7 low-energy ModCell homes

by Oliver Style / 2015-10-01 10:34:25 / International / 9816 / EN

Primary energy need :

120 kWhpe/m^2.year

(Calculation method :)

ENERGY CONSUMPTION

Economical building — *Building*

< 50	A	
51 à 90	B	B
91 à 150	C	
151 à 230	D	
231 à 330	E	
331 à 450	F	
> 450	G	

Energy-intensive building

Building Type : Collective housing < 50m
Construction Year : 2015
Delivery year : 2015
Address 1 - street : St Bernards Road BS11 9UR BRISTOL, United Kingdom
Climate zone : [Cfb] Marine Mild Winter, warm summer, no dry season.

Net Floor Area : 668 m^2
Construction/refurbishment cost : 1 575 000 €
Cost/m2 : 2357.78 €/m^2

General information

These 7 terraced homes located in Shirehamton, Bristol, UK, constitute the world's first commercially available straw eco-homes, using the BM Trada Q Mark certified ModCell Core prefabricated straw bale panel system. As part of the planning requirement the panels are clad with the traditional red brick, that complements the look and feel of existing neighbouring Shirehampton homes. This handsome row of housing comprises five 3 and 4 bedroom homes, and two 2 bedrooms homes that bookend the development. Each house has full height timber fences as well a shed to store bikes and other household goods.

Behind the traditional brick elevation of the St Bernard's Road development is a state of the art, super insulated, low carbon straw bale construction system by ModCell: the recently BM Trada Q Mark certified ModCell Core prefabricated straw bale panel system. The excellent insulating properties of straw encapsulated in the walls of the project can reduce heating bills by up to 90% compared to the average for Bristol.

All internal wall partitions are made from Coobio Compressed Straw Board panels (CSB), replacing conventional plasterboard which has a negative environmental impact, and providing instead a fully carbon negative build system with excellent acoustic insulation between rooms.

The rear garden has been turfed and has a timber deck as standard. Some of the units have chosen to have oak flooring fitted in the open plan ground floor.

Progetic designed the Mechanical Ventilation with Heat Recovery (MVHR) systems for the homes, which cleverly swap heat from the outgoing air into the incoming fresh air, ensuring stable temperatures, better air quality and drastically reduced heating bills and carbon footprint. The combination of straw bale construction and MVHR means the homes stay warm in winter, cool in summer and are healthy and comfortable to live in.

Heating is provided by a high efficiency air source heat pump that extracts heat from outdoor air and transfers it to water, which is circulated through low temperature radiators around the homes. The same system provides domestic hot water generation.

Additionally,each home is fitted with a 2.2 kWp grid-tied solar PV array. The green electricity they generate can be instantly self-consumed and/or exported to the grid, receiving a feed in tariff that reduces occupants' electricity bills.

All homes come with 'A+ or A++' appliances and broad spectrum LED lighting.

Each home is equipped with a rain water harvesting system. The Washing machine,toilets and garden will all draw their water needs from the rain water harvesting tank.

See more details about this project

http://www.st-bernards-portway.co.uk/
http://www.modcell.com/projects/straw-eco-homes-nearly-finished/

Stakeholders

Stakeholders

Function : Thermal consultancy agency

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Function : Contractor

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http://www.cadfangroup.com/?q=sustainability

Function : Manufacturer

ModCell

enquiries@modcell.com

http://www.modcell.com/

Function : Manufacturer

Coobio

http://www.coobio.com/contact/

http://www.coobio.com

If you had to do it again?

The house is warm and the MVHR system is quiet. Very comfortable

Energy

Energy consumption

Primary energy need : 120,00 kWhpe/m^2.year

Primary energy need for standard building : 200,00 kWhpe/m^2.year

Calculation method :

CEEB : 0.0001

Breakdown for energy consumption : - Space Heating: 10.2 kWh/(m2a)
- Hot Tap Water [DHW]: 10.3kWh/(m2a)
- Electricity: 25.9 kWh/(m2a)

Envelope performance

Envelope U-Value : 0,13 W.m^{-2}.K^{-1}

More information :
Behind the traditional brick elevation of the St Bernard's Road development is a state of the art, super insulated, low carbon straw bale construction system by ModCell: the recently BM Trada Q Mark certified ModCell Core prefabricated straw bale panel system. The excellent insulating properties of straw encapsulated in the walls of the project can reduce heating bills by up to 90% compared to the average for Bristol.
All internal wall partitions are made from Compressed Straw Board panels (CSB), replacing conventional plasterboard which has a negative environmental impact, and providing instead a fully carbon negative build system with excellent acoustic insulation between rooms.

