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eco congregation Scotland

IDEAS FOR ACTION

GREENING CHURCH BUILDINGS

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Ideas for Action: Greening Church Buildings

Introduction and Guiding Principles: Scott Wham

This guide is designed as an introduction to the issues surrounding the care and management of church buildings and offers guiding principles which all churches can follow.

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1.0 Introduction & Background

Our church buildings are increasingly becoming a burden for congregations as escalating maintenance and energy costs threaten to consume ever tightening budgets. Needless to say for many congregations fabric issues all too often dominate the agenda. We are of course tremendously blessed in this country to have such a rich heritage resource which, whilst important, should never outweigh the fact that our buildings are primarily tools for mission and outreach. The church is not intended to function as a building preservation society, albeit we cannot afford to neglect our buildings either, and we should certainly not mistake the important part they play in church and community life. Caring for our buildings is therefore a fundamental part of our stewardship of God's resources and we should endeavour to explore ways of maximising their potential. Far from being merely a drain on resources we should view them as valuable community assets. Indeed for centuries churches have provided the focal point to our town and villages, offering a safe haven from the stresses of the world and helping to prepare ourselves for worship.

Since the earliest times we have always sought somewhere set apart where we can meet to worship God. Whether this is the grand surroundings of a cathedral or the humble surroundings of a rural parish church we should be aware of the impact architecture has on how we worship. Our buildings also contribute to the identity of our congregation and reflect the values which we are judged upon by our community. Understandably a poorly maintained church offers a bad advertisement for any congregation. We all know the importance of providing a warm welcome for visitors and equally a cold draughty sanctuary will fail to make a good impression.

1.1: A small rural church: Isle of Whithorn Parish Church in the Machars of Galloway - *author*
1.2: A 1960s urban church: Blawarthill Parish Church in Glasgow – *author*

With electricity and gas prices more than doubling since 1990, and set to double again in the next decade, it is safe to say that the era of cheap energy is well and truly over. This offers particular challenges to church buildings which are by their nature very resource intensive being notoriously difficult to heat and maintain. It is imperative then that the church is seen to take its environmental responsibilities seriously. Clearly the best way to protect ourselves against a volatile energy market is to reduce our demand. Whilst there remains no magic cure for the challenges we face there are a number of ways we can mitigate their effect and these will be explored in more detail in the following pages.

2.0 Basic Principles

2.1 Create a Vision

Being environmentally conscious of course encompasses far more than simply tackling issues of energy efficiency. Indeed the issue is not merely how much energy our buildings are using but rather whether we are using them to their full potential. In that respect the greatest waste of all is a building which is underused or unfit for purpose. Many churches have survived for years on a policy of make do and mend but in doing so they have often just been avoiding more fundamental questions. We need to ask ourselves honestly if our buildings meet the needs of our congregation and local community. For a start, are they in the right location? Decades of urban redevelopment and rural depopulation have left many churches, which were once at the heart of their community, isolated on the fringes of their parish or cut off by modern traffic management schemes. First and foremost then we need to develop a vision for our buildings. How does our building fit into our mission plan? How do we anticipate our needs changing in the next five, ten or twenty years? This requires an in depth knowledge of our parish profile not to mention a good understanding of the current provision of services in our area. This process will demand brave decision making and may leave us faced with some very tough choices. Would we be better consolidating our activities to one building, or relocating altogether? Like everything else we do, we need to develop a long term strategy for our buildings.

2.1: Rural Depopulation: Glasserton Parish Church near Whithorn - *author*
2.2: Urban Redevelopment: Pollokshaws Parish Church, Glasgow - *PD Architects*

2.2 Maximise Occupancy

Using a building for less than one day in seven can never be described as a sustainable use. This represents a 15% occupancy rate and when considering most are only used for a few hours you are looking at an under 2% occupancy rate. Equally all across the country there are congregations worshipping in vast sanctuaries designed for several hundred achieving a regular attendance of a fraction of their capacity. Regardless of how energy efficient these buildings are they are still going to be a drain on limited resources. The easiest way of addressing this issue is by increasing the occupancy of our buildings through extended use, in other words to combine church, community and cultural functions in one location. As we will read later on this is far from a new concept and is indeed a return to the historical use of churches which served as the first true community centres providing for the full range of community needs. In an age of austerity when charities are struggling to maintain premises it makes even more sense than ever to forge partnerships with other local providers.

