Scaynes Hill Sustainability Group & Church Eco Team

Energy saving in the home

Two Journeys towards

Net Zero

by Graeme de Lande Long and David Woolley

Plan for the evening

- Introduction to speakers and intention of the meeting
- Basics of heat loss from homes and ways to save energy/money
- Graeme's experience (house built c 1850)
- David's experience (house built 1980s)
- Solar energy, batteries and heat pumps
- Grants still available and qualification criteria

Break for refreshments

- Questions & discussion of common issues and potential solutions

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Who are we and why are we doing this?

Objectives

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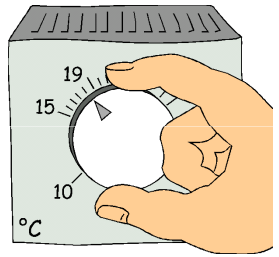
Saving energy for FREE!

BEHAVIOUR CHANGE

Heating & hot water (~80% of energy used)

- Turn thermostat down (1 - 2 degrees or more) & wear warmer clothes
- Optimise condensing boiler controls (reduce flow temp to 55-60^{o}C)
- Showers (short – 4 mins) rather than baths & fit shower head aerator
- Close off any rooms not being used and turn off/down radiators
- Close curtains when dark, open when light



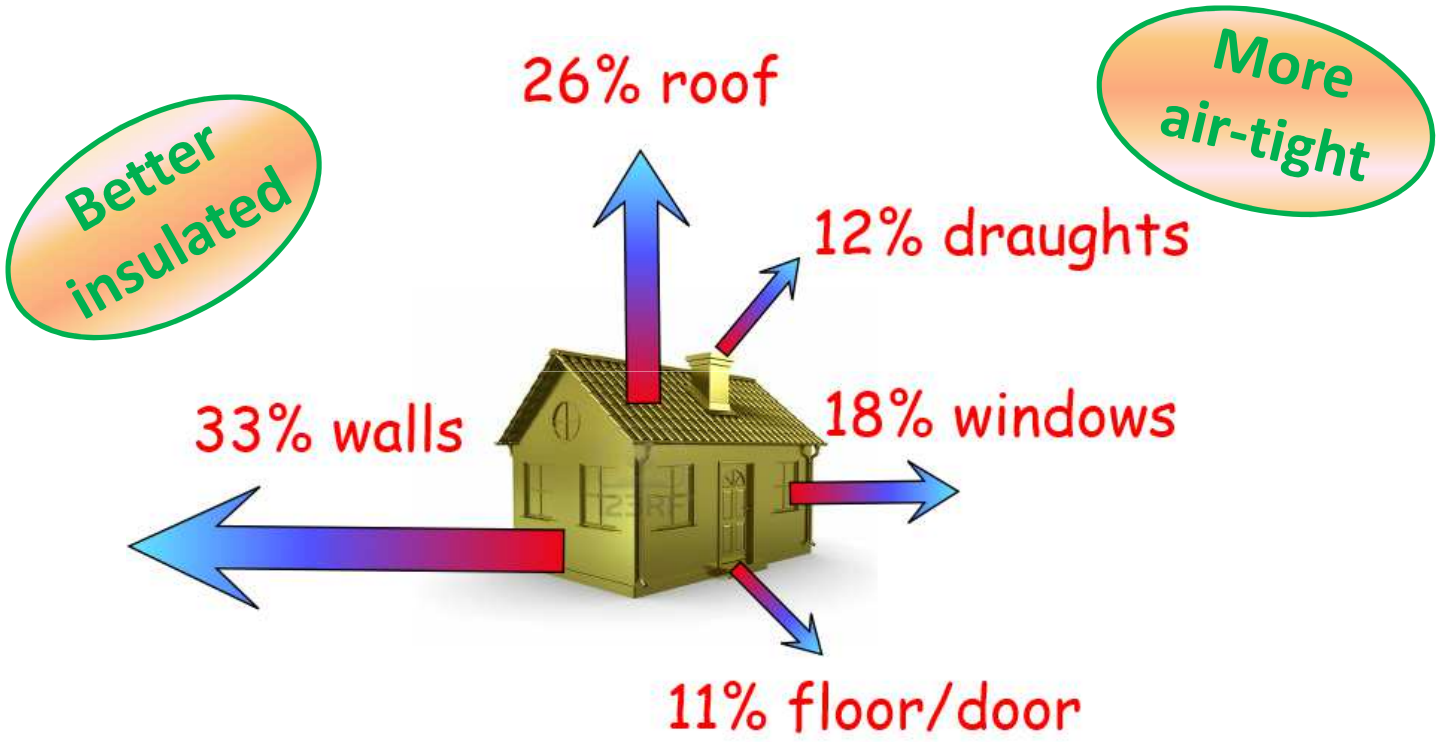
Appliances & lighting (~20% of energy used)

- Avoid using a tumble drier (dry outside in summer)
- Reduce use of oven (use microwave, air fryer, slow cooker etc)
- Wash clothes at lower temperature
- Reduce dishwasher use by always running with a full load
- Boil kettle with only amount of water needed
- Turn off things not being used (lights, appliances on standby)

Getting a Smart Meter or reading and recording meter readings regularly to quantify any savings can be a good motivator for further action.

