



Historic England

Carbon reduction options for churches using oil for heating

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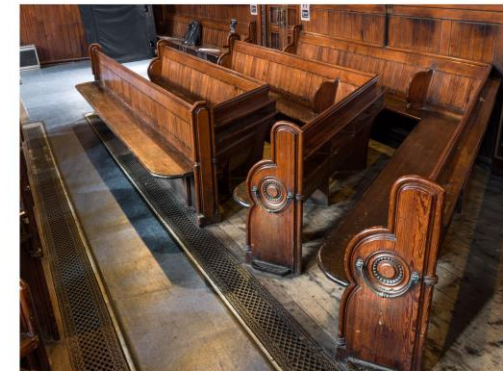
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Building and Landscape Conservation

Diocese of Gloucester: Carbon reduction
options for churches using oil for heating

Dan McNaughton

Discovery, Innovation and Science in the Historic Environment

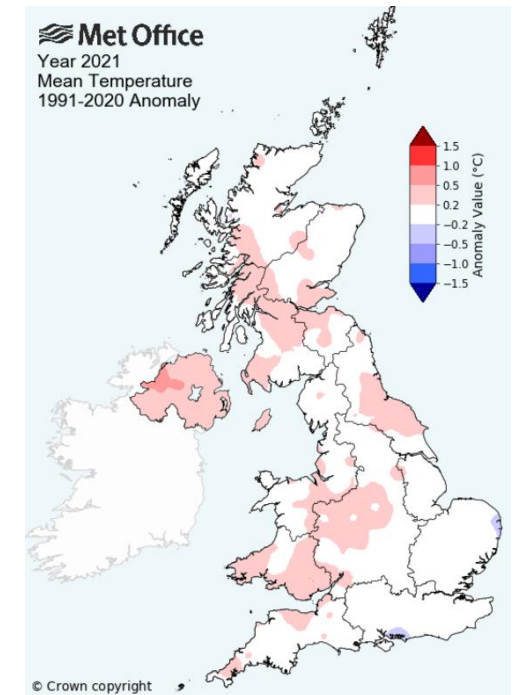


Research Report Series no. XXX/XXXX



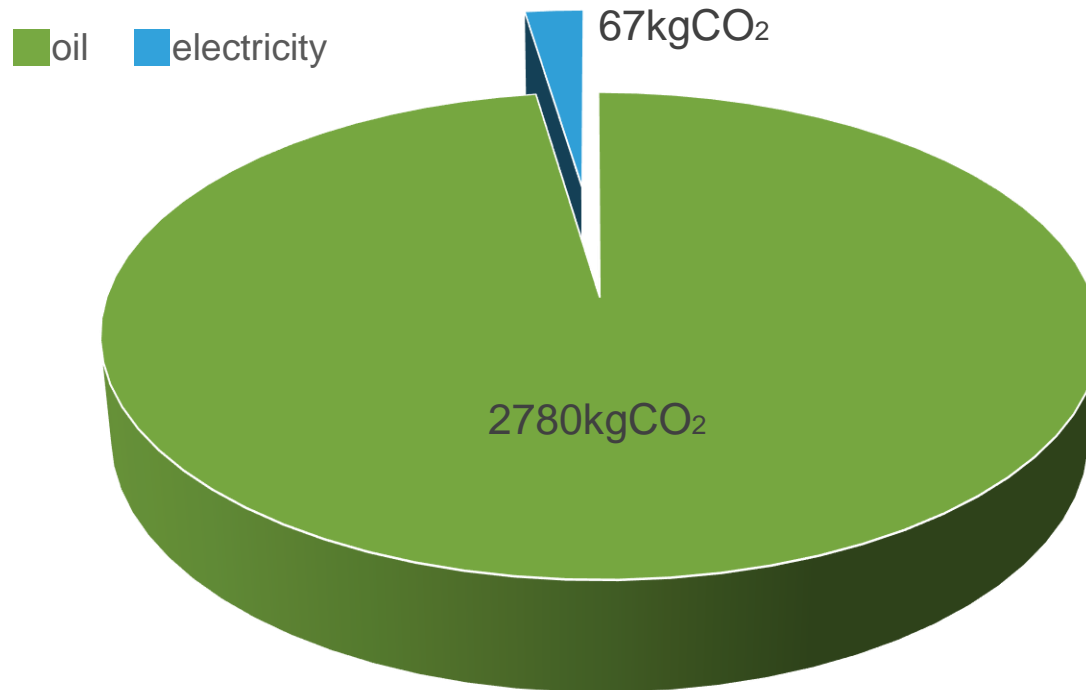
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Why do we need to act now?





