



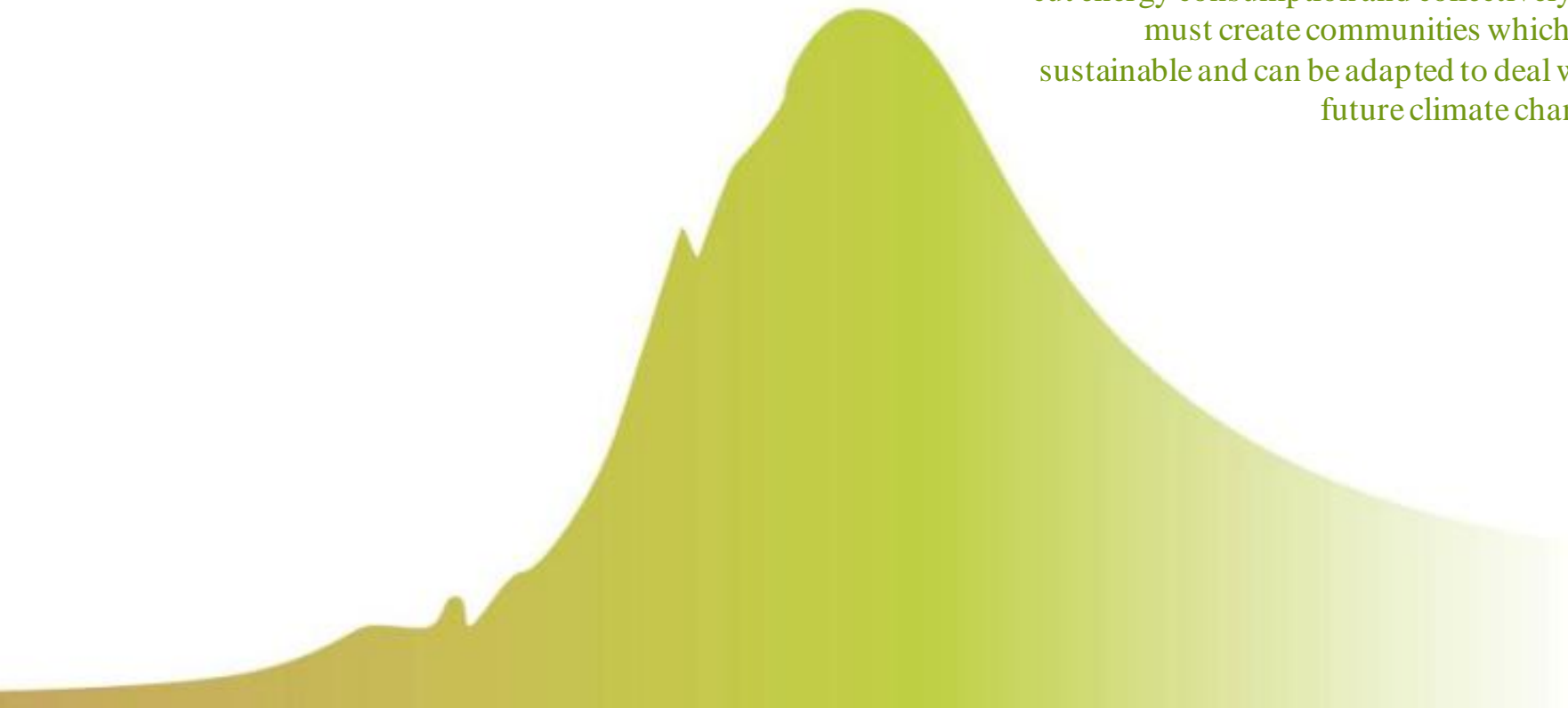
Alan Shingler - Partner  
Sheppard Robson

CLIMATE FOR  
CHANGE

ZERO CARBON  
FUTURE

**The way we live is changing.**

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.



THE  $\diamond \approx \Delta \gg \setminus * 23/4 \# ?$   
CODE  $\S \phi \alpha > \ddot{O} \_ / +$

How will the Code effect the housing market?

Will it compromise lifestyle

?

THE  $\diamond \approx \Delta \gg \setminus * \frac{23}{4} \# ?$   
CODE  $\S \phi \alpha > \text{O} \_ / +$

Zero carbon lifestyle !





Innovation ?





