CityZEN Strategy Plan # 6: Roeselare Belgium.


Design

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Download date: 17. Dec. 2018
City-zen ‘Roeselare’ Roadshow

Een Duurzame Stadsvisie
‘Co-creation’ & ‘Synergy of Solutions’

ROADSHOW METHODOLOGY: Prof. Dr. Craig Lee Martin, TU Delft, The Netherlands

Aim: Zero-Energy
Heart of process
Co-creation
Fun / Reachable
Maandag 23 april | Introductie
9.30 u. - 11.30 u.: 'Het loopt op wieltjes'-fietstocht*

ROADSHOW METHODOLOGY: Prof. Dr. Craig Lee Martin, TU Delft, The Netherlands
What went on...

Roadshow Methodology:
Prof. Dr. Craig Lee Martin, TU Delft, The Netherlands

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What went on …

ROADC\_SHOW METHODOLOGY : Prof. Dr. Craig Lee Martin, TU Delft, The Netherlands

Maandag 23 april | Introductie
13.30 u. - 15.30 u.: Inspirerende presentaties
#VANRSL

Roeselare, Belgium. April 2018
What went on ...

ROADSHOW METHODOLOGY : Prof. Dr. Craig Lee Martin, TU Delft, The Netherlands
What went on ...

ROADSHOW METHODOLOGY: Prof. Dr. Craig Lee Martin, TU Delft, The Netherlands

Donderdag 25 april | Evalueren Fun-shops 'Buurten van de Toekomst' & 'Energie'

CITY-zen
New urban energy

Roeselare, Belgium. April 2018
Woensdag 25 april | Design
9 u. - 12.30 u.:
Serious Game ‘Go2Zero’
Woensdag 25 april | Design
13 u. - 14.30 u.: Mini-masterclass C02-voetafdruk en de stappen die we moeten zetten
Woensdag 25 april | Design
14.30 u – 17.00: VRP Urban Design Session - Vlaamse Vereniging voor Ruimte en Planning: VRP
Donderdag 26 april | Evalueren fun-shops 'Buurten van de Toekomst' & 'Energie'

ROADSHOW METHODOLOGY : Prof. Dr. Craig Lee Martin, TU Delft, The Netherlands
What went on ...

ROADSHOW METHODOLOGY: Prof. Dr. Craig Lee Martin, TU Delft, The Netherlands
Vrijdag 27 april | Outro

10 u. - 11 u.:
Een duurzame stadsvisie #VANRSL met de Roadies

11 u. - 12 u.:
Roadshow discussie & Food for thought
I DON'T BELIEVE IN GLOBAL WARMING

