DIOCESAN ADVISORY COMMITTEE

SCHEDULE OF DOCUMENTS

1. **Statement of Significance** (Heating - Statement of significance and needs for All Saints Hertford for DAC 22 August 2025.docx)
2. (Boiler quote - LH Cook re all saints church 15962 - May 2025.docx)
3. (Heating_checklist - Colin Bird 12 June 2025.docx)
4. (ESOS Energy Report All Saints Church SG13 8AY.pdf)
5. (Heating All Saints Church.docx)
6. **DAC site visit report August 2025** (Hertford All Saints Site Visit Report August 2025.docx)

TO THE CHANCELLOR OF
THE DIOCESE OF ST ALBANS

26/08/2025

VIEWED by the St Albans Diocesan
Advisory Committee

ALL SAINTS CHURCH, HERTFORD **22 August 2025**

Statement of significance

PART I

All Saints' is one of two churches in Hertford mentioned in the Domesday book and the current building replaced a 15th century church which burned down on Monday 22nd December 1891. The foundation stone for the current building was laid on March 25th, 1893, and the new All Saints' church was consecrated by the Bishop of St. Albans on February 20th, 1895, a very short space of time to erect such a large building. The building is Grade II * listed and the style is Victorian perpendicular.

All Saints' is one of the largest churches in Hertfordshire, apart from St Albans Abbey, seating more than 600 adults or even more children. The exterior of the chancel has Latin texts carved in the walls. On the north side verse 20 from Psalm 103: *Praise the Lord all you His angels, you that excel in strength: you that fulfil His word and obey the voice of His commandment*. On the south side there is a verse from the Te Deum: *To Thee cherubim and seraphim continually do cry, Holy, Holy, Holy*.

The tower was completed ten years later and was opened by the Bishop of St. Albans on All Saints Eve, 1905, as a thanksgiving for the life of Queen Victoria and is named the Victoria Tower. It rises 140 feet from the ground. A peal of 10 bells was installed in 1907. These bells are still in regular use and have recently undergone refurbishment.

The interior

The dominant feature of All Saints' is the great **East Window**. It is by **C.E. Kempe** and his **wheatsheaf** mark can be seen in the lower left corner.

The theme of the window is the verse *I am the true vine, you are the branches* (John 15, v5). In the central pane is the true vine with the crucified Christ reigning in majesty upon it. The branches of the vine, spreading out from the cross, contain Christian saints. At the foot of the vine is St John the Evangelist with his gospel and an eagle. In the surrounding panels are many more, including St Mark, St John the Baptist (in camel skin), St Peter (with keys), St Alban (with palm), St Cecilia (with organ), St George (in armour), St Matthew and King Ethelbert.

The beautiful alabaster **Reredos** depicting the last supper was presented in 1913 and was repaired and refurbished several years ago. The **organ** was installed in 1899 and is one of the last built by "Father" Willis. Alongside it are memorial plaques to previous organists including Charles Bridgeman, organist of All Saints' from 1792 to 1873, until recently the world record at 78 years in office.

The **Memorial Chapel** was finally completed in 1934 and is a memorial to those from All Saints' parish who died in the First World War. The east window, by J.N.C.Bewsey, depicts the four martyrs, Stephen, Peter, Paul and Matthew. The north side has windows by **Shrigley and Hunt** depicting Elizabeth and John the Baptist, Eunice and Timothy and the Annunciation.

There are two further windows in the **south aisle** the first depicts people who figure in the birth and life of John the Baptist and the second the Presentation of Christ in the temple.

The **Regimental Colours** of the 1st Battalion the Hertfordshire Regiment hang in the chancel. They were laid up on May 16th, 1954, and July 1st 1967, on both occasions in the presence of H.M. Queen Elizabeth the Queen Mother.

The **glass doors** at the west end were installed in 2003. The etching, designed by **Michael Coles**, is based on the vision of the Heavenly City with the river of the water of life, as described in the last chapter of the last book of the bible,

The Revelation of John. The doors have the text *Blessed are they that do his commandments, that they may have right to the tree of life and may enter in through the gates of the city* which is taken from Revelation chapter 22 verse 14. One side panel is inscribed to the memory of Reginal Cull, a major benefactor of the church who sang in the choir for many years. He contributed over £250,000 towards the total of £600,000 spent improving and repairing the church.

All Saints' churchyard covers six acres and is a haven for wildlife. Many varieties of wildflowers and species of birds can be seen as well as avenues of chestnut trees, originally planted to commemorate the return of Charles II in 1660. Some of the yew trees are at least 300 years old. Interesting gravestones include two mill stones just west of the tower, under which millers were buried. The two iron gates either side of Gascoyne Way are of late 18th century origin and were owned by Dr. Thomas Dinsdale the pioneer of smallpox inoculation. They were given to All Saints in 1963 and make a fine feature in a churchyard that has been in use for at least a thousand years.

The size of our building is a strength. It enables us to welcome large numbers of people, for example the service to welcome Bishop Jane Mainwaring as the new Bishop of Hertford, and Civic Services, concerts and large-scale events, both for ourselves and for the community. The building is full most days leading up to Christmas as it is the only local building with the capacity to take large school services. In 2024, some 8,000 people came through the doors in the 2 weeks of Christmas. It provides a large space that we could use in many different ways and with financial support could adapt for a wider community use.

PART II

The main weakness of the building is that it is expensive to heat and to maintain and over the last few years our ageing boilers have proved problematic with one now obsolete and unusable and the other unreliable. Over the last 2 years we have replaced both the pump and extraction fan systems which together cost £7,000.

We have the Memorial Chapel within the church which can provide a more cosy and welcoming space when needed although this too has out of date wall mounted electric heaters.

The proposal is to replace the old boilers and replace them with 2 new condensing wall hung boilers. The engineers are firm in their view that we should leave the present distribution system in place, utilising the new pump. Presently this feeds the church via pipes under the floor with a small number of large radiators at the back of the church and one near the organ. To achieve this, we have to remove asbestos from the boiler room and the adjoining storeroom. The latter room is out of bounds currently due to deterioration in the asbestos boxing around a large distribution pipe, whereas the asbestos in the boiler room is in a satisfactory condition.

Accordingly, the work will be contained within the boiler room area; however, the need for asbestos removal requires the heating to be off for several weeks whilst a safe area is created and therefore the work cannot realistically be done in winter.

We are acutely conscious that replacing our boilers with new gas boilers, albeit modern efficient ones is not ideal, but is the only practical way forward at the present time. We are advised that the large space is too much for present heat pump technology, pew heaters are not desirable as we want to reorder the church to make it more usable for community activities and this would involve removal of pews. We have explored infrared heating, but it is impractical, not effective for the space and hideously expensive. In addition, we would need to upgrade the electricity supply.

We are currently awaiting proposals to install solar panels on our south facing roof which would reduce our electricity costs (currently £4000pa) and potentially provide an income stream given the new digital system which would allow us to sell excess energy into the Grid.

We expect that when the new boilers come to the end of their useful life (or earlier if funding permits), we will be looking at alternative heating; but recognise that this may well entail replacing underground piping and the present distribution system, which will be extremely expensive. We propose to create a heating fund to be invested and built up to help in this regard. We can place £50,000 from a legacy into the fund straightaway and a further £30,000 may be available from our existing heating fund (where we are only entitled to income, leaving the capital invested), subject to any necessary approvals. Over the next few years, we aim to increase the fund to £150,000.

Statement of needs

SECTION A

All Saints' is the Civic Church for the County Town of Hertford and is the venue for the annual Civic service following the appointing of the new Mayor, the annual Remembrance Day service is held in the church following the service at the town War Memorial and various other services are held to commemorate special occasions. It has also been used for large diocesan services including the welcome service for the Bishop of Hertford and the retirement service for the previous Archdeacon of Hertford.

The church is at the centre of the community with 2 secondary schools and 4 primary schools within the parish. The building, due to its size, is regularly used for concerts and other events by local choirs and symphony orchestras in addition to the annual Hertford Music Festival. Commercial hirers have begun to appreciate the space available, and we usually have an event at least once a month booked over the course of any given year. The building is well used by local schools both as a venue for Christmas concerts and a place to hold special events such as prize giving and Founders Day.

The building is normally open for public worship 6 days a week with morning and evening prayer as well as Communion on Thursdays and 2 services every Sunday. A variety of services is offered including Family Eucharist, Parish Eucharist, Evensong and Compline.

The church is a favourite of the local undertakers, because (mostly!) it is warm. These services are important in the life of the church.

All Saints has a strong choral tradition, and the excellent choir regularly sing anthems at the Sunday morning services as well as Choral Communion and Choral Compline in the evenings. Young choir members are encouraged to study instrumental as well as choral music and grants are given for music lessons. Several former choir members have gone on to become professional musicians including the current Assistant Director of Music at Exeter Cathedral who begun learning to play the organ with our Director of Music.

Various regular weekly events take place in the church, and more are planned as we reach out the community and welcome people into our very special building. These include an Art Group, Flower club, Bell ringers, Choir practice and a new Toddler group which will be starting after the summer holidays. Each week during term time we hold a "Soundbites" concert where local people gather to have lunch together before listening to top class recitals from talented musicians. These have been taking place for a great many years and provide an opportunity for large numbers of local people to come together in fellowship and a shared appreciation of music whilst enjoying an inexpensive lunch. Whilst a number of those who attend and those who prepare the food are members of All Saints; a great many are not. It is a joy to share the building with local people who might not have otherwise ever have entered a church but now see All Saints as their church.

In addition, we have regular "Greenwatch" talks on environmental themes, preceded by a light lunch. Again, a number of local like-minded people, both church members and others enjoy coming together to hear a variety of talks and learn more about environmental issues.

With the arrival of our new vicar last September the congregation has been encouraged to think about new ways of serving our God and supporting the local community and many ideas are currently being discussed to make more use of the church on weekdays.

SECTION B

The reason for needing the heating upgraded should be clear from the sections above. We have looked at alternative ways of heating the church without relacing the gas boilers, but none are presently viable. Our church is used extensively and needs to be heated as a whole. We have proved, when the present boilers fail, that the building gets very cold very quickly (to the point where nobody can stand being in it longer than a couple of hours). We are concerned not to have the structure of the building deteriorate and,

in particular need to ensure that there is a good environment for our heritage organ.

SECTION C

As stated above the proposal is to replace the old gas boilers and replace them with 2 new condensing wall hung boilers. The engineers are firm in their view that we should leave the present distribution system in place, utilising the new pump. Presently this feeds the church via pipes under the floor with a small number of large radiators at the back of the church and one near the organ. To achieve this, we have to remove asbestos from the boiler room and the adjoining storeroom. The latter room is out of bounds due to deterioration in the asbestos boxing around a large distribution pipe, whereas the asbestos in the boiler room is in a satisfactory condition. We believe the new boilers will be much more efficient and use a lot less gas than at present. The heating cost (£16,500 in 2024) is the largest cost we have behind the Parish Share, and we have a structural deficit of £25,000 pa, presently funded by legacies. Using less gas and installing solar panels will help us to reduce this deficit.