SHEPPARD ROBSON

ARUP



MACFARLANE WILDER  
URBAN & ENVIRONMENTAL LAND PLANNING



DAVIS LANGDON



CHORUS

lighthouse







F  
Fire assembly point

The Assembly Point  
Evacuation Board for:  
Shop 14  
Milton, 12 & 13

bre

14



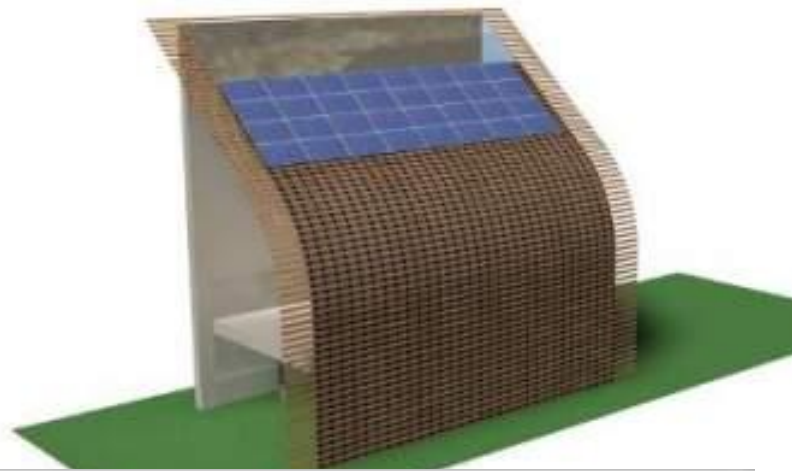
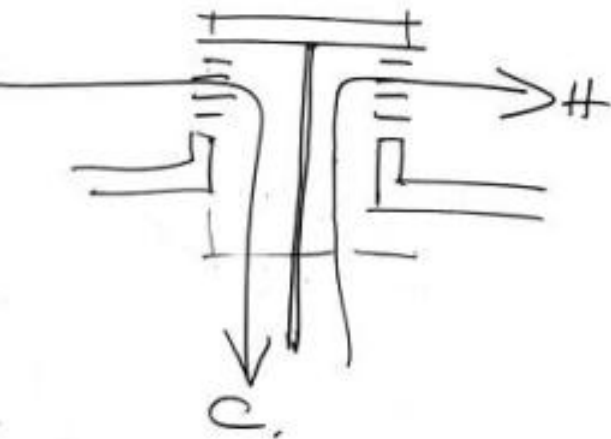
Innovation Park



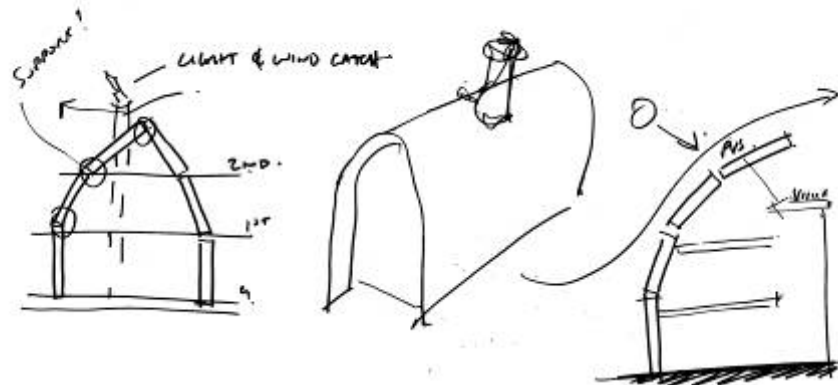
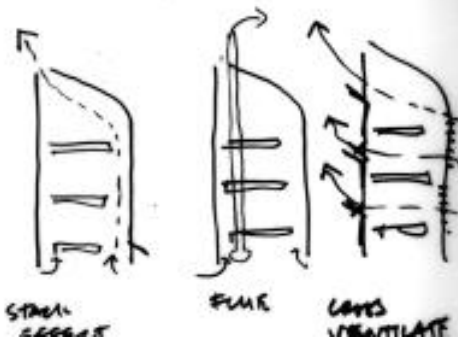




DESIGN



CROSS VENTILATION?