UNIT kg CO2-eq

GWP CO2 = 1
GWP CH4 = 34
GWP N2O = 298

EMISSION FACTOR
## Emission Factor of Electricity Grid Mix in Belgium

### BELGIUM 2016

<table>
<thead>
<tr>
<th>General Data</th>
<th>LCA based EF</th>
<th>DATA</th>
<th>%</th>
<th>GHG Emission</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity Demand</td>
<td>kgCO2/kWh</td>
<td>kWh</td>
<td>%</td>
<td>kt CO2-eq/yr</td>
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<tr>
<td>Electricity Production</td>
<td>-</td>
<td>8.35E+10</td>
<td></td>
<td></td>
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<tr>
<td>Import</td>
<td>0.46</td>
<td>3.65E+09</td>
<td>4.4%</td>
<td>1.68E+09</td>
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<td>Termo-Electricity</td>
<td>2.31E+10</td>
<td>29.0%</td>
<td>1.03E+10</td>
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<tr>
<td>Natural gas</td>
<td>0.443</td>
<td>2.31E+10</td>
<td>29.0%</td>
<td>1.03E+10</td>
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<td>Petroleum products</td>
<td>0.778</td>
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<td></td>
<td>0.00E+00</td>
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<tr>
<td>Coal</td>
<td>1.050</td>
<td></td>
<td></td>
<td>0.00E+00</td>
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<tr>
<td>Renewables</td>
<td>1.43E+10</td>
<td>17.9%</td>
<td>2.14E+08</td>
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<tr>
<td>Solar thermal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solar PV</td>
<td>0.032</td>
<td>2.95E+09</td>
<td>3.7%</td>
<td>9.45E+07</td>
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<tr>
<td>Wind</td>
<td>0.010</td>
<td>5.11E+09</td>
<td>6.4%</td>
<td>5.11E+07</td>
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<tr>
<td>Hydro</td>
<td>0.012</td>
<td>3.19E+08</td>
<td>0.4%</td>
<td>3.83E+06</td>
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<tr>
<td>Geothermal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biomass</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biogas</td>
<td>0.011</td>
<td>5.91E+09</td>
<td>7.4%</td>
<td>6.50E+07</td>
</tr>
<tr>
<td>Hydrogen</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nuclear</td>
<td>4.13E+10</td>
<td>51.7%</td>
<td>2.72E+09</td>
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<tr>
<td>Nuclear</td>
<td>0.066</td>
<td>4.13E+10</td>
<td>51.7%</td>
<td>2.72E+09</td>
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<tr>
<td>Total</td>
<td>0.181</td>
<td>8.23E+10</td>
<td>1.49E+10</td>
<td></td>
</tr>
</tbody>
</table>
### ROESELARE HOUSEHOLD PROFILE

<table>
<thead>
<tr>
<th>Emission sources</th>
<th>unit</th>
<th>rawdata</th>
<th>%</th>
<th>kg CO2-eq</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ENERGY</strong></td>
<td>kWh</td>
<td>15840</td>
<td></td>
<td>3476</td>
<td>51.3%</td>
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<tr>
<td><strong>LIGHTING &amp; APPLIANCE.</strong></td>
<td>kWh</td>
<td>3563</td>
<td>100%</td>
<td>643</td>
<td>9.5%</td>
</tr>
<tr>
<td>electricity</td>
<td>Kwh</td>
<td>3563</td>
<td>100%</td>
<td>643</td>
<td>9.5%</td>
</tr>
<tr>
<td><strong>HEAT + DHW + cooking</strong></td>
<td>kWh</td>
<td>12277</td>
<td>100%</td>
<td>2833</td>
<td>41.8%</td>
</tr>
<tr>
<td>Nat gas</td>
<td>kWh</td>
<td>10021</td>
<td>82%</td>
<td>2522</td>
<td>37.2%</td>
</tr>
<tr>
<td>LGP</td>
<td>kWh</td>
<td>460</td>
<td>4%</td>
<td>121</td>
<td>1.8%</td>
</tr>
<tr>
<td>Biomass</td>
<td>kWh</td>
<td>1662</td>
<td>14%</td>
<td>189</td>
<td>2.8%</td>
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<tr>
<td>Solar thermal</td>
<td>kWh</td>
<td>43</td>
<td>0.3%</td>
<td>0</td>
<td>0.0%</td>
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<tr>
<td>Geothermal</td>
<td>kWh</td>
<td>91</td>
<td>1%</td>
<td>0</td>
<td>0.0%</td>
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<tr>
<td><strong>MOBILITY</strong></td>
<td>kWh</td>
<td>10858</td>
<td>100%</td>
<td>2972</td>
<td>43.8%</td>
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<tr>
<td>Electric car</td>
<td>kWh</td>
<td>2</td>
<td>0.0%</td>
<td>0</td>
<td>0.0%</td>
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<tr>
<td>LGP + Gas</td>
<td>kWh</td>
<td>28</td>
<td>0.3%</td>
<td>7</td>
<td>0.1%</td>
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<tr>
<td>Diesel</td>
<td>kWh</td>
<td>8945</td>
<td>82%</td>
<td>2550</td>
<td>37.6%</td>
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<tr>
<td>Gasoline</td>
<td>kWh</td>
<td>1554</td>
<td>14%</td>
<td>414</td>
<td>6.1%</td>
</tr>
<tr>
<td>Bio-fuel</td>
<td>kWh</td>
<td>328</td>
<td>3%</td>
<td>0</td>
<td>0.0%</td>
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<tr>
<td><strong>WASTE</strong></td>
<td>kg</td>
<td>1076</td>
<td>100%</td>
<td>276</td>
<td>4.1%</td>
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<tr>
<td>% waste-to-energy</td>
<td>kg</td>
<td>312</td>
<td>29%</td>
<td>204</td>
<td>3.0%</td>
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<tr>
<td>% organic</td>
<td>kg</td>
<td>230</td>
<td>21%</td>
<td>21</td>
<td>0.3%</td>
</tr>
<tr>
<td>% landfill</td>
<td>kg</td>
<td>44</td>
<td>4%</td>
<td>51</td>
<td>0.8%</td>
</tr>
<tr>
<td>% recycling</td>
<td>kg</td>
<td>490</td>
<td>46%</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td><strong>WATER</strong></td>
<td>m³</td>
<td>96</td>
<td>100%</td>
<td>56</td>
<td>0.8%</td>
</tr>
<tr>
<td>m³ per yr (house)</td>
<td>m³/yr</td>
<td>96</td>
<td>100%</td>
<td>56</td>
<td>0.8%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td>6779</td>
<td>100%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**ROESELARE CITY (BELGIUM)**

