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Zonnige Kemp



## Energy efficient ventilation from a housing association's point of view

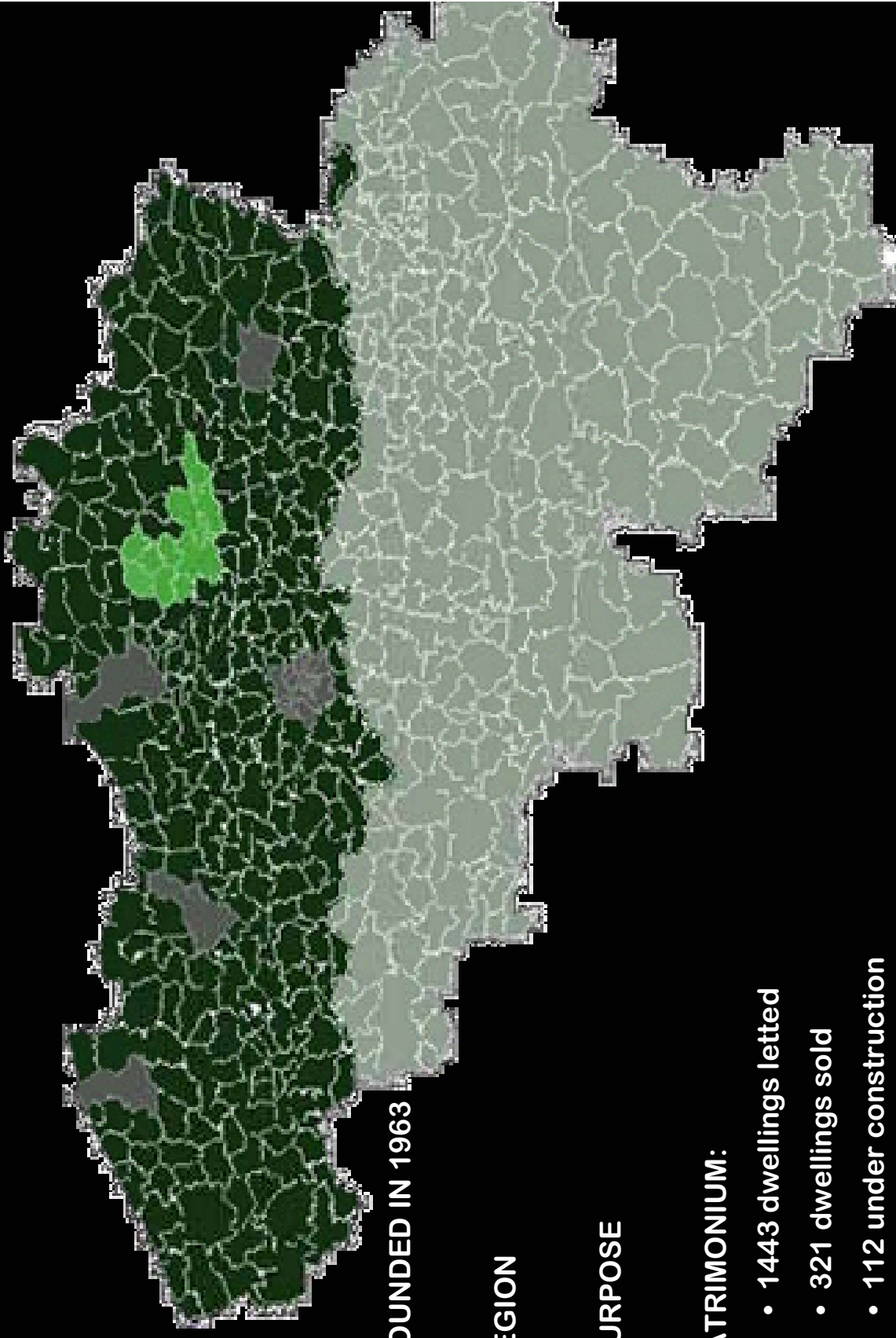
EGGN CONFERENCE - TORINO

Ir. Luc Stijnen



## A. Introduction

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- **FOUNDED IN 1963**

- **REGION**

- **PURPOSE**

- **PATRIMONIUM:**

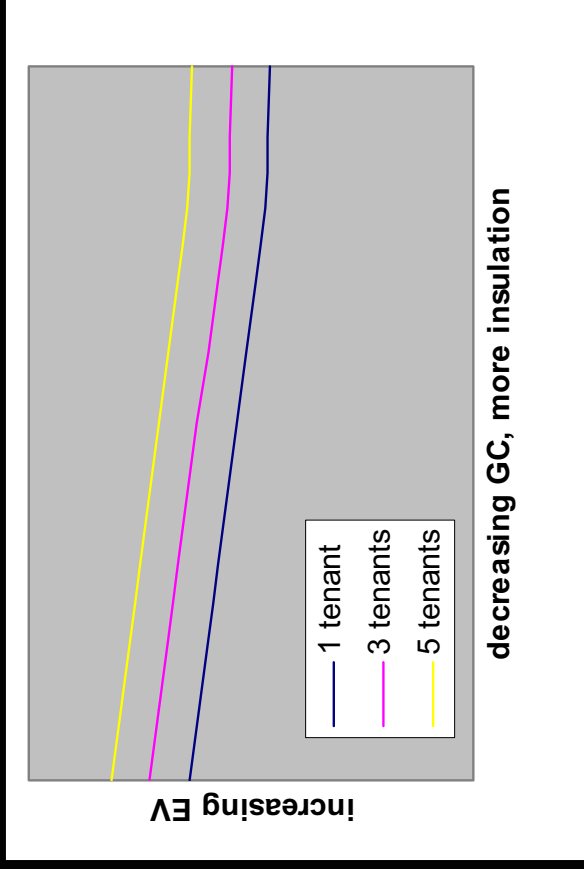
- 1443 dwellings letted
- 321 dwellings sold
- 112 under construction

## B. FIRST EXPERIENCE

### RESEARCH ENERGY CONSUMPTION IN 250 SOCIAL HOUSES

- FORMULE:

$$EV = 22\,796,2 + 129,2 \times GC + 2\,644,7 \times TOT$$



EV = energy consumption (MJ)  
GC = building constant  
TOT = number of tenant

- ENERGIEAUDIT: very important is always the behaviour of the tenants and also the rebound-effect