2.3 Improve Energy Efficiency

For many people their concept of greening buildings is simply to attach solar panels or some similar 'green' technology. This microgeneration technology of course has its place, but only when applied correctly and under the right site specific conditions. We must resist the temptation to jump into these apparent quick fix solutions before exploring the full picture. Sadly those attractive performance figures and payback periods all too often prove elusive for a considerable number of installations. It is vital therefore that we approach the issue of energy efficiency with the right attitude. Our actions can be arranged in this simple hierarchy: begin by addressing user behaviour and use patterns, followed by steps to optimise controls and upgrade thermal performance, and lastly explore higher investment and more invasive options. Simple steps can make a huge difference and can be relatively inexpensive to implement. We should bear in mind that there is no one size fits all solution and everything has to be tailored to suit individual needs. Above all we must remember that it is our responsibility to ensure a sustainable model is in place for the future and we should not repeat the mistakes of the recent past when environmental issues and material longevity were of little consideration.

3.0 Challenges

3.1 Poor Thermal Performance and Ventilation

Fabric Performance

As is typical of buildings of their period the majority of our church buildings and manses were constructed with little, if any, insulation. Equally many relatively modern properties, dating from the 1960s and 1970s, also suffer from poor levels of insulation, encouraged by the relatively inexpensive cost of fuel at the time. It was not until as late as the 1990s that maximum U-values (the standard measurement of heat loss) were introduced to the Building Regulations and the issue of thermal performance began to be taken seriously. Since then the maximum U-values have been gradually reduced which each revision of the regulations.

Before looking at ways of improving the thermal performance of traditional fabric we need to consider how the fabric responds to temperature fluctuations. Buildings should if at all possible be kept at a steady base temperature of around 10°C which can then be boosted for services. Sharp temperature changes can cause damage to the fabric as they trap moisture and lead to a build-up of condensation on surfaces. Ironically the installation of heating systems to previously unheated buildings has actually had an adverse impact on many churches with the hot moist air from services being trapped in the building. It is therefore recommended that buildings be ventilated following each service to allow this moisture to escape.

Our primary aim is of course to heat people rather than the fabric and with this in mind direct heating systems, such a pew heaters, may prove more efficient than traditional indirect systems which require the heating of a very large air volume. Studies suggest that our comfort level is dedicated by the temperature of our extremities, such as our hands and feet, and in that sense direct systems may prove more effective. It is not unknown for churches to distribute hot water bottles or keep a store of rugs at the back of the church! We should bear in mind that thermal comfort is highly subjective and as such it is impossible to please everyone.

Ventilation

Just as important as maintaining a steady temperature in our buildings is the need maintain good ventilation. In an effort to reduce heat loss many are tempted to seal off historic systems, such as ceiling vents, and in doing so are unwittingly trapping more moisture in the building. Ventilation is also crucial to ensure good air quality and prevent mould growth. Traditional lime mortar rubblework construction is naturally breathable and can to some extent help to control the levels of moisture, however the application of many costs of un-breathable paint can leave moisture trapped on surfaces. Equally the application of cement renders in lieu of lime traps moisture and accelerates the erosion of the underling masonry. Chimneys provide very effective ventilation by encouraging air circulation through convection, however, for this very reason they are often sealed over. A plaster vent should always be installed to redundant flues to prevent the build up of condensation behind. Traditional shutters are an excellent means of reducing thermal losses but are all too often painted over and disused. In the same way heavy curtains help to reduce heat loss through windows and doors at night.

Unaffordable Heating Costs

Some congregations can no longer afford to heat their properties and are forced to take drastic action. That was the case for Sandyford Church in Paisley, a concrete inverted V-Frame church built in the early 1970s, which was struggling to run a cripplingly expensive underfloor heating system. They were forced to relocate into their adjoining halls and demolish their sanctuary in the summer of 2011. Many modern buildings suffer from poor detailing and issues such as cold bridging, concrete cancer and defective flat roofs all serve to undermine thermal performance.

3.1: Sandyford Church in Paisley prior to demolition - *PD Architects*
3.2: Defective details - *PD Architects*