- **People**: 2.34 inhab./house
- **Electricity**: 3500 kWh/yr
- **Natural gas**: 12300 kWh/yr
- **Mobility**: 18000 km/yr
- **Waste**: 467 kg/cap yr
- **Water**: 114 L/cap day

**HOUSEHOLD profile**

Roeselare, Belgium. April 2018

**Carbon Accounting**: Riccardo M. Pulselli, University of Siena
**HOUSEHOLD PROFILING**

**HOUSEHOLD IN ROESELARE**

**CARBON FOOTPRINT**

6.78 t CO₂eq/yr

7.72 t CO₂eq/yr

**Carbon Footprint Offset per household**

0.50 ha forestland

**ROESELARE CITY (BELGIUM)**

**TYPICAL HOUSEHOLD PROFILING**

People: 2.34 inhab./house

Electricity: 3500 kWh/yr

Natural gas: 12300 kWh/yr

Mobility: 18000 km/yr

Waste: 467 kg/cap yr

Water: 114 L/cap day

**HOUSEHOLD profile**

People: 2.34 inhab./house

Electricity: 3500 kWh/yr

Natural gas: 12300 kWh/yr

Mobility: 18000 km/yr

Waste: 467 kg/cap yr

Water: 114 L/cap day

ROESELARE CITY New urban energy...
The ecological footprint of Londoners, by component:

- Food 41%
- Energy 10%
- Transport 5%
- Materials & waste 44%
- Degraded land 0.7%
- Water 0.3%

The ecological footprint of Londoners is 293 times the size of London. The area of London and the UK are superimposed for a clearer comparison.
COLLIEVIJVER NEIGHBOURHOOD

Roeselare, Belgium. April 2018

1358 households
2795 inhabitants
77 ha area
36 inhab./ha

Carbon Accounting: Riccardo M. Pulselli, University of Siena

CF: 9206 t CO₂-eq
Carbon Accounting: Riccardo M. Pulselli, University of Siena

Roeselare, Belgium. April 2018

COLLIEVIJVER NEIGHBOURHOOD

1358 households
2795 inhabitants
77 ha area
36 inhab./ha

CF: 9206 t CO₂-eq

= 682 ha forestland

X 8.9
CF: 9206 t CO$_2$-eq

= 682 ha forestland

ELECTRICITY
NATURAL GAS
MOBILITY
WASTE
# Carbon Footprint of Roeselare City

The carbon footprint of Roeselare City, Belgium, was calculated based on various emission sources. Here is a summary of the data:

