



Λιγότερο από 2%:

«Φανταστείτε ξανά» το κτίριο για να
επαληθεύσετε πόσο επιπλέον κοστίζει το
Passivhaus

Energy Efficiency in Buildings Conference

Ίδρυμα Ευγενίδου, Αμφιθέατρο

Τρίτη 28 Ιουνίου 2022



EVANGELIA MITSIAKOU

Passivhaus Designer – Senior Sustainability Consultant

AECOM overview

We are the world's trusted infrastructure consulting firm.

We partner with those who want to make a positive difference as we lead the change toward a more sustainable and equitable future.

47k

People



Featured on *Fortune's "World's Most Admired Companies"* seven years in a row

7

Continents



#1 transportation design firm, facilities design firm, program management firm, environmental science and global environmental consulting firm, and **#2 water design** firm as ranked by *Engineering-News Record*

US\$13.2B

FY 2020 revenue



Named one of 2021 **World's Most Ethical Companies** for its commitment to integrity and making a positive impact by *Ethisphere*

#163

Fortune 500



Received a perfect score for three years in a row on the **Human Rights Campaign Foundation's Corporate Equality Index**



Our environmental, social and governance commitments

1. What is AECOM's Sustainable Legacies strategy?



Our Sustainable Legacies strategy encompasses how we are integrating ESG factors into everything we do. Click here to view our [our strategy](#)

2. What is AECOM doing to decarbonize?



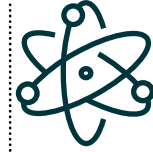
SCOPE X™

Incorporating an ESG action plan for reducing carbon impact by at least 50 percent on all major projects (our 'ScopeX™' service)



OPERATIONAL NET ZERO

by 2021



SCIENCE-BASED NET-ZERO

by 2030, which includes:



BUSINESS TRAVEL EMISSIONS

50 percent reduction in business travel emissions by 2030, compared with 2018



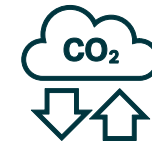
SUPPLY CHAIN

Developing carbon reduction targets in partnership with our supply chain



VEHICLES AND ENERGY

Decarbonizing all fleet vehicles and switching to renewable energy tariffs



OFFSETTING

Offsetting residual carbon, including through creating our own nature-based solution projects

3. What is AECOM doing to increase social value and social impact?

PARTNERING WITH SME'S

Partnering with small and medium-sized enterprises to deliver social value through community investment, positively impacting clients, communities and society



CAM TARGETS

Embedding net-zero, resilience and social value targets into our client account management program and the work we bid for

MEASURING KEY IMPACTS

Measuring key impacts such as carbon emissions, climate resilience and social value on major projects

4. What is AECOM doing to advance equity, diversity and inclusion?

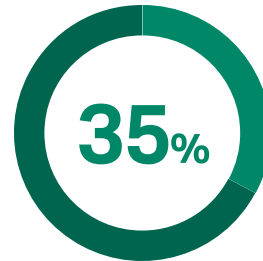


SOCIAL EQUITY, DIVERSITY AND INCLUSION

Ensuring that our work with clients and communities promotes social equity, diversity and inclusion

DIVERSITY

Ensuring our project teams reflect the diversity of the clients and communities we serve



WOMEN IN SENIOR LEADERSHIP

We have set an industry-leading, near-term target of women comprising at least 20 percent of senior leadership roles and at least 35 percent of the overall workforce

5. What are we doing to enhance our governance to deliver sustainable legacies?



ASSESSING RISK

Developing an enterprise framework to assess ESG risk in potential projects



ACCOUNTABILITY AND ADVOCACY

To drive leadership accountability and advocacy through specific ESG goals/metrics in annual goals

TRACKING AND REPORTING

Tracking and reporting on ESG performance targets in line with leading industry benchmarks (i.e., Sustainability Accounting Standards Board [SASB] and Task Force on Climate-related Financial Disclosures [TCFD])

