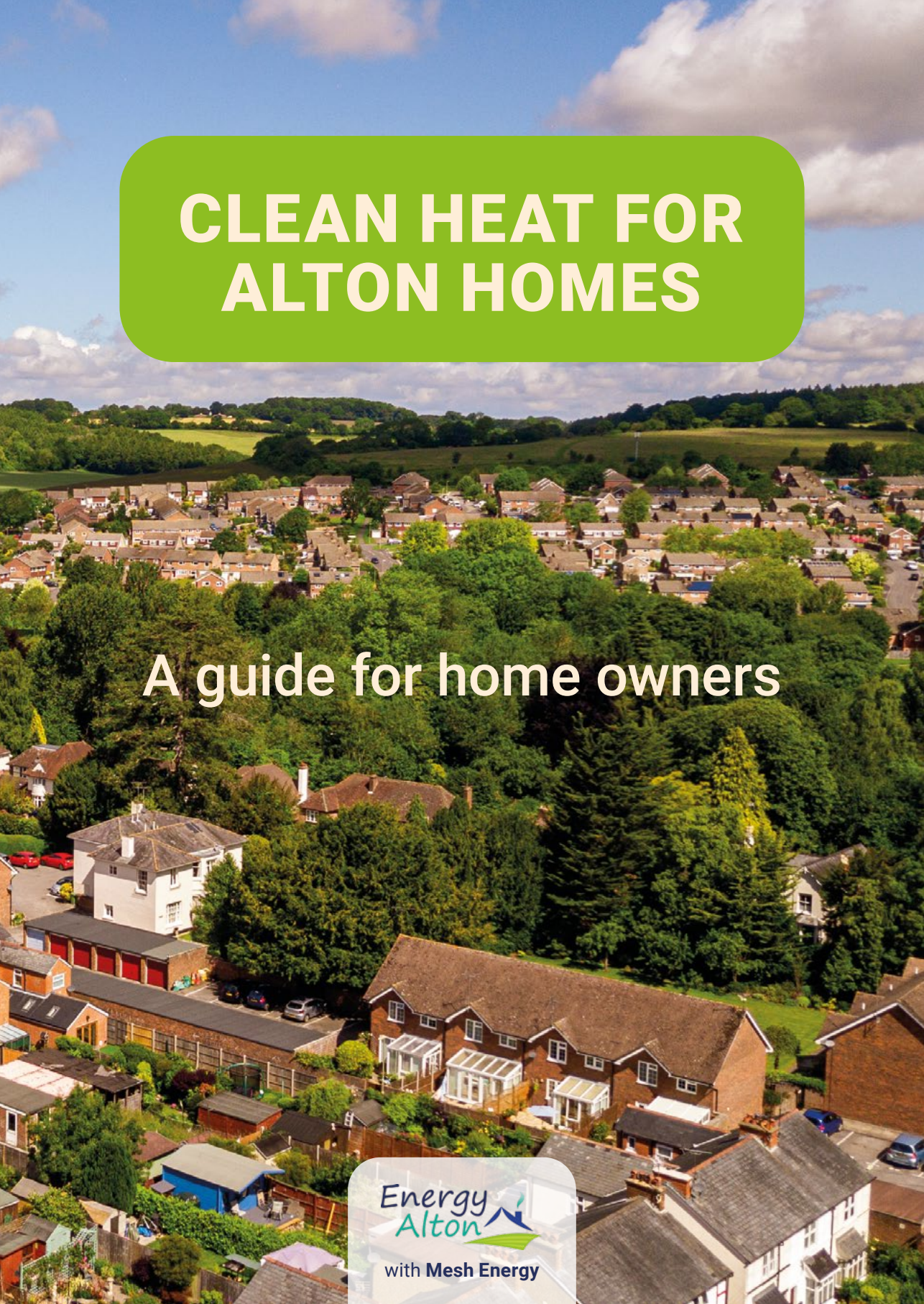
# CLEAN HEAT FOR ALTON HOMES



## A guide for home owners

Energy Alton

with **Mesh Energy**

FOREWORD BY
## DAMIAN HINDS MP

This is an important and practical guide to heating our homes here in Alton and more widely in East Hampshire.

As we look to the world summit at COP26 in Glasgow this autumn, all communities here and abroad must act to reduce their carbon emissions including a rapid move away from gas, coal and oil to heat our homes.

I commend the volunteer team at Energy Alton and other local environmental groups who work 'hands on' in our towns and villages to help us all make the changes that are so necessary.

### ENERGY ALTON

Energy Alton is an award-winning community group run entirely by volunteers. Over the last ten years it has provided free home energy surveys and thermal images, organised exhibitions and green open homes events, run a drop-in energy advice shop and an energy advice clinic, installed solar PV on the roof of Alton Town Library (in a conservation area) as an exemplar project, handed out free loft insulation to 500 homes in Alton, held regular evening meetings on a wide range of topics and contributed to the EHDC Energy Strategy and Alton Town Council Climate Emergency Strategy and Action Plan. In addition, we are now promoting community renewable energy projects with a 'Powering-Up' volunteer team launched this summer.

**www.energyalton.org.uk**

Design by Snap Designs (snapdesigns.uk)

## CONTENTS



## INTRODUCTION

Heating our homes with fossil fuels such as gas, oil and coal causes a third of all carbon emissions in the UK – **energysavingtrust.org.uk/significant-changes-are-coming-uk-heating-market**. Many homeowners are keen to do all they can to reduce their energy in the home and so cut carbon emissions.

Our UK Government is also taking action. It has committed to reducing these emissions to net zero by 2050. As part of that plan, no gas boilers will be installed in new homes from 2025. However, the biggest challenge is to change the old fossil fuel heating systems in current homes to 'clean heat' alternatives.

Volunteers at Energy Alton have been advising residents about saving energy in the home for the last ten years.

We are pleased to present this guide on the 'clean heat' options for heating systems. Our advice is impartial, relevant and up to date. It is based on wide-ranging knowledge and the experience from recent surveys of five typical Alton homes. The five examples ranged from the late 1800's to 2000 and are of varying design, size and heating systems.

A team of independent energy consultants at Mesh Energy used the survey results to write reports for each of the five homes. Together the consultants and Energy Alton volunteers created this general guide on clean heat alternatives. It includes local installers specifically suited to Alton's housing stock.

You may have heard about hydrogen replacing gas in a boiler as a carbon-free fuel. This is still in the developmental stage. No one is sure how it will work and is not included in this guide.

### OUR THANKS

This guide was conceived by the team at Energy Alton in partnership with Doug Johnson and Jenny Wallace at Mesh Energy and our curious and supportive five home owners in Alton. It has been made possible with financial support from Community Energy South (CES), Alton Town Council and East Hampshire District Council.

In particular my thanks to Jenny Griffiths, Tim Woolman, Chris Chappell, Tony Cohen, Bob Booker, Andrew Sweeney, Jenny Wallace and Barry Sawyer

### ABOUT THIS GUIDE

This report and the material contained in it has been distributed for general information purposes only. It is provided in good faith and we are making no statements or warranty of any kind, express or implied, regarding the accuracy adequacy, validity or completeness of any information contained and the purpose for this guide for Home Owners (Alton Clean Heat Project General Guide) to provide information to members of the public who when using such information should take their own professional advice specific to their circumstances. This is intended to assist only in decision making and we cannot be held liable for any cost, damages, claims or demands or losses suffered from use of the information contained in this guide.