## Roeselare City
- **Population**: 61,657 inhabitants
- **Households**: 26,349
- **Area**: 5979 ha

### Emission Sources

<table>
<thead>
<tr>
<th>Source</th>
<th>Unit</th>
<th>Raw Data</th>
<th>% of Total</th>
<th>t CO2-eq</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Energy</strong></td>
<td>MWh</td>
<td></td>
<td>415222</td>
<td>91,118</td>
<td>22.1%</td>
</tr>
<tr>
<td><strong>Lighting &amp; Appliances</strong></td>
<td>MWh</td>
<td>93402</td>
<td>100%</td>
<td>16,867</td>
<td>4.1%</td>
</tr>
<tr>
<td><strong>Electricity</strong></td>
<td>MWh</td>
<td>93402</td>
<td>100%</td>
<td>16,867</td>
<td>4.1%</td>
</tr>
<tr>
<td><strong>Heat + DHW + cooking</strong></td>
<td>MWh</td>
<td>321820</td>
<td>100%</td>
<td>74,251</td>
<td>18.0%</td>
</tr>
<tr>
<td><strong>Natural Gas</strong></td>
<td>MWh</td>
<td>262681</td>
<td>82%</td>
<td>66,115</td>
<td>16.0%</td>
</tr>
<tr>
<td><strong>LPG</strong></td>
<td>MWh</td>
<td>12071</td>
<td>4%</td>
<td>3,171</td>
<td>0.8%</td>
</tr>
<tr>
<td><strong>Biomass</strong></td>
<td>MWh</td>
<td>43560</td>
<td>14%</td>
<td>4,965</td>
<td>1.2%</td>
</tr>
<tr>
<td><strong>Solar thermal</strong></td>
<td>MWh</td>
<td>1124</td>
<td>0%</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td><strong>Geothermal</strong></td>
<td>MWh</td>
<td>2383</td>
<td>1%</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td><strong>Mobility</strong></td>
<td>MWh</td>
<td>284617</td>
<td>100%</td>
<td>77,894</td>
<td>18.9%</td>
</tr>
<tr>
<td><strong>Electric car</strong></td>
<td>MWh</td>
<td>63</td>
<td>0.0%</td>
<td>11</td>
<td>0.0%</td>
</tr>
<tr>
<td><strong>LPG + Gas</strong></td>
<td>MWh</td>
<td>731</td>
<td>0.3%</td>
<td>192</td>
<td>0.0%</td>
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<tr>
<td><strong>Diesel</strong></td>
<td>MWh</td>
<td>234482</td>
<td>82.4%</td>
<td>66,836</td>
<td>16.2%</td>
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<tr>
<td><strong>Gasoline</strong></td>
<td>MWh</td>
<td>40733</td>
<td>14.3%</td>
<td>10,855</td>
<td>2.6%</td>
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<td><strong>Bio-fuel</strong></td>
<td>MWh</td>
<td>8608</td>
<td>3.0%</td>
<td>0</td>
<td>0.0%</td>
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<tr>
<td><strong>Waste</strong></td>
<td>t</td>
<td>28345</td>
<td>100%</td>
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<td>t</td>
<td>8231</td>
<td>29%</td>
<td>5,367</td>
<td>1.3%</td>
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<tr>
<td><strong>% organic</strong></td>
<td>t</td>
<td>6049</td>
<td>21%</td>
<td>548</td>
<td>0.1%</td>
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<tr>
<td><strong>% landfill</strong></td>
<td>t</td>
<td>1159</td>
<td>4%</td>
<td>1,345</td>
<td>0.3%</td>
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<tr>
<td><strong>% recycling</strong></td>
<td>t</td>
<td>12919</td>
<td>46%</td>
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<td>0.0%</td>
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<td><strong>Water</strong></td>
<td>m³</td>
<td>2521692</td>
<td>100%</td>
<td>1,476</td>
<td>0.4%</td>
</tr>
<tr>
<td><strong>m³ per yr (house)</strong></td>
<td>m³/yr</td>
<td>2521692</td>
<td>100%</td>
<td>1,476</td>
<td>0.4%</td>
</tr>
</tbody>
</table>