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

Today's Agenda

Myths

Scope of the study

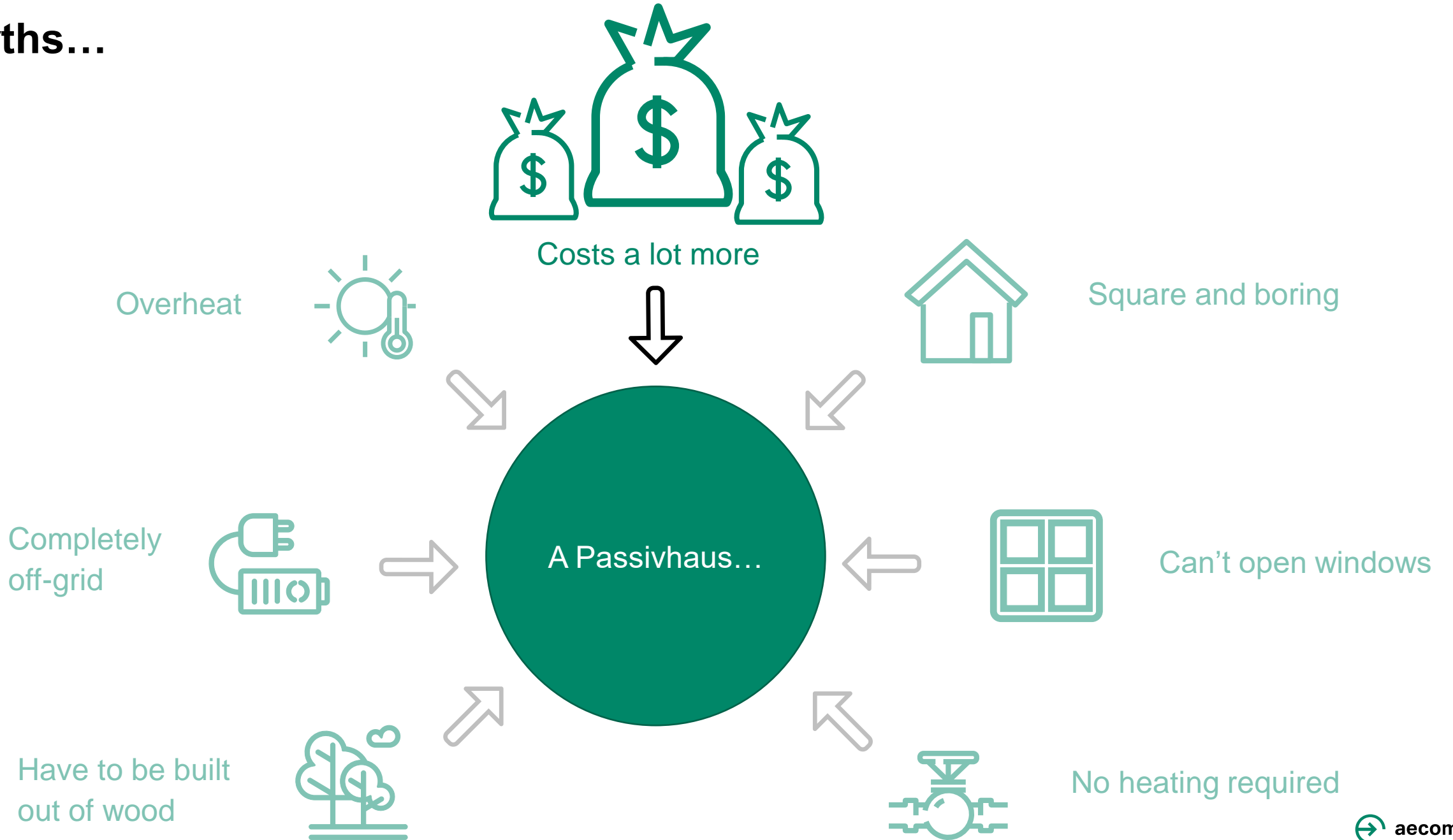
Methodology (limitations, assumptions, proposals)

