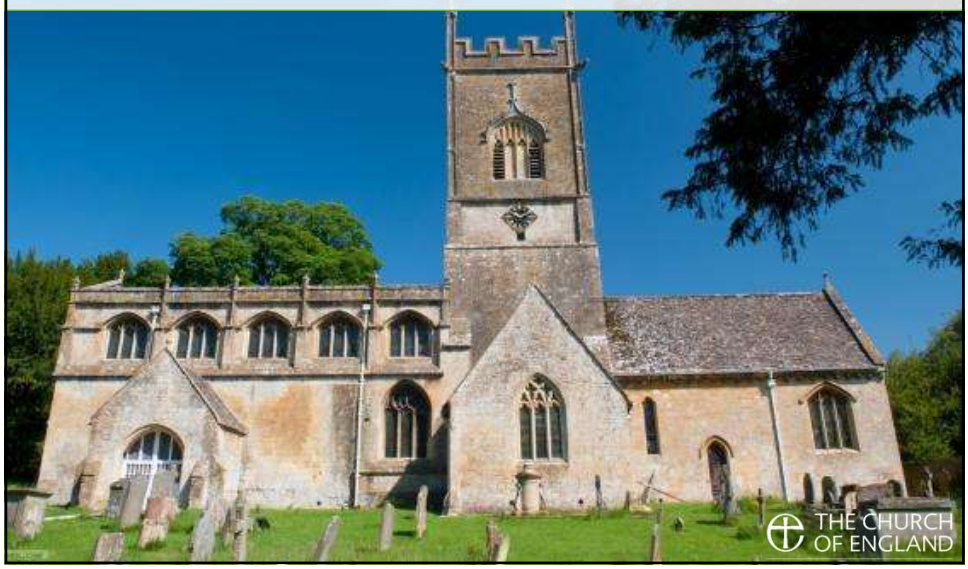
The practical path to net zero carbon

Catherine Ross, Cathedral and Church Buildings Division



1

Examples of net zero carbon churches …

St Michael's, Baddesley
LED lights
Pew heating
100% 'Green electricity'
Offset travel with Climate Stewards

St Michael's and All Angels, Withington
Reduce floodlighting hours & LED lights
Biomass and then pew heating
Solar panels which generate
more than churches use, so act as offset

2

Today….

- Why net zero carbon?
- What is net zero carbon anyway?
- Our start point
- A vision of a net zero carbon church
- A practical path to get there
- A first step: gathering data
- Next steps and questions

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Why net zero?

- 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**

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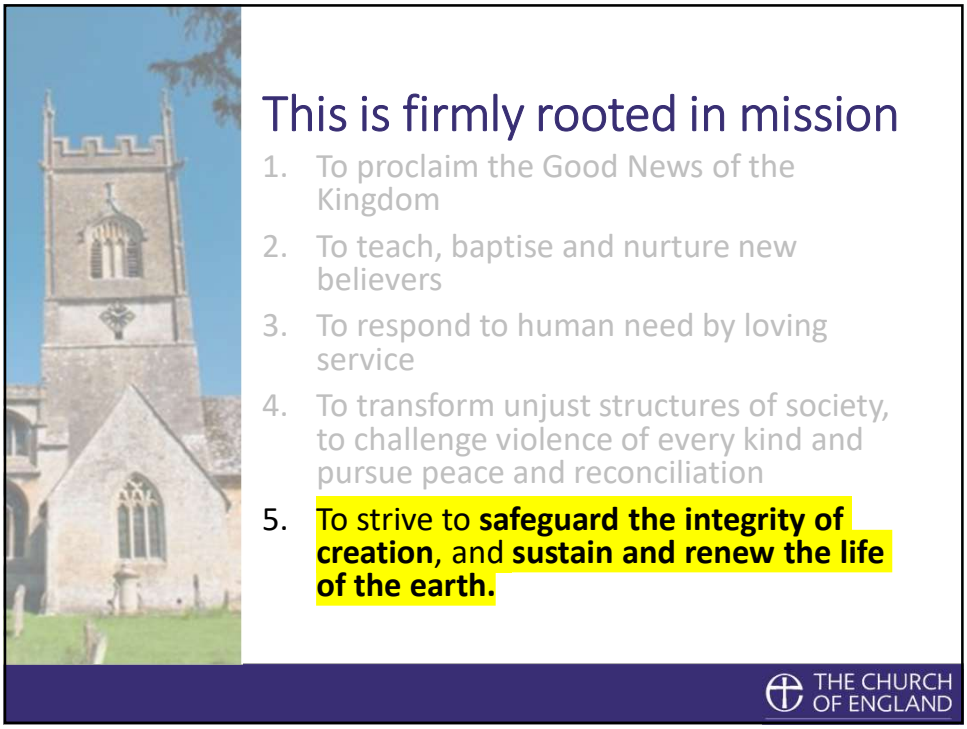
This is firmly rooted in mission
1. To proclaim the Good News of the Kingdom
2. To teach, baptise and nurture new believers
3. To respond to human need by loving service
4. To transform unjust structures of society, to challenge violence of every kind and pursue peace and reconciliation
5. To strive to safeguard the integrity of creation, and sustain and renew the life of the earth.
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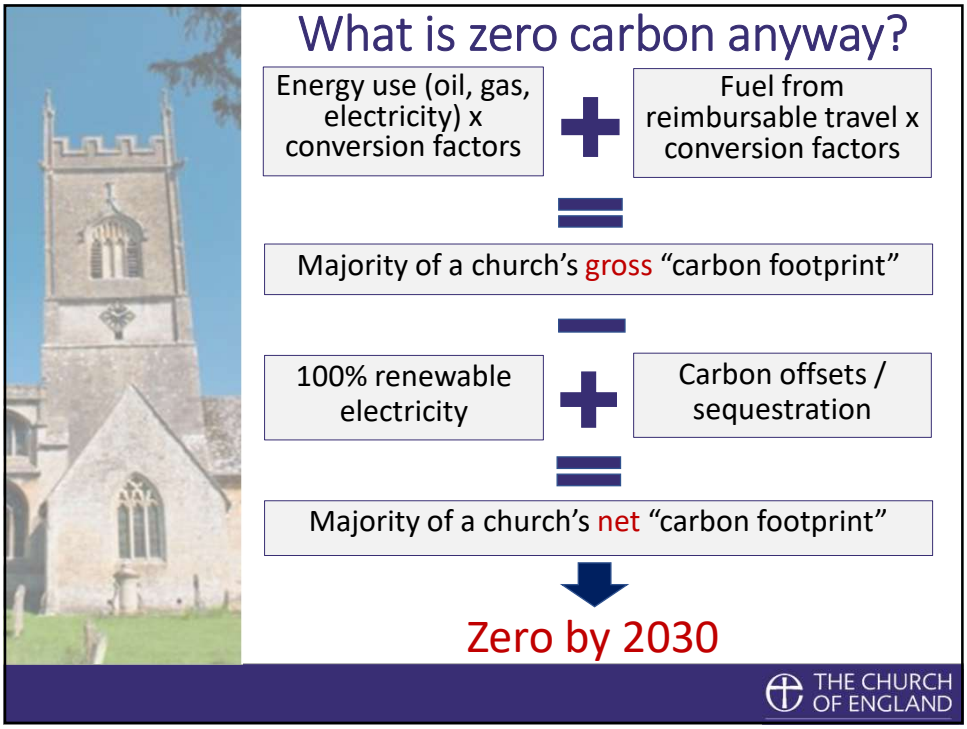
6


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
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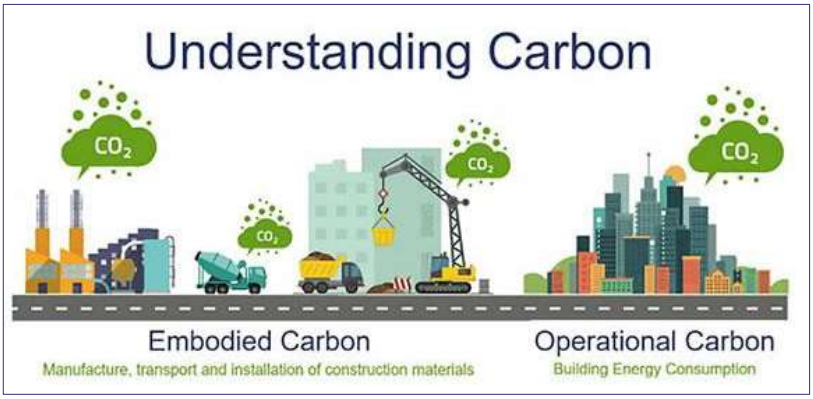

With buildings projects, it's important to think about both operation carbon, such as gas for heating, and embodied carbon, such as building materials.

