

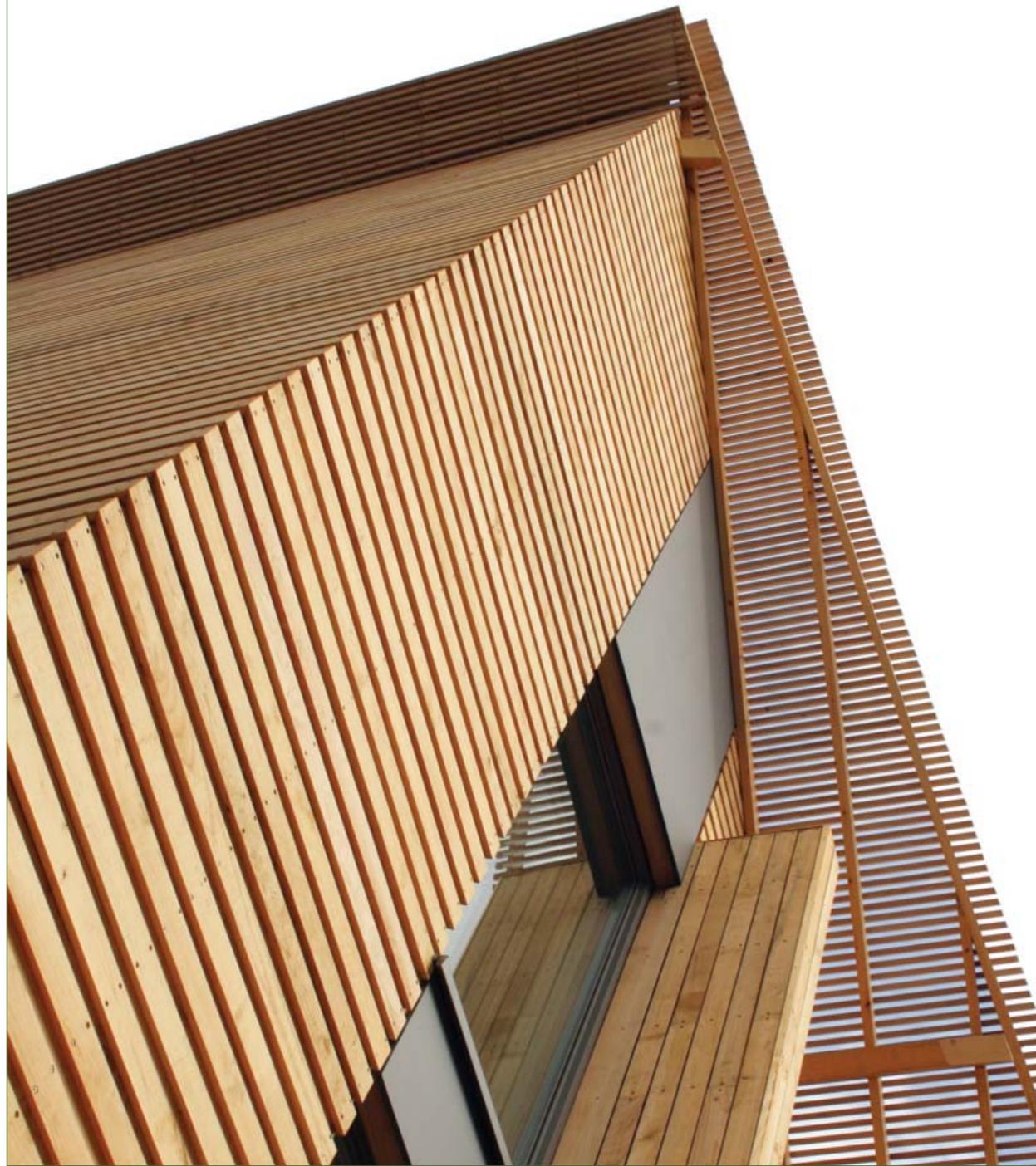


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The self-build home for the future



lighthouse by Potton

Sustainable, contemporary design without compromising on style.