Capital Cost Breakdown Results

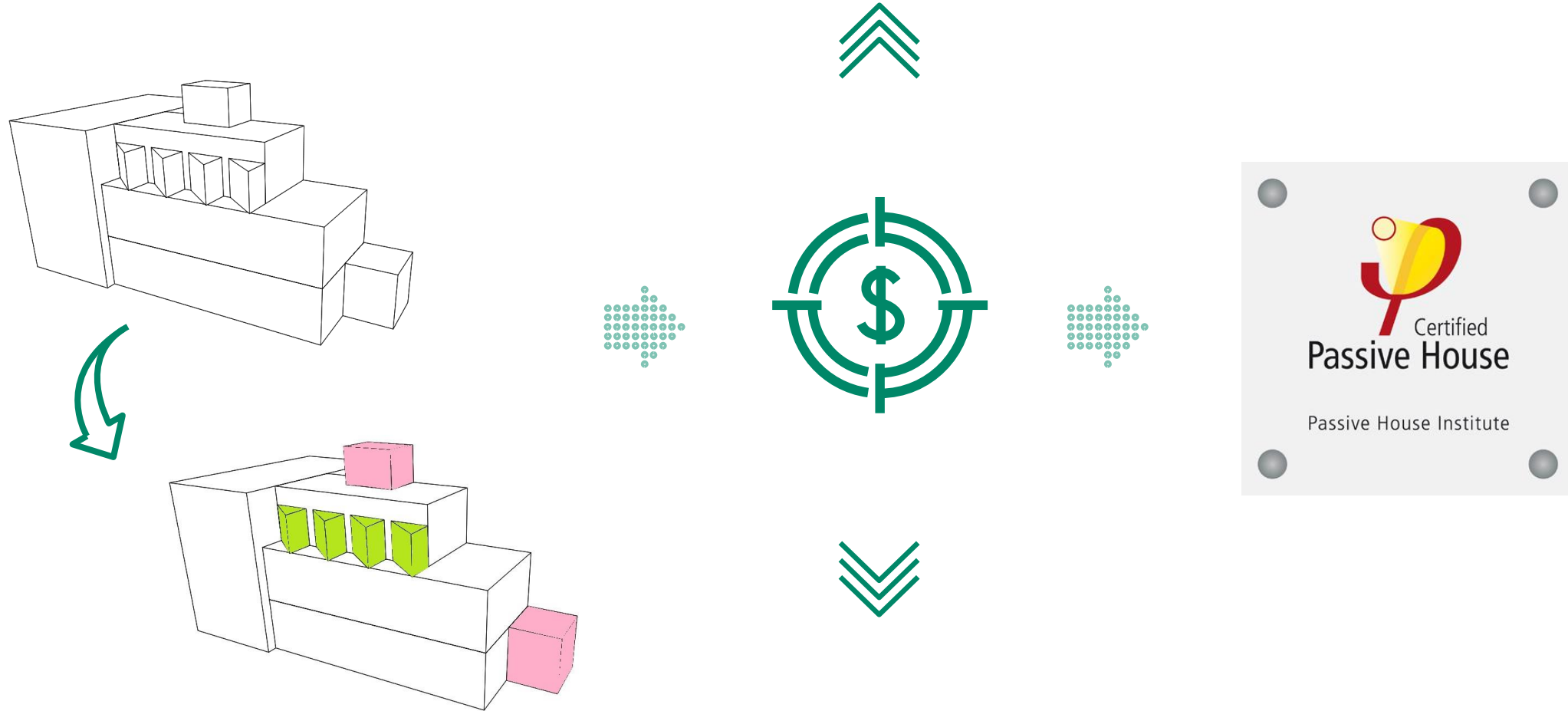
Thoughts to share

Conclusion

Myths...

