

SUSTAINABLE BUILDINGS

Guidance



- This Guidance relates to the Eco Church programme and in particular the ‘Fabric first’ approach.
- The Guidance is intended to assist in producing a local Sustainable Buildings Plan. Please use the separate template or your own preferred approach to create a Plan which will inform the journey to Net Zero Carbon.
- The plan is a basic requirement to seeking grant assistance.
- We have tried to simplify what can become a very complex subject, particularly in terms of actually measuring the lifetime carbon footprint.

THE SUSTAINABLE BUILDINGS PLAN

This checklist is intended to provide a structure and suggested areas to consider when compiling a plan alongside the ECO Church programme.

This plan needs to sit alongside the Buildings Plan. Both of which are required as a basis for obtaining Synod grants for significant programmes of works.

The plan template follows the process set out below.

SUSTAINABLE BUILDINGS PLAN

Creates a picture of the needs-based changes required to the buildings over a similar timescale as the Sustainability Action Plan. It will ensure that building changes are incorporated into the Sustainability Action Plan.

SUGGESTED ACTIONS	FURTHER INFORMATION
THE CHANGING PICTURE	
<p>Humanity’s ingenuity will, given the commercial viability develop further solutions which are not incorporated in a Net Zero Plan at present. It is therefore important to review the Buildings Sustainability Plan in the light of changing opportunities and targets.</p>	<p>We learn that Carbon capture, for so long considered not to be transferable to the large scale needed may indeed become a significant element in the future climate change solution. The theory of Energy Abundance where at some point in the journey to 2050 Net Zero sufficient energy will be generated using renewable resources may reduce the requirement for the currently assumed stringent energy saving measures.</p>
TARGET AND TIMETABLE	
<p>There are various stages or even stopping points along the journey, as reflected in the ECO Church programme. The setting of a final target will depend upon the nature of the buildings involved, and the active life expectancy This will enable funding to be focused in the most effective way and avoid an unnecessarily heavy burden being placed upon smaller congregations. The current URC Environmental policy passed by General Assembly in 2022 sets the target of achieving Net Zero by 2030. This target may not be realistic for many Churches but can provide a challenging starting point.</p>	
<p>When commissioning the information required to assemble an Environmental Sustainability Plan targets need to be agreed at an early stage in the process. There are probably three significant stages for existing buildings:</p>	<p>Net Zero Carbon: The Net Zero target is an energy efficient building which is fully powered from on-site or off-site renewable energy sources and offsets.</p>

<p>STAGE 1 - OPERATIONAL IMPROVEMENTS Initial measures. Possible Bronze ECO Church.</p> <p>STAGE 2 – FABRIC IMPROVEMENTS LOW CARBON, but may not fully meet the 75% target, may include some building services improvements (may be carried out in more than one step) Possible Silver ECO Church.</p> <p>STAGE 3 – DECARBONISED HEATING NET ZERO (may be carried out in more than one step) Possible Gold ECO Church and beyond. See notes regarding the definition of Net Zero</p> <p>STAGE 4 – NEW BUILDINGS AND SIGNIFICANT ALTERATIONS – Will be determined by the Buildings Plan.</p>	<p>For existing Church buildings this target is generally going to be achieved using a mix of on-site generation and drawing green energy from the national grid. The ideal balance being the majority of energy being generated on-site with the fabric improvements reducing the overall energy requirement.</p> <p>This does not take account of the embedded carbon resulting from constructing the building.</p> <p>Low Carbon: To set a viable initial target in many existing buildings, it can be assumed that some of the electrical energy required can be drawn from the grid creating a balance between the extent of the decarbonised heating installation and the level of practical, initial fabric improvements.</p>
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STAGE 1. OPERATIONAL IMPROVEMENTS

Some initial and largely lower cost starting points generally carried out prior to Grant aided works. Probably relates to an ECO Church Bronze Award