The heart of the design concept for the lighthouse by Potton is the ambition to create a home that is attractive and a place where the environmental systems and construction methods do not compromise the quality of lifestyle but add to it - spaces that are designed for modern living, intuitively integrating sustainability.

lighthouse by Potton has been designed to meet the highest level (Level 6) of The Code for Sustainable Homes, the Standard to which all homes will have to be designed and built by 2016.

Building with Potton

Potton is the largest and longest established specialist self-build package provider in the UK. We have helped thousands of families build their dream homes. With over 40 years experience in building, we have amassed a vast knowledge base and expertise which is at the disposal of all our clients.



Potton Style . . . with a Difference

One of the areas where we differ from other self-build providers, is the time, care and absolute attention to detail we put into all our designs. Each component is painstakingly examined to ensure that the whole is greater than the sum of its parts.

We are delighted to work with Sheppard Robson, one of the UK's largest architectural practices, recognised for its sustainable and environmental design, who bring their innovative solutions to the Potton traditions of craftsmanship.

Design

The structure of the lighthouse by Potton is a simple barnlike form, derived from a 40 degree roof pitch accommodating a Photovoltaic (PV) array, which generates all the electricity for the house. The sweeping roof envelops the central space – a generous, open-plan, light and airy, double height living space which also includes a mezzanine study area. The sleeping accommodation, bathroom and utility room are at ground level. The living space uses a timber portal structure so floors can be slotted between the frames or left open as required.

At ground level, a timber frame structure carries the vertical loads of the open plan frames above and provides stability to the load bearing walls.

It is constructed using the Kingspan TEK Building System, a high performance SIPS (structural insulated panel based system) which will provide a very high level of thermal insulation and performance – U values of 0.11W/m2K and air-tightness of 1.0m3/hr/m2 at 50Pa - reducing the heat loss by potentially two thirds of a standard house.

Materials

Although not mandatory to The Code for Sustainable Homes (see page 5), we can assist you in choosing building material and components to optimise your home's overall sustainability credentials; minimising embodied energy and maximising the recycled content.

To complement the Potton timber frame your specification could include:

- Sweet chestnut cladding
- Screw piled foundations
- Floating ground floor, replacing a concrete slab
- Rainwater harvesting
- Solar hot water
- Wind catcher

All of these are featured in the lighthouse by Potton show house at the Building Research Establishment (BRE) in Watford.



Climate for change, Zero carbon future

Today, home ownership is an environmental responsibility; individually we have a duty to cut energy consumption and collectively we must create communities which are sustainable and can be adapted to deal with future climate change.

lighthouse by Potton is the UK's first net-zero carbon house that also meets Level 6 (the highest level) of The Code for Sustainable Homes. It is designed to provide a way of living that encourages lifestyles which are inherently 'light' on the world's resources, balancing the practical requirements of today's homeowners with a response to the expected climate change in the UK impacting as little as possible on the way we live.



The Code

The Code for Sustainable Homes

The Code for Sustainable Homes is the single National Standard for house building. It is currently a voluntary code but it is expected that a Code assessment will become mandatory in 2008.

Its ambition is clear; guiding the design and construction of sustainable homes to set World-class Standards that reduce the impact our homes have on the UK's carbon emissions, and creating communities that consist of truly environmentally sustainable houses. It is a means of driving continuous improvement, greater innovation and exemplary achievement.

How it works

To communicate the overall sustainability performance of a home, the Code is split into nine design categories:

- Energy & carbon dioxide
- Materials
- Ecology
- Waste
- Pollution
- Health & well-being
- Water
- Surface water run off
- Management



Not all the categories carry the same importance. However, minimum standards for energy and water efficiency have been set at each of the Code's six levels. Apart from these requirements, the Code is completely flexible. In order to achieve a high sustainability rating and receive certification, Potton clients can choose which and how many standards they wish to implement to obtain points under the Code.



Timeline

lighthouse by Potton achieves 2016 mandatory level 6 – today!

