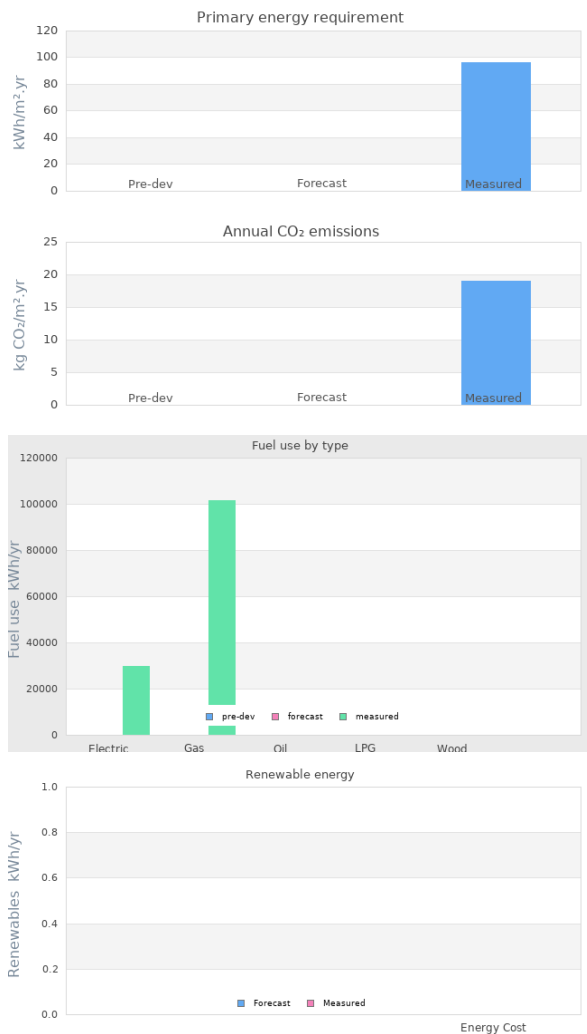


## Project name Low Energy House, Ross on Wye

**Project summary** This project was designed in 1997-99 and constructed in 2000. It is a custom designed 249 m<sup>2</sup> detached house on an infill plot in a historic small market town. An attached unheated garage, workshop and storage space are provided to the north of the house, outside the thermal envelope but integrated into the form of the house. The house is mainly two-storey and partly one-storey, with most of the important rooms facing almost due south.



## Project Description

|                                               |                                     |
|-----------------------------------------------|-------------------------------------|
| Projected build start date                    | 01 Nov 1999                         |
| Projected date of occupation                  | 30 Nov 2000                         |
| Project stage                                 | Occupied                            |
| Project location                              | Ross on Wye, Herefordshire, England |
| Energy target                                 | other                               |
| Build type                                    | New build                           |
| Building sector                               |                                     |
| Property type                                 |                                     |
| Existing external wall construction           |                                     |
| Existing external wall additional information |                                     |

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Existing party wall construction

|            |                    |
|------------|--------------------|
| Floor area | 249 m <sup>2</sup> |
|------------|--------------------|

|                               |        |
|-------------------------------|--------|
| Floor area calculation method | APPROX |
|-------------------------------|--------|

## Project team

Organisation

Project lead

|        |                              |
|--------|------------------------------|
| Client | Drs. Richard and Jenny Cook. |
|--------|------------------------------|

|           |                                                                     |
|-----------|---------------------------------------------------------------------|
| Architect | Hook Mason Partnership, Architects and Diocesan Surveyors, Hereford |
|-----------|---------------------------------------------------------------------|

|                                       |       |
|---------------------------------------|-------|
| Mechanical & electrical consultant(s) | None. |
|---------------------------------------|-------|

|                      |                                                         |
|----------------------|---------------------------------------------------------|
| Energy consultant(s) | David Olivier of Energy Advisory Associates, Leominster |
|----------------------|---------------------------------------------------------|

|                     |                              |
|---------------------|------------------------------|
| Structural engineer | Martyn Peters Ltd., Hereford |
|---------------------|------------------------------|

|                   |                                                                     |
|-------------------|---------------------------------------------------------------------|
| Quantity surveyor | Hook Mason Partnership, Architects and Diocesan Surveyors, Hereford |
|-------------------|---------------------------------------------------------------------|

Other consultant

Contractor

## Design strategies

Planned occupancy

|                        |                                                                                                                                                                                                                                            |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Space heating strategy | Combination gas condensing boiler, supplying radiators. No radiators in the kitchen, in one small bedroom or in the bathroom above the kitchen & a glass fronted fireplace in the living room, with an air supply direct into the firebox. |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                        |                                                                                                                                                          |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Water heating strategy | A relatively compact hot water plumbing system for such a large house. The first floor bathroom and the two shower rooms are directly above the kitchen. |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|

|               |                                                                                  |
|---------------|----------------------------------------------------------------------------------|
| Fuel strategy | Mains gas for heating and hot water. Mains electricity for lighting & pumps etc. |
|---------------|----------------------------------------------------------------------------------|

Renewable energy generation strategy

|                        |                                                                                                                                                                                          |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Passive solar strategy | In order to raise the level of passive solar gains, a high proportion of the total window area faces south. The south window area is equal to around 16% of the houses total floor area. |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Space cooling strategy

No active cooling system. In summer, the MVHR system is to be turned off and the house relies on natural ventilation; i.e., opening windows at low and/or high level. Usually, the north-facing landing windows and the utility room rooflight are used for this purpose. To provide summer ventilation in the internal bathrooms, PIR controls briefly turn on the whole MVHR system when a bathroom or WC is in use.