## 6 steps approach

### Trias Energetica

- 1 Decrease consumption (more isolation)
- 2 The use of an inexhaustible energy source which gives the least environmental burden (sun, wind, ...)
- 3 Use of the most efficient technologie (condensing boilers)
- 4 Setting, measurement and evaluation of the measurements taken
- 5 Informing and assisting the user
- 6 Spreading the findings, both positive and negative

### Add

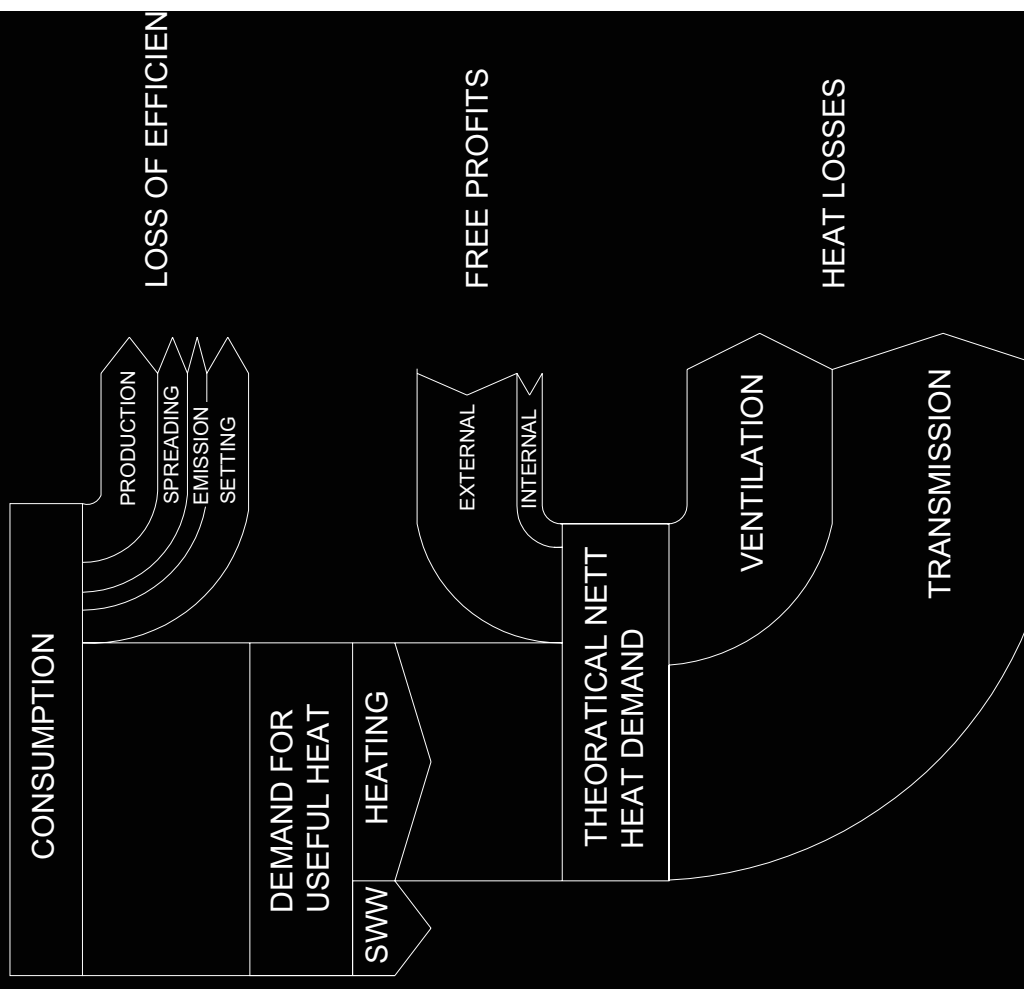
↓  
**PRESENTATION**

# C. ENERGY AND VENTILATION

## C1. INTRODUCTION

- AIR QUALITY INDOORS
  - our health
  - energy
  - building materials
- CONNECTION BETWEEN INSULATION AND VENTILATION

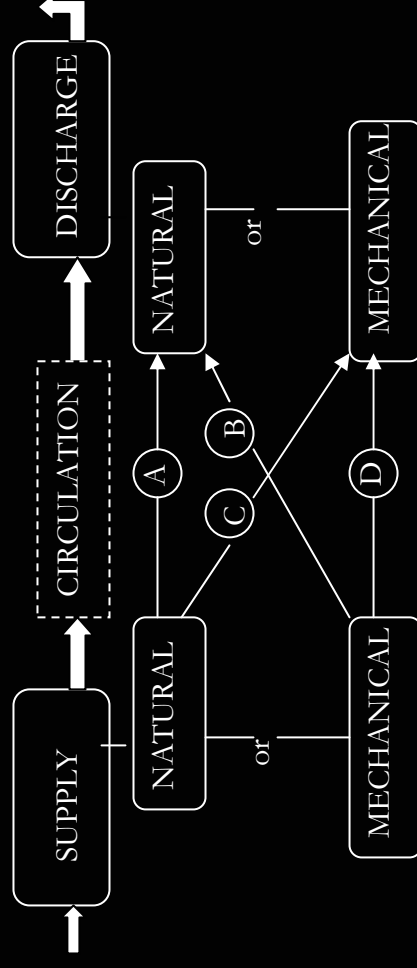
## THERMAL BALANCE OF A HOUSE



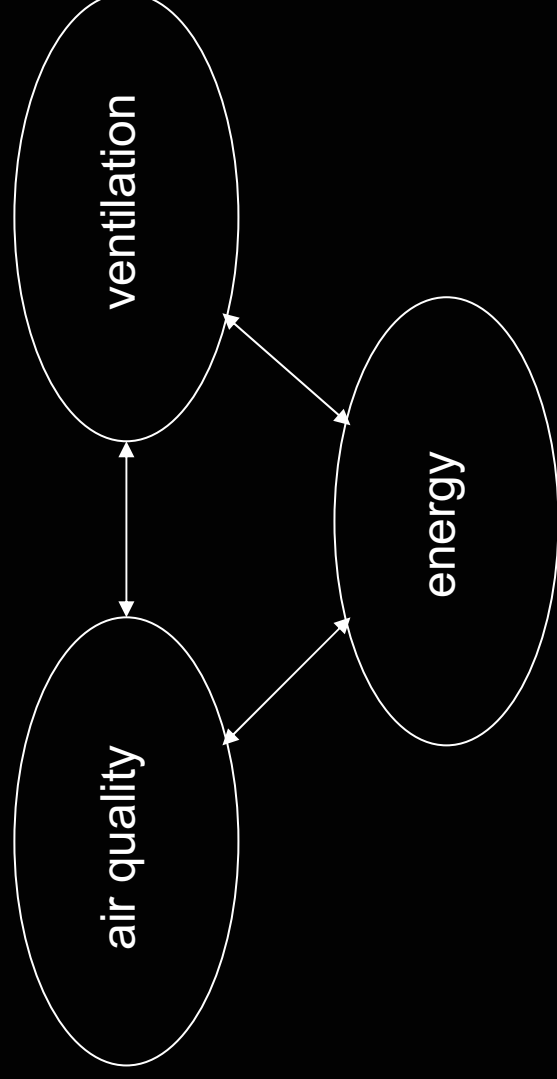
## C. ENERGY AND VENTILATION

### C2. HOW TO VENTILATE ?

- AS FORMERLY
- TOWARDS A CONTROLLED VENTILATION
- THE STANDARD NBN D50-001
  - basic ventilation
  - intensive ventilation
  - ventilation of special rooms



