

# Newcastle Cathedral

Road to sustainable energy usage through the *Common Ground in Sacred Space Project*



# Timeline of the CGISS Project

2012 – replacement of gas boilers with hydraulic connections for future upgrade to include ASHP

2013 – submission to the CFCE for refurbishment of interior incl removal of Victorian pews, nave floor replaced, 136 ledger stones re-burying/conservation/re-laying, new heating pipes laid & installation of ASHP and under-floor heating

2019 – NLHF awarded £4.5m for CGISS project

Jan 2020 – main contractor started

March 2020 – cathedral closed

May 2020 – additional CFCE application to include LED lighting throughout the cathedral

August 2021 – cathedral re-opened







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# CGISS : Integrated Design Team







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## CASE STUDY: Newcastle Cathedral

**Client:** The Chapter of St Nicholas' Cathedral

**Location:** Newcastle Upon Tyne

**Status:**

**Completed Nov 2022**

**Project Value:** £4.5m

### **Description:**

- Initial project started ~2013 with a view on considering carbon reduction in use
- Internal alterations to provide a more flexible and community focused Nave area
- Removal of all pews
- Improved access
- Increased visitor numbers

### **Solution:**

- Suits slow responding heating system
- Underfloor heating to the Nave area (First Phase)
- ASHP serving UFH, operating in a bivalent configuration
- Operation cost savings using RHI
- First Cathedral to have an ASHP with UFH
- First (and maybe last!) Cathedral to receive RHI running cost payments





## **Energy Design Solution for the heating :**

- 2 x ASHPs (28kw total) sensitively located on flat roof area and not visible
- Design team process included assessment of flat-roof loading plus new access requirements for maintenance
- ASHP dedicated to under-floor heating in the nave (central nave area only)
- Back up radiators run off 4 x gas boilers
- Plant room space requirement doubled from original assessment





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Plant room x 2



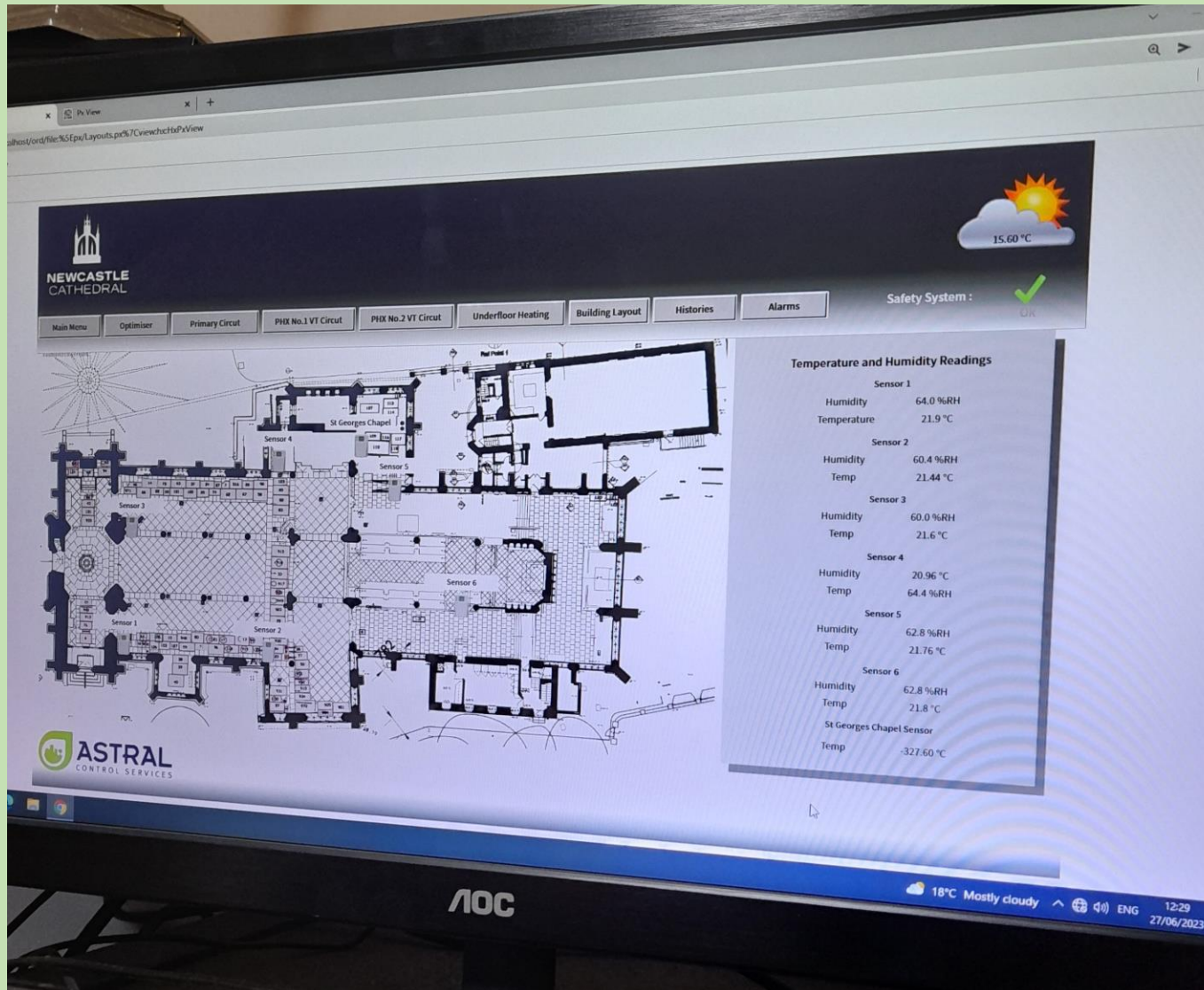
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# Building Management System



