Approach to Net Zero Carbon Buildings at UCL : Passivhaus and capital cost implications

UK Passivhaus Conference 2021: "DELIVERING NET ZERO THROUGH PASSIVHAUS"

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#UKPHC21

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Aim of this study…

AECOM has been appointed by UCL Estates Team to carry out an assessment to estimate the cost implication along with the benefits of net zero carbon buildings.

Net zero buildings have to reduce energy demand before applying low/zero carbon technologies and paying into offset funds.

An effective and proven way of significantly reducing energy demand is to apply Passivhaus principles.

Therefore, this project has applied Passivhaus principles to a sample of buildings in the UCL portfolio that have recently been completed as new or refurbished buildings.

Myths…

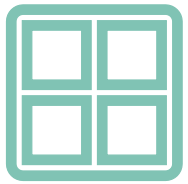
Costs a lot more

Overheat

Square and boring

Completely off-grid

A Passivhaus…

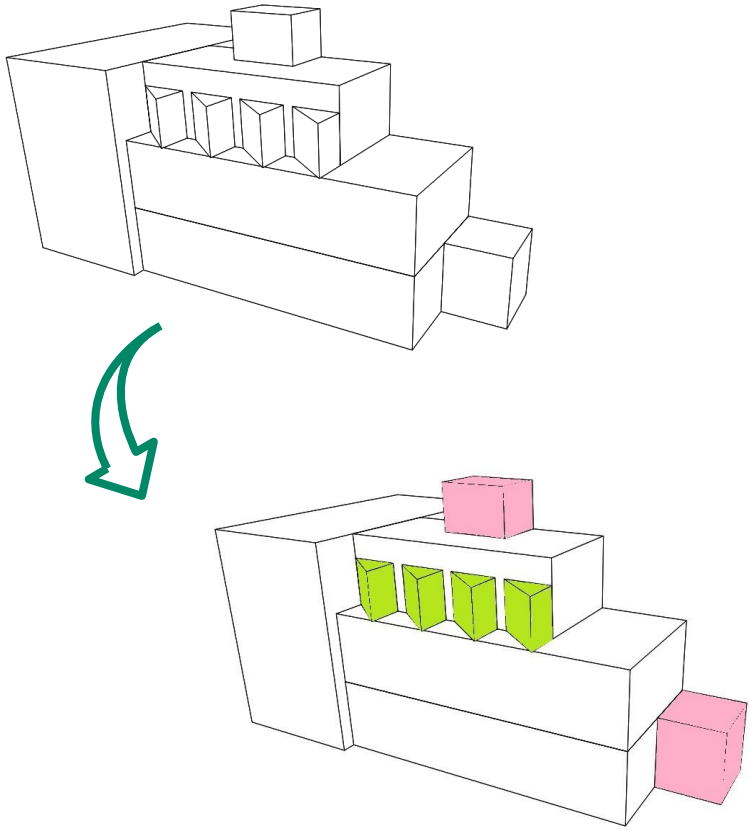


Can’t open windows

Have to be built out of wood

No heating required

Scope of the Study



Re-imagine

Certified Passive House

Passive House Institute

Methodology

Heat Loss Form Factor Improvement

TFA
Alterations to space use

Thermal Envelope
Review of thermal bridge design, window ratios, '*think in layers*' approach