Self Build Timeline

New Builds (Energy) >	Voluntary	Assessment Mandatory	Level 3 Mandatory	Level 4 Mandatory	Level 6 Mandatory
	2007	2008	2010	2013	2016

The Code provides valuable information to homebuyers on the sustainability performance of homes. Houses built to the standards of the Code will bring with them lower running costs, improved well-being and reductions in the environmental footprint. In addition, all new net-zero carbon homes for sale up to £500,000 will be exempt from stamp duty and where the purchase price of the home is greater stamp duty will be reduced to a one off fee of £15,000. This is a real benefit if and when you decide to sell your self-build home.



The Technology

With the Code comes new technology and altered ways of living. To operate a truly net-zero carbon home, occupiers need to be well-informed – making optimum use of appliances and systems that reduce consumption and generate renewable and alternative forms of energy.

Technology to reduce consumption

Mechanical ventilation with heat recovery (MVHR)

An electrically driven whole house ventilation system with very efficient heat recovery provides background ventilation in the home.

Electricity

Appliances: efficient A++ goods and a reduction in stand-by power
Lighting: low energy lighting technology throughout, with external mood lighting provided by LED lights.



Technology to generate renewable energy

Biomass boiler

The boiler provides hot water and space heating in winter, fuelled by wood pellets. It is located in the utility room to provide a dedicated drying area, as an alternative to the (electricity sapping) tumble dryer.

Solar thermal panels

The panels generate all the hot water in the summer and some in the spring and autumn, reducing the demand on the biomass boiler and the amount of wood used, keeping costs to a bare minimum.

Photovoltaic (PV) array

PV panels capture energy from the sun to supply electricity for the whole house. Any surplus is sold back to the grid.

Building Fabric

For Code Level 6, the mandatory heat loss parameter standard is very high, placing more demands on the building envelope such as insulation, glazing and shading and how these operate with the technological systems of the house.

Building envelope

Utilising the Kingspan TEK wall system, the construction method provides the highest level of thermal efficiency and air tightness.

Smart metering and monitoring systems

A smart meter records energy consumption, to help occupants identify any wastage and to promote more environmentally aware lifestyles.

Ventilation

The mechanical ventilation and passive system operates – the ‘wind catcher’ – that operates in tandem to provide flexible and effective ventilation.

Heating

The building envelope specification will deliver high levels of thermal insulation and air-tightness so that the home will only need to be heated for a couple of months in mid-winter.

Reducing solar gain

External shutters can be used in summer to reduce the build up of heat. They block out all direct sunlight.

Reduced glazing

Complying with the U values of the Code, the glazing is 5 - 10% less than that in the traditional home. The living space is adapted to accommodate this with a large double height volume on the upper levels with sleeping accommodation below.

Air tightness

Lobby areas designed to the front and back of the house maintain the high level of air-tightness in the build.

Water

Increased awareness about what water to use where - rainwater for the garden and washing machine and used shower and bath water for the WC. An average saving of 50% compared to a conventional house.

Solar gain and shading

Beyond the requirements of the Code, the design of the lighthouse by Potton deals specifically with solar gain and shading. Pinpointing the orientation of your house on the building plot is

crucial. Potton experts will be able to advise you on this.

At Level 6, there is a mandatory heat loss parameter which demands high U-values for the building fabric. This, along with the Code requirements for day lighting, influenced the design of the lighthouse by Potton which creates light and airy spaces even though the ratio of glazing to wall is 18% as opposed to 25-30% in conventional houses. For this reason, the living space is located on the first floor, maximising daylight and volume.