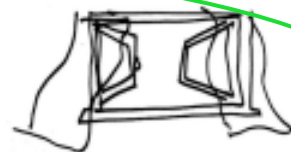
- MINIMISE POWER CONSUMPTION
- REDUCE TYPICAL CONSUMPTION BY 30%



- MAXIMISE DAYLIGHT TO AREAS INSIDE AND USE THE MOST

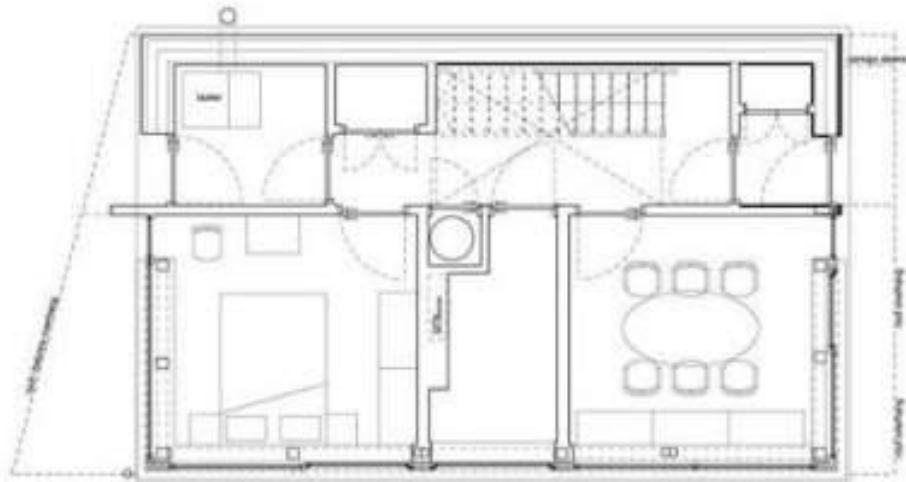
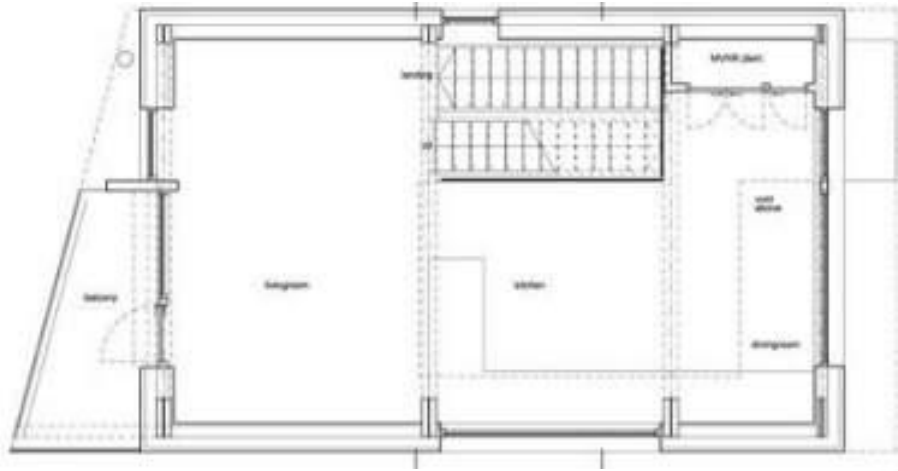


- PROVIDE 30M<sup>2</sup> PV PANELS



- NATURAL VENTILATION
- SEALED + TRICKLE VENT - FLUE
- OR
- CROSS VENTILATION?

# DESIGN

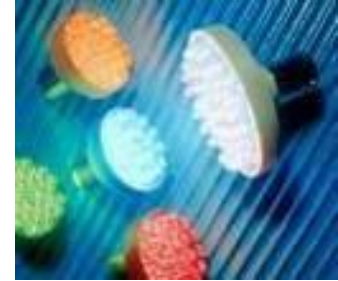
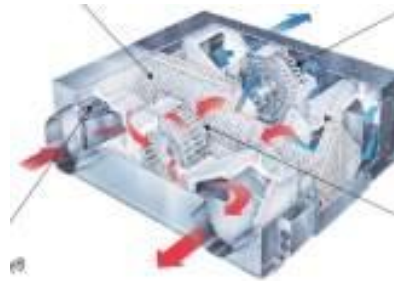




# THE CODE AND THE UK MARKET

## Technology to reduce consumption

All new zero carbon homes costing up to £500,000 will be exempt from stamp duty and where the purchase price of the home is greater, then the stamp duty will be reduced by £15,000.



**Mechanical ventilation with heat recovery (MVHR)**

**Lighting: low energy lighting technology throughout with external mood lighting provided by LED lights.**

**Electricity Appliances: efficient A++ goods and a reduction in stand-by power**

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**Smart metering and monitoring systems**

**Ventilation**

**Heating**

**Reducing solar gain**

**Reduced glazing**

**Air tightness**

**Water**

# THE CODE AND THE UK MARKET

## Technology to generate renewable energy

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### **Photovoltaic (PV) array**

PV panels capture energy from the sun to supply electricity for the whole house.

### **Solar thermal panels**

The panels generate all the hot water in summer and some in the spring and autumn.



