Appendix 3

Hanley Castle Parish

Baseline Energy Report

For the Hanleys Energy Action Team (HEAT)

Carried out by Dave Green & Fran Hunt, Sharenergy

October 2020, revised December 2020
Funded by the Rural Community Energy Fund

Contents

Executive Summary

The Hanleys Energy Action Team (HEAT), one of the groups formed by the Parish Council as part of its carbon neutral initiative, has been looking at ways to reduce the local "carbon footprint". HEAT secured a grant from the Rural Communities Energy Fund (RCEF) to fund a feasibility study to see how that might be achieved, and engaged Sharenergy Co-operative to do the work.

This report summarises the information obtained from the Case Studies carried out and from Energy Performance Certificates (EPCs) and Display Energy Certificates (DECs) listed in the online EPC and DEC Registers. Some additional data was obtained from the Office for National Statistics re the Lower Support Output Area (LSOA) that includes the Hanley Castle Parish, (although this does not completely cover the Parish area).

This report sits alongside the report on the Energy Survey that was undertaken in the Parish, and the report on Renewable Energy Opportunities.

In total, 357 domestic Energy Performance Certificates (EPCs) were found in the online EPC Register. As EPCs are only normally required when a property is sold or rented, or when a grant is applied for and they only came in in 2009 there are still many properties that do not have an EPC.

50% of these dwellings have an energy rating of E, F or G, the worse three bands. It is likely that many of the houses without EPCs would also fall into these bands.

80% of the dwellings are on oil, lpg, electric storage heating or electric room heaters, though surprisingly 9% have air source heat pumps. 6 properties are on wood chip or pellet heating. Again the proportion on the high carbon heating systems is likely to be higher in the overall stock.

30% of them have uninsulated solid walls, another 15% have uninsulated cavity walls.

36% of them have a new boiler as a recommendation, 17% have room in roof insulation recommended.

10% of the properties have photovoltaic panels but this will not be representative of the overall stock.

There are also 39 non domestic EPCs on the register, of these 36% are in the worse three bands.

Display Energy Certificates for the two schools were also analysed.

Eight properties were studied in greater detail with a visit from a trained energy assessor. Of these 7 were assessed to be suitable for a heat pump. 5 of these are interested in finding out more. One of the others already has a low oil use and the last one has a fairly new oil boiler and elderly occupants.

Other recommendations made include sloping ceiling insulation, loft top-up, cavity wall insulation, solid wall insulation, radiator panels, draughtstripping, chimney blocking, photovoltaic panels.

National Data

Lower Super Output Area (LSOA) Data

The Government uses LSOA areas as it's basis for many of its statistics, including census data. The LSOA E01032217 includes the whole of the Parish plus for some reason an extra sparsely populated area to the South.

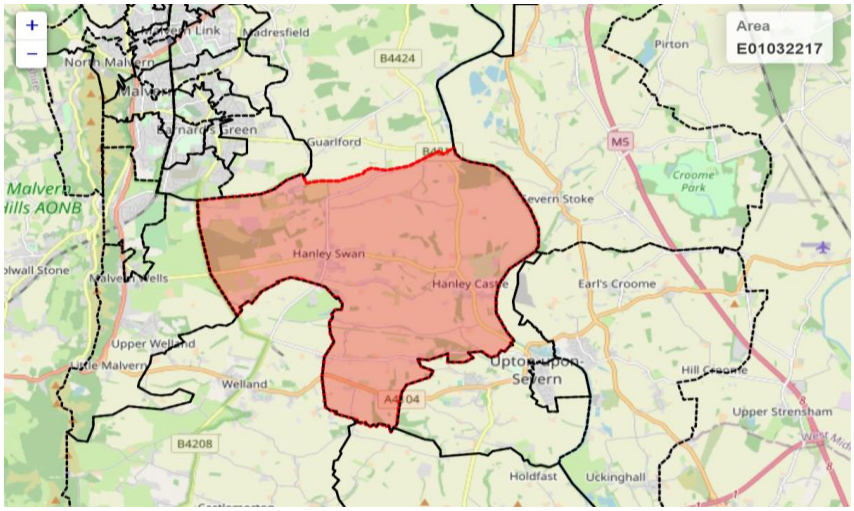


Fig 1 LSOA E01032217

Source: https://www.nomisweb.co.uk/query/construct/components/stdListComponent.asp?menuopt=12

Fig 2 Map of Hanley Castle Parish

There were 1,340 usual residents as at Census day 2011. Of these, 94.9% lived in households and 5.1% lived in communal establishments. The average (mean) age of residents was 47.2 years.

In total there were 593 household spaces. Of these, 560 (94.4%) had at least one usual resident and 33 (5.6%) had no usual residents.

The “Rooms, bedrooms and central heating” data shows:

Households

	Hanley Castle Parish	
	count	%
All households	560	100.0
Does not have central heating	20	3.6
Does have central heating	540	96.4
Occupancy rating (rooms) of -1 or less	13	2.3
Occupancy rating (bedrooms) of -1 or less	5	0.9
Average household size	2.3	
Average number of rooms per household	7	
Average number of bedrooms per household	3.3	

The Department for Business, Energy and Industrial Strategy (BEIS) document “Sub-national gas and electricity consumption statistics” provides commentary on BEIS’ sub-national estimates of electricity and weather corrected gas consumption for England, Scotland and Wales. Estimates are based on meter point data provided by the electricity and gas industries from their administrative systems. The most recent estimates are for 2018 Lower Super Output Area (LSOA) electricity consumption:

Area Name	LSOA Code	Meters	kWh	Mean	Median
Malvern Hills	E01032217	698	3904824.9	5594.305014	4305.1

Source:https://www.gov.uk/government/statistics/lower-and-middle-super-output-areas-electricity-consumption

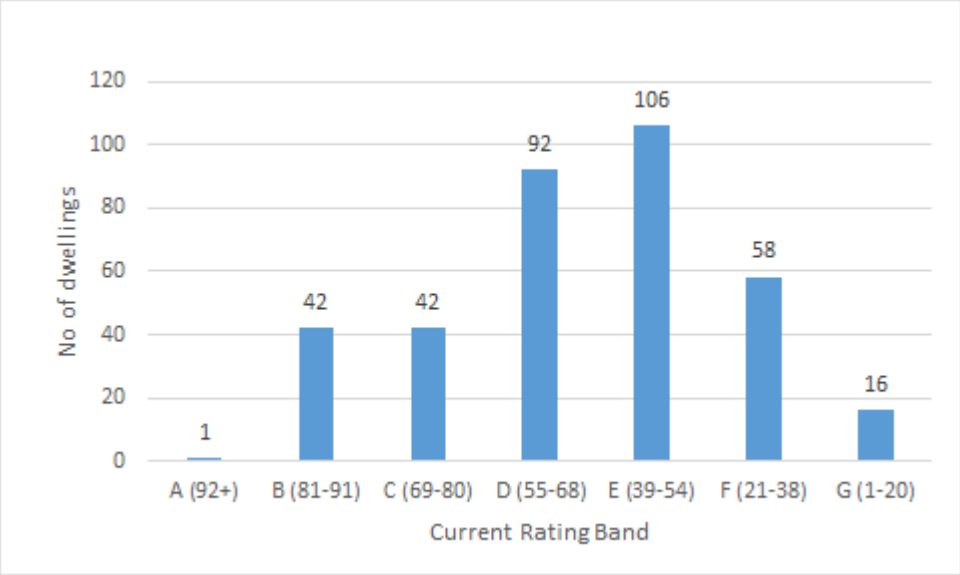
Domestic EPC Analysis Summary

In total, 357 domestic Energy Performance Certificates (EPCs) were found in the online EPC Register. As EPCs are only normally required when a property is sold or rented, or when a grant is applied for and they only came in in 2009 there are still many properties that do not have an EPC.

