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A practical path to net zero carbon for our parsonages

This paper sets out some helpful hints and tips for energy efficiency and energy reduction in parsonages.

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A Practical Path to Net Zero for Parsonages

This paper sets out some helpful hints and tips for energy efficiency and energy reduction in parsonages. Part One of the document offers guidance to the occupants of parsonages and Part Two outlines information of relevance to Diocesan Parsonage Boards and Parsonage Inspectors.

Part One: Advice for occupants

These recommendations aim to help residents of parsonages, clergy housing and other residential property save money by reducing their energy consumption and in so doing, saving carbon at the same time. They are based on the experience of Parsonage Inspectors and other property staff.

NOTE: Many of the suggestions below appear common sense, yet when implemented collectively can help save considerable sums of money and reduce the carbon emissions associated with the occupancy of the dwelling.

Know your home's carbon footprint

The concept of carbon emissions may seem rather abstract, but every time we use the heating, lighting and appliances in our homes, we produce carbon emissions, and the more we produce the more costly it is on our finances and the environment.

To reduce your carbon emissions, it helps to know where you are starting from - the 'operational carbon' produced by heating, lighting, and appliances. These are affected by how occupants live and behave in their homes. You can use the technique below to calculate your start-point carbon footprint to know how much carbon your property produces.

The amount of carbon emitted by you using heating, lighting and your appliances in the property can easily be calculated from annual consumption figures provided by your energy supplier. Using the formula below, you can calculate your home's carbon emissions:

Annual CO_2e emissions = annual consumption (kWh) x standard emission factors

The 2023 emission factors are:

- Standard grid electricity 0.205 kg CO_2e / kWh,
- Natural gas 0.202 kg CO_2e / kWh,
- Oil 0.284 kg CO_2e / litre
- LPG 0.230 kg CO_2e / litre.

Worked example

When, if a parsonage as an annual consumption of 6,000 kWh electricity and 20,000 kWh of gas, the annual CO_2e emissions = (6,000 x 0.205) + (20,000 x 0.202) = 5.27 tCO_2e. In this example, to achieve net zero this dwelling will need to remove or offset 5.27 $tC0_2e$ each year. However, if the electricity/gas is from a 100% green

tariff, then it is already very nearly net zero carbon (there is a small factor for the distribution of the electricity/gas).

Note: If your household wants to go further, you can find your whole ecological footprint, including food, purchases, and travel, using a carbon footprint tool such as 360 Carbon https://www.climatestewards.org/carbon-calculators/ or the WWF Footprint calculator https://footprint.wwf.org.uk/.

Section A: Where do we start?

Answer – 'Energy conservation': - The easiest and cheapest way to conserve energy and save money is to reduce your consumption by adjusting day-to-day behaviour in simple ways. These suggestions below are the easiest to implement and will help you to save money and reduce your carbon footprint, and all can be achieved by some simple adaptions to the day-to-day use of your home.

You could:

A1. Adjust room thermostats – dropping down a degree or two will reduce demand on the boiler.

A2. Adjust heating programme timer settings – does it need to run as long? Can you reduce the duration that the heating is on for?

A3. Turn off the lights, computers and unplug appliances not in use. Even leaving them on standby – Appliances left plugged in are still using electricity. Considerable savings can be made by unplugging.

A4. Close curtains in unused rooms – this will help retain residual heat.

A5. Wash laundry in a 30deg wash – this will save energy.

A6. Reduce the use of a tumble dryer – hang clothes to dry naturally either outside or in a well-ventilated room with an open window.

A7. Avoid drying clothes on radiators as not only will this limit their efficiency, but it may also cause issues with condensation and mould.

A8. Avoid storing materials up against the building to prevent damp penetration.

A9. Try taking shorter showers or fewer baths. Less water means less demand on the boiler and less energy will be used.

A10. Avoid overfilling the kettle by only boiling the water that you will use.

A11. Use a microwave, when possible, as that method heats the food and not the air space inside, unlike an oven.

A12. Wait to run a washing machine or dishwasher until you have a full load.

A13. Consider solar power portable chargers for phones, ipads etc. - leave them on a windowsill or sunny place to charge, then charge your appliance when needed.

A14. Choose to purchase 100% green electricity and green gas.

A15. Having undertaken the above measures, choose to offset the remainder of your energy use by using a verifiable offsetting scheme.

Section B: What next?