# THE CODE AND THE UK MARKET

## Technology to generate renewable energy

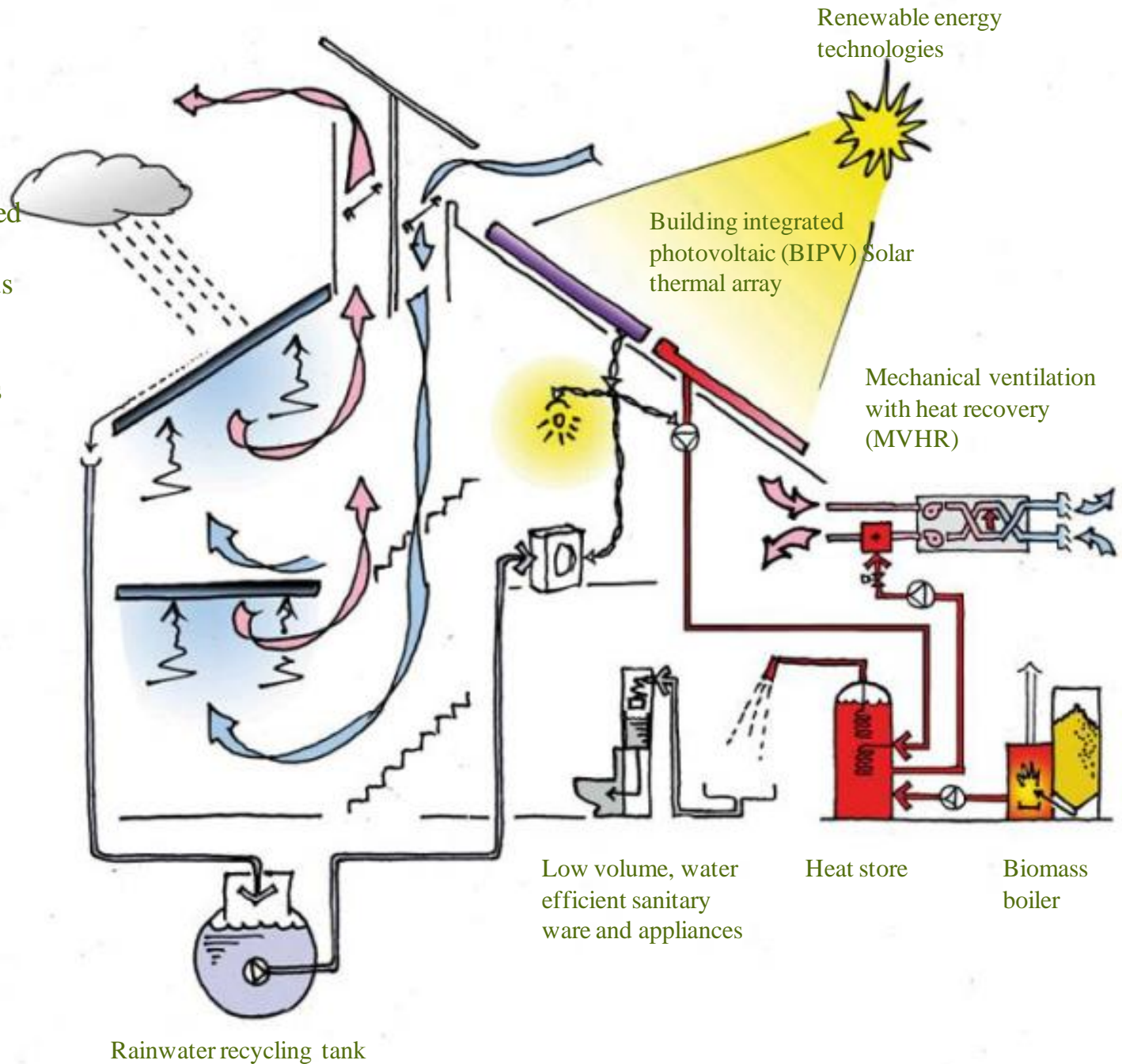
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### Biomass boiler

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.

Services will be integrated with smart metering and monitoring which records energy consumption and enables occupants to identify if any wastage is occurring, helping to promote more environmentally aware lifestyles.



# HOW IT ACHIEVES LEVEL 6



## Energy & carbon dioxide

- Walls, roof, floor U-values = 0.08/0.11 W/m<sup>2</sup>K - Tek System, 284mm thick
- Windows = 0.7 W/m<sup>2</sup>K (inc. wooden frame), triple glazed, gas filled
- Air permeability = 1.35 m<sup>3</sup>/h/m<sup>2</sup> at 50 Pa
- Thermal bridging 4.5% of surface area
- Mechanical ventilation = 88% heat recovery - Kingspan KAR MVHR
- Specific fan power 0.92 W/l/s
- Lighting – 100% fluorescents
- Drying room with fittings
- Energy labelled A++ white goods
- External lights on PIR (presence detection)
- Cycle storage
- Home office facilities
- On-site renewable energy: 4.7kW, 46m<sup>2</sup> photovoltaic's
- 10kW automatic wood pellet boiler – only 2kW needed
- Wood store, filled three times a year
- 4m<sup>2</sup> solar hot water to reduce wood resource used in summer



# HOW IT ACHIEVES LEVEL 6



## Materials

Walls and roof – TEK structurally 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

