

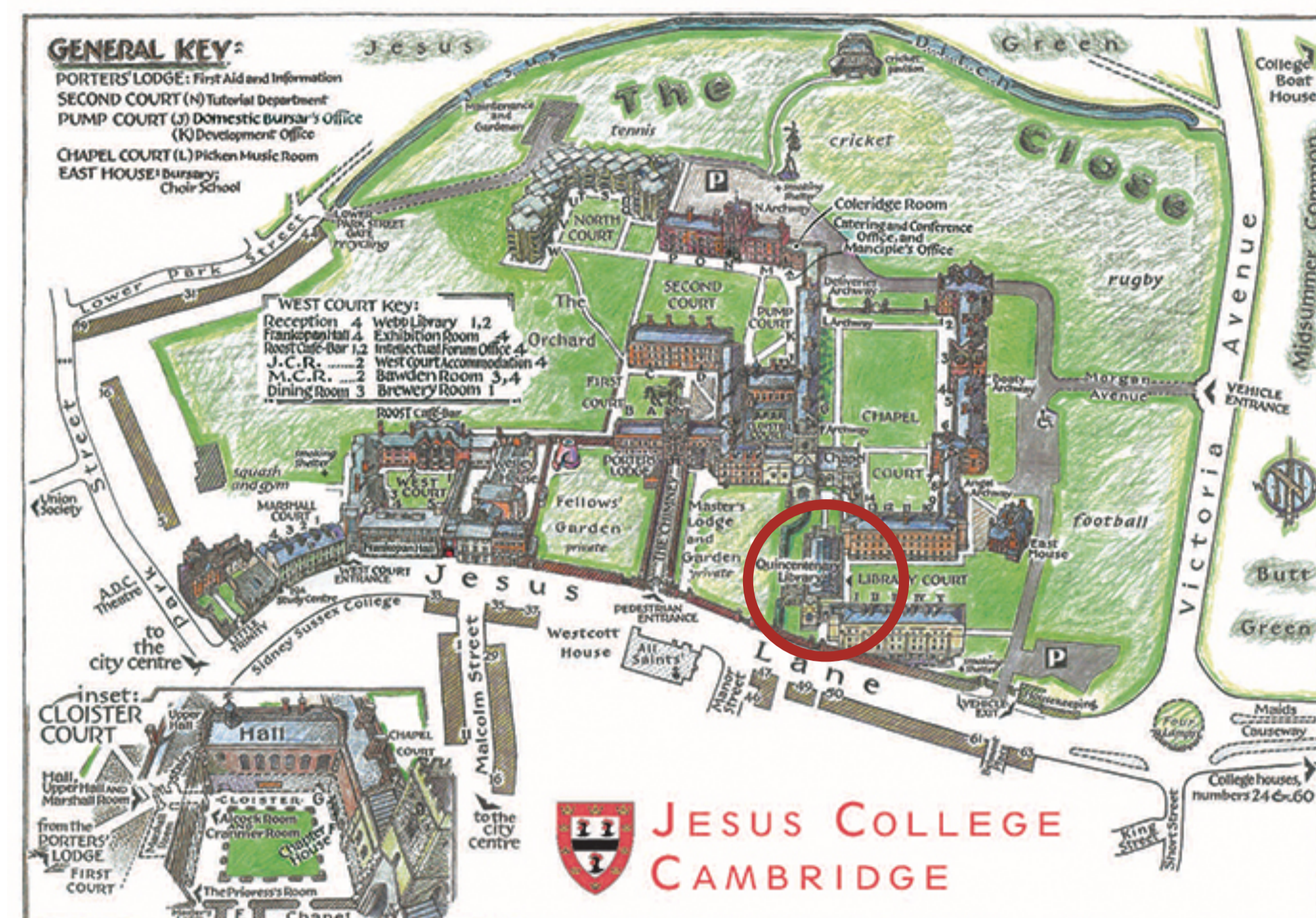


# Quincentenary Library

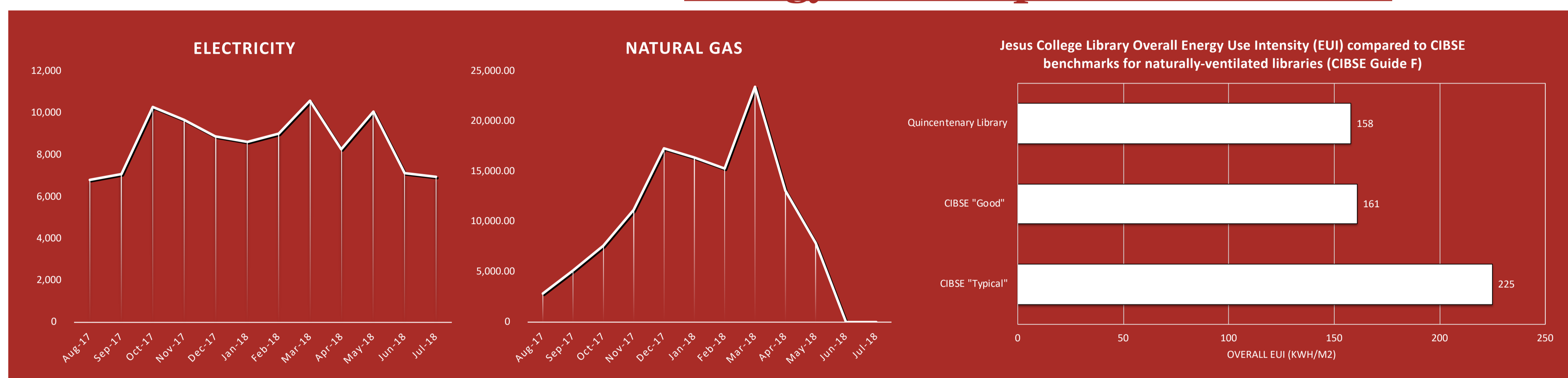
*Opportunities to preserve Jesus College history in an innovative, net-zero and comfortable space while enhancing the learning experience and delivering a positive impact on biodiversity*

## The Facts

- 25 years old
- 1,417 m<sup>2</sup>
- Holds 60,000 books
- Caters for 125 readers
- Open 24 hours/day, 365 days/year
- Naturally ventilated
- Gas-fired boilers
- Radiators & underfloor heating
- AC in computer room



