

NLA Retrofit Conference

Upskilling the Sector



LETI Guide







Download

www.leti.london/retrofit







PDP | LDN

Theory





➤ SIGNPOST Chapter 3 - Where are we now and what can we achieve?

Practice

SIGNPOST Chapter 4 - LETI home retrofit targets

SIGNPOST Chapter 5 - How do we do it?

SIGNPOST Chapter 6 - Case studies















PDP

Retrofit quick start guide





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Principle 6: (remote his performance)



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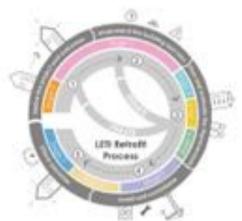
Make a whole house Retrofit Plan and follow the LETI Retrofit Process



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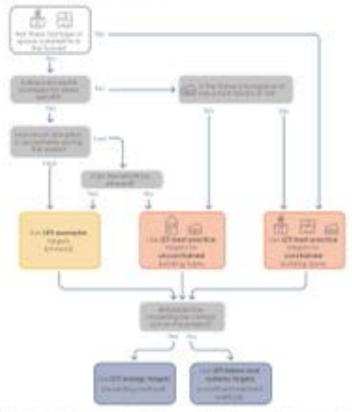
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PDP

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(Se) LETI retrofit fabric and system largets (constituent element method)

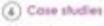
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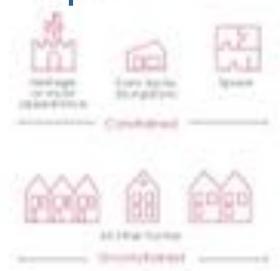
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Two depths of retrofit



LETI Best Practice

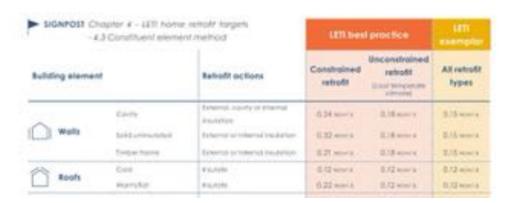
- Constrained
- Unconstrained

LETI Exemplar

Two Approaches



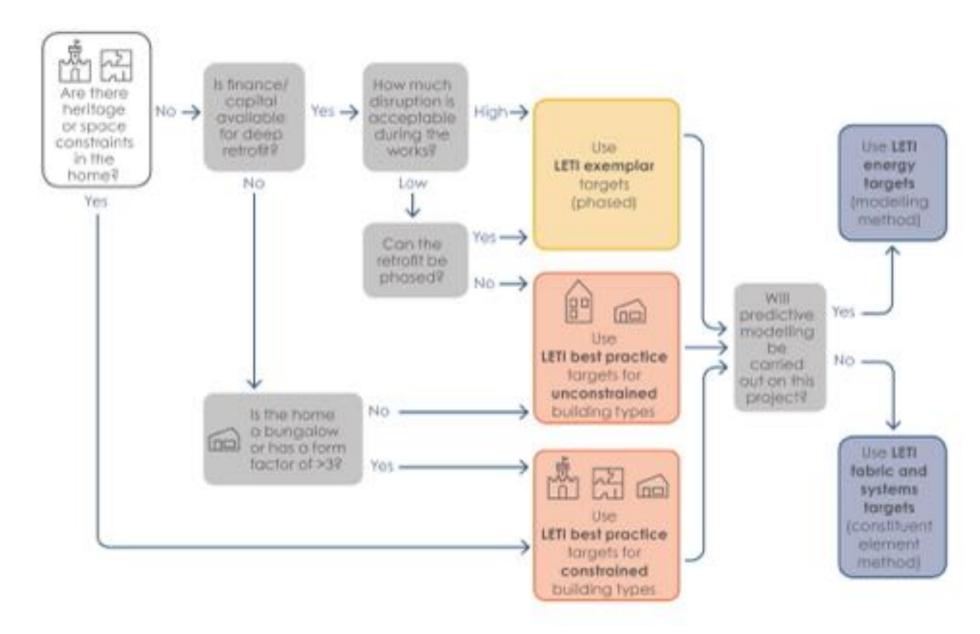
Energy Targets (Modelling method)



Fabric and systems targets (Constituent element method)



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How can you help?