The current heating controls require manual interventions in the boiler room to adjust the temperatures, and as a consequence the current heating system, after some experimentation in the past, is run to maintain a constant 15-16C, with the exception of Saturday concerts when our approach is to increase the temperature as the users pay us to do so. Replacement gas boilers will have modern controls allowing remote adjustments. As we have a smart gas meter already fitted, we will be able to run new trials to understand the capabilities of the heating with the new boilers with a view to developing an optimum control strategy and understanding the heat up times from different temperatures to deliver the comfort desired with minimum energy use and resultant carbon emissions.

We are developing our vision for the future, which may well require significant changes to how the building is used: increasing our community engagement, which will drive the increased use of the church, and may involve significant reordering, which would likely result in the removal of some or all pews. For example, currently lunchtime concerts can attract up to 100 attendees who can then buy lunch and eat it either in the southwest side or sitting in the pews. Removal of some or all of the pews would give us much greater flexibility is using the space, and mean different types of hirers would be attracted to the space. In September a toddlers' club will start and there are plans for an art project next year with two partner organisations.

These developments would have two significant effects when considering heating options in the medium term:

1 - it makes investment in pew heating potentially a short term solution.

2 - if reordering of the aisles is undertaken it could free up wall space for future heat emitters that could enable a water based heating system to operate at lower water temperatures improving the efficiency of any future heat pump installation, and/or enable a faster response space heating system.

5.2. Replacing pews with chairs might involve all congregational seating or might focus on spaces in the aisles in addition to the areas previously cleared at the west end, and/or at the front of the nave. Additionally, there may be a wish to replace the fixed choir pews with bespoke movable choir stalls. Specific heating will be required for rehearsals, and the significant Willis pipe organ has its own requirements for environmental conditions. These would need to be fully understood in the event of a change in heating approach.

In the longer term, as we develop and implement our vision for the future, keeping records of which areas of the church are used, by who, and for how long will prove invaluable for identifying the future heating needs of different spaces in the church. This information would then be able to be used to determine methods to deliver the right level of comfort heating to discrete areas within the building.

Our efforts to look at alternative heating systems have been supported by the PCC, which has been considering these for the last 2 years. The PCC has approved unanimously the proposal outlined in this Statement.

Further, the PCC will be encouraged to continue to discuss and document how they will consider net zero carbon in the development and delivery of our vision for the parish, and the possible pathways for how we will reach net zero carbon in the future.

SECTION D

The project will bring a number of benefits to church users, quite apart from heating the church more efficiently and cheaply: -

The heating will be set up using Hive, and settings will be able to be adjusted day by day from within the church. Presently, to change settings, someone has to go down slippery granite stairs to the boiler room and manually make amendments.

The boiler room and adjacent storeroom will be made safe by removing asbestos. The storeroom can be brought back into use for various groups to store items (e.g. fabric, work party, flower club).

SECTION E

These proposals, if implemented, would not result in harm to the significance of the church as a building of special architectural or historic interest. Indeed, the church would be in danger if we could not maintain it as a warm space for the use of the church and the wider community.

L.H.COOK
PLUMBING & HEATING Ltd *Domestic & Industrial Installations*

13/11/2023
Ref: LHC/15962

All Saints Church
Queens Road
Hertford
Sg13 8AE

QUOTATION

RE: Heating Upgrade

Thank you for your enquiry. We now have pleasure in submitting the following quotation for your consideration and approval.

Installation work/Boiler:

Asbestos to be removed by asbestos company.

Supply and fit 2 Ideal commercial Evo Max 2 80kw wall hung boiler.
Supply and fit Commercial Evomax frame kit
Supply commercial DN80 header.
Supply and fit Ideal insulation kits.

Flue:
Supply and fit 2 x Ideal balanced flue kit and terminate horizontally.
Supply and fit Ideal plume kit.

Condense:
Run pipework to suitable termination point.

Gas supply:
Connect onto existing gas supply.

Pipe work:
Run new primary flow and return pipes from boilers connecting onto plate heat exchanger.
Connect onto existing heating pipes connecting onto plate heat exchanger.

Controls:
Supply and fit Hive Active heating thermostat.

System Protection:
Supply and install 2 x Ideal system protection unit positioned adjacent to boiler

Redundant materials:
All builders' rubble and metal components to be removed from site, all cardboard and packaging to be recycled by yourself.

The cost of this work is: **£ 24,712.29 + £ 4,942.46 VAT**

TOTAL COST **£ 29,654.75**

This price is valid for 28 days from the date of the quotation.

Manufacturer's warranty

Ideal Evomax comes with a 5-year warranty.

LH Cook Guarantee

All work to be carried out in a neat and tidy manner. Workmanship will be guaranteed for a term of 12 months from date of practical completion.

Yours sincerely

Lewis Tarrant

LH Cook Terms and Disclaimer

1. Definitions

1.1. The Company: References to 'The Company' in all dealings shall include The Company (LH Cook Plumbing and Heating Limited), The Company's agents and employees.
1.2. Variations: Variations shall include additions, omissions or substitutions to the originally agreed work, fittings and fixings, etc.

2. Payment Terms

2.1. Unless explicitly agreed prior to commencement of work, payment will be due in full within 28 days upon completion of works.
2.2. All prices include VAT at the appropriate rate.
2.3. Acceptable methods of payment are: a) Electronic Payment (BACS, CHAPS, etc.) b) Cheque c) Cash
2.4. All materials and goods supplied by The Company shall remain the property of The Company until the customer has paid the full invoice.

3. Quotations

3.1. All quotations for work will be provided based on the information given to The Company by the customer and The Company's agents. Any variations to the work following the issue of the quotation and prior to commencement of work shall result in a revised quotation being issued for acceptance. 3.2. For variations after work has commenced, a fixed price to cover the variation shall be agreed between The Company and the customer and added to the final invoice.
3.3. In the event that requirements change due to insufficient information having been provided, defects/faults found in existing installations, etc. the customer would be liable for any additional expense incurred.

4. Liability

4.1. The Company can only be held liable for the extent of works carried out by The Company. No liability shall be accepted in respect of defects in existing installations or in respect of parts not manufactured by The Company.
4.2. The Company shall not be held responsible for any loss or damage to property, materials or injuries to individuals caused by the personal actions of the customer or other household members or guests before, during or after such works have been carried out.
4.3. All advice provided by The Company is offered as an opinion only and the customer accepts such opinions at their sole discretion and risk. The customer employs the services of The Company at his or her sole risk at all times.

5. Health and Safety

5.1. The Company will take appropriate and practical measures to ensure the environment in which works are being carried out is safe to avoid risk of injury to The Company or other parties; the customer is expected to do the same. Outside of working hours, where works are ongoing, The Company accepts no liability for the actions of the customer or other household members or guests, which result in damage or injury to persons or property.
5.2. The Company reserves the right to refuse to undertake work in an environment which is deemed to be unsafe or where the works are considered to be unsafe, illegal (or out with the spirit of the Building Regulations) or where The Company considers the other parties will be put at risk as a result of the works being undertaken.
5.3. If the customer notices any situation, property, equipment or materials that they believe to be unsafe they must mention it to The Company immediately.
5.4. If any form of asbestos or other hazardous material covered by the Control of Substances Hazardous to Health (COSHH) regulations is discovered on site, The Company will notify the customer and may cease work until it has been removed and disposed of in compliance with the relevant legislation. The cost of removal and disposal shall be met by the customer.

6. Duty of Care

6.1. The Company accepts that it has a duty of care to the customer in respect of materials, workmanship, security, property and belongings and will conduct its business in a manner such that a reasonable level of care is provided.

7. Building Regulations

7.1. The Company reserves the right to refuse to carry out any work which is in breach of the Building Regulations or which it believes to be in breach of the Building Regulations or the spirit in which they are intended.

8. Services and Waste

8.1. The customer will provide and pay for all power and water reasonably used by The Company to undertake the work. The customer shall also be expected to provide access to sanitary conveniences for The Company whilst undertaking the work.
8.2. Unless otherwise agreed between The Company and the customer, waste removal and disposal will be organised by and at the cost of the customer.
8.3. The Company has the right to update, amend and change any section of its terms and disclaimer documents at any time.

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CHURCH HEATING 5

HEATING CHECKLIST

CHURCH HEATING

1 PRINCIPLES 2 PERSPECTIVES 3 APPROACHES 4 DECARBONISING AND THE FUTURE OF HEAT

5 HEATING CHECKLIST

6 PITFALLS 7 OPTIONS APPRAISALS AND GETTING ADVICE 8 PERMISSION AND REGULATIONS 9 COSTS AND FUNDING 10 TEMPORARY HEATING OPTIONS 11 CASE STUDIES 12 SUMMARY FLOWCHART

This guidance is issued by the Cathedrals Fabric Commission for England pursuant to its powers under section 3(3)(a) of the Care of Cathedrals Measure 2011, and/or by the Church Buildings Council pursuant to its powers under section 55(1)(d) of the Dioceses, Mission and Pastoral Measure 2007. As it is statutory guidance, it must be considered with great care. The standards of good practice set out in the guidance should not be departed from unless the departure is justified by reasons that are spelled out clearly, logically and convincingly.

Photo by Christin Hume on Unsplash

Issued by the Cathedral and Church Buildings Division, March 2021 © Archbishops' Council

HEATING CHECKLIST: WHAT YOU HAVE, AND WHAT YOU NEED

Every church is different. Work out what you have and what you need.
RIght: **Harrogate, St Wilfred**

5a Introduction

Before you go any further, you should carefully review your current situation.

What problems are you trying to solve? What do you need the heating system to *do* for you? What are your constraints?

Use our heating checklist – over the next few pages – to record your information, and then discuss the results with your PCC.

Only answer those questions which are relevant to you.

If you don't know the answer to something, keep going and complete the parts you can. Revisit the trickier parts later.

When you ask for advice, from your DAC or a paid heating advisor, show them this checklist. It will help them understand your situation, and give you better advice, faster.

5bPeople

What do users need, now & in the future? What causes discomfort?	
Currently, when is the church regularly used during the week for *church* purposes? What is the pattern of services? What areas do they use?	Building Open 8-17 Mon-Thurs, Sat: 9.-19 Sunday. Weekday services 8 & 17 in Mem Chapel. Thurs HC in Mem Chapel. Main Sunday service 10; evening service 18.30 (Main building). Discussion group Thurs am.
Currently, when is the church regularly used during the week for *community* purposes? What is the pattern of activities? What areas do they use?	(from 9/25) Tuesday am Toddler Group Weds Soundbites (10-15) Greenwatch monthly on Sats Regular concerts by eternal users (2/month+) Schools for awards ceremonies, concerts and Xmas services (something on most days in December)
Do these regular users have particular needs; for example are there small children, or elderly people who need to be a little warmer?	Toddlers: Small children. Soundbites elderly, Concerts ditto
Are church users in the main seated, or are they moving around the building?	Maily seated
Currently, what are the occasional uses of the church, for example for weddings and concerts?	Weddings 5/year. Funerals 10/year. External concerts 20/year
Do visitors drop in? For how long? Are they generally dressed for a relatively cool church, or in lightweight clothes?	We're open to all.
Are church users comfortable in our building currently? If not, what causes them discomfort?	Down draughts and relatively low temperature (15C)
Who complains, and why?	Elderly. Anyone in the building continuously for more than 90 minutes
In the future, what changes do we expect to see to the patterns, above?	Add Youth Group on Mondays. More church events on Saturdays. As many concerts as we can sensibly host.
In the future, when we have a heating system that better meets our users' needs, what do we want to be different?	More energy efficient and reliable.