## C. ENERGY AND VENTILATION



## D. EXAMPLES

### D1. HULSHOUT – HOUTVENNE, WATERSTRAAT

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#### 1. PARTNERS

- C.V. ZONNIGE KEMPEN, social housing company
- PROVINCE OF ANTWERP
- VITO, Mol research institute
- KUL, University of Leuven

#### 2. FUNDING

- Flemisch Government - Demonstration Program
- European Union - Thermie program

#### 3. TOOLS

- INGREDIENT EN RECIPE: COOK BOOK
- AS WELL AS ENERGY NEEDS AS ENERGY OFFERS
- USERS - TENANTS: ECOTEAM

# D1. HULSHOUT - HOUTVENNE, WATERSTRAAT

## 4. AIM OF THE PROJECT

- Reduction of energy consumption for heating with 77 %

**220 kWh/m<sup>2</sup>/year** (average consumption in Belgium)

↓ compact building passive solar energy, standard insulation (K55)

**190 kWh/m<sup>2</sup>/year**

↓ condensing boiler

**162 kWh/m<sup>2</sup>/year**

↓ super insulation of wall, floor, roof and glazing

**79 kWh/m<sup>2</sup>/year**

↓ mechanical ventilation with heat recovery

**50 kWh/m<sup>2</sup>/year**

- Reduction of energy consumption for hot water with 50 %  
solar panels

# D1. HULSHOUT - HOUTVENNE, WATERSTRAAT

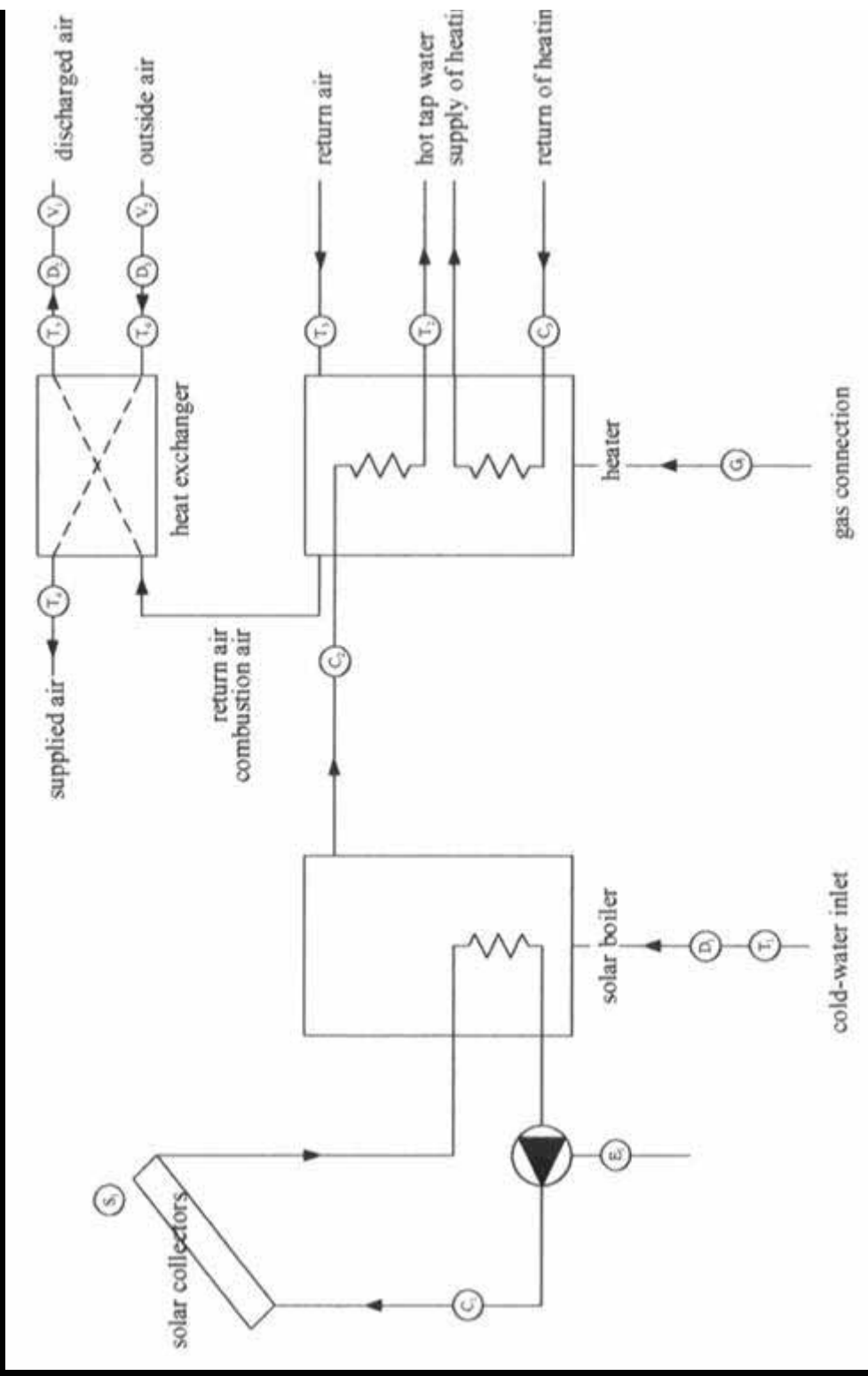
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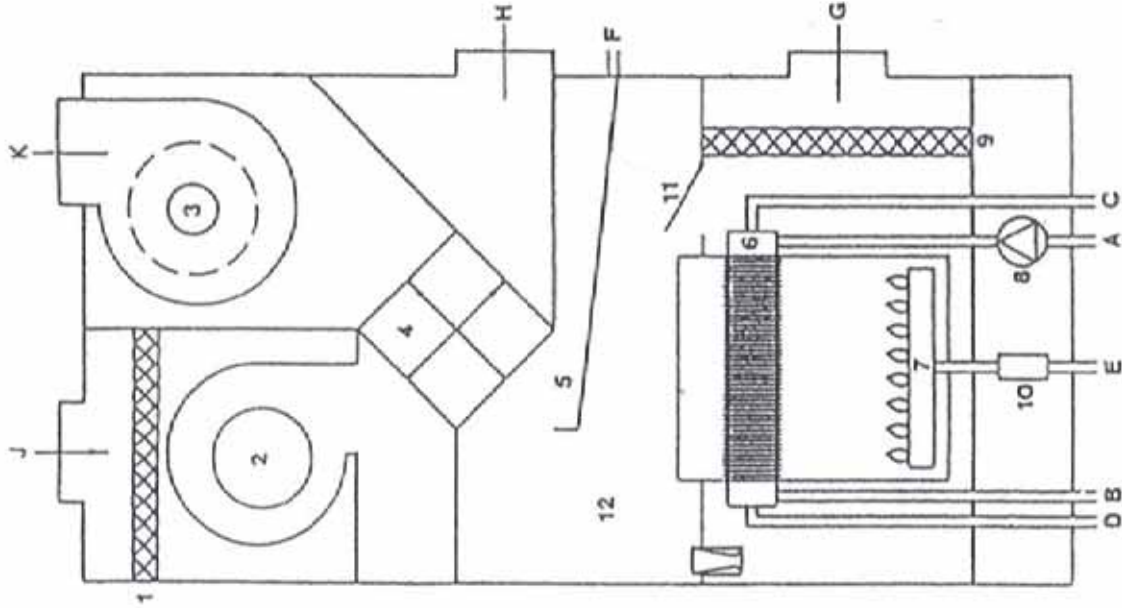
# D1. HULSHOUT - HOUTVENNE, WATERSTRAAT