These have been analysed and produced the results that follow.

Energy Efficiency Ratings

The Energy Efficiency Rating shows the current and potential energy efficiency of homes. The main rating assesses the property on the basis of cost/square metre allowing for standard occupancy, not including cooking and appliances.

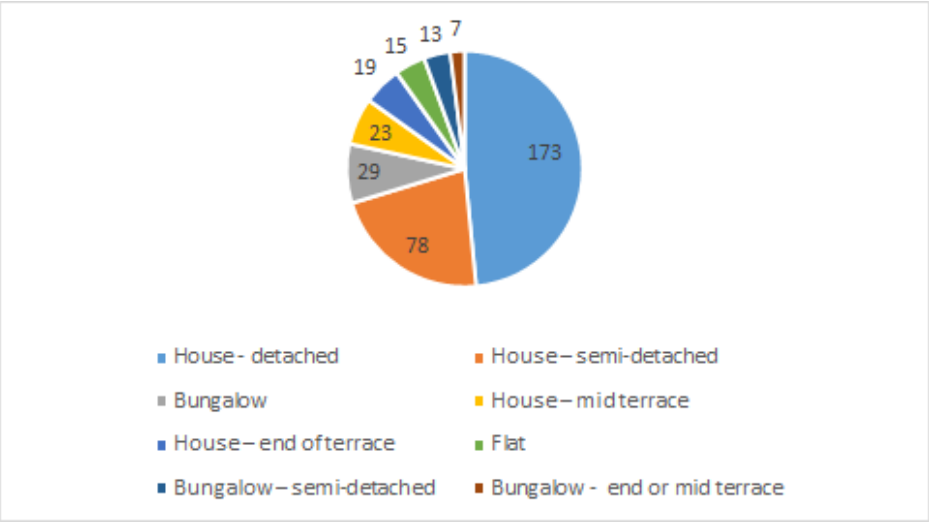


Highest Rating 95 A Lowest Rating 1 G

The higher the rating, the lower the bills are likely to be, but because the occupancy of the properties will vary, the EPC rating does not reflect actual energy usage. A ruling was made in 2018 that properties with a Rating of F or G should not be rented out (although exemptions can be applied for).

There is also a secondary rating for domestic properties which measures carbon emissions (but this is seldom used).

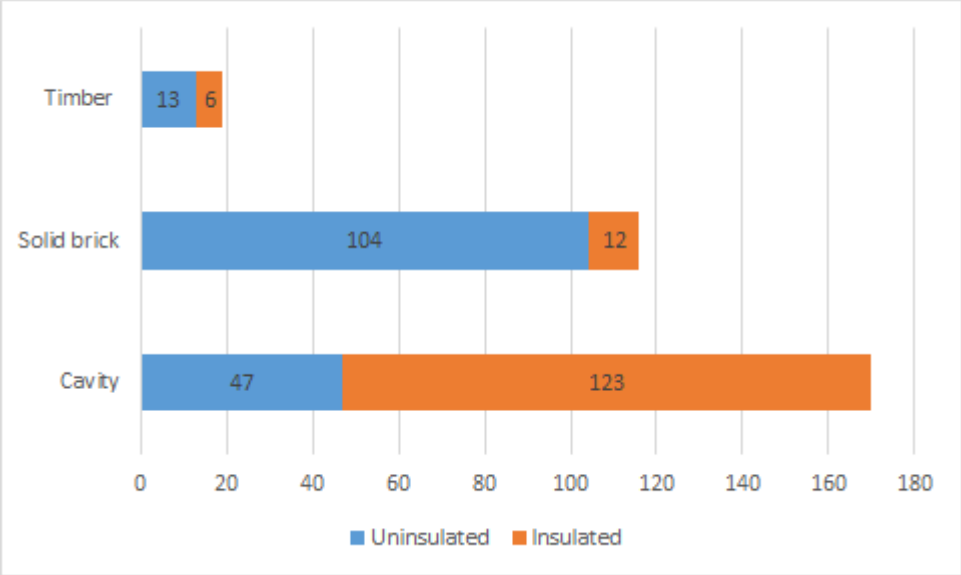
Dwelling Types



Dwelling sizes

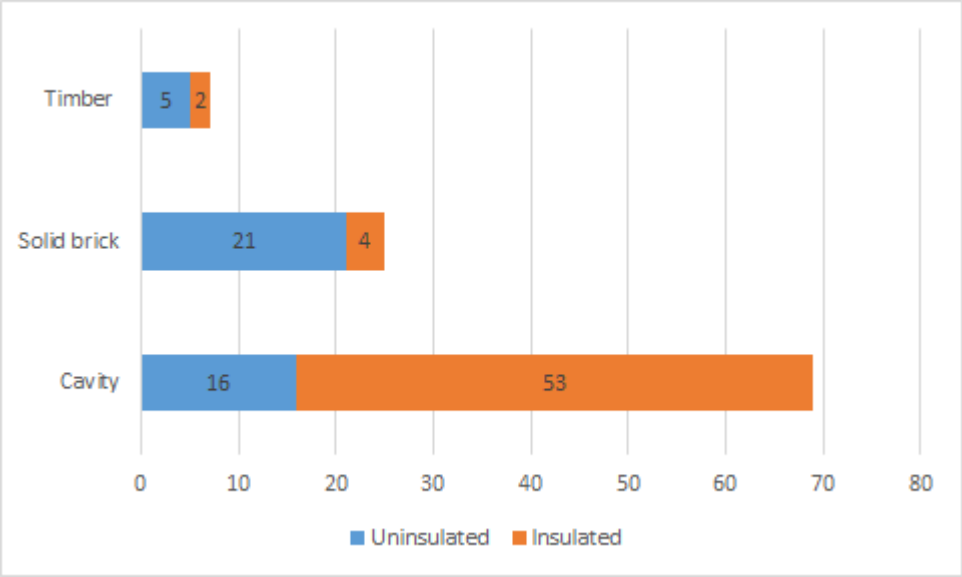
Sum of Area m²	Total EPCs	Average Area m²	Highest Area m²	Lowest Area m²
51843	357	145.2	1079	38
Excluding Severn End: 50764	356	142.6	521	39

Main wall construction



New-build EPCs do not give main wall type; this indicates that 52 of the EPCs are for properties built in the last 11 years.
If 52 is added to the 141 properties with insulated walls, this equals 193 insulated, or 54%