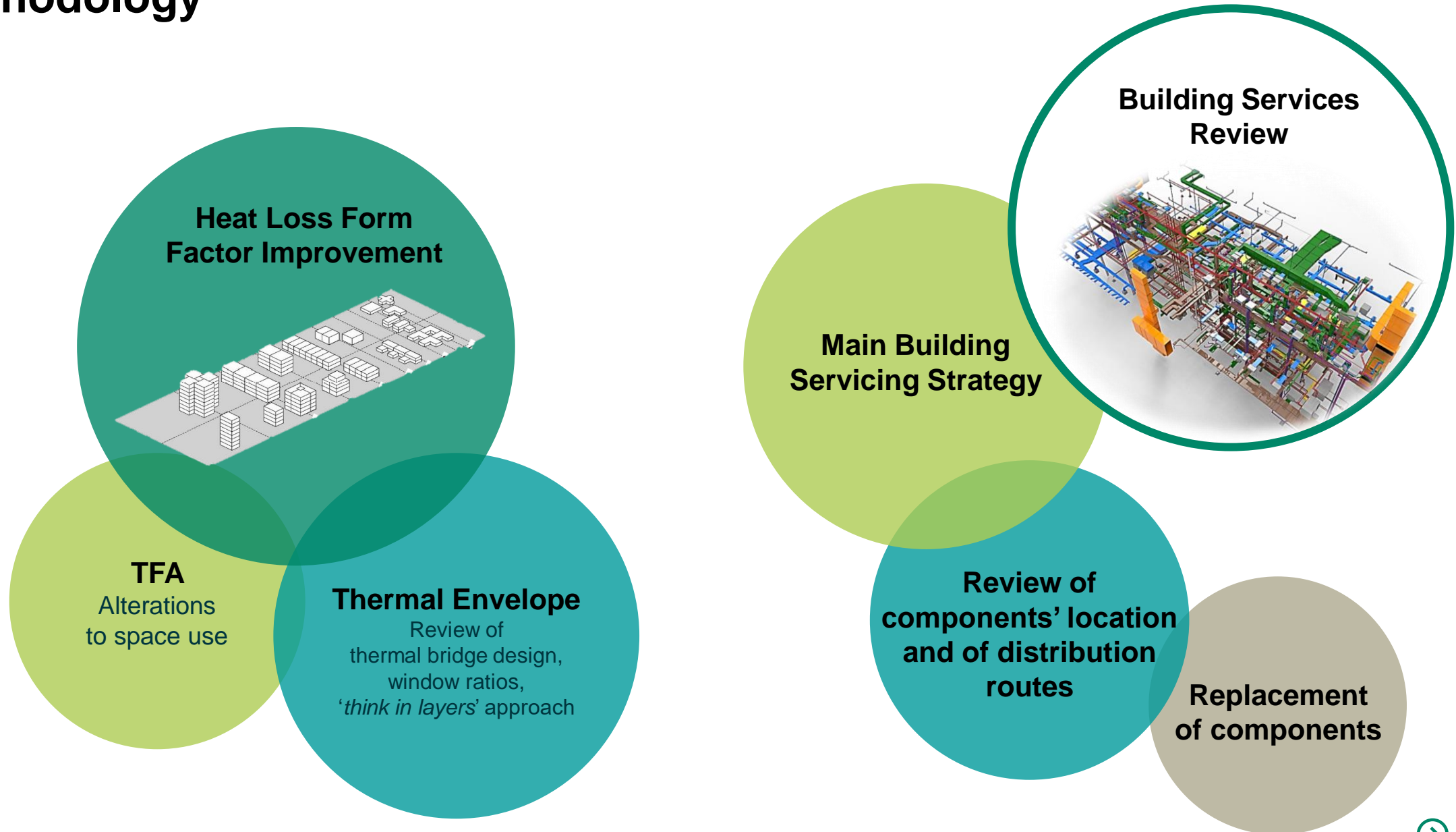


Scope of the Study



Re-imagine

Methodology



Limitations of the study

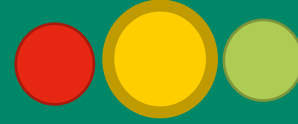
Data Quality



- Client's Detailed Brief unknown
- Stage 4 information
- Not all building services specifications were available
- Unclear thermal insulation and airtightness line
- Limited time and restricted budget



