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Summer Study
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HabitEnergy

Success factors in the construction of very low-energy housing: the weight of stakeholder relationship and of household practices

A survey in three European countries

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Context and Objectives

Very low-energy consumption buildings

Single-family housing => decision-makers

1/ Analyse the weight of:

- **network of professional actors and relationship with final users**
- **motivation, practices and behaviour of final users...**

...for reaching energy efficiency targets

2/ Compare issues and results:

- **3 different Countries: France, Germany, Switzerland**

3/ Share knowledge and feedback:

- **Which support and which follow-up actions for boosting actors throughout the project process (from decision to exploiting)?**

Actions

18 months: September 2006 - February 2008

1/ Study of historical evolution of the energy efficient buildings development

2/ Socio-economic perspective of drivers and practices of actors in moving toward energy efficient buildings

3/ Comparison of energy efficiency labels for building in the 3 Countries

4/ Technical analysis of a pool of projects and on-site survey of key-actors of these projects

5/ Set-up of practical recommendations for boosting the sector

The energy efficiency targets: the national labels comparison

3 Countries: 3 labels, 3 energy targets
defined by a similar expression of energy consumptions in *x kWh/m²*

- **Which kWh? "Useful", "Final" or "Primary" Energy?**

If primary, which conversion factors?

- **Which floor area ?**

Internal or external dimensions?

- **Which energy end-use purposes are taken into account?**

Heating, hot domestic water, ventilation, lighting, other domestic appliances?

- **Which is the influence of the calculation method?**

The energy efficiency targets: the national labels comparison

The energy efficient targets are different…

Label	Passivhaus (Germany)	Minergie (Switzerland)	BBC (France)
Requirement	Heating Useful Energy max: 15 kWheu/m² Consumption max: 120 kWhep/m²	Consomption max for heating and domestic hot water heating: 42 kWhep/m²	Consumption max for lighting, heating and domestic hot water heating (auxiliaries included): 50 kWhep/m²
Ef/Ep Conversion factors	Electricity: 2,7 Wood: 0,2 Fossil: 1,1	Electricity: 2 Wood: 0,75 Fossil: 1,0	Electricity: 2,58 Wood: 0,6 Fossil: 1,0

***Useful energy*: energy needs of building**

***Final energy*: energy supplied and used**

***Primary energy*: it takes into account the energy used for the production and the transport of final energy**

Common potential mistakes: comparison between German and French calculation

Example for a house: 135 m² "leaving surface"

	Germany	France
Reference Floor Area	**132 m²**	**149,1 m²**
Results without correction	**24,14** *all uses*	**24,41** *(heating, domestic hot water, auxiliaries, ventilation, lighting)*
Results with correction		
Reference Floor Area	**149,1 m²**	**149,1 m²**
Final Energy kWhef/m²	**9,6** *(heating, domestic hot water, auxiliaries, ventilation, lighting)*	**24,41** *(heating, domestic hot water, auxiliaries, ventilation, lighting)*

Projects pool analysis (1)

- **18 Buildings have been identified** (built between 1997 and 2007)
  - 7 Passivhaus in Germany
  - 6 Minergie in Switzerland
  - 5 energy efficient building in France

Projects pool analysis (2)

Some main selection criteria

- Certificated operation
- Geographical variety
- Key-actors variety
- Sources availability for on-site survey
- Thermal studies and energy receipts availability
- Envelop and HVAC systems variety
- Household variety
- …

Technical sheet for each project

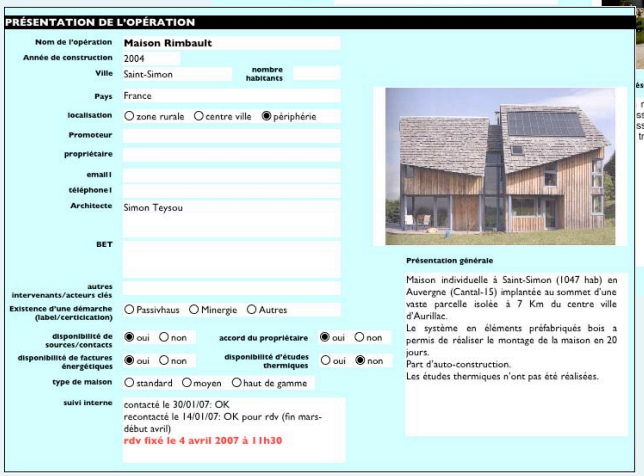
- Actors involved
- General data
- Climatic data
- Building description
- Energy consumption data
- HVAC description
- Financial issues