Answer – 'Energy conservation': - through DIY adaption/monitoring of your home. The steps below can be done by you with little external assistance. Most actions cost more than the ones in Section A above, and/or require more time and thought. Some require some specialist advice and/or installers. They are often good next steps for those occupants with the time and resources to move on further towards 'net zero'.

You could:

B1. Switch to LED bulbs - LED light bulbs are more energy efficient; you could also consider installing motion sensor lighting in communal and external areas.

B1. Use draught excluders – consider ways to reduce draughts around the house such as curtains over doors and the use of door 'sausages' for gaps at floor-level. Please discuss other draught exclusion measures with your parsonage inspector.

B2. Ensure all ventilation grilles or air bricks are clear and in working order. Dust can accumulate in these vents reducing their effectiveness.

B3. Enquire about a smart meter. All energy suppliers should be able to offer you a smart meter free of charge as part of the government's plan to reduce carbon emissions. A smart meter enables you to know exactly how much energy you are using in real time.

B4. Consciously select appliances with high energy efficient ratings when replacing. Ideally, choose A+++ efficient appliances where possible.

B5. Report issues and liaise with the Diocese to keep the building in good repair.

Further work

The Diocesan Parsonage Board has the responsibility of assessing each property for its suitability for additional energy conservation work. Targeted work will be carried out across the Diocese based on the recommendations of the Diocesan Parsonage Board only.

Summary

Applying the easy items in Section A first may assist in reducing your energy consumption, save you money, and help the diocese to achieve the aim of Net Zero by 2030. It will also enable you to demonstrate good stewardship of resources and be a visible wider witness of Caring for God's Creation.

Part Two: Advice for Diocesan Parsonage Boards and Diocesan Inspectors

These recommendations aim to help Diocesan Parsonage Boards and Diocesan Inspectors make considered decisions that will help reduce the energy consumption and associated carbon emissions of parsonages within their diocese. The information is based on the advice of leading retrofit specialists and traditional homes advisors.

Calculate baseline carbon footprints for each property.

To reduce carbon emissions, in the first instance, it is useful to know the baseline emissions produced by the property – how much 'operational carbon' is being produced by heating and lighting, and the appliances within the building – its *current performance*. This is influenced by how the occupants use their homes.

The amount of carbon emitted during the operational use of any building can easily be calculated from annual energy consumption figures outlined in the utility bills for the property. Using the formula below, the carbon emissions and carbon intensity of each property can be established and aid the identification of priority buildings requiring work:

Annual CO_2e emissions = annual consumption (kWh) x standard emission factors

The 2023 emission factors are:

• Standard grid electricity 0.205 kg CO_2e / kWh

• Natural gas 0.202 kg CO_2e / kWh

• Oil 0.284 kg CO_2e / litre

• LPG 0.230 kg CO_2e / litre.

Worked example

When a parsonage has an annual consumption of 6,000 kWh electricity and 20,000 kWh of gas, the annual CO_2e emissions will be = (6,000 x 0.205) + (20,000 x 0.202) = 5.27 tCO_2e. In this example, to achieve Net Zero this dwelling will need to remove or offset 5.27 $tC0_2e$ from the atmosphere each year. However, if the electricity/gas is from a 100% green tariff, then it would already be very close to achieving Net Zero carbon (there would be a small factor for the distribution of the electricity/gas).

Most of the energy used in homes is for space heating. To calculate the annual space heating of the property, take the annual energy consumption in kWh used to heat the property and divide that by the area of the property in m^2 (heating in $kWh/m^2/year$). So, assuming the property in the above example is $140m^2$, the annual space heating of the property would be 20,000 kWh (gas)/$140m^2$ = $143kWh/m^2/year$.

NOTE: the government's target is $50kWh/m^2/year$.

Energy efficiency measures requiring no specialist input

Inexpensive and accessible energy efficiency measures

Initial, quick, and inexpensive improvements can help reduce the energy use of a property.

- Ensure that the property has LED bulbs throughout. Also, consider the installation of motion sensor lighting in communal and external areas.
- Encourage the use of Draught Excluders / Ventilation on all door & window frames to reduce uncontrolled ventilation and save energy.
- Ensure all ventilation grilles or air bricks are clear and in working order. Enable vacuum cleaning on a regular basis as necessary.
- Check whether the property has a smart meter. All energy suppliers should be able to offer a smart meter free of charge.
- If you provide appliances, replace them, when required with energy efficient appliances. Choose A+++ efficient appliances where possible.
- Encourage the purchase of 100% renewable electricity and 'green' gas from a green supplier.
- Encourage the offsetting of the remainder of the occupant's energy use using a verifiable offsetting scheme.