John Hubbard
Chairman Energy Alton, September 2021

## CLEAN HEAT ALTERNATIVES

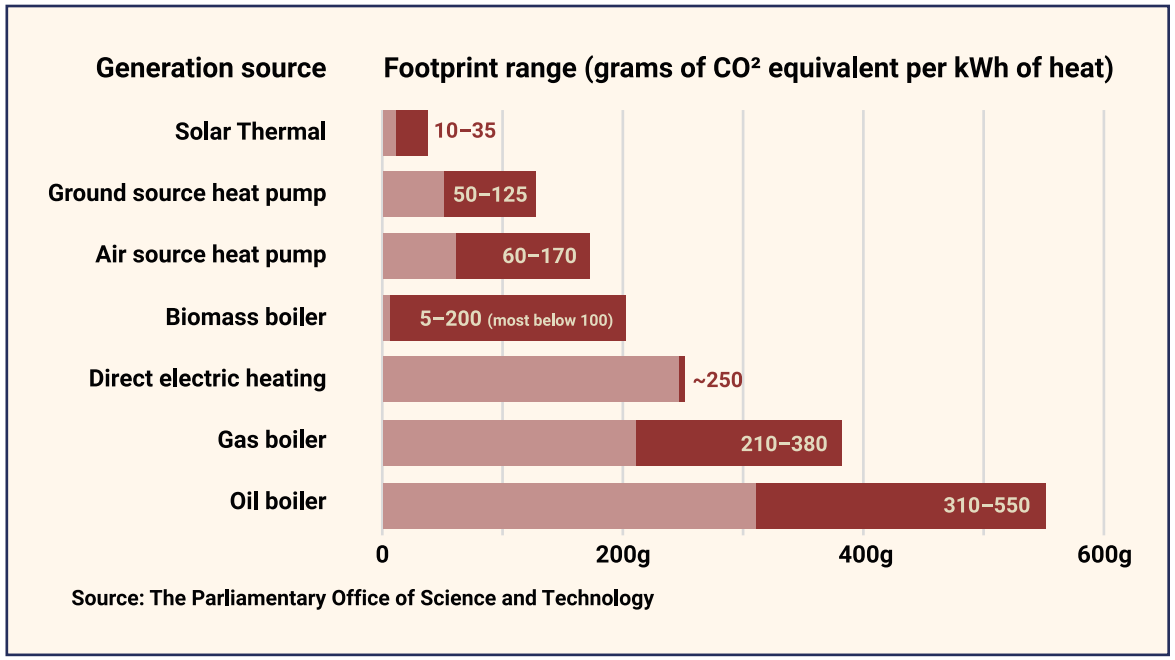
**There are four types of low carbon, ie clean heat systems:**

- Heat pumps; either Air Source Heat Pumps (ASHP) or Ground Source Heat Pumps (GSHP)
- Electric water & space heating
- Biomass (wood and wood pellets)
- Other renewable systems eg Solar PV and Solar thermal

**For most homes the practical choices are an Air Source Heat Pump or electric water and space heating. Our guide focusses on these. Further details, including cost comparisons are in an appendix.**

## HEAT PUMPS

Heat pumps bring in heat from the outside, either from the ground or the air. The heat they provide is at least 3 times greater than electrical energy they use. It is low-temperature heat but provides enough warmth to heat a well-insulated home. It typically costs the same to run as a gas boiler and less than an oil-fired boiler. Heat pumps are low carbon compared to gas heating, even more so if you choose to buy 100% renewable electricity from your energy provider. Good insulation is vital for heat pumps as it reduces running costs.




Source: The Parliamentary Office of Science and Technology

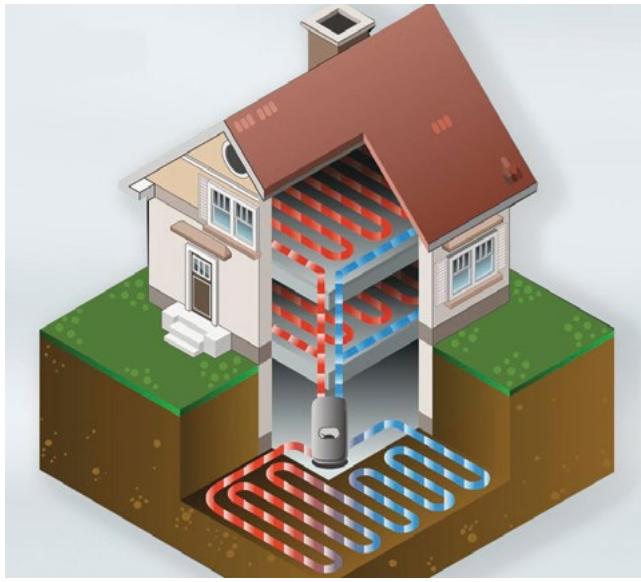



## USING AN AIR SOURCE HEAT PUMP (ASHP) FOR WATER AND SPACE HEATING

- ASHPs are most efficient run at low temperatures e.g., 45°C. This compares to old systems that run at 65°C. They need modern, double panel radiators and very good loft & wall insulation.
- A new HW tank and radiators may be needed.
- An outdoor space is needed for the unit, usually against the house wall. It needs a good air flow and must be at least 1 m from the boundary. Size is that of a large suitcase. See photo above.
- The compressor and fan will make a low hum, but only when working. This happens intermittently, to top up hot water.
- The external fan unit can be close to the house ('monobloc'), or further away if 'split' with a compressor inside the house.
- ASHPs cost much more to install than gas boilers. The Renewable Heat Incentive (RHI) grant reduces the additional cost; see details in Indentify Grants (page 17).

## WOULD A GROUND SOURCE HEAT PUMP (GSHP) BE AN OPTION?

- A GSHP draws heat from the ground instead of the air.
- There are two types:
  - horizontal loops of tubing buried about a metre below the surface. For a large house this could be 300m long.
  - drilling a borehole vertically downwards, 3 holes each 100 metres deep.
- The equipment requires more space than for a ASHP but it will be quieter to run and last longer.
- It is not suitable for most local houses because of the space required.
- A vertical borehole might be possible in a medium sized garden but it would require access for a large drilling rig to install it.
- It is more expensive to install than an ASHP.
- You would still get the RHI grant.



# ELECTRIC HEATING SYSTEMS


Electricity is the most common form of low carbon heating. In the UK much electrical power comes from renewable sources such as solar, wind and biomass. Competition between energy providers is bringing down the cost of 100% renewable energy.

Many hot water tanks that provide hot water have an electric immersion heating element. This can also be used for space heating. There is no RHI grant for this type of heating.

Let's consider modern electric heaters/panels, then look at new electric boiler options.

## ELECTRIC HEATERS AND PANELS

- Storage heaters heat brick-like material during the night. They discharge the heat during the day. This uses low-cost electricity at night, e.g., Economy 7. The discharge of that heat through the day can be set to fast or slow. New thermostatic controls provide a steady flow of heat during the day. The daytime electricity is charged at the standard rate. Installation costs are far less than for a heat pump and you won't need to install radiators. But the running costs will be higher than for heat pumps.
- Radiant panels use an element to heat the air. This warms a room quickly by convection and by radiation. They are fairly cheap to install and are only turned on when needed. But they are more expensive to run than heat pumps.
- Oil-filled radiators are a middle ground. The oil heats & cools quicker than storage heaters. They are cheaper to run compared to radiant panels.
- Infrared panels (IR) emit radiation, like the sun does, to warm our skin. We feel the warmth directly from a panel or from nearby objects, walls etc. There is no associated heating of the air. IR panels are relatively low power and affordable.