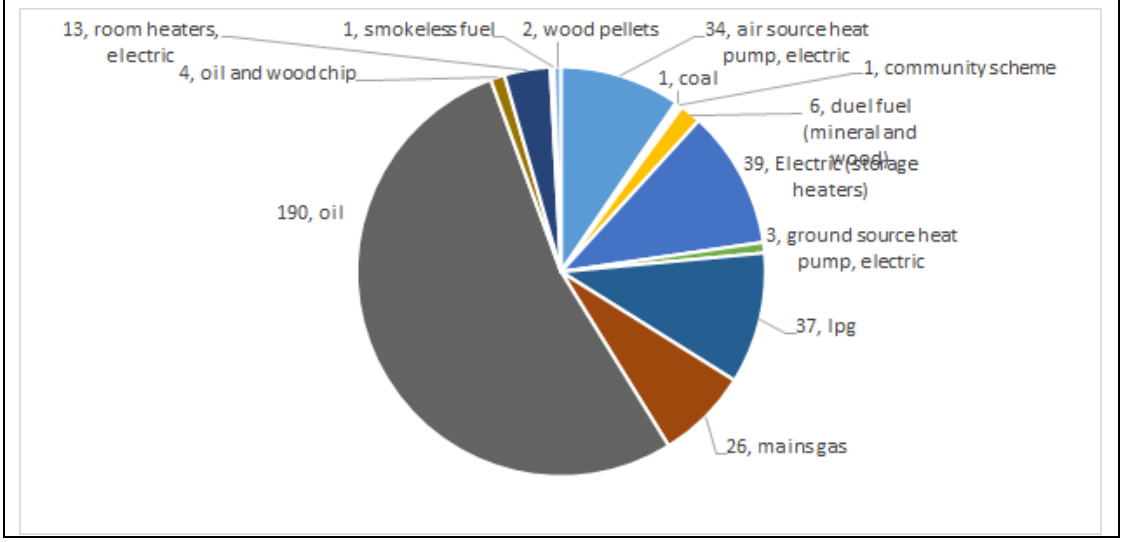
Secondary walls



Main heating

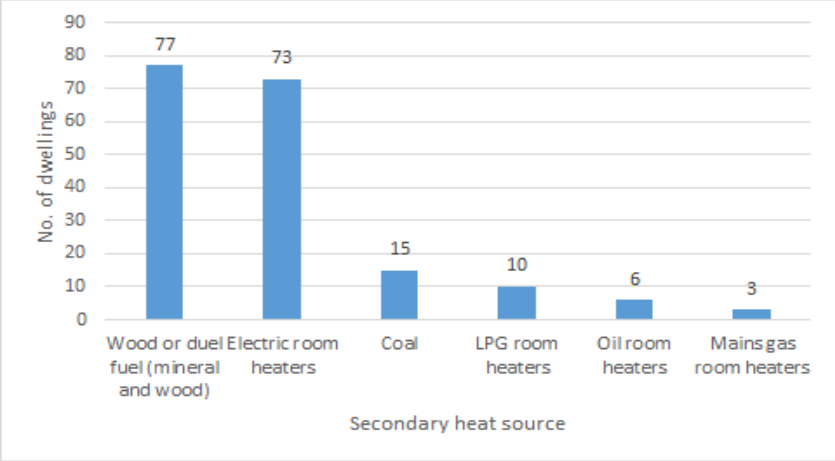
There is no mains gas available for most of the Parish, so heating is mostly oil fired with some LPG, electric and biomass.

Main heating fuel	Number of dwellings	Percentage
Oil	190	53%
LPG	42	12%
Electric storage	39	11%
Air source heat pump	34	9%
Mains gas	20	6%
Room heaters, electric	13	4%
Duel fuel (coal and wood stoves)	6	2%
Wood chip (& oil)	4	
Wood pellets	2	
Ground source heat pump	3	
Bottled gas	1	
Coal	2	
Community scheme	1	
Grand Total	357	
The mains gas properties are all at Blackmore Park, The wood chip & oil are at Severn End.		



266 have boiler & radiators, or 75%
39 have storage heaters, or 11%
37 have a heat pump, or 10%*
15 have none of these.

Secondary heating

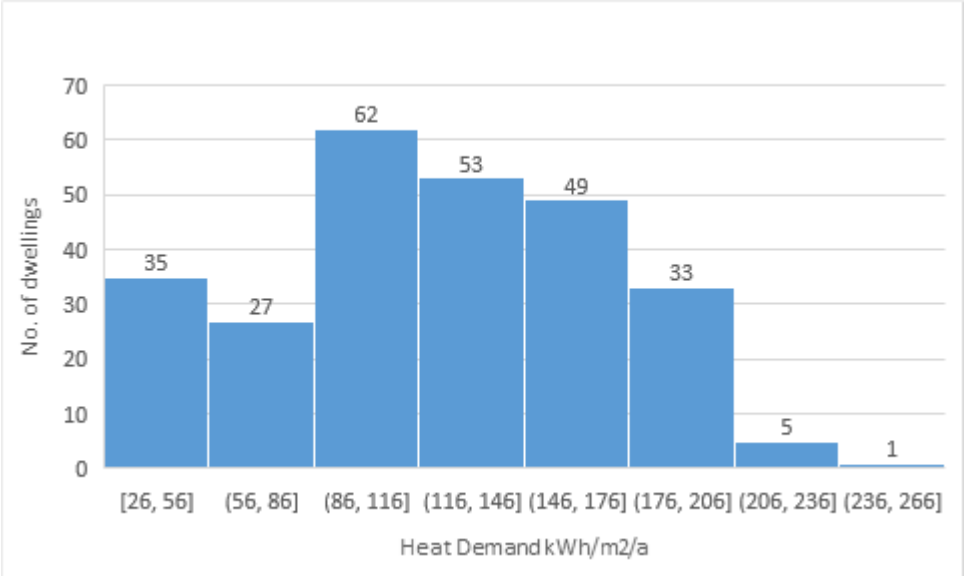


92 of those properties with secondary heating (132) 58.3% have wood or multifuel stoves.

Heat demand

For most homes, the vast majority of the energy costs derive from heating the home.

Earlier EPCs don't include a heat demand figure, therefore data for heat demand is only available for 265 properties.

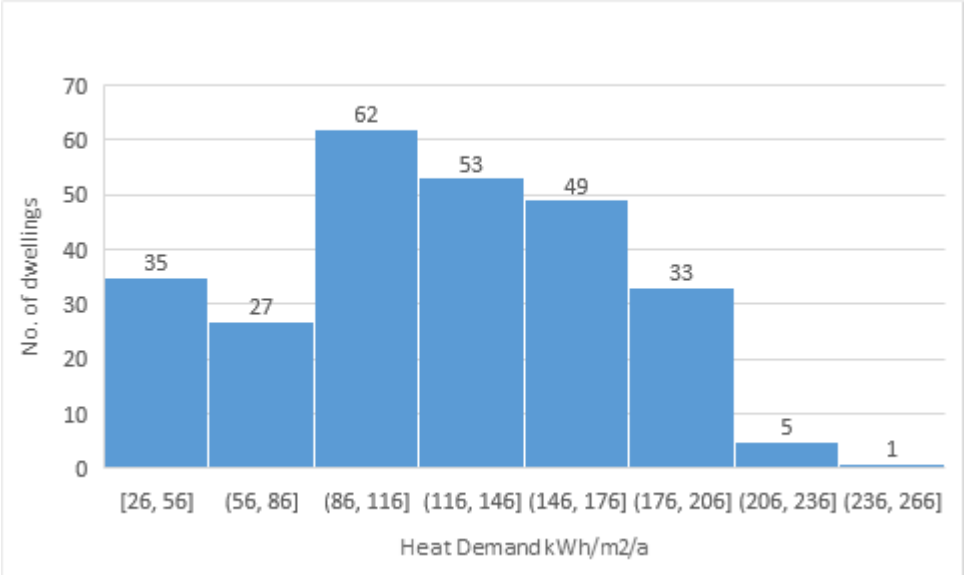


The total heat demand figure varies from 2,960kWh/a to 183,110 (Severn End), giving an average of 17,280.

The next highest heat demand after Severn End is 78,400.