3.2 Inadequate Maintenance and Inefficient Systems

Maintenance

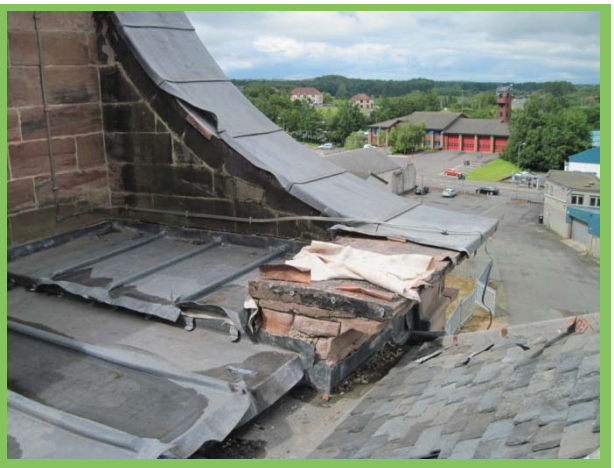
Naturally in an effort to cut costs maintenance schedules are one of the first areas to suffer. This is of course a false economy and often leads to the accumulation of greater problems down the line not to mention a knock on effect on thermal performance. A lack of maintenance quickly leads to the creation of outdated and uninviting spaces which are off-putting to user groups. People have a higher expectation of services than in the past and unattractive spaces will soon lose appeal to congregations and external users alike.

Dampness & Mould Growth

One of the most common causes of dampness in buildings is failure to clean and maintain rainwater goods. The build up of moss and other debris causes blockages which lead to overflows and in turn expensive bills for treating wet rot. Whilst appreciating the difficulties in gaining safe access, it is more often than not a neglected hidden valley gutter which will be the source of the dampness. It is vital therefore that an annual maintenance and inspection programme is followed. A damp building will be almost impossible to heat and will also encourage mould growth which in turn contributes to respiratory problems.

Metal Theft & Vandalism

Due to their rocketing price the theft of brass, copper and lead has become increasingly common. Churches are prime targets as they are largely unoccupied and have significant quantities of easily accessible material. The resulting damage from water ingress can run into many thousands- considerably more than the scrap value of the metal. Brass handles and even plaques on war memorials are targeted. Frustratingly the theft is often no longer covered by insurance companies, leaving the use of smart water or other protective methods the only practical solutions available. Vandalism is another all too common issue with massive repair bills for repairing damaged fabric. Understandably it is difficult to achieve the right balance between security and maintaining a welcoming and attractive property for all users.



3.3: A lack of maintenance leading to uninviting spaces - *PD Architects*
3.4: The damage caused by lead theft at Riccarton Parish church in Kilmarnock- *PD Architects*

Inefficient Heating Systems

Many churches operate with antiquated heating systems which have been kept running through various temporary repairs. In one instance I discovered a church which had a hot air system which was being heated by a large cast iron coal boiler modified to burn gas. A burner had simply been fitted to one end of the boiler creating what was essentially a large flame thrower. Not surprisingly such systems struggle to achieve even close to 50% efficiency and are also difficult to maintain. In contrast a modern condensing boiler can achieve efficiencies of up to 95%. Depending on the volume of hot water usage the installation of a combi boiler may remove the energy losses associated with storing hot water and equally the running costs of an electric immersion cylinder. In order to work correctly combi boilers require good mains pressure.

Water Usage

Although the abundance of water may not be an issue in this country, the treatment and delivery of that water consumes a significant amount of energy. Indeed Scottish Water is the country's single biggest consumer of electricity at 1.5%, or 500,000 MWhs, annually. Therefore it is important that we consider how we use water in our buildings, especially as most churches will now be fitted with water meters. The fitting of water hippos in cisterns can save around 2-3 litres of water from a standard 12 -13 litre flush. In contrast modern dual flush toilets use only around 5 litres of water per flush. The fitting of aerated taps also helps to control the water flow and reduce wastage. Where appropriate water butts should be connected to the rainwater system for use in watering gardens.

3.3 Historic Fabric

With a long Christian tradition Scotland has a very rich and diverse ecclesiastical built heritage. With the majority of our churches dating from Victorian times or before there are many challenges associated with caring for this historic fabric. Approximately 10% of Scotland's 47,000 listed buildings are churches of which 13% of these are A listed, 58% B listed and the remainder C listed. Many people wrongly assume that listing is an automatic barrier to any sort of intervention, however, that need not be the case as long as any changes are sympathetic to the character of the building. Indeed the Scottish Historic Environment Policy (SHEP, 2011) sets out:

"The protection of the historic environment is not about preventing change… change in this dynamic environment should be managed intelligently and with understanding, to achieve the best outcome for the historic environment.

The majority of listed buildings are adaptable and have met the needs of successive generations while retaining their character. Change should therefore be managed to protect a building's special interest while enabling it to remain in active use. ***Each case must be judged on its own merits but in general terms listing rarely prevents adaptation to modern requirements but ensures that work is done in a sensitive and informed manner.***

Listed buildings will however, like other buildings, require alteration and adaptation from time to time if they are to remain in beneficial use, and will be at risk if such alteration and adaptation is unduly constrained. In most cases such change, if approached carefully, can be managed without adversely affecting the special interest of the building."