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- Why net zero carbon?
- What is net zero anyway?
- Our start point
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- Next steps and questions

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We know we have some of the most sustainable buildings in Britain…..

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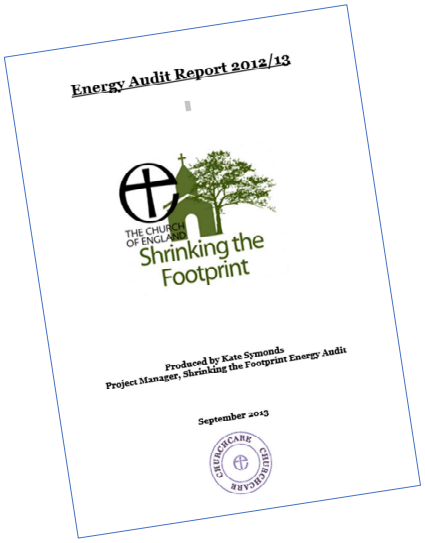
10

… but our "carbon footprint" is significant.



2012 baseline study: total annual carbon footprint **609k-1013k tonnes CO2e.**

This **only** includes **energy** (not transport, materials, procurement, food, waste ….)

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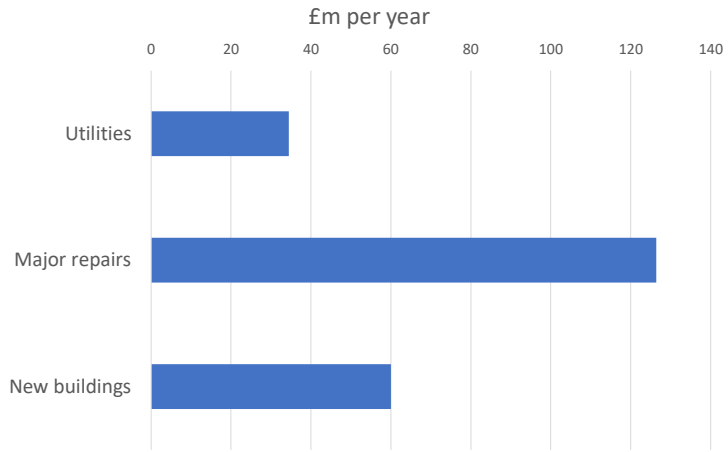
11

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



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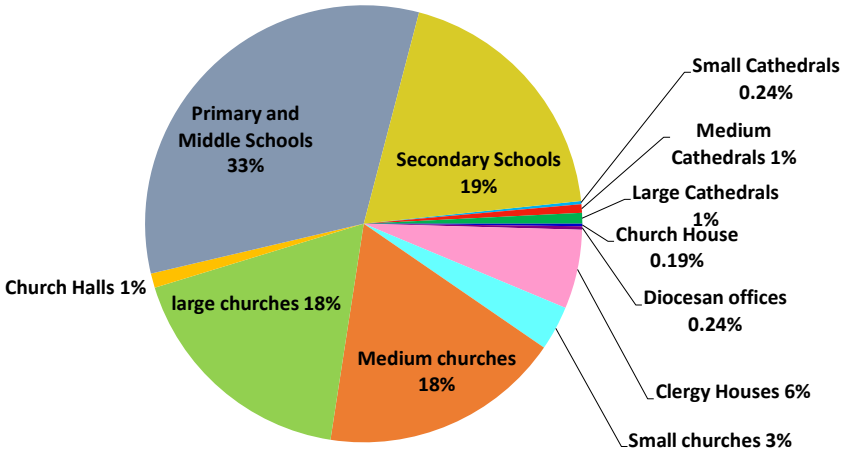
12

The 2012 study show us churches make up less than half our carbon footprint.

% of total carbon emissions by building type



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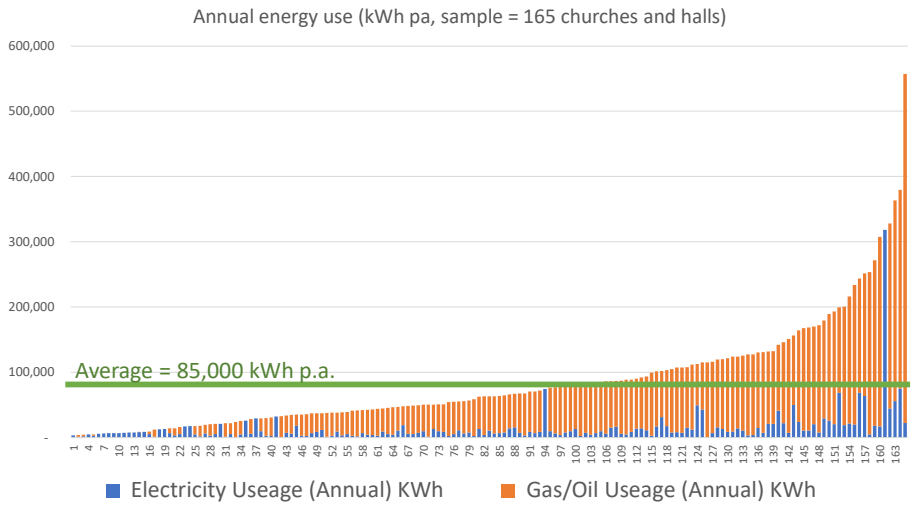
13

The recent energy audits show how widely energy use varies from church to church



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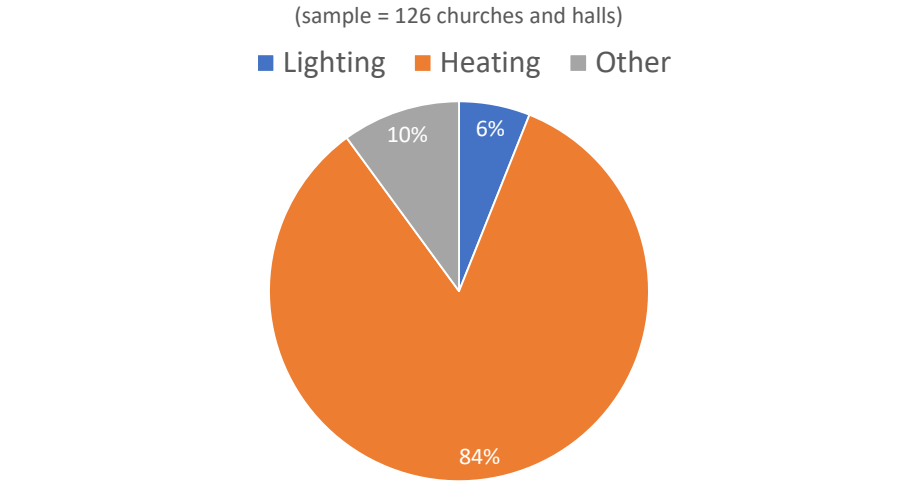
14

We know that heating makes up the majority of church energy use



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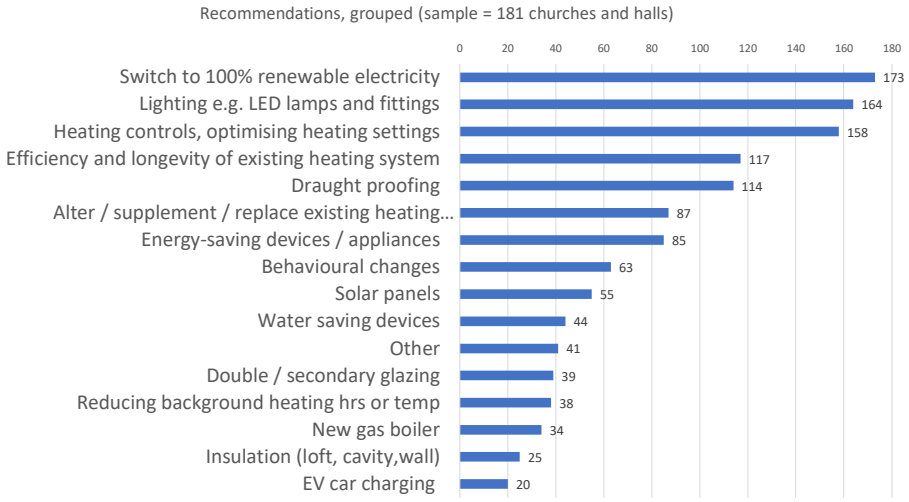
15

And the energy audits indicate the most important areas for action.