Consider a dual tariff and run energy hungry devices (washing machine, dishwasher etc) at the lower night rate.

Heat loss distribution from ‘typical’ older home without additional insulation



NB. Actual losses depend hugely on the age and type of construction

House fabric improvement priorities

Saving **some** energy/cost (at **moderate** outlay) £

- Insulation (cavity walls – 33%, loft/ceilings - 26%, floors -11%) – total 70%
- Draught proofing (doors, windows, chimneys, vents) – 12%
- Secondary glazing (helps insulation & draught proofing) – 18%
- Thermostatic radiator valves (TRVs), foil behind radiators on outside walls
- Lag hot water tank and pipes

Saving **more** energy/cost (at **higher** outlay) £ £

- Double or triple glazing
- Solid wall insulation (internal or external)
- Porch for main external door (air-lock)
- Replace boiler with more efficient one (condensing with compensation controls)
- Replace boiler with a heat pump

Home energy generation

Reduce bills and dependency

- Solar thermal (generally only for heating hot water)
- Solar Photovoltaic (PV) with/without battery storage
- Wind turbine
- Biomass boiler
- Wood burning stove?

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Bracken Cottage in 1988

Central heating by gas boiler with gravity system

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Bracken Cottage in 2004

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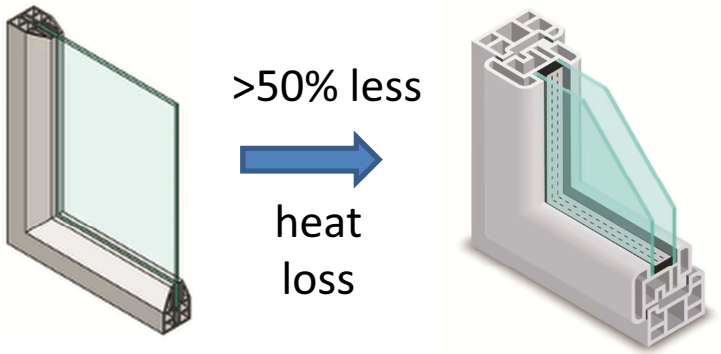
Modifications 1997-2004

Timber framed walls for extension and sloping roof of loft conversion insulated with Celotex boards



Celotex: PIR foam board sandwiched between two layers of low emissive foil

Double glazing reduces losses

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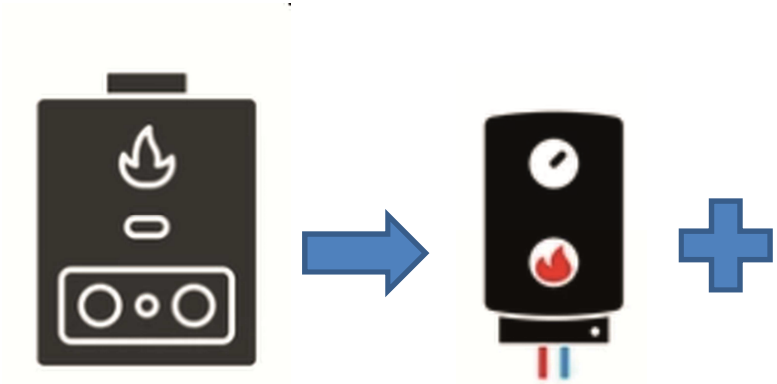
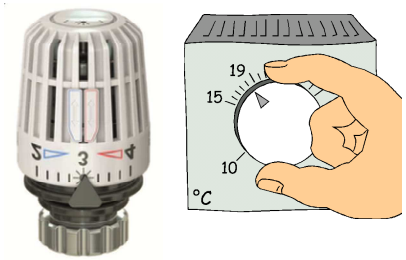
Modifications 2005 – 2009 (Saving 30%)

Solar thermal panel

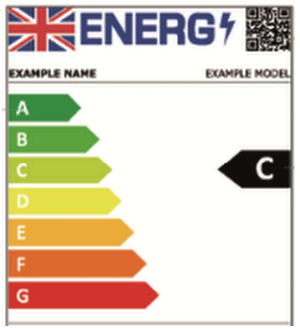
Cavity wall insulation



Upgrade to condensing boiler (efficiency 75% → 90%)