It is also worth bearing in mind that listing actually opens up a number of additional funding streams such as the Listed Places of Worship Scheme (VAT reclaim for repairs and alterations) as well as making your project more attractive to other funders.

Prohibitively Expensive Repairs

Unfortunately our heritage is much more at risk from inappropriate repairs with best practice frequently disregarded in favour of more economical options. This inevitably leads to further problems, such as those caused by cement based masonry repairs which can actually cause significant damage to the masonry. When most churches were constructed building stone and skilled labour were both plentiful and relatively inexpensive. However, there are now only 350 registered stonemasons left in

Scotland of which 117 are employed by Historic Scotland. There are also very few working quarries remaining. This makes indenting and repair work prohibitively expensive to many congregations. Slaterwork has equally increased in cost due to similar factors with limited availability of second hand slate of suitable colour and quality.

The work completed at St. Meddans Church in Troon highlights the often prohibitive cost of traditional repairs. Their impressive tracery window dating from 1892 was badly eroded and crumbling due to its seaside location and construction of soft Ballochmyle red sandstone. Cement based artificial stone repairs had been attempted which in turn accelerated erosion, and expanding foam used to plug the resulting gaps. All sections of the tracery were templated and replacements carved. The glass was carefully removed, cleaned and returned to its original condition. The work, which included indenting and repointing work to the whole south elevation, cost in excess of £180,000. The window reached 4th place in the Royal Commission's *'Scotland's Treasured Places'* competition as voted by the public in 2008.

3.3 & 3.4: St. Meddan's tracery before work, note the severe erosion of the sandstone and failure of render repairs. Expanding foam had been used in an attempt to plug the ever widening gaps around the glazing – *PD Architects*

3.5 & 3.6: The window after full recarving of all the intricate tracery elements and overhaul of the stained glass. Note the relatively unobtrusive new black powder coated protective grilles. These ensure adequate ventilation is maintained to the glass preventing overheating and accelerated corrosion of the lead common with secondary glazing systems - *PD Architects*

Accessibility

Lastly as we are all no doubt aware accessibility presents a great challenge for church buildings with very few complying with modern standards. Churches were often constructed on raised ground or on a raised plinth course to enhance their prominence and as such there are often many steps to negotiate. Ramps can be sympathetically designed to minimise their visual impact and even compliment the historic setting. Accessibility of course does not just mean tackling issues of mobility but also of sight and sound. We therefore need to consider how people navigate through our buildings safely in terms of signage, lighting and surfaces finishes.

3.7: A typical inaccessible flight of entrance steps - *PD Architects*
3.8: An attractive and functional solution to accessibility issues - *Monkton & Prestwick North Church*

4.0 Low-tech Strategies

Before we can begin to reduce our energy demand we need to have a good understanding of our present usage. The easiest way to do this is to arrange an energy audit for your buildings. This can be done through a number of organisations such as the Energy Saving Trust who provide free of charge consultations. There are also DIY energy audits available such as the one developed by Callander Parish Church (refer to the eco-congregation website). This will allow you to identify the areas of greatest losses and therefore where the most cost effective savings can be made and efforts focused. Some of the following advice can be implemented almost immediately at little cost whilst some could be included as part of an on-going maintenance and upgrade programme. The advice can be equally applied to manses, rectories and vicarages as well as other church property.

4.1 User Behaviour

The simplest way to reduce our demand is through addressing user behaviour. Introducing signage to remind people to switch off lights and turn down the thermostat when they leave are the obvious targets although these are only effective within a wider strategy. The aim is to encourage people to think about the way they use the building and take responsibility for their own usage, in the same way that they would at home. It would come as no surprise to learn that in many cases hall heating is often left on unregulated for the entire day. Through the clever management of bookings we can significantly reduce the proportion of the building we need to heat. If possible we should aim to use

the same room for bookings in a given day, or co-ordinate activities to maximise residual heat e.g. the timetabling of sedentary and physical activities. As mentioned previously curtains and shutters help to keep heat in during cold nights. Leaving doors open, whilst encouraging draughts, is also a fire hazard and the installation of self-closers is recommended.