SUGGESTED ACTIONS	FURTHER INFORMATION
REDUCING ENERGY USE	
Where practical change light bulbs or fittings for LED	More complex analogue dimming systems will require equipment replacement.
Take measures to improve lighting controls to avoid wastage	
Take measures to improve timing and temperature control of existing heating installation, increasing the number of zones if practical to avoid heating rooms which are not being used.	
Insulate heating pipework where passing through unheated spaces and separately controlled rooms.	
Consider measures such as destratification fans to improve the performance of existing heating systems.	
When replacing electrical equipment and whitegoods consider the energy use, bearing in mind the balance between more expensive low energy equipment and the likely payback period.	
EXISTING ENERGY SUPPLIERS AND SOURCES	
Consider 'green energy suppliers	
REDUCING GAS AND OIL RELIANCE	
As the opportunity arises replace gas cookers and other water heating equipment with electric subject to the adequacy of the supply.	
ON SITE ENERGY FROM RENEWABLE SOURCES	
Typically roof mounted PV panels but in exceptional circumstances wind or communal sources. This can certainly become part of the initial Operational	

Improvements it is covered as part of the Heating Decarbonising section as the provision is normally designed in relation to the future anticipated electrical requirements. It can be carried out as a phased installation.	
VENTILATION AND AIR TIGHTNESS	
Ensure adequate natural ventilation in all occupied rooms and improve control by draft seal all gaps in opening window and external door frames, including those between the wall and frame.	Controlled ventilation in all rooms is important and should be designed to act passively rather than requiring mechanical extract where possible and to avoid introduction of cold air where it will be experienced as a cold draft. Ventilation and cooling will become more important as climate change increases air temperatures.
When introducing or replacing fans consider a heat recovery ventilation system, typically a package unit which will combine all extracts.	
Loose glazing in leaded lights can allow cold air infiltration, take specialist advice regarding repair works.	
Consider draft lobbies of other means to restrict heat loss.	
Open joints in exposed boarded suspended timber floors with a ventilated void below can be a further route for uncontrolled cold air entering the building.	However, sealing such floors can alter the natural balance between moisture and drying and cause timber decay. Take specialist advice if needed.
Georgian and Victorian buildings usually have ventilation via the roof space and sometimes fresh air inlets at lower level. Ensure that the ventilation can be controlled.	Note that the building fabric needs to 'breathe' as traditional construction methods do not create a damp proof enclosure. And some natural ventilation is needed particularly in the winter to avoid condensation and high humidity levels.
CARBON OFFSETTING	
Following ECO Church suggestions increase the carbon capture in surrounding land. Typically, by enhanced tree planting and future management. This and commercially available offsetting may be used as a last resort to achieve net zero carbon by cancelling out the elements of fossil fuel reliance and carbon production which cannot be viably removed.	
WATER USE	
Follow ECO Church guidance to restrict water use.	
Consider simple rainwater harvesting for maintaining gardens.	
GENERAL MAINTENANCE	
Ensure that existing heating systems are regularly serviced and maintained to maintain efficiency.	
Take account of ECO Church principles regarding repair, re-cycling and sourcing of new material and equipment.	
TRAVEL	
Whilst not strictly a building matter providing facilities for covered cycle storage and electric car charging will meet the grant criteria.	

STAGE 2. FABRIC IMPROVEMENTS

Largely works to reduce fabric energy consumption in preparation for alternative means of heating. Generally assumed to be part of a Grant assisted programme. Probably relates to an ECO Church Silver Award. The 'Fabric First' approach