Donate time:

Join our new retrofit workstreams

Retrofit Part 2: HOW DEEP, FOR HOW MANY, AT WHAT COST? - NOV 21

Retrofit Part 3: NON- DOMESTIC - JAN 22

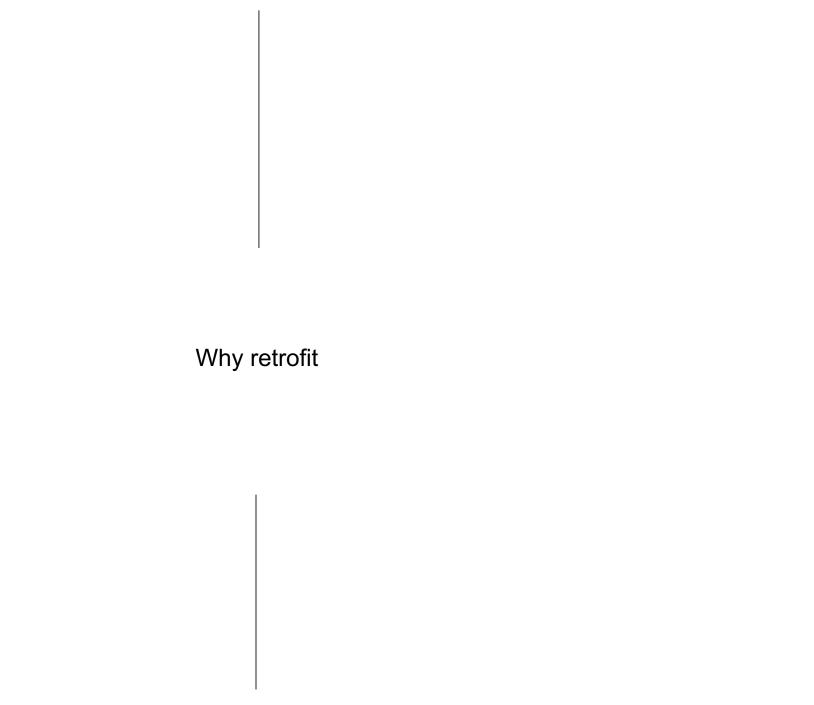
www.leti/london/retrofit



Donate money:

Keep LETI moving Raise £25k

£50 - individual donations £500 - organisational donations www.leti/london/donate







Definition of Retrofit



"Retrofit is the upgrading of a building to enable it to respond to the imperative of climate change."

Marion Baeli, Residential Retrofit 20 Retrofit Case Studies, London: RIBA Publishing 2013

- Reduce carbon emissions
- Adapt for climate change





The Climate Emergency

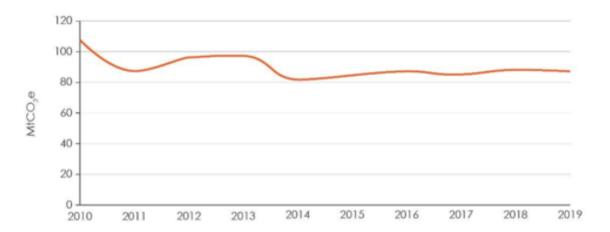


Figure 1.3 - Total annual emissions from UK buildings, 2010 to 2019, in NtCO_e. Source: UKCCC, Progress Report to Parliament, June 2020



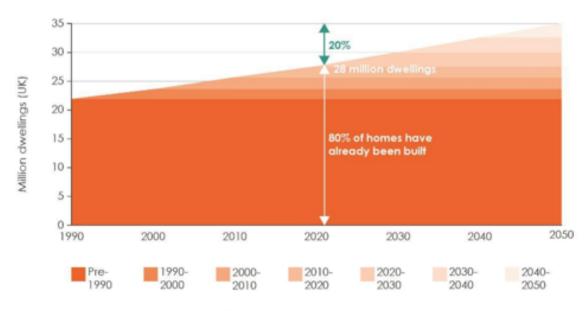


Figure 1.4 - Millions of dwellings built in the UK from pre-1990 to 2050. Note: demolition has been ignored in this table as the relatively small amount of domestic demolition is usually followed with replacement.