## NEW ELECTRIC BOILER OR ELECTRIC COMBI BOILER

- Electric boilers can replace a gas or oil boiler to heat a hot water tank for hot water and radiators.
- Electric combi boilers or flow boilers, heat water on demand.
- They may suit small/medium homes.
- A combi/flow boiler is compact and cheap to install & service. It doesn't need a hot water tank. They may not supply an adequate flow for large homes.
- They are cheaper to install & maintain, but more expensive to run than gas and heat pumps.



# BIOMASS (WOOD AND WOOD PELLETS)

Many homes have a wood burning stove for heating. Biomass boilers are a large version of a stove. They burn logs, woodchip or pellets and provide heat and hot water throughout a house. The size of the equipment and fuel storage make it impractical for most homes in the town. But they qualify for RHI grants.

# OTHER RENEWABLE SYSTEMS

## SOLAR THERMAL

Solar thermal panels convert heat from daylight into energy to provide hot water in the home. They need very large hot water tanks and rarely provide enough to hot water to heat a home.

## WIND

Wind turbines are an important source of renewable energy in remote locations. But they are not effective in towns, even if planning consent was given.

## SOLAR PV ELECTRICITY

Solar PV panels don't provide enough electricity to power a heating system. But they can be made to heat hot water. A solar diverter is installed which uses excess electricity to heat hot water in your tank. This would otherwise be exported to the grid. This maximises your solar gain, is cost-effective but does need a hot water tank. You can also now install batteries to store excess electricity to use it at night.

# RECOMMENDATIONS FROM THE FIVE HOMES SURVEYED

This section summarizes the advice given to 5 different homeowners on how to best:

- reduce their energy costs
- reduce their carbon emissions
- take advantage of government subsidies and grants.






The five homes are typical in size, age and original design to the majority of homes in the town. Over time homes and families change. The recommendations for similar housing types could differ depending on house upgrades and the typical heating demand.

- Heat pumps are viable in many homes in Alton. They can cut carbon emissions dramatically. Even more so if the electricity used is 100% renewable. They are currently much more expensive to install than gas heating. Prices will reduce as sales increase. We await news of government grants to make them affordable.
- Government grants via the Renewable Heat Incentive (RHI) will reduce the cost of installation by about £7000 to £8000. That scheme ends March 2022. We expect further grants to be offered but as yet no details are available. (Summer 2021)
- Improving home insulation is essential for clean heat options. The new systems work at lower temperatures (35°C compared to 60°C) so a first step is to reduce heat lost through the walls, ceiling, floors, windows and doors.
- Comparing different systems depends on the price of energy now and in the future. Today 100% renewable electricity is slightly more expensive than fossil fuels, but the gap is closing fast. If the cost of fossil fuels rises in the future (due to a carbon tax or cost of production or both), then the clean heat options will become more attractive.
- As 100% renewable electricity becomes cheaper, direct heating is an option to consider. This is especially so for flats or terraced houses.

## POINTS TO NOTE WHEN READING THE RECOMMENDATIONS

- Prices quoted are industry averages (spring 2021) and are a guide only. Always obtain competitive quotations from suppliers before starting on a project.
- Survey results refer to RdSAP. This is a UK wide method of assessing the energy performance of existing dwellings. It is used to generate Energy Performance Certificates and was used with this project as a well known and common assessment tool.
- We have not included installation costs in all examples because conditions vary. Again, please obtain your own quotes from suppliers
- The figures shown for reductions in carbon relate to emissions from heating, hot water and lighting. The average household carbon emissions for a typical 3 bed house in the UK, using gas and electricity is 2.7 tonnes each year – energysavingtrust.org.uk/significant-changes-are-coming-uk-heating-market.

PROPERTY 1

## TWO BEDROOM SECOND FLOOR FLAT IN YORK MEWS

A two-bedroom, top floor flat (built 1980s), uninsulated, apart from 75mm of loft insulation. Space and hot water heating is provided by direct electric devices.

### BUILDING FABRIC IMPROVEMENTS:

- Increase mineral wool loft insulation to a depth of 270mm
- Install wall insulation to internal walls to a depth of 100mm by a professional installer to meet building regulations for fire safety.

### HEATING & DHW SYSTEM IMPROVEMENTS:

- The lowest capital cost and 20-year cost option would be to replace the direct heaters in the single flat with high retention night storage heaters and to insulate the existing DHW cylinder
- A second option at this property is to retrofit an ASHP system to serve the flat. This option while being more expensive does offer the most significant carbon reduction.
- An ASHP could be installed for all the flats in the block but buy- in would be required from all leaseholders who would all need to agree to the investment.

| Home improvement | Possible | Proposed | Capital Cost after grant | Annual running cost saving | Payback years | Annual $CO_2$ saving tonnes |
|---|---|---|---|---|---|---|
| Loft insulation (270mm mineral wool) | ✓ | ✓ | £760 | £140 | 5.4 | 0.46 |
| Internal wall insulation (100mm PIR) | ✓ | ✓ | £3,000 | £800 | 3.8 | 2.77 |
| High retention night storage heaters | ✓ | ✓ | £3,850 | £443 | 8.7 | 0 |
| DHW cylinder insulation | ✓ | ✓ | £30 | £37 | 0.8 | 0.26 |
| Communal ASHP for block – costs & benefits to a typical householder | ✓ | ✓ | £15,170 | £760 | 20 | 1.13 |



PROPERTY 2

## FOUR BEDROOM DETACHED HOUSE OFF GREENFIELDS AVENUE

The property is a four-bedroom, detached house originally built in 1974. Since then, double glazing, cavity wall insulation and 270mm loft insulation has been installed, improving the property's thermal performance; as well as solar PV. A modern combi gas system boiler provides both space and domestic hot water heating.

### BUILDING FABRIC IMPROVEMENTS:

- Building Fabric has been improved to good level. Further improvements would offer diminishing returns

### HEATING & DHW SYSTEM IMPROVEMENTS:

- This is an energy efficient house. The alternative to keeping the existing gas boiler is to retrofit an ASHP 'split' system; an external unit at the end of the garden, an internal unit and adding a hot water cylinder. A room-by-room study would also ensure radiators were sized appropriately for the lower running temperature of the ASHP.

### SOLAR TECHNOLOGY

- The suitable roof space of this property has already been filled with solar PV, additional solar PV or solar Thermal panels are therefore not feasible
- A solar diverter controller would allow excess solar generation to displace gas to heat water, saving c.£90 annually.

| Home Improvement | Feasible | Recommended | Capital cost after grant | Annual running cost saving | Payback years | Annual $CO_2$ Saving*, Kg |
|---|---|---|---|---|---|---|
| Further building fabric improvements | ✓ | ✗ | | | | |
| ASHP | ✓ | ✓ | £6,620 + radiators | £80 | 82 | 2.53 |
| Solar Diverter Immersion Control | ✓ | ✓ | £400 | £90 | 4.4 | 0.091 |
| Solar Thermal | ✗ | ✗ | Recommend by RDSAP output but no suitable roof space available | | | |

PROPERTY 3

## THREE BEDROOM TERRACED HOUSE ON BUTTS ROAD

A three-bedroom terraced house built around 1860 with solid walls to the front with an extension added in 2019 at the back, without deep loft insulation. Space and domestic hot water heating are provided by a modern gas combi boiler.