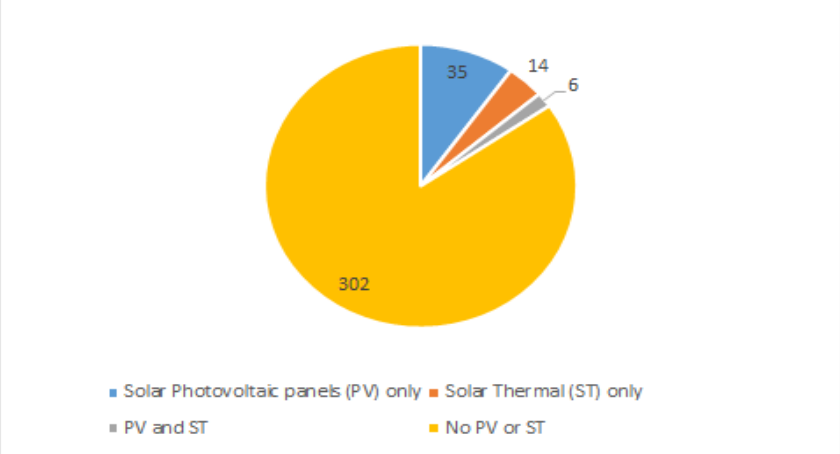
Removing Severn End from the calculations, the average drops to 16,650.

Heat demand measured in Kilowatt hours per square metre of area (kWh/m2/a) varies between 26 and 253. The average is 120kWh/m2/a, ten properties are over 200kWh/m2/a.



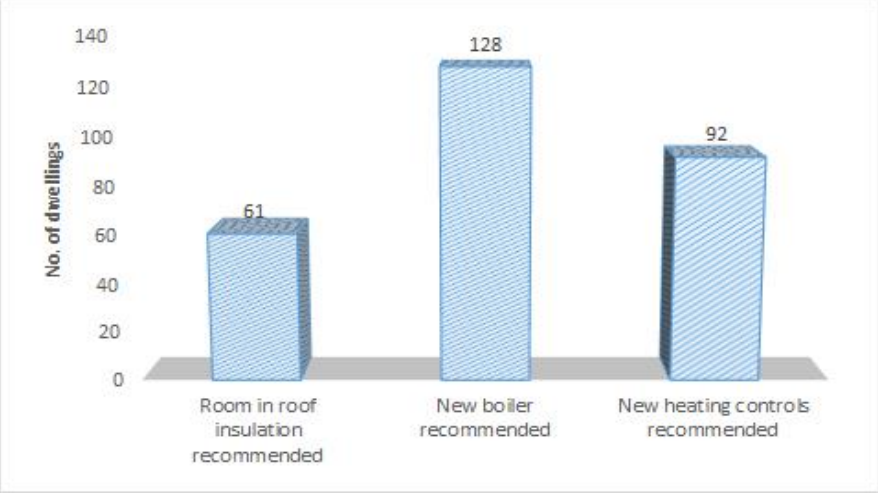
Solar PV or Solar Thermal Panels

Solar PV or Solar Thermal	No. of dwellings	%
Solar Photovoltaic panels (PV) only	35	10%
Solar Thermal (ST) only	14	4%
PV and ST	6	2%
No PV or ST	302	
Total	357	



It is unlikely that there are many properties that have PV but don't have an EPC, as having an EPC was a requirement of claiming the Feed In Tariff, so proportion of all properties is probably nearer 7%. If the PV systems average 3kW then that amounts to 126kW.

Recommendations made



Loft insulation was found to be under 200mm in 143 dwellings.

New boiler will be recommended if the current boiler is not condensing. A condensing boiler even if over 10 years old will not trigger the replace boiler recommendation.

Non-domestic EPC Analysis Summary

Hanley Castle Parish includes a facility for children with autism, a care home, one outdoor pursuits centre, four industrial estates, two smaller estates with smaller office units, two shops, two pubs, a British Legion hall and a village hall. The largest industrial estate has one large recently-built factory and warehouse and a smaller, fairly new office block; five further plots are being offered for development. Non domestic EPCs are normally only produced when a property is sold or rented out. The two schools are unlikely to have EPCs but they do have Display Energy Certificates (DECs).

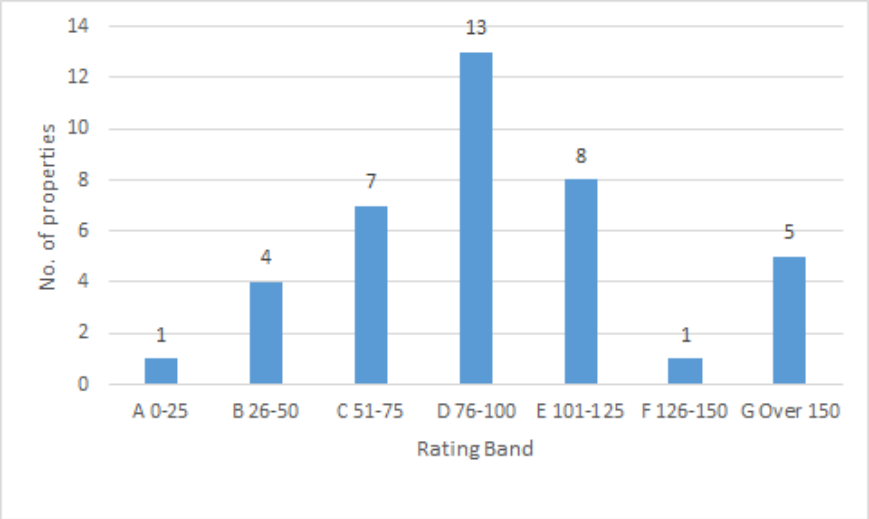
The energy performance of non-dwellings is shown as a CO2 based index. The CO2 based rating a building receives depends on the energy used for space heating, water heating, ventilation and lighting, less any energy generated from energy generation technology installed in the building (such as solar water heating). The activity is also important and the building is compared to a similar reference building and it's the comparison that determines the final rating. It is therefore not an absolute measure of $CO2/m^2$. The lower the number, the lower the typical CO2 emissions (based on a scale of zero to 150+, note this is the opposite direction to the domestic rating).

39 non domestic EPCs were found for the Parish, 19 of these are for the Hanley Workshops, 10 are for Willow End. Some of these appear to be duplicates where larger units have been split into smaller parts.

Energy Efficiency Ratings

The non-domestic building EPC indicates the energy efficiency of the building fabric and the heating, ventilation, cooling and lighting systems for non-dwellings. The ratings are A to G with F and G rated properties not deemed suitable for rental.