Broader Benefits of Retrofit



Energy bills & Fuel Poverty

1kWh of electricity = 4 x 1kWh of gas 3.3m UK homes in fuel poverty

Energy infrastructure costs

1kWh saved = 1kWh we don't need to produce

Energy capacity

Winter peak heat demand = 3x peak electricity supply

Energy security

Global energy supply & shocks



Health & IAQ

1m homes have serious damp

1 in 5 UK children carry inhalers

Health & Cold Homes

1m homes are unhealthily cold and contribute to 10,000 winter excess deaths

Fire

1m homes have significantly higher than average risk of fire

Resilience

2020 - 1 in 6 homes at risk of flooding 2050 - 1 in 3 homes at risk of flooding

Economy

CLC: 500,000 new jobs in retrofit by 2030

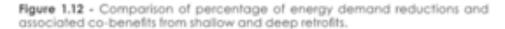
How far should retrofit go?





Deep retrofit

- → Reduced carbon emissions
- Reduced renewable energy demand
- → Reduced peak load
- Less grid storage required
- → Significantly lower energy bills
- Improved health and comfort
- → Effective heat pumps





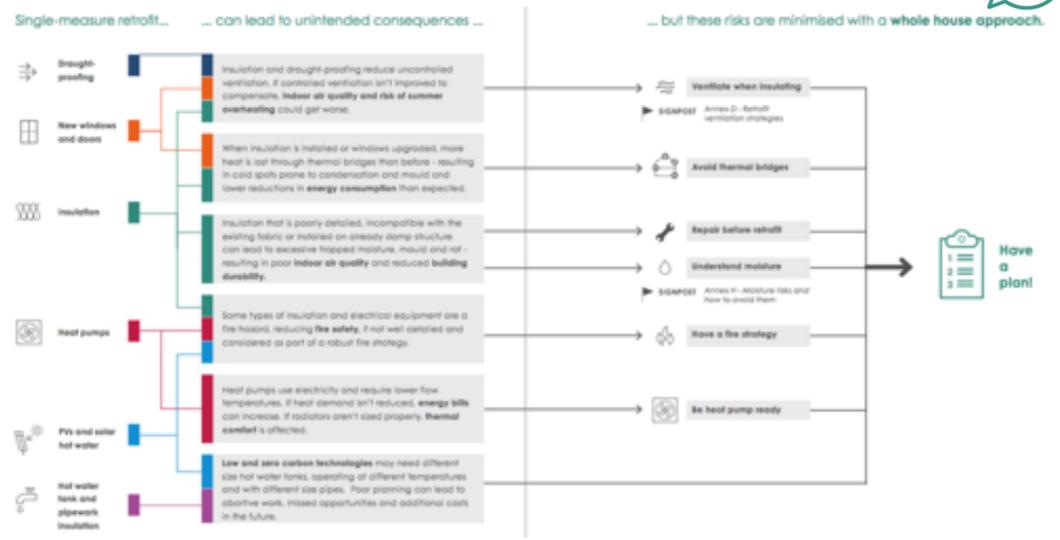
Shallow retrofit

- → Reduced carbon emissions
- Large renewable demand
- → Large peak demand
- More grid storage required
- Little change in energy bills
- → Limited health benefits
- Sub-optimal heat pump performance



Risks of Retrofit









Principles of Good Retrofit

Use the six key principles to good retrofit



Principle 1: Reduce energy consumption



Principle 2: Prioritise occupant and building health



Principle 3: Have a whole building Retrofit Plan



Principle 4: Measure the performance



Principle 5: Think big!



Principle 6: Consider embodied carbon

Tailor the retrofit to the property type

Determine whether the home is constrained or unconstrained:



Form factor (bungalow)