### BUILDING FABRIC IMPROVEMENTS:

- Add 270mm deep mineral wool loft insulation
- Retrofitting double glazed front windows
- Add draught exclusion to the front
- Internal wall insulation to just the solid front wall is possible but would not significantly reduce energy demand.

### HEATING & DHW SYSTEM IMPROVEMENTS:

- The best alternative to keeping the existing gas boiler is to retrofit an ASHP 'monobloc' system; an external unit in the garden and adding a hot water cylinder – a close fit under stairs. The running cost will be higher than the current gas heating by £290 per annum.

### SOLAR TECHNOLOGY

- Solar PV panels could be fitted
- A solar diverter is an option if an ASHP is installed since it would need a DHW tank
- Installing solar thermal panels would not be preferable to PV panels.

| Technology | Feasible | Recommended | Capital cost after grant | Annual running cost saving | Payback years | Annual $CO_2$ Saving*, Kg |
|---|---|---|---|---|---|---|
| Internal wall insulation | ✓ | ✗ | £800 | £14 | 57 | 0.072 |
| Loft insulation (270 mm) | ✓ | ✓ | £400 | £110 | 3.6 | 0.57 |
| Double glazing | ✓ | ✓ | £1,800 | £30 | 60 | 0.72 |
| ASHP | ✓ | ✓ | £5,110 + radiators | -£290 | None | 1.08 |
| Solar thermal | ✓ | ✗ | £2,800 | £26 | 108 | 0.013 |
| 2.1 kWp Solar PV | ✓ | ✓ | £4,800 | £280 | 17 | 0.258 |



PROPERTY 4

## THREE BEDROOM SEMI-DETACHED HOUSE

A three bed, semi-detached house built in the early 1900s extended at the rear in 1980. The windows are double glazed, the original cavity walls are insulated. Space and domestic hot water heating are provided by a modern gas combi boiler. A wood burning stove has been installed.

### BUILDING FABRIC IMPROVEMENTS:

- Loft insulation to a depth of 270mm is recommended, this is a very cost-effective improvement.
- 90mm PIR (rigid thermal) Solid floor insulation is recommended, either by taking up the existing slab or installing over the top.
- Low energy bulbs are recommended throughout and pay for themselves within 3 years

### HEATING & DHW SYSTEM IMPROVEMENTS AND SOLAR TECHNOLOGY:

- The best alternative to keeping the existing gas boiler is to retrofit an ASHP 'monobloc' system; an external unit outside the kitchen and adding a hot water cylinder – this would be a close fit under the stairs. A room-by-room study would also ensure radiators were sized appropriately.
- The ASHP is more expensive option but reduces Co2 emissions. Running costs would be approx. £10 p.a. more to run than the current gas heating.
- Given a hot water cylinder, 6 PV panels (2.1kWp) could be fitted, with a solar diverter. Installing solar thermal panels would not be preferable in terms of payback.

| Technology | Feasible | Recommended | Capital cost after grant | Annual running cost saving | Payback years | Annual $CO_2$ Saving*, Kg |
|---|---|---|---|---|---|---|
| Solid floor insulation | ✓ | ✓ | £1550 | £43 | 36 | 0.25 |
| Loft insulation (270 mm) | ✓ | ✓ | £350 | £25 | 14 | 0.146 |
| ASHP | ✓ | ✓ | £8,190 + radiators | -£10 | None | 2.35 |
| Solar thermal | ✓ | ✗ | £2,800 | £28 | 100 | 0.14 |
| 2.1 kW Solar PV | ✓ | ✓ | £4,800 | £210 | 23 | 0.194 |

PROPERTY

5

## THREE BEDROOM SEMI-DETACHED BUNGALOW

A three-bedroom semi-detached bungalow built in 1972, without cavity wall insulation and with only 150mm loft insulation. Space and domestic hot water heating are provided by an oil boiler installed in 2004 with a hot water cylinder.

### BUILDING FABRIC IMPROVEMENTS:

- Install cavity wall insulation
- Increase loft insulation to a depth of 270mm
- Insulate the floor to a depth of 50mm

### HEATING & DHW SYSTEM IMPROVEMENTS:

- The best alternative to an oil boiler is to replace it with an ASHP 'monobloc' system and an external unit under the kitchen window. As well as replacing the hot water cylinder radiators would need to be upgraded to operate at the lower running temperature of the ASHP.

### OTHER MEASURES

- Solar PV is an option but because of the limited roof space only 2.1KWp is possible
- Solar thermal would not be a better solution than ASHP with or without Solar PV.
- Install LED lighting.

| Technology | Feasible | Recommended | Capital cost after grant | Annual running cost saving | Payback years | Annual $CO_2$ Saving*, Kg |
|---|---|---|---|---|---|---|
| Cavity wall insulation | ✓ | ✓ | £300 | £50 | 6 | 0.24 |
| Loft insulation (270 mm) | ✓ | ✓ | £400 | £24 | 17 | 0.115 |
| Suspended floor insulation | ✓ | ✓ | £885 | £70 | 12 | 0.335 |
| ASHP | ✓ | ✓ | £8,170 + radiators | £200 | 40.9 | 2.66 |
| Solar thermal | ✓ | ✗ | £1,700 | £45 | 37.8 | 0.026 |
| LED lighting | ✓ | ✓ | £48 | £26 | | 0.024 |



## BUILDING FABRIC IMPROVEMENTS

### (LOFT, WALLS, FLOORS, DOORS & WINDOWS)

**Fabric improvements are particularly important when considering ground and air source heat pumps, as they operate most efficiently at low flow temperatures (35 – 45°C). To ensure comfort and efficiency, the heat emitters (radiators or underfloor heating) in each room must be able to meet the peak heat demand of the room using low temperatures.**

### LOFT INSULATION

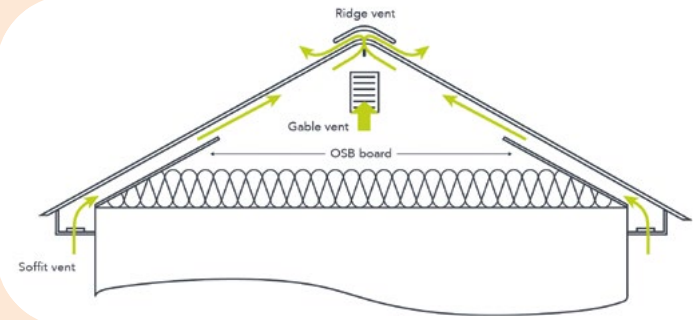
Mineral wool loft insulation is a cheap and cost-effective improvement. Aim to have a depth of about 270mm to ensure the best outcome. Layers should be laid at right angles to one another to reduce air flow between layers. It is important to keep the loft space above the insulation well ventilated, cool and dry. The diagram below shows how woodfibre (OSB) board or similar can be used to maintain effective ventilation to the loft space.