Building Services Review

Main Building Servicing Strategy

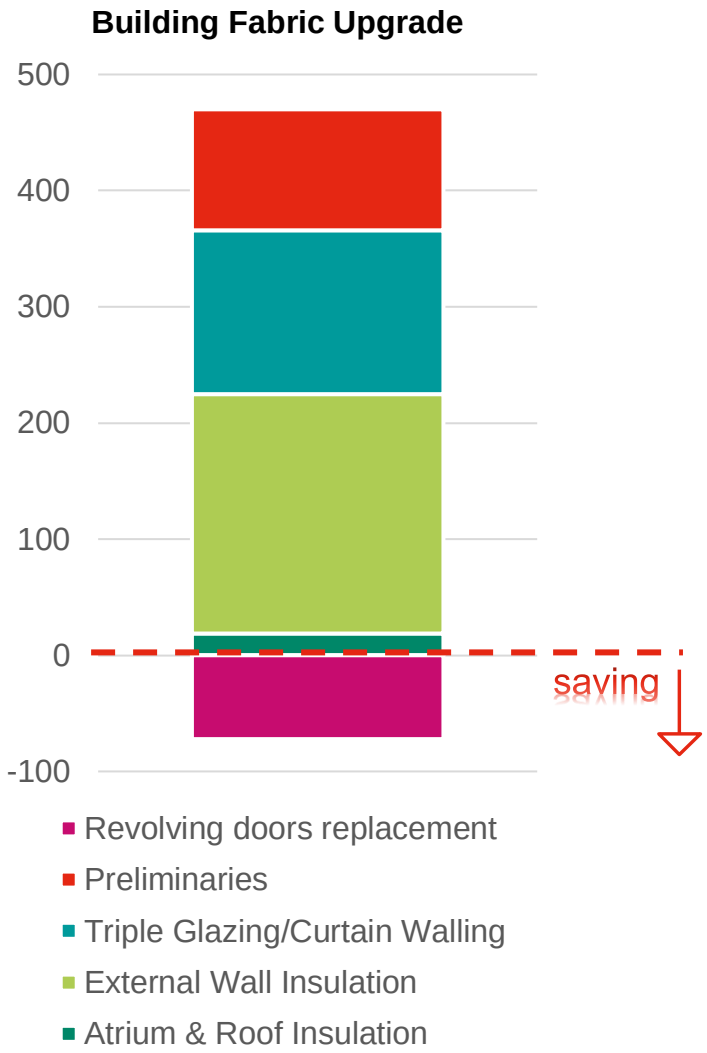
Review of components' location and of distribution routes