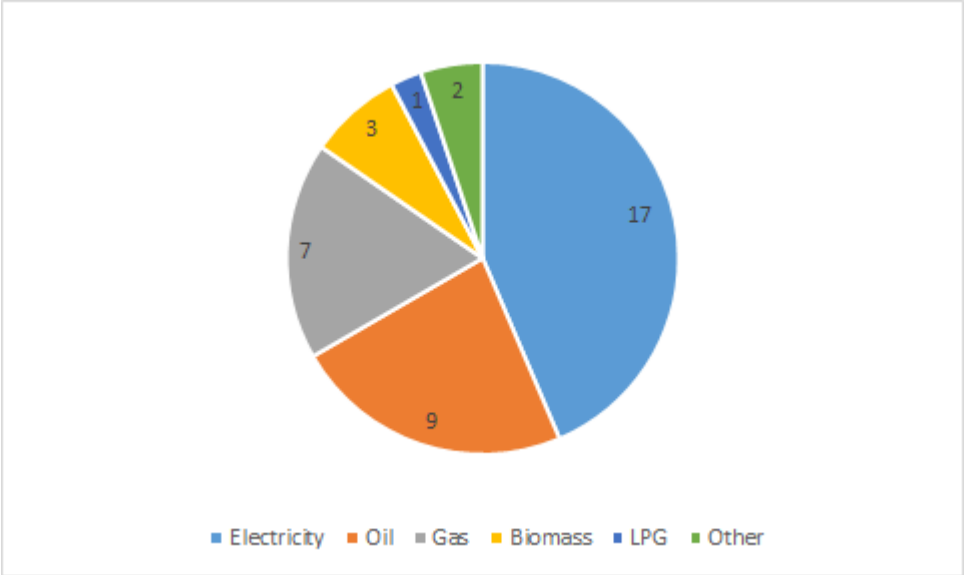
Current Rating Band	No. of properties
A (0-25)	1
B (26-50)	4
C (51-75)	7
D (76-100)	13
E (101-125)	8
F (126-150)	1
G (150+)	5
Total	39



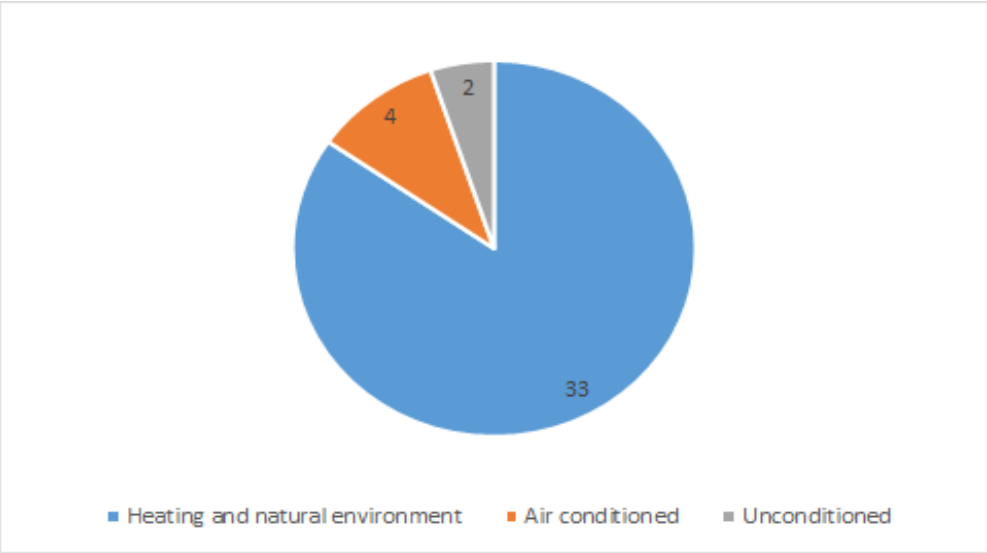
The highest rated property is the new ESP factory at A 21. This is also by far the largest non-domestic property in the Parish at 14,778m^2

The worst rated property is Hanley Workshops U4-6 at G300, Hanley Workshop U1 is rated G286. The other G rated properties are the Butchers (though this probably actually uses very little energy), Cobweb Folly at Blackmore and Hanley Workshop U11-12.

Main heating



Building environment



Total useful floor area

Sum of Area	No. of EPCs	Average Area	Highest Area	Lowest Area
32081	39	823	14778	41

Not including ESP, the average area is 455m^2

There are only five buildings other than ESP's factory with over 1,000m^{2,}

These are Albion Lodge Care Home, two units at Merebrook, Hanley Workshops Units 4-10 and the ESP offices.

Non-domestic DEC Analysis Summary

Whereas EPCs measure *theoretical* performance, Display Energy Certificates (DECs) measure *actual* performance. All buildings over 500m2 that allow access to the public should have a DEC. Normally DECs are produced annually and the certificate shows three years' energy use, but buildings less than 1,000m^2 only need to have a certificate done every 10 years.

DECs are produced for separate buildings, not for a site, so a school may have several DECs, this can cause issues where parts of a site are split up into separate DECs but there isn't any data available for the energy use of that particular building.

DECs are rated against a benchmark for that type of building, A best to G worst.

There are 6 DECs for the High School, one for the Primary School

	Area	Rating	Fuel	Energy use/m^2	Improving?
Main Building	3111	D	Oil	127	Yes,
Y&E Block	2016	D	Oil	127	Yes
Sports Hall	810	C	LPG	73	n/a
L Block	803	C	Biomass	127	n/a
6th Form	709	C	Electricity	51	n/a
Aspire	485	E	Oil	156	n/a
Primary School	694	C	Oil	131	n/a

The two larger buildings at the High School are both overdue for a new DEC.

Display Energy Certificate

HM Government

How efficiently is this building being used?

MAIN BUILDING
Hanley Castle High School
Church End
Hanley Castle
WORCESTER
WR8 0BL

Certificate Reference Number:
0290-1217-0150-7060-5004

This certificate indicates how much energy is being used to operate this building. The operational rating is based on meter readings of all the energy actually used in the building including for lighting, heating, cooling, ventilation and hot water. It is compared to a benchmark that represents performance indicative of all buildings of this type. There is more advice on how to interpret this information in the guidance document *Display Energy Certificates and advisory reports for public buildings* available on the Government's website at: www.gov.uk/government/collections/energy-performance-certificates.

Energy Performance Operational Rating

This tells you how efficiently energy has been used in the building. The numbers do not represent actual units of energy consumed; they represent comparative energy efficiency. 100 would be typical for this kind of building.

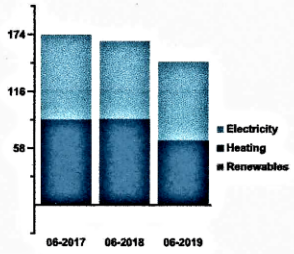
More energy efficient

A 0-25
B 26-50
C 51-75
D 76-100 ◀ 93
100 would be typical
E 101-125
F 126-150
G Over 150

Less energy efficient

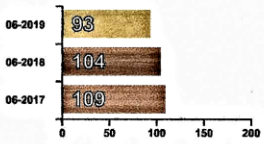
Total CO_2 Emissions

This tells you how much carbon dioxide the building emits. It shows tonnes per year of CO_2.



Previous Operational Ratings

This tells you how efficiently energy has been used in this building over the last three accounting periods.



Technical Information

This tells you technical information about how energy is used in this building. Consumption data based on actual meter readings.

Main heating fuel: Oil
Building environment: Heating and Natural Ventilation
Total useful floor area (m²): 3111
Asset Rating: Not available

	Heating	Electricity
Annual Energy Use (kWh/m²/year)	80	47
Typical Energy Use (kWh/m²/year)	148	40
Energy from renewables	0%	0%

Administrative Information

This is a Display Energy Certificate as defined in the Energy Performance of Buildings Regulations 2012 as amended.

Assessment Software:	DCLG, ORCalc, v3.6.3
Property Reference:	105175670000
Assessor Name:	Mr. Callum Blakemore
Assessor Number:	EES/019323
Accreditation Scheme:	Elmhurst Energy Systems
Employer/Trading Name:	Briar Associates (part of the Zenergi group)
Employer/Trading Address:	York House, High Street, Amblecote, Stourbridge, DY8 4BT
Issue Date:	20-01-2020
Nominated Date:	30-06-2019
Valid Until:	29-06-2020
Related Party Disclosure:	Not related to the occupier.