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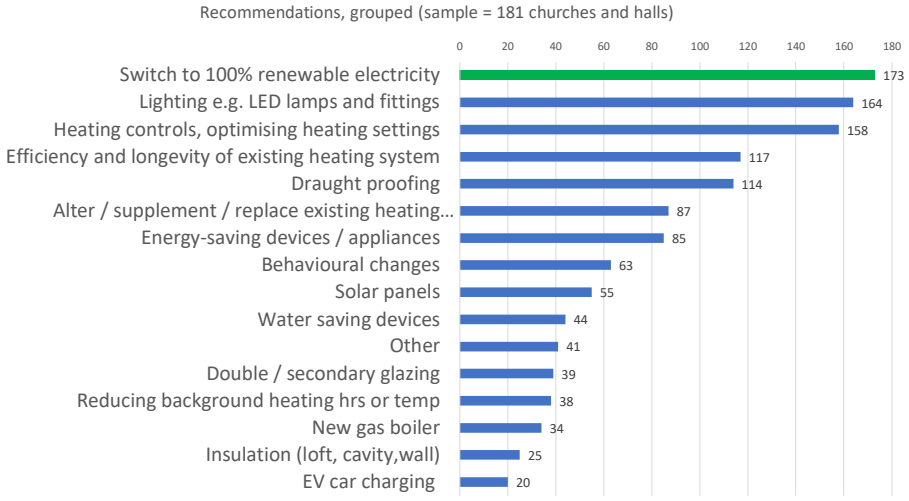
16

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



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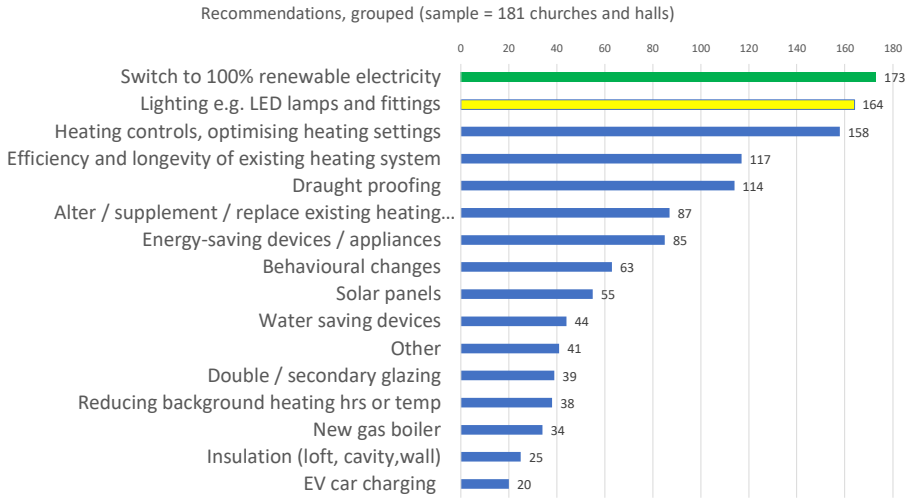
17

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



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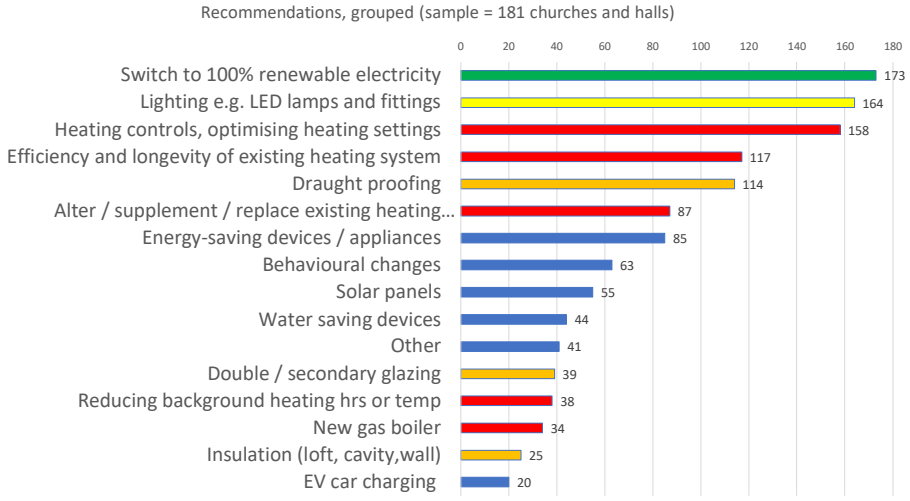
18

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



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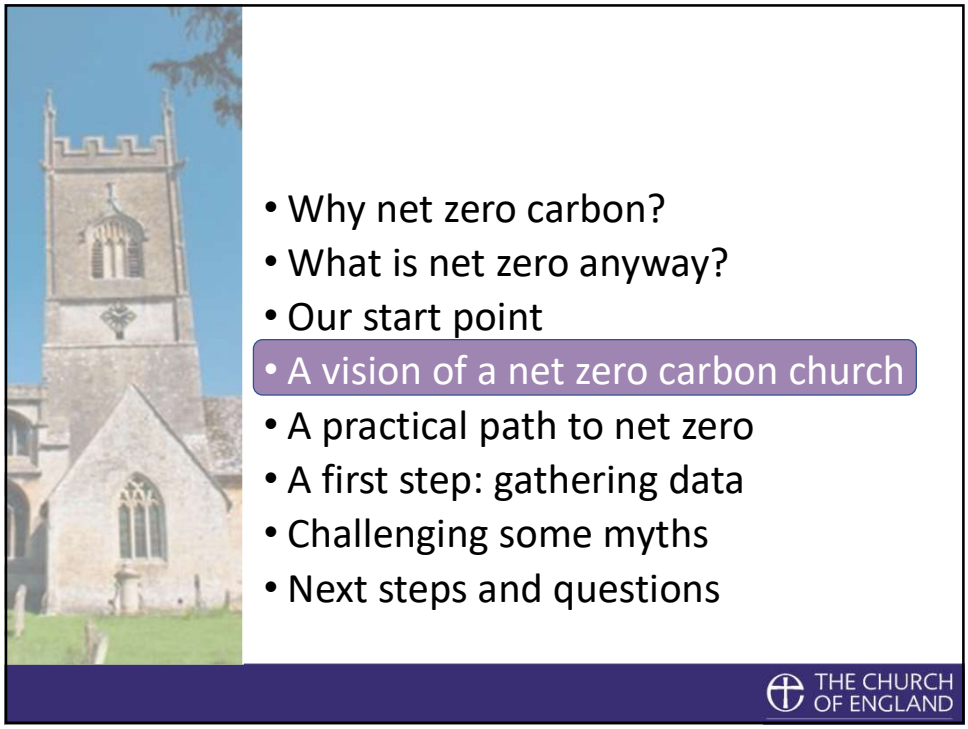
19