4.2 Optimising Controls

Lighting

There are a number of simple fixes which can be applied to help reduce energy consumption. Starting with lighting, most of us will be aware that the traditional incandescent light bulbs are being gradually phased out in favour of more efficient compact fluorescent lamps. These CFLs use 80% less energy and last up to ten times longer than incandescents. Improvements have also been made to improve warm up times and tonal range. LED lighting has entered the market in recent years and the technology is gaining ground on CFLs. LEDs use 50% less energy than CFLs and last twice as long (typically 40,000 hours) although they currently cost around 40% more and suffer from poorer colour rendering (making them less suitable for e.g. lighting artwork and stained glass panels). Although associated with a harsh cool white tone they are now available in a variety of tones and colours. LEDs are certainly a worthwhile investment for high traffic and hard to access areas. Light intensity is measured in lumens and to give an appreciation of the cost benefits, LEDs produce up to 100 lumens per watt of input power whereas halogen and incandescent lamps only produce 15-25 lumens per watt. Fluorescent tubes on the other hand produce around 50-75 lumens per watt. As part of a gradual upgrade programme older larger diameter fluorescent tubes should be replaced with modern energy efficient equivalents (with the option for LED tubes).

4.1: A selection of CFL fittings and standard florescent tubes.
4.2: 6W LED GU10 lamps can provide the same light output as a 50W halogen bulb.

To prevent leaving lights burning in corridors for extended periods of time passive infrared sensors (PIR) can be installed. Energy intensive external lighting should also be controlled by infrared sensors where possible. Poor light levels can often be attributed to dirty fittings, with few benefiting from any regular cleaning due to access difficulties. The Work at Height Regulations deter the use of ladders for high level work and recommend that maintenance work, such as the changing of fittings, be carried out from a stable working platform such as a scaffold tower. An alternative may be the installation of a motorised winch mechanism for large hard to reach fittings.

Heating

In terms of heating one of the most common problems is that of overcomplicated control systems which in some cases would not look out of place in a power station control room. There is little sense in investing in sophisticated control systems if they will end up being operated in an on off function by the majority of users. Of more benefit is the installation of zoning valves to ensure that only occupied areas of the building are heated. The costs of installation will soon be recovered through savings. Tamperproof thermostats are also a worthwhile investment to prevent overheating and these should be set to provide two programmes covering both sedentary and physical activities.

4.3: Overcomplicated controls are seldom used efficiently - *Andrew MacOwan Associates*
4.4: A simple timer with boost function is more suitable in most cases.

4.3 Thermal Upgrades

The next step should be to consider ways of improving the thermal performance of the building. Understandably it proves challenging to retrofit insulation to listed buildings without damaging sensitive decorative interiors or indeed in some cases archaeological features. However, that does not mean to say that no improvements are possible. Before considering any upgrades to the thermal performance of your building you need consider the length of the payback period. For example you may find it makes little sense to invest in upgrading a building which is only used only one day per week. At the same time a payback period of 10 years of more, whilst not attractive to domestic owners, may still prove worthwhile considering the projected lifespan of the building.

Insulation

Approximately 35% of heat is lost through uninsulated walls. A traditional 600mm rubblework wall achieves a U-value of between 1.1 and 2W/m^{2}k compared to the current maximum of 0.25W/m^{2}k for new builds. Even if we cannot reach modern standards we should bear in mind that a two thirds improvement in U-value provides by far the greatest cost benefit and is also the most practical to achieve.

There are a number of different techniques for upgrading traditional walls with the most common being the construction of a new insulated wall against the internal masonry. This can be a timber or

metal stud wall with insulation fitted between the studs or alternatively a composite board comprising a rigid insulation sandwiched onto plasterboard. Either way plaster vents should always be incorporated to prevent the build up of condensation on the underlying masonry. Where possible natural insulation products such as hemp or sheeps wool should be specified as they are more breathable and sustainable than man-made alternatives.

4.5 & 4.6: Thermal lining of St Ninians Old Parish church halls in Stirling - *Michael Adam*

Even if upgrading of walls is not an option the addition of 200mm (8 inches) of loft insulation can save around 20% of heating costs. Equally insulating between floor boards provides good savings and hemp board is an ideal material being easily shaped to suit joist sizes. Bear in mind it is vital to ensure good ventilation below floors and in attics to remove moisture and stale air which favours the growth of dry rot. When carrying out this work it is not uncommon to discover outbreaks of wet and dry rot to build-in joist ends and other timbers, and an allowance for some element of remedial work should be factored into the initial costs.

Windows

Windows are another obvious source of heat loss with single glazed windows accounting for around 20% of total losses. Single glazing achieves a U value of around 5W/m^{2}k whereas modern double glazing with a low E (low emissivity) coating and argon filling can reach as low as 1.4W/m^{2}k. There is an approximate payback period of 10-15 years for upgrading although with rising energy prices this is becoming more favourable.