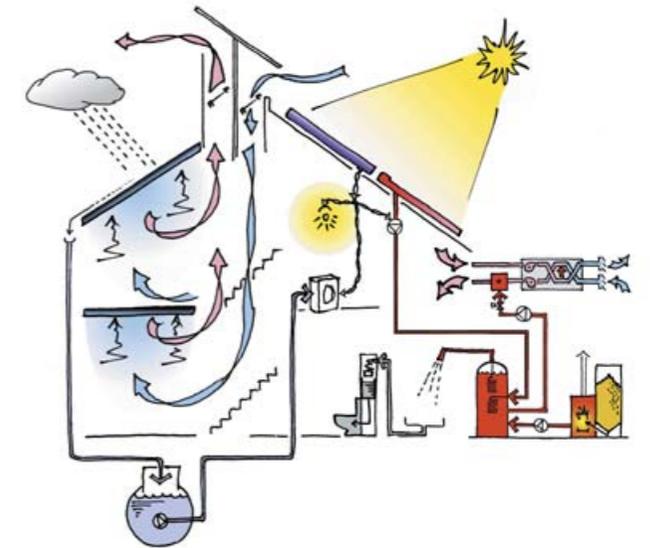
Future temperatures in the UK may reach those similar to southern Europe. However, our sun angle will remain low, so we still need to maximise sun and daylight mid-season and winter.

Retractable shutters restrict direct sunlight, minimising heat gain in the summer. These can be folded away when not required to shade the space from evening sun.



Building Services

Services can be integrated with smart metering and monitoring which record energy consumption and enables occupants to identify any wastage, helping to promote a more environmentally aware lifestyle.



Wind catcher/Light funnel

Located on the roof, above the central void over the staircase, the wind catcher provides passive cooling and ventilation. Its design, while functional, architecturally defines the lighthouse by Potton.

When open, it catches the wind, no matter which direction it is travelling. The air (which is at a lower temperature than the still air in the house) descends through the house, supplying fresh air and displacing the stale air 'turbo charging' the stack effect.

The intelligent passive design of the lighthouse by Potton balances technical considerations with our expectations of light and airy living.



Reduce Your Carbon Footprint

Energy use

From the experience of building our show house at the BRE, we have been able to accurately calculate the energy use.

SAP has been adapted as follows:

- 100% low energy lighting rather than 30%
- 0% secondary heating rather than 10% electrical
- 88% heat recovery efficiency rather than 66%
- specific fan power (SFP) of 0.92 W/l/s rather than 2 W/ l/s
- 2940 kWh/yr solar thermal (calculated by manufacturer) rather than 1475 kWh/yr
- water heating based on reduced shower water flow rate

This is offset by extra renewable electricity that is generated from the sun by the photovoltaic panels and exported to the grid.

In this way, the show house at the BRE is net-zero carbon on an annual basis.



The entire energy cost of running the lighthouse by Potton would be about £31 per year for the wood pellets, assuming wood pellets cost 1.8 p/ kWh. The electricity is free, from the sun! A house of the same size and shape but built to 2006 Building Regulations Standards, would cost about £500 a year in energy bills.

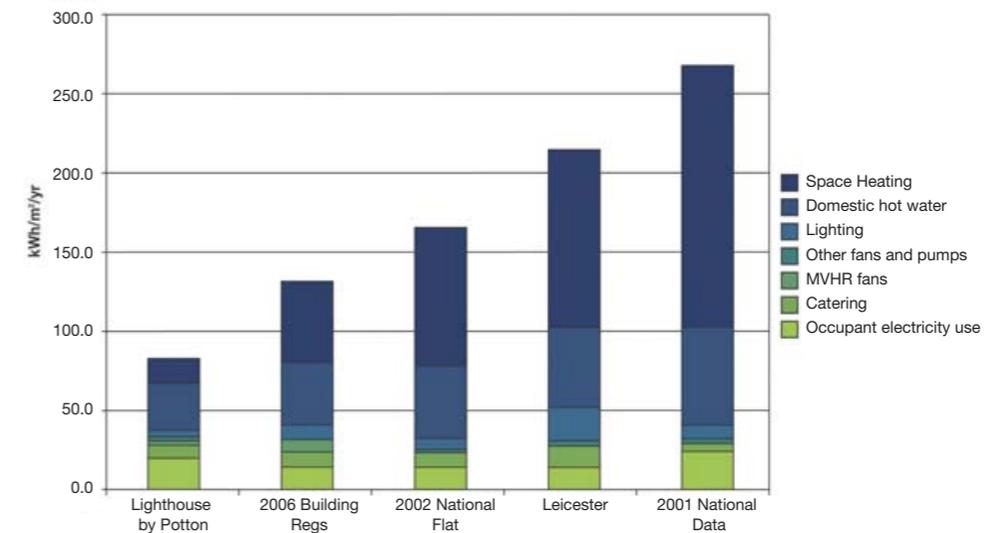
Most of the domestic hot water energy is provided by the solar thermal panels. There is a small amount of carbon dioxide emissions associated with the growing, processing and delivery of the wood pellets for the remainder of the hot water and for the space heating.



