering cold</th>
<th>End user</th>
<th>Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guaranteed business case (incl. 10-15% profit) because of city obligation</td>
<td>No possibility to opt out</td>
<td>CO2 reduction</td>
</tr>
<tr>
<td>Annual fixed fee of 161 €/household covering connection fee (3000€) + operational costs + profit margin</td>
<td>Avoid traditional coolers in Summer (electricity use, noise)</td>
<td>Avoid environmental impact from traditional coolers in Summer</td>
</tr>
</tbody>
</table>
REPLICATION POTENTIAL - SUCCES FACTORS

- Only for newly built areas
- Large amount of connections needed to cover investment (3000 dwellings)
- More potential in countries with higher cold demand (and heating in winter)
Experience in City-zen with business model canvas template:
+ structured information eases sorting/filtering on keywords
+ details are useful for professionals - internal discussions and set-up of cooperation

- Too detailed for replication to a general public
- Confidentiality issues with sharing details

Recommendations:
• More open format, more descriptive and more “story telling” is more appropriate for communication with wider community
• Structure is needed in a standardised way
CHALLENGES

Did not make it in City-zen: heating with sewage water, cooling with DW at Schiphol

Main challenges:

• Find suitable business partners (e.g. lack of knowledge at potential client’s side regarding cold demand, installed capacity)
• Live up to requirements of clients (e.g. not as cold as traditional coolers, contractual implications)
• Limiting geographical possibilities e.g. size pipeline, close presence of TES