The options are more limited for historic timber sash and case windows as they provide an important contribution to the overall character of the building. Slimlite double glazing (12mm) can be fitted depending on the astragal sizes but this too can adversely affect the appearance of the building due to the double reflection effect. Additionally the texture and impurities of historic plate, crown and cylinder glass adds unique character to the property. Secondary glazing is a more suitable option when dealing with historic windows and can provide similar benefits. Historic Scotland provides useful advice on the subject and should be consulted when considering any such alterations to a listed building. In the meantime the installation of draught seals around doors and windows can help to reduce losses. Gaskets can also be retrofitted to sash and case timber windows and should certainly be considered when overhauling or repairing sashes.

5.0 High-investment options

5.1 Microgeneration

Only once all other measures have been explored should we turn our attention to high investment solutions. There are many systems advertising attractive performance figures but unfortunately they can often fail to deliver on their promised benefits leading to extended payback periods. Real life performance is dependent upon a number of determining factors and the application of any technology should be site specific.

Photovoltaic Panels

One of the most popular forms of microgeneration are photovoltaic panels or solar panels as they are more commonly known. Most church roofs are ideal due to their traditional east-west orientation. Selkirk Parish Church was able to obtain an 80% grant and loan to install a 7.2kW array of photovoltaic panels on the roof of their B listed building. They receive payment through the Feed in Tariff Scheme (FiTs) which pays a guaranteed unit price for 25 years as well an export bonus. With the grant the payback time for the installation is 6.6 years and whereas it would have been 13.2 years without grant assistance. The FiT tariff for new schemes has been reduced to reflect the drop in costs of installations, and therefore payback time would now be 15.5 years for this project (for a total cost of £37,500). The panels have a life expectancy of around 25 years although their efficiency drops by approximately 1% year on year. Historic Scotland is generally relaxed about the application of solar panels and other such technologies, however clearly it greatly depends on the significance and location of the building. The condition of the underlying roof structure and slaterwork should also be considered when installing panels. More information on the project, including performance figures, is available on the Eco-congregation website.

5.1 & 5.2: Selkirk Parish Church photovoltaic panel installation - *David Bethune*

Wind Turbines

Wind turbines are another popular form of microgeneration. From 2001 to 2002 Westray Church of Scotland in Orkney installed a ground source heat pump as part of an extensive upgrade and repair programme. They decided to go further by erecting a 9m high 6kW wind turbine a year later to power three storage heaters. They received an 81% grant from the Scottish Community and Householder

Renewables Initiative towards the cost of the £27,000 installation. Wind turbines are by their nature suited to more exposed rural locations like those found in the highlands and islands. They are not appropriate for a dense urban environment due to the turbulence of the air flow between buildings. They also should not be attached to existing buildings due to the danger of vibration being transferred through the structure.

5.2 Heating Systems

Where there is access to mains gas there are still few systems which will compete with the efficiency of a modern condensing gas boiler. For areas without a mains gas supply there a number of options available. Biomass boilers are an attractive option providing there is a reliable local supply of wood fibre pellets, although the initial cost of the system is high. In 2011 Comrie Parish Church installed a 72kW biomass boiler unit connected to an underfloor heating system in their B listed Victorian building. The project cost a total of £109k with a 65% Community and Renewable Energy Scheme (CARES) grant and has generated estimated annual savings of 164,000 kWhs per year.

5.3: Comrie Parish Church – *Scotland's Places*
5.4: An example of the OkoFEN Pellematic biomass units – *Community Energy Scotland*

Ground and air source heat pumps are another increasing popular means of reducing heating costs. Heat pumps operate on the principal of an inverted refrigerator and as such incorporate much of the same technology as air-conditioning systems. Ground source heat pumps, which are connected to bore holes or underground pipework loops, are more suited to new build and rural projects due to the disruption involved, although wall mounted air to air source heat pumps provide a good alternative where space is restricted (refer to S7 for more details).

5.3 Alternative Approaches

As well as exploring ways of reducing the burden of heating costs it might be worth considering how to reduce the heated volume of your buildings instead. The aging and defective halls at St. Teresa of Lisieux RC Church in Possilpark in Glasgow had to be demolished and the congregation could not afford replacement facilities. The creative solution was to construct new accommodation pods to the rear of the nave to provide kitchen, toilet and meeting facilities, effectively turning the church into a multiuse hall space with screened sanctuary. This 'box in a box' approach can be adapted to suit many different buildings and could help to solve the challenge of maintaining hall and sanctuary space on a limited budget.

