# The Ncube lab

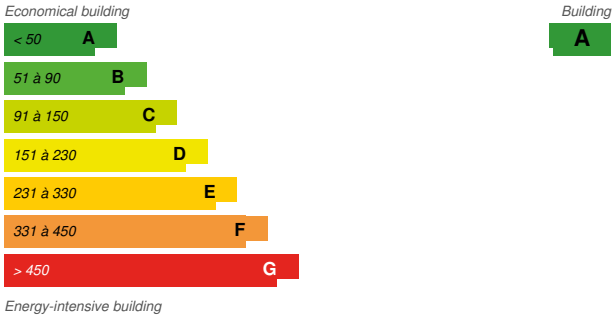
by Olivier LOUIS / 2015-08-28 15:34:47 / Luxembourg / 14599 / FR


**Primary energy need :**

**39.1** kWhep/m².an

**(Calculation method : RGD du 30 novembre 2007 - bâtiment d'habitation )**

**ENERGY CONSUMPTION**




**Building Type** : Isolated or semi-detached house
**Construction Year** : 2014
**Delivery year** : 2014
**Address 1 - street** : Maison 9780 WINCRANGE, Luxembourg
**Climate zone** : [Cfb] Marine Mild Winter, warm summer, no dry season.

**Net Floor Area** : 114 m²
**Construction/refurbishment cost** : 248 399 €
**Number of Dwelling** : 1 Dwelling
**Cost/m2** : 2178.94 €/m²

**Certifications :**

MINERGIE-A®

## General information

The future of one-family houses brought to life in a prototype house in Luxembourg. It is the result of three years of development and cooperation with a number of partners. With the support of the Luxembourg Ministry of the Economy, the support of Neobuild, Newconcepts and the H Tudor Public Research Centre and in partnership with the companies Dupont de Nemours, Bosch, Saint-Gobain Glass, Home Eos and Peintures Robin, the Luxembourg-based wood construction specialist Naturhome SA has designed Ncube, a highly industrialised approach to construction which is used to build passive one-family houses which are AAA-rated (mandatory standard for new builds in Luxembourg from 01/01/2017) and AAA+ (energy-positive house from 01/01/2019) as well as well-equipped and finished, all on a modest budget.

REDUCING COSTS WHILST INCREASING PERFORMANCE

By bringing together at the construction site the 2-D prefabricated walls and self-supporting 3-D modules which are fully fitted out in the factory (international

patent pending) and making use of innovative materials and equipment, it is possible to provide a home which is cutting edge in terms of its thermal and acoustic performance whilst remaining affordable.

AN ONLINE CONFIGURATOR

The inspiration for Ncube is drawn from the production and organisational practices of the automotive industry. This also applies to its marketing: an online configurator allows the potential builder to design their future house and to get a price for it immediately.

FULFILLING PROMISE

The Wincrange "Living Lab" is a house which has been built using the techniques of Ncube. It will be lived in and fitted with sensors. Neobuild will monitor its thermal and acoustic performance throughout the year, along with variations in moisture and VOC levels. The purpose of these measurements is to confirm the laboratory results in a real-life environment.

See more of Ncube:

http://www.youtube.com/watch?v=EwQY0q0z6QQ

www.ncube.eu

www.ncube-maison.com

## Data reliability

3rd part certified

# Stakeholders

## Stakeholders

Function : Structures calculist

NEOBUILD

Francis SCHWALL

http://www.neobuild.lu/

Neobuild S.A., Technology and Sustainable Development Innovation Hub, was set up in 2011 by the Council for the Economic Development of Construction (CDEC). As the only hub of its kind, Neobuild has two main missions. The first is to promote innovation amongst all stakeholders in the sector.

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Function : Other consultancy agency

LIST

Lahcène Harbouche

http://www.list.lu/

The Henri Tudor PRC contributes to Naturhome's Ncube project (RDI draft law) in the commercial production and site planning stages. The Centre's contribution involves providing examples of lean manufacturing techniques for the construction sector.

## Contracting method

Lump-sum turnkey

https://www.construction21.org/luxembourg/data/sources/users/18/communique-de-presse-ncube---v2-150314.docx

## Owner approach of sustainability

The Ncube modules are made solely from panels of laminated PEFC-certified wood, produced from wood taken from sustainably managed forests. The use of an amount of solid timber inside houses constitutes a significant additional carbon sink. The concept itself, which greatly reduces the amount of traveling for craftsmen to the construction sites, reduces the amount of grey energy involved in building houses.

## Architectural description

A typical Luxembourg house - plastered façade and pitched roof with natural slates - 3 bedrooms - 1 study - 1 bathroom - 2 WCs - 1 entrance hall - 1 living room - 1 dining room - 1 kitchen - 1 equipment room

https://www.construction21.org/luxembourg/data/sources/users/18/ncube-wincrange-version-extenso.docx

## If you had to do it again?

4 houses have already been built using the new Ncube concept.