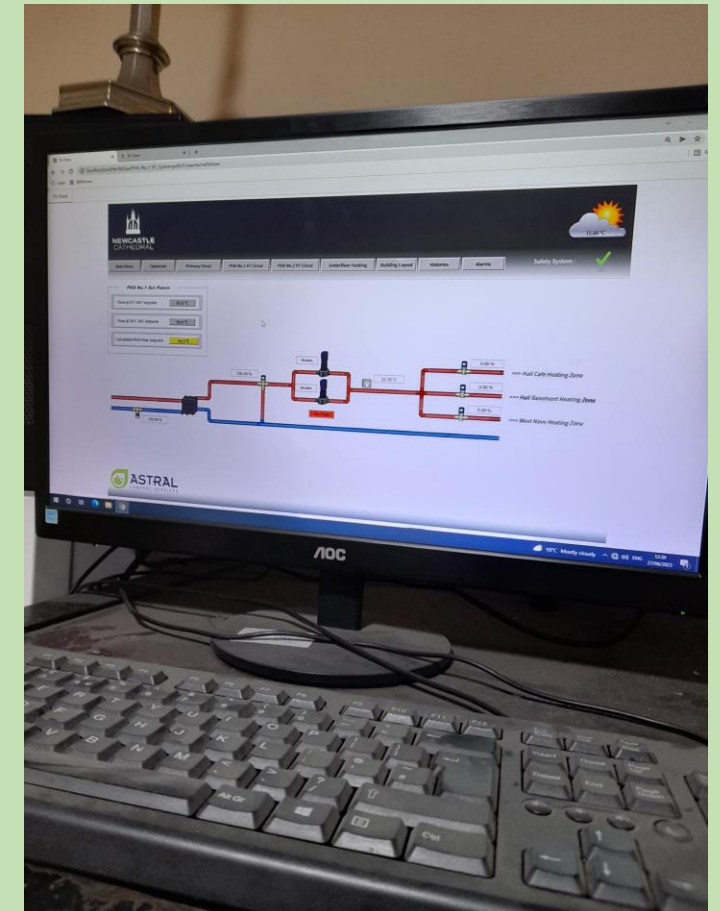
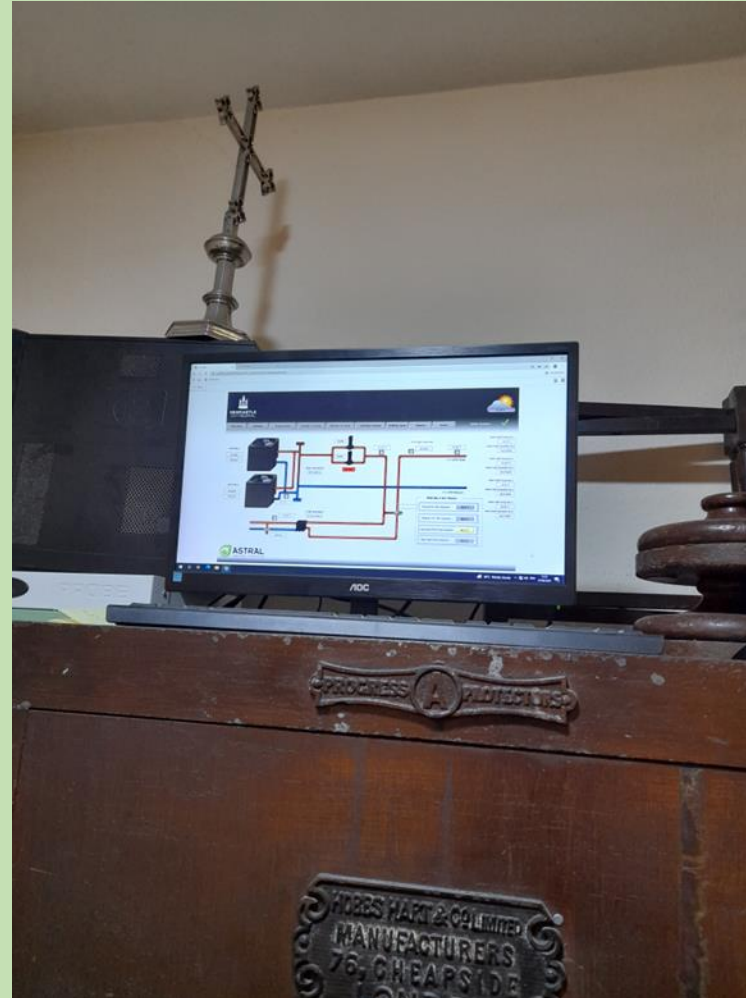