• Why net zero carbon?
• What is net zero anyway?
• Our start point
• A vision of a net zero carbon church
• A practical path to net zero
• A first step: gathering data
• Challenging some myths
• Next steps and questions
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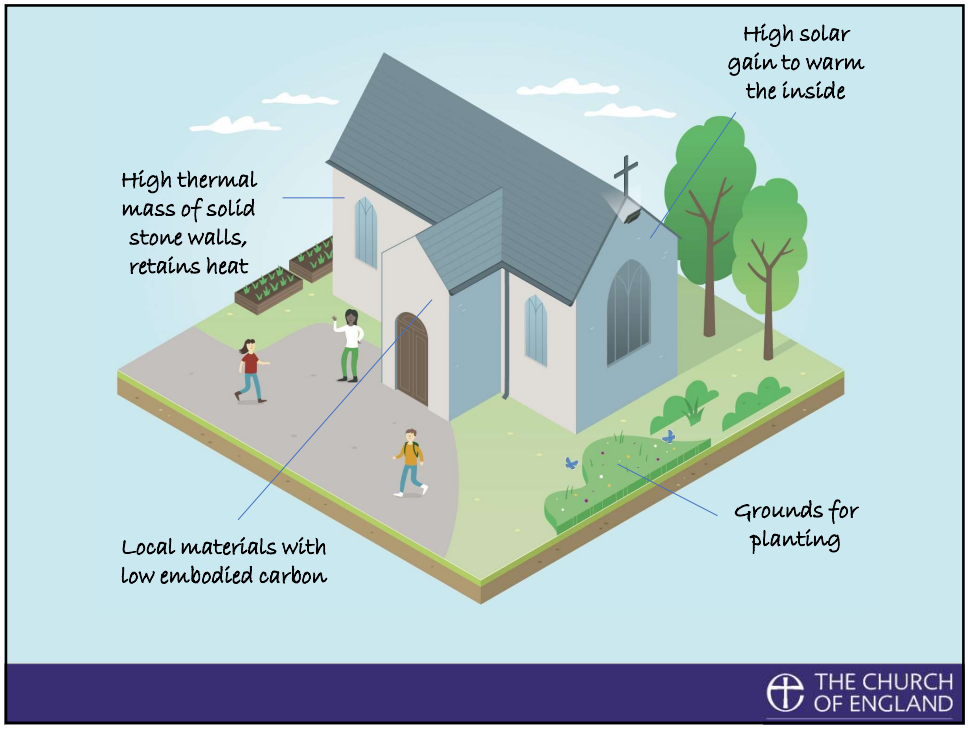
High solar gain to warm the inside
High thermal mass of solid stone walls, retains heat
Grounds for planting
Local materials with low embodied carbon
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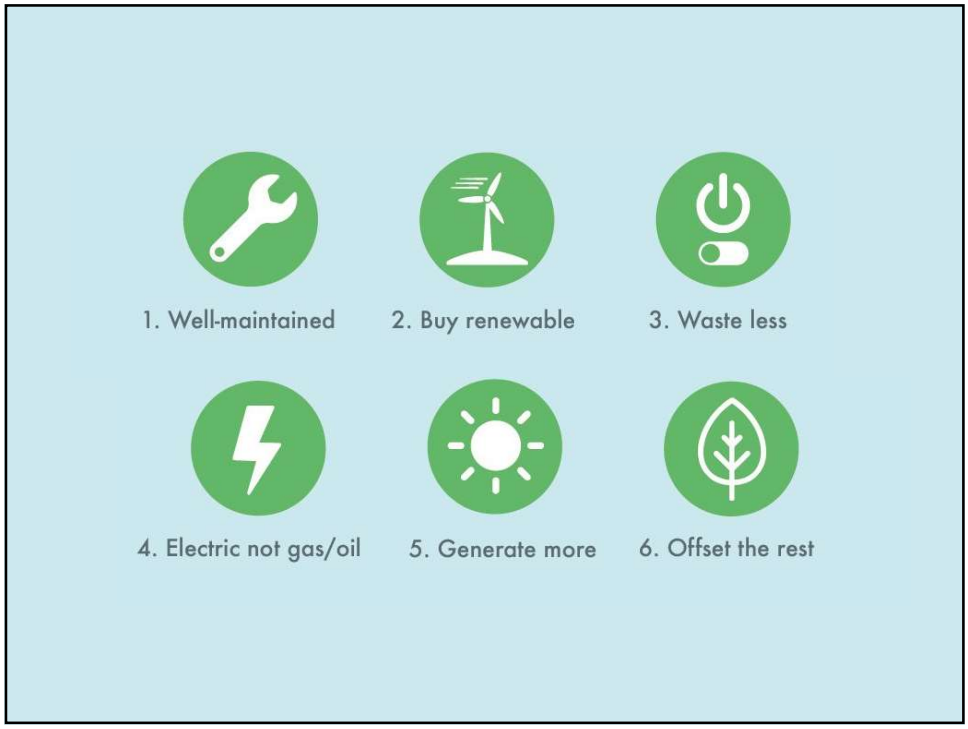
22


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

23


1. Well-maintained
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3. Waste less
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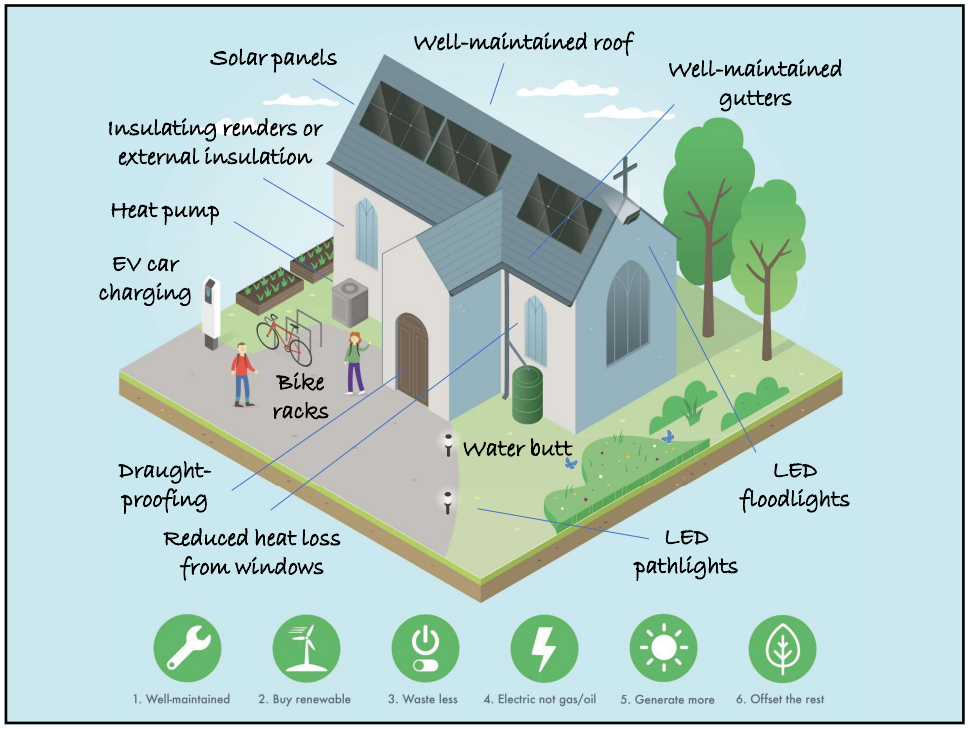
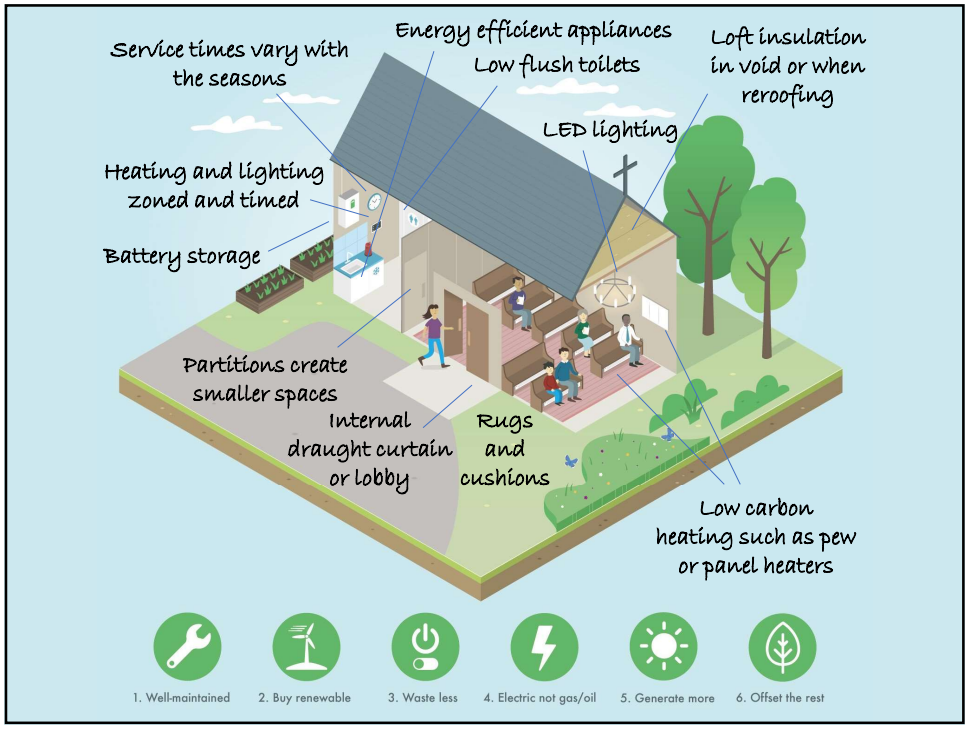
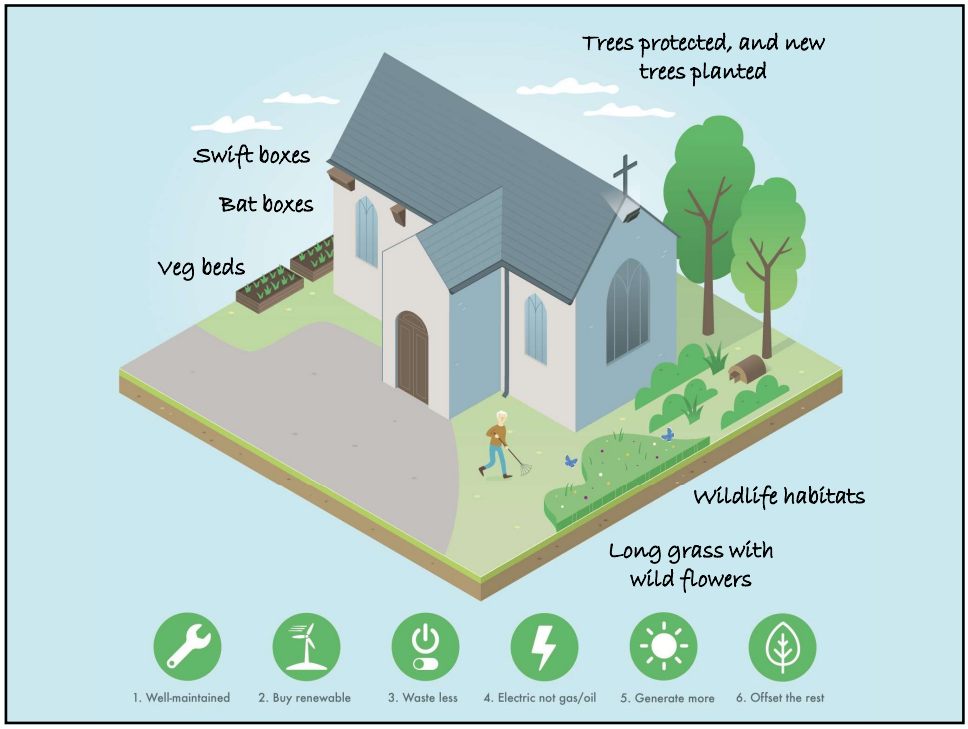
24