PHPP input



- Not full PHPP calculation
- Unknown district heating distribution losses
- Very low internal heat gains allowed in PHPP compared with the brief/reality

Basic assumptions of the study

- **only** main contributors that would have the **major capital cost impact** were considered

- equipment     
compliant with PH requirements

- **thermal-bridge free** design

- **full** Passivhaus and EnerPHit **certification** would be achieved respectively



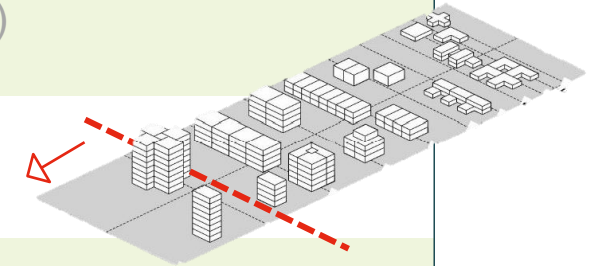
- Suggestions on **services** were based on **best practice** from other PH projects that **AECOM** had **experience of**.
- Current **Natural ventilation** strategy works

Assessed Buildings

- A. The Student Centre, UCL
- B. 22 Gordon Street, Bartlett School of Architecture, UCL

Buildings basic characteristics

	The Student Centre	22 Gordon Street
Status of the building	New	Deep Refurbishment
Total Floor Area	~5,650 m ²	~8,340 m ²
Treated Floor Area	~4,200 m ² (-25%)	~6,810 m ² (-18.5%)
Heat Loss Form Factor	<2	<1.5
Building Type/ Use	Student Centre (meetings rooms, study rooms, cafeteria, circulation space)	Architecture School (offices, workshops)
Total Actual Energy Consumption	267 kWh/m ²	200 kWh/m ²



The Student Centre, UCL, London

- Multi-awarded NEW building
- BREEAM 'Outstanding'
- 35% CO₂ reduction over Part L 2013

Assessed against



for this study

Copyright only for a live/video recording version and not for pdf

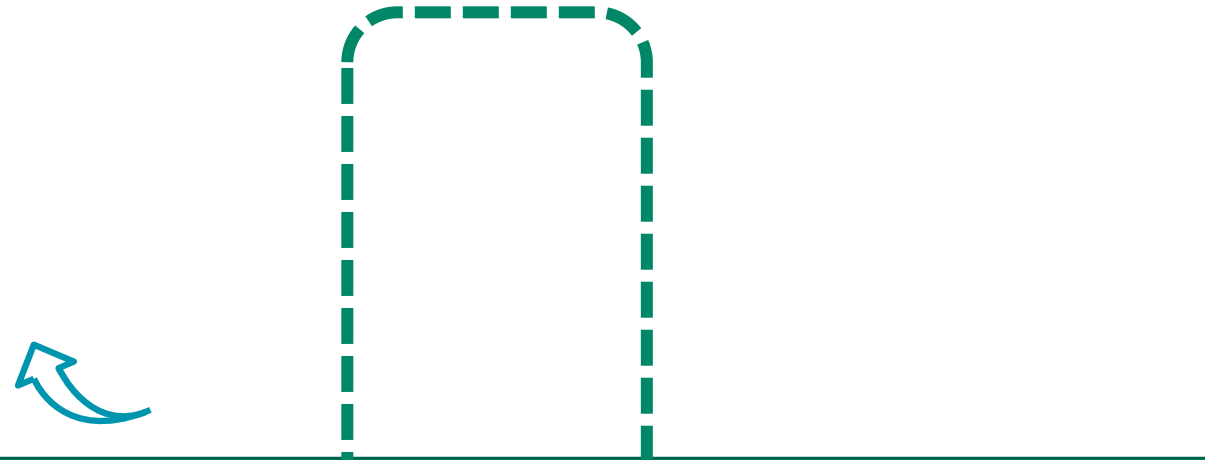
WEST

SOUTH

EAST

The Student Centre, UCL, London

- Mainly circulation areas
- Atrium, staircases,
- Rooflight orientated to the east
- Controlled cross ventilation strategy