PRÉSENTATION DE L'OPÉRATION

Nom de l'opération: Passivhaus à Ulm
Année de construction: 2004
Ville: Ulm — nombre habitants: 120000
Pays: Allemagne
localisation: ○ zone rurale ○ centre ville ○ périphérie
Promoteur: Casa Nova
propriétaire:
email:

ésentation générale

maison se trouve dans un lotissement de au-
ssus de Ulm. Le lotissement avec 104 maisons
ssives a été construit pour la EXPO 2000. Ulm
trouve au sud-est de Stuttgart à environ 93 km.


PRÉSENTATION DE L'OPÉRATION

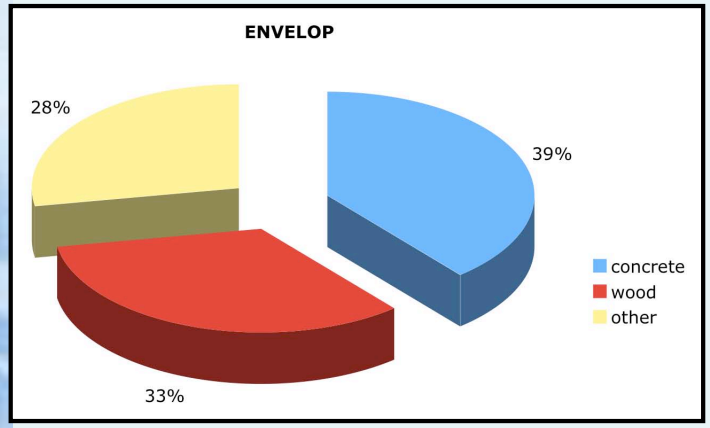
Nom de l'opération: Maison Rimbault
Année de construction: 2004
Ville: Saint-Simon — nombre habitants:
Pays: France
localisation: ○ zone rurale ○ centre ville ◉ périphérie
Promoteur:
propriétaire:
email:
téléphone:
Architecte: Simon Teysou
BET:
autres intervenants/acteurs clés:
Existence d'une démarche (label/certicication): ○ Passivhaus ○ Minergie ○ Autres
disponibilité de sources/contacts: ◉ oui ○ non — accord du propriétaire: ◉ oui ○ non
disponibilité de factures énergétiques: ◉ oui ○ non — disponibilité d'études thermiques: ○ oui ◉ non
type de maison: ○ standard ○ moyen ○ haut de gamme
suivi interne: contacté le 30/01/07: OK
recontacté le 14/01/07: OK pour rdv (fin mars-début avril)
rdv fixé le 4 avril 2007 à 11h30