### Total Emissions

- **Total CO2-eq**: 412,396 t
- **Total CO2-eq/yr**: 412 kt
- **43% Residential**
- **24.2% Tertiary (private + public)**
- **1.9% Agriculture**
- **30.2% Industry**
- **0.3% Public transport**
- **0.2% Public lighting**

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**Roeselare, Belgium. April 2018**

Carbon Accounting: Riccardo M. Pulselli, University of Siena
CARBON FOOTPRINT OF ROESELARE CITY

Roeselare City

- 61,657 inhabitants
- 26,349 households
- 5979 ha area
Roeselare City

CARBON FOOTPRINT
412,000 t CO2 eq

FORESTLAND GRABBING
30,548 ha

X 5.1

30,548 ha forestland grabbing vs 5979 ha area
CARBON FOOTPRINT OF ROESELARE CITY

18 km

1 km square

ELECTRICITY (HOUSING)
HEAT (HOUSING)
MOBILITY (PRIVATE CARS)
WASTE (URBAN)
WATER USE (HOUSING)
TERTIARY
INDUSTRY
AGRICULTURE
Public transport
Public lighting
Electricity demand Roeselare 2015 (GWh)

- **Industrial**: 220 GWh (44%)
- **Residential**: 95 GWh (20%)
- **Non-Residential**: 180 GWh (36%)

Current Electricity Demand

495 GWh-e in 2015
Heat demand Roeselare 2015 (GWh)

- Industrial: 100 GWh (15%)
- Residential: 300 GWh (46%)
- Non-Residential: 250 GWh (39%)
- Industrial Process: 320 GWh

Current Heat Demand

- 620 GWh-th in 2015
- + 320 GWh-pr
Electricity potentials in Roeselare

- **Incineration**: 17 GWh (2%)
- **Wind**: 240 GWh (31%)
- **PV-Non-Roof**: 120 GWh (15%)
- **PV-Roof**: 400 GWh (52%)

**Electricity Demand**
- 495 GWh (100%)

**Electricity Potential**
- 777 GWh (157%)

**Space for production**
- 40 Wind turbines
- 50% of all roofs (235 ha)
- 80 ha non-roof
Heat potentials in Roeselare

**Heat Demand**
- 650 GWh (100%)

**Heat Potential (HT)**
- Sunboiler: 1480 GWh (86%)
- Industrial: 100 GWh (6%)
- Incineration: 130 GWh (8%)

**Heat Potential (MT)**
- PV-Thermal: 2000 GWh (99%)
- Residual: 25 GWh (1%)

**Heat Potential (LT)**
- ATES / BTES: 1000 GWh (100%)

Temperature levels

- **High-T** for district heat network (DHN)
- **Mid-T** needs energy renovation
- **Low-T** needs heat pumps and energy renovation

Energy strategy: Siebe Broersma MSc, Technical University, Delft.

Roeselare, Belgium. April 2018
Heat Balance towards 2050

Energy strategy: Siebe Broersma MSc, Technical University, Delft.

Temperature levels

- 30% High-T for DHN
- 25% Mid-T
- 25% Low-T
- 20% reduction

Roeselare, Belgium. April 2018
Energy strategy: Siebe Broersma MSc, Technical University, Delft.
Assumptions

30% reduction of current demand for appliances

15% total increase due to Electrification of Heating + transport
Electricity Balance towards 2050

Main measures

- 25 Wind Turbines
- 240 ha PV panels
- Co-generation of waste incineration

Energy strategy: Siebe Broersma MSc, Technical University, Delft.
Temperature levels for heating of buildings towards 2050

Required temperatures

\[
\begin{align*}
HT &= > 65^\circ C \\
MT &= 40^\circ C - 65^\circ C \\
LT &= < 45^\circ C 
\end{align*}
\]
Energy strategy: Siebe Broersma MSc, Technical University, Delft.