## Building users opinion

# Energy

## Energy consumption

Primary energy need : 39,10 kWhep/$m^2$.an

Primary energy need for standard building : 95,00 kWhep/$m^2$.an

Calculation method : RGD du 30 novembre 2007 - bâtiment d'habitation

CEEB : 0.0002

Final Energy : 9,80 kWhef/$m^2$.an

Breakdown for energy consumption :
5,326 kWh = solar power generation
854 kWh = DHW production requirements
1,380 kWh = heating
3,250 kWh = domestic electricity requirements

## Envelope performance

Envelope U-Value : 0,16 $W.m^{-2}.K^{-1}$

More information :
Uwalls = [0.08:0.12] W/m2K
Uw = [0.7:1.6] W/m2K

Building Compactness Coefficient : 0,97

Indicator : EN 13829 - n50 » (en 1/h-1)

Air Tightness Value : 0,49

Users' control system opinion : Excellent

## Real final energy consumption

Year of the real energy consumption : 2 014

# Renewables & systems

## Systems

Heating system :
- Heat pump
- Low temperature floor heating

Hot water system :
- Heat pump

Cooling system :
- Reversible heat pump

Ventilation system :
- Double flow heat exchanger

Renewable systems :
- Solar photovoltaic

Renewable energy production : 34,00 %

## Smart Building

Smartgrid :
Not yet installed but provided for by NEOBUILD

# Environment

## GHG emissions

GHG in use : 10,00 $KgCO_2/m^2/an$

## Life Cycle Analysis

Eco-design material : Wood – cellulose – Flax wool

## Indoor Air quality

Tests in progress by the Luxembourg Ministry of Health

## Comfort

Health & comfort : Tests in progress by the Luxembourg Ministry of Health

Acoustic comfort : Lnw (CI) = 61 dB Rw (C;Ctr) = 54 dB

# Products

## Product

Ncube

Naturhome

Olivier LOUIS - info@naturhome.net

http://www.naturhome.net/language

Product category : Gros œuvre / Système passif

Modular construction system

Modular construction system

ENERGAIN

DUPONT DE NEMOURS

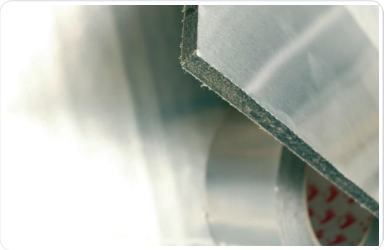
00352/366665885

http://energain.fr/Energain/fr_FR/index.html

Product category : Second œuvre / Cloisons, isolation

Membrane which provides additional thermal inertia

Measurements currently in progress



Peintures ROBIN S.A.

Peintures ROBIN S.A.

BECKIUS Patrick - p.beckius@robin.lu

http://www.verdello.lu/

Product category : Second œuvre / Peinture, revêtements muraux

Verdello® is the first 100% bio-sourced paint. An indoor wall paint with an extra matt finish for warm interiors and at one with the environment. Made from tall oil, Verdello® is an entirely natural paint that comes from the plant world.

Nothing to report

# Costs

## Construction and exploitation costs

Global cost : 344 247,00 €

Reference global cost : 2 445,00 €

Renewable energy systems cost : 12 996,00 €

Global cost/Dwelling : 344247

Reference global cost/Dwelling : 2445

Cost of studies : 63 220 €

Total cost of the building : 266 619 €

Subsidies : 45 000 €

## Urban environment

House integrated into its rural surroundings

## Land plot area

Land plot area : 700,00 $m^2$

## Built-up area

Built-up area : 10,00 %

## Green space

Green space : 200,00

## Parking spaces

1 covered parking place – 2 uncovered parking places – 1 bike store

# Building Environnemental Quality

## Building Environmental Quality

- Building flexibility
- indoor air quality and health
- works (including waste management)
- acoustics
- comfort (visual, olfactive, thermal)
- waste management (related to activity)
- energy efficiency
- renewable energies
- building process
- products and materials

# Contest

## Reasons for participating in the competition(s)

- AAA+, positive energy, single-family passive house. – Built and fitted in the factory using modular-structure principles – Only healthy, ecological materials have been used (Ministry of Health monitors the absence of VOCs) - Economical: 25 % cheaper than standard passive buildings thanks to the production process being rationalized. Passive housing is now available to everyone! – And it can be configured on the internet – please go to: www.ncube.eu

## Building candidate in the category

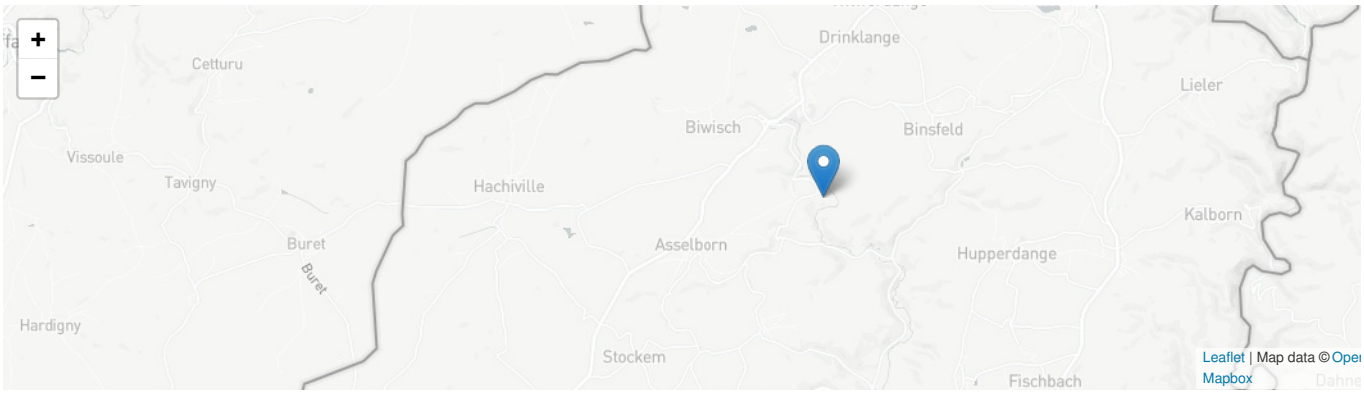
Green Building Solutions Awards 2015

powered by Construction21

Matériaux bio-sourcés et recyclés

Bâtiment zéro énergie

Santé et confort

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