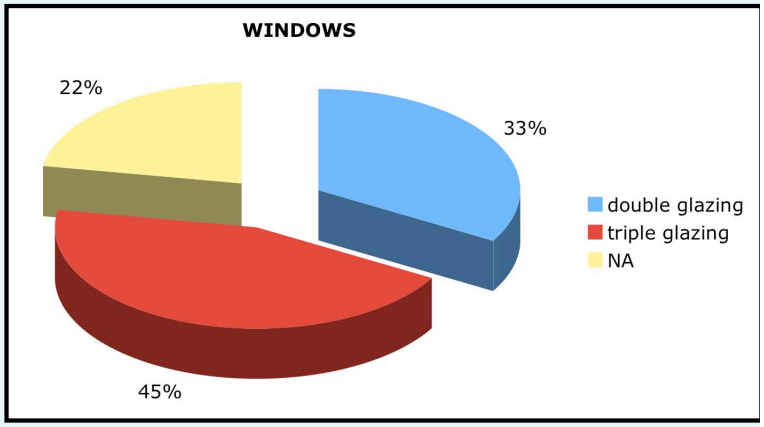
Présentation générale

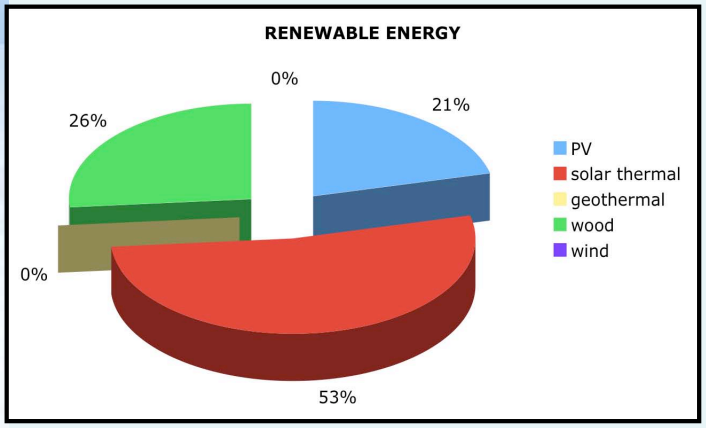
Maison individuelle à Saint-Simon (1047 hab) en Auvergne (Cantal-15) implantée au sommet d'une vaste parcelle isolée à 7 Km du centre ville d'Aurillac.
Le système en éléments préfabriqués bois a permis de réaliser le montage de la maison en 20 jours.
Part d'auto-construction.
Les études thermiques n'ont pas été réalisées.

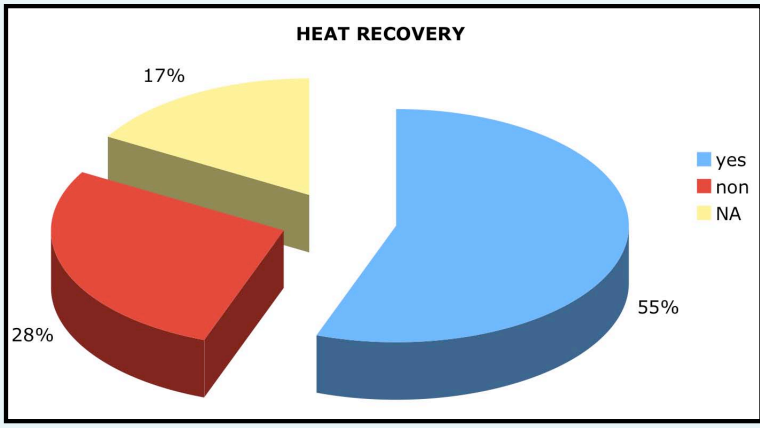
Projects pool analysis (3)

- **Summing up of some main issues of projects pool**









On-site survey: the objectives

- **On-site survey among final users and professional actors**
- **A qualitative, geographical and compared approach**
  - Interviews with owners (decision-makers)…
  - …& Interviews with professional actors involved in the building construction
- **Two main objectives:**
  - to understand the weight of technical, management and sociological factors in the development of low energy consumption housing
  - to work on the link between the **demand** and the offer sides

Retracing the network of the offer and identifying the factors that may be a threat or an opportunity to link the offer and the demand sides

On-site survey of the stakeholders: the Owners

- **Interviews focus (18) on 4 main themes:**
  - Motivation of the households to live in this type of building
  - Decision-making process of the households and implementation steps of the project
  - If any, specific domestic practices associated with living in "low-energy housing"
  - Satisfaction degree regarding this type of building

On-site survey of the stakeholders: the key-actors

- **The survey with the key-actors: professionals or any other actor identified in the interviews with the owners**

- **Interviews focus on:**
  - The reasons for their involvement in this kind of project
  - Their opinions concerning management, regulatory and financial factors that are a threat or an opportunity for a project
  - The factors allowing the improvement of the professional network and the wide dissemination of these projects
  - The recommendations that they give to better exploit these buildings

Some first results

- **Historical review in the 3 Countries…**
  - Impact of major societal events
  - Different speed in evolution of regulatory environment
  - Different level of public and mainly of **private incentives** (subsidies, tax reductions, preferential interest rate…)
  - Different implementation of **voluntary initiative of market players** (e.g. certification labels)

- **On-site survey of owners…**

Before…decision-making

- Professional feedback of owner: it may play a role, but it's not very relevant
- The architect: he has a key-role in decision-making process and in implementation of the project
- Some cultural threats: many doubts about ventilation issues…

During…design and implementation

- Big threat: the lack of local offer in specific energy efficient solutions

After…living

- Degree of satisfaction: in general, it's high, but some more daily efforts to do in living…
- Success factor: the strong will of owners on environmental issues