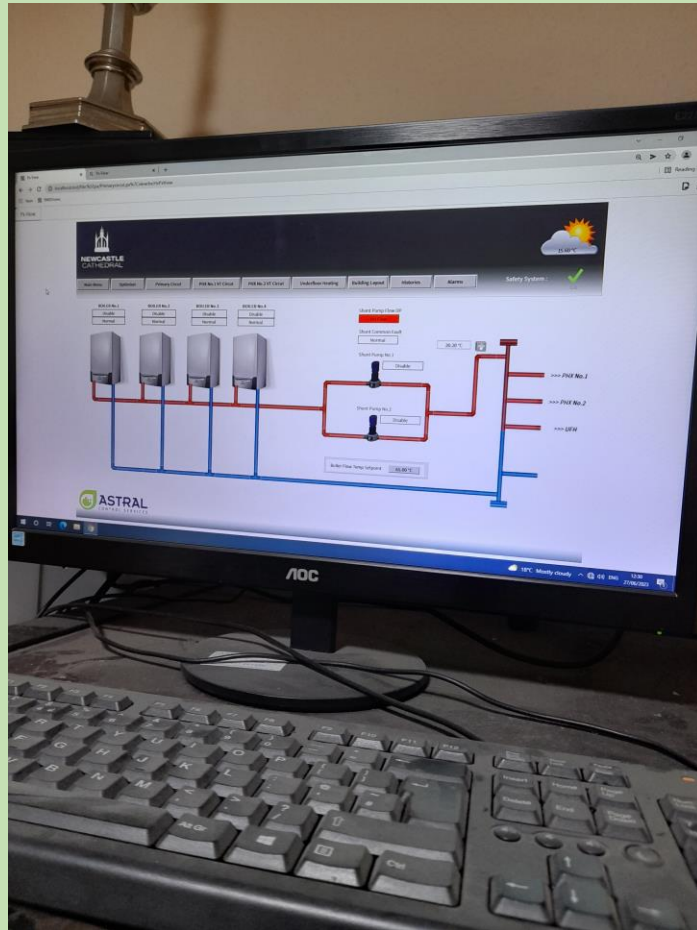
## BMS information