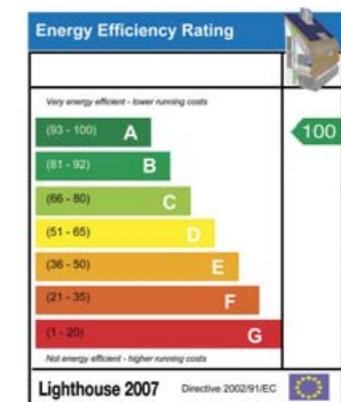
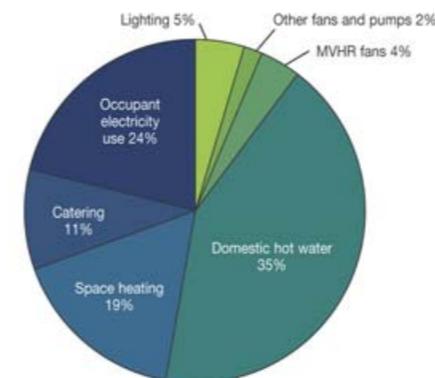
This chart compares the estimated energy use for lighthouse by Potton with benchmarks and measured data.

The Building Regulations estimates were done for a similar size and shape house designed to Building Regulations standards for 2006 and for 2002. Leicester, is measured data for a residential home development which was built in the mid-1990s. The 2001 National data is measured data averaged over all the housing stock in the UK.

Operational Energy Use



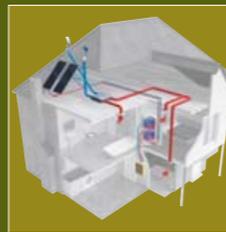
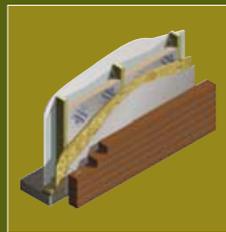
lighthouse Energy Use



How we achieve level 6

Energy & carbon dioxide

- Walls, roof, floor U-values = 0.11W/m²K -Tek System, 284mm thick
- Windows = 0.7W/m²K (inc. wooden frame), triple glazed, gas filled
- Air permeability = 1 m³/h/m² at 50 Pa
- Thermal bridging 4.5% of surface area
- Mechanical ventilation = 88% heat recovery - Kingspan KAR MVHR
- Specific fan power 0.92W/l/s
- Lighting – 100% fluorescents
- Drying room with fittings
- Energy labelled A++ white goods
- External lights on PIR (presence detection)
- Cycle storage



Materials

Walls and roof – Kingspan TEK structural insulated panels (SIPs)
Cladding – sweet chestnut
Paved surface – from recycled or sustainable sources

Ecology

Improved biodiversity through native planting and creation of surface water environment

Health & Well Being

Daylight – 1.5 -2%
Daylight factors
Private spaces
Lifetime homes standards

Water Reduction

Low water shower – 8 litres/min and taps
Dual flush WC – 4/2 litres
Bath – 160 litres
Water labelled A++ washing white goods
Greywater recycling for WC flushing
Rainwater harvesting for washing machine and irrigation.