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**OPCK 1: Individual**  
**75 m<sup>2</sup> per dwelling**  
**boiler 100 liter**



# D1. HULSHOUT - HOUTVENNE, WATERSTRAAT



A = return CH

B = supply CH

C = cold-water inlet

D = hot tap water outlet

E = gas connection

F = condensation connection

G = return air

H = supplied air

J = outside air

K = discharged air, also discharge of combustion gases

1 = outside air filter

2 = air supply fan

3 = air discharge fan

4 = heat recovery battery

5 = condensation discharge

6 = integrated heat exchanger for central heating (CH) and hot water

7 = burner bed

8 = circulation pump

9 = return air filter

10 = gas control block

11 = control valve

12 = header

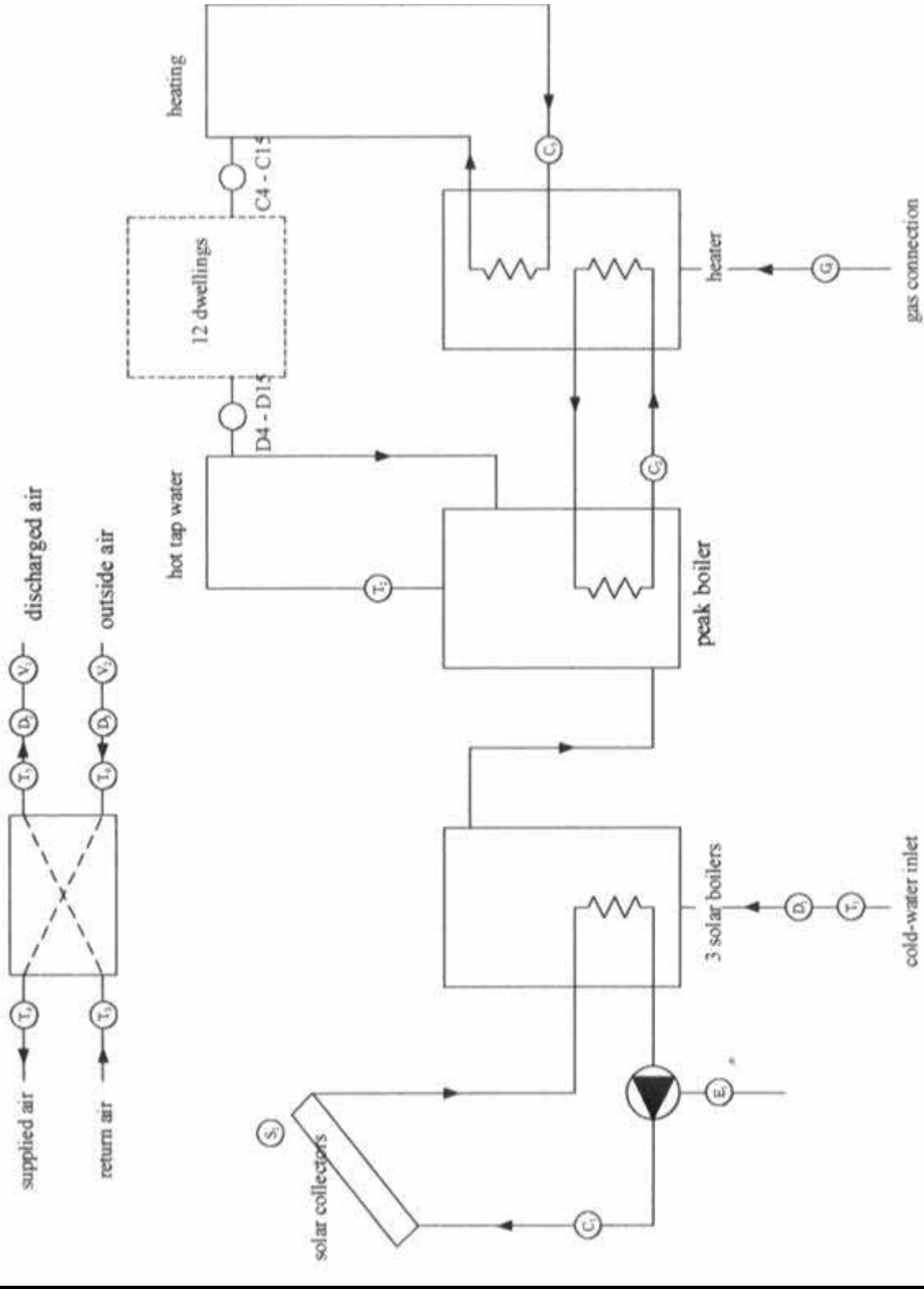
# D1. HULSHOUT - HOUTVENNE, WATERSTRAAT

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OK2: Collective

41 m<sup>2</sup>

500 liter



# D1. HULSHOUT - HOUTVENNE, WATERSTRAAT

VENTILATION	BLOCK 1	2	3	Total
Technique :	Mechanical ventilation with heat recovery			
Energy savings:				
Energy consumption per m <sup>2</sup>				
•without heat recovery =	79	79	79	79 kWh/m <sup>2</sup>
•with heat recovery =	50	50	50	50 kWh/m <sup>2</sup>
Total energy consumption				
•without heat recovery =	27.729	97.249	48.980	173.958 kWh
•with heat recovery =	17.550	61.550	31.000	110.100 kWh
Energy savings in natural gas				
•consumption =	10.179	35.699	17.980	63.858 kWh
•costs =	11.854	41.573	20.938	74.365 BEF/yr
Investment:				
•Surplus costs per dwelling =	55.000	55.000	55.000	55.000 BEF
•Total surplus cost =	165.000	660.000	440.000	1.265.000 BEF
Period to recover the costs:	13.0	15.0	21.0	17.0 years

# D1. HULSHOUT - HOUTVENNE, WATERSTRAAT

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**G**lobal  
**R**enewable  
**E**nergy  
**E**nvironmentally  
**N**eighbourhoods  
**and**  
**r**esponsible

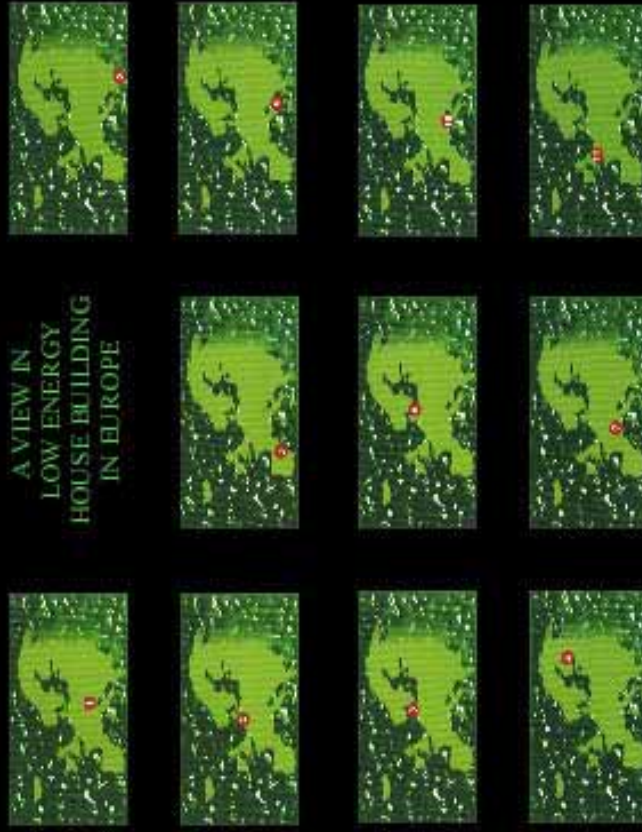