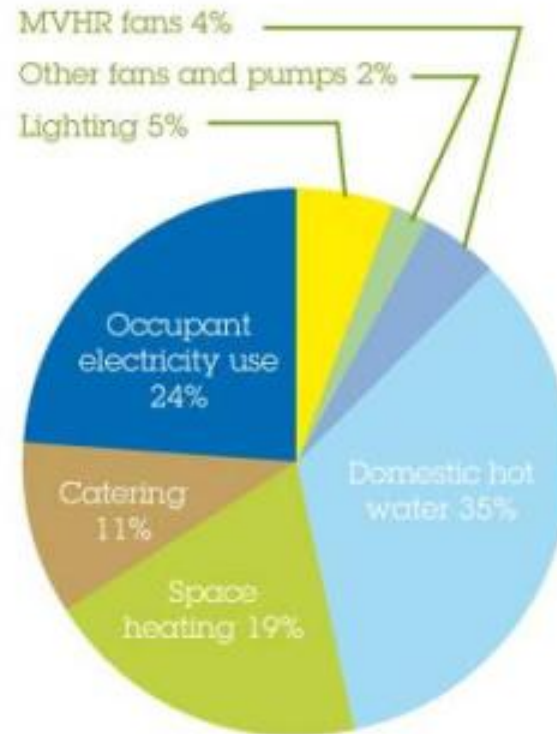
## Water

Potable water reduction: Low water shower 8 litres/min and taps Dual flush WC, 4/2 litres, 160 litre bath Water labelled A++ washing white goods Greywater recycling for WC flushing Rainwater harvesting for washing machine and irrigation.

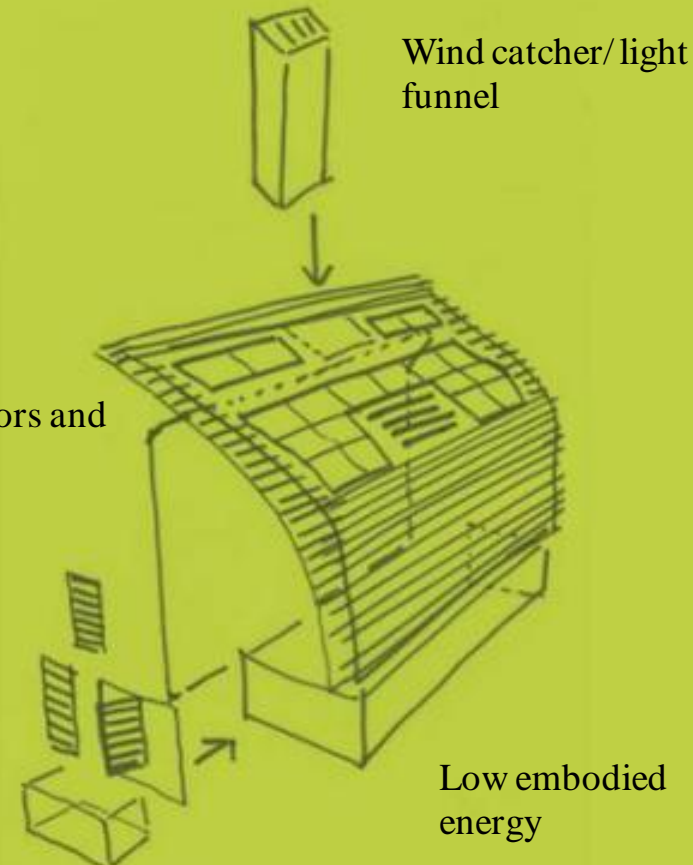
# CARBON FOOTPRINT

The energy cost of running the Kingspan BRE house 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.

