Lipman Building EnerPHit
Newcastle upon Tyne, UK

Project Type University

Client Northumbria University

Value £9.5m

Area 7,268sqm

Retrofit Type
Critical Infrastructure - Education
Deep Energy

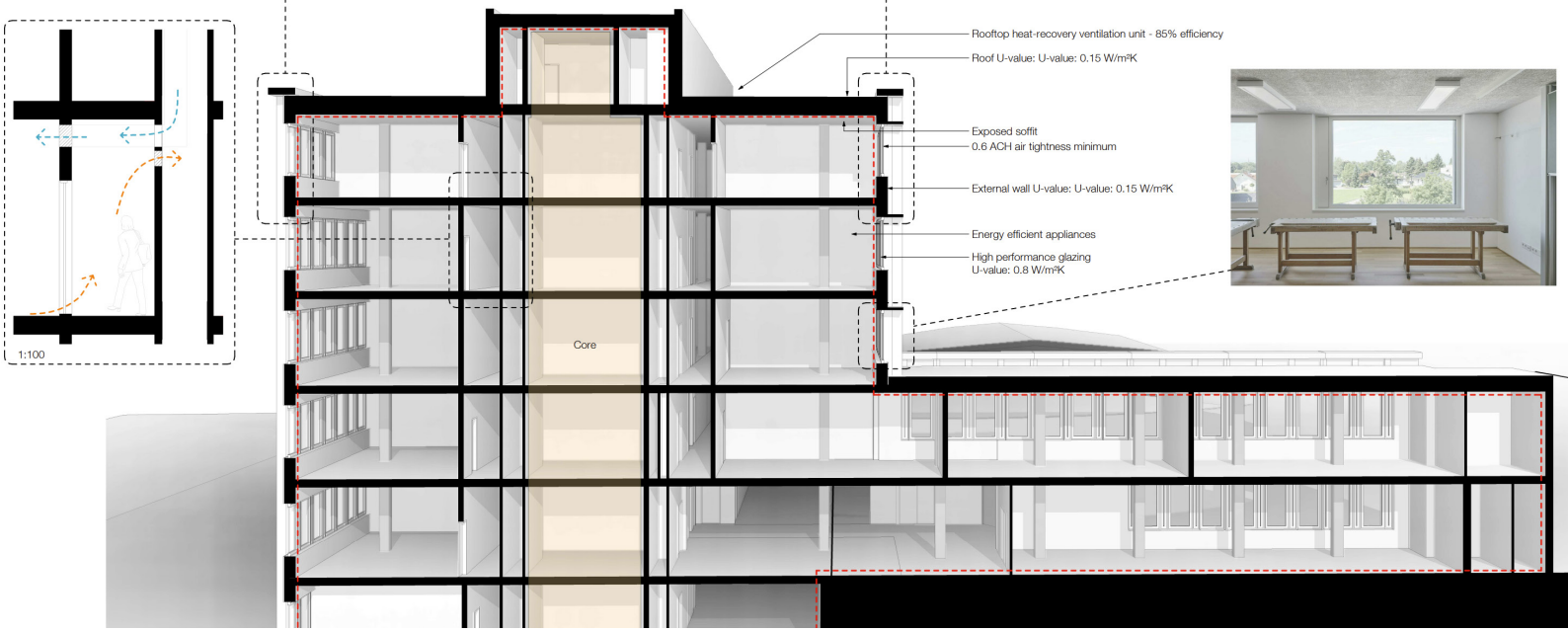
Ryder developed early design proposals for the retrofit, internal reconfiguration and extension of an existing 1960s building for Northumbria University.

The concept design was developed to Passive House EnerPHit standard, making it the largest EnerPHit project in the United Kingdom and the third largest in Europe at the time.

Retrofit Strategy
The facility is one of the poorest performing buildings on the University estate and the envelope performance falls significantly short of current building regulations.

Heating and ventilation occurs through wall mounted radiators and air handling units, with the building being prone to overheating. As a result, the energy consumption is 225kWh/sqm/year, well above industry benchmarks.

The exposed concrete structure of the building causes thermal bridging, where outside cold is easily transmitted inside and heat is transmitted outside. Mitigation of cold bridging and upgrading the thermal performance therefore formed a key focus of the retrofit design.



The proposals included the removal of the building envelope and internal fittings while retaining the building structure and circulation cores. The existing risers would also be retained.

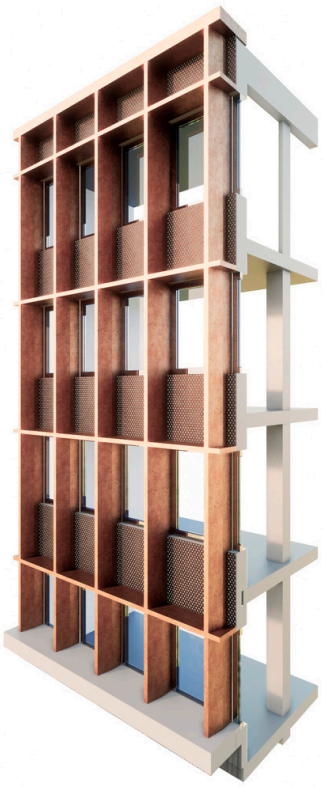
The design includes full replacement of the external cladding and window systems to improve U-values and air leakage. Rainscreen cladding and window systems would be supported by a lightweight structural framing system which sits on the existing floor slab.

Perforations in the vertical fins reduce the extent of framing to the window system and improve thermal performance. Ventilation would occur through solid panels between the windows.

An Energy Strategy Report was developed during RIBA stage 2. The report analysed the existing building performance and the potential impact of improvements to the envelope and services.

By achieving the EnerPHit standard - and with a future opportunity to install a heat pump - the potential energy consumption would reduce to 50kWh/sqm/year, a reduction of 77 percent.

This would result in a carbon saving of 67 percent. 95 percent could be saved over a 30 year life cycle as the grid continues to decarbonise.



Lessons Learnt

The glazing to wall ratio of the existing building was not conducive to achieving the required thermal performance. A series of thermal modelling studies were therefore carried out focusing on the impact of altering the façade depth and solar angle. These were entered into the DesignPH software to iteratively test the design and understand the best solution for optimising thermal performance.

Despite the need for EnerPHit buildings to be airtight, this should not preclude the manual opening of windows, which can be important for managing summer overheating. Openable windows were therefore integrated within the fins with perforated panels to provide sufficient free area.