- Supplier – Astral
- Monitors 6 sensors across the nave
- RH/Temp. can be monitored and temp. adjusted from this point
- System needs to be on external network to be monitored by Astral
- Approx annual maintenance/monitoring/remote access support agreement : £800
- Significant upskilling of vergers team to monitor and respond





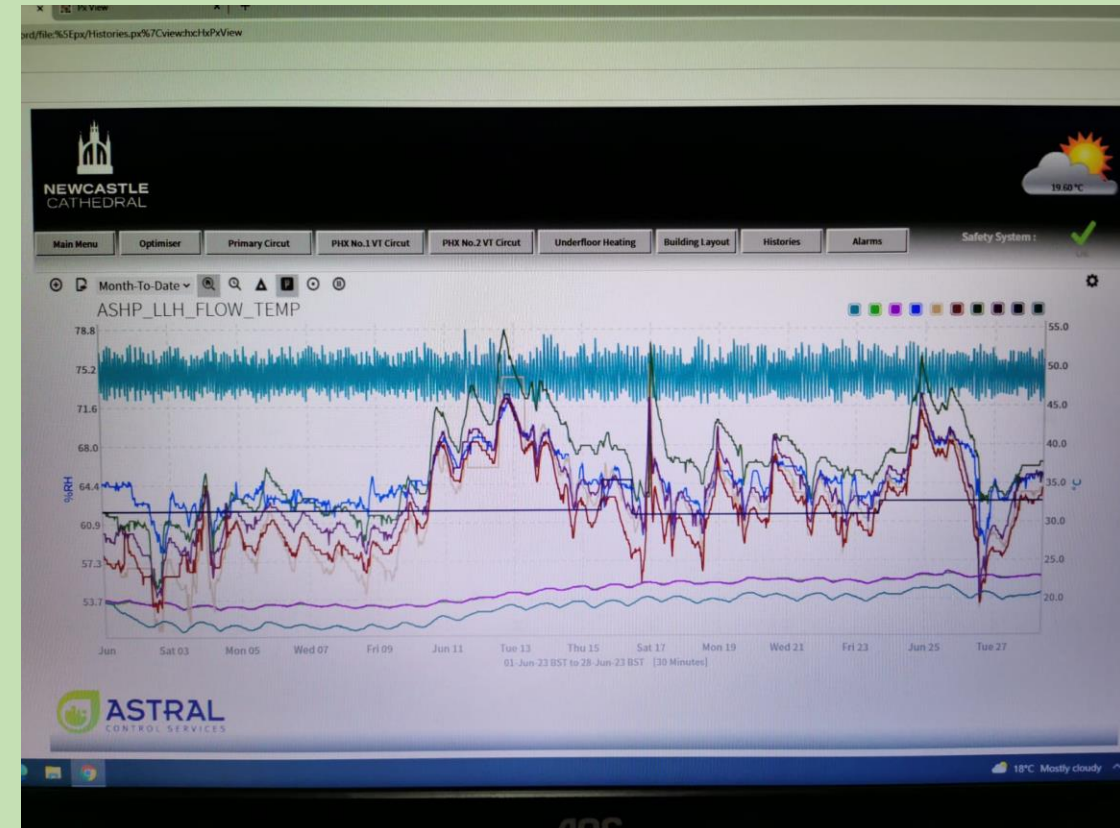
# Building Management System



# Building Management System



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## ASHP Performance

- Period 14<sup>th</sup> Dec 2022 – 14<sup>th</sup> June 2023
- Electrical energy absorbed = 41,322 kWhrs
- Thermal energy generated = 131,490 kWhrs
- Calculated CoP (efficiency) = 3.1 (310%)
- Carbon saving in period = 21 tonnes
- RHI payment to date : £400