Building Compactness Coefficient : 0,61

Indicator : EN 13829 - q50 » (en m3/h.m3)

Air Tightness Value : 3,00

Real final energy consumption

Final Energy : 46,20 kWhfe/m^2.year

Renewables & systems

Systems

Heating system :
- Heat pump

Hot water system :
- Heat pump

Cooling system :
- No cooling system

Ventilation system :
- Natural ventilation
- Double flow heat exchanger

Renewable systems :
- Solar photovoltaic

Renewable energy production : 29,00 %

Other information on HVAC :
Progetic designed the Mechanical Ventilation with Heat Recovery (MVHR) systems for the homes, which cleverly swap heat from the outgoing air into the incoming fresh air, ensuring stable temperatures, better air quality and drastically reduced heating bills and carbon footprint. The combination of straw bale construction and MVHR means the homes stay warm in winter, cool in summer and are healthy and comfortable to live in.
Heating is provided by a high efficiency air source heat pump that extracts heat from outdoor air and transfers it to water, which is circulated through low temperature radiators around the homes. The same system provides domestic hot water generation.

All homes come with 'A+ or A++' appliances and broad spectrum LED lighting
Finally, each home is equipped with a rain water harvesting system. The Washing machine, toilets and garden will all draw their water needs from the rainwater harvesting tank.

Each home is fitted with a 2.2 kWp grid-tied solar PV array. The green electricity they generate can be instantly self-consumed and/or exported to the grid, receiving a feed in tariff that reduces occupants' electricity bills.

Solutions enhancing nature free gains :
Heat Recovery System

Environment

Urban environment

Informally known to locals as “Shire”, Shirehampton is a neighbourhood of some 7000 inhabitants, located near Avonmouth at the north-western edge of the city of Bristol, England. Originally a separate village, the area retains a village feel, with good access to all parts of the city and its work environment.

Land plot area : 363,00 m^2

Built-up area : 160,00 %

Products

Product

Nilan CT150 MVHR Unit

Nilan

info@nilanuk.com

http://www.nilanuk.com/

Product category : Génie climatique, électricité / Ventilation, rafraîchissement

PHI Certified heat recovery ventilation unit with heat recovery efficiency of 87%
For ventilation requirement of up to 150 m3/h

System is quiet and efficient, providing good air quality

Daikin Altherma LT Monobloc 6kW

Daikin

+44 845 641 90 00

http://www.daikin.co.uk/

Product category : Génie climatique, électricité / Chauffage, eau chaude

Electrical Input: 1.41 kW
Heating COP: 4.26 *Ambient air temperature 7°C and leaving water temperature 35°C (A7 W35)

No comment as yet

ModCell Core

ModCell

enquiries@modcell.com

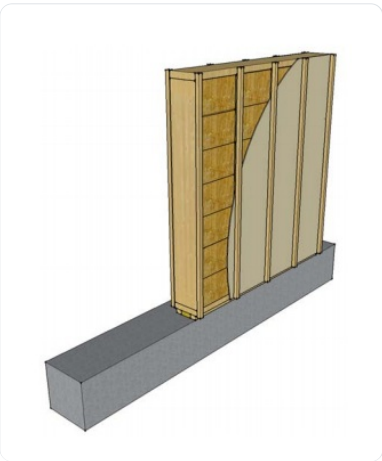
http://www.modcell.com/

Product category : Second œuvre / Cloisons, isolation

ModCell® Core panels are 427mm deep, factory finished fully closed, dry lined panel system using breathable sheathing boards in place of the render. The standard internal finish is a sheathing board, battened (not included in above dimension) ready to recieve a variety of internal surface finishes, external finish is a breathable sheathing board, battened ready to receive a variety of rainscreen options.

U-Value: 0.13 W/(m2K)

Modular prefabricated system which is quick and easy to install.



Panasonic HIT photovoltaic module

Panasonic

info.solareu.panasonic.com

http://eu-solar.panasonic.net/

Product category : Second œuvre / Equipements électriques (courants forts/faibles)

Array of 8 PV Modules with a total output of 1.96kWp

No comment as yet

Costs

Energy bill

Forecasted energy bill/year : 890,00 €

Real energy cost/m2 : 1.33

Real energy cost/Dwelling : 127.14

Health and comfort

Indoor Air quality

Good indoor air quality is achieved by two means: firstly, indoor air is continually replenished with full fresh, filtered, and pre-heated outdoor air, via the mechanical ventilation with heat recovery system; secondly, almost all materials in contact with indoor air are bio-based, non-toxic and low VOC's, meaning off-gassing is minimal and indoor contaminant generation is small.

Comfort

Health & comfort : Thermal comfort is provided through high levels of thermal insulation, reduced thermal bridges, and minimal air leakage, meaning cold spots and draughts are kept to a minimum.

