

# **HOMEBUILDING & RENOVATING**

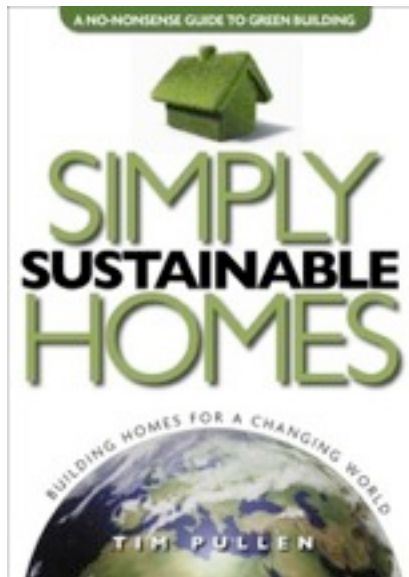
*The UK's no 1 Selling Self-Build & Renovation Magazine*



## How to Heat Your Home

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# The Home We Are Heating

## Space heating for a 200m<sup>2</sup> house

Built to current Building Regs Part L standard

55kWh/m<sup>2</sup> = 11,000 kWh p.a.

Using gas-fired boiler :-

Capital Cost = C.£2,000

Running Cost = £800 p.a. (with 85% efficiency)

CO<sub>2</sub> Emissions = 2.6 tonnes p.a.



Predicted annual price rises of 12%

Cost of heating the same house in 5 years = £1,400 p.a.

## Passivhaus cost analysis

Passivhaus =  $<15\text{kWh}/\text{m}^2 = 3,000\text{kWh p.a.}$

Using heat pump :-

Capital cost = £4,000

Running cost = £95 p.a.

CO<sub>2</sub> emissions = 0.28 tonnes p.a.

**12% year-on-year price rise = £246 p.a. in 5 years**

**How much energy will you want to buy in  
10 years time?**

# Heating Systems Options

## 1. SOLAR

High capital cost  
Low running cost  
Zero CO<sub>2</sub> emissions



## 2. BIOMASS

Low to medium capital cost  
Medium running costs  
CO<sub>2</sub> neutral



## 3. HEAT PUMPS

Medium capital cost  
High running cost  
High CO<sub>2</sub> emissions



# Solar House Examples



**Solar House - Oxford**

**Solar House - Dublin**



# Photovoltaic Thermal

**Looks like standard PV**

**Same size as standard PV**

**Costs roughly the same as standard PV**

**Produces electricity AND heat**

Assume 8,000kWh heat plus DHW

Needs 25m<sup>2</sup> area – south-facing

Capital cost £20,000 to £22,000

Net Running Cost = **Net Zero**

Net CO<sub>2</sub> emissions = **Net Zero**



**Used with a heat pump provides complete Heating  
and Hot Water solution + electricity**



## **Wood pellet stove or boiler**

Capital cost = £3,000 to £15,000

Will need C.1.6 tonnes p.a.

Running cost = £360

CO<sub>2</sub> neutral

## **Wood Burning Stove**

Space heating only

Needs MVHR

Capital cost £500 to £5,000

Running cost = <£100 p.a.

CO<sub>2</sub> neutral



# Biomass Heating



25kW Batch  
Log Boiler



20kW Pellet  
Boiler



Typical Pellet  
Store

**Big machines for big houses**

**2 Million tonnes of wood goes to landfill each year**



**Typical COP:**

- 1. Ground source 3.5 to 4.5**
- 2. Water source 4.0 to 4.5**
- 3. Air source 2.5 to 4.0**



**COP IS AFFECTED BY AMBIENT TEMPERATURE AND  
FLOW TEMPERATURE**

**High efficiency needs high temperature heat source**

# Heat Pumps



## 6kW Air Source

Capital cost = £5,000 to £6,000

Running cost at COP 3.0 = £375 p.a.

CO<sub>2</sub> emissions = 1.5 tonnes p.a.



## 6kW Ground Source

Capital cost £6,000 to £7,000

Running cost at COP 4.0 = £280 p.a.

CO<sub>2</sub> emissions = 1.1 tonnes p.a.

**Add £5,000 to capital  
cost for Solar Thermal  
array**

# Heating Distribution

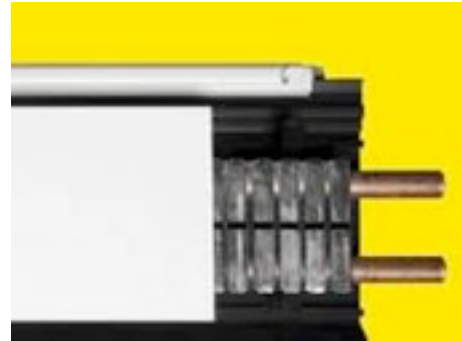
## Solar:

UFH or Skirting



## Biomass:

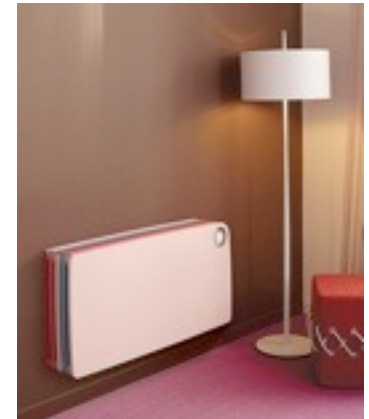
UFH, Skirting or Radiators



## Heat Pumps:

UFH or Skirting

**All need good time & temperature controls**



# Heat Recovery Ventilation

**Air movement is the biggest single factor causing heat loss**

**A highly insulated and air-tight house will need ventilation.**

**Air tightness needs to be C.5m<sup>3</sup>/hr to make heat recovery effective**



**Can recover 90% of the heat lost with purge ventilation**

**Can be Active or Passive**

## **INSULATION & AIR TIGHTNESS**

**Minimise heat loss and minimise running costs**

## **HEATING AS A DESIGN FUNCTION**

**Part of the design process – not an afterthought**

## **SOLAR HAS LOWEST RUNNING COST**

**And lowest CO<sub>2</sub> emissions**

## **VENTILATION WITH HEAT RECOVERY?**

**Also part of the design**

# More Information

The Association of Environment Conscious Building –  
[www.aecb.net](http://www.aecb.net)

The Energy Saving Trust –  
[www.energysavingtrust.org.uk](http://www.energysavingtrust.org.uk)



**Simply Sustainable  
Homes** - Tim Pullen, Ovolo Books,