5c System

What do we have now, and what needs changing? How long will it last?	
What heating equipment is already installed? Boilers, radiators, portable heaters, etc.	2x Gas boilers heating a pumped water system though mainly underfloor pipes/grills plus a few large radiators. Radiant heaters in Memorial Chapel Portable heaters in Vestry
Do we have a plan of the heating? (If yes, make it available to any advisors you consult.)	
What condition is our current heating system in?	In urgent need of replacement. One boiler is beyond repair making the system at best 60% of what is needed. This boiler/system is prone to unexplained shutdowns. The water flow through he Chancel area is poor.
What is its likely lifetime? Is there a plan for when the boiler breaks down?	We are at end-of-life already
Overall, does it do what is needed? If not, what do we want it to do, that it can't do now?	No. Needs significantly higher heat delivery and reliability and greater fuel efficiency
Do we think it could it be adapted to achieve greater efficiency and a lower carbon footprint?	Only by replacing the boilers
Do we think there is a better solution, with which we could replace it?	Believe replacing the boilers with modern condensing boilers is the only way forward with existing technology at a rational costs – see Energy Audit from ESOS

5dBuilding and fabric

Where is there heat loss and can we reduce it?	
Are there cold, draughty spots? What causes them? (Poorly fitting doors? Broken or poorly closing windows? Air being drawn up to the tower or belfry?	Some poorly fitting windows with thin glass
Where does heat 'leak' from the building; consider the tower, windows, walls, and doors.	Windows (see above)
What ability do we have to reduce heat loss, for example through draught-proofing, insulation, or soft furnishings?	We're Grade II* so have restrictions on glass replacement
Do we have an asbestos plan of the building? (If yes, make this available for any advisors you consult. If not, you need one.) Does it affect our options?	Yes. It is important to remove old asbestos when replacing the boilers
Is the building generally well maintained? Are there any defects highlighted in the most recent QI report which should be addressed before introducing a new heating system?	Yes - well maintained by a mixture of in-house 'work party' and external contractors where appropriate/necessary
Are there areas where water condenses on surfaces, when the building cools down?	No

5e. Performance

How well to the people, systems, and building interact?	
What temperature(s) do we currently set our thermostats to, and why?	15°C
What times of the week does the heating system currently run, and why?	Continuous. We have experimented with various options, and this has proved the least costly and most thermally effective. And agreed with DAC
,When we turn on the heating, how long does the building take to come up to temperature?	After a breakdown it takes 48 hours to return to 'normal'
When we turn on the heating, and warm air starts to rise, does it displace cold air and cause discomfort elsewhere?	N/A
When we turn off the heating, how long does the building take to cool back down?	N/A
Considering the above, are the heating timings optimised for the uses of the building? How do we know?	Have experimented with timings (and dual temperature settings) and are satisfied that a continual fixed temperature controlled by thermostats is the best option open to us
Who has control over the programming of the heating system? Does the current system work well for them?	N/A
When we have an unexpected meeting or event, is the system responsive enough?	N/A
Are the controls user friendly? Are they well understood?	Old system with poor documentation (some parts refer to elements – eg timer -that have been replaced long since)
How does the temperature and humidity vary during the week and year? (You can measure this with inexpensive data loggers.)	N/A
***Note**: Levels of relative humidity should be kept at 40-70% RH and ideally 45-55%. Below 40%, loss of moisture causes damage to pores in wood. Above 70% allows moulds to develop and insect infestations to proliferate.)*	

5fListing and interiors

What fragile or precious objects/materials do we have, and what needs special care?	
What listing is our church? What features of the church contribute to this listing?	Grade II*
What does our building contain in terms of historic fabric, timber elements (such as screens, pews or altarpieces), pipe organs, wall or other paintings, or other items which will require special consideration?	Pews and alter surrounds Fr Willis organ 1898 (https://npor.org.uk/survey/R00207) Yamaha C7 Concert Grand Piano (2004) Extensive Music Library (Susceptible to damp)
At what rate does our building heat up and cool down? (More than 2◦C temperature rise per hour is considered damaging to fabric.)	N/A
Are wall-mounted panel heaters a realistic option, or do historic fabric or finishes prevent this?	No. We have had a survey to confirm this. Heating areas were insufficient, new chandeliers would be required, and the cost is prohibitive
Are pew heaters a realistic option, i.e. you have pews, and the pews are not historic (pre 18C)?	Building needs to be reconfigured to make it more useable for community use, Likely that the pews will be removed within 5 years
Is digging in the grounds to install a ground source heat pump a realistic option? They are much harder to install if burials surround the church, although not impossible. (There are two options for the pipework; snaking pipwork near ground level or deep vertical boreholes.)	No our churchyard has ben in use as a burial ground for over 1000 years and is full.
Is under floor heating a realistic option? Historic floors should generally not be lifted.	We have underfloor pipe already but would have to be replaced with any alternative system
Are there monuments or brasses which would be affected by having heaters or heating pipes close to them?	No

5g Energy use

What is our current energy use, utility cost, and carbon footprint?	
What is the annual usage of oil / gas / electricity? (litres or kWh per year)	Gas 231,000 KwH Electricity 10,600 KwH
What is the annual spend on oil / gas / electricity?	Gas £16,000 Electricity £4,000
Who reads the meters, and how often?	Smart meters installed
How is information about energy use shared with the church community?	Regular reporting of the costs
What is our gross carbon footprint? (This can be calculated quickly using the Church of England Energy Footprint Tool online.)	52.2 Tonnes CO2
What is our net carbon footprint? (Use the Energy Footprint Tool online.)	49.6 Tonnes CO2
What are our two energy efficiency ratings, from A+ to G? (Use the Energy Footprint Tool online.)	

5h Money

What budget do we have for up-front capital, for maintenance over time, for running costs every year, and for future replacement?	
What budget has the PCC set for replacing the heating system?	£60,000 (including £23,000 for asbestos removal)
What amount can the church realistically afford to spend on maintenance, over (say) the next ten years?	£5,000 pa
What amount can the church realistically afford each year for utility bills?	£15,000
What amount can the church realistically afford to invest in a 'sinking fund' for the systems' eventual replacement?	£50,000 plus potentially £30,000 from a legacy fund
If we need expert advice, what budget has the PCC authorised for advisors?	Energy Audit done and 3 quotes obtained for replacements

5i Constraints

What connection do we have to utilities? What space constraints are there?	
Are we connected to gas? If not, is it possible?	Yes
Are we connected to electricity? Single phase or three phase? What load can the system take, and what could it be expanded to?	Yes, single phase
Has our QI report recommended improvements?	No
What space is there within our boiler room for change in the size of equipment? Are there any other suitable locations?	No
Is biomass a realistic option? It generally requires room for a storage hopper for the wood pellets. It may not be allowed in some areas due to the Clean Air Act. It will require weekly attention and regular maintenance.	No

5j Advice

Who can we ask, or commission, for advice?	
What advice do we need, to help us choose the right heating system (including conserving any historic fabric / interiors)? What questions don't we know the answers to?	
Have we had an energy audit? If yes, what did it recommend? If not, could we commission one? (Parish Buying offers them as do some dioceses.)	Yes
Does the DAC have a heating or sustainability advisor, who can offer up-to-date guidance to us on low and zero carbon technologies?	Yes. We have a report from the Diocesan net zero adviser
Is there anyone on our PCC who is expert and up-to date in this area?	No
Can our QI recommend an advisor?	No
If you need advice and it is not available from the sources above, try the CIBSE directory: https://www.cibse.org/buildingservices/find-a-specialist. There is more on this in the next section, on Options Appraisals.	

5kConsultations

Who do we need to involve, and when?	
Which church users should we speak to about our heating system (for example regular hirers or tenants)?	
Which church volunteers and staff should we speak to (for example the treasurer, church wardens, youth leaders, and PCC members)?	All PCC and officers fully on board with replacing the old boilers and need to see the asbestos removed
Who in the deanery and diocese should we speak to (for example the DAC Secretary, Diocesan Environment Office, and Archdeacon)?	DAC
Which external organisations should we speak to (for example the amenity societies)?	N/A
Do we need to consult the local planning authority?	No

5l Objectives

Overall, how important are the following to us?	Top three	High	Medium	Low
Environmental factors (For example, cutting our carbon footprint by reducing our energy use and/or switching to a cleaner fuel)			✓	
Conservation of our historic interiors			✓	
Making church users comfortable in the building	✓	✓		
Increasing lettings income			✓	
Capital cost			✓	
Maintenance cost			✓	

Running cost	✓	✓		
Replacement cost			✓	
Ease of use			✓	
Reliability	✓	✓		

HEATING CHECKLIST

5m Conclusions

What are the main things we learned from this review?	Given the church's size and large use of utilities and sizeable emissions we have to achieve a more energy efficient system. All engineers who have visited agree that modern condensing boilers are the only practical alternative given present technology at rational cost; however the PCC would designate £50,000 from a legacy as a Heating Fund. In addition, we have £30,000 in a legacy heating fund which we could add, subject to agreement of the Charity Commission

What are our next steps?	PCC has appointed preferred contractors for boiler replacement and asbestos removal and now need to seek a faculty.

Having completed your checklist, we suggest discussing the results at an upcoming PCC meeting.

The next section of guidance builds on this checklist, to help you carry out an Options Appraisal. You can then identify the feasible options for your church, and start to assess them.

ESOS-ENERGY
Energy efficient solutions

Energy Efficiency and Zero Carbon Advice

All Saints Church, Hertford
PCC of All Saints Church

Author	Reviewer	Audit Date	Version
Paul Hamley	Tamsin Hockett	24th January 2023	1.0

Contents

1. Executive Summary

An energy survey of All Saints Church, Hertford was undertaken by ESOS Energy to provide advice to the church on how it can be more energy efficient and provide a sustainable and comfortable environment to support its continued use. This audit has been provided in conjunction with 2buy2, the Church of England's Parish Buying scheme provider and is subsidised from Total Gas & Power, the Parish Buying schemes principal energy suppliers.

All Saints Church, Hertford is a large late Victorian building constructed of red sandstone in the perpendicular style. There is both gas and electricity supplied to the site.

The church has a number of ways in which it can be more energy efficient and a clear path towards net zero carbon. Our key recommendations have been summarised in the table below and are described in more detail later in this report. It is recommended that this table and the route to net zero carbon diagram below are used as the action plan for the church in implementing these recommendations over the coming years.