Space

Constrained



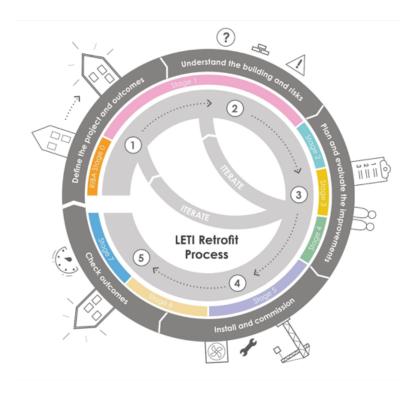


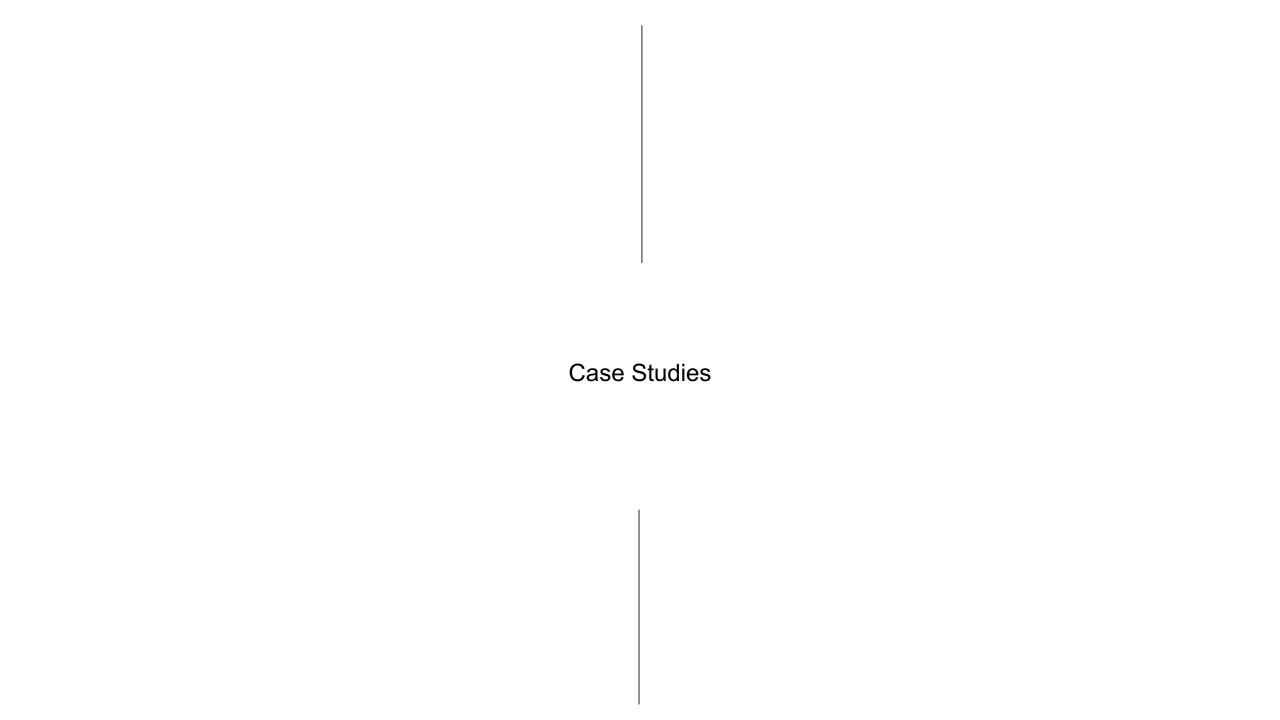
All other homes

Unconstrained



Make a whole house Retrofit Plan and follow the **LETI Retrofit Process**





Princedale Road

Victorian terraced house
Conservation area
Social housing
Retrofit for the Future



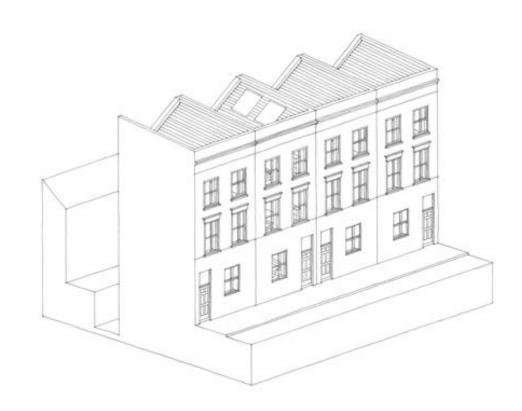
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Princedale Road