Thermostatic Radiator Valves



Efficient appliances and lighting

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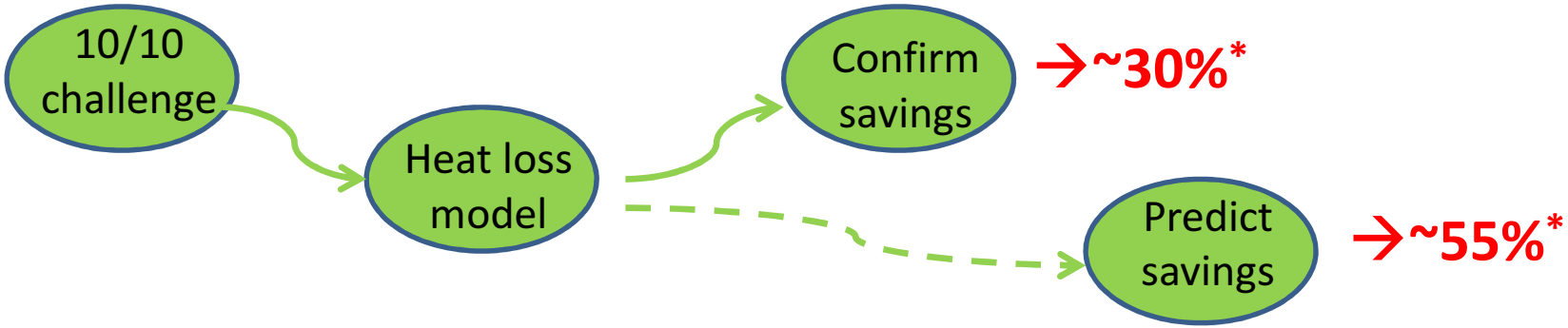
Modifications 2010 – 2011 (Saving 25%)



Measures suggested to make additional 25% energy savings

- insulation floor to cellar (cellar ceiling) & lagging heating pipes
- additional doubling glazing (ground floor extension)
- secondary glazing to bay windows & front door
- draught proofing chimney (using balloon)
- reflecting foil behind radiators on external walls
- more insulation in smaller boarded loft (only done recently)

** Percentage energy saving based on energy consumption in 2005*

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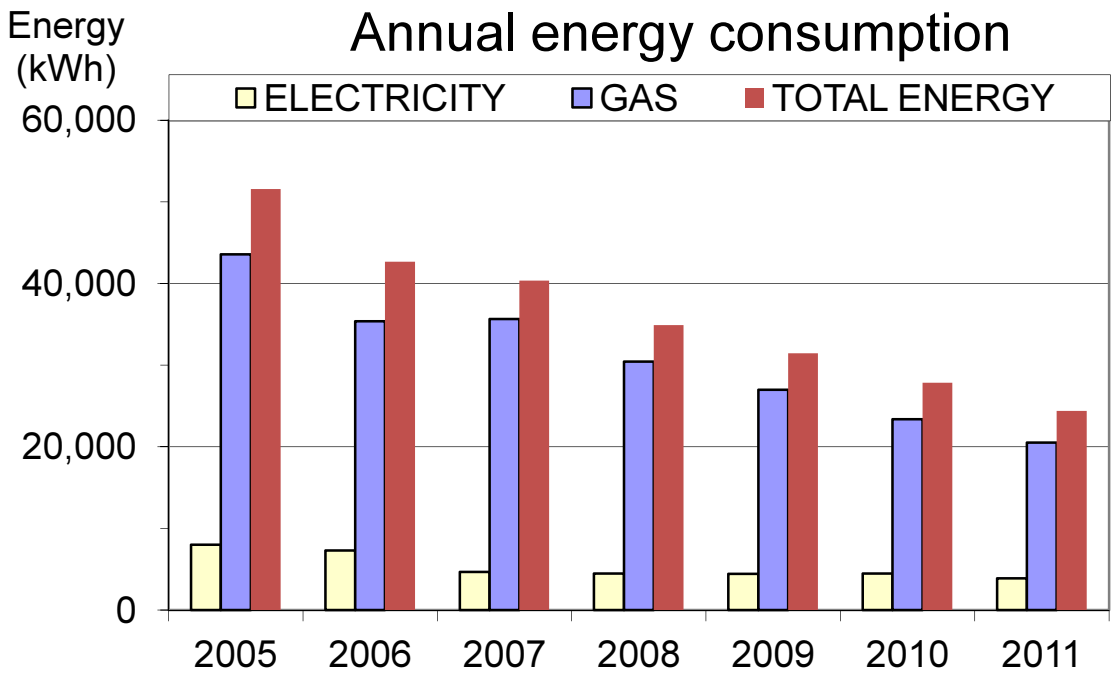
Bracken Cottage – Reduction in energy use



Energy saving indicated by heat loss model

Description	% save	Return (yrs)
Lower thermostat 2ºC	15%	0
Condensing boiler	15%	15
Solar panel (thermal)	5%	20
Insulating floor	4%	5
Low energy bulbs	3%	5
Thermostatic valves	3%	10
Cavity wall insulation	3%	2
Double glazing	2%	25
Draught proofing	2%	1
TOTAL	53%	