Why is this research important?



The Church of England's General Synod has set new targets for all parts of the church to work to become carbon 'net zero' by 2030.

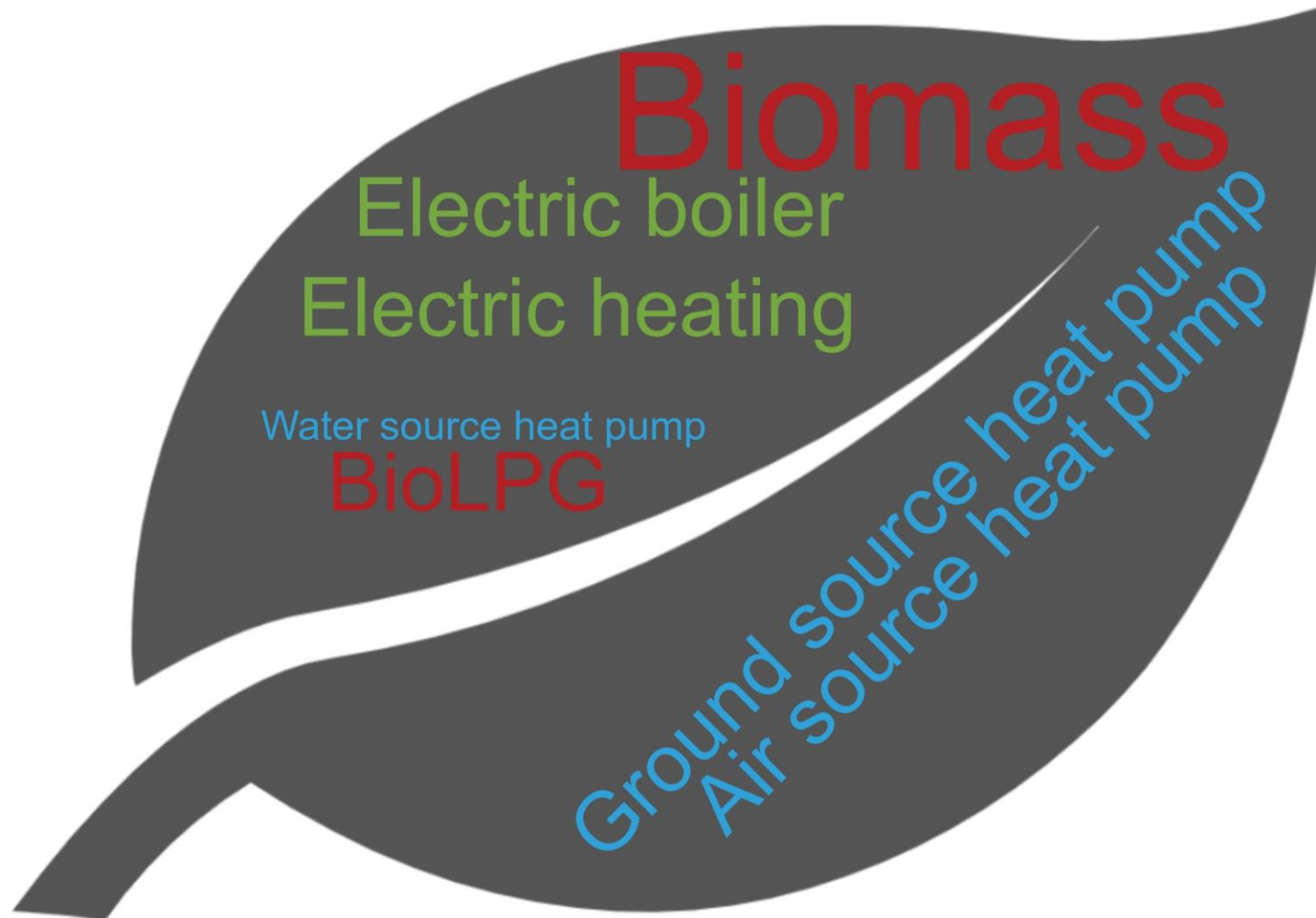
www.churchofengland.org

Existing annual carbon dioxide emissions for a Grade I listed church



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Heating technology options

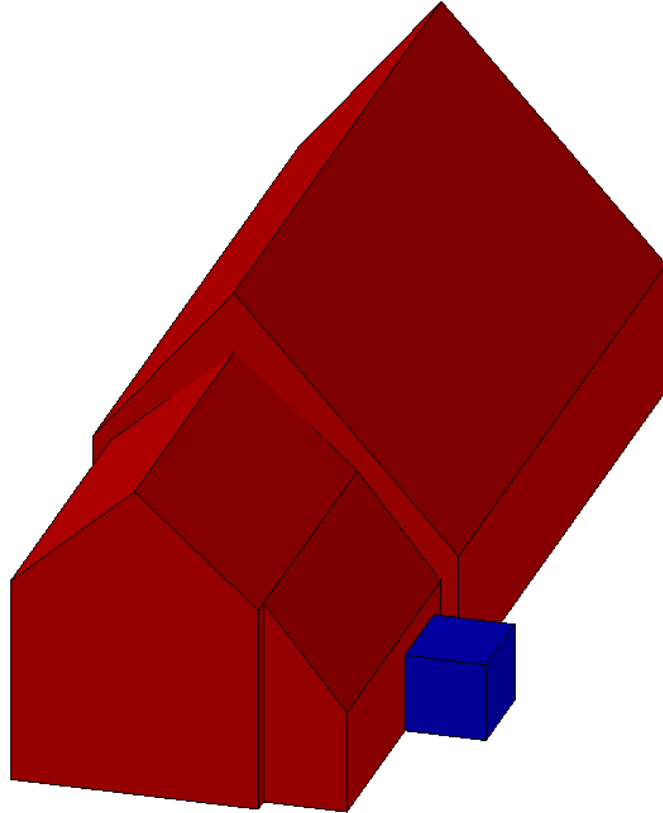


Air source heat pump installation



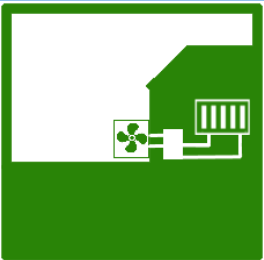