SUGGESTED ACTIONS	FURTHER INFORMATION
DESIGN ADVICE	
<p>This work should be considered holistically to ensure that the level of fabric improvements are compatible with any changes to the heating system. This may include:</p> <ul style="list-style-type: none"> Existing energy audits Building Thermal modelling to enable heat loss and heating requirements to be modelled for various approaches. Agree a design approach to achieve Low Carbon and Net Zero within an agreed timescale. 	<p>Take specialist advice and commission an energy audit and assessment which will offer planning information and net zero carbon guidance.</p>
ON SITE GENERATION	
<p>The installation of suitable Photovoltaic Panels can be carried out at an earlier stage. However, if designed by a specialist Building Services Consultant in relation to the electrical requirements for heating and general power, the target of a 'net zero, carbon building and the general performance can be calculated, and targets set.</p>	
<p>Consideration may be given to battery storage to enable more of the on site generated energy to be used to heat and run the building.</p>	<p>This needs detailed design and viability advice.</p>
<p>In some rare cases other measures such as wind turbines may be considered.</p>	
LIGHTING	
<p>Larger scale replacements of fittings and controls to maximise the low energy benefits of LED lighting.</p>	<p>Care should be taken when selecting fittings and manufacturers as some are less reliable than others and generally failure requires replacing the fitting.</p>
<p>Consider control systems which will ensure that the correct level of lighting is only used when needed.</p>	
WINDOWS AND DOORS	
<p>Replace existing single glazed windows with new double or triple glazed unites.</p>	<p>Frame types and glazing pattern to suit building and in particular any Town Planning or Listed Building Requirements.</p>
<p>Fit secondary glazing where window replacement is not possible or not economic.</p>	
FLOORS	
<p>It is unlikely that there will be an option to add floor insulation, and this probably only applies to timber suspended floors. But if works are being carried out this may be an option.</p>	<p>Care needs to be taken to ensure that the floor void has sufficient ventilation. Overlaying timber floors will need careful investigation as sealing boarding with a natural high moisture content will lead to decay. (This particularly applies to carpet tiles)</p>

WALLS	
Additional insulation levels can be achieved if required as part of a planned fabric assessment. The degree of heat loss to be addressed should be determined by Specialist advice.	
Uninsulated cavity walls: Cavity insulation can be injected without changing the appearance.	
Solid masonry walls: Internal or external insulated linings can be considered, the impact upon the appearance and complexity of the insulation will usually determine the approach	<ul style="list-style-type: none"> • Town Planning and the impact upon historic fabric must be considered. • As applying linings will change the way that the wall performs specialist advice should be sought to avoid condensation within the fabric (Interstitial condensation) and deleterious effect upon the fabric caused by changes in moisture levels. • In addition, internal linings will reduce the thermal mass and the ability of the fabric to limit temperature changes and improve cooling in the summer. However, heating up times will be improved. Again, specialist advice will be required to consider the internal environment of the building.
Other wall types will need further investigation.	
ROOFS	
Consider upgrading insulation quilt in roof spaces to achieve approximately 40cm thickness.	Ensure that additional insulation does not block eaves ventilation paths and that electrical cables are not fully covered to avoid the possibility of overheating
Flat roofs and roofs where the ceiling lining follows the roof profile can be insulated from above, generally when the covering or tiling and slating needs replacing. An insulated internal lining can be considered subject to the impact upon appearance and historic fabric.	Insulated internal linings will need to include a vapour barrier to avoid moisture condensing on or within the cold existing structure. Ventilation to the void will become more important as the lining may restrict the natural ventilation process.
STAGE 3. DECARBONISED HEATING	
<p>This section focuses upon decarbonisation and the reduction or omission of gas and oil-based heating systems.</p> <p>At this stage a form of electrical heating is the only realistic option, however as this final part of the process may be later in the decade, technology may by then be offering more efficient approaches and perhaps even further options. But the fabric improvements will still be required to facilitate this last stage in the process.</p> <p>Probably relates to an ECO Church Gold Award.</p>	
SUGGESTED ACTIONS	FURTHER INFORMATION
POWER SUPPLY	
As the likely decarbonising will rely upon an electrical based system it is likely that the incoming electrical supply will need to be upgraded to accommodate a greater reliance upon electrical energy, particularly for heating.	Again, specialist advice is needed if a balance between fabric improvements, electrical based heating and on-site generation is to be considered.