Advantages:

- ✔ Inexpensive
- ✔ Cost effective
- ✔ DIY

Disadvantages:

- ✖ Loss of loft space for storage, but the floor can be raised above the insulation to compensate




### CAVITY WALL INSULATION

Homes built after 1980 will have insulation built into the walls. Homes built between 1920 and 1980 usually have a double wall with an empty cavity between them. This can be filled with insulation and is not expensive. Installers will check there is no exposure to driving rain and the house wall is sound.

## SOLID WALLS

Homes built before 1920 usually have a solid double wall with no cavity. These need a thick layer of special plasterboard fitted to the outside or inside of the walls. Both require a professional install.

External wall insulation is most effective, is less disruptive but costs more. There may be grants for this in the future.

Internal wall insulation is cheaper, but you lose room space and will have to redecorate. Pipes, radiators, windowsills, sockets etc may have to be re-set.

## FLOOR INSULATION

Insulating a solid floor can be done in two ways:

Taking the floor slab up and excavating underneath. A damp-proof membrane, underfloor insulation and a concrete slab is added.

Installing board on top of the slab then lay a laminate floor on top. This is the least disruptive, but both may cause problems with doors, skirting boards, pipes etc.

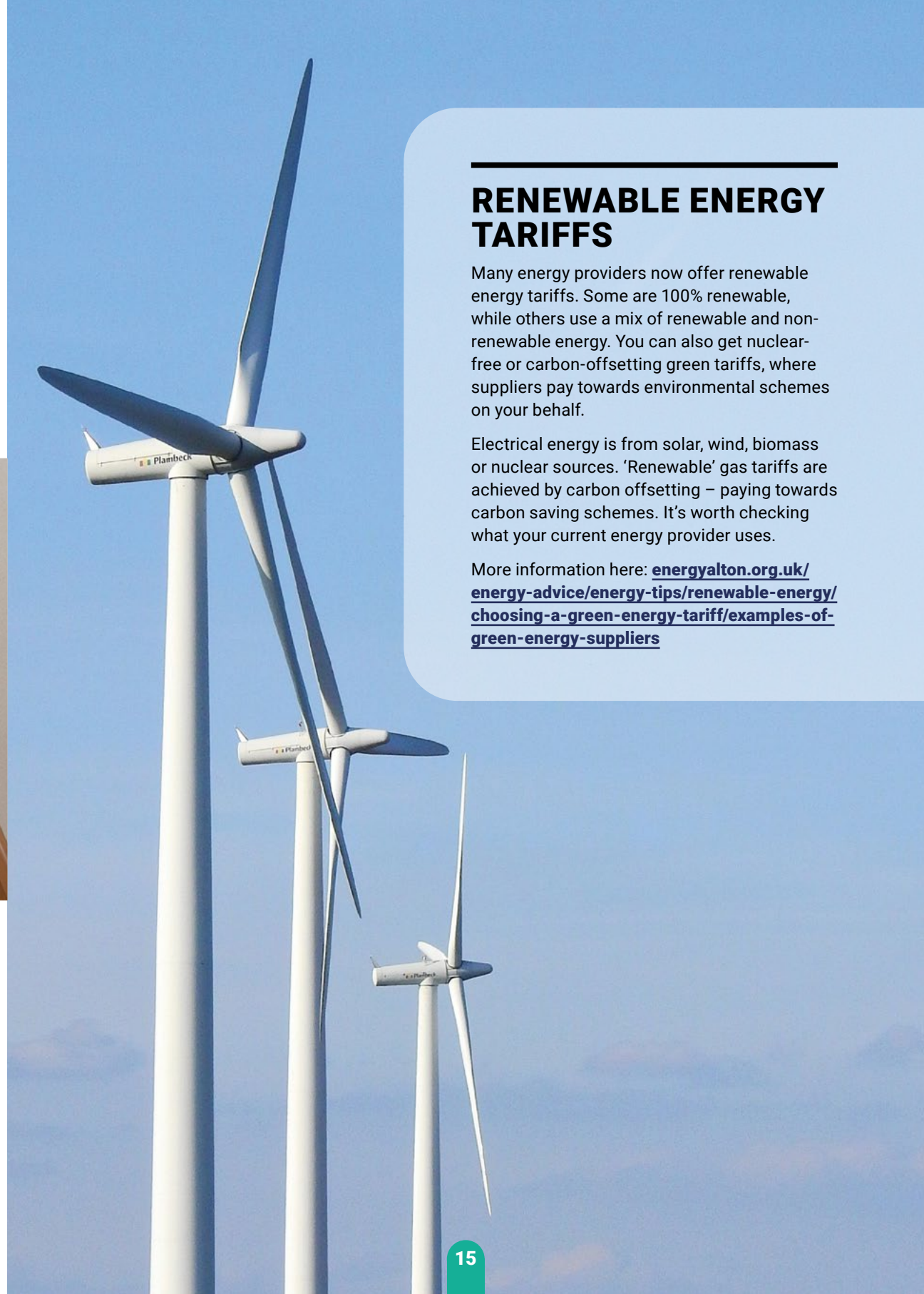
## DOORS, WINDOWS AND FIREPLACES

Replace old and leaking double glazing.

Draughts make people feel cold. Draught exclusion is cheap, simple to install and should lead to cost savings.

Use sealer in gaps and cracks, draught excluders for doors and hatches. You can buy special balloons for use in chimneys.






## RENEWABLE ENERGY TARIFFS

Many energy providers now offer renewable energy tariffs. Some are 100% renewable, while others use a mix of renewable and non-renewable energy. You can also get nuclear-free or carbon-offsetting green tariffs, where suppliers pay towards environmental schemes on your behalf.

Electrical energy is from solar, wind, biomass or nuclear sources. 'Renewable' gas tariffs are achieved by carbon offsetting – paying towards carbon saving schemes. It's worth checking what your current energy provider uses.

More information here: **energyalton.org.uk/energy-advice/energy-tips/renewable-energy/choosing-a-green-energy-tariff/examples-of-green-energy-suppliers**

# NEXT STEPS FOR HOUSEHOLDERS

- Where to get advice on clean heat alternatives
- Identify grants
- List of local installers
- A guide to choosing products and installers

## WHERE TO GET ADVICE ON CLEAN HEAT ALTERNATIVES

**Government Endorsed Advice** is available from **www.simpleenergyadvice.org.uk**.

- You can compare clean heat options under 'Make Your Home Greener'.
- See the personalized advice under 'Plan Home Improvements'
- And look up recommendations in your Energy Performance Certificate (EPC). See **find-energy-certificate.digital.communities.gov.uk**.

**The Environment Centre (tEC, Southampton)** offers heating and insulation advice for homeowners in Hampshire. Tel 0800 804 8601. See links under 'Save Money' and 'Go Green' at **environmentcentre.com/support-and-guidance**.

**Hitting the Cold Spots** – advice for Hampshire residents on broken heating, insulation, saving money on energy bills, funding for home improvements and energy discounts. Run by the Environment Centre (tEC:) 0800 804 8601 or **staywarm@environmentcentre.com**.

**Energy Alton** offers free home energy surveys. Visit **energyalton.org.uk** for independent advice on how to lower your energy bills:

- reducing heat loss through walls, roof, windows and floors
- heating systems
- effective lighting
- damp, condensation and draughts.

**Petersfield Area SuperHomes**, a non-profit service offering whole-home retrofit assessments tailor-made for your home. The assessments have been developed by the National Energy Foundation to identify the best ways to insulate and heat your home. A retrofit assessment is the first step to dramatically lowering your home's carbon emissions and might lead to your home being rated by the National Energy Foundation as a SuperHome. Assessments will be at a discounted rate according to means. For further information go to **petersfieldcan.org/projects/energy-efficient-homes**.