Solar panels
Well-maintained roof
Well-maintained gutters
Insulating renders or external insulation
Heat pump
EV car charging
Bike racks
Water butt
Draught-proofing
Reduced heat loss from windows
LED floodlights
LED pathlights
1. Well-maintained
2. Buy renewable
3. Waste less
4. Electric not gas/oil
5. Generate more
6. Offset the rest

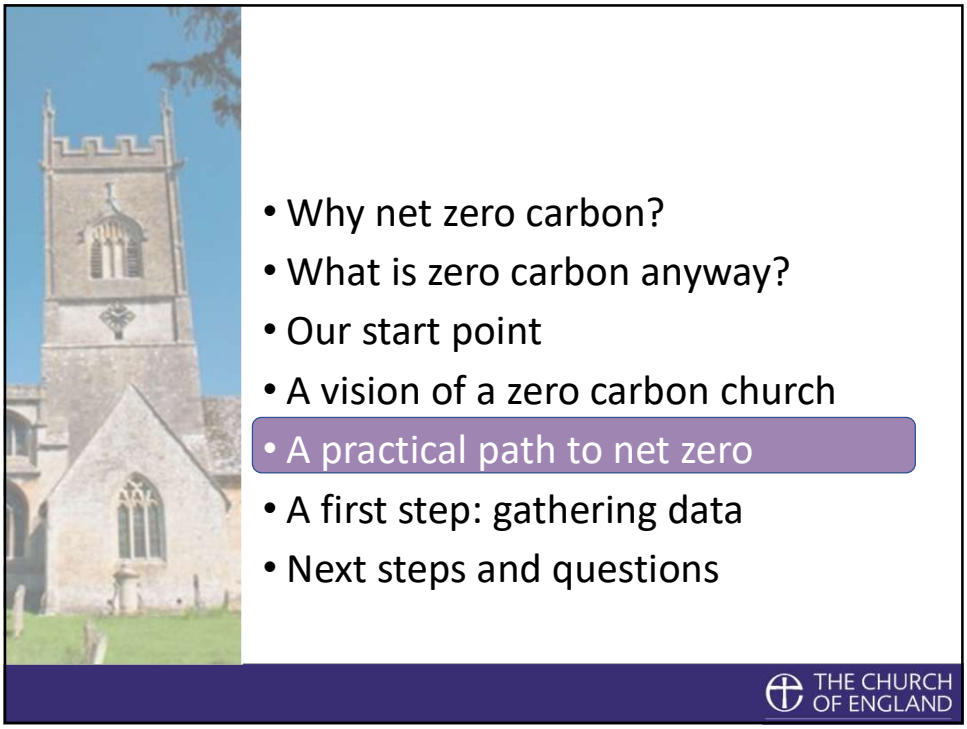
25


Service times vary with the seasons
Energy efficient appliances
Low flush toilets
Loft insulation in void or when reroofing
LED lighting
Heating and lighting zoned and timed
Battery storage
Partitions create smaller spaces
Internal draught curtain or lobby
Rugs and cushions
Low carbon heating such as pew or panel heaters
1. Well-maintained
2. Buy renewable
3. Waste less
4. Electric not gas/oil
5. Generate more
6. Offset the rest

26


Trees protected, and new trees planted
Swift boxes
Bat boxes
Veg beds
Wildlife habitats
Long grass with wild flowers
1. Well-maintained
2. Buy renewable
3. Waste less
4. Electric not gas/oil
5. Generate more
6. Offset the rest