## EUROPEAN GREEN CITIES

INSPIRATION

# guide



A VIEW IN  
 LOW ENERGY  
 HOUSE BUILDING  
 IN EUROPE



BELGIUM - HOUTVENNE

### Low-income housing with reduced energy costs

Social housing company Zoning Kempex has a global objective of building houses for low-income people at reasonable costs. On a tight limited budget reduced energy costs are even more important than in general, so innovative solutions will be implemented afterwards in many other countries. Director Luc Sibghem explains that "energy efficient social houses are an essential part of a social housing policy."

The 21 new energy efficient social housing units located in Houtvenne near Antwerp will be a demonstration project for introducing energy efficient design and construction in Belgium - and for promoting such technology for energy efficiency in housing, which until now has had unacceptably high costs because of a low thermal mass, high energy consumption for heating, unventilated air for a standard house



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in Belgium. The project aims at a reduction in 20 kWh/m<sup>2</sup>. The Province of Antwerp, which is a pioneer in introducing energy efficient design and construction in Belgium - and for promoting such technology for energy efficiency in housing, which until now has had unacceptably high costs because of a low thermal mass, high energy consumption for heating, unventilated air for a standard house

**GREEN**

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**European Green Cities Network**  
[www.europeangreencities.com](http://www.europeangreencities.com)

**Sustainable Urban Housing**

Where partners and technologies of sustainable urban housing come together



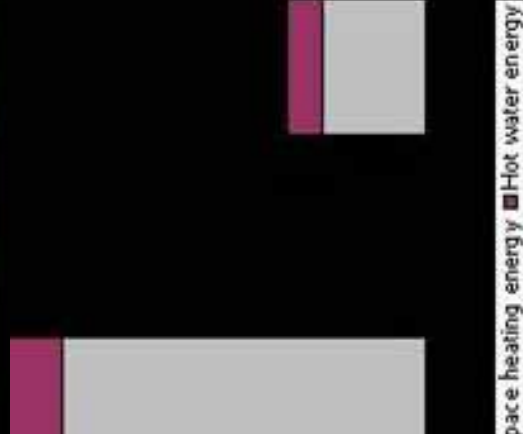
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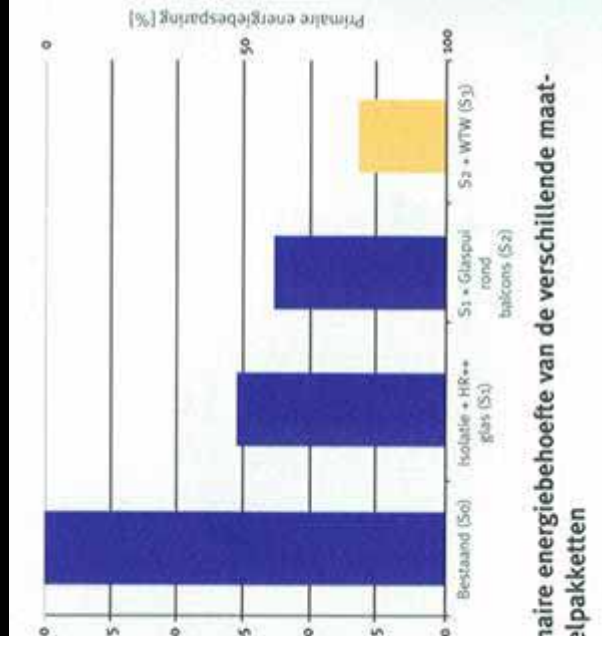