**Local Energy Advice Partnership (LEAP)** is a free service that is helping people keep warm and reduce their energy bills without costing them any money, especially those on low incomes, with health conditions or who are vulnerable. Visit **applyforleap.org.uk** or freephone 0800 060 7567.

**You can buy advice from Retrofit Assessors.** They undertake a survey of your home, produce a detailed floor plan, a condition survey and occupancy assessment. This is based on nationally agreed standards (RdSAP) data.

Search **www.trustmark.org.uk/find-a-tradesman**.

**Retrofit Coordinators** will assess and then project manage a retrofit for a fee.

Search as above.



## IDENTIFY GRANTS

### THE ENVIRONMENT CENTRE (TEC, SOUTHAMPTON)

Offers advice on grants for homeowners. Tel 0800 804 8601 and see links under 'Save Money' & 'Go Green' at **environmentcentre.com/support-and-guidance**.

### DOMESTIC GREEN HOMES GRANT (GHG) – CLOSED TO NEW APPLICATIONS

Homeowners in England could apply for a voucher towards the cost of installing energy efficient and low-carbon heating improvements, typically up to £5,000 for up to two thirds of the cost of qualifying improvements.

### DOMESTIC RENEWABLE HEAT INCENTIVE (RHI) CLOSES 31ST MARCH 2022

The RHI scheme is run by Ofgem. It offers a government subsidy for seven years from the installation of a clean heat system. Each system has a different tariff, including rate and payment cap, roughly based on its likely installed cost. The rates are reviewed each quarter and then confirmed for the 7 years of the scheme. It increases in line with inflation. The Domestic RHI ends at midnight 31 March 2022.

**www.ofgem.gov.uk/environmental-and-social-schemes/domestic-renewable-heat-incentive-domestic-rhi/applicants/apply-domestic-rhi**

### REPLACEMENT FOR RHI – THE CLEAN HEAT GRANT

The Clean Heat Grant is a UK government-run scheme that aims to help existing small domestic buildings transition to low carbon heating systems. The scheme will come into effect from April 2022 and is expected to replace the Renewable Heat Incentive (RHI) – **www.greenmatch.co.uk/green-energy/grants/rhi** – when it ends in March 2022. Based on consultation earlier in 2021 grants may be up to £7000 in voucher form. As of September the scheme has not been announced so we cannot confirm the detail but for further info visit **www.greenmatch.co.uk/blog/clean-heat-grant**.

### ENERGY COMPANY OBLIGATION (ECO)

Energy Company Obligation (ECO) is a government scheme for people on benefits, on low income or who have a long-term illness or disability. Large energy companies offer grants for energy-saving measures. Access via Local Energy Advice Partnership (LEAP) **applyforleap.org.uk** or freephone 0800 0607567.

### WARMER HOMES

This local scheme is for households whose income is less than £30,000. It can fund:

- Solid wall insulation (external or internal)
- Air Source Heat Pumps
- Solar PV panels
- Park Home insulation
- Gas central heating/ gas connection

Currently there is a waiting list for applications for home improvements Tel: 0800 038 5737 or see **www.warmerhomes.org.uk**.

# LIST OF INSTALLERS Information correct as at May 2021

| Name & Location | Biomass | Ground source heat pumps | Air to water heat pumps | Air to air heat pumps | Solar thermal panels | Insulation | Other | Accreditation |
|---|---|---|---|---|---|---|---|---|
| **ECS Plumbing & Heating**<br>Four Marks GU34 5AJ<br>01420 571 000 – www.ecsplumbing.co.uk | ✓ | | ✓ | ✓ | | | Servicing<br>Underfloor heating | Trustmark<br>MCS, RECC<br>Gas SAFE |
| **Green Square**<br>Guildford, GU5 0HB<br>03333 707 707 – www.greensquare.co.uk | ✓ | ✓ | ✓ | | ✓ | | | Trustmark<br>MCS, RECC |
| **A Greener Alternative**<br>Shoreham Airport, West Sussex, BN43 5FF<br>01273 455 695 – www.agreeneralternative.co.uk | ✓ | ✓ | ✓ | | ✓ | | Servicing<br>Underfloor heating | MCS, HETAS, OFTEC<br>Gas SAFE, HIES |
| **Elite Renewables**<br>Surrey CR5 2HT<br>0208 706 0056 – www.eliterenewables.co.uk | | ✓ | ✓ | | ✓ | | Solar PV<br>MVHR<br>Air Con.<br>Architecture (PASSIVHAUS) | Trustmark<br>MCS, RECC<br>GSHPA, Gas SAFE |
| **Air Craft (Southern) Ltd**<br>Christchurch BH23 6NX<br>0800 0016123 – www.acsouthern.com | | ✓ | ✓ | ✓ | | | Mechanical Ventilation and Heat Recovery (MVHR)<br>Air Con. & Air Purification<br>Underfloor heating | Trustmark<br>MCS, RECC<br>BPEC, CIBSE |
| **South Coast Insulation Services**<br>Fareham PO15 5RU<br>01329 822845 – scisltd.co.uk | | | | | | Cavity<br>Internal<br>External<br>Loft | | Trustmark |
| **InstaGroup Ltd**<br>Wokingham, RG40 4PZ<br>0800 526 023 – www.instagroup.co.uk | | | | | | Cavity<br>Internal<br>External | | Trustmark<br>SWIGA, CIGA<br>Members of the NIA and REA |
| **Source Heat Pumps**<br>Old Alresford SO24 9EB<br>0845 4597204 – www.sourceheatpumps.com | | ✓ | ✓ | | | | | MCS |
| **JEM Energy**<br>Fleet GU51 2UJ<br>01252 900052 – www.jem-energy.co.uk | | ✓ | ✓ | ✓ | | | Solar PV | Trustmark MCS<br>F-Gas<br>HIES |
| **The Warmer Group**<br>Dorset BH21 7RZ<br>0800 716846 – www.thewarmergroup.co.uk | | | | | | Cavity<br>Loft | | Trustmark<br>CIGA<br>KIWA |

# A GUIDE TO CHOOSING INSTALLERS AND EQUIPMENT

## ASHP HEATING SYSTEM

### INSTALLATION:

- Ensure your installer and the equipment they use is MCS (Microgeneration Certification Scheme) certified, to obtain grants and funds.
- Your installer should carry out a room-by-room heat loss assessment. This will allow them to accurately size your heat pump and to recommend radiator upgrades, if needed. This ensures enough heat is provided at efficient low temperatures.
- Your heat pump should be set to supply heating water at the lowest temperature possible for your home.
- Avoid siting your ASHP where there is limited air flow (e.g., a courtyard). It reduces efficiency.
- You may need a new unvented domestic hot water cylinder, compatible with your heat pump.
- The ASHP will heat water to 45°C without using the immersion.
- The ASHP should automatically allow a weekly disinfection cycle which raises the water temperature to at least 60°C.

### AFTERCARE:

- Upon completion your installer should show you the day-to-day operation of the system, outline the maintenance requirements and maintenance services available.
- Your installer should offer a 12-month defects warranty from the date of handover. During that time the installer should repair any faults or defects that occur due to faulty materials or workmanship.
- After the warranty expires the manufacturer's warranty should cover any defects caused during normal operations. However, if the defects occur due to poor workmanship, then a claim can be made for latent defects. The statutory period for this is up to twelve years after completion.