27


• Why net zero carbon?
• What is zero carbon anyway?
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• A practical path to net zero
• A first step: gathering data
• Next steps and questions
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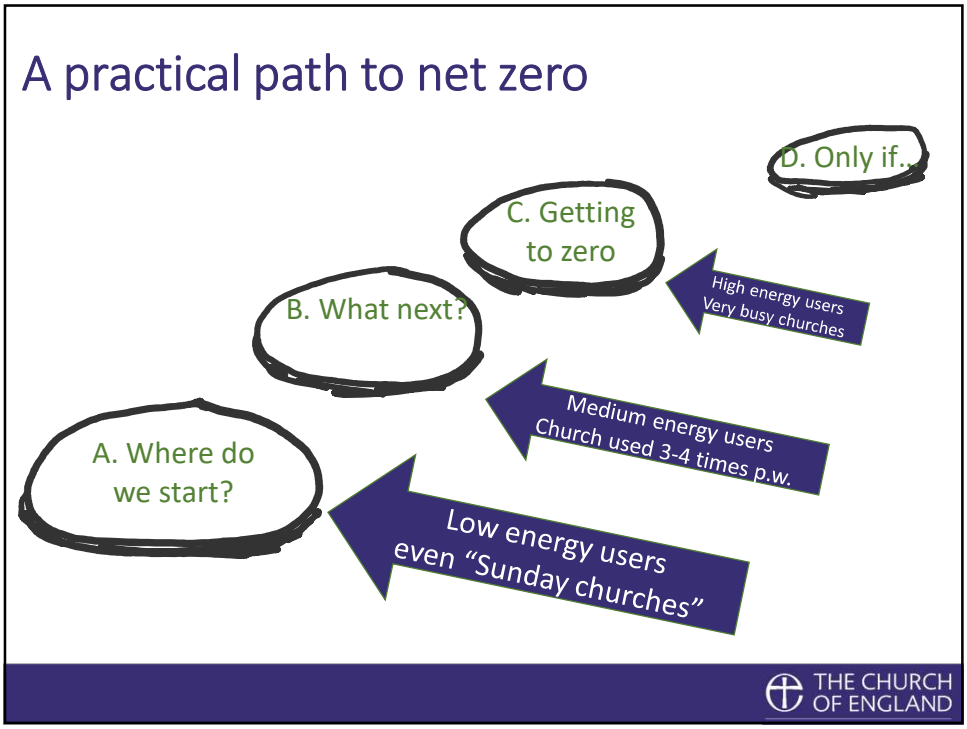
A practical path to net zero
D. Only if..
C. Getting to zero
B. What next?
A. Where do we start?
High energy users
Very busy churches
Medium energy users
Church used 3-4 times p.w.
Low energy users
even "Sunday churches"
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A: Where do we start?

D. Only if..

C. Getting to zero

B. What next?

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

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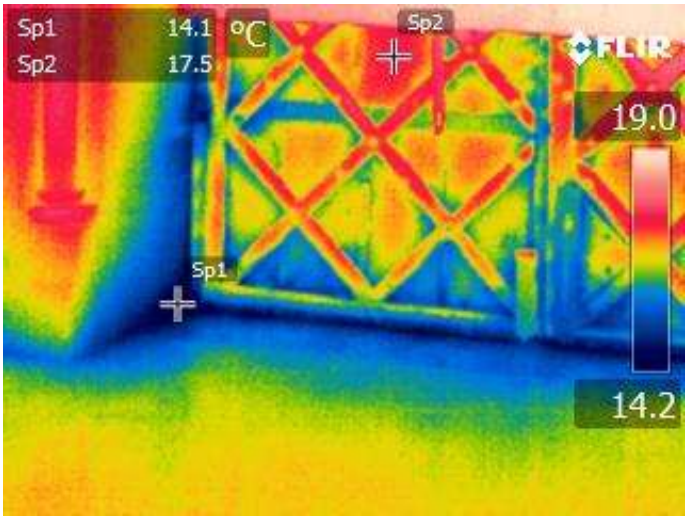
30

Simple steps – that don't cost the earth



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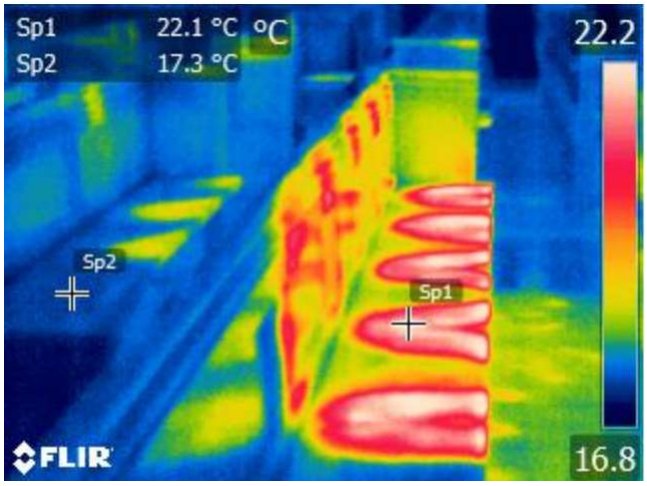
Simple steps – that don't cost the earth



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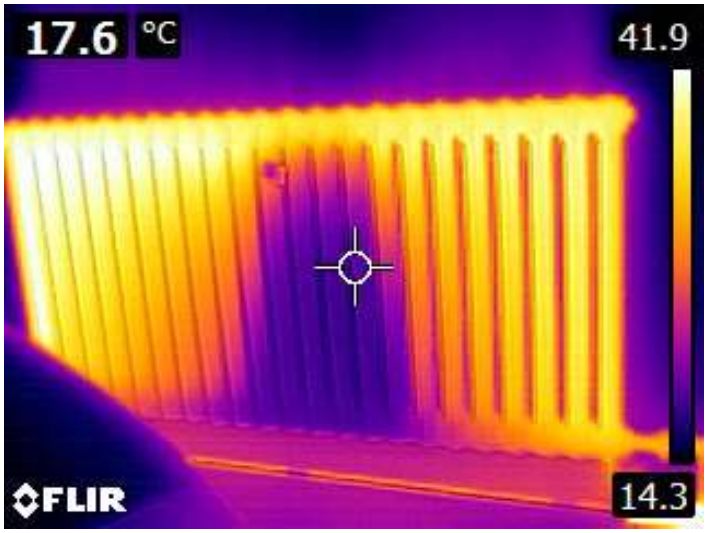
32

Simple steps – that don't cost the earth



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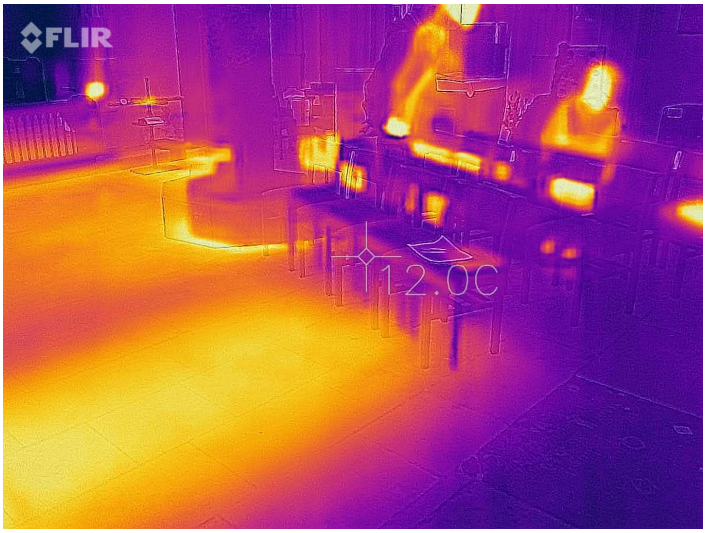
33

Simple steps – that don't cost the earth



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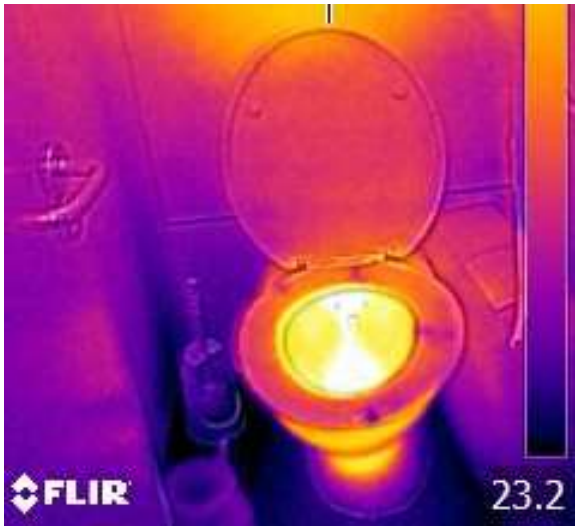
34

Simple steps – that don't cost the earth



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B: What next?

D. Only if..

C. Getting to zero

B. What next?

A. Where do we start?

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

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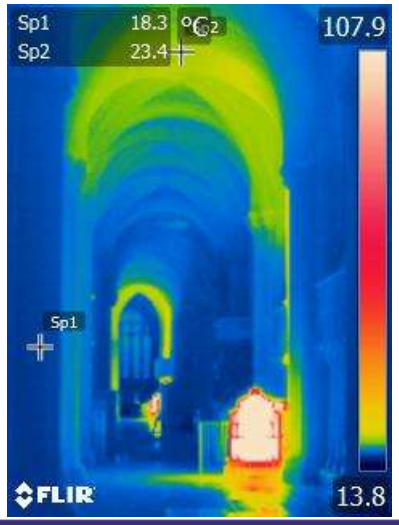
Tackling space heating (if not needed for stabilisation of historic interiors) is critical



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Instead, we need ways to make people comfortable whilst conserving interiors

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… with solutions such as pew heaters…

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… far infra-red radiant panel heaters ….