Carbon

GHG emissions

GHG in use : 31,00 $KgCO_2/m^2$/year

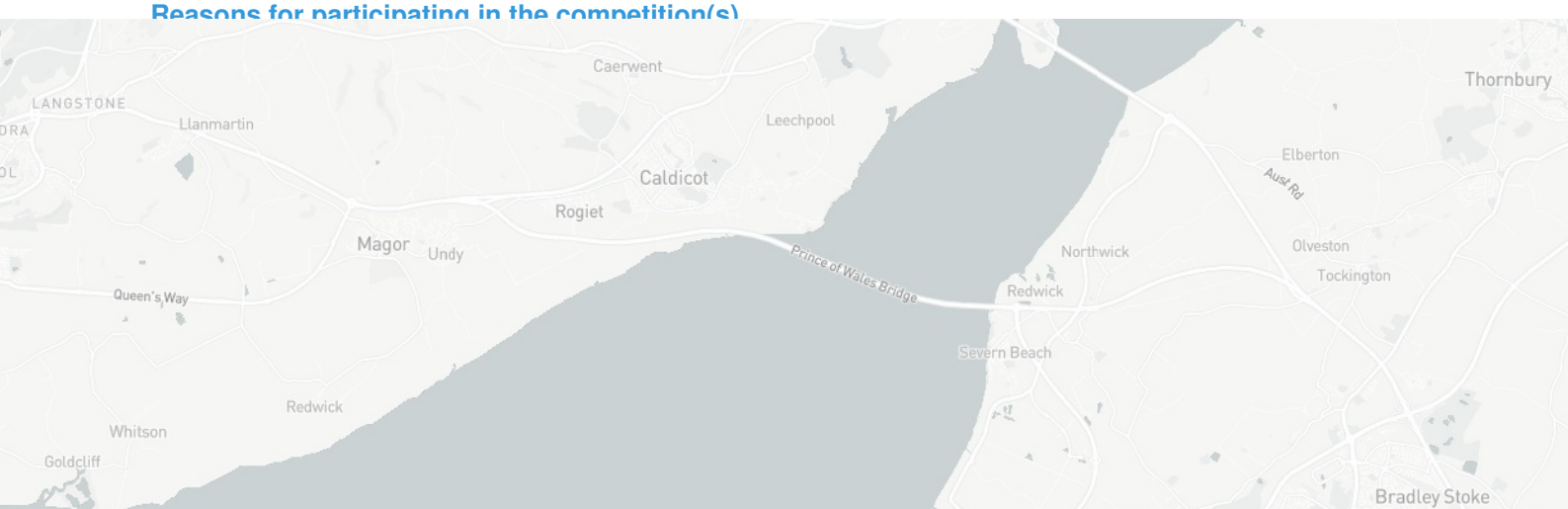
Methodology used :

PHPP with GEMIS CO2 emissions data

Building lifetime : 100,00 year(s)

Contest

Reasons for participating in the competition(s)



Low Carbon

Solutions Awards 2016
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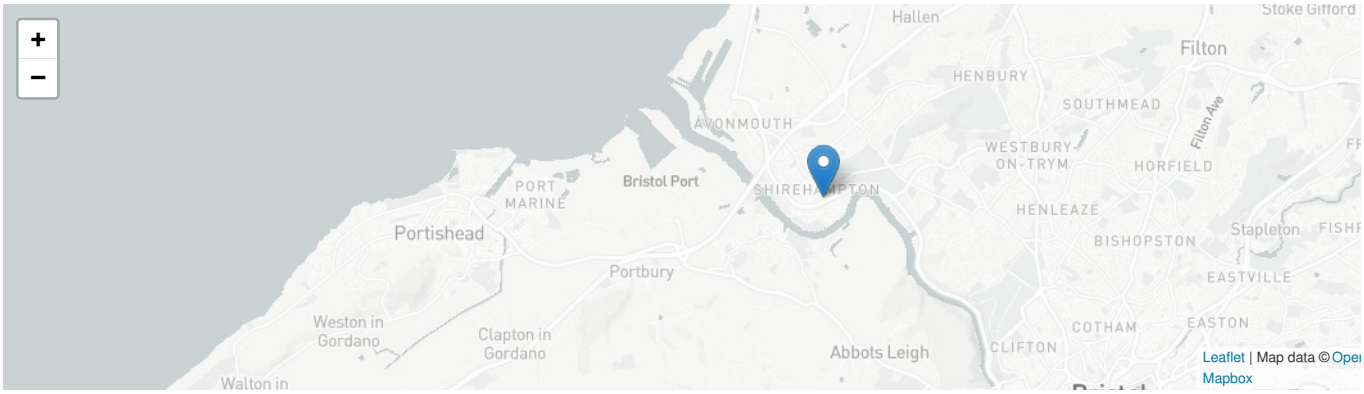

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