## SOLAR PV, BATTERY SYSTEMS AND SOLAR DIVERTER

### INSTALLATION

- Ensure your installer and the equipment they use is accredited with the MCS (Microgeneration Certification Scheme)
- PV panels should have:
  - a minimum 15-year product and 25-year linear performance warranty
  - an inverter with a minimum 10-year product warranty
- Batteries should have a 10-year warranty
- The generation and export meter installed should be compliant with the requirements for the Smart Export Guarantee (SEG) Scheme
- We suggest you use the same installation company for both technologies. Ie battery storage system and the solar PV system
- A Solar Diverter controller is only recommended without a battery. The cylinder should also be equipped with the Marlec Solar I-Boost (or similar). This will a) provide thermal disinfection and b) use any excess electricity from the panels to heat the hot water.

### AFTERCARE:

- For PV only installations: a final installation and commissioning certificate will be raised and submitted to the appropriate district network operator (DNO) on the customer's behalf, within 28 days.
- For PV & Battery installations: the installer shall provide the documents for the Distribution Network Operator (DNO) prior to installation. This is needed by Engineering Recommendations G98 & G99.
- Upon completion the installer should explain to the client the maintenance requirements and maintenance services available.

## INSULATION

### INSTALLATION

- Consult a professional to avoid any risk of condensation and damp or fire.

### MATERIALS TO CONSIDER

- Mineral wool – for suspended floors and loft space
  - **www.thermafleece.com** – this product contains sheep's wool which is more sustainable.
  - **www.knaufinsulation.co.uk/products/loft-roll-44** – Knauf are a market leader, their products are good quality and widely available

### POLYISOCYANURATE (PIR) IS A RIGID INSULATION BOARD. IT IS USED IN MANY AREAS, EG FLOORS, WALLS, LOFT

- **www.kingspan.com/gb/en-gb/products/insulation-boards/insulation-boards/kooltherm/kooltherm-k118-insulated-plasterboard**. This product has high thermal efficiency for rooms where space is tight.
- **www.knauf.co.uk/store/pir-laminate/c-23/p-111**. Slightly less thermally efficient but more cost effective where there is space.
- **insulation-uk.com/products** Celotex offers a cost effective PIR with many uses.

## FABRIC FIRST – FIRST REDUCE THE ENERGY TO BE USED FOR HOME HEATING

Choosing alternatives to fossil fuel heating should be complemented by a fabric first approach, seeking to reduce the amount of energy the building loses through windows, doors, walls, floors and ceilings. Reducing heat loss through insulation and minimising drafts will reduce the electricity or biofuel required, which will reduce heating costs and carbon impacts.

The potential for reducing heat energy input should be found from an Energy Performance Certificate (EPC) or similar energy survey. Energy Alton offers **free Home Energy Surveys**. These can suggest which insulation measures could be applied and ways to reduce draughts. Typical costs and savings will be included in a recent EPC. EPCs can be viewed at **https://find-energy-certificate.digital.communities.gov.uk/find-a-certificate/search-by-postcode?lang=/&property_type=domestic**. A specialist survey would be required to confirm costs and benefits of external or internal wall insulation – see the **List of Local Installers (p18-19)**.

Energy Alton 'Energy tips' on Insulation can be found at **https://energyalton.org.uk/energy-advice/energy-tips/insulation/**

## INSULATION

| | Suitability | Tips about installation | Typical Price | Comments |
|---|---|---|---|---|
| **Loft insulation** | For vented lofts with no damp or condensation problems. Any loft boards need to be raised on legs. | Easy to fit (DIY) using rolls of mineral wool insulation up to the required 270 mm depth. Loft legs enable boards to be re-fitted over this depth of insulation. | £400 to £800 | Ensure good ventilation to avoid condensation.<br>**More info** |
| **Cavity Wall Insulation** | Most 1920s-70s homes have cavity walls; many already filled. | Installers inspect the cavities first to ensure the fibre or beads will spread when injected from the outside. | £1,000 to £5,000 | Resolve any damp issue first.<br>**More info** |
| **Internal Wall Insulation** | Suits solid walls without existing penetrating or rising damp. Useful savings from thicknesses of 100 mm. Some floor area lost. | Need to re-attach internal fittings e.g. skirting, sockets and re-decorate. Breathable insulation or a vapour barrier avoids condensation on cold walls. Professional installation will ensure fire safety. | £5,000 to £11,000<br>(Approx. £50/m2) | Check installation is covered by a 25 year guarantee SWIGA or similar<br>**More info** |
| **External Wall Insulation** | Suits solid walls with good access. | May need planning permission. | £6,000 to £15,000 | Check guarantee cover<br>**More info** |
| **Underfloor Insulation** | Suitable for suspended timber floors. | Unless using a **robot sprayer**, floorboards are lifted, mineral wool is suspended by netting between joists. | £2k-£5k wool<br>£4k-7k spray | |
| **Solid floor insulation** | Suitable where i) a concrete slab can be re-laid over insulation, or ii) where insulation is laid on top. | i) Floor taken up, excavated, damp-proof membrane laid, 90mm of PIR insulation, topped with a concrete slab. ii) PIR insulation laid on slab, new flooring on top | £1000 to £8000 | For new flooring on top of insulation, check the effect of a raised level. |

## COMPARING HEAT PUMPS

Heat pumps transfer heat gathered from the air or ground to an internal heat exchanger to heat domestic hot water (DHW) and either a wet radiator system (air/ground to water) or fanned air (air to air).

| Option Prices and Average Life* | Space Htg, DHW | Space Needed | Hot Water Cylinder | Tips about installation | Ease of use | Grant Eligibility | Note on carbon/ other emissions |
|---|---|---|---|---|---|---|---|
| **Air to water heat pump**<br>Typical price: £8k (8kW) to £9k (12kW) + cylinder £1k + radiators £2k<br>Life: 17 years | Space Heating & DHW | A suitable outside space with good air flow, with a connection from the external unit to HW cylinder through a wall or buried pipe | A suitable hot water cylinder with an immersion element.<br>Expansion vessels or header tanks are also needed. | Efficient models operate at low radiator temperatures, typically requiring an upgrade to older radiators and/or a connection to (new) underfloor heating. External space is needed more than 1m from the property boundary, where a low fan noise would not be a nuisance. If sited away from the home, the fan unit can be connected by buried insulated pipe. | Standard though heating less intensively they are set to run for longer. | RHI | Carbon emissions come from any non-renewable electricity used to run the heat pump.<br>('Refrigerant' will be contained at end-of-life.) |
| **Ground to water heat pump**<br>Typical price: £12k (8kW) to £13k (12kW) + cylinder £1k + radiators £2k<br>Life: 22 years | Space Heating & DHW | Large (garden) area for digging and laying a horizontal ground loop or access (1.5+ m wide) for drilling a deep vertical bore hole. | New hot water cylinder integrated with or additional to a heat pump buffer cylinder. Example size if integrated; 0.6m wide, 2m tall. | The length of the horizontal or vertical ground loop depends on the amount of heat needed. If space is limited, a vertical borehole can be drilled if ground conditions suit, typically 90–160 m deep.<br>Expert advice is required to confirm the suitability and permissions required for drilling a bore hole.<br>GSHPs particularly suit underfloor heating. | Standard though heating less intensively they run for longer. | RHI | Carbon emissions come from any non-renewable electricity used to run the heat pump. ('Refrigerant' will be contained at end of life) |
| **Air to air heat pump**<br>No price data available | Space Heating only | External wall space with good air flow close to internal units for all heated spaces. | A separate DHW system is needed e.g. an electric DHW heater | Only for space heating; not for providing hot water.<br>Need a close connection from external wall units to internal units mounted high on internal walls for each heated space. | Provides warm air and cooling which is thermostat controlled like air conditioning. | None - not eligible for the RHI | Carbon emissions come from any non-renewable electricity used. ('Refrigerant' will be contained at EoL) |