Building stock

57,000 residential unit equivalents of which:
26,000 residential
31,000 non-residential
Roadmap for sustainable heating (HT) of Roeselare’s current building stock

**Main measures**

**DHN extension**

Maximize waste heat use of industrial waste by 2035

Partly reduced and replaced by solar heat and underground storage towards 2050

---

**Energy strategy**: Siebe Broersma MSc, Technical University, Delft.
Main measures

60% of building stock moderately renovated by 2050

Solar collectors and MT-storage in underground

Roadmap for sustainable heating (MT + LT) of Roeselare’s current building stock

Renovate 500 res. eq. /year from G/F/E/D labels to C/B labels
These buildings will be heated with mid-temperature heat

Use 2.5 GWh/year of MT waste heat in heat grids up to 35 GWh
Mid-temperature waste heat from local sources

Facilitate 3 GWh/year MT storage up to 80 GWh
To store summer heat on mid-temperature levels (i.e. central heat pumps in case MT-storage is not allowed)

Install 1 ha/year of solar thermal collectors on roofs
And optimize for seasonal storage in ATES/ BTES and supply by mid-temperature systems

Renovate 600 res. eq. /year from C/B to A labels
These buildings will be heated with low-temperature heat

Facilitate 3 GWh/year ATES/BTES systems up to 80 GWh
For non residential functions with similar heating and cooling demands

Energy strategy: Siebe Broersma MSc, Technical University, Delft.
### Roadmap for sustainable electricity production in Roeselare

<table>
<thead>
<tr>
<th>Energy strategy: Siebe Broersma MSc, Technical University, Delft.</th>
</tr>
</thead>
</table>

**Main measures**

- **235 ha PV panels**
- **25 4MW Wind Turbines**
- **17 GWh-e from Waste Incineration**

<table>
<thead>
<tr>
<th>Year</th>
<th>Action</th>
<th>Panels</th>
<th>Capacity</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Now</td>
<td>Planning</td>
<td>2,000 panels</td>
<td>(30,000)</td>
<td>Up to 152 ha. (228 GWh) in 2050</td>
</tr>
<tr>
<td>2020</td>
<td>Install</td>
<td>5 ha.</td>
<td>(30,000) panels</td>
<td>Up to 152 ha. (228 GWh) in 2050</td>
</tr>
<tr>
<td>2030</td>
<td>Install</td>
<td>1 ha.</td>
<td>(3,000) panels</td>
<td>Up to 17 ha. (25 GWh) in 2050</td>
</tr>
<tr>
<td>2050</td>
<td>Install</td>
<td>2 ha.</td>
<td>(13,000) panels</td>
<td>Up to 67 ha. (100 GWh) in 2050</td>
</tr>
<tr>
<td></td>
<td>Planning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Install one 4 MW-wind turbines per year</td>
<td>up to 100 MW</td>
<td>Including replacement of existing smaller turbines during the final phase</td>
<td></td>
</tr>
</tbody>
</table>

- **17 GWh/year** as currently already produced
Schematic section of Roeselare’s sustainable energy systems in 2050
Main directions

Central HT-DHN
Cascaded to

235 ha PV panels

25 4MW Wind Turbines

17 GWh-e from Waste Incineration
Sustainable transport and mobility

Regional connectivity
- People
- Packages
- Heavy materials

Energy strategy: Siebe Broersma MSc, Technical University, Delft.
Urban Analysis

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Roeselare, Belgium. April 2018
Urban Analysis

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Roeselare, Belgium. April 2018
Urban Analysis

Low Density

- 1300 Houses
- 85 Hectares
- 15 Homes/Ha

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.
Urban Analysis

Low Intensity

- No bars
- No cafes
- No civic functions
Urban Analysis

Over-engineered Roads

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.
Over-engineered water ways
Flooding an issue

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Roeselare, Belgium. April 2018
Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Empty but full

75 Homes/Ha

17 Hectares

68 Hectares empty
Urban Analysis

Small green spaces
- Individual gardens
- Grass verges
- Road infrastructure

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Roeselare, Belgium. April 2018
Over-engineered water ways

Flooding issues
Urban Analysis

Car-orientated

Highest mobility impact

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.
Urban Analysis

Egg-like structure

Neighbourhood is isolated, both from city and nature.
Urban Analysis

City of bits

Very little contact between neighbourhoods

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.
Urban Design: blurring boundaries