Energy and decarbonisation recommendations	Estimated Annual Energy Saving (kWh)	Estimated Annual Cost Saving (£)	Estimated capital cost (£)	Payback (years)	Permission needed	CO2 saving (tonnes of CO2e/yr)
Contact suppliers to arrange for the gas meter to be changed to a smart meter	None	None	Nil	N/A	None	N/A
Replace R7s floodlight elements and spotlights with LED units	2,700	£864	£500	1	List B	0.6
Replace external floodlights with LED units	1,500	£480	£600	1.5	List B	0.3
Install draught proofing measures	1% 2,200	£704	£500	1	Consult DAC	0.4
Obtain quotation for under pew heater installation	220,000 gas 21,000 electric use	£700	£42,000	60	Faculty	35.4
Install Solar photovoltaic panels	10,920	£3,494	£15,600	4.5	Faculty	2.3
Consider registering for Eco Church	The Eco Church programme, which is recommended by the Church of England, helps congregations care for the environment in all aspects of church life. The programme is free; you can, however, make a donation to A Rocha UK towards its costs.					
Create a procurement policy for appliances (and other goods)	Commit to buying only appliances with the new energy efficiency ratings of A, B or C at the lowest when those you currently have reach the end of their useful life. (NB ovens, air conditioners and space or water heaters are still on the older rating scale, so for these, try for A+++.)					

Alternative Options	Estimated Annual Energy Saving (kWh)	Estimated Annual Cost Saving (£)	Estimated capital cost (£)	Payback (years)	Permission needed	CO2 saving (tonnes of CO2e/yr)
Air to Air Heat Pump system	220,000 gas 55,000 electric use	Extra expense	£135,000		Faculty	28.2

The church should check any faculty requirements with the DAC Secretary at the Diocese before commencing any works.

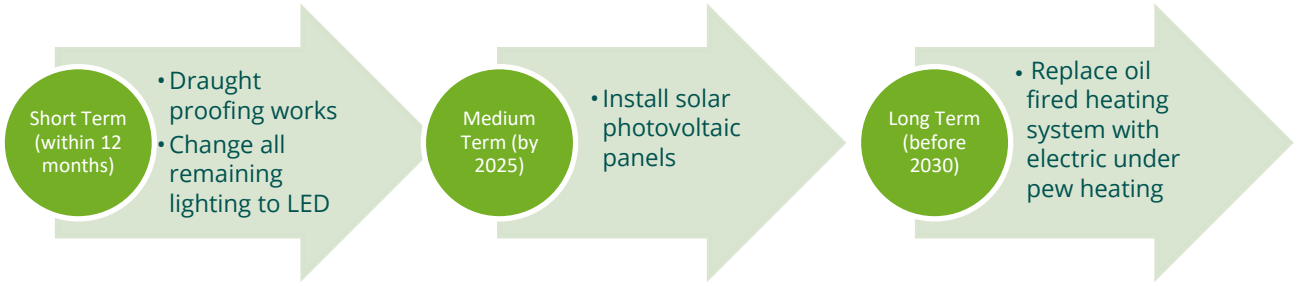
Figures in the table are based on current contracted/market prices of 32p/kWh and 10p/kWh for electricity and mains gas respectively. The carbon figures are based on the DEFRA 2022 carbon emission factors of 0.211 for electricity, 0.18 for gas and 0.27 for oil. Do note that as energy prices increase, payback periods decrease.

2. The Route to Net Zero Carbon

Our Government has committed to move towards Net Zero Carbon – the point at which we have reduced emissions as much as we can and then balanced any residual emissions through removal of carbon from the atmosphere. They have done this as part of a worldwide agreement which aims to limit global warming to well under 2 degrees Celsius, with an aim of keeping it below 1.5 degrees Celsius. This will help protect all of us from the impacts of climate change.

In February 2020, the Church of England's General Synod set its own Net Zero Carbon target. The first stage of this target covers energy used by churches, cathedrals, schools, vicarages, other church buildings, as well as emissions caused by reimbursed transport. The target date is 2030.

This church has a clear route to become net zero by 2030 by undertaking the following steps:



3. Introduction

This report is provided to the PCC of All Saints Church, Hertford to give them advice and guidance as to how the church can be improved to be more energy efficient. In doing so the church will also become more cost effective to run and seek to improve the levels of comfort. Where future church development and reordering plans are known, the recommendations in this report have been aligned with them.

An energy survey of the All Saints Church, Hertford, Queen's Road SG13 8AY was completed on the 24th January 2023 by Dr. Paul Hamley. Paul is an energy auditor with experience of advising churches and small businesses. He is part of the Diocesan Environment Officers Energy Group developing advice for the Church of England and authored the "Assessing Energy Use in Churches" report for Historic England. He is a CIBSE Associate member and a Chartered Scientist, with experience of the faculty process gained from chairing the building committee of a Grade I listed church.

All Saints Church, Hertford	
Church Code	632145
Gross Internal Floor Area	900 m^2
Volume	9,000 m^3
Heat requirement	295kW
Listed Status	Grade II*
Average Congregation Size	60 mornings, 25 evenings

The church is typically used for 24 hours per week for the following activities

Type of Use	Hours Per Week (Typical)
Services	6.5 hours per week
Meetings and Church Groups	7 hours per week
Community Use	10.5 hours per week

There is additional usage over and above these times for festivals, weddings, funerals and the like

4. Energy Procurement Review

Energy bills for gas and electricity have been supplied by the church.

The electricity rates which applied in September 2022 are:

Day Rate	17.8262p/kWh
Night Rate	12.678p/kWh
Standing Charge	63.1115p/day

The gas rates which applied in September 2022 are:

Single / Blended Rate	1.9501p/kWh
Standing Charge	542p/day

The electricity is supplied by Total Energies, and is purchased on a renewable tariff (although the supplier's overall fuel mix disclosure is only 50%).

Going onto a renewable tariff is an important part of the process of taking churches towards net zero. The church is therefore encouraged to consider procuring its electricity from suppliers that offer 100% renewable electricity, and in some cases 'green' or 'carbon neutral' gas.

A review has also been carried out of the taxation and other levies which are being applied to the bills. These are:

VAT	Gas 5% Electricity 20% when consumption exceeds 1,000kWh per month	The church is a charity and therefore should be benefiting from only be charged a 5% VAT rate. A VAT declaration should be sent to the supplier to adjust this.
CCL	100% charged when 20% VAT is applied	As the church is being charged the wrong VAT rate, they are also being charged CCL which should not be applied as they are a charitable organisation. Sending the supplier a VAT declaration will remove this charge.

The above review has highlighted that VAT and CCL are being charged. The church is a charity and therefore can claim VAT exemption status. As such the PCC of All Saints Church, Hertford should send the supplier at VAT declaration confirming this and check all supplies on other sites. VAT declarations are available from the suppliers website and can usually be found by typing the suppliers name followed by "VAT Declaration Certificate" into most website search engines.

5. Energy Usage Details

5.1 Annual Consumption

All Saints Church, Hertford electricity use has declined from 14,526 kWh reported for 2019 to 10,800kWh (10 months utility bill data adjusted to 12 months) for November 2021 to September 2022.year of electricity. Costs were £3,209 for 2019 and approximately £2,320 for 2022.

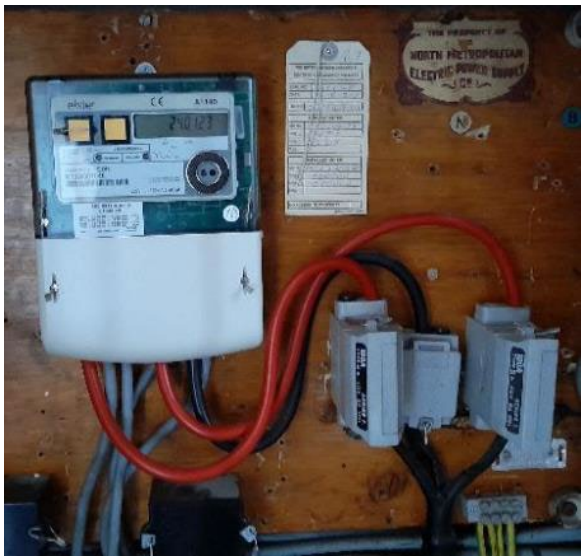
455,424 kWh/year of gas were consumed in 2019; figures supplied covering the period from October 2021- September 2022 are 221,288kWh (a 52% fall) costing £7,430. Much of this may be due to the failure of one of the two boilers.

The total carbon emissions associated with this energy use has reduced from 85.0t to 42.1t CO_2e tonnes/year.

This data has been taken from the annual energy invoices provided by the suppliers of the site.

Utility	Meter Serial	Type	Pulsed output	Location
Electricity – Church	K13W301046	Elster A1140	Yes	Toilet, NE corner of site
Gas – Church	M0040 A0531 14 D6	Itron metric	No	Cupboard outside boiler room door

It is recommended that the church consider asking their suppliers to install a smart gas meter so that the usage can be monitored more closely, and the patterns of usage reviewed against the times the building is used. Detailed electricity consumption data could be obtained from the supplier.



5.2 Energy Profiling

The main energy consuming plant can be summarised as follows:

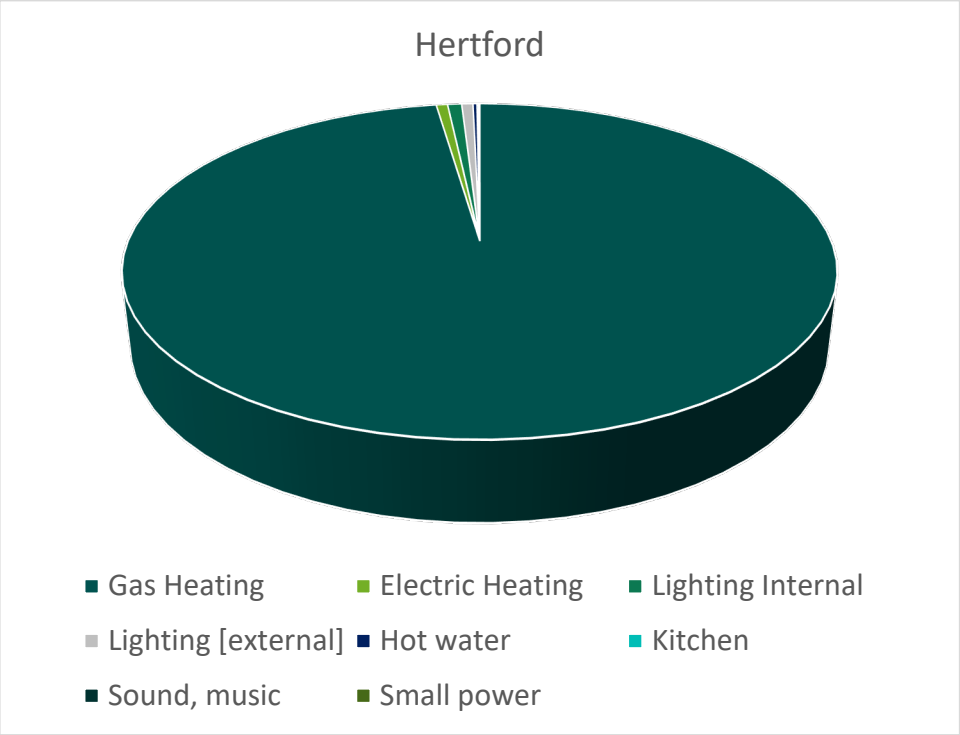
	Equipment	Power kW	Annual Consumption kWh	Proportion
Heating [Oil]	No.1 Ideal Concord CXD [failed] No.2 Ideal Concord CXS [working]	100? 100?	[230,000] 220,000	Was 97.6%
Heating [Electric]	Boiler circulation pumps [2,000 hours] Chapel: 4 wall mounted quartz radiant heaters [approximately 5 hours/week]	400W 8	800 2,000	 0.4%
Lighting [Internal]	Church 840 hours use R7s floodlights 21 x 150W LED floodlights 4 x 50W LED chandelier mounted 72 x 4.5W Spotlights 19 x 10W Fluorescent 5 x 58W 4 x 36W Bulkhead 3 x 40W	 3150W 200W 324W 190W 290W 144W 120W TOTAL 4318W	 3,500	 0.8%
Lighting [External]	2 x Floodlight 500W 3 x Floodlight 250W 1 x Spotlight 150W If 4 hours/night	 TOTAL 1,900W	 2,800	 0.6%
Hot Water (electric)	Fixed water heater 2 urns	3 4	600 400 TOTAL 1,000	 0.2%
Kitchen	Fridge	120W	400	0.1%
Sound, Music	Organ Sound system	1 0.5	100 100	 0.04%
Small Power	Vacuum cleaner Photocopier	1.5 0.5	50 50	 0.02%

Sum of electricity use estimates: 10,800kWh

Annual church electricity consumption, 2019: 14,526kWh

Annual church electricity consumption, 2022: 10,800kWh

Major differences in consumption are likely from changing the hours of use of the quartz radiant heaters in the chapel.



As can been seen from this data, the heating makes up by far the largest proportion of the energy usage on site. The other significant loads are electric heating, lighting and floodlighting.

5.3 Energy Benchmarking

In comparison to national benchmarks for church energy use[1] All Saints Church, Hertford uses 60% less electricity and was using over three times more heating energy [with two working boilers] than would be expected for a church of this size. It should be noted that the national benchmarks do not make any specific adjustment for the amount of time the church is used and the usage of this church will therefore affect how it performs against this benchmark.

	Size (m^2 GIA)	All Saints Church, Hertford use kWh	All Saints Church, Hertford use kWh/m^2	Typical Church Use kWh/m^2	Proportion
Electricity	900	10,800	12	30	40%
Heating Fuel	900	450,000 225,000	500 250	156	320% 160%

1 Shrinking the Footprint: Energy Audit report for the Church of England, 2013

The church is seated using pews, except for the chapel (below) which uses chairs.

6. Efficient / Low Carbon Heating Strategy

6.1 Overview

The energy used for heating a church typically makes up around 80% to 90% of the overall energy consumption. Heating also often uses gas or oil as its primary fuel. These are fossil fuels with high carbon emissions and little opportunity to decarbonise in the near future. Mains gas does have some potential to reduce its carbon content through the use of bio gas and hydrogen, but these are less developed solutions and will be unable to deliver 'zero carbon mains gas' in the foreseeable future.

It is therefore important to review and set out a plan to make heating more efficient and less carbon intensive. One way to achieve this is to consider a transition to electrical heating where this also represents an efficient and comfortable solution for churches. Electricity currently has carbon emissions of around the same level as mains gas, but the carbon emissions associated with electricity are reducing rapidly as the UK builds more renewable energy and decommissions its remaining oil and coal-fired power stations.

6.2 Current Heating System

The church is currently heated by one of two Ideal Concord gas fired boilers. These are around 20 years old and one of the pair has failed. The remaining unit may remain serviceable for a few years but is at end of life and should be expected to fail imminently. The boilers are of the non-condensing type with an efficiency of only around 80%.

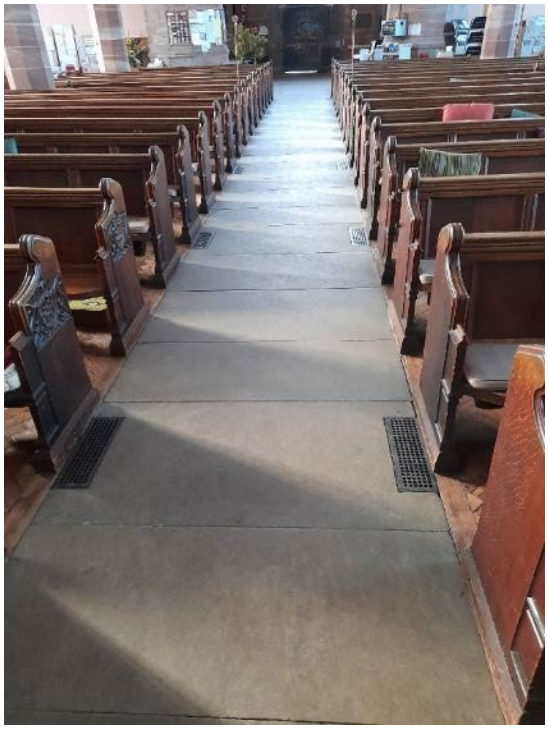
The flue system uses an extraction fan which results in much heat being lost to the outside environment, a stream of hot air from the vent being noticeable adjacent to the boiler room.

The low height of the vent is not ideal as combustion products are vented close to head height.

The boilers provide heating to a mixture of cast iron column radiators and elderly horizontal pipe radiators in a few locations, but mostly under floor heating pipes delivering heat through a series of small grilles in the flooring.

The inefficient nature of the system (low boiler efficiency inherent in the non-condensing design, low surface area of the small number of radiators and much heat transfer through pipework under the floor) means that the church relies on background heating, that is not allowing the temperature to fall below a set point, as it takes a long time for temperature to rise in the large space (approximately 9,000m^3).

The flue extraction fan, below right.



The majority of the space heating is delivered via very small grilles in the floor. Heat transfer from pipework to flooring may produce a partial underfloor heating effect, but without insulation below, half of the heat will be lost to the ground.

The chapel below has four subsidiary wall mounted quartz radiant electric heaters.

The church makes use of fixed wooden pews in the main, with chairs in the chapel.

The church has two Sunday services and the typical congregation size is 85 with 20 at midweek services.

6.3 Future Heating Options

The church is used for around 16 hours per week, with extra use of the meeting room. This is approaching the number of hours when a heat pump system becomes viable, however the very large volume of the building would make heating times for an Air to Air Heat Pump system very long. If hours of use of the building increased (perhaps to 30 hours), this would become viable as the use hours would approach the number of hours the heating would need to be in operation to deliver the heat required.

It is considered unlikely that permission would be granted for suspended radiant infrared heating in the Grade II* listed church such as chandelier mounted (glowing) quartz heaters, or far infra-red "black heat" rings.

The remaining option is to install under pew convector heaters. There are a relatively large number of pews, but also a large congregation and the need to seat and heat civic events.

The various options for a decarbonised heating solution have been reviewed in the table below.

Decarbonisation Heating Solution	Viable
Air to Water Source Heat Pump	No – unsuited to current heating pipework and heat emitters
Air to Air Source Heat Pump	Not with current hours of use
Water Source Heat Pump	No – no water source locally
Ground Source Heat Pump	No – significant archaeology, unsuited to current heating pipework and heat emitters
Under Pew Electric Heating	Yes
Electric Panel Heaters (to provide supplemental heating only)	No – building too large
Over Door Air Heater (to provide a supplemental warm welcome at the door only)	Yes
Overhead Infra-Red Heaters	No – visual intrusion to the church would do harm, least preferred heating source due to comfort
Heated Chair Cushions	Suitable for "top up" heating

The recommendation is therefore that the church consider under pew heaters as described below. Air to Air Heat Pumps are included for comparison should the church consider that higher hours of use are likely (running costs are lower for high hours).

6.4 Install Electric Under Pew Heaters

Electric under pew heaters provide a high level of thermal comfort to people sat in the pews. They are not installed to try and heat the entire air volume of the church, instead thermal comfort is achieved through a flow of warm air rising past the person in the pew. This means that the heaters should be installed under the entire length of all the pews that are likely to be used.

These heaters warm up almost instantly and a flow of warm air over the pew area is created within around 15 minutes of their being turned on. This significantly reduces the amount of preheating required before each use of the building and can make electric heating cost competitive with gas. It is important that this reduced 'on time' is properly reflected in any comparisons with other types of heating.

We would therefore suggest that the following works could be considered:

Install under pew heaters suspended from brackets from the underside of the pew seat as follows:

60 pews each with one central support; two 650W heaters each.

120 x 650w = 78kW. 9 hours use per week x 30 weeks = 270hours x 78kW = 21,060kWh

Capital cost 120 units x £350 = £42,000

Operating cost at evening / weekend rate 21,060kWh x 12.678p/kWh = £2,670

Operating cost at present market rate 21,060kWh x 32p/kWh = £6,739

Gas bill (2019, 455,000kWh): £9,655

Gas bill (221,000kWh for 2022 at 10p/kWh market rate = £22,000

Cable runs to the pew heaters should run along the along existing routes where possible (all cabling should be in armoured cable or FP200 Gold when above ground). Each pew heater to be switched with a neon indicated fused spur located underneath the pew seat.

A case study of a church which has adopted this solution is available at https://www.churchofengland.org/about/environment-and-climate-change/st-andrews-chedworth-electric-heating

Photos of installations are shown below. In addition, several churches have recently installed such systems. If you would like to find out about churches whom you could ask about their experiences, please contact the diocese.

Brown BN Thermic 650W under pew heaters fixed to underside of pew seats for pews which have no solid backs.

Black 650W Norel under pew heaters fitted to solid pew backs.

6.5 Air to Air Source Heat Pumps

Air-to-Air Source Heat Pumps (AASHP) work by having an external unit which sucks air in and extracts the heat from it. The pumps concentrate this heat and put it into a refrigeration gas (in the same way as a fridge or freezer works). This refrigeration gas is then piped inside the building in a small pipe where is it then allowed to expand in an internal unit with a fan. This heat is then blown out into the space. This system is identical to an air conditioning system, but it works in reverse to heat the space. As warm air is blown into the space this type of system can heat spaces from cold relatively quickly. AASHPs provide around 4.5 units of heat for every 1 unit of electricity used in the heat pump; they therefore have a Coefficient of Performance (CoP) of up to 4.5.

The Centre for Sustainable Energy model[1] can be used to estimate heat load for the building.