## D2. RENOVATION : VORSELAAR SCHRANSSTRAAT

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- Simulation table TRNSYS type 56
- Interventions
  - + insulation
  - + aluminium windows with thermal interruption + double glazing
  - + pack in balconies
  - + elevator
  - + public ↔ individual heating
  - + solar collectors 25m<sup>2</sup> covering 40%
  - + ventilation with heating recuperation



### REALIZED MEASURES

Measure	affects	before	after
External wall insulation	u-value [W/m <sup>2</sup> K]	1,4	0,33
High performance glazing	u-value [W/m <sup>2</sup> K]	5,8	1,1
Ventilation heat recovery	Energy demand	–	20% savings
Glazed balconies	No cold bridges	–	10% savings
Solar water heater	Energy demand	–	40% solar
High efficiency boiler	Energy demand	–	10% savings

### - Energy use

## D2. RENOVATION : VORSELAAR SCHRANSSTRAAT

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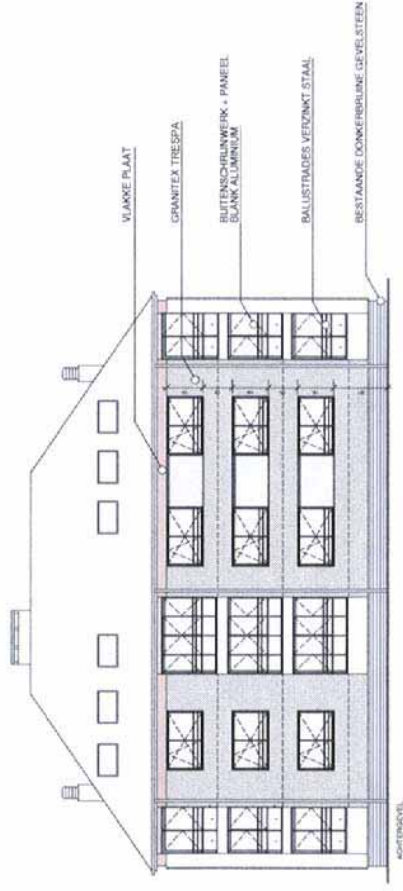
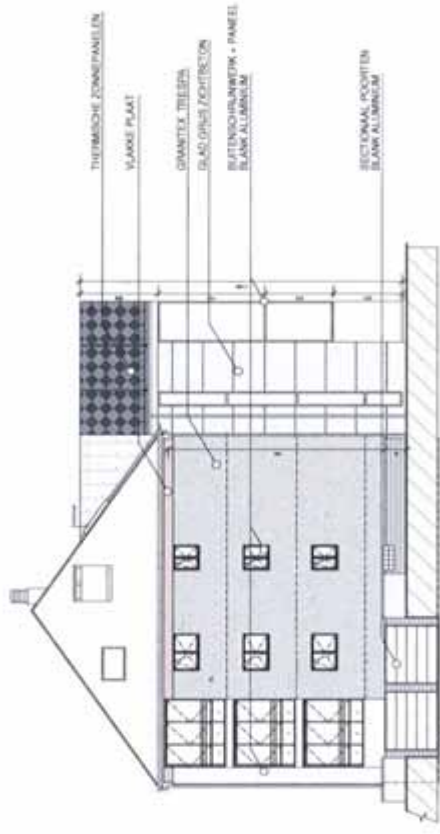
before