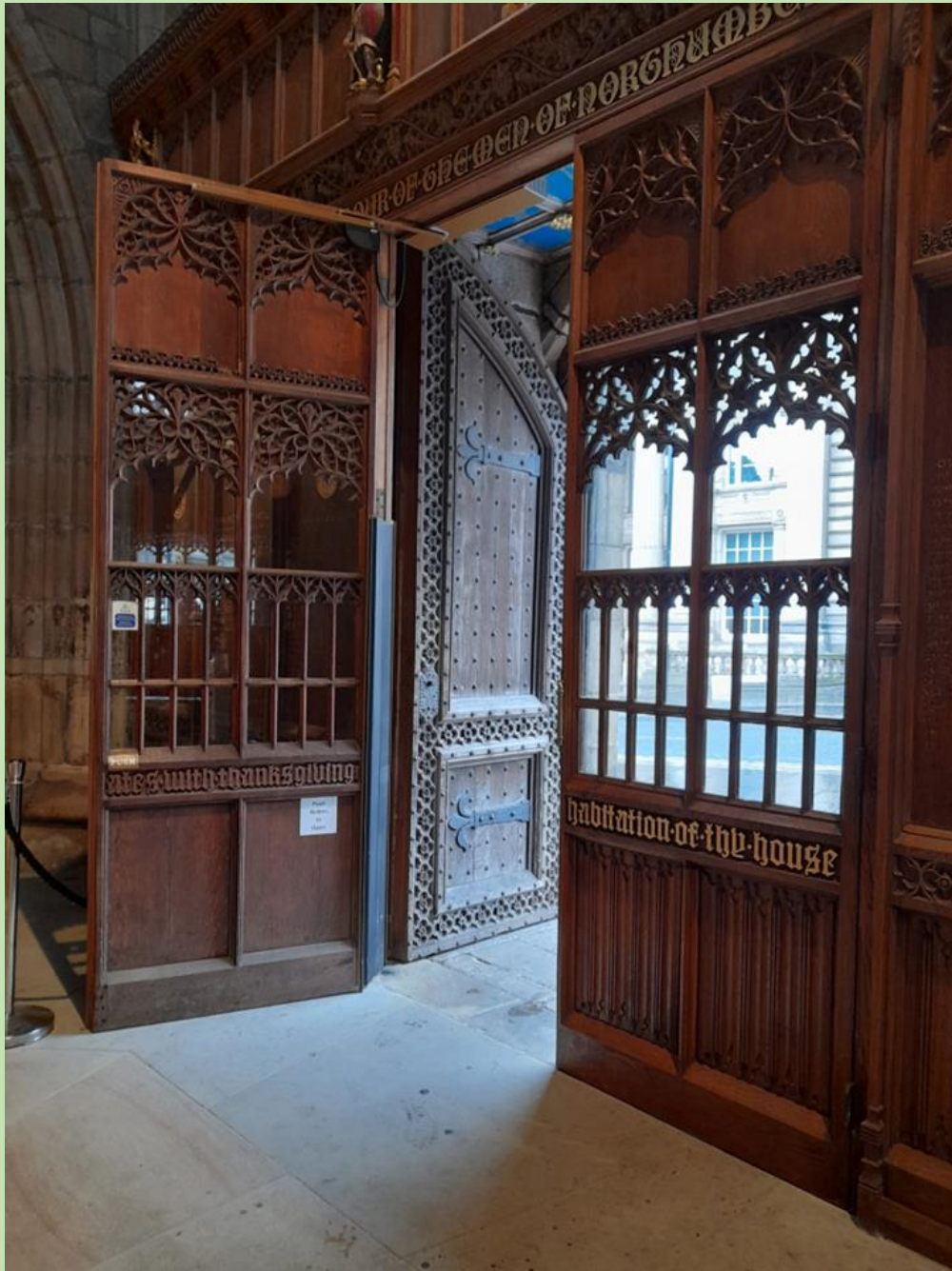


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However.....

It's actually not about heating, it's about an integrated solution based on heat loss and how you operate your building....

Impact on :

- Events
- Visitors
- Worship
- Income generation



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## How we use the building and impact on heating/lighting usage

Activity	Season	Seated	Coats on/off	West door shut if cold/windy	West door closed in advance	Short-term temp increase needed?	Lighting levels (Low/High)
Sunday & other services	All	Y	On & off	Y	N	Possibly	H
Classical concerts	Any	Y	Off	Y	Y	Y	L
Pop concerts	Any	Y	Off	Y	Y	N	L
Dinners	Avoid Nov-Feb	Y	Off	Y	Y	Y	L
Silent disco	Any	N	Off	Y	Y	N	L
Art installation	Any	N	On	Y	N	N	L
Daily visits - tourists	All	N	On	N	N	N	H
Daily visits – prayer & reflection	All	Y?	On	N	N	N	H
Lunchtime eucharist	All	Y	On	N	N	N	H
Schools	All	N	Off	N	N	N	H



## Energy costs – the reality



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Increase in Gas Costs		
	pre 1st March 2022	post March 1 <sup>st</sup> 2022
Standing charge	0	£17.25
Unit charge (p/kwh)	£0.02	£0.11
Annual cost	£16,674	£72,000 est
		331.8% increase
Electricity similar cost - estimated annual cost of £70,000 in 2023		

## Next steps for Newcastle Cathedral

- Post-project review of energy usage – with M&E Consultant and Utility Broker
- Full Net Zero survey commissioned – including additional heat-loss survey; Chapter Net Zero action plan ratified and reviewed bi-annually
- New Cathedral Architect – feasibility study for a number of Net Zero projects including expanding the under-floor heating system to the Eastern end, possible solar tiles to tie in with major roof repairs, and potential project with Historic England/Newcastle University re wind power (we have a lot in Newcastle!)
- Do away with printing.....