Heat Load (kW) = Volume V (m^3) x Insulation Factor

Insulation Factors

Condition	Factor kW/m^3
Poorly insulated with open or broken windows, draughty doors (add 5%)	0.034
Poorly insulated (assume no interventions)	0.033
Some insulating features	Estimate value
Well insulated	0.022
Insulated to 2010 regulations	0.013

Area	Volume m^3	Insulation Factor kW/m^3	Heat Required (Space heating) kW
Church	9,000	0.033	297

Therefore, a heat pump of 297 kW output would be required.

Capital cost estimate, £134,000

Operating cost for 221,000kWh heat supply (as at present) = 221,000/4 x 32p/kWh = £17,680

Gas bill (221,000kWh for 2022 at 10p/kWh market rate = £22,000

AASHPs require the installation of external units which look like air conditioning modules in well-ventilated external locations. These external units will need an electricity supply and pipework running from them to the heating system. They will also need a drain nearby as the back of the units can build up moisture, which condenses and sometimes freezes on the coils. The larger units do create some low-level noise and therefore the location and baffling of the units may need to be considered carefully.

[1] www.cse.org.uk/local-energy/download/estimating-the-heat-demand-of-a-hypothetical-community-building-79

Examples of external units for AASHP comprising of three smaller 3kW units (10kW output each) and two larger 10kW units (37.5kW output each).

Internal units come in a variety of styles. The most appropriate internal units for most churches are floor mounted units which look very similar to a fan convector heater.

FVXM - Floor Mount Air Conditioning Unit

Designed to fit rooms of any size and shape, it blends well with the interior due to the new design which incorporates more flowing lines and softer edges. These units are ideal when it is not possible to fit a high level wall mount unit for aesthetic or practical reasons.

They are suitable for a wide range of applications including domestic, small to medium offices and commercial uses.

All these units do have a fan element within them and therefore a small amount of fan noise is emitted. This tends to be less than a fan convector heater on a boiler-based system and similar to the noise from a fridge or freezer. Air conditioning units are commonplace in hotel rooms, indicating that the noise is low enough even to be suitable for sleeping environments.

A case study of a church which has installed such a solution is available at 5. Air-source heat pumps at Hethel Church - All Saints Church, Hethel - A Church Near You

6.6 Heated Pew / Seat Cushions

Most are now familiar with the concept of heated seats within cars; the same solution is also used in some outdoor venues such as alfresco dining and sports stadiums. These provide a heated cushion to sit on: the direct warmth from the contact areas provides a degree of comfort

even when the surrounding space is cold. This can be a useful solution for churches which only have chairs (having removed pews) and/or for small congregations where there are few other alternatives.

There are a variety of heated seat cushions on the market. Some are directly plugged into a power socket (similar to an electric blanket). Others have battery packs, which can be charged and then connected to a seat pad. This makes them more flexible and avoids trailing leads. The more advanced products have a pressure sensor which means heat is only provided when someone is sitting on the cushion. Heated pads for 'benches' can also be used to heat a pew or could even be adapted to form a heated kneeler for the communion rail.

It is recommended that the church consider using a set of heated cushions / chair covers to provide heating to the chapel area which would be suitable for smaller services.

A case study of a church using heated cushions is available at https://www.churchofengland.org/about/environment-and-climate-change/towards-net-zero-carbon-case-studies/marown-church-tries-new

6.7 Office Heating

The office space in the vestry area at the north east of the building is open to the ceiling 4m above. If in on/off use through the week, a heated office chair may be found to be a useful alternative / extra heating source. Regular use would make installing internal secondary glazing to the window worthwhile.

6.8 Upgrade to 3 Phase Electricity Supply

To be able to have sufficient electrical power to supply enough energy into an electrical heating system, the church will need to increase the existing electrical supply from single phase 100A supply to a 3 phase 100A supply.

The upgrade to the supply has to be carried out by the District Network Operator in the areas.

The cost of bringing in a new 3 phase supply can range from £300 to £30,000. The DNO will provide a quotation for free, so it is well worth obtaining a quotation even if plans are not yet certain, so that decisions can be made on a well-informed basis.

7. Improve the Existing Heating System

In the period before the replacement of the existing heating system it is recommended that measures are taken to improve the efficiency of the existing heating system. These should include:

7.1 Clean the Existing Heating System

Magnetic sludge builds up and circulates within heating systems. This will prevent the proper and efficient operation of the system by reducing both the ability of the boiler to heat up the water and the output of the radiators. It is similar to how scale build up can adversely affect kettles and showers.

The church should hold a record (in the Log Book) of when cleaning was last carried out. If more than a decade, and it is likely that the system will be in use for more than a further two years, it is strongly recommended that the heating system is cleaned to remove this sludge from the system. This is done by using a chemical clean and/or power flush procedure in which cleaning chemicals are put into the system, which is then turned on and run through a filter consisting of high-power magnetics to remove the sludge.

The cleaning of a heating system can be carried out by any competent heating engineer and typically increases the efficiency of a system by between 10 and 15%. This can dramatically improve comfort for the congregation.

8. Energy Saving Recommendations

In addition to having a revised heating strategy there are also a number of other measures that can be taken to reduce the amount of energy used within the church.

8.1 New LED Lighting

The lighting makes up a relatively large overall energy proportion of the electricity used within the church.

Most areas have had efficient LED lights installed but there are still several high powered floodlights with linear halogen lamps (often of 150 or 250W indoors, and may be 500W. 150W spares are stocked in the church). These bulbs should be replaced by LED R7s lamps of equivalent length (118mm). To obtain sufficient power (20W), the lamps are of wide diameter (20mm), so care must be taken to purchase those with off centre end terminals so they will fit into the existing luminaires.

It is also recommended that the external floodlights (2 @ 500W, 3 @ 250W, 1 spotlight) are replaced by LED floodlighting.

Floodlights using 118mm R7s halogen lamps

Guidance on lighting, produced by Historic England for churches, can be found at: https://historicengland.org.uk/advice/caring-for-heritage/places-of-worship/making-changes-to-your-place-of-worship/advice-by-topic/lighting/

There are some fittings where the existing fitting can be made more efficient by simply changing the bulb/lamp within the existing fitting to a new LED bulb/lamp. This could be carried out by competent members of the churches internal team, very cost effectively and, unlike a change of fittings, would be a List A item, so no permissions would be required.

8.2 Lighting Controls (Internal)

Areas such as the vestry, kitchen and toilet which are only used occasionally and for a short amount of time do not require lighting to remain on constantly. There are also spaces which benefit from a good amount of natural daylight coming in through the windows, such that artificial lighting is not required for much use during the year.

It is recommended that a motion sensor is installed on these specific lighting circuits so that the lights come on only when movement is detected in the space and turn off approximately two to five minutes after the last movement has been detected. (Note that the duration of the time lag after which the light goes off needs to be considered alongside the type of light that is fitted. LED lights are much more suited to being switched off after only a short duration than some fluorescent lights.) These movement sensors, commonly called PIRs, also have light sensors integrated into them, so they can be used to make sure that the light does not come on if there is already sufficient daylight in the space.

Your existing electrician or any NICEIC registered electrical contractor can install PIR sensors onto existing lighting circuits. This can be carried out without significant disruption to the use of the space.

8.3 Draught Proof External Doors

There are a number of external doors in the church. Where historic timber doors do not close tightly against the surrounds, a large amount of cold air can enter the church around the side and base of these doors, as can be seen below.

It is recommended that the draughtproofing around doors are improved and draught strips are added. This could be achieved in a number of ways:

For timber doors that close onto a timber frame a product called QuattroSeal is often used in heritage environments to provide appropriate draught proofing.

For timber doors that close onto a stone surround, traditional solutions can be used such as brush draught strips rebated into the edge of the door by a skilled joiner. Other traditional methods such as using hessian or felt pads tacked to the door could also be used. Keeping the door maintained in a good condition is also important.

It is necessary to check with the DAC before undertaking any form of draughtproofing that involves work on the fabric of the door.

Simple measures such as having a 'sausage dog' style draught excluder laid along the base of a door (it needs to be sufficiently heavy to stay in place), using plasticine of the right colour to fill gaps where daylight can be seen, and putting painted fridge magnets over large keyholes can all be simple DIY measures which are effective.

Such measures should be considered carefully around bat conservation needs to ensure that access points bats use are not disturbed. Check your draught excluding plans with the Bat Conservation Trust's free helpline: 0345 1300 228 https://www.bats.org.uk/

8.4 Secondary Glazing

The windows of the building are singled glazed with metal frames. It is not possible or desirable to change the window(s) as the building carries listed status. The vestry windows would be worth installing secondary glazing if it is, or becomes used regularly during the week.

Installing permanent glass secondary glazing units costs around £500/m2. There are a number of suppliers who offer cut to size acrylic panels which can be attached / held in place using blu tack or plasticene, or strip wood framing. They can also be trimmed using a craft knife.

The introduction of secondary glazing would considerably reduce the heat loss through the existing windows and improve both thermal comfort and noise levels, as well as providing added security.

Any possible installation would need to be carefully specified.

9. Renewable Energy Potential

The potential for the generation of renewable energy on site has been reviewed and the viability noted.

Renewable Energy Type	Viable
Solar Photo Voltaic (PV)	Yes
Battery Storage	Future potential

The church uses over 10,000kWh of electricity annually and the hours of use are sufficient that it would be worthwhile installing a medium sized solar photovoltaic array on the flat roof behind a parapet.

The following formula calculates annual generation:

Annual Generation (kWh) = Area x 0.15kWp/m^2 x 1000kWh/kWp x Orientation Factor x Overshading Factor.

The optimum size of installation may be smaller than the maximum outlined below if electricity use declines.

Roof Section	Area / m^2	System Size / kW peak	Orientation factor	Shading factor	Annual Generation, kWh
Church	80	12	135 degrees / 10^0 0.91	1	10,920

A 12kW peak system would cost in the region of £15,600.

Battery storage is not strictly a renewable energy solution, but it does provide a means of storing energy generated from solar PV on site to be able to be used at peak times or later into the day when the solar PV is no longer generating. It therefore extends the usefulness of the existing solar PV system particularly in this sort of church. This is a new but fast-growing technology with prices expected to fall substantially over the next 2 to 3 years.

10. Funding Sources

There are a variety of charitable grants for churches undertaking works and a comprehensive list of available grants is available on this Parish Resources page:
https://www.parishresources.org.uk/resources-for-treasurers/funding/

11. Faculty Requirements

It must be noted that all works intended to be undertaken should be discussed with the DAC at the Diocese.

Throughout this report we have indicated our view on what category of permission may be needed to undertake the work. This is for guidance only and must be checked prior to proceeding as views of different DACs can differ.

Under the new faculty rules:

List A is for more minor work which can be undertaken without the need for consultation and would include changing of light bulbs within existing fittings, repair and maintenance works to heating and electrical systems and repairs to the building which do not affect the historic fabric.

