A vision of a zero carbon church building
Catherine Ross, Cathedral and Church Buildings Division

Zoom tips
• You can click “side by side view” in the View Options to see the slides better.
• Mute your microphone please
• To ask a question, type it into the chat. I’ll come back to the questions at the end.

Today....
• Why zero carbon?
• What is zero carbon anyway?
• Our start point
• A vision of a zero carbon church
• A practical path to get there
• A first step: gathering data
• Challenging some myths
• Next steps and questions

Why zero carbon?
• IPCC report: scientific analysis > halve emissions by 2030 and net zero carbon by 2050
• General Synod have called for all parts of the Church to move faster, setting us the challenge of planning for net zero by 2030

This is firmly rooted in mission
1. To proclaim the Good News of the Kingdom
2. To teach, baptise and nurture new believers
3. To respond to human need by loving service
4. To transform unjust structures of society, to challenge violence of every kind and pursue peace and reconciliation
5. To strive to safeguard the integrity of creation, and sustain and renew the life of the earth.

What is zero carbon anyway?
Energy use (oil, gas, electricity) x conversion factors + Fuel from reimbursable travel x conversion factors

Majority of a church’s gross “carbon footprint”

100% renewable electricity + Carbon offsets / sequestration

Majority of a church’s net “carbon footprint”

Zero by 2030
19/05/2020

Guidance has been issued, defining the scope of ‘net zero’

Embodied carbon is not expected to be part of the net zero definition for 2030

Understanding Carbon

Churches make up less than half our carbon footprint. % of total carbon emissions by building type

Church buildings cost a lot to run, so potential savings are significant ...

... but the energy audits show how widely energy use varies from church to church.

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... but the energy audits show how widely energy use varies from church to church.
We know that heating makes up the bulk of church energy use.

What is energy used for? (sample = 38 churches and halls)

- Lighting: 6%
- Heating: 72%
- Other: 22%

The energy audits clearly indicate the most common areas for action.

- Switch to 100% renewable electricity
- Lighting e.g. LED lamps and fittings
- Heating controls, optimising heating settings
- Draught proofing
- Efficiency and longevity of existing heating system
- Solar panels
- Energy-saving devices
- Change heating system to a new one
- Other
- Reducing background heating hrs or temp
- New gas boiler
- Insulation (loft, cavity)
- Double / secondary glazing
- Behavioural changes

The easiest win is switching to purchasing 100% renewable electricity.

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Energy-efficient lighting is a very common, relatively inexpensive change.

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After this, the majority of recommendations concern heat loss or heating.

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A positive vision of a zero carbon church

Our zero carbon church: principles

1. Well-maintained
2. Buy renewable
3. Waste less
4. Electric not gas/oil
5. Generate more
6. Offset the rest

Running a zero carbon church:
Clear, simple, well-understood systems
Heating and lighting is zoned and used only when needed
Regular monitoring of energy use
All procurement considers sustainability

End result:
A comfortable, welcoming place to be
A cool sanctuary during hotter summers
Lower bills and lower carbon taxes in the future

We already start with some advantages

High solar gain to warm the inside
Local materials with low embodied carbon

Our zero carbon church: outside

Solar panels
Well-maintained roof
Insulating renders or external insulation
Reduced heat loss from windows
Heat pump
Water butt
EV car charging
Draught-proofing
Bike racks
Well-maintained gutters

Our zero carbon church: inside

Service times vary with seasons
Heating and lighting zones and timed
Low flush toilets
Energy-efficient kitchen appliances
Battery storage
Internal doors or draught-curtain
Rugs, cushions, hangings
Low carbon heating where people are, such as pew heaters

A biodiverse church

Trees protected and new trees planted
Bat boxes
Swift boxes
Wildlife areas e.g. hedgerows, bug hotels
Vegetable beds
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A practical path to net zero

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A: Where do we start?

- Maintain roof, gutters, broken windows
- Insulate around pipes
- Deal with draughts
- Rugs, floor coverings, cushions
- 100% renewable electricity
- Match heating timings to use
- Get timers and ‘smart’ controllers
- Add anti-freeze and anti-sludge filter
- Easy LED replacements
- Behaviour changes: e.g. turning off

B: What next?