## Energy Consumption Information

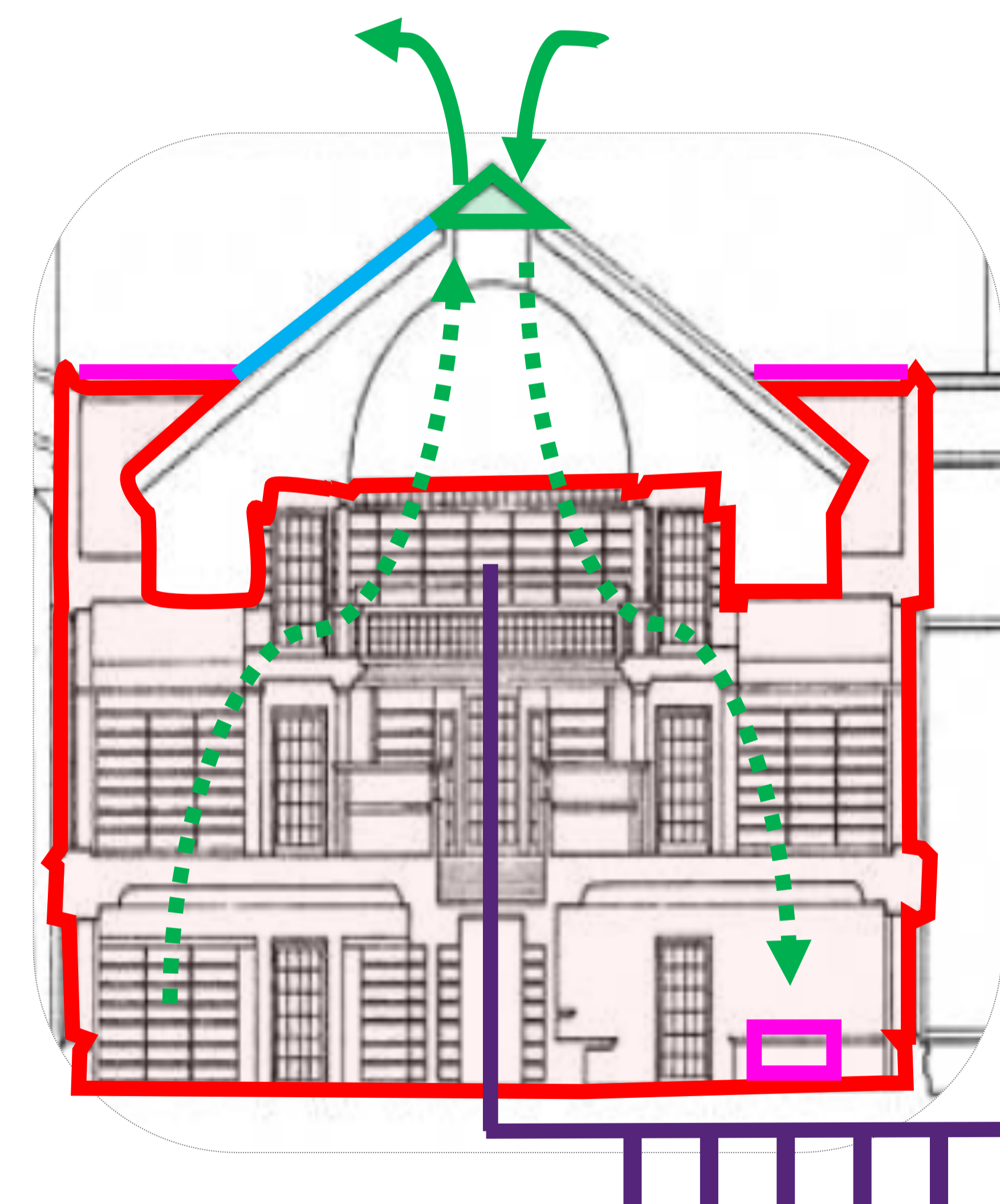


Energy profiles for the library over a year-long period show typical curve for natural gas with the peak in March, and heating is turned off for the summer months. The electricity profile shows that there is a relatively constant use of electricity in the library year-round without any big drop-off, consistent for year-round operation

When overall EUI is calculated (gas and electricity), the library comes in to about the same as the CIBSE benchmark for a "good" naturally ventilated library. This is good news but doesn't mean we can't make improvements!

**Problem:** The main issue in the library is thermal comfort. It is too hot in the summer and too cold in the winter. Many studies have shown that thermal comfort is important in terms of students' academic performance and reaching potential, so our recommendations are based around improving the temperature issues in the library, in tandem with working towards achieving net zero and enhancing biodiversity. The UN Sustainable Development Goals provide a framework for sustainability in a wider context.

**Solutions:** While most of our solutions are technical, we tried to keep in mind the student experience and how we would want people to feel when they were in the library. Words like 'inspired', 'productive', 'comfortable' and 'relaxed' came to mind, and we tried to consider how these technical building solutions could contribute to these more intangible benefits.



### Systems - Building Envelope

Door operation changes should be made so that outer door closes before inner door opens. This will reduce heat loss during the winter and lessen distraction to library users. Cracks in window frames should be repaired to improve the integrity of the building envelope and minimize air leakage.

### Systems - Ventilation

Repair roof vents so they operate as designed, to open and naturally ventilate building in the summer. Switch the vents to mains power so batteries no longer need to be replaced. Investigate addition of mechanical ventilation system to circulate fresh air, particularly in top floor where there are no operable windows.

### Systems - Ground Source Heat Pump

A ground source heat pump can be used to heat and cool the building using the natural temperature of the earth. More study is needed to determine how to properly size the system based on building demand and to figure out the logistics of the heat pump working with the underfloor heating system and existing radiators, as well as any new radiators.