List B is for works which can be undertaken without a faculty but must be consulted on with permission sought from the Archdeacon through the DAC. This includes works of adaptation (but not substantial addition or replacement) of heating and electrical systems and also includes the installation of under pew heaters to pews which are made in or after 1850 and are not of historic interest.

All other works, including the like for like replacement of gas and oil boilers will be subject to a full faculty.

Works which affect the external appearance of the church will also require planning permission (but not listed building consent) from the local authority. This includes items such as solar PV installations.

12. Other Items

12.1 Bats in Churches

The Bat Conservation Trust has a project with the Church Buildings Council Natural England, the Church of England, Historic England and the Churches Conservation Trust to address bat issues: *www.churchofengland.org/resources/churchcare/advice-and-guidance-church-buildings/bats-churches*

ALL SAINTS HERTFORD

PLANS TO UPGRADE HEATING IN CHURCH

June 2025

One of the two existing linked gas boilers is obsolete and whilst we were hopeful it could be repaired this has proved not to be possible.

The other gas boiler is old and is still functioning, but at 60% efficiency which means it is working hard to heat the church but there are areas where this is not good, especially the Chancel.

We have had an energy audit by specialist heating consultants. They advised us that heat pumps would not work for such a large space and recommended we look at electric pew heaters. As, before too long we may wish to consider reconfiguring the church space the use of pew heaters is not thought to be the way forward. A quote was obtained for infra-red heating but, at £167,000 was way too expensive and did not give us the heating we need, especially around the organ area. Every engineer who has visited has advised that modern efficient condensing gas boilers are the only effective way of heating such a large space.

We have now had visits from 3 heating engineering firms and have had extensive discussions with each. All three require the asbestos in the boiler room removed safely before they can fit new boilers. On that basis we can ignore the cost of asbestos removal when comparing quotes.

For information, we have had 2 inspections by an asbestos removal specialist, Asbestos Gone based in Rochester, who were recommended by LH Cook, one of the heating engineers. Their latest visit was this week. This has highlighted that the safe removal from the boiler room is normal (albeit complex and heavily regulated), and the cost will depend on how many pipes are still needed in any new system (it being cheaper to remove pipes than making them safe and relagging). We are awaiting a new quote but one 18 months ago was £17K; however, there have now flagged up a need to deal with asbestos in the adjoining storage room, and this will be more complicated. Again, we expect a quote shortly. The storage room is out of bounds until this work is done, which obviously is best done with the boiler room work.

The main issue as regards costs of upgrading the heating is not the cost of the boilers so much as the cost of the flue system. Presently the boilers vent from the top and the flue system and extraction fan exit the boiler room above the boilers. Condensing boilers vent from the bottom, and this brings with it issues of how best to handle the required changes to the flue and how to make sure there is adequate ventilation (presently the ventilation is through the boiler room doors, but this would not be allowed with a new system. In all cases the engineers recommend that we do not change anything in the church itself but are sure that with modern linked boilers using the existing distribution system (underfloor pipes) we should see a lot less gas being used (and hence cheaper bills) and more efficient distribution (a better heated space).

The National Church now requires us to obtain a faculty for any replacement involving gas boilers. We are concerned at the time this may take as ideally, we want the work to be finished before winter, and therefore we need to prepare an application as soon as possible. We will need to explain what we have done to explore alternatives and also to comment on what we can do to ensure that in the future, as technology develops, we would be able to use alternative

forms of heating. In this latter case, we would need to look at replacing the present underfloor pipework. We could designate some funds to go towards this as a future project.

The three firms involved to date are: -

LH Cook – in Ware, they have fitted out churches locally and looked after the boilers in Hertford Castle

Indoor Maintenance – Leeds based engineers brought in to explore repairing the obsolete boiler.

SafeSure – Based in Luton, have fitted out churches locally and do a lot of work for the Diocese, especially on vicarages (including our own).

The position on quotes is as follows: -

LH Cook propose internally vented boilers fitted on a separate frame with ventilation through the existing space. They seem very knowledgeable and have visited twice. Their quote is £29,654.

Indoor Maintenance propose to redesign the flue system and ventilate up and over the door. Their quote is £69,698

SafeSure visited on 2 June. They also seemed very knowledgeable but need specialist advice about the flue system. They have been asked to give us an idea of costs prior to the PCC meeting.

Colin & Janet Bird

6th June 2025

AC/25/23
DIOCESAN ADVISORY
COMMITTEE
7 August 2025

DIOCESE OF ST ALBANS
Living God's Love

VISIT TO THE CHURCH OF: HERTFORD, ALL SAINTS, 7 AUGUST 2025

Purpose of Visit: to discuss heating options based on the long and short term plans for the use of the church

1. The Committee was represented by Mark Eddison (DAC architect member), Mike Popper (DAC consultant - sustainability), Emma Critchley (DAC Secretary), Tom Abraham (Net Zero Carbon Officer), Ann Wise (Historic Church Buildings Support Officer) and Liz West (Church Buildings Maintenance Officer). They were met at the church by Revd Simon Cutmore (Vicar), Colin Bird and Janet Bird (churchwardens).

2. The Grade II* listed church was built in 1893-95 to replace the earlier parish church that was destroyed by fire in 1891. The new building was designed by Paley, Austin and Paley of Lancaster in the Gothic Revival perpendicular style in pink Runcorn sandstone. It was consecrated in 1895 with the belfry added in 1907. It has an extensive churchyard and despite the A414 dual carriageway cutting it off from the historic centre of Hertford, it is deemed the 'Town church'. Accordingly, the first four pews on the south side of the nave are for the Hertford Mayor and Corporation. The organ is a Willis organ.

3. **Background**

   3.1. The PCC obtained an Energy Audit report in January 2023 (ESOS Energy). This provided recommendations for decarbonising the church based on the current building usage and layout, including replacing the gas boilers serving heating pipes in floor ducts and some radiators with under pew heating.
   3.2. One of the gas boilers has now failed and there is an urgent need to provide a heating solution for the coming heating season, as well as a longer-term plan for providing comfortable, affordable heating without the use of fossil fuels. Current levels and location of asbestos would prevent any work being done for a considerable length of time in the event of further boiler failure and there is not an adequate power supply for a temporary electric heating solution if required.
   3.3. At the site visit on 7 August 2025, DAC members rehearsed with the parish representatives the current issues, vision for use of the building and heating options.
   3.4. The parish and its church is in something of a transition, and this presents a significant challenge for specifying an appropriate low carbon heating solution for the future while meeting the current needs, and providing the opportunity for the current outline vision to flourish.
   3.5. Based on current levels of usage of the building, and as noted in the ESOS Energy Audit undertaken in January 2023, and at a visit by the Net Zero Carbon Officer in 2023 a heat the people heating solution would be the most efficient solution when considering energy consumption, its cost and carbon emissions. However the usage levels is getting close to that where a space heating solution would become the more efficient choice.

4. Heating – current

4.1. The current heating system comprises two gas boilers, one of which has completely failed, and the second has had multiple failures over the past several years. It has become increasingly unreliable, to the point where a temporary gas boiler option was briefly explored in late 2023, but fortunately a repair was managed to be made to the existing system to extend its life.

4.2. The gas boiler feeds through asbestos wrapped pipes in the boiler room into a twin run of heating pipes along the perimeter walls, 4 cast iron radiators (the one next to the organ currently works intermittently), and heating pipes in trenches along either side of the central aisle of the nave and along the front of the choir, with relatively small grilles to enable heat transfer. It was reported that it takes approximately 48 hours to warm the building up from cold, and the heating system is generally run with a constant target temperature of 16C. The current controls need a physical presence to adjust them. Within the Memorial Chapel there are also some electric radiant heaters.

4.3. The heat distribution system is thought to be more than 100 years old, and will at some point inevitably need replacement or repair. There would not be an easy way to add supplementary heat emitters into the system without significant disturbance which could introduce its own problems, and due to the current layout of the church with pews up to the walls in both aisles, it would be a difficult challenge to find the space to add heat emitters.

4.4. After Parish Share the energy bill is the single largest operational expense the PCC has to meet, currently around £14,000 per year for gas. The PCC report that they are currently running with an annual deficit of around £25,000 which is unsustainable, and therefore increased expenditure on heating costs is not considered to be currently viable.

4.5. The current electrical system is understood to be a single phase. Any electrical heating solution would require this to be upgraded.

4.6. Current church usage:

- Worship: Sunday and Thursday (fixed)
- Term time: concert series on Wednesdays (£15k income)
- Saturdays: monthly green watch talks.
- Growing number of organisations (schools and commercial) using the space
- Outdoor space – street food events: get 350-450 people through

4.7. The building is made warmer for Saturday concerts at the request of the user who contribute an additional £50 per use for this.

4.8. It was reported that the parish are considering engaging an events manager to further drive the usage of the church, which currently holds around 24 significantly sized concerts per year. While mostly the audiences sit in the central nave, it was reported that some tickets do get sold for the aisles, even though they have a restricted view.

4.9. The concerts bring in significant revenue, and it is hoped that usage for these will expand. A typical concert will involve the space being occupied for 5-10 hours include the set-up, concert, and takedown, and this length of usage , on a regular basis, would lend itself more appropriately to a space heating solution. With a low air temperature, but higher radiant temperature heat the people solution (such as infrared) there may be an impact on the sound produced by the instruments during concerts, however this is something that the musicians would likely be able to compensate for in their preparations.

4.10. The space is also reported to be used almost daily during Advent, with up to 8,000 people coming through the doors in the period, and usage by schools as the largest capacity venue in the area. Again it is hoped to increase civic usage of the church.

5. Parish long term plans

5.1. The parish is hoping to develop a grand vision for the future: increasing its community engagement, which will drive the increased use of the church, and may involve significant reordering, which would likely result in the removal of some or all pews. For example, currently lunchtime concerts can attract

up to 100 attendees who are can then buy lunch and eat it either in the south west side or sitting in the pews. In September a toddlers club will start and there are plans for an art project next year with two partner organisations. This would have two significant effects when considering heating options:

1 - it makes investment in pew heating potentially a short term solution.

2 - if reordering of the aisles is undertaken it could free up wall space for future heat emitters that could enable a water based heating system to operate at lower water temperatures improving the efficiency of any future heat pump installation, and/or enable a faster response space heating system.

5.2. Replacing pews with chairs might involve all congregational seating or might focus on spaces in the aisles in addition to the areas previously cleared at the west end, and/or at the front of the nave. Additionally there may be a wish to replace the fixed choir pews with bespoke movable choir stalls. Specific heating will be required for rehearsals and the significant Willis pipe organ has its own requirements for environmental conditions. These would need to be fully understood in the event of a change in heating approach.

6. Possible Heating Options

6.1. Heat the people:

6.1.1. Pew Heating - this has been discounted by the parish due to the considerable uncertainty about the future presence of pews. The suggested installation in the ESOS Energy Audit was for 120no. 650W pew heaters creating an electrical load of 78kW / 339A. This would require a significant power supply upgrade. A separate heating solution would be needed for the musicians performing concerts, with additional consideration of the needs of the organ, and likely a redesign of the heating in the chapel where the seating is provided by chairs, and the existing radiant heaters are reported to overheat people's heads.