Copyright only for a live/video recording version and not for pdf

22 Gordon Street, Bartlett School of Architecture

- deep refurbishment
- BREEAM 'Excellent'
- 30% CO₂ reduction over Part L 2010
- Multi-awarded building i.e. CIBSE's Retrofit Project of the Year 2020

Assessed against



for this study

Copyright only for a live/video recording version and not for pdf

22 Gordon Street, Bartlett School of Architecture

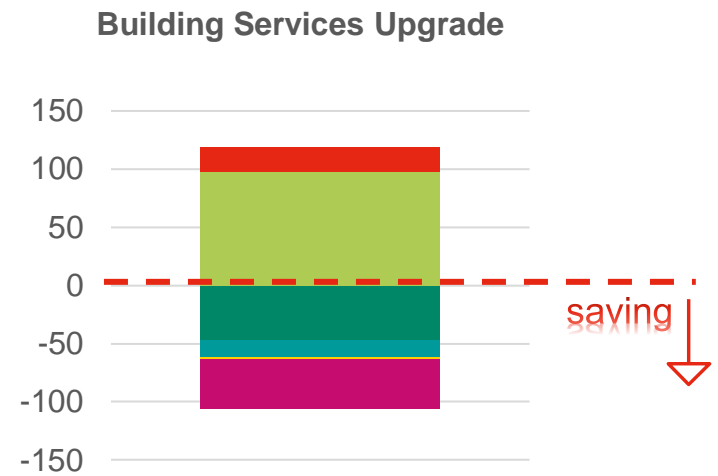
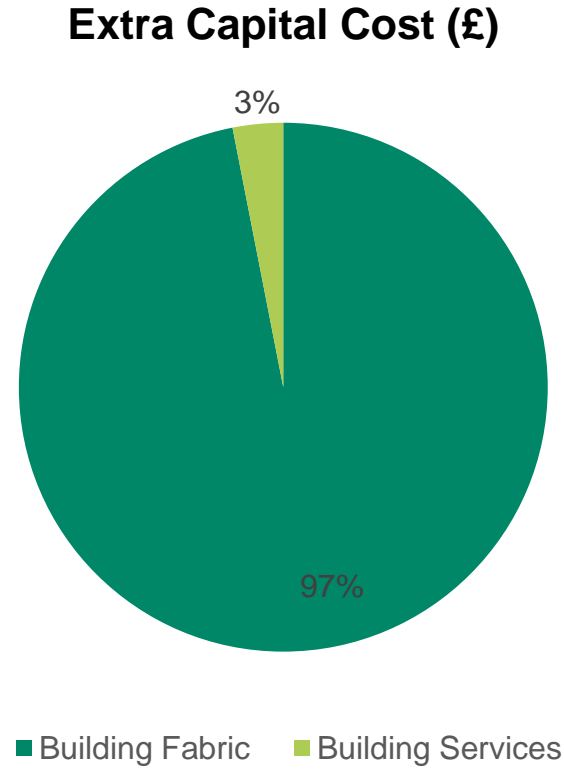
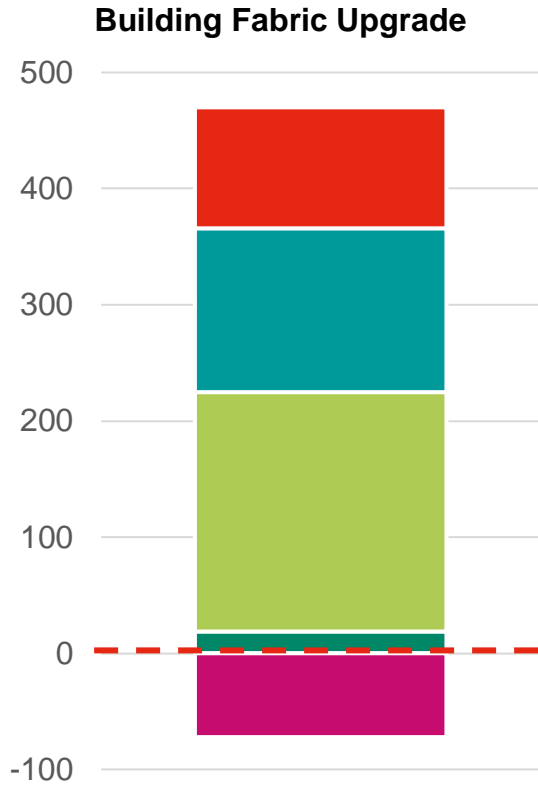
- New thermal envelope
- Low operational energy based on Post Occupancy Evaluation
- Efficient space use
- Efficient services distribution