6.0 Extended Use

6.1 Churches as Community Centres

Traditionally church buildings were not exclusively for worship but also took on a variety of other roles throughout the week. They were in effect the first dedicated community buildings finding use in a broad range of gatherings, even on occasion being used for drying fishing nets! The trend today is for the development of community hubs incorporating all services in a single convenient location - and church buildings make the ideal candidates. By increasing the occupancy of your buildings you are effectively spreading the load of energy and maintenance costs. There is an almost endless list of possible community uses for church buildings. Of perhaps the most obvious, sanctuaries often boast excellent acoustics and can be used as rehearsal spaces and concert venues. It is worth exploring the *www.onechurch100uses.org* website for ideas.

Figure 6.1: A sample of the many successfully trialled church community uses - *author*

6.2 Maximising Income Streams

We need to be prepared to investigate all possible income streams to help with the maintenance of our buildings. One such opportunity is that of faith tourism, the benefits of which are certainly not limited to grand urban cathedrals. For example, Iona Abbey attracts 40,000 visitors to the small Hebridean island each year alone. In rural areas other opportunities which are being explored include faith trails

and pilgrimage routes. The Whithorn Pilgrim's Way in the Machars, which has the attraction of being the birthplace of Christianity in Scotland, has drawn many visitors to the area since its inception in 1992. There are many other historic routes which could be reinstated and the Scottish Pilgrim Routes Forum was established in February 2012 to promote the development of new routes. Churches can help to attract visitors by establishing heritage displays and perhaps by offering café facilities or even bunkhouse accommodation. The Scottish Churches Trust manages a scheme which encourages people to explore our rich ecclesiastical heritage. It currently has more than 1300 member churches which operate an 'open doors' policy to visitors.

7.0 Case Study 1: Upgrading a Listing Building: St. Ninians Church, Stirling

In 2011 St. Ninians Church in Stirling undertook a large programme of repairs and upgrades to their 1840s church hall. The blonde sandstone hall is a C listed early Free Church building. The congregation were able to obtain a grant from the Climate Challenge Fund of £142,000 for the work which involved strapping and lining the walls, insulating, installing secondary glazing, redecorating and modernisation of all services. They also received a grant to install air to air source heat pumps. The air source heat pumps have a near instant response and are effective down to -15^{O}C. The project cost a total of £243,600 with a 70% grant contribution. Whilst encountering many challenges during the process, not least the discovery of rotted joist ends and structural issues, the project illustrates the possibilities for upgrading the thermal performance of a listed building.

7.1 & 7.2: St. Ninians Hall after completion – *Michael Adam & author*

7.3 & 7.4: Air source heat pump external and internal units - *author*

8.0 Case Study 2: Demolition and New Build: Kilmallie Free Church

Kilmallie Free Church was built in 1961 to serve the paper and aluminium mill community of Caol bordering Fort William. The building, of traditional cavity wall construction, had reached capacity and was also proving difficult to heat and maintain. Proposals were drawn up for the upgrade and extension of the building which would enable them to expand their community work and develop new initiatives. Following tender the costs for demolition and rebuild were found to be more favourable than refurbishment and the congregation proceeded to demolish the building in early 2012. The new building is constructed of a glue laminated timber and steel frame and is heated by air to air source heat pumps.

8.1 & 8.2: The original Kilmallie Free Church and during demolition – *Kilmallie*

The new building provides a 220 seat sanctuary, community cafe, improved accessibility, meeting rooms, hall and a base for their outreach work with local schools. The project cost £600,000 with a £250,000 grant from the EU Highland LEADER programme. When working with buildings of the construction and condition of Kilmallie it can often prove cheaper to demolish and rebuild rather than refurbish. The project highlights the importance of exploring and comparing all of the options. Kilmallie is also an excellent example of the transformative effect a new church building can have on a community. Prior to the project the church was an alien environment to many in the community. The warm inviting atmosphere and attractive surroundings of the new building have broken down these barriers and created a strong sense of community ownership. As a result the congregation has experienced tremendous growth and has discovered a new vibrancy.

8.3 & 8.4: The new church looking from sanctuary to the multipurpose hall/café - *author*

9.0 Further Information

9.1 Energy Checklist

At a time when congregations are facing real financial challenges it is vital we do not pay more than is absolutely necessary for energy in church buildings.

The Church of Scotland published the following checklist for its congregations in January 2014 which you may f find useful.

How much energy do you use?

Question	***Best practice***
Do you read your energy meters?	*The first step to good energy management is to know how much energy you use.* ***Read your meters*** *monthly and report the figures to Kirk Session or Board.*
Do you keep records of your energy use?	*Keep a record to* ***check your bills*** *and to compare year on year performance. Ensure you have not been charged more than 5% VAT and are not paying CCL (Climate Change Levy) on your bill.*
Do you let your energy company know your energy use?	*For many accounts you can supply your own readings to ensure your bills are accurate. Do check you are not receiving inaccurate or estimated bills from your supplier.*

What tariff are you on?