Surface water run off/Pollution

Bio-filtration through surface water management – swales

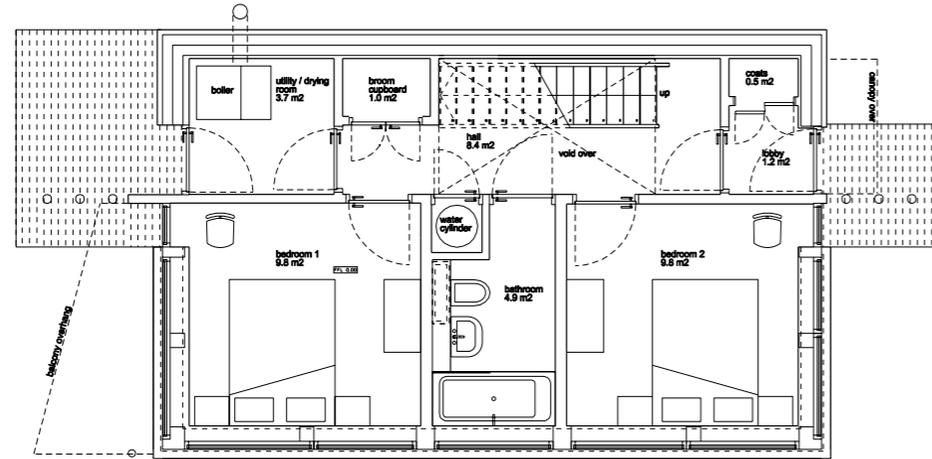
Management

Home user guide
Construction site impacts
Security – alarm system

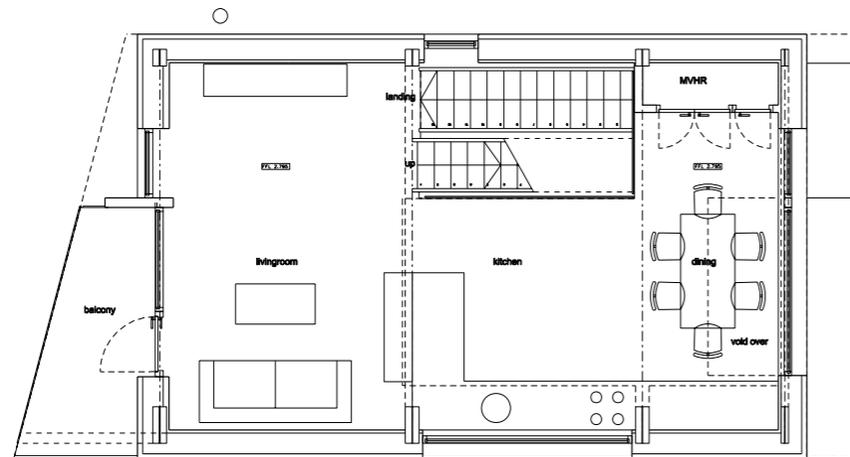


Layout

Ground Floor



First Floor



Lighthouse show house sizes

Ground Floor

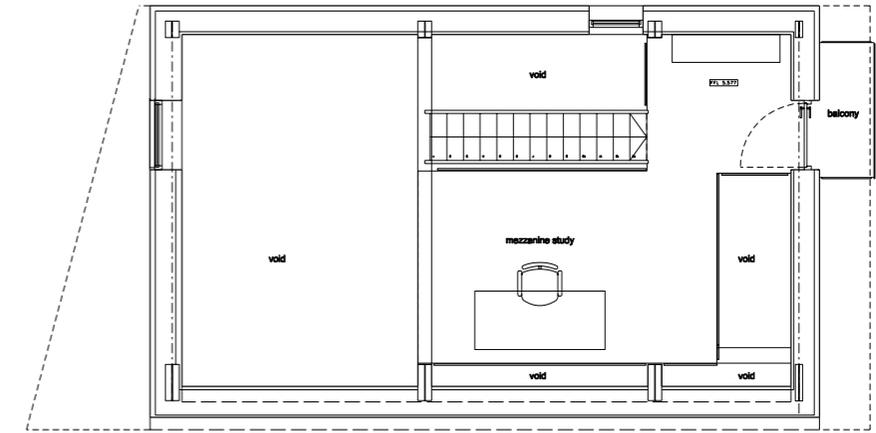
Bedroom 1	9.8m ²	(3200min X 3050)
Bedroom 2	9.8m ²	(3200min X 3050)
Bathroom	4.9m ²	(3050 X 1700max)
Utility room	3.7m ²	(2000 X 1860)
Hall	8.4m ²	(5220 X 1860max)
Lobby	1.2m ²	(1200 X 1200max)