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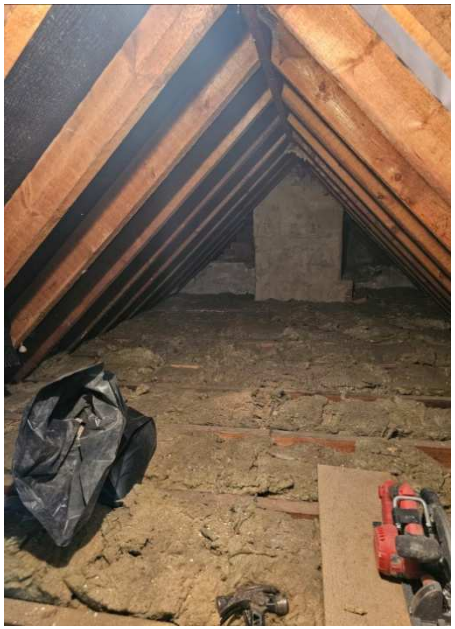
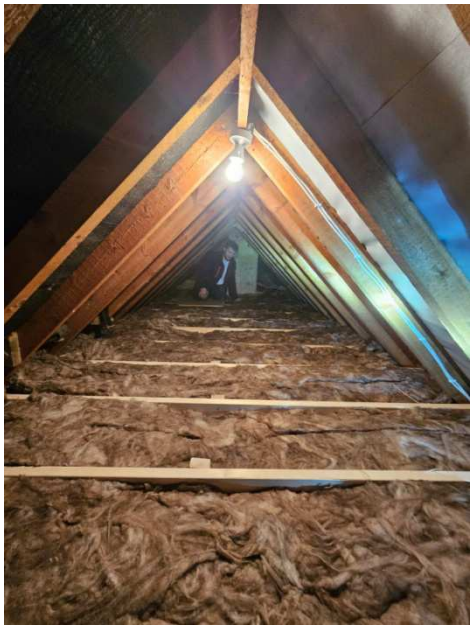
Insulation





Draught-proofing

Central heating

Modifications – Current & future

- Replace solar thermal with solar PV & battery storage (done recently)
- Insulation to smaller boarded loft (done recently)
- Water repellent external wall coating eg StormDry (this summer)
- Solid wall insulation (investigate and review)
- Upgrade gas boiler to a heat pump (investigate and review)

Solar thermal → Solar PV

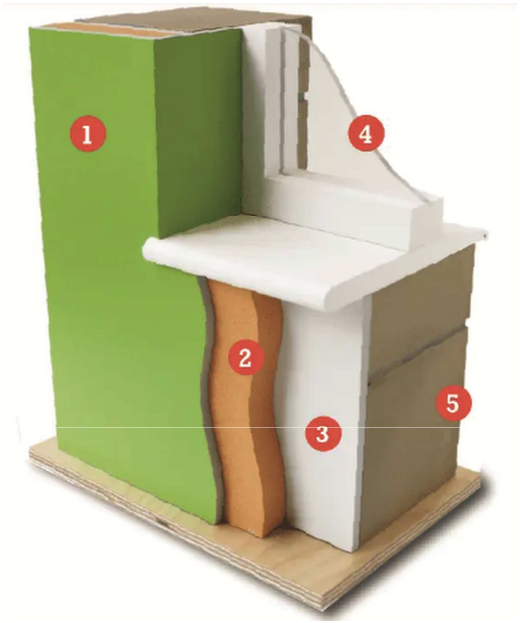
- Solar thermal (1.2 kW) only heats hot water and has higher maintenance requirements
- Solar PV (7.2 kW) provides electricity (more flexible on use) and little maintenance
- Battery storage (7 kWh storage) allows use of energy captured by day in the evening

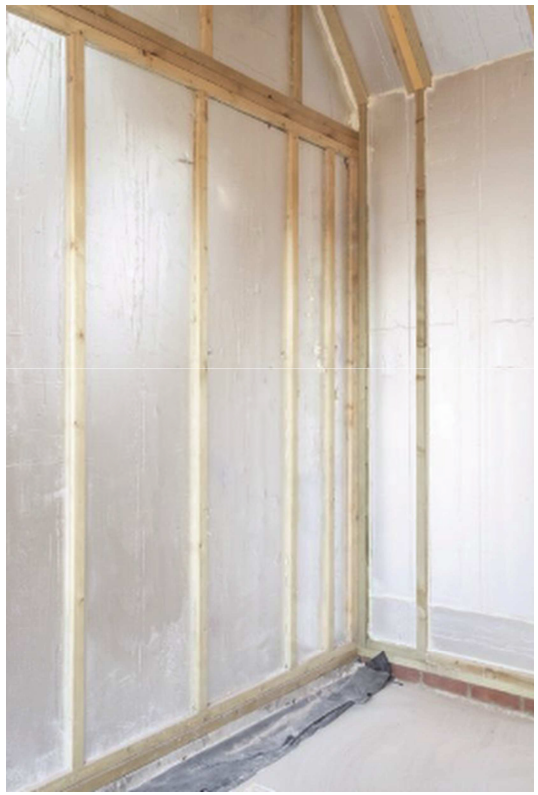
Solid wall insulation - External

Advantages: More effective than internal wall insulation, increased thermal mass, lower risk of thermal bridging and/or damp issues, less disruption.

Disadvantages: Changes appearance, may need planning consent, more expensive than internal wall insulation.