## Daylighting strategy

### Ventilation strategy

Mechanical ventilation and heat recovery. (MVHR)

## Airtightness strategy

### Strategy for minimising thermal bridges

## Modelling strategy

### Insulation strategy

## Other relevant retrofit strategies

Other information (constraints or opportunities influencing project design or outcomes)

The house is next door to the owners previous three-storey Victorian house, which had a large garden of over 3,000 m<sup>2</sup>. Planning permission was gained to subdivide this area of land and to erect a new house with its own separate access from the end of a nearby cul-de-sac.

It is classified as within the Wye Valley Area of Outstanding Natural Beauty and is a relatively short walk from Ross-on-Wyes historic town centre. All normal mains services are available on the site.

Several design proposals were produced, although the owners initially felt that energy efficiency could be emphasised more and requested the architects to take advice from outside the practice. The final shape and floor plan were settled in late 1999, a contractor was appointed and the owners moved in during late November 2000.

## Energy use

Fuel use by type (kWh/yr)

| Fuel            | previous | forecast | measured |
|-----------------|----------|----------|----------|
| <b>Electric</b> |          |          | 3732     |

| Fuel        | previous | forecast | measured |
|-------------|----------|----------|----------|
| <b>Gas</b>  |          |          | 12690    |
| <b>Oil</b>  |          |          |          |
| <b>LPG</b>  |          |          |          |
| <b>Wood</b> |          |          |          |
|             |          |          |          |

#### Primary energy requirement & CO2 emissions

|                                                               | previous | forecast | measured |
|---------------------------------------------------------------|----------|----------|----------|
| <b>Annual CO2 emissions</b><br>(kg CO2/m <sup>2</sup> .yr)    | -        | -        | 19       |
| <b>Primary energy requirement</b><br>(kWh/m <sup>2</sup> .yr) | -        | -        | 96       |

#### Renewable energy (kWh/yr)

| Renewables technology                | forecast | measured |
|--------------------------------------|----------|----------|
| -                                    |          |          |
| -                                    |          |          |
| <b>Energy consumed by generation</b> |          |          |

#### Airtightness ( m<sup>3</sup>/m<sup>2</sup>.hr @ 50 Pascals )

|                              | Date of test | Test result |
|------------------------------|--------------|-------------|
| Pre-development airtightness | -            | -           |
| Final airtightness           | -            | -           |

#### Annual space heat demand ( kWh/m<sup>2</sup>.yr )

|                          | Pre-development | forecast | measured |
|--------------------------|-----------------|----------|----------|
| <b>Space heat demand</b> | -               | -        | -        |

Whole house energy calculation method

Other energy calculation method

Predicted annual heating load

-

Other energy target(s)

## Building services

Occupancy

Space heating

Ideal Response SE Fanned Flue Combination gas condensing boiler supplying radiators.

Hot water

Ventilation

MVHR

Controls

Conventional UK controls; i.e. a combination of an overriding room thermostat and individual TRVs on standard panel radiators.

|                                         |                                                                           |
|-----------------------------------------|---------------------------------------------------------------------------|
| Cooking                                 | Gas hob and electric oven.                                                |
| Lighting                                | Virtually all fluorescent, except for a few incandescent lamps on tracks. |
| Appliances                              |                                                                           |
| Renewables                              |                                                                           |
| Strategy for minimising thermal bridges |                                                                           |

## Building construction

|                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Storeys                                | 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Volume                                 | 6225m <sup>3</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Thermal fabric area                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Roof description                       | Tiles, felt and battens, breather membrane, 300 mm deep OSB-webbed I beams on 600 mm centres, filled with 300 mm mineral fibre. Polyethylene membrane for airtightness, sealed well at seams and sealed to the plaster on the walls. Plasterboard, skim coat of plaster. No electrical wiring penetrates the membrane.                                                                                                                                                 |
| Roof U-value                           | 0.14W/m <sup>2</sup> K                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Walls description                      | <p>Wall type 1: Cavity wall with brick outer leaf; fair-faced concrete block outer leaf below plinth level. Separate lintels are used, in order to avoid a severe thermal bridge at the window head. The masonry returns are broken by 50 mm of PU foam insulation. (U-value: 0.27 W/m<sup>2</sup>K)</p> <p>Wall type 2: Externally-insulated wall with timber cladding. In effect, an inside-out masonry-clad timber frame wall. (U-value: 0.24 W/m<sup>2</sup>K)</p> |
| Walls U-value                          | 0.27W/m <sup>2</sup> K                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Party walls description                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Party walls U-value                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Floor description                      | Carpet, 100 mm ground-supported concrete slab, DPM, 100 mm EPS insulation, blinded hardcore. As the local soil is a coarse sandy loam, the floor U-value would be lower than the average for this level of floor insulation.                                                                                                                                                                                                                                           |
| Floor U-value                          | 0.21W/m <sup>2</sup> K                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Glazed doors description               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Glazed doors U-value                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Opaque doors description               | Timber, made locally by a joiner, 25 mm PU foam in the door leaf.                                                                                                                                                                                                                                                                                                                                                                                                      |
| Opaque doors U-value                   | 1.20W/m <sup>2</sup> K uninstalled                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Windows description                    | Swedish aluminium and softwood composite windows, with 12 mm argon-filled low-e double glazing.                                                                                                                                                                                                                                                                                                                                                                        |
| Windows U-value                        | 1.60W/m <sup>2</sup> K uninstalled                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Windows energy transmittance (G-value) |                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

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Windows light transmittance

|                        |                                          |
|------------------------|------------------------------------------|
| Rooflights description | 12 mm argon-filled low-e double glazing. |
|------------------------|------------------------------------------|

Rooflights light transmittance

|                    |                                      |
|--------------------|--------------------------------------|
| Rooflights U-value | 4.80W/m <sup>2</sup> K   uninstalled |
|--------------------|--------------------------------------|

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## Project images