Recommendations for improving the energy performance of the building are contained in the associated Recommendation Report - .
You can obtain contact details of Elmhurst Energy Systems at www.elmhurstenergy.co.uk.

Case Studies

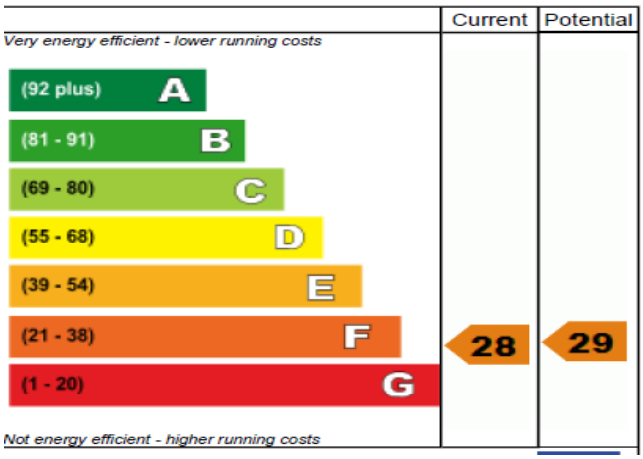
Six properties in the Parish were given an extensive survey and written report; two further properties were visited and advised on potential measures.

Case Study 1 Victorian Detached

This is a Victorian building which was converted into a three-bedroom dwelling in 1982. The floor area is 231m^2 including a large living room. The walls are all solid brick, uninsulated. There is apparently 200mm of insulation in the loft, but this is a relatively small area. There are large areas of sloping ceiling which have had some spray foam insulation injected into them. Many of the windows have been double glazed, but not all.

The boiler is fed by bottled LPG rather than from a tank, but is rarely used. There are also several modern storage heaters with automatic controls and two wood stoves. The main living room is rarely used in winter. There is a foam-covered hot water tank. There is a PV system and Electric Vehicle chargers.

The property was rated F28 in 2009 (certificate now expired)



Electricity Use, 11,000kWh/a including two electric cars and storage heaters,

LPG use, 5,200kWh/a background heat only plus 2.25m^3 of wood.

Recommendations made:

1. Insulate Sloping Ceilings

Sloping ceilings in a property like this will be a major source of heat loss even with the spray foam. A dense foam insulation such as Kingspan or Celotex will give twice as much insulation per inch as fibreglass or polystyrene.

This work could qualify for the £5,000 voucher scheme recently launched but only if the builder is TrustMark accredited (see https://www.trustmark.org.uk/find-a-tradesman) and the work is completed by end of March 2022.

This work is unlikely to produce fuel savings as the building is not fully heated at present, but would make the building more comfortable and the fitting of a heat pump more viable.

2. Consider Fitting a Heat Pump

Electricity is rapidly becoming a low carbon fuel as the UK grid decarbonises; a heat pump is a good way of reducing the carbon impact further by extracting much of the energy needed from the surrounding environment.

Heat pumps work by tapping heat from an external heat source by use of a compression cycle, in the same way that fridges extract heat from their interior. Ground source pumps are more efficient in colder weather than air source ones as the ground temperature is less variable than the air temperature. The ground source can be either through slinky pipes laid under a lawn or by boreholes. Care should be taken that the loop area is sufficient to provide the heat needed, otherwise the ground can freeze.

Heat pumps are measured by a Coefficient of Performance (COP). A COP of 3 means 3 kWh of heat is generated for every kWh of electricity put into the system. An average COP of around 3 for an air source pump, nearer 4 for a ground source would be expected.

Heat pumps work well with a better insulated building, with underfloor heating or larger radiators (as they distribute lower temperature water than a standard boiler does), with a wood stove to top up the heat in the coldest weather and with Photovoltaic (PV) panels which can produce some of the electricity to run the pump in spring and autumn.

It is considered that an air source heat pump on its own would struggle, given the size and age of the house but a hybrid heat pump could be considered,

See https://www.daikin.co.uk/en_gb/product-group/hybrid-heat-pump.html

Heat pumps benefit from the Renewable Heat Incentive (RHI); the domestic RHI has been extended to the end of March 2022. For more info on the RHI see

https://www.ofgem.gov.uk/environmental-programmes/domestic-rhi

These installers could be contacted for quotes:

- Caplor Energy of Herefordshire https://www.caplor.co.uk/renewable-heat/heat-pumps/ground-source-heat-pump/
- Kensa, based in west Country but with national reach https://www.kensaheatpumps.com/
- Energy Zone, Cleobury Mortimer www.energyzone.co.uk
- Worcester Renewable Energy, Malvern http://www.worcester-renewable.co.uk/

Alternatives to a heat pump include:

- Wood Pellet boiler, which could also attract RHI funding and be automated. Pellet storage would be needed, and the pellets need to be of good quality, enabling the feed mechanism to work properly.
- High Heat Retention Storage Heaters (HHRSHs). HHRSHs can improve the energy rating of the property, but only if an approved model is fitted. Normal storage heaters lose heat to the room, but HHRSHs hold on to a significant amount of heat in warm conditions, giving substantial savings and more control over standard storage heaters.

3. Radiator Panels

For any radiators on an external wall, radiator panels fitted against the wall can reduce heat loss and enable the radiator to heat up more quickly. These panels can be bought as a foil roll or as sheets with fins, the sheets provide a slightly better performance and can be easier to fit. Radiator panels are available from all good hardware suppliers.

4. Draughtstripping

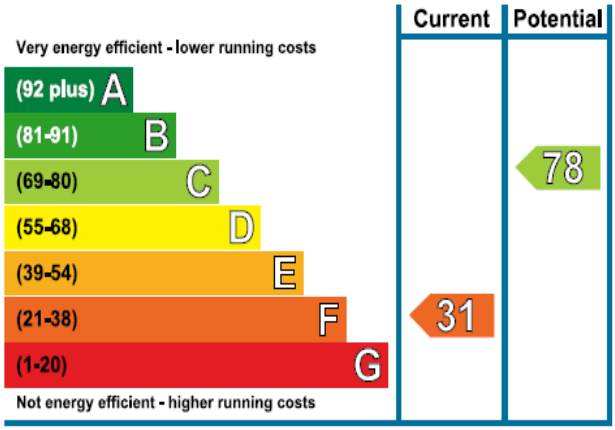
For draughts through gaps in floorboards or under skirting boards, products such as Stop-Gap (See www.stogaps.com) or Draughtex (See www.draughtex.co.uk) are very useful.

Case Study 2 Detached House with Storage Heaters

This is a detached two-storey house built in at least three parts. The oldest section is timber frame walls with brick infill, the central section is probably 19th C built with solid brick walls, and the third section is circa 1980s having cavity walls with partial fill insulation. There is also a separate small annex. The floor area is 152m$^{2.}$

There is some insulation in the lofts and sloping ceilings. The current heating is from electric storage heaters, with a large open fireplace in the lounge. Water is heated by electric immersion. All windows are double glazed.

The property rated F31 in 2020



The property was only purchased recently so no fuel data is available.

Recommendations made:

1. Insulate Sloping Ceilings

Sloping ceilings in a property like this will be a major source of heat loss. As major repair works are being undertaken this is an ideal time to insulate these. If the existing ceilings are removed then insulation can be placed between the rafters and further insulation applied below them (eg an insulated plasterboard). Any ceilings remaining in place can have insulation placed under the rafters,

but to get the same effect a greater thickness of insulation will be needed. Dense foam insulation such as Kingspan or Celotex is recommended (See Case Study 1).