First Floor

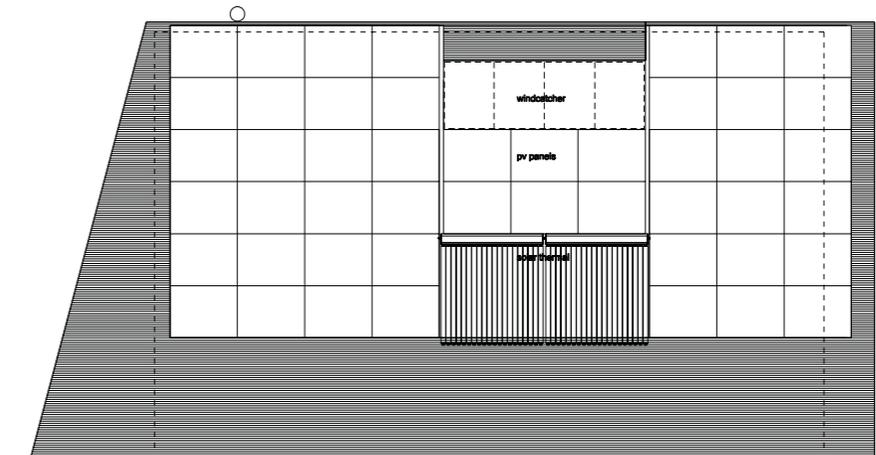
Kitchen	10.1m ²	(3180 X 3170)
Dining area	8.7m ²	(4350 X 1990)
Living room	16.4m ²	(5025 X 3260)

Layout

Mezzanine



Roof Plan



Lighthouse show house sizes

Mezzanine

Landing	3.8m ²	(1990 X 1900)
Home office	10.4m ²	(3940 X 2630)

Overall Dimensions

External	5900 wide x 9250 deep
Internal	5025 wide x 8400 deep

Show house

The lighthouse by Potton show house, at the BRE in Watford, is the first UK built net-zero carbon house to meet level 6 (the highest level) of The Code for Sustainable Homes.

Designed by Sheppard Robson, to meet the highest level of The Code for Sustainable Homes, every building material and component used for the show house has been specified for its ability to optimise the overall sustainability credentials of the building.

The materials used include highly insulated, airtight building fabric which has been designed to provide generous daylight levels and includes effective solar control, together with integrated building services based around a platform of renewable and sustainable technologies. These include water efficiency techniques, renewable energy technologies, passive cooling and ventilation, as well as mechanical ventilation with heat recovery (MVHR).

To visit the lighthouse by Potton, please see our website www.lighthousebypotton.co.uk for workshop dates.



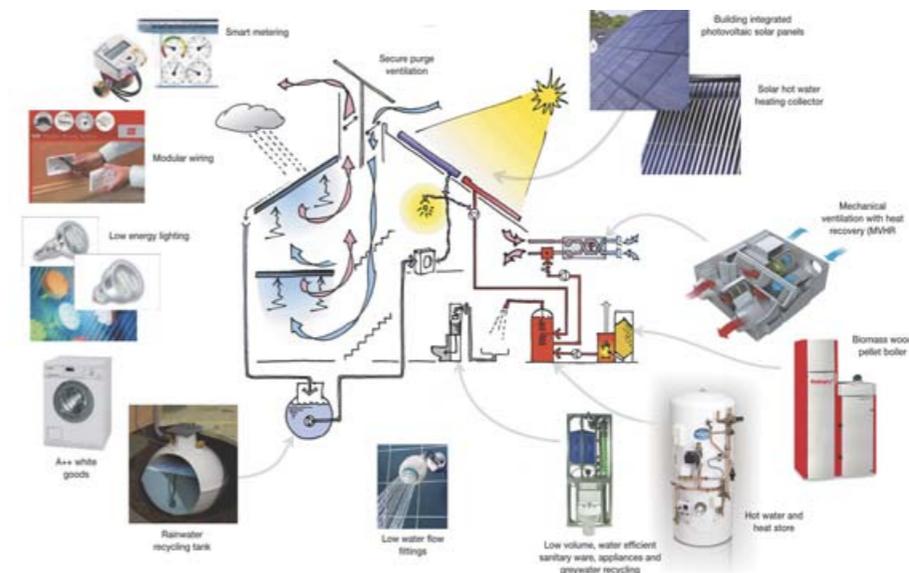
Extended package for lighthouse by Potton