after

# D2. RENOVATION : VORSELAAR SCHRANNSSTRAAT

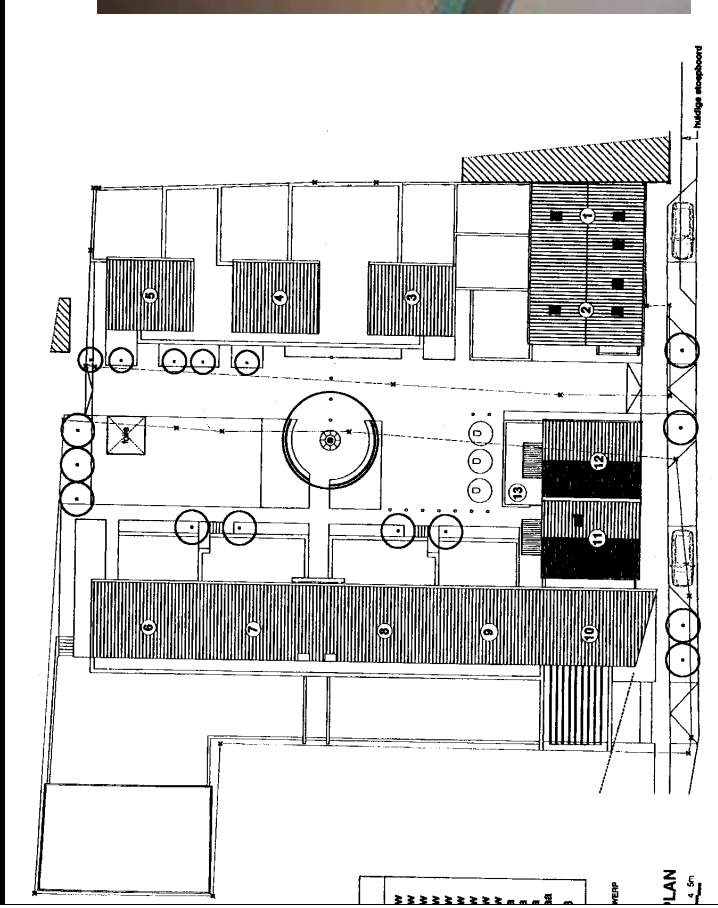
Zonnige Kemp





# D3. RENOVATION : VORSELAAR SCHRANSSTRAAT

Zonnige Kemp

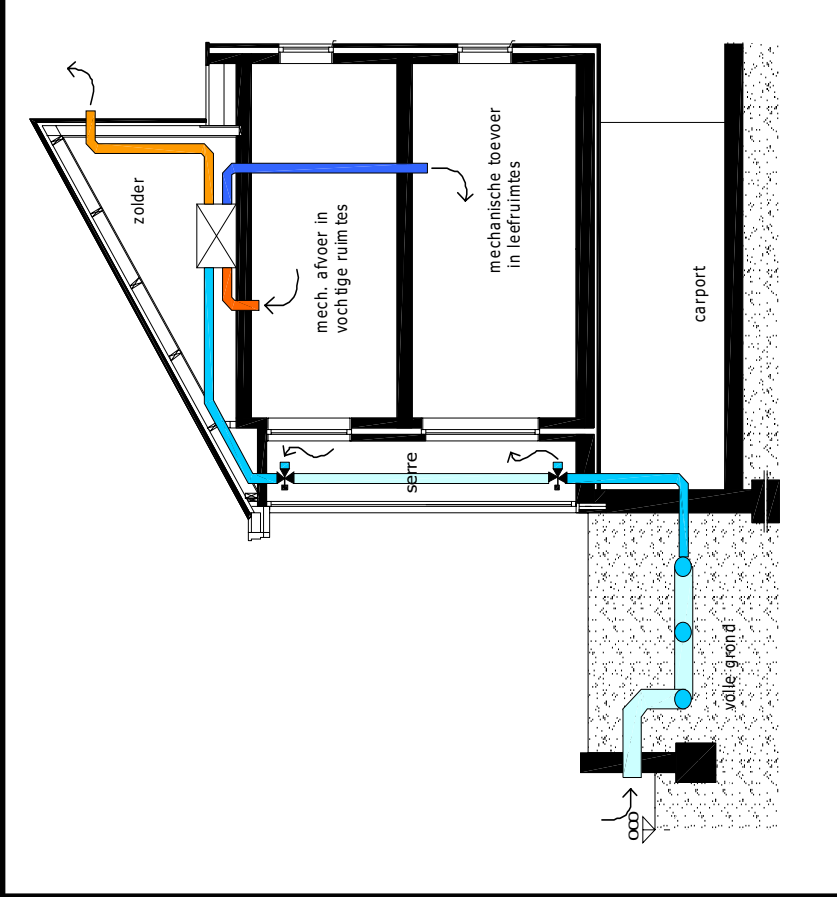


Implanting

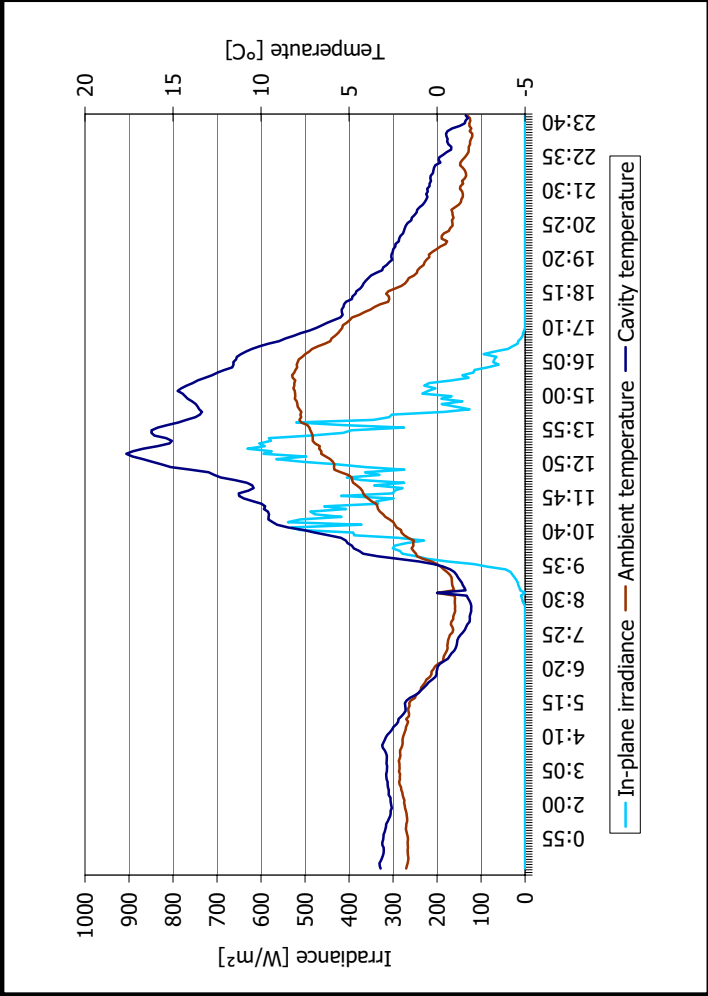
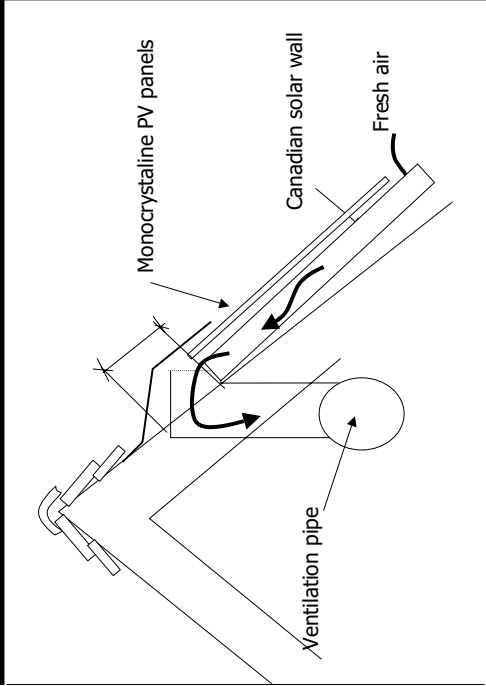
Foto van de maquette van het bouwproject