Solid wall insulation - Internal





1. Surface coating (eg plaster)
2. Insulation
3. Original internal surface of wall
4. Window
5. Solid brick wall

NB: Likely to need to incorporate a vapour barrier

Advantages: Less expensive, no change in external appearance,
Disadvantages: Reduced room size, risk of thermal bridging/damp issues, more disruption

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David's ongoing journey towards net zero

Before external refurbishment

- Measure and evaluate performance
- Identify areas of concern
- Discuss with friends, neighbours, experts
- Lots of googling and reading
- Make a plan
- Put the simple things at the top of the list

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1980’s detached in Lindfield

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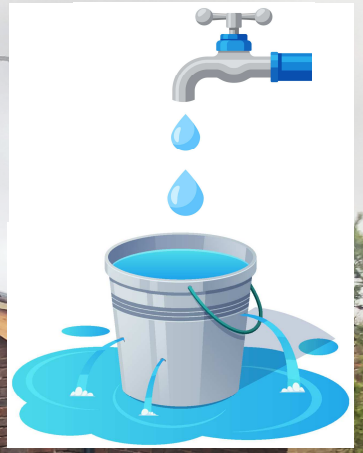
A couple of definitions

What is the "heat loss" and "heat demand" of a whole house?

"It's the rate that energy is lost through all the outside surfaces and the power needed to keep a house at a temperature. Heat demand is higher when its colder outside, and is lower when the house is better insulated"

- Every one kW of heat demand must come from the heating system and costs 24kWh (£2ish) per day on your energy bill to service.



What is a U-value?

"a U-value is a number that describes how "lossy" one particular element is – a window, a door, a wall etc. e.g. a U-value of 1.4 means that the item in question loses 1.4 watts of heat per square metre for every degree of temperature difference between the inside and outside"

- Smaller U-values are better – they indicate a lower heat demand.

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£50,000 on better insulation? Is it worth it?

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Front Doorset - £2,680

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Stable Doorset - £2,800

Tile canopy
Driving rain leaks
Thin planking
Single glazed
U-value 4.0
Heat loss 110w

Glass canopy
Accoya wood
Celotex core
Double glazed
U-value 1.5
Heat loss 40w

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15 triple glazed windows - £15,000

plus fitting - £13,000

old U-value 2.8
Heat loss 1200w

new U-value 0.9
Heat loss 385w

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Prep the holes. Fit and seal the new wood frames

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Install the hinged sash

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Aluminium sashes, triple glazed

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Replace gutters & softwood cladding - £11.5k

- Added 40mm insulation behind cladded sections
- Reduces U-value from 1.1 to 0.4 - Saves 155 Watts

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old softwood cladding

40 years old, dry, poor condition, warping and without insulation

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Strip off old cladding, gutters, soffits & fascias

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add moisture control membrane

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add Celotex insulation and fixing battens

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fit Thermowood cladding

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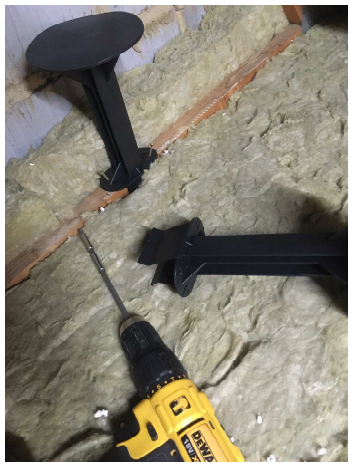
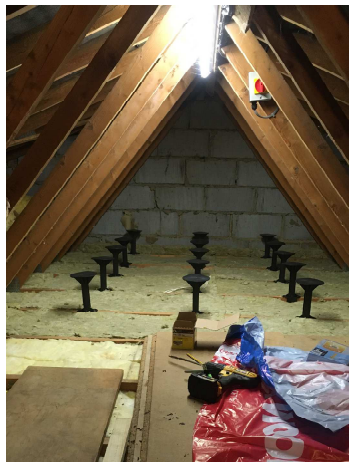
Boarded loft insulation - £500 DIY

- Increased insulation from 100 to 400mm
- Reduces U-value from 0.36 to 0.11 - Saves 380 Watts



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Cavity wall Insulation - £2.7k

- Added 60mm insulation
- Reduces U-value from 1.72 to 0.5 - Saves 3.3kW

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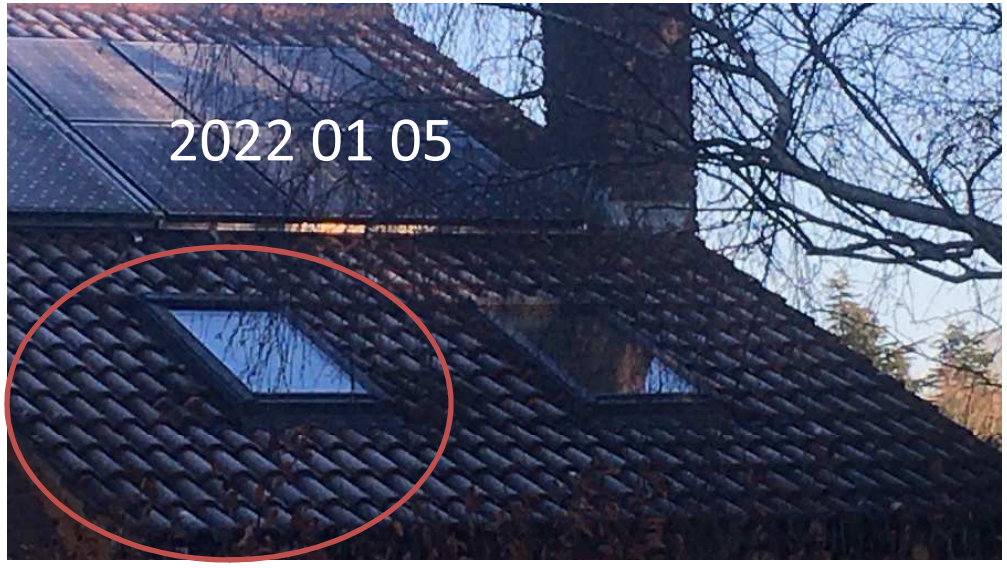
Roof insulation weak spot