Copyright only for a live/video recording version and not for pdf

Results

Design Alterations
Impact on Capital Cost

Capital Cost breakdown related to Passivhaus for the Student Centre



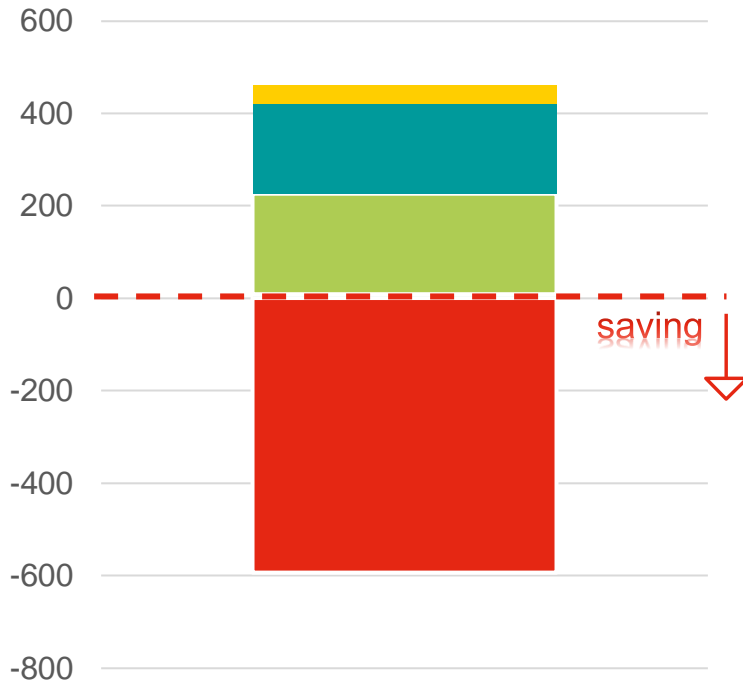
- Revolving doors replacement
- Preliminaries
- Triple Glazing/Curtain Walling
- External Wall Insulation
- Atrium & Roof Insulation

- Heating Load reduction
- AHU alterations
- MVHR replacement
- Toilet Extract alteration