Star-city
Urban Analysis

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Roeselare, Belgium. April 2018

No nature
Urban Analysis

Isolated from nature

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Roeselare, Belgium. April 2018
Urban Design: flood proofing naturally

Sustainable urban drainage
- Cheap
- Easy
- Bio-diverse

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Roeselare, Belgium. April 2018
Interface between blue and green

Create blue route
Create Green cycle route
Connect in neighbourhood

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.
Community Agora

Food focussed neighbourhood

Community food trading

Paddy field

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Roeselare, Belgium. April 2018
Urban Design

Bring city to neighbourhood

Bring neighbourhood to city

Increase density

Blurred boundaries

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Roeselare, Belgium. April 2018
Modal shift provides urban space

Source: www.verkehrswende-ev.de

Source: www.wegcode.be

Source: http://www.iedereengorilla.be/

Neighbourhood connectivity

Social
Safe
Healthy

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Roeselare, Belgium. April 2018
Urban Analysis

No need to visit

Very generic

No difference
Urban Design: New green ring of exciting neighbourhoods

Lots of reasons to visit!

Each neighbourhood is individual and productive!
Urban Proposal Super sharing, low impact, urban agriculture neighbourhood

Shared surface

Productive
Flood proof
Community focussed

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Roeselare, Belgium. April 2018
Urban agriculture: low impact with technical food systems

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Productive Landscapes

Urban Castles

Productive street systems

Techno terps
Urban Design. Aquaponic people first highways

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.
Urban Design - Blue Green castles

Consolidation of green space

- Energy renovation
- Urban Agriculture
- Community focused
- Sharing

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Roeselare, Belgium. April 2018
Urban Design - Blue Green castles

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.
All-electric self-sufficient renovation – *Green blue castle*

Energy strategy: Siebe Broersma MSc, Technical University, Delft.

**Main measures**
- PV-Thermal roof
- Collective Heat pump
- Triple glazing
- Greenhouse garden
- BTES
- DHW booster
- Roof insul.
- SUDS

*Winter*  
*Summer*
All-electric self-sufficient renovation – Techno terp

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Consolidation of green space

List 1
List 2
List 3

Roeselare, Belgium. April 2018
All-electric self-sufficient renovation – Techno terp

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.
All-electric self-sufficient renovation – Techno terp

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Techno terp

Independent energy
Aquaponic greenhouse
Fish-tank flood barrier
SUDS
Main measures

- PV-Thermal roof
- Underground heat storage
- Ground source HP
- DHW booster
- Greenhouse roof
- Triple glazing + roof insul.
- Aquaponics
Unsafe and unnatural

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.
Unpacking the city into the neighbourhood

Increased intensity

Community services

Increased density

Reason to visit

Urban Design strategy: Prof Greg Keeffe, Queens University, Belfast.

Roeselare, Belgium. April 2018
Food-LETTS Agora

Community Agora

Food focussed neighbourhood

Community food trading

Paddy fiels

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.
All-electric self-sufficient renovation – **Collievijver agora**

**Main measures**

- Full PV-roof
- Collective Heat pump
- DHW booster
- Greenhouse garden
- Moderate renovation:
  - Triple glazing + roof insul.

**PV-Thermal roof**

**Waste heat from refrigeration**

**BTES**

**MT mini heat grid**

**Greenhouse roof**

**Water storage**

**Local food production**

**Super market**

**PV**

**SYNERGETIC EXCHANGE**

- Electricity over-production
- (Waste) heat production

Energy strategy: Siebe Broersma MSc, Technical University, Delft.

Roeselare, Belgium. April 2018
Urban Design: nature reconnection

Enjoy the environmental tax!

- Short coppice willow provides carbon sink
- Amenity space
- bio-diversity

Urban design strategy: Prof Greg Keeffe, Queens University, Belfast.