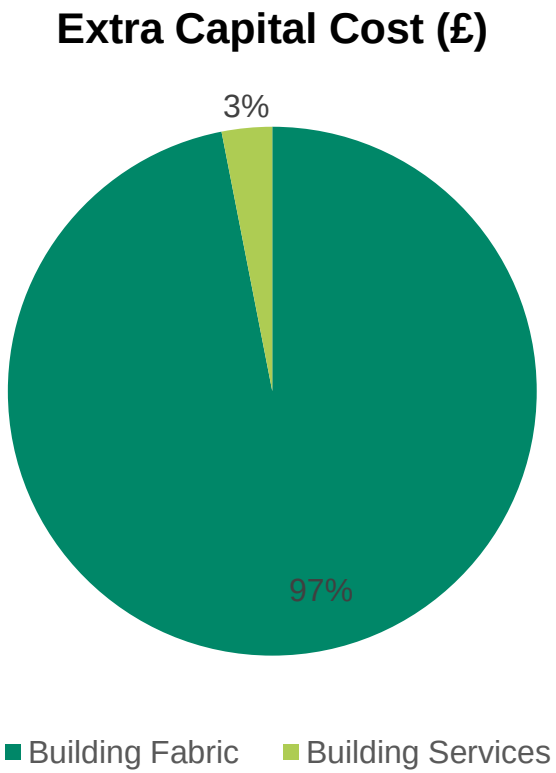
Replacement of components

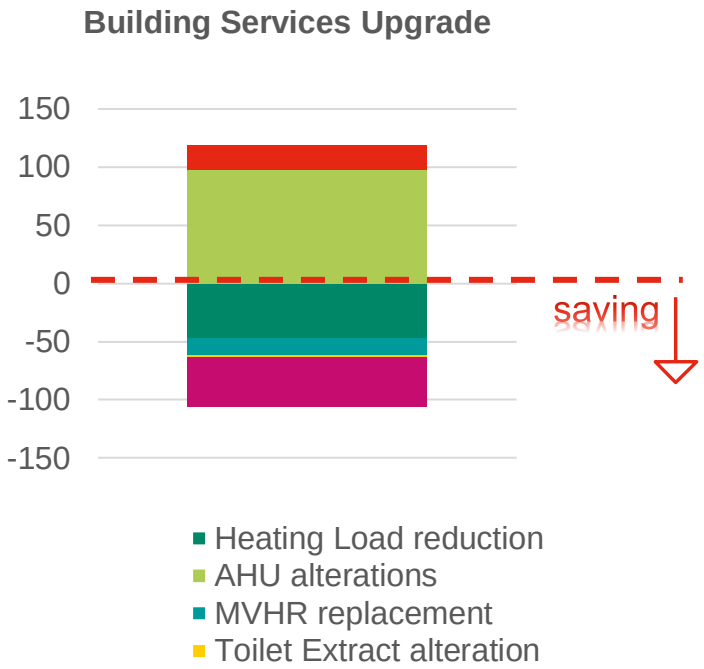
Results

Impact on Capital Cost

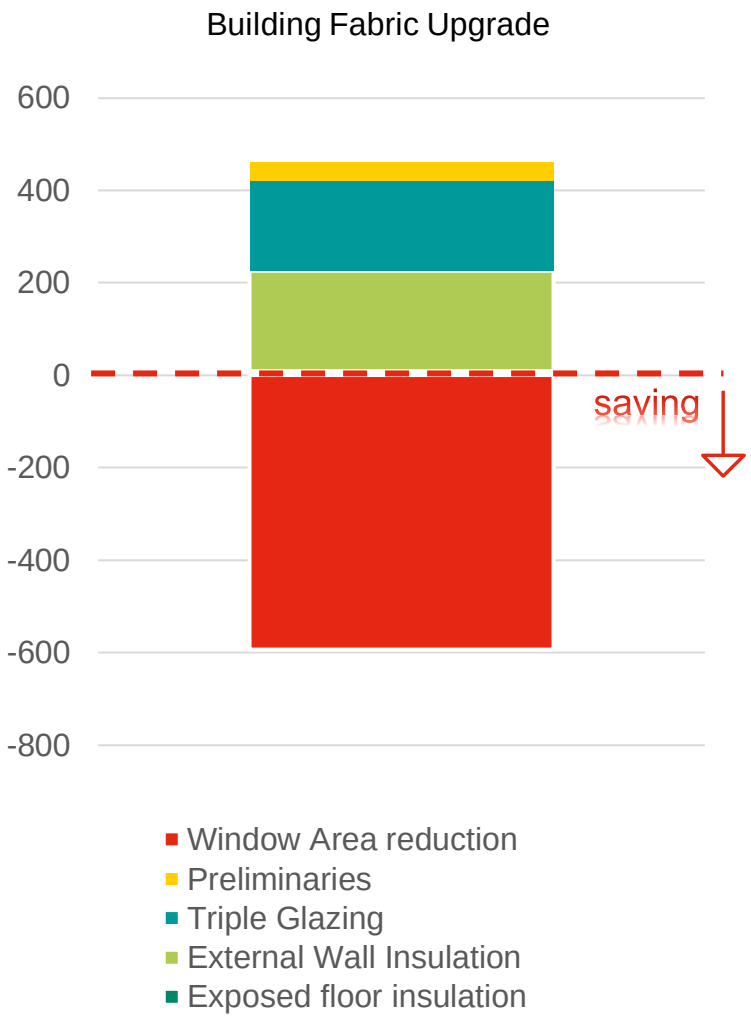
Capital Cost breakdown related to Passivhaus for the Student Centre