* 2020 Price and expected life data from CCC Supporting Research 'Assumptions Log – Development of trajectories for residential heat decarbonisation to inform the Sixth Carbon Budget (Element Energy)' [ **www.theccc.org.uk/publication/development-of-trajectories-for-residential-heat-decarbonisation-to-inform-the-sixth-carbon-budget-element-energy/** ]

## COMPARING OTHER FORMS OF ELECTRIC SPACE & WATER HEATING

Electric space heating can be from distributed panel heaters, storage heaters or from an electric boiler or combi boiler feeding central heating; domestic hot water (DHW) from an immersion heater or combi boiler. Running costs vary with electricity tariff, so compare long term costs carefully.

| Option Prices and Average Life* | Space Htg, DHW | Space Needed | Hot Water Cylinder | Tips about installation | Ease of use | Grant Eligibility | Note on carbon/ other emissions |
|---|---|---|---|---|---|---|---|
| **Storage heaters**<br>Typical price: £10k to £15k + wiring £5k<br>Life: 15 years | Space Heating only | Deep radiator spaces on internal walls | A separate DHW system is needed. | Suitable current electricity needs to be connected to each storage heater location. Metering needs to separate readings for Economy 7 or similar tariff so night-time heating input is charged at lower cost. | Control of charging & release of stored heat is basic. | None – not eligible for RHI | Carbon emissions come from any non-renewable electricity used. |
| **Infrared panels**<br>Typical price: £1000 to £3000<br>Expected life: 15 years | Space Heating only | Suitable internal wall spaces which provide a radiant effect in a line of sight to occupants. | A separate DHW system is needed. | Suitability of IR panels which heat people (like the sun), not heating air & walls like other systems, needs careful consideration. Suitable electricity connections need to be made to each infrared panel location. | Panels can be controlled to instantly respond to needs. | None – not eligible for RHI | Carbon emissions come from any non-renewable electricity used. |
| **Radiant panels**<br>Typical price: £3k to £5k + wiring £4k<br>Life: 15 years | Space Heating only | Suitable internal wall spaces which provide radiation and convection. | A separate DHW system is needed. | Suitable mains electricity connections need to be made to each radiant panel location. | Panels suit quick control responding to needs. | None – not eligible for RHI | Carbon emissions come from any non-renewable electricity used. |
| **Electric combi**<br>Typical price: £500 to 1000<br>Life: 10 years | Space Heating & DHW | Compact – a replacement for an existing gas combi boiler. | Not needed for a combi boiler. | No flue required.<br>Likely need to uprate the electrical supply to 100A. Take professional advice | Timed heating & DHW on demand. | None – not eligible for RHI | Carbon emissions come from any non-renewable electricity used. |
| **Immersion heater**<br>Typical price: £300 to £2000<br>Life: 5-10 yrs | DHW only | Hot water cylinder | A suitable cylinder with immersion element. | Power supply may need to be increased for a large immersion heater. Take professional advice | DHW comes from the tank if heated in advance. | None – not eligible for RHI | Carbon emissions come from any non-renewable electricity used. |

* 2020 Price and expected life data from CCC Supporting Research 'Assumptions Log – Development of trajectories for residential heat decarbonisation to inform the Sixth Carbon Budget (Element Energy)' [ **www.theccc.org.uk/publication/development-of-trajectories-for-residential-heat-decarbonisation-to-inform-the-sixth-carbon-budget-element-energy/** ]

## COMPARING BIOMASS HEATING USING WOOD/PELLETS

Biomass can be a primary fuel source for space heating and domestic hot water (DHW). Carbon dioxide is emitted during burning, though no more than has been absorbed during the trees' growth.

| Option | Space Htg, DHW | Space Needed | Hot Water Cylinder | Tips about installation | Ease of use | Grant Eligibility | Note on carbon/ other emissions |
|---|---|---|---|---|---|---|---|
| **Wood fuelled boilers**<br>Typical price: £5,000 to £14000<br>Expected life: 10-20 years | Space Heating & DHW | Space for storing wood fuel<br>Space for a boiler e.g. a back boiler | A suitable cylinder with immersion element. | Needs a flue which meets regulations for wood-burning appliances - a new insulated stainless steel flue pipe or an existing chimney. Chimneys normally need lining to make them legal. | Manual feeding and re-lighting needed.<br>Biomass boilers (including stoves with a back boiler) should be kept clean and swept regularly. The chimney / flue pipe must be swept regularly; HETAS recommend "twice a year" | RHI<br>Fuel used by RHI participant must be from an approved sustainable wood fuel supplier. | Biomass absorbs carbon during growth and emits the same amount when burned.<br>Note: Burning wood, especially unseasoned wood, emits harmful PM2.5 particulates. |
| **Pellet fuelled stove**<br>Typical price: £9000 to £25000<br>Expected life: 10-20 years | Space Heating & DHW | Space for pellet burner and accessing pellet fuel feed container. Larger containers allow for cheaper fuel. Access required to load large silos.<br>Buffer cylinders are needed. | A suitable cylinder with immersion element. | Needs a flue which meets regulations for wood-burning appliances - a new insulated stainless steel flue pipe or an existing chimney. Chimneys normally need lining to make them legal. | Automatic feeding systems available.<br>Biomass boilers (including stoves with a back boiler) should be kept clean and swept regularly. The chimney / flue pipe must be swept regularly; HETAS recommend "twice a year" | RHI<br>Fuel used by RHI participant must be from an approved sustainable wood fuel supplier. | Biomass absorbs carbon during growth and emits the same amount when burned. |

### ABOUT THIS GUIDE AND APPENDICES

This report and the material contained in it has been distributed for general information purposes only. It is provided in good faith and we are making no statements or warranty of any kind, express or implied, regarding the accuracy adequacy, validity or completeness of any information contained and the purpose for this guide for Home Owners (Alton Clean Heat Project General Guide) to provide information to members of the public who when using such information should take their own professional advice specific to their circumstances. This is intended to assist only in decision making and we cannot be held liable for any cost, damages, claims or demands or losses suffered from use of the information contained in this guide.

For further information go to

**www.energyalton.org.uk/clean-heat**

or contact us at

**www.energyalton.org.uk/contact** and **07811 462 659**

Energy Alton

See our website **www.energyalton.org.uk** for information about events, other projects, to sign up for our newsletter or for an energy survey.

This work is licensed under the Creative Commons Attribution-NonCommercial 4.0 International License. To view a copy of this license, visit **creativecommons.org/licenses/by-nc/4.0/** or send a letter to Creative Commons, PO Box 1866, Mountain View, CA 94042, USA.