THE ENERGIZED MONUMENT

A graduation project by Suzanne Naus - P5 presentation - 06/11/2015
tutors: L.G.K. Spoormans, W.J. Quist, N.J. Clarke external
examinator: L.A.M. Willekens

AN ENERGY CONCEPT, COLLECTIVE HOUSING CONCEPT
AND A MONUMENT MEET AT THE BINNENGASTHUIS AREA
IN AMSTERDAM.
CONTENT:

- INTRODUCTION
  - MONUMENT
  - COLLECTIVE HOUSING
  - NEAR ZERO-ENERGY
- RESEARCH
- DESIGN
  - COLLECTIVE
  - PRIVATE
- CONCLUSION
INTRODUCTION
GOAL:
CREATING NEAR ZERO-ENERGY HOUSING AT THE BINNENGASTHUYS AREA

NEAR ZERO-ENERGY

MONUMENT

COLLECTIVE HOUSING
“Monuments are buildings with historical or scientific value”
(Rijksoverheid, 2014)
“Creating housing for like-minded people who can benefit from the same collective functions”
(VROM-raad, 2009)
“Near zero energy is defined as the balance between consumption and production of energy.”

(Voss & Musall, 2011, p. 6)
INTRODUCTION
INTRODUCTION - design - conclusions
RESEARCH
INTRODUCTION
- design - conclusions

MONASTERY/GASTHUIS
1570

HOSPITAL RENEWED
1887

UNIVERSITY
1981
INTRODUCTION - design - conclusions
INTRODUCTION - design - conclusions

PRECONDITIONS MONUMENT
KRAAMVROUWEN KLINIEK
INFORMAL vs. FORMAL
ORGANIZATIONAL STRUCTURE
COLLECTIVE HOUSING CONCEPT

“Creating housing for like-minded people who can benefit from the same collective functions”
VROM-raad (2009)

OPEN COLLECTIVE SPACE

CLOSED COLLECTIVE SPACE
“Near zero energy is defined as the balance between consumption and production of energy.”

(Voss & Musall, 2011, p. 6)
NEAR ZERO-ENERGY CONCEPT

METHOD

TRIAS ENERGETICA

Figure 1. Trias energetica (Duijvestein, 2014)
TOTAL ENERGY CONSUMPTION

- conventional: 126.2 kwh/m²
- max: 47.2 kwh/m²
- monument: 54.0 kwh/m²

Figure 2. Based on EI-calculation, Uniec2.nl
1. LIMIT THE ENERGY DEMAND

GOAL

APPLIANCE
NEAR ZERO-ENERGY CONCEPT

INTRODUCTION - design - conclusions

INSULATION

IMPACT ON MONUMENT

EFFICIENCY kWh/M²

IMPACT ON COLLECTIVE HOUSING

EFFICIENCY kWh/M²

- design - conclusions
NEAR ZERO-ENERGY CONCEPT

1. LIMIT THE ENERGY DEMAND

2. USE RENEWABLE SOURCES FOR:

- design
- conclusions
### NEAR ZERO-ENERGY CONCEPT

#### INTRODUCTION - design - conclusions

<table>
<thead>
<tr>
<th>1. LIMIT THE ENERGY DEMAND</th>
<th>2. USE RENEWABLE SOURCES FOR: EFFICIENT</th>
<th>3. IF NEEDED, USE FOSSIL FUELS EFFICIENT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GOAL</strong></td>
<td><strong>APPLIANCE</strong></td>
<td><strong>GOAL</strong></td>
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<tr>
<td>![House icon]</td>
<td>![Battery icon]</td>
<td>![Solar panel icon]</td>
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<tr>
<td>![Appliance icon]</td>
<td>![Water heater icon]</td>
<td>![Refrigerator icon]</td>
</tr>
<tr>
<td>![Image of solar panel]</td>
<td>![Image of water heater]</td>
<td>![Image of refrigerator]</td>
</tr>
</tbody>
</table>

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CONCLUSION RESEARCH

INTRODUCTION - design - conclusions
DESIGN
URBAN SITUATION
URBAN SITUATION

introduction - DESIGN - conclusions
introduction - DESIGN - conclusions
ORGANISATION
COLLECTIVE SPACE - interior

SPOT A - OPEN COLLECTIVE
COLLECTIVE SPACE - interior

SPOT A - OPEN COLLECTIVE
COLLECTIVE SPACE - interior

SPOT B - CLOSED COLLECTIVE
COLLECTIVE SPACE - interior

SPOT B - CLOSED COLLECTIVE
COLLECTIVE SPACE - exterior

introduction - DESIGN - conclusions
COLLECTIVE SPACE - exterior

ZONE 1 & 2 - BUFFER AND OPEN COLLECTIVE
ZONE 3, HIDDEN PRIVATE
PRIVATE SPACE

- 48 DWELLINGS
- STUDIOS: 30 M²
  FAMILY APARTMENTS: 72 M²
  100 M²
PRIVATE SPACE

ZONE 1
PRIVATE SPACE

ZONE 2
COLLECTIVE - FACADE

introduction - DESIGN - conclusions
REFLECTION & CONCLUSION
NET - ZERO-ENERGY BUILDING
Voss & Musall (2011)

\[ 0 \text{ kWh/m}^2 \]
### NET - ZERO-ENERGY BUILDING

*Voss & Musali (2011)*

<table>
<thead>
<tr>
<th>0 kWh/m²</th>
<th>49.5 kWh/m²</th>
<th>54.0 kWh/m²</th>
<th>4.5 kWh/m²</th>
<th>NO</th>
</tr>
</thead>
</table>