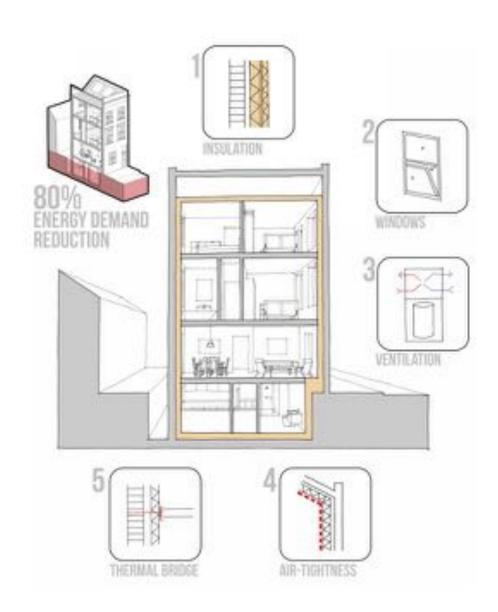
Key principles

- 1. Insulate
- 2. Upgrade the windows
- 3. Ventilate
- 4. Make it all draft-proof airtight
- 5. Address cold bridges



Princedale Road

Key principles



Princedale Road

Prototyping





Princedale Road

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Princedale Road

Fabric:

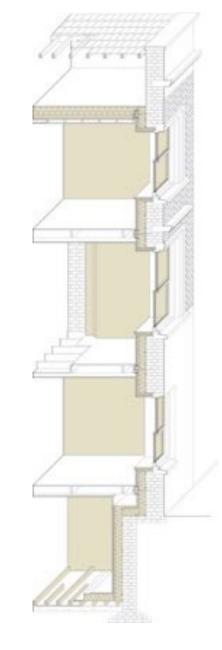
- Continuous internal insulation
- Triple glazing
- No cold bridges (joist ends detached)

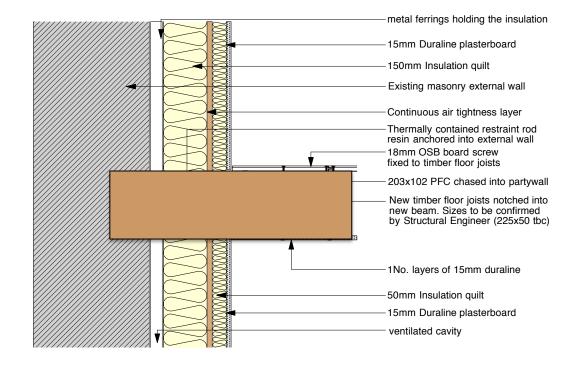
Services:

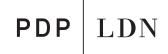
- MVHR (Genvex Combi)
- Solar thermal
- Below ground heat exchanger