<p>The general approach is to add PV panels where practical to generate electrical power to offset that used particularly for heating. The ideal aim is to generate the whole requirement but for an improved existing building this is unlikely to be achievable. Battery storage could be considered to even the gap between high and low demand.</p>	<p>Planning and Listed Building Consent may be required, and the installation will need to take account of the orientation and elevation, nature of the roof covering and structure, particularly in relation to historic fabric.</p>
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<p>In unusual situation wind power can possibly be used but the economics are probably not realistic.</p>	
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<p>ELECTRICAL PANEL HEATERS</p>	
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<p>For very well insulated buildings, particularly if electricity is generated locally a viable option will be to use electrical heating.</p>	<p>Avoid radiant heaters as they do not heat the air and fabric and this leads to reduced thermal comfort.</p> <p>A net zero building can rely upon low levels of electrical energy, but the design of the building fabric works, and the heating output required will require specialist advice</p>
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<p>HEAT PUMPS</p>	
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<p>These are principally air source which captures low level heat from the surrounding air and generates increased heat energy for use in water-based heating systems. Or ground source which relies upon extensive buried pipes to collect the low-level sub soil heat. The latter is usually only economic for large installations particularly in association with building works where beneficial use can be made of excavations and boreholes. Some smaller individual units have an external condenser and an internal fan assisted heat emitter and are suitable for smaller spaces. It should be noted that this approach provides on average 3 times the heat energy compared with the electrical energy used to drive the system. Over time this ration may approach the target of 4 times.</p>	<p>As frequently publicised the water temperature in a typical radiator heating system will be lower than that produced by a modern boiler, and this therefore results in the need to reduce building heat losses by improved insulation and ventilation control. Increasing the number of radiators will offer some compensation particularly on a temporary basis but as the aim is not only to reduce the reliance upon gas and oil but also to reduce general energy requirements both from a climate change point of view but also for the economics of heating with the potentially more expensive electrical energy.</p>
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<p>ELECTRIC BOILERS</p>	
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<p>Electric boilers can be used to replace existing gas boilers but are only a viable option for small buildings as they use more electricity compared with the equivalent heat pump installation.</p>	<p>It is likely that the incoming power supply will need upgrading.</p>
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<p>STAGE 4. NEW BUILDINGS OR SIGNIFICANT ADDITIONS</p>	
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<p>SUGGESTED ACTIONS</p>	<p>FURTHER INFORMATION</p>
<p>It is expected that new buildings and significant extensions and alterations will be designed to achieve net zero</p>	
<p>Consider using the BREEAM or Passivhaus standard similar assessment methods.</p>	
<p>A whole life carbon assessment may be considered, particularly for new buildings, taking account of embedded carbon in the building fabric and in the management and maintenance over the lifetime of the building.</p>	

**A NOTE REGARDING
CARBON OFFSETTING**

The ECO Church guidance on buildings includes the approach advocated by the Church of England ‘Reduce what you can, offset the rest’

Carbon offsetting can be seen as mitigating the environmental impact of the residual emissions by investing in projects around the world which reduce carbon.

This generally requires a calculation to establish the carbon produced following the available energy and fossil fuel reduction measures. The resulting weight of carbon can then be offset by investing in the relevant proportion of carbon reduction achieved by international projects.

HOWEVER:

The URC Environment Policy provides the following guidance.
How do we define ‘net zero’? It would be possible to define it in ways that cause minimal inconvenience – such as by allowing the purchase of large amounts of carbon offsets to compensate for continuing with carbon-emitting activities – but that would not be the right thing to do (even though it is currently how the UK government intends to reach its target). It would be unjust for those with sufficient wealth to ‘buy’ their way to net zero by offsetting without addressing the actual cuts in carbon emissions that are needed. However, we also need to recognise that we cannot separate ourselves from the infrastructure, habits or technology of the world we live in. As well as doing all we can to achieving net zero emissions by 2030, we need to push for stronger and faster government action in these areas, and use carbon offsetting as a last resort

DEVELOPING TECHNOLOGY:

The development of carbon capture technology may at some future stage enable this to become a more sustainable means of offsetting.

SUGGESTED CURRENT APPROACH:

This is a ‘moving target’

- Consider Carbon Offsetting only when there are no other viable measures available. The long-term financing will no doubt limit the degree of offsetting.
- Offsetting could be considered as an interim measure prior to completing the Decarbonised Heating stage.

Offsetting is more commonly used at present in relation to travel.