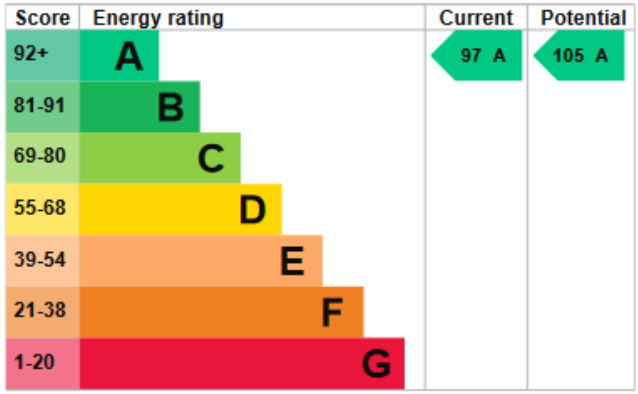
Energy performance certificate (EPC)

Brambles Blackthorns Close Lindfield HAYWARDS HEATH RH16 2UA	Energy rating **A**	Valid until: **31 January 2034** Certificate number: **0637-9722-7309-0818-3222**

Property type	Detached house
Total floor area	182 square metres

Energy rating and score

This property's energy rating is A. It has the potential to be A.



For properties in England and Wales:

the average energy rating is D
the average energy score is 60

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Energy performance certificate (EPC)

Brambles Blackthorns Close Lindfield HAYWARDS HEATH RH16 2UA	Energy rating **A**	Valid until: **31 January 2034** Certificate number: **0637-9722-7309-0818-3222**

Breakdown of property's energy performance

Feature	Description	Rating
Wall	Cavity wall, filled cavity	Good
Roof	Pitched, 300 mm loft insulation	Very good
Window	Fully triple glazed	Good
Main heating	Boiler and radiators, mains gas	Good
Main heating control	Programmer, room thermostat and TRVs	Good
Hot water	From main system	Average
Lighting	Low energy lighting in all fixed outlets	Very good
Floor	Solid, no insulation (assumed)	N/A
Secondary heating	Room heaters, dual fuel (mineral and wood)	N/A

Low and zero carbon energy sources

Low and zero carbon energy sources release very little or no CO2. Installing these sources may help reduce energy bills as well as cutting carbon emissions. The following low or zero carbon energy sources are installed in this property:

- Solar photovoltaics

Energy performance certificate (EPC)

Brambles Blackthorns Close Lindfield HAYWARDS HEATH RH16 2UA	Energy rating **A**	Valid until: **31 January 2034** Certificate number: **0637-9722-7309-0818-3222**

Heating this property

Estimated energy needed in this property is:

- 14,644 kWh per year for heating
- 2,791 kWh per year for hot water

How this affects your energy bills

An average household would need to spend **£2,362 per year on heating, hot water and lighting** in this property. These costs usually make up the majority of your energy bills.

You could **save £582 per year** if you complete the suggested steps for improving this property's energy rating.

This is **based on average costs in 2024** when this EPC was created. People living at the property may use different amounts of energy for heating, hot water and lighting.

Energy performance certificate (EPC)

Brambles Blackthorns Close Lindfield HAYWARDS HEATH RH16 2UA	Energy rating **A**	Valid until: **31 January 2034** Certificate number: **0637-9722-7309-0818-3222**

Impact on the environment

This property's environmental impact rating is B. It has the potential to be A.

Properties get a rating from A (best) to G (worst) on how much carbon dioxide (CO2) they produce each year.

Carbon emissions

An average household produces	6 tonnes of CO2
This property produces	1.2 tonnes of CO2
This property's potential production	-0.5 tonnes of CO2

These ratings are based on assumptions about average occupancy and energy use. People living at the property may use different amounts of energy.

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Energy performance certificate (EPC)

Brambles Blackthorns Close Lindfield HAYWARDS HEATH RH16 2UA	Energy rating **A**	Valid until: **31 January 2034** Certificate number: **0637-9722-7309-0818-3222**

Score	Energy rating	Current	Potential
92+	A	97 A	105 A

Changes you could make

Step	Typical installation cost	Typical yearly saving
1. Floor insulation (solid floor)	£4,000 - £6,000	£197
2. Condensing boiler	£2,200 - £3,000	£386

Help paying for energy improvements

You might be able to get a grant from the Boiler Upgrade Scheme (https://www.gov.uk/apply-boiler-upgrade-scheme). This will help you buy a more efficient, low carbon heating system for this property.

Solar PV and / or battery

What to do with the energy?