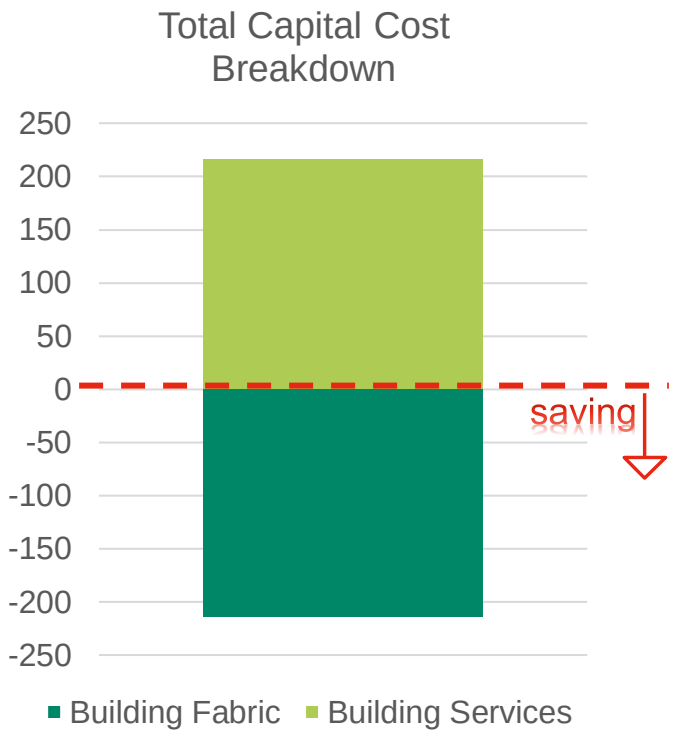


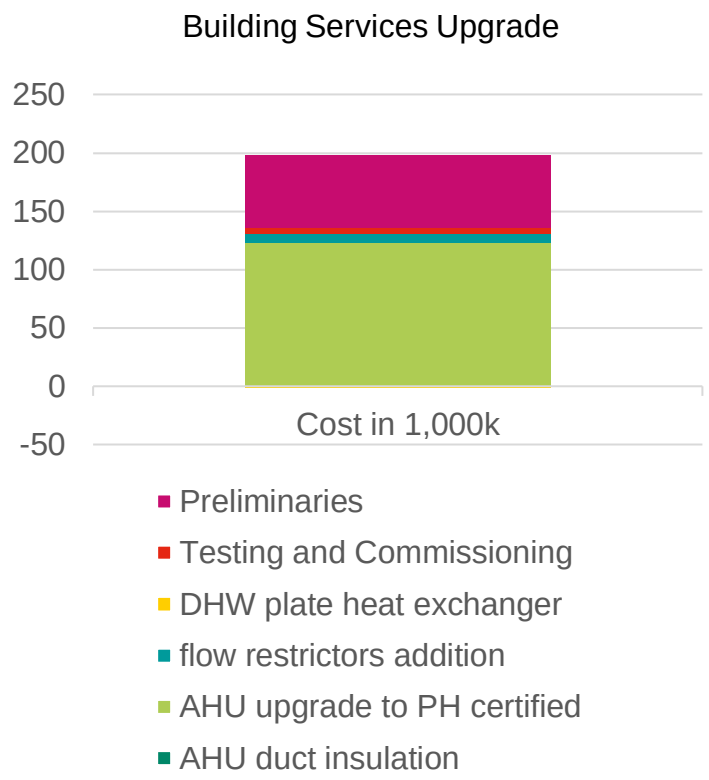




Capital Cost breakdown related to Passivhaus for the 22 Gordon Street

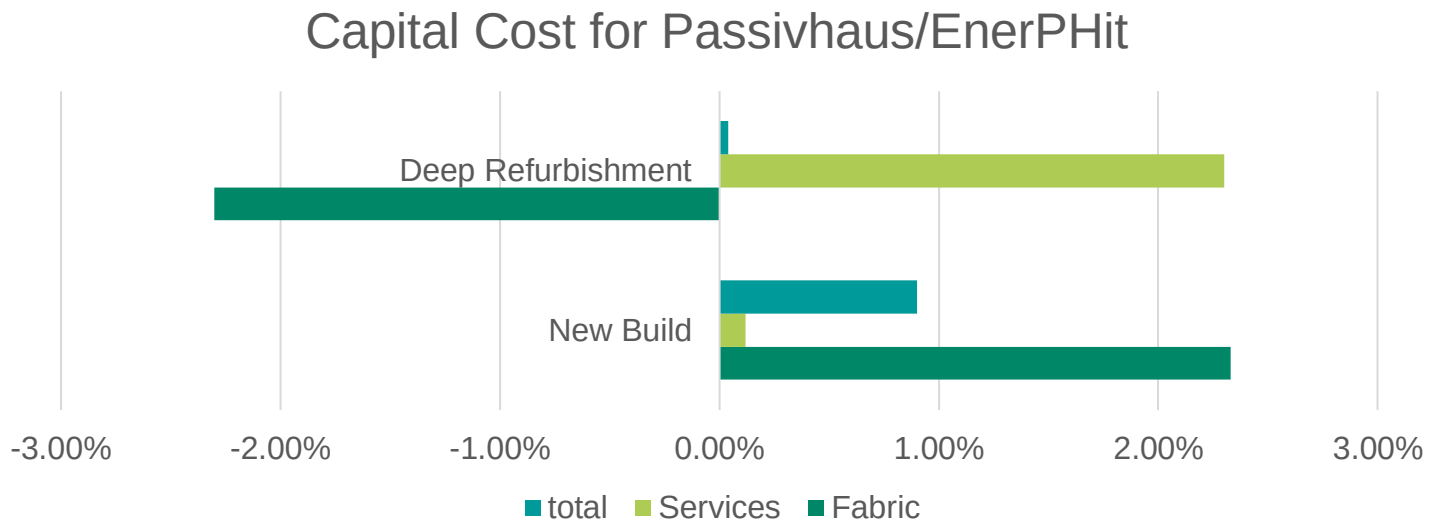






Capital and Life Cycle Cost comparison

	Capital Cost Comparison		
	Fabric	MEP	Total %
The Student Centre	2.33% extra	0.12% extra	0.92%
22 Gordon Street	2.3% saving	2.3% extra	0.04%



Conclusion

Thoughts to share

Reassuring client’s strategy for Net Zero Carbon Buildings

“At UCL Estates, we’ve updated our standards to place a much greater emphasis on reducing energy demand as part of our approach to net zero carbon buildings. Our work with AECOM provided reassurance that implementing Passivhaus principles doesn’t necessarily cost more for new buildings, and can even result in significant savings when viewed in life cycle terms.”

Ben Stubbs, Sustainable UCL

Thoughts to share based on this study

Occupant's thermal comfort is the real added value to a Passivhaus building.
It can't be costed!

At the early stages, the **performance and cost** in the round for the **building lifetime** should be considered.

With Building Regulations getting more onerous, Passivhaus will **become the mainstream**

Treated Floor Area
≠
Total Floor Area

Life Cycle Cost analysis is the big **ALLY** for Passivhaus cost comparison

At the end of the day, you get what you pay for.

Passivhaus cannot be added at late stages but should **guide the design** from the very first beginning**.**

Deep Refurbishment cost comparison **canNOT be applied** to all refurbishments

Thank you.

Any questions?

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AECOM's Dream Team

Project title:
Approach to Net Zero Carbon Buildings at UCL - Assessing Life Cycle Value

Dave Cheshire, Director - Sustainability: Project Director

Evangelia Mitsiakou, Architect and Passivhaus Designer, Project Manager

Jonathan Hollett, Principal Mechanical Engineer: main contributor for the Passivhaus proposal in building services

Rebecca Lindridge, Associate, Cost Consultant; main contributor for the capital cost comparison in building fabric elements

Florentino Bercasio, Director, Cost Management: main contributor for the capital cost comparison in building services

Anthony Bulaong, Senior Project Surveyor: input on capital cost for the building services

Colin Reed, Life Cycle Cost expert

Chris Bicknell, Asset Advisory, Director, Life Cycle Cost Consultant

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