Achieving the higher levels of The Code for Sustainable Homes requires an holistic approach to the design, specification and construction of your home. For this reason, we have extended our package for the lighthouse by Potton to include the specification and/or supply of a number of products and technologies to achieve your desired level of the Code.

These could include:

- Screw plied foundations
- Kingspan Tek building envelope
- Triple glazed windows
- Kingspan Mechanical Ventilation and Heat Recovery (MVHR)
- Solar hot water
- Photovoltaic energy
- Smart metering
- Rain water harvesting
- Grey water recycling

Once you are ready to proceed with your lighthouse by Potton project, a consultation with your Potton Regional Business Manager will reveal which products are provided in our package and which will be signposted.



The development of the lighthouse by Potton range

Our plans are to develop a range of lighthouse designs for launch in mid 2008. The size and scale of the designs will be similar to those of other Potton product ranges, providing flexible solutions to match budgets, planning conditions and of course your dreams.

The range will include a variety of footprints and layouts ranging from the initial lighthouse design to large family homes.

The designs will contain many of the original lighthouse by Potton features - the DNA of this ground breaking design will be evident throughout the entire range.



Design considerations

- Sustainable, contemporary design
- Passive, future proofing elements
- Available in Code levels 4 – 6
- Net-zero carbon
- Light airy rooms
- Security
- Drying room
- Home office facilities
- Plant room
- Private space
- Integrated technology
- Glazing
- Quality component selection (doors, ironmongery, staircase etc.)



Other Potton ranges

Heritage

If your idea of a self build dream home is a country cottage with roses around the door, then the Heritage Range is for you. Packed full of authentic period features like inglenook fireplaces and exposed posts and beams, but at the same time built to the highest possible labour and energy saving specifications, Heritage remains probably the most popular self-build house style available today.

The range utilises a traditional and genuine 'aisle frame' construction method, in which the posts and beams remain exposed throughout the house, giving a totally authentic period ambience and allowing complete flexibility with regard to room layouts and sizes.

Barn

The concept of living in a converted barn is one with very wide appeal but the high cost of converting an old barn to meet stringent modern day building regulations is often prohibitive – especially if the barn is listed or in a conservation area.

Potton have drawn on their years of experience developing homes that fit sensitively into local environments to bring the 'new old' barn to the market the perfect home to blend easily into any rural community.

Rectory

The grace and style of an earlier age are beautifully recaptured in these elegant Queen Anne style homes. Carefully researched, Rectory's light and airy living space offers the perfect environment for those who desire a home totally aligned with a twentieth century lifestyle, yet traditionally designed with immense individuality and quality. A perfect backdrop to modern living but with all the unhurried character of a storybook country house.

Shire

The Shire Range of homes has been designed to offer a unique combination of style and value. All Shire designs benefit from remarkably attractive build costs and are manufactured using high quality materials and leading brand joinery sets.

Renaissance

The Renaissance Collection incorporates everything we know about design, culminating in what we believe is a range packed full of authentic period detailing, in combination with contemporary interior layouts.

Victorian Arts and Crafts influenced designs, promoting classical architecture and traditional details combined with a modern living space.

For friendly, well-informed advice, please call 01767 676400