- Self-consumption – reduces demand on National Grid infrastructure
- Diverting surplus solar into local heaters - immersion heater etc.
- Charging EV (variable rate chargers)
- Summer - Export to the grid for neighbours to use – contribution to net-zero
- Winter – only 10% of summer production, so must re-import

PV Options

- Roof mounted / ground mounted
- (planning permission consequences)
- Behaviour during power cut.
- Performance viewable without internet (full local control)?

Battery Options.

- integrated unit vs components
- AC coupled retrofit vs hybrid inverter
- Behaviour during power cut
- Operable without internet (full local control)?
- Not 100% efficient
- Time shifting consumption into off-peak and low carbon periods

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Solar PV and battery at Brambles

10kWp Solar PV – 2024 target price £10k installed

- Roof mounted / ground mounted
- Added piecemeal since 2011
- During power cut 8.5kW cuts out, 1.5 kW continues
- Planning to change to 7kW cuts out, 3kW continues

4kW Victron Multiplus II Battery - £5.3k

- Component system with 14kWh storage
- AC coupled and DC coupled
- 4kW loads supported during power cut
- Full local control without internet

victron energy

On-Grid Energy Storage Bundle With 5kVA Victron Multiplus II With 4 X 3.5kwh Pylon US3000C Battery Modules, Cables, Fuses, Comms, Metering, Etc

Price:
£5,278.58 +vat
£6,334.30

Bundle with:

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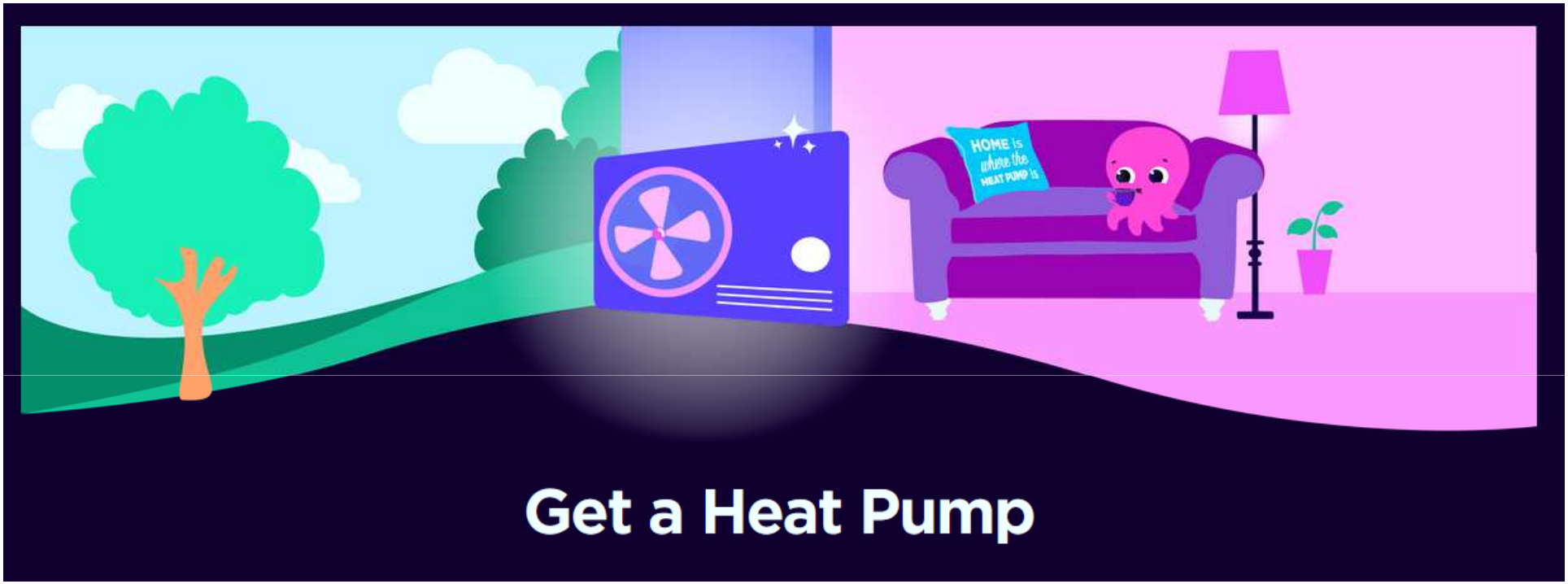
Summer 2024 project



Octopus Energy Supply & Install price £3.8k includes:-

- Govt grant of £7.5k
- Full heat demand survey
- New Hot water cylinder
- New radiators as required

A fridge but in reverse?

[Air Source Heat Pump principles explained]

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Ongoing journey towards net-zero energy demand

2023 energy balance		Energy consumed
Solar PV generated		8,493 kWh
Grid elec imported	2105 kWh	
Grid elec exported	2749 kWh	
Net grid electricity		-641 kWh
Gas imported		2,024 kWh
	Total	9,876 kWh

2024 …
Plan to:-

- Expand solar PV capacity by 10%
- Disconnect gas supply and
- AirSource some of the heat kWhs

Rainwater harvesting - £700

230 litres outside kitchen

800 litres near veg garden

Grants/assistance

Grants generally means tested and need to be on some kind of benefits or low income to qualify. Funds originate from Department of Energy and Net Zero (DENZ) but often administered by local councils, energy suppliers or installers
See https://www.gov.uk/government/collections/find-energy-grants-for-you-home-help-to-heat

West Sussex affordable energy
Their website www.westsussexenergy.co.uk gives a range of trusted information from local services. Go the the 'Advice' section and select 'Mid Sussex District Council' (or equivalent for you)
Also energy saving tips, heating advice, grants and up-to-date information on the latest government grants.