2. Loft Insulation Top-Up

The loft insulation should be topped up to at least 200mm and doing this is a requirement to claim the Renewable Heat Incentive for a heat pump system (see recommendation 6). This is a relatively cheap and straight forward job, however, it needs to be ensured that there is sufficient ventilation above the insulation to reduce condensation risk.

3. Consider Internal Solid Wall Insulation

This is an expensive measure but could be carried out using the new voucher scheme and as other extensive work is being carried out, should certainly be considered. It is assumed that external insulation would not be suitable for this property. Internal insulation is less effective but the advantage is that only certain rooms can be insulated, not necessarily the whole house. For older properties it is recommended that a breathable insulation is used, such as cork or Pavatherm, see https://www.pavatex.com/en/products/wall/pavatherm/. If the plaster is removed from more than 50% of the external walls, then your Building Inspector would expect them to be insulated unless it can be shown that it is too expensive.

For smaller areas where thickness is an issue (For example, dormer windows and window reveals) products such as Semapatap or Aerogel could be used. Sempatap does not provide much thermal improvement, but it is enough to raise the surface temperature and reduce condensation risk, see https://www.mgcltd.co.uk/sempatap-thermal/. Aerogel is more effective, it costs more but for small areas this would make little overall difference, see https://www.thermablok.co.uk/

4. Consider Insulating Floors

This is normally an expensive measure but if the floors are being taken up anyway, then insulation should certainly be included when they are relaid; in fact, building regulations will require this.

Replacing solid floors also gives the opportunity to lay underfloor heating pipes. Underfloor heating is very effective but is not a quick response system so is best used in properties with fairly high occupancy. Underfloor heating works particularly well with heat pumps (see Recommendation 6).

5. Consider Fitting a Wood Stove

The existing open fireplace will be a major source of ventilation losses, with much valuable heat escaping up the flue whether the fire is lit or not. The fire itself will be around 25% efficient. The open fireplace should be blocked off and consideration given to fitting a wood stove. Wood stoves are a good combination with heat pumps, because they give a means of topping up the heat in the coldest weather. If fitting a wood stove, consideration needs to be given to where the draught comes from. Depending on the size of the stove, an air brick or other ventilation may be a requirement. This can be provided by a pipe laid under the floor or out through an external wall. If separate ventilation is provided for the fire, then the doors and other openings can be well sealed to reduce uncontrolled draughts.

Any wood burnt should be well seasoned and a wood stove should not be loaded up at night and left to smoulder; this produces more tar. See http://www.lightfootenergy.org.uk/how-to-use-a-stove-2/

Energy Zone also wood stoves, see Case Study 1 for details.

6. Consider Fitting a Ground Source Heat Pump

See Case Study 1 for more details.

Alternatives to a heat pump include a wood pellet boiler or High Heat Retention Storage Heaters (HHRSHs). See Case Study 1 for more details.
The annex to this property could be included in the heat pump system, or fitted with HHRSHs.

7. Consider Fitting Photovoltaic Panels (PV)

PV panels generate electricity, but are no longer supported by the Feed In Tariff so are only worth fitting if the direct use of the electricity generated is high enough. With a heat pump, there would be a high direct use, and if already fitting scaffolding, this could lower the cost.
Caplor, Worcester Renewables and Energy Zone install PV. See Case Study 1 for details.

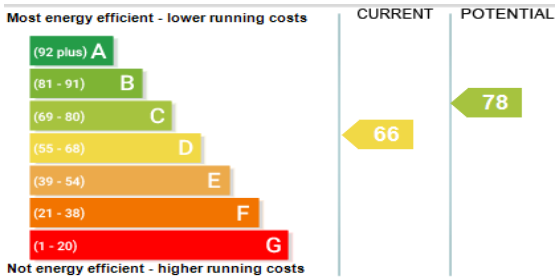
Consideration could also go further to look at achieving the Passive House Retrofit standard; see https://www.passivhaustrust.org.uk/competitions_and_campaigns/passivhaus-retrofit/ or an AECB carbonlite accreditations. https://www.aecb.net/aecb-building-certification/. This would be more costly but would deliver a very comfortable, easy to heat home. To do this, it would be necessary to engage a Passive House consultant, see https://www.passivhaustrust.org.uk/members/consultants/

Case Study 3 1950s Semi Detached

This is a 4-bedroom 1950s semi-detached house in Winnington Gardens that was extensively extended in 2005.

The walls are all insulated cavity brickwork. There is some insulation in the main loft, the extension loft is fully insulated. There is a condensing combi oil boiler, with a programmer, room thermostat and thermostatic radiator valves. The living room has an electric room heater but it is seldom used. All windows are double glazed, most of the lights are low energy.

The property was rated D66 in 2020



Electricity Use 3,900kWh/a

Oil Use around 1,000l/a (10,000kWh)

Recommendations made:

1. Loft Insulation Top-Up

Loft insulation should be topped up to at least 200mm. See Case Study 2 for more details.
To maintain storage in the loft this, can be achieved using loft legs and boarding. See www.loftleg.com.
Insulation should not be squashed as this reduces its insulation value.

3. Radiator Panels

See Case Study 1 for more details.

4. Draughtstripping

See Case Study 1 for more details.

Case Study 4 Thatched cottage

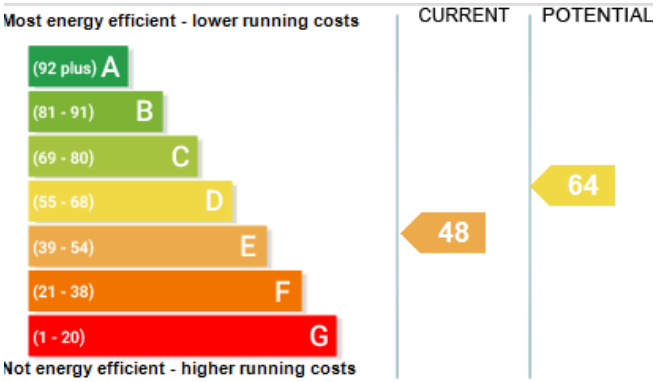
This is a thatched cottage, a modern timber frame extension at the rear and smaller front bathroom extension with tiled roof. The cottage walls are all uninsulated solid brick. The bathroom roof is uninsulated.

There is a condensing combi oil boiler, rated at 89% efficiency. There is also a multi fuel stove in the new extension. Most lights are low energy, around 70% of the windows are double glazed or fitted with secondary glazing.

Electricity use 7,000kWh/a

Oil use 1,000l/a (10,000kWh) plus firewood

The property was rated as E48 in 2020



Recommendations made:

1. Insulate Sloping Ceilings for front bathroom extension

Sloping ceilings in a property like this will be a major source of heat loss.

See Case Study 1 for more details.

2. Consider Fitting a Ground Source Heat Pump

See Case Study 1 for more details.

Case study 5 Large Detached Listed House

This is a large detached Grade 2 listed property, mostly timber framed, with one end built in the 1940s, possibly with cavity brickwork. The heating and hot water are from a new oil boiler with full controls and a factory insulated hot water cylinder. There are two large open fires which are not used. An electric AGA is used for cooking, which is switched off in the summer months. Most windows are single glazed, and there is 200mm of insulation in the loft. The house is quite exposed to heavy winds.

No energy certificate is available.