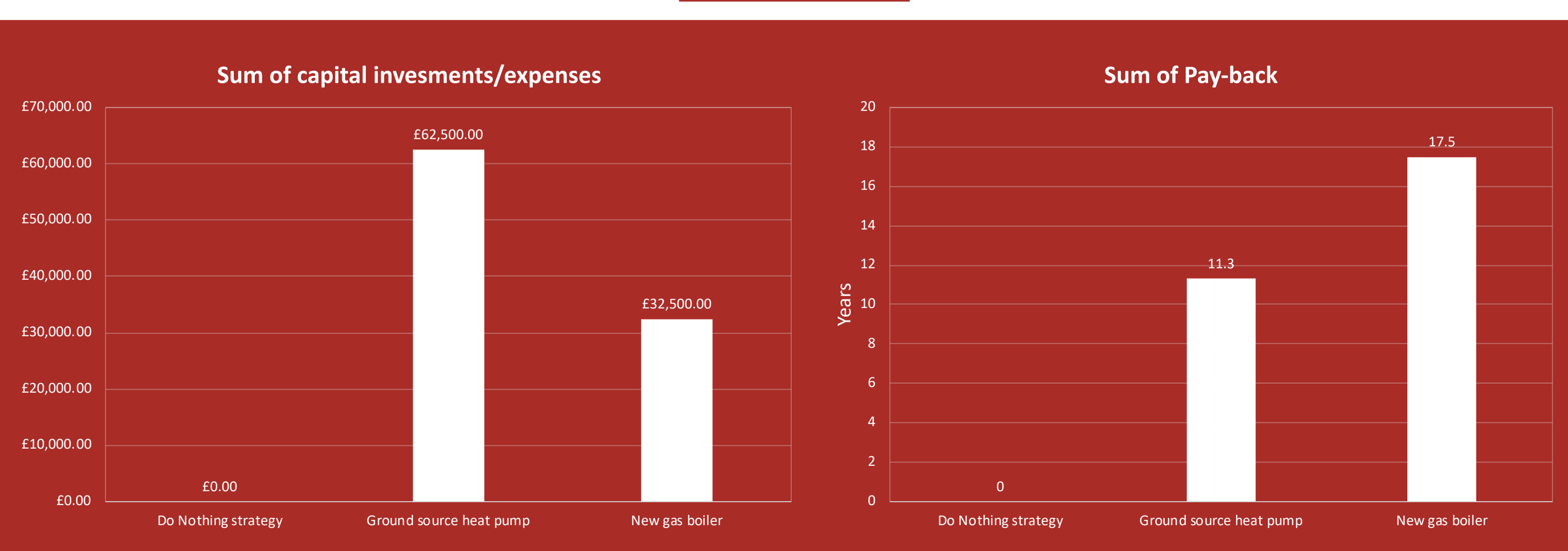
### Renewables - Solar Photovoltaics

More investigation should be done to assess the potential for adding solar PV to the roof of the library through a site visit. If a big enough system could be installed, it could potentially generate all the electricity required to run the ground source heat pump, making the system operate at net zero carbon emissions on site.

### Biodiversity

The Library has a long history with art, so it should use this as a chance to promote biodiversity and sustainability through art and student engagement. Students can be challenged to create art that reflects sustainability initiatives and local wildlife, which can be displayed in the library alongside posters that explain how the library is helping Jesus College to reach its ambitious sustainability goals.

## Finance



Rough calculations done to model three different scenarios, 1. Do nothing and leave the library exactly how it is now, 2. Install a new ground-source heat pump to heat and cool the building and 3. Install a new gas boiler. Scenario 3 was included to make comparisons to a more conventional strategy for building retrofits and was not actually considered as a viable option. Calculations are shown for sum of capital investments in each strategy, along with number of years for strategy to be paid back.

## Opportunities

There are many opportunities to make Quincentenary Library an example of the Jesus College commitment to sustainability, through technical building solutions and engagement with the College community. The Library already does an excellent job of catering to student needs through offering an inviting space that lends itself well to the different ways that students interact with the space, whether it is a quick visit to check out a book or a day filled with hours of study. We hope our suggestions can be a starting point for more in-depth analysis, investigation and stakeholder engagement that will hopefully help to drive real-world implementation.

We would like to thank Jesus College for their help on this project, particularly Alexis Moreau, Peter Moore and Head Librarian at the Quincentenary Library Rhona Watson.

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IDBE Masters Course, March 2020