Airtightness

0.34 m3/m2h@50Pa



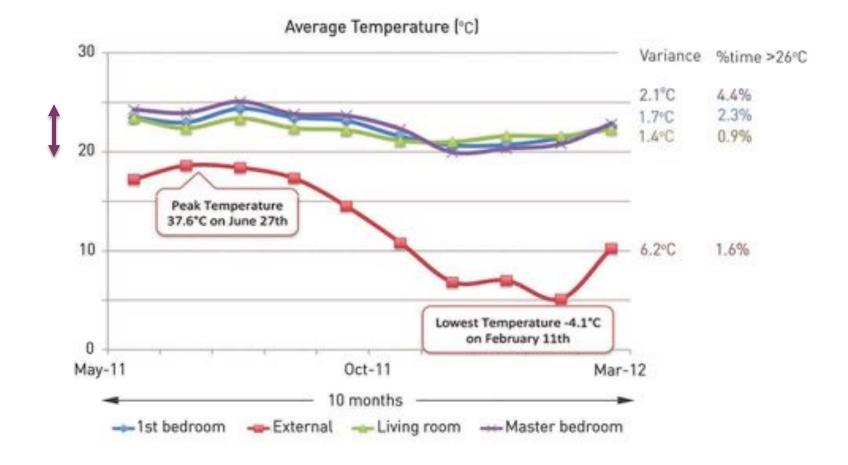




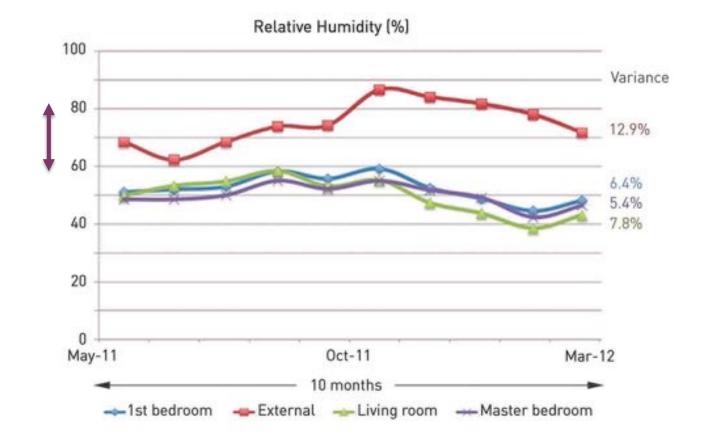
Princedale Road

Vital statistics table						
Characteristics	Before	Target	Measured			
Primary energy (kWh/m²/yr)	250	120	128			
Space heating (kWh/m²/yr)	120	15	10			
Airtightness (m³/m²h (d 50 Pa)	_	0.6	0.34			
Type of glazing	single	triple	triple			
CO ₂ emissions (kg CO ₂ /m²/yr)	70	17	20			

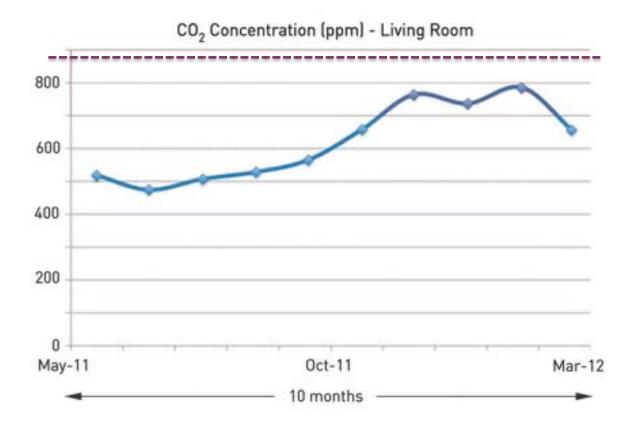
Princedale Road



Princedale Road



Princedale Road



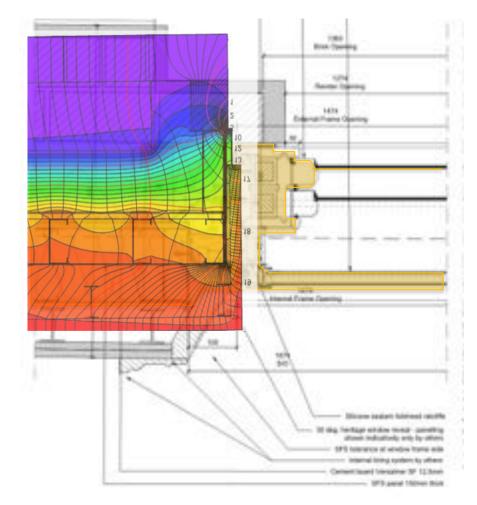
Regent's Crescent

Grade I listed Designed by John Nash



Regent's Crescent

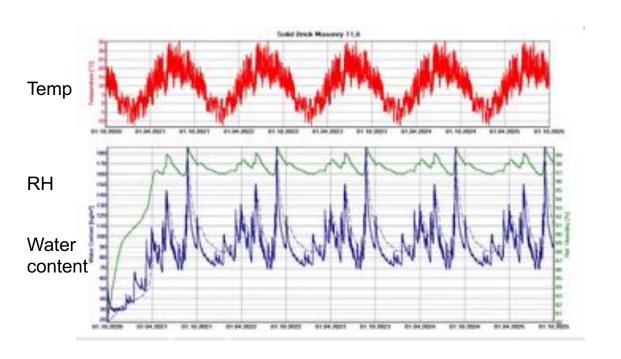
Building Physics – Thermal bridges - **THERM**