Question	***Best practice***
Have you considered joining the Church's Utility Purchasing Scheme?	*Compare your current tariff with the tariff available through the General Trustees.*
Who supplies your gas/electricity/oil or other fuel?	*If you are not in the Church of Scotland Utility Purchasing Group and have stayed with same supplier for years it may be worth considering changing.*

Where do you go for advice?

Question	***Best practice***
Have you had an energy survey of your building recently?	*The Energy Saving Trust (EST) can provide free advice and may be able to carry out a survey of your building: contact them at the telephone number below.*
Do you know the carbon footprint of the energy used in your church buildings?	*You can find out using the simple calculator on the Church of Scotland website.*
Do you have a plan to manage your energy use?	*If you know how much energy you use and have had an energy survey draw up a plan to help you manage and reduce your energy use.*

9.2 Links & Sources of Advice

Better Heating Scheme

The Better Heating Scheme is managed by the General Trustees and helps congregations obtain tailored advice from Andrew MacOwan Associates on heating bills and improving the efficiency of heating in buildings. You can find out more at:

www.churchofscotland.org.uk/__data/assets/pdf_file/0010/2998/heating_guide.pdf

Utility Purchasing

The General Trustees in association with Argyle Energy offer an energy procurement service. Congregations can purchase gas, electricity and oil at fixed rates that may be cheaper than those available on the open market. You can find out more from the General Trustees department: gentrustees@cofscotland.org.uk

Energy Saving Trust

The Energy Saving Trust (EST) in Scotland provides free, impartial advice on how to take simple steps to reduce your carbon footprint and save money. Find out more at the website: www.energysavingtrust.org.uk/scotland/ or ring EST on 0800 512012.

Community Energy Scotland

Community Energy Scotland helps groups including congregations throughout Scotland to own and operate renewable energy installations. They can provide education, finance and practical help. Find out more at the website: www.communityenergyscotland.org.uk/ or ring them on 01349 860120.

Caring for Creation

For more information on the Church of Scotland climate change project see: www.churchofscotland.org.uk/speak_out/care_for_the_earth

You can work out the carbon footprint of your church buildings using the calculator at:

www.churchofscotland.org.uk/speak_out/care_for_the_earth/articles/how_to_measure_your_churchs_carbon_footprint

Climate Challenge Fund

www.keepscotlandbeautiful.org/sustainability-climate-change/climate-challenge-fund/

For more information on advisory and grant funding bodies please refer to:

www.ecocongregationscotland.org/materials/practical-living/greening-the-cornerstone/

For further details on any of these issues contact Adrian Shaw/Miriam Dobson at the Church of Scotland Climate Change Project on 0131 240 2277 or by e-mail at climatechange@cofscotland.org.uk

10.0 About Eco-Congregation

Eco-Congregation Scotland is a growing movement of churches from Shetland to Dumfries, and from Iona to Aberdeen. They are urban and rural, small and large, Protestant and Catholic, traditional and cutting-edge. They share the conviction that our society's wholesale exploitation of the natural world is a dishonour to God the Creator; and that to do nothing in the face of environmental destruction is to fail in our duty to worship God and to care for the poor.

As well as taking action in their own church life, Eco-Congregations are working together in networks, and promoting the programme to other churches through talks, workshops, events and materials. Eco-Congregation Scotland is a charity, offering a programme to enthuse and equip churches to weave environmental issues into their life and mission in an enjoyable and stimulating way. We do this through three strands:

- Grow in faith and understanding
  Make the link between environmental issues and Christian faith
- Put God's house in green order
  Take practical action in the church
- Change lives, change communities
  Influence attitudes and take action in the local or global community

We send out materials, maintain contact with churches, provide the website and newsletter, arrange for churches to be assessed for awards, assist regional networks and equip volunteer promoters and co-ordinators to develop the programme at local level. In addition we represent Eco-Congregation to national church bodies and environmental organisations.

Churches who register as eco-congregations can benefit from:

- Support from local networks of churches
- Free resource Ideas for Action on all aspects of church life
- An award scheme to recognise achievement in caring for the environment
- Information through networks, newsletter and website
- Links to other organisations including free resources and grant opportunities

All registered churches and organisations are entitled to become charity members. As members of the charity, they are able to vote at the AGM and shape the vision of Eco-Congregation Scotland.

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