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… modern chandelier heaters ….

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… and heat pumps.

United Kingdom: St Stephen's, Lympne church

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Space heating

People heating

Purchase / generate renewable electricity

Cuts **gross** carbon footprint

Cuts **net** carbon footprint

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C: Getting to zero

D. Only if..

C. Getting to zero

B. What next?

A. Where do we start?

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

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In the right place, renewables can be part of the solution

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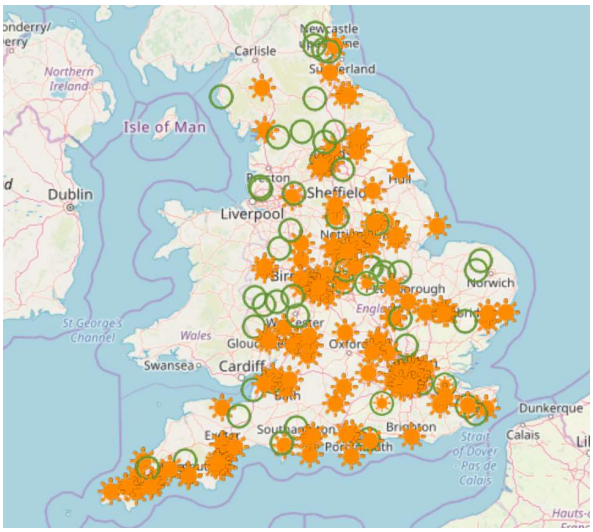
And have already been achieved in many locations



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But there is still a perception that it will be very difficult to get permission

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And rules on visibility need to be tested, so the missional impact can be maximised

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D: "Only if…"

D. Only if…

C. Getting to zero

B. What next?

A. Where do we start?

If re-roofing > insulate
If got a cavity > cavity wall insulation
If suitable & v.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

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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.

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

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.

	Capital	% carbon saving
Air source heat pump	£25k	41%
Under pew heating	£12k	47%
Solar panels	£17k	20%
Replace boiler	£11k	13%
Insulate roof	£4k	6%

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- Why net zero carbon?
- What is net zero anyway?
- Out start point
- A vision of a net zero carbon church
- A practical path to net zero
- A first step: gathering data
- Next steps and questions

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The Energy Footprint Tool calculates the carbon footprint of your energy use.

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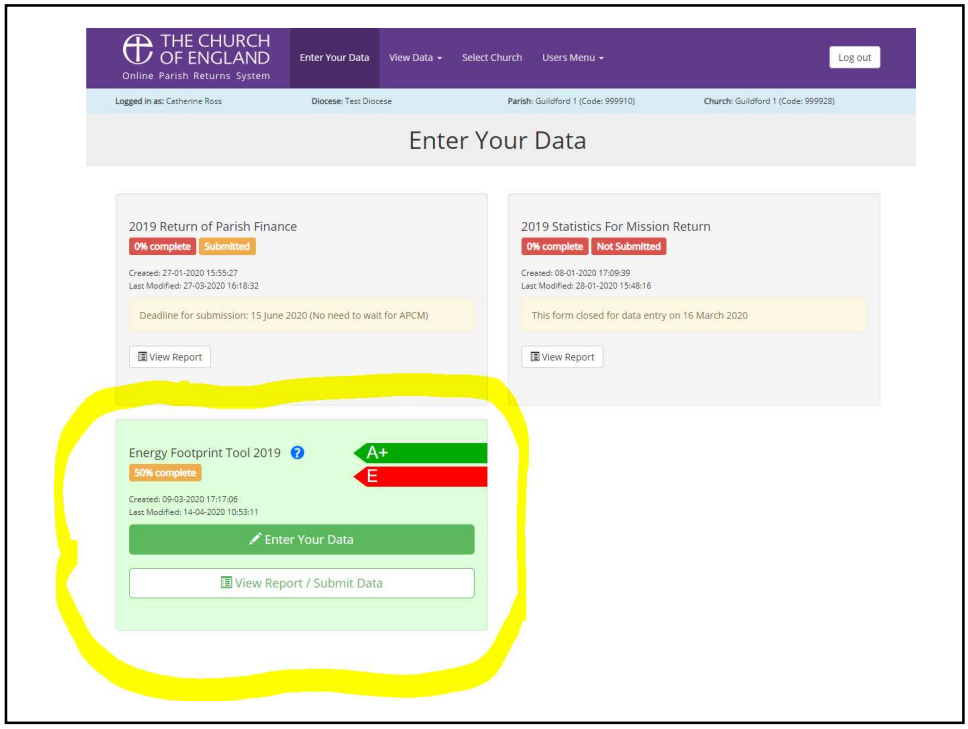
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Online Parish Returns System
Enter Your Data
View Data
Select Church
Users Menu
Log out
Logged in as: Catherine Ross
Diocese: Test Diocese
Parish: Guildford 1 (Code: 999910)
Church: Guildford 1 (Code: 999928)
Enter Your Data
2019 Return of Parish Finance
0% complete
Submitted
Created: 27-01-2020 15:55:27
Last Modified: 27-03-2020 16:18:32
Deadline for submission: 15 June 2020 (No need to wait for APCM)
View Report
2019 Statistics For Mission Return
0% complete
Not Submitted
Created: 08-01-2020 17:09:39
Last Modified: 28-01-2020 15:48:16
This form closed for data entry on 16 March 2020
View Report
Energy Footprint Tool 2019
A+
E
50% complete
Created: 09-03-2020 17:17:06
Last Modified: 14-04-2020 10:53:11
Enter Your Data
View Report / Submit Data

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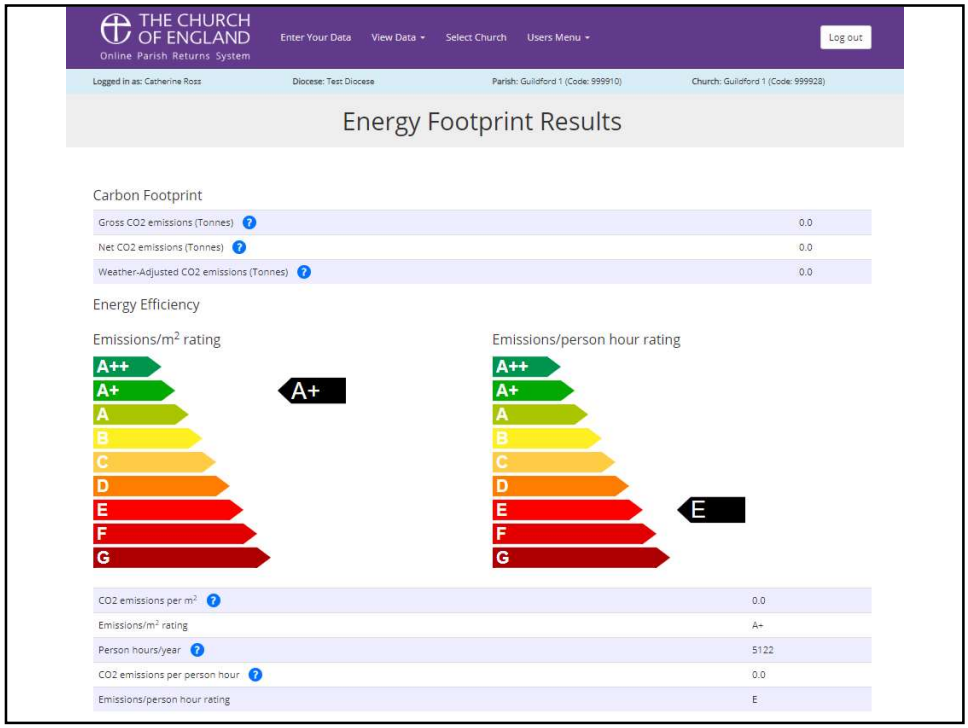
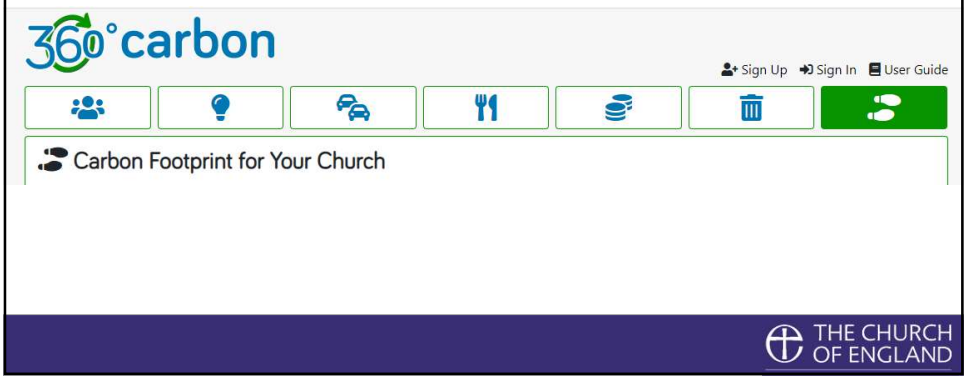

THE CHURCH OF ENGLAND
Online Parish Returns System
Enter Your Data
View Data
Select Church
Users Menu
Log out
Logged in as: Catherine Ross
Diocese: Test Diocese
Parish: Guildford 1 (Code: 999910)
Church: Guildford 1 (Code: 999928)
Energy Footprint Results
Carbon Footprint
Gross CO2 emissions (Tonnes) 0.0
Net CO2 emissions (Tonnes) 0.0
Weather-Adjusted CO2 emissions (Tonnes) 0.0
Energy Efficiency
Emissions/m² rating
A++
A+
A
B
C
D
E
F
G
A+
Emissions/person hour rating
A++
A+
A
B
C
D
E
F
G
E
CO2 emissions per m² 0.0
Emissions/m² rating A+
Person hours/year 5122
CO2 emissions per person hour 0.0
Emissions/person hour rating E

55

360°Carbon goes further, covering the whole carbon footprint, but is more complex to complete.



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Dataloggers are an easy way to understand the heating and humidity of the building

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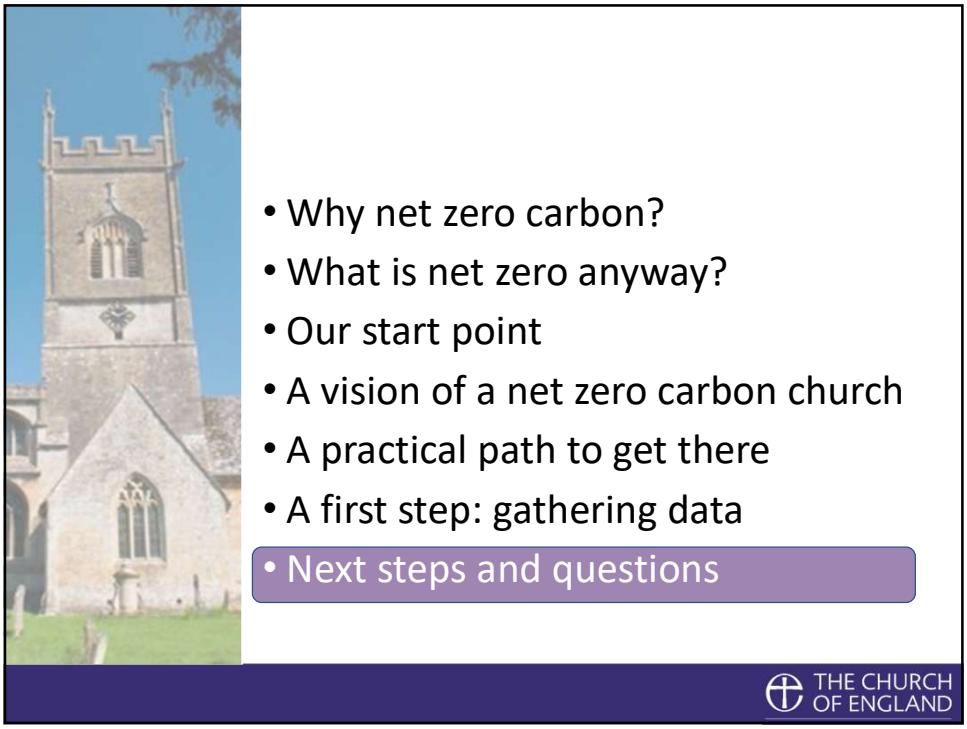
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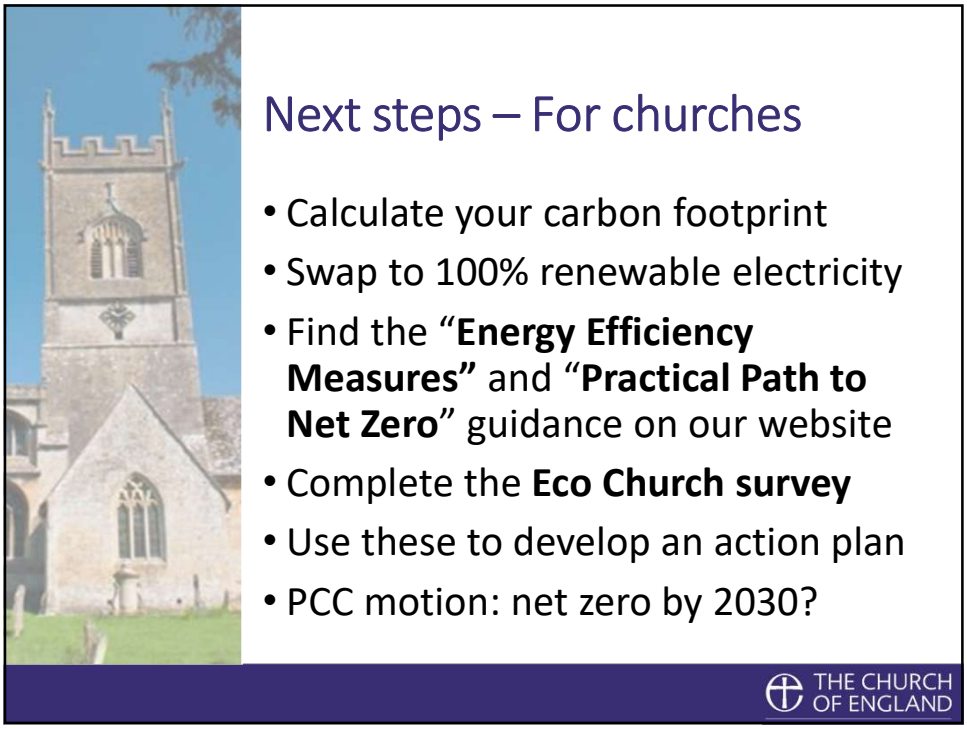
Next steps – For churches
• Calculate your carbon footprint
• Swap to 100% renewable electricity
• Find the "Energy Efficiency Measures" and "Practical Path to Net Zero" guidance on our website
• Complete the Eco Church survey
• Use these to develop an action plan
• PCC motion: net zero by 2030?
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Next 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?

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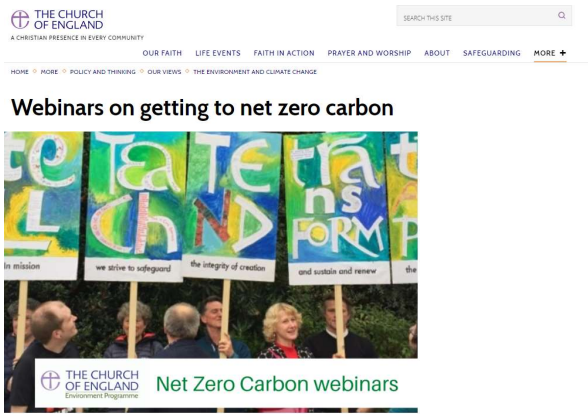
And please to come to our webinars ….



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Questions

Catherine Ross catherine.ross@churchofengland.org

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