## Lighthouse Energy use



# ACCOMODATING FOR CLIMATE CHANGE



Wind catcher/light funnel

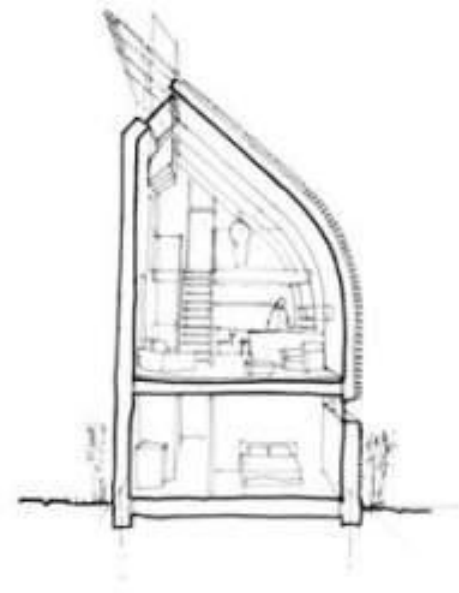
Solar collectors and shading

Selective thermal mass

Low embodied energy



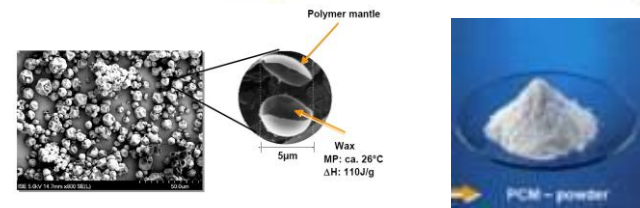
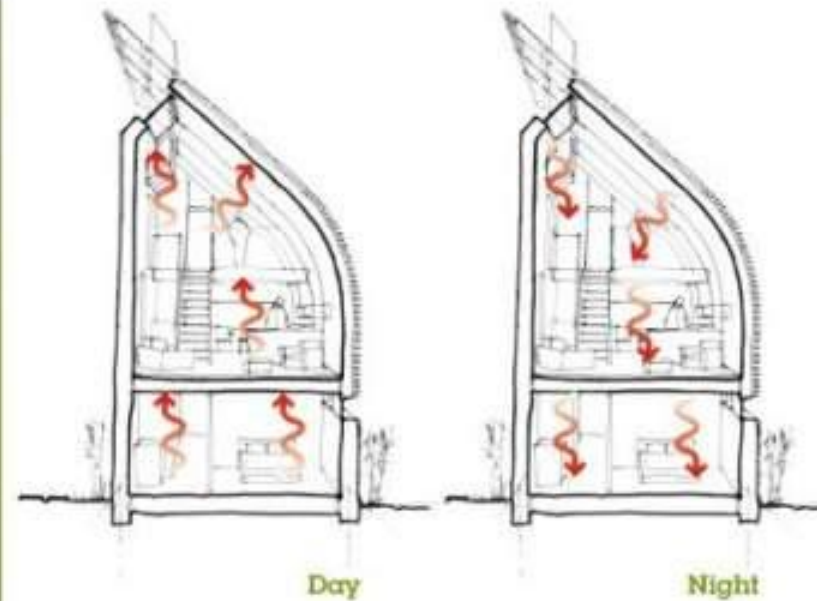
# SOLAR GAIN AND SHAD- ING



## Solar gain and shading

- At Level 6 there is a mandatory heat loss parameter. The shutters restricting direct sunlight, minimising heat gain in the summer.
- As a result the ratio of glazing to wall in the Lighthouse is 18% as opposed to 25-30% and traditional houses.
- The design of the house must balance the technical considerations with the occupants' expectations who are more accustomed to light and airy living.
- This drove our decision to locate the living space on to the first floor enabling us to maximise daylight and volume, with a top-lit double height living space.

# SELECTIVE-THERMAL-MASS

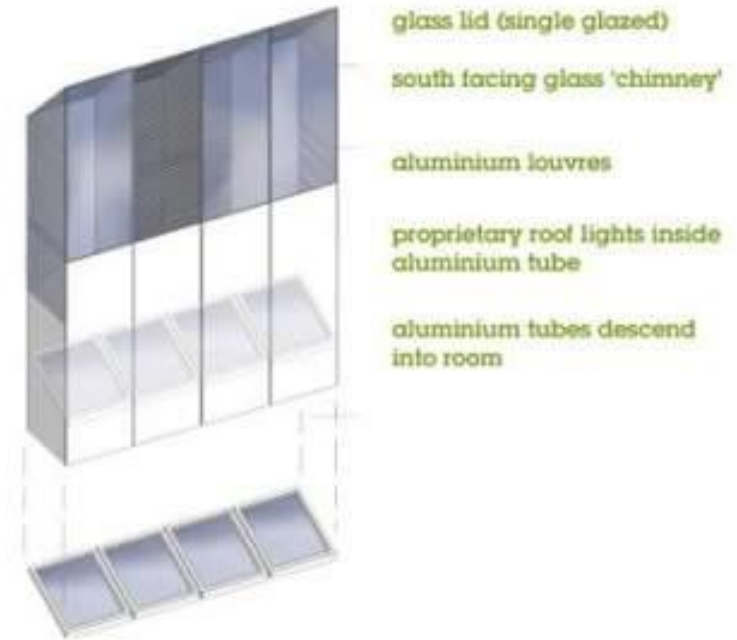


## Selective thermal mass

Phase changing material in the ceilings absorbs the room heat by changing from solid to liquid within microscopic capsules embedded in the board. This process is reversed when the room is cooled with the night air, working with the passive system of the wind catcher.



# WIND CATCH- ER/ LIGHT FUNNEL



Located on the roof, above the central void over the staircase, the wind catcher provides passive cooling and ventilation. The wind catcher also brings daylight deep into the plan of the house and provides the ground floor sleeping accommodation with secure night time ventilation.