Capital Cost breakdown related to Passivhaus for the 22 Gordon Street

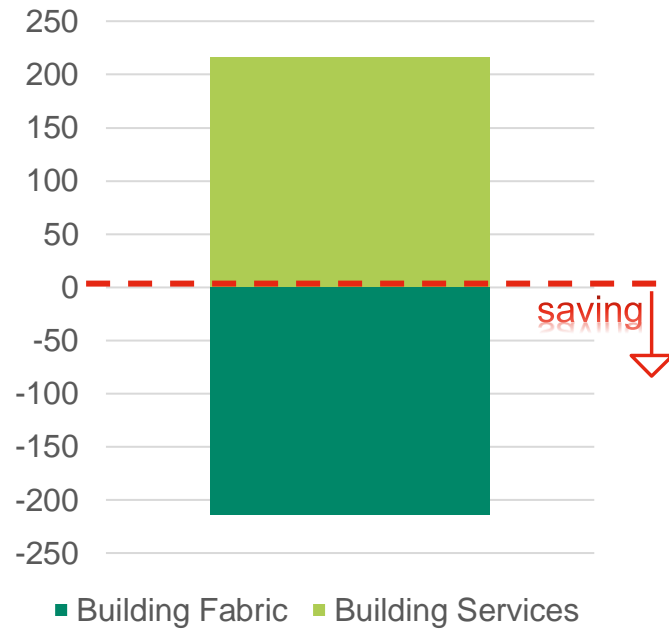


Building Fabric Upgrade



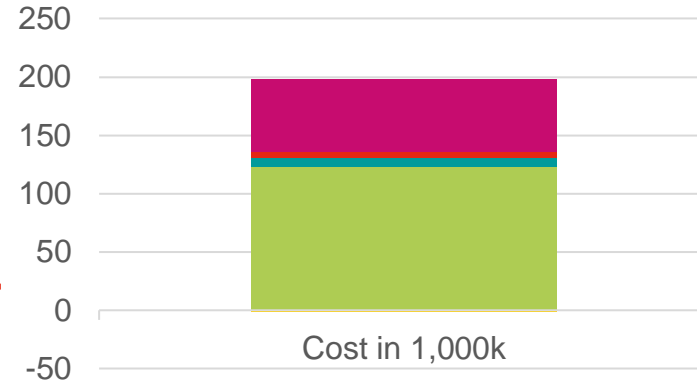
- Window Area reduction
- Preliminaries
- Triple Glazing
- External Wall Insulation
- Exposed floor insulation

Total Capital Cost Breakdown



- Building Fabric
- Building Services

Building Services Upgrade



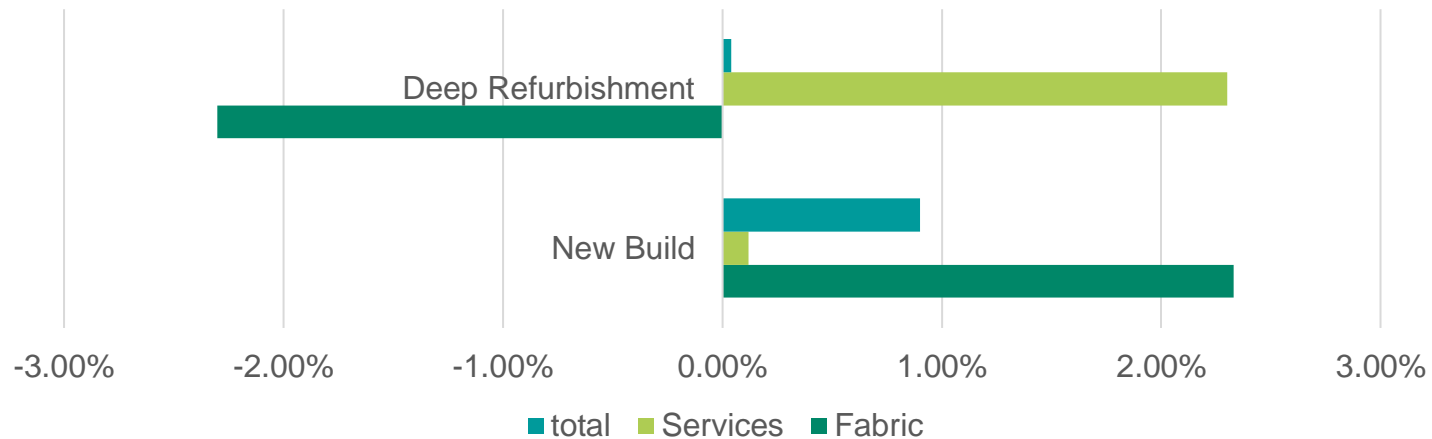
- Preliminaries
- Testing and Commissioning
- DHW plate heat exchanger
- flow restrictors addition
- AHU upgrade to PH certified
- AHU duct insulation

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%



Capital Cost for Passivhaus/EnerPHit



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?

Contact details

Evangelia Mitsiakou, Msc, MArch (ARB Qualified), Passivhaus Designer
Senior Sustainability Consultant, OCD & ND Energy Assessor, DEA Retrofit Assessor
Buildings & Places, UKI
M +44 (0) 7552 982 222
evangelia.mitsiakou@aecom.com

AECOM Delivering a
better world



UCL