6.1.2. Infrared - A quote was obtained from Herschel Infrared for approximately £130,000 +VAT and excluding installation. Beyond the cost it was reported that there were areas within the church that wouldn't be reached with the proposal. The electrical load was calculated at 151.8kW / 660A which would require a substantial electrical upgrade. Beyond the cost of the power supply upgrade there would be additional charges applicable to the electricity bill for availability. The quote obtained was for far infrared heating. The parish's current experience with near infrared heaters in the Memorial Chapel with people having overheated heads means they are currently reluctant to explore this technology at this time, even though it is normally lower cost from both a capital and operational perspective. It is recommended that this technology be further explored in future for heating the people in the main church space if usage of the building does not increase to make space heating a sustainable zero carbon option in the long term.

6.2. Space heating:

6.2.1. Air to water heat pump - this was discounted by the ESOS Energy Audit as being unsuited to the current heating pipework and emitters so this option has not been considered by the parish. However, there are now high temperature heat pumps available which could potentially be connected to the existing heating distribution system, and can offer flow

temperatures of up to 70C. If in future additional heat emitters could be added then the flow temperature could be reduced which would boost the efficiency, and therefore cost effectiveness of the heat pump. At the present time a high temperature heat pump may achieve an efficiency of around 2kWh heat output per kWh of electrical input. With the current cost differential to gas this would result in running costs approximately doubling to deliver the same level of heat to the building. With the current state of the parish finances these running costs would be unlikely to be financially sustainable at present, but may become more cost competitive and sustainable if the difference in price between gas and electricity reduces, and paid usage of the building increases.

6.2.2. Air to air heat pumps - these have not been explicitly considered at this time. They were suggested as a possibility for space heating in the ESOS Energy Audit if the usage of the building was to increase. The indicative capital cost identified was £134,000, with running costs likely to be comparable to the existing gas heating costs. While ideally these would have been fully explored the current pew layout, particularly in the aisles, would restrict the possible locations for heat emitters.

6.3. It was noted that in relation to placement of the external units for an air source heat pump there was plenty of potential space, and the noise environment would be unlikely to be problematic due to the adjacent A414. For the long term planning, if space heating is demonstrated to be the correct approach, a hybrid heat pump could be considered. This could potentially use part or all of the existing heat emitter system (provided it was still in adequate condition) to provide background heating, potentially supplemented by additional air-to-air elements to provide a boost function in to the church, allowing for lower total energy consumption by reducing the background heating temperature and relatively quickly increasing the air temperature to deliver the comfort levels required.

6.4. Gas boiler replacement using existing flues:

6.4.1. Three quotes for replacement boilers have been obtained, ranging from £30,000 to £70,000, largely dependent on the level of works required to the flues. A new Nest control system would be installed at the same time allowing settings to be changed remotely. As part of these works the existing asbestos covered pipes would also be removed from the boiler room and adjacent currently closed off areas with any remaining asbestos made inaccessible. It is very difficult to split any boiler works from the asbestos works, and to prevent the need for two lots of asbestos works it is similarly difficult to separate these projects.

6.4.2. The PCC is hoping the new condensing boilers will be significantly more efficient than the existing boiler, reducing their energy consumption. They believe the current boiler is probably operating at around 60% efficiency. While a new boiler should be more efficient, it would only be able to achieve the high levels of efficiency if it can enter and operate in condensing mode. This generally means that the return temperature to the boilers is likely to need to be below 55C. It is not known if, and how often, this can be achieved with the current heat emitters. As such the parish should request the heating engineers to ensure that weather compensation controls are fitted to the system, but be prepared in case the hoped for efficiency improvements are not as significant as hoped due to the age and characteristics of the heat emitters.

7. Net Zero Planning

7.1. The parish doesn't currently have developed plans for how the church can reach net zero carbon in the future. Should permission for a gas boiler be granted and works undertaken then there will be significant carbon emissions to be considered. Historic reported gas consumption has varied between 212 and 445MWh per year, with average carbon emissions relating to the heating of 55 tonnes CO_2e, with Hertford All Saints being consistently amongst the highest energy users and carbon emitters in the diocese. Replacement boilers will essentially lock in this level of carbon emissions for the next 15+ years, totalling in the region of 822 tonnes CO_2e. The expectation when the next boiler fails is that a replacement gas boiler would not be possible, and therefore significant financial provision would need to be made to ensure that any replacement system can be funded. There is also the risk that as more organisations electrify and disconnect from the gas grid that the standing charges associated with maintaining a connection will increase, irrespective of the unit cost of gas.

7.2. There is a concern that with two fully functioning boilers, and increasing demand for use of the space, potentially with it being heated to a higher temperature (as per the Saturday user at present) then energy consumption and carbon emissions will increase above where they were in 2024 (42 tonnes CO2e) towards the levels in 2019 (83 tonnes CO2e). This would be considered more likely in the event that concert usage increased. This could lead to the total emissions over 15 years to be 1,250 tonnes CO2e. The PCC should consider how they could prevent or mitigate this significant increase in net CO2e emissions from occurring in the light of any increased income that may be expected to accompany any increase in energy use and emissions.

7.3. The current heating controls require manual interventions in the boiler room to adjust the temperatures, and as a consequence the current heating system, after some experimentation in the past, is run to maintain a constant 15-16C, with the exception of Saturdays when the PCC approach is to try and increase the temperature as they are paid to do so. Should the replacement gas boilers be installed these will have modern controls allowing remote adjustments. It is suggested that the PCC confirm with their energy supplier whether there is a smart meter or automated meter reader installed on the gas meter. If not they should discuss having one installed by their energy supplier. The PCC should then run a new trial to understand the capabilities of the heating with the new boilers with a view to developing an optimum control strategy and understanding the heat up times from different temperatures to deliver the comfort desired with minimum energy use and resultant carbon emissions.

7.4. Ultimately the heating is the main source of carbon emissions for the parish, and the need or otherwise for space heating, and a determination of the running costs the parish can sustainably bear needs to be understood and demonstrated over the coming years. This will need to be done while trying to build a substantial fund for the current heating systems eventual replacement, with the plans developed before a future boiler failure. While the boilers would be hoped to last 15 years, it is unfortunately not uncommon for modern boilers to fail irretrievably from 10 years old or less.

8. Solar Panels

8.1. The possibility of installing solar panels on the South Aisle roof was discussed. It was noted that these would need planning permission, and that Historic England's attitude to these was changing, with less likelihood of them being refused if they are either not normally visible, or not on a main roof pitch.

Electricity usage over the past several years has varied between 6 and 12 MWh at a cost of £3-5,500. Due to a change in legislation, provided that a smart meter has been installed the PCC can request half hourly energy use data from their energy supplier. This will show how much energy is being used for each half hour through the year. This can then be compared to the expected output from any solar installation to determine how much may be used by the church, and how much would be exported to the grid. It can also be used to inform battery sizing. In combination this information can be used to determine whether solar panels would be a cost effective investment. It should be noted that the current electricity usage is only responsible for around 5% of the carbon emissions of the church, and this will decrease as grid supplied electricity continues to be decarbonised.

9. Long term planning and options

9.1. As the parish develops and implements its vision for the future, keeping records of which areas of the church are used, by who, and for how long could prove invaluable for identifying the future heating needs of different spaces in the church if the usage doesn't increase enough to make running a space heating scheme affordable and sustainable. This information would then be able to be used to determine methods to deliver the right level of comfort heating to discrete areas within the building.

9.2. It is recommended that the PCC make contact with local councils at all levels to understand their planning for achieving net zero carbon, and whether there may be any district heating schemes developed that the church could be linked to and which would avoid the need for the church to develop its own heat source. It is also suggested that other significant sized buildings such as the local schools and County Hall could be approached to understand their plans for the future, and if there may be opportunities for co-development, or economies delivered through simultaneous delivery of schemes such as electrical power supply upgrades.

9.3. Financial planning for the replacement of the heating system should begin as soon as possible. The quotes and estimates that have been obtained in recent years could be used as a target level for funds to be raised for the future replacement. While there are currently grant funds available from a variety of sources to encourage decarbonisation projects it is not known what those funding streams availability may be in the future.

9.4. The PCC are encouraged to discuss and document how they will consider net zero carbon in the development and delivery of their vision for the parish, and the possible pathways for how they will reach net zero carbon in the future.

10. PCC proposal and next steps

10.1. The PCC has obtained quotations for undertaking the asbestos work, decommissioning existing pipework in the boiler room, and replacing the gas boilers. They would like to take up the lowest quote which involves connecting to the existing flue, with new pipework connecting the boilers to the current heat distribution system.

10.2. As discussed on site, the PCC proposal takes account of the following issues:

10.2.1. Asbestos has been identified in the boiler room (pipe insulation) and in the inner storage room beyond (flaking paint). Asbestos needs to be removed or made safe in these areas before any work can be undertaken to the boilers and associated heating system.

10.2.2. The heating system does not have adequate controls and adjustments have to be made manually e.g. to increase the temperature or the timings to prepare for special services, rehearsals and concerts.

10.2.3. The church currently has a single-phase electricity supply which is used to near capacity, so a major supply upgrade would be required to support a move to electric heating.

10.3. The work and next steps would be undertaken in two phases:

Phase 1

1a. Remove/make safe asbestos including decommissioning existing boilers and associated pipework in boiler room.
1b. Install replacement new/second-hand gas boiler, pipework and connection to existing system as short-term provision to continue existing uses for worship, performance and hospitality.

Phase 2

10.3.1. Develop options for replacement of entire heating system, taking into account:

- Plans to change seating and therefore provide option of underfloor heating whilst reducing scope for under pew heating;
- Environmental conditions required for significant Willis pipe organ;
- Requirement to upgrade electricity supply to 3-phase, potentially via land to be developed adjacent to hall and east end of the church rather than under the A414 dual carriageway;
- Options for air-to-water or air-to-air heat pumps with comparison of installation and running costs for current and planned usage, including option of running heat pump at high temperature to existing heat emitters and incorporating e.g. fan convector units into design for reordering seating;
- Possible option for community heating scheme in conjunction with development of land to east of church.

11. **Recommendations**

11.1. The visiting members of the DAC invite the Committee to:

11.1.1. Endorse the advice given in its name.

11.1.2. Note the DAC standing committee's advice not to oppose the grant of a faculty for the Phase 1b replacement of the boilers, subject to the following conditions:

Condition 1*: Within 5 years, the PCC needs to decide on the approach to future heating (space heating or direct heating of building users) based on the current and expected usage of the church, the needs for mission and worship, and affordability at that time, and should obtain outline costings for replacement of the entire heating system.*
Condition 2: *The PCC should establish a fund to enable the costed plan for a new heating approach to be implemented in full in the next 10-15 years when the new boilers reach the end of their life.*

Tom Abraham, Ann Wise, Liz West and Emma Critchley
14 August 2025