Roeselare, Belgium. April 2018
CARBON FOOTPRINT MITIGATION SCENARIO FOR ROESELARE

Roeselare, Belgium. April 2018

Carbon Accounting: Riccardo M. Pulselli, University of Siena
CARBON FOOTPRINT MITIGATION SCENARIO FOR ROESELARE

MEASURE #1
ENERGY SAVING
Building energy retrofitting

- ELECTRICITY (HOUSING)
- HEAT (HOUSING)
- MOBILITY (PRIVATE CARS)
- TERTIARY
- INDUSTRY
MEASURE #3
DISTRICT HEATING NETWORK
Waste incineration

- ELECTRICITY (HOUSING)
- HEAT (HOUSING)
- MOBILITY (PRIVATE CARS)
- TERTIARY
- INDUSTRY

Carbon Accounting: Riccardo M. Pulselli, University of Siena

Roeselare, Belgium. April 2018
Carbon Accounting: Riccardo M. Pulselli, University of Siena

MEASURE #4
DISTRICT HEATING NETWORK
Solar collectors + HT storage

- ELECTRICITY (HOUSING)
- HEAT (HOUSING)
- MOBILITY (PRIVATE CARS)
- TERTIARY
- INDUSTRY

Roeselare, Belgium. April 2018
MEASURE #5
DISTRICT HEATING NETWORK
HT industrial waste

ELECTRICITY (HOUSING)
HEAT (HOUSING)
MOBILITY (PRIVATE CARS)
TERTIARY
INDUSTRY

Carbon Accounting: Riccardo M. Pulselli, University of Siena
MEASURE #6
MINI HEAT GRIDS
Solar collectors + MT storage

Carbon Accounting: Riccardo M. Pulselli, University of Siena

Roeselare, Belgium. April 2018
CARBON FOOTPRINT MITIGATION SCENARIO FOR ROESELARE

MEASURE #8
LT MINI HEAT GRID
LT ATES Aquifer
Thermal Energy Storage

- ELECTRICITY (HOUSING)
- HEAT (HOUSING)
- MOBILITY (PRIVATE CARS)
- TERTIARY
- INDUSTRY
CARBON FOOTPRINT MITIGATION SCENARIO FOR ROESELARE

MEASURE #9
PV on ROOF

- ELECTRICITY (HOUSING)
- HEAT (HOUSING)
- MOBILITY (PRIVATE CARS)
- TERTIARY
- INDUSTRY
CARBON FOOTPRINT MITIGATION SCENARIO FOR ROESELARE

MEASURE #9
PV non ROOF

- ELECTRICITY (HOUSING)
- HEAT (HOUSING)
- MOBILITY (PRIVATE CARS)
- TERTIARY
- INDUSTRY

Roeselare, Belgium. April 2018

Carbon Accounting: Riccardo M. Pulselli, University of Siena
MEASURE #10
SUSTAINABLE MOBILITY
Cycling roads, electric public/sharing

- ELECTRICITY (HOUSING)
- HEAT (HOUSING)
- MOBILITY (PRIVATE CARS)
- TERTIARY
- INDUSTRY

CARBON FOOTPRINT MITIGATION SCENARIO FOR ROESELARE

Roeselare, Belgium. April 2018

Carbon Accounting: Riccardo M. Pulselli, University of Siena
MEASURE #11
TRANSITION TO ELECTRIC MOBILITY

CARBON FOOTPRINT MITIGATION SCENARIO FOR ROESELARE

Roeselare, Belgium. April 2018
CARBON FOOTPRINT MITIGATION SCENARIO FOR ROESELARE

MEASURE #13
Waste recycling %
LED public lights
Electric public transport

- ELECTRICITY (HOUSING)
- HEAT (HOUSING)
- MOBILITY (PRIVATE CARS)
- TERTIARY
- INDUSTRY
MEASURE #15
NEW FOREST
Nu is’t aan junder, veel succes!

Web:
https://www.klimaatswitch.be/programma-city-zen
https://www.cityzen-smartcity.eu/nl/home-nl/

@CityzenRoadshow
@CityzenRoadshow
cityzenroadshow

Contact: c.l.martin@tudelft.nl