- Insulate easy-to-access lofts
- Partition-off smaller areas
- Install a draught lobby
- Use data loggers & smart meters
- Improve zoning, install TRVs
- Set boiler temps correctly
- Install thermal or motion sensors
- Replace gas/oil space heating with electric pew/panel heaters

C: Getting to zero

- Draught-proofing windows
- Secondary/double glazing suitable windows in busy areas e.g. office/hall
- Draught-proof the tower ceiling
- Insulate under pew platforms
- Internally insulate suitable areas
- Reinstate ceilings
- Solar PV panels
- New lighting systems

D: “Only if…”

- If re-roofing > insulate
  - if got a cavity > cavity wall insulation
  - if suitable & < busy > external renders
- If used all week > heat pumps
- If used all week & lifting the floor anyway > under floor heating
- If nothing else viable > new gas boiler
- If lots of car use > EV charging points

A vision of a zero carbon church

A practical path to net zero

A: Where do we start?

B: What next?

C: Getting to zero

D: “Only if…”
The (very rough) cost of net zero – Step A

Doing all the steps in Step A on the path costs c. £10-15k. (But much of this is needed anyway for basic maintenance.)

The average “Sunday church” pays £2k p.a. on utility bills.

Doing all the steps in Step A achieves a c. 50% reduction in energy.

They will pay back in 10-15 years.

The remaining “carbon footprint” for a “Sunday Church” is c. 6 tCO2e.

At a carbon cost of £20 per tonne, this costs £120 p.a. to offset.

So the (very rough) cost of net zero for a “Sunday church” is £10-15k capital and £120 p.a.

The (very rough) cost of net zero: An indicative cost of some bigger projects

<table>
<thead>
<tr>
<th>Capital</th>
<th>% carbon saving</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air source heat pump</td>
<td>£20k</td>
</tr>
<tr>
<td>Under pew heating</td>
<td>£14k</td>
</tr>
<tr>
<td>Solar panels</td>
<td>£15k</td>
</tr>
<tr>
<td>Replace boiler</td>
<td>£9k</td>
</tr>
<tr>
<td>Insulate roof</td>
<td>£5k</td>
</tr>
</tbody>
</table>

Note: These prices are for specific churches where auditors judge these interventions as cost effective, not an average cost for any church.

Costs exclude professional advice, planning and scaffolding.

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The Energy Footprint Tool is now live.

Gives the ‘footprint’ of energy use in the church. Please encourage all churches to complete it.

Enter Your Data

Energy Footprint Results
Dataloggers are an easy way to understand the heating and humidity of the building.

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Myth 1: New buildings are more sustainable
The most sustainable building is the one that is already built.

Myth 2: It’s all about solar panels on roofs
The place to start is reducing heat loss and making the heating & lighting more efficient.

Myth 2: It’s all about solar panels on roofs
Which said, in the right place renewables can be part of the solution.

Myth 3: It’s impossible to get permission
Every dot is an installation of renewables.
Very few cases are turned down. (Very few ask for things that push the boundaries.) The culture is changing.

Myth 3: It’s impossible to get permission

Myth 4: Nothing can be done without £££s

Pew cushions and rugs help prevent body-heat being lost.

Sludge build-up in a radiator

Pipes are lagged, but not the air and dirt separator.

Underfloor heating, but the chairs aren’t on the warm area.

Toilet plumbed in to the hot water.
Myth 5: Space heating the whole church is the right start point

Instead focus on making people comfortable and conserving historic interiors.

Cuts gross carbon footprint

Cuts net carbon footprint

Myth 6: Electric heating is expensive and inconvenient

Under pew heaters can heat the people not the spaces.

This reduces the time & amount of heating needed.

Far-infrared radiant panel heaters offer responsive heat.

Heat pumps can be effective in busy churches, either with radiators or under-floor heating.
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Next steps and questions

Next steps – For churches

• Complete the Energy Footprint Tool
• Swap to 100% renewable electricity
• Find the “Energy Efficiency Measures” and “Practical Path to Net Zero” guidance on our website
• Complete the Eco Church survey
• Use these to develop an action plan
• PCC motion: net zero by 2030?

Next steps – For dioceses

• Encourage update of Energy Footprint Tool
• Encourage switching to 100% renewables
• Find the “Heating principles”, “Energy Efficiency Measures” and “Practical Path to Net Zero” guidance and communicate it
• Develop a sustainability policy for your DAC (use Gloucester’s as a start point)
• Consider the skills of advisors on the DAC; any gaps around heating & renewables?
• Develop an action plan for the diocese
• Diocesan motion: net zero by 2030?

And come to other net zero webinars ....

Questions

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