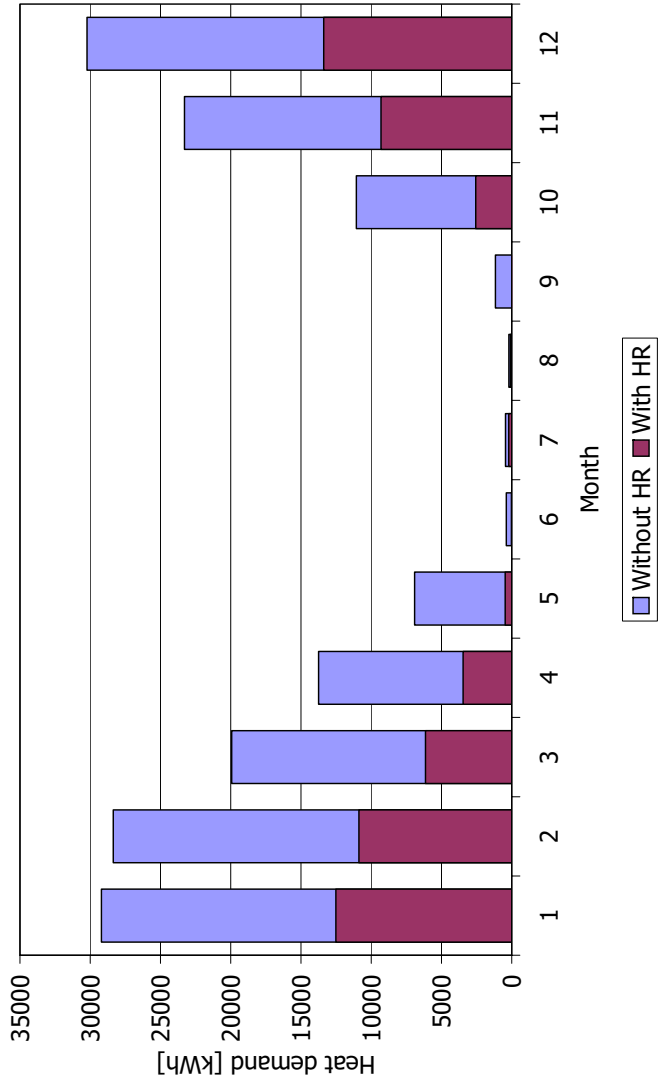
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## Measurements

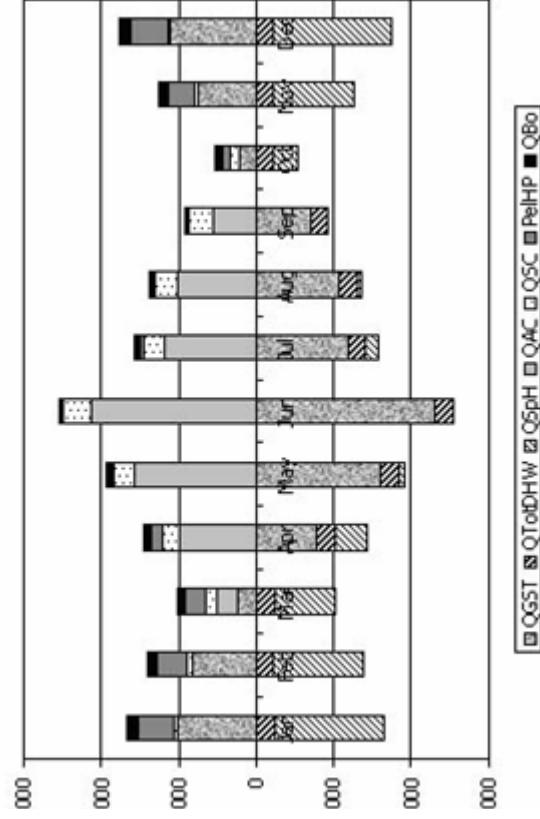
Energy control system

Use of renewable energy sources

Generate efficient energy

Energy

Annual energy balance



Parameter	Energie	Perc.
QSC (zonnecollector)	22210 kWh	17%
QAC (asfalt collector)	76930 kWh	58%
PelHP (elektrische energie warmtepomp)	22750 kWh	17%
Qbo (gasverwarming)	10635 kWh	8%
QIGST (verliezen in grondopslag)	- 35250 kWh	27%
QtotDHW (totale vraag warmtapwater)	- 27345 kWh	21%
QSpH (ruimteverwarming)	- 69930 kWh	53%
Balans		
QSC + QAC + PelHP + Qbo - QIGST - QTotDHW - QSpH	0 kWh	100%

# Annual savings

## Financial

### Annual savings regarding to a simular project with standard techniques

Description	13 standard families		Estimation project Zoerle-Parwijs	
	Expenditure (kWh)	Cost (€)	Expenditure (kWh)	Cost (€)
Natural gas use heating	232050	6774,14	geen	geen
Natural gas use hot tapwater	50700	1480,06	10635 (after-burning)	310.46
Electr. Expenditure	52000	6650,8	39000 (applications of rational energy consumption) + 22750 (consumption heat pump)	7897.83
<b>Total</b>	<b>334750</b>	<b>14905,01</b>	<b>72385</b>	<b>8208,29</b>

Realized saving:

$$E = 14\ 905,01 - 8\ 208,29 = €\ 6\ 696,72\ €$$

For PV: 1275 €

Total energy saving

€ 6 696,72 + 1 275,00 = € 7 971,72 €

# Annual savings

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## Environment technique

The used energy concept realises every year the following savings regarding the reference project:

Description	Realized saving in kWh	Realized saving in kg CO <sub>2</sub>	Realized saving in kg NO <sub>x</sub>	Realized saving in kg SO <sub>2</sub>
Natural gas use Heating	272115	54967,23	51,70185	0,54423
Electr. Expenditure	-1250	-1233,75	-1,5875	-1,4
Balance		53733,48	50,11435	-0,85577

# Zonnige Kemp



Afbeelding: Eduard Mena voor Theresah Jorke  
Visualisatie: John van Noord voor JZDV



Afbeelding: Eduard Mena voor Theresah Jorke  
Visualisatie: John van Noord voor JZDV

## E. Situating the initiative within the wider context of social housing

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Europe-Flanders  
step by step approach

Always start from a surplus value, approach:

**TENANT:**

- Financial profit: \* euro can be spent only once
- \* energy <-> rent
- Healthier, sociable house and environment

**COMMUNITY:**

- Saving: \* energy
- \* natural resources
- reduce CO<sub>2</sub> -emmission
- Reduced use of building land
- Satisfied tenant
- Repetitive effect

**SOCIAL HOUSING**

**COMPANY:**

- Satisfied tenants

## E. EDUCATION AND TRAINING

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- LOCAL TRAINING
  - announcement and sensitisation
  - passing on the knowledge
- ITEMS
  - decrease of energy
  - alternative energy
  - LCA
  - water
  - waste
  - future
- TENANTS



## F. BOTTLENECKS AND LIMITING CONDITIONS

- front lines have been drawn
- further development and necessary conditions
- policy supporting measures and financial incentives
- the board of directors and the local governments should be receptive to a sustainable approach
- sustainability is more than energy
- solutions only are sustainable if integrated in the design proces
- accurate setting and regular inspection of the systems are necessary
- one should learn from experiences and the results from other equal initiatives that have been taken already
- scientific support is necessary
- one should show consideration for the tenants that will live in the houses build