Local Energy Advice Partnership (LEAP)
LEAP provides free support for lower income households across West Sussex. They offer home visits and can install free energy saving features. There is also phone support for money advice, information and referrals to other services, schemes and grants and support with bills
Telephone: 0800 060 7567 or email: support@applyforleap.org.uk
Or visit: www.applyforleap.org.uk

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Grants – Summary

Courtesy of Greener Steyning

https://greeningsteyning.org/energygrants/

Scheme	What you can get for free	Eligibility Criteria (both apply)	
		Income related	Home related
Boiler Upgrade Scheme	**£7500 towards heat pump**	None	House needs to be well insulated
ECO4 Scheme	**Wide range of home energy improvements** *(insulation, solar, heat pump, etc.)*	Receiving benefits	EPC of D or worse
Great British Insulation Scheme	**Free Insulation** *(all types)*	Either receiving benefits	or in Council Tax band A to D + EPC = D or worse
Warmer Homes Scheme	**Up to £25k towards a wide range of home energy improvements** *(insulation, solar, heat pump, etc.)*	Household income under £31k or receiving benefits	**Not** on gas grid + EPC = D or worse

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Grants – **no income restrictions**

Scheme name	Eligibility		Grant
	Income related	Home related	
Boiler upgrade scheme (BUS) - **Heat pump** Administered by installers or energy suppliers	None	Replacing gas, oil or electric heating. Own the home, which has to have EPC with no qualifications for loft or cavity wall insulation.	£7,500 grant towards air source or ground source heat pump. Various energy suppliers have schemes (eg Octopus fixed cost ~ £3k)
Boiler upgrade scheme (BUS) - **Biomass boiler** Administered by installers or energy suppliers	None	As above but also off the gas grid in a rural location and the new biomass boiler has a qualifying emissions certificate	£5,000 grant towards a biomass boiler
Connected for Warmth Insulation scheme (managed by AgilityEco & Affordable Warmth Solutions) https://www.warmerhomes.org.uk/funding-for-on-gas-homes (0800 107 8576)	Apparently none	Homeowner or private rental (EPC rating C or worse) in Council Tax bands A-D **with gas boiler**	Fully funded measures for cavity wall insulation and loft insulation if less than 200mm thick, and for smart heating controls

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Grants – **low income or receiving benefits**

Scheme name	Eligibility		Grant
	Income related	Home related	
Warmer Homes Scheme Apply via local council - MSDC 01444-477300) https://www.warmerhomes.org.uk/programme (0800 038 5737)	Household income under £31,000, or under £20,000 after mortgage/rent and council tax, or receiving benefits	Homeowner or private rental (EPC rating D or worse) **without gas boiler as main heating system**	Free insulation (incl solid walls), air source heat pump, PV solar panels, electric radiators or heating controls organised and paid by council up to £25,000 until March 2025
Energy Company Obligation (ECO4) (via energy supplier)	Receiving benefits	Own or rent private property with EPC rating D or worse	Help with insulation, repairing or replacing a boiler or upgrading heating system delivered by your energy company (varies with company)
Great British Insulation scheme (0800 098 7950) https://www.gov.uk/apply-great-british-insulation-scheme	EITHER Receiving benefits	OR EPC rating of D or worse and Council Tax band A-D	Free or cheaper insulation

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Grants – others

Scheme name	Eligibility	Grant
Winter Fuel Allowance (Automatic from Government)	Receiving state pension	£250-£600 (age dependant) cash towards winter heating costs
Warmer Home Discount Scheme (Normally automatic but call helpline 0800 032 9322 before 29th Feb 2024)	On Pension Credit or other benefit and home has poor EPC rating, Pre-payment or Pay-as-you-go meter.	£150 off your electricity/gas bill for winter 2023-24
Sustainable Warmth Competition (administered by local council)	Eligibility varies by council but MSDC has not won any funding	Awards funding to local authorities to help them upgrade energy inefficient homes of low-income households
Social Housing Decarbonisation Fund (administered by local council)	If your property is eligible, your social housing provider will contact you. MSDC has not won any funding	Will upgrade a significant amount of the social housing stock currently below EPC D up to that standard

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EPC & Energy Audits

Energy Performance Certificate (EPC)

For all grants you will need an EPC for the property. You can check if your property already has an EPC at https://www.gov.uk/find-energy-certificate

For a list of qualified EPC assessors in your area go to https://www.gov.uk/get-new-energy-certificate . Costs £60 - £120

Energy Audits

- **Either** installers will often offer a free survey to see what you might need to make your home more energy efficient
- **Or** use an independent advisor or company which can carry out a full energy audit. You may have to pay for this but they should also be able to help you find the right installer for your needs and help with any grant applications.

REFRESHMENTS BREAK

QUESTIONS
&
DISCUSSION