# WIND CATCHER





# CON- STRUC- TION











# Photos


















external shading devices









**Water management and conservation  
integrated into landscaping**





















# THE MASTERPLAN: SUSTAINABLE REQUIREMENTS



## 1 Unit

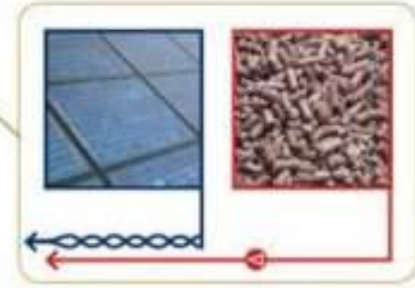


Photovoltaics  
4.7kW

Solar hot water  
4m<sup>2</sup>

Wood pellet  
boiler 2kW

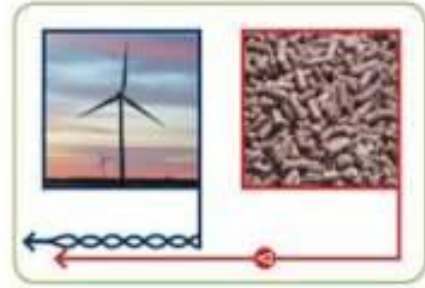
## 25 Units



Photovoltaics  
4.7kW

4 x Wood pellet  
micro-CHP  
1kW

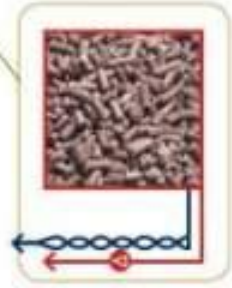