Regent's Crescent

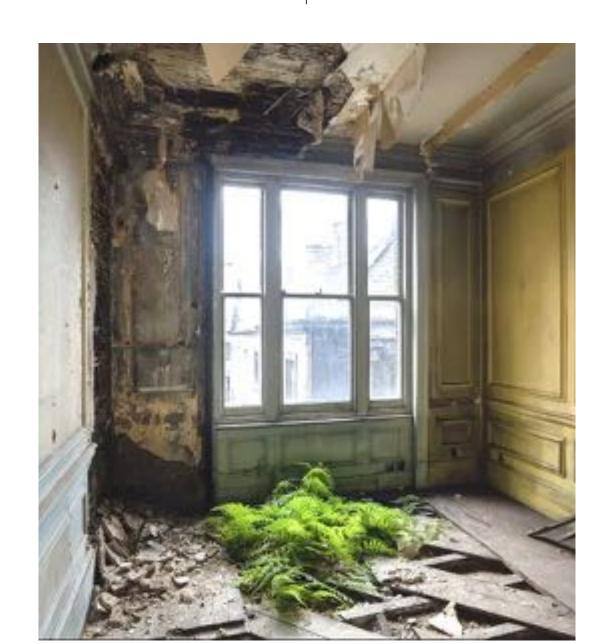
Building Physics – Moisture content - **WUFI**