Maintenance and repairs

Confirm that annual checks are carried out to ensure that the building is kept in good repair:

a. Clean gutters out on a regular basis to prevent water ingress and dampness.
b. Fix broken windows and panes of glass.
c. Arrange to have boiler/heat system serviced annually.
d. Upgrade insulating blanket around hot water cylinder.
e. Fit thermostatic valves to radiators.
f. Seal gaps between skirting boards and floor.
g. Insulate all external and exposed water & heating pipework.
h. Avoid storing materials up against the building to prevent penetrating damp.

When carrying out current maintenance / refurbishment works always consider future proofing the property.

Develop a strategy to prioritise work.

Ensure up-to-date EPC Certificates are available for all properties, collate and use them to scope and prioritise work. Devise an overall housing strategy to include all retrofit, disposal and acquisition work.

Undertake any simple improvement recommendations that can easily be carried out.

Take note of all improvement recommendations which require the input of specialists to be undertaken and create a retrofit plan to enable the work to be carried out.

Energy conservation requiring specialist input.

Develop a “Whole House” responsible retrofit plan.

The aim of retrofitting any property is make changes to the existing building to control and manage its heat, air, and moisture flow. In doing so, energy consumption and associated emissions are reduced for the property and its occupants are provided with a more comfortable and healthier living environment.

A holistic “Whole House” assessment carried out by a qualified Retrofit Professional considers how the occupants live in and use the property, as well as any specific circumstances that affect the building. Traditional buildings will need special consideration. A “Whole House” approach comprises of:

- Building Envelope – Fabric first approach
- Building Services – Heating, hot water, ventilation
- Renewable Energy systems – solar / PV
- Behaviour of occupants – controls, information displays, automated devices, awareness, behaviour, and occupation patterns

“Fabric First” approach (insulation and ventilation)

A “fabric first” approach considers upgrading the fabric (walls, lofts, and floors) of the building first, together with ensuring the correct ventilation is present to reduce heat loss.

Insulation and air tightness - Improve the insulation and address ‘leaky’ parts of the building through air tightness *before* installing the more complex building services, such an energy efficient heating, hot water and lighting systems, otherwise, any low carbon installation will be uneconomic and inefficient in operation. Insulation is a relatively low cost, long-life measure.

Ensure high performance Windows and Doors - High-performance, double or triple-glazed windows help reduce heat loss and risk of condensation.

Ventilation - Installation of a Mechanical, Ventilation Heat Recovery System (MVHR) – With increased air tightness, specialist advice should be sought from a building services engineer or manufacturer to design and build a controlled ventilation solution, based on the fresh air calculations for the building. Sealing a property may cause damp or mould because of a lack of ventilation, so care should be taken, and specialist advice sought.

Insulation, airtightness, and ventilation should be carried out simultaneously, and ensure that all efficiency measures are appropriate, especially when dealing with traditional properties.

NOTE: There is no one-size-fits-all approach to retrofitting, each property should be assessed on an individual basis and the performance targets adapted to suit that dwelling.

Space heating

Heat pumps

The principal space heating proposed for residential properties is a heat pump.

There are 3 main types:

• Ground source

• Air Source

• Water Source

As above, replacing a gas boiler with a low carbon system such as a heat pump will almost certainly require the insulation in a property to be upgraded for low carbon system to operate efficiently.

Heat pumps run at approximately 50°Celcius while a boiler operates at 70°Celcius. To run at a lower temperature and maintain the previous comfort level means that a parsonage needs to be well insulated and draught free. A well-insulated property will require less energy, thus reducing the size capacity and cost of the heating system to be installed.

NOTE: A heat pump will require a hot water storage cylinder to be present, and the existing radiators and pipework may need to be replaced with larger units to compensate for the lower running temperature of a heat pump.

Renewable electricity
To achieve Net Zero, a property would require either to generate its own electricity from solar panels (planning permission may be needed) or for the electricity and supply to be from a 100% 'green' tariff.

Generate renewable electricity on site – The addition of solar panels to a property will enable the property to emit fewer emissions. Check for planning or listed building requirements. There could be space in the garden rather than the roof for solar panels to be installed.

Contracts and contractors

Ensure all projects are carried out to a high standard of quality and that any contractor/tradesperson appointed provides financial protection and guarantees and is a member of Trademark.

Guidance modified from document produced by Church Commission and Marshall's Charity.