Electricity Use 17,000kWh/a, inc an electric AGA,

Oil Use, 3,500l/a (35,000kWh)

Recommendations made:

1. Block off the larger chimneys
This can be done using felt pads such as Chimney Sweep (See www.chimneysheep.co.uk), which cut down heat losses through warm air rising up the open chimneys.

2. Secondary glazing
This is an acceptable measure on listed buildings as it can be removed easily, and can help to cut draughts and reduce condensation as well as reducing heat loss. Magnetic versions are effective and relatively cheap (See www.magneglaze.co.uk), and the panels can easily be lifted off and stored during the summer months.

3. Radiator Panels
See Case Study 1 for more details.

4. Draughtstripping
See Case Study 1 for more details.

5. Consider Cavity Fill Insulation
The 1940s extension probably has uninsulated cavity walls. These should be inspected to see if they are suitable for insulating. If the cavity is wide enough and clean enough, then insulating them would save heat loss from this end of the house, provide warmer wall surfaces and enable this part of the house to stay warm for longer when the heating is switched off.
See www.dysoneneryservices.co.uk

6. Photovoltaic Panels (PV)
PV panels generate electricity, but are no longer supported by the Feed In Tariff, so are only worth fitting if the direct use of the electricity generated is high enough. The electricity use for this property is high, so a PV system should be considered.
See Case Study 2 for more details.

Case study 6 Detached House 1940s with 1960s extension

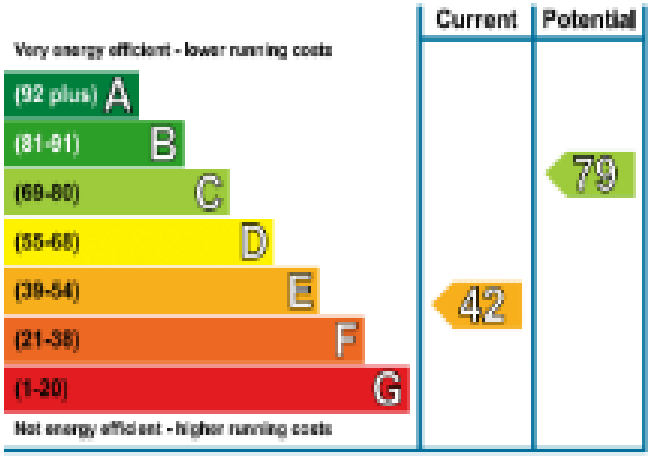
This is a detached house built in 1947 with a rear extension added in the 1960s.

The walls are all of cavity construction that are not insulated. The windows are all double glazed. There is over 200mm of insulation in the loft and no sloping ceilings.

The heating is mostly from an oil boiler which is over 10 years old, but has been well serviced. Problems with the radiators had led to use of supplementary electrical heating, but this has now been resolved. There is a Hive controller on the heating system. There is no wood stove. Hot water is from the oil boiler, and there is a well lagged hot water tank.

The electricity usage for this property is particularly high (around twice the average), but it is expected that this will drop, and the oil usage increase, following the replacement of the radiator system.

The property was rated as E42 in 2014



Electricity Use 7,000kWh/a

Oil Use 1,500l/a (15,000kWh)

Recommendations made:

1a. Consider Cavity Wall Insulation

Cavity wall insulation can dramatically improve the heat retaining properties of a property, saving on heating bills and keeping the property much warmer when the heating goes off. This is a fairly straightforward job and problems are relatively rare, but an insulation inspector must check that the cavities are wide and clean enough before any installation is agreed. This property is in a fairly sheltered location, with no obvious cracking or mortar defects noted, so providing the cavities are suitable, this work should be done. This work would qualify for the new Green Homes voucher scheme, which would pay 40% of the cost. *(details given previously above)*

Dyson Energy services also carry out this work, see www.dysonenergyservices.co.uk

or 1b. Consider Internal Solid Wall Insulation

This is an expensive measure, but could be carried out using the new Green Homes voucher scheme. It is assumed that external insulation would not be suitable for this property, partly due to the appearance, but also the lack of roof overhang.

See Case Study 2 for more details.

2. Consider Fitting a Heat Pump

See Case Study 1 for more details.

3. Consider Fitting a Wood Stove

See Case Study 2 for more details.

4. Consider Fitting Photovoltaic (PV) Panels

See Case Study 2 for more details.

5. Radiator Panels.

See Case Study 1 for more details.

Case Study 7 Detached House with Oil Heating

This is a four bed solid walled detached property with insulated sloping ceilings in the attic and a modern rear extension with underfloor heating. There is a good quality wood stove and the potential to fit PV panels on a new garage at the rear of the garden.

The owners had been advised by an installer to fit an electric boiler to replace their ageing oil fired system. The installer had incorrectly stated that the electric boiler would be a similar price to run as the current system. We pointed out that actually an electric boiler would cost between two and three times as much to run as the current oil system and there is no financial support to fit one.

We recommended that the owners consider an air source or ground source heat pump which could benefit from the Green Homes Voucher scheme and the Domestic RHI (although if claiming both, the RHI payments would be reduced). A biomass boiler was also discussed but the owners were keener on a heat pump.

With the installation of a heat pump, the owners might need to replace some of the ground floor radiators but this is not a major job. The heat pump would fit well with the underfloor heating to the rear of the property, and the woodstove. Fitting PV panels would provide some of the electricity to run the pump, especially in spring and autumn.

There is no EPC for this property.

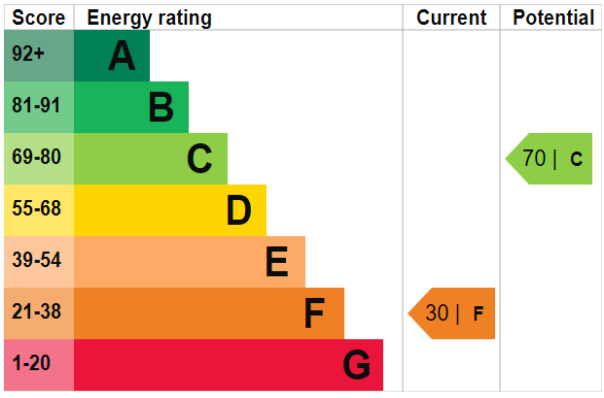
Oil use around 2,500l/a (25,000kWh)

Case Study 8 Detached Cottage with Storage Heaters

The owners had already had a visit by Energy Zone who had recommended an air source heat pump. Whilst most of the cottage is pre 1900 timber frame, the wall panels, floors and sloping ceilings have all been insulated and the windows are double glazed. There is also a good-sized wood stove in the living room. A smaller part of the property is a 1950s cavity wall extension, these cavities are probably not filled and should be filled if possible but it can be difficult to find an installer to tackle such a small area.

We recommended that an air source heat pump appeared to be viable for the property.

The property was rated as F30 in 2020.



No fuel data was available.

Update on the eight properties visited

The owner of Case Study 2 (Detached House with Storage Heaters) is undertaking considerable renovation work including insulation to sloping ceilings and floors and has decided not to fit a heat pump, but will probably fit an oil boiler.

Case Study 3 (1950s semi) needed very little work and already has a low use of oil, so little action is anticipated.

The owners of Case Study 4 (Large Detached House) are elderly and have a relatively new oil boiler, so are not planning any improvements at the moment.

The other five properties are all seriously considering fitting heat pumps and carrying out other works, although it has proved difficult to find any installer willing to quote for ground source heat pumps (despite one installer stating that the local ground conditions are ideal). The one ground source quote that has been obtained was for over £40k. It is therefore more likely that these properties will fit air source heat pumps.