Cambridge House Hotel

Grade I listed Grade II listed



Cambridge House Hotel

Grade I listed Grade II listed





Cambridge House Hotel

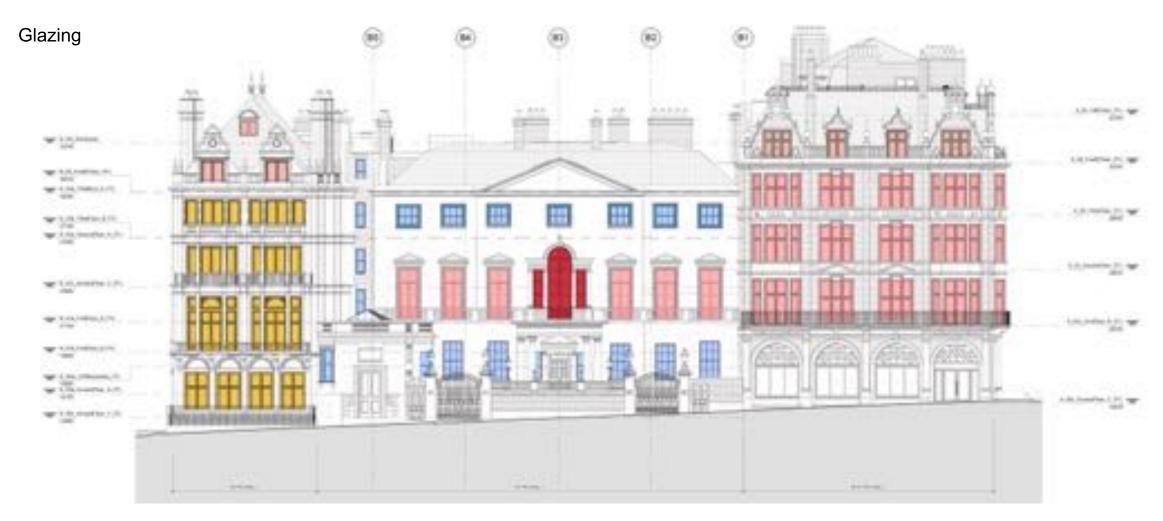
Cambridge House

Heritage



Cambridge House Hotel

Cambridge House

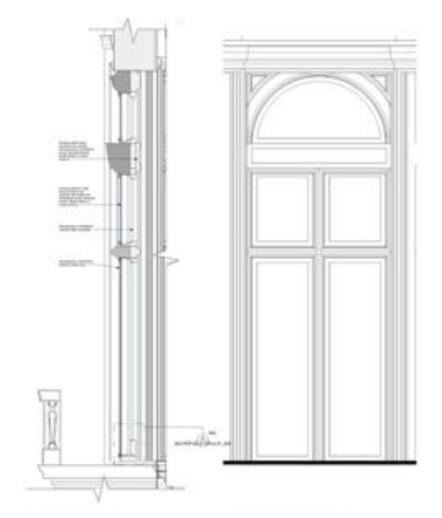


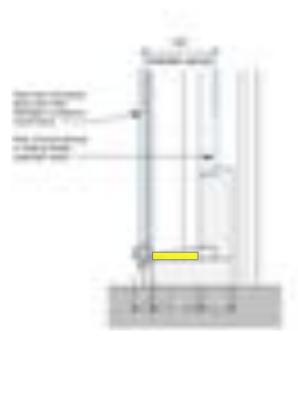
Cambridge House Hotel

Cambridge House

Secondary glazing







Secondary Glazing

Vacuum glass panes



LANDVAC - 0.5w/m2k



FINEO - 0.7w/m2k

Internal wall insulation

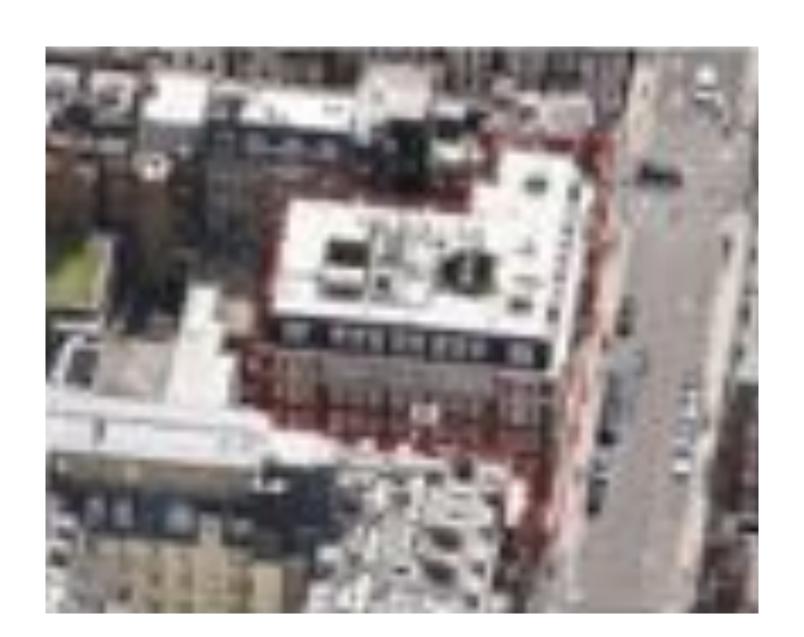
Non-flammable - obligations

- Thermablock
- Rockwool
- Diathonite
- Dritherm
- Calsitherm
- Spacetherm
- Icynene
- Calostat

Details Insulation type	Glass Minera	d Milesof	Mineral Woo		Lime, cork	Lime, cork	Calcium	Aerogel		Polyurethan	Amorphous
insulation type	Glass Minera	ii wooi	Morner at 4900		and clay	and clay/ Catcium silicate	silicate board	Aerogei		e e	synthetic silicone dioxide
Insulation manufacturer	Knauf		Rockwool		Diasen	Dissen/ Cals/therm	Calsitherm	Thermablok.	ProctorGrou p	Icynene	Evonik
Insulation product	Dritherm 32	Dritherm 37	Rockwool RWS	Rockwool Duoslab	Disthonts	Diathonite w/ Calsithern	Calsisherm	Thermaslim	Spacetherm Sientex	Icynena	Calostat Pad
	-	-						STATE OF THE PARTY	9	1	
Third Party Certification	BBA 95/3212	BBA 95/3212		88A				88A 16/5290		NFPA285	BCEMT
Installation	Between metal studs (70 i 70)	Detween metal stude (70 l 70)	Between Simber studs	Direct to wall- mechanical fixing (mushroom plates)	Direct to wall- spray or hand applied	- Cirect to wall spray or hand applied/ adhesive morter		Direct to well- mechanical fixing (mushroom plates)	Between metal stude (70 i 70)	Direct to well - spray applied	Between metal studs (70 l 70)
Drying time	N/A	NA	N/A	N/A	c.2mm/ day	District Control	N/A	NA	NA	Negligible	N/A
Cavity venting requirements (2ACH) 25mm cavity; weephales top and bottom at 1m centres	Weepholes	Weepholes	TBA with WUFI	Not required	Not required	Not required