OR



Local wind  
turbine 45kW ~  
15m blades

Wood pellet  
boiler 50kW

## 250 Units



Biomass  
CHP  
100kW

OR



Local wind  
turbine 400kW  
~ 45m blades

Biomass boiler  
450kW



# Barking Riverside Vision - Maxwan

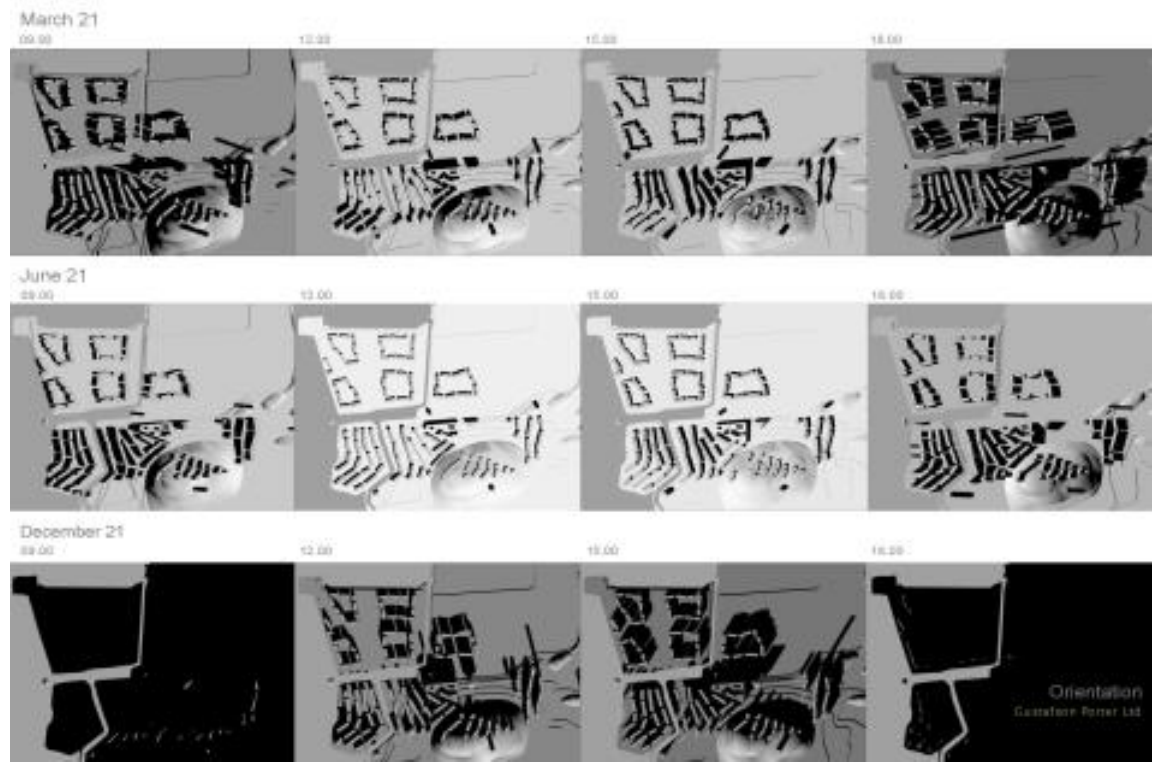
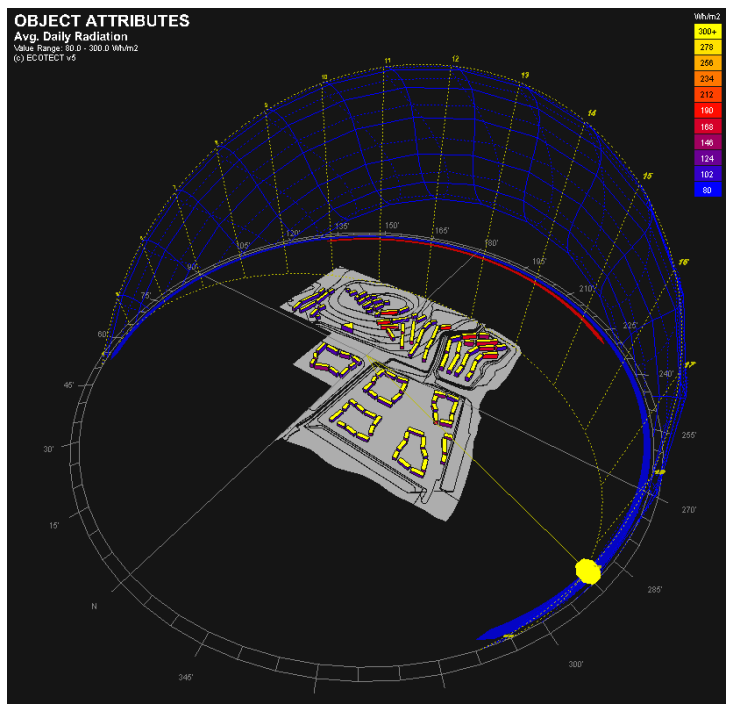
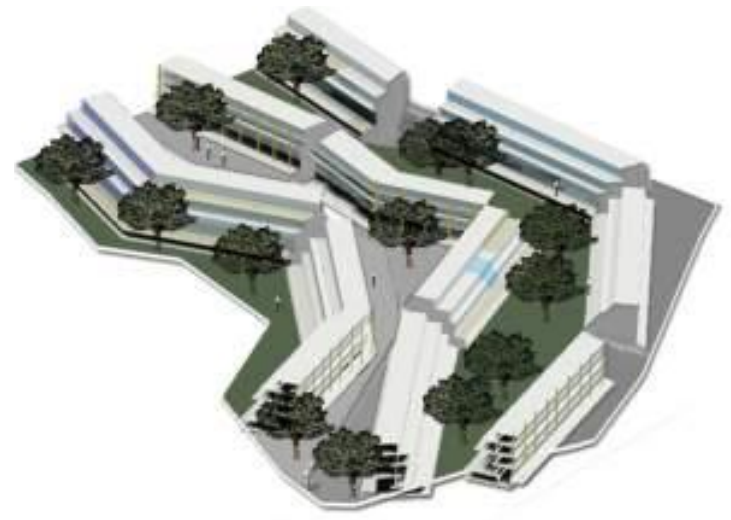
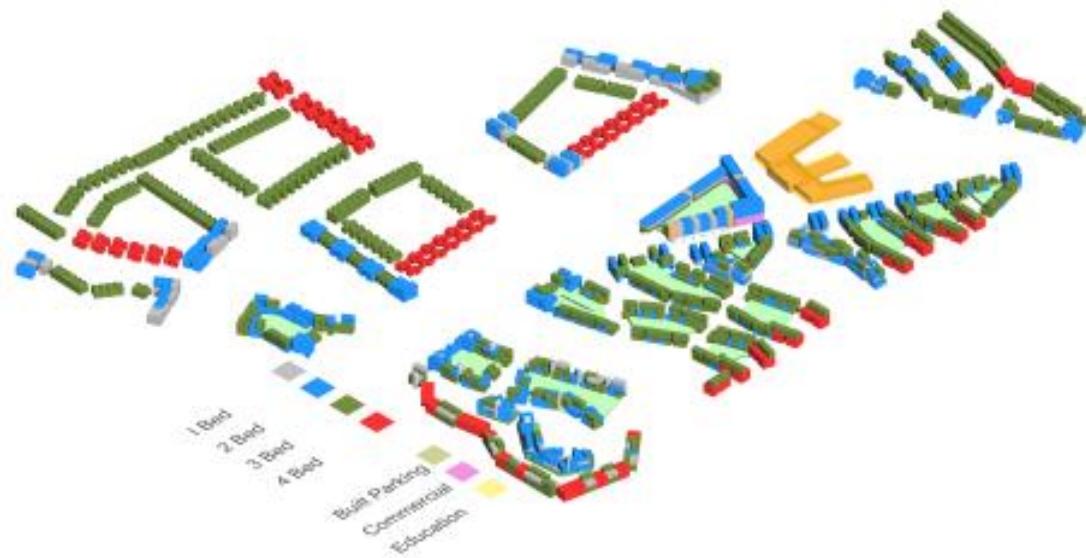




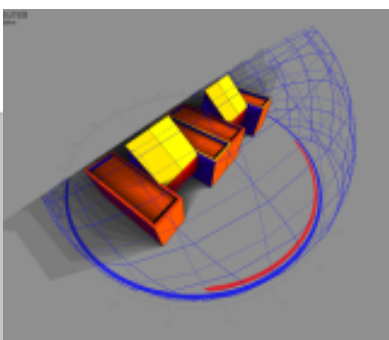
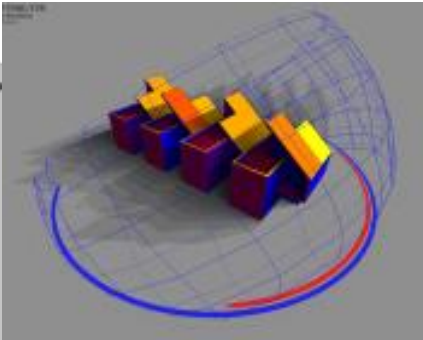
Barking Riverside











Thank you