### NET - ZERO-ENERGY BUILDING

**Voss & Musall (2011)**

<table>
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<tr>
<th>Down</th>
<th>Up</th>
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### PASSIVE BUILDING

**PHPP (2009)**

MAX = 15 kWh/M²

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### NET - ZERO-ENERGY BUILDING

*Voss & Musall (2011)*

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<th>Up (54.0 kWh/m²)</th>
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### PASSIVE BUILDING

*PHPP (2009)*

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<th>13.2 kWh/M²</th>
<th>YES</th>
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NET - ZERO-ENERGY BUILDING
Yoss & Musall (2011)

| 0 kWh/m² | 49.5 kWh/m² | NO |

PASSIVE BUILDING
PHPP (2009)

| MAX = 15 kWh/M2 | 13.2 kWh/M2 | YES |

NEW BUILT NORM EPC = 0.4, A+
Uniec2.nl (2015)

SOCIAL SUSTAINABILITY
Brundtland, (1987)
NET - ZERO-ENERGY BUILDING

Voss & Musall (2011)

0 kWh/m²

54.0 kWh/m²

PASSIVE BUILDING

PHPP (2009)

MAX = 15 kWh/M2

13.2 kWh/M2

NEW BUILT NORM EPC = 0.4, A+

Uniec2.nl (2015)

EPC = 2.7

EPC = 1.4

EPC = 0.4

original

conventional

nze-strategy

YES

YES

YES
NET - ZERO-ENERGY BUILDING
Yoss & Musall (2011)

PASSIVE BUILDING
PHPP (2009)

NEW BUILT NORM EPC = 0,4, A+
Uniec2.nl (2015)

SOCIAL SUSTAINABILITY
Brundtland, (1987)
MONUMENT & ENERGY

NET - ZERO-ENERGY BUILDING
Voss & Musall (2011)

PASSIVE BUILDING
PHPP (2009)

NEW BUILT NORM EPC = 0,4, A+
Uniec2.nl (2015)

SOCIAL SUSTAINABILITY
Brundtland, (1987)
MONUMENT & ENERGY

- INCONSPICUOUS DESIGN SOLUTIONS

CONCLUSIONS
Galerijflat
Schiecentrale, Mei architects, Rotterdam, 2008

Windsong cohousing
Langley, Dys Architecture, Canada, 1998

Near zero-energy collective in monument
Binnengasthuisterrein, Amsterdam

MONUMENT & COLLECTIVE HOUSING
MONUMENT & COLLECTIVE HOUSING

**Gallery flat**
Schiecenzalle, Mei architects, Rotterdam, 2008

**Windsong cohousing**
Langley, Dys Architecture, Canada, 1998

**Near zero-energy collective in monument**
Binnengasthuis, Amsterdam
Galerijflat
Schiecentrale, Mei architects, Rotterdam, 2008

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MONUMENT & COLLECTIVE HOUSING

introduction - design - CONCLUSIONS

The energized monument - P5 presentation - 06/11/2015 - tutors: L.G.K. Spoormans, W.J. Quist, N.J. Clarke
MONUMENT & COLLECTIVE HOUSING

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CONCLUSIONS
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COLLECTIVE SMART GRID

144 people

96 people

48 people
SMART GRID FOR COLLECTIVE HOUSING

“Electricity with a brain”

“A modernized grid that enables bidirectional flows of energy and uses two-way communication and control capabilities that will lead to an array of new functionalities and applications.”

(NIST, 2015)
MONUMENT, COLLECTIVE HOUSING & NEAR ZERO-ENERGY

MONUMENTAL, COLLECTIVE ENERGY SMART GRID
HISTORIC BUILDINGS FROM +/-1900 WITH A NON-HOUSING FUNCTION

“ENERGIZING THE MONUMENT”
ENERGIZED MONUMENTS
HISTORIC BUILDINGS FROM +/-1900 WITH A NON-HOUSING FUNCTION

JUSTUS VAN EFFENBLOK
“het nieuwe bouwen”, 1922, Michiel Brinkman, Rotterdam

Living TOGETHER under NEW BUILT COMFORT norm while living in a MONUMENT
MONUMENTAL SMART GRID DEPENDENT OF:

- DIFFERENCE IN REPRESENTIVE AND INFORMAL FACADES

CATEGORY: MONUMENTAL BUILDINGS FROM +/-1900 WITH A NON-HOUSING FUNCTION
MONUMENTAL SMART GRID DEPENDENT OF:
- DIFFERENCE IN REPRESENTIVE AND INFORMAL FACADES
- ORIENTATION OF INFORMAL FACADE

CATEGORY: MONUMENTAL BUILDINGS FROM +/-1900 WITH A NON-HOUSING FUNCTION
MONUMENTAL SMART GRID DEPENDENT OF:

- DIFFERENCE IN REPRESENTIVE AND INFORMAL FACADES
- ORIENTATION OF INFORMAL FACADE
- WIDE CORRIDOR STRUCTURE

CATEGORY: MONUMENTAL BUILDINGS FROM +/-1900 WITH A NON-HOUSING FUNCTION
Living TOGETHER under NEW BUILT COMFORT norm while living in a MONUMENT