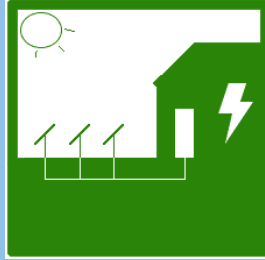
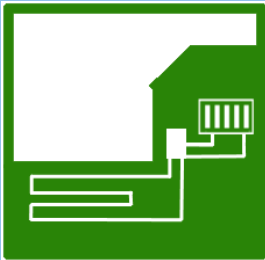

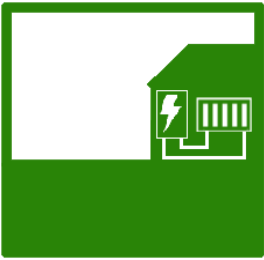
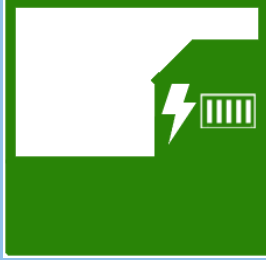

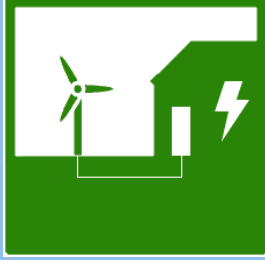
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Case study 1: Overview









Case study 1: Technology viability

| Viable | | May become viable | | Not viable | |
|--|--|--|---|--|--|
|  |  |  |  |  |  |
| ASHP | Biomass | BioLPG | PV | GSHP | Hydro |
|  |  | | |  |  |
| Electric boiler | Electric heating | | | WSHP | Wind |



Case study 1: Heating technology comparison

| Technology | Estimated annual emissions (kgCO ₂) | Estimated annual fuel cost | Estimated capital cost | Heating system capacity (kW) |
|--|---|----------------------------|--|------------------------------|
| Existing oil fired boiler | 5353 | £1764 | n/a | 59 |
| Air Source Heat Pumps  | 1717 | £2012 | £95,784 | 68 |
| Biomass  | 701 | £1216 | £41,000 Heating plant only £79,244 Heating plant & new heat emitters/ distribution pipework | 65 |

| Technology | Estimated annual emissions (kgCO ₂) | Estimated annual fuel cost | Estimated capital cost | Heating system capacity (kW) |
|--|---|----------------------------|--|------------------------------|
| Electric boiler  | 4294 | £5030 | £12,367 Heating plant only £50,611 Heating plant & new heat emitters/ distribution pipework | 65 |
| Electric heating  | 4294 | £5030 | £42,734 | 65 |
| Local electric heating (pew heaters) | 2997 | £3511 | £34,330 | 46 |



Conclusions

| Building | Recommended heating technology | Other viable heating technologies |
|---|--------------------------------|-------------------------------------|
| Church A Grade I listed, C11 | Electric heating | None |
| Church B Grade II* listed, C13 | Electric heating | None |
| School A Grade II listed, C19 | Biomass | Air source heat pumps |
| Church C - Case Study 1 Grade II listed, C19 | Biomass | Electric heating Electric boiler |
| Church D Grade I listed, C11 | Air source heat pumps | Electric heating |
| School B Grade II listed, C19 | Air source heat pumps | Electric heating |

What next?

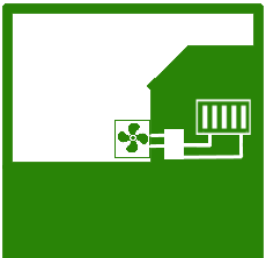
Diocese of Gloucester: Carbon reduction options for churches using oil for heating

Diocese of Bristol: Carbon reduction options for churches using oil for heating

The viability of air source heat pumps in historic buildings (Part 1)

<https://historicengland.org.uk/images-books/publications/air-source-heat-pumps-historic-buildings/>

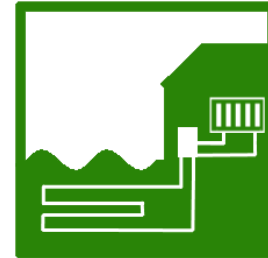
Current ongoing research



Air source heat pumps (Part 2)



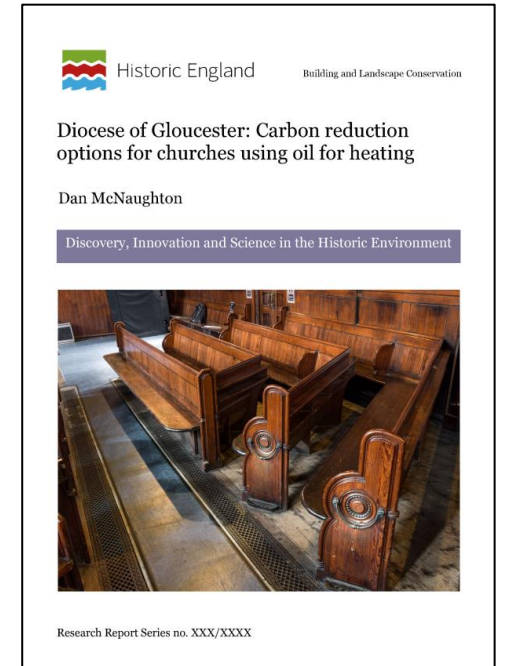
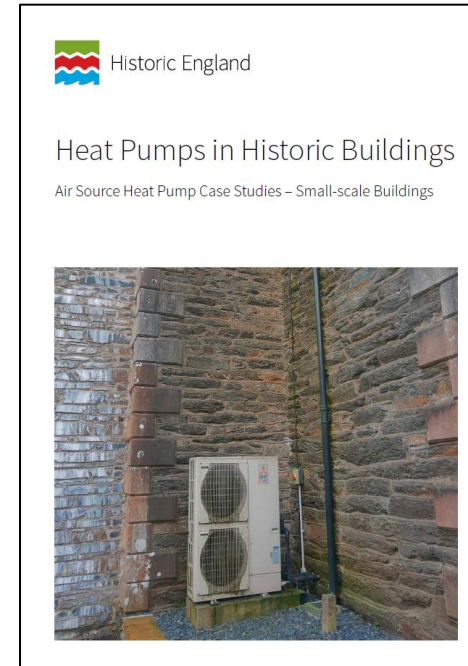
Ground source heat pumps



Water source heat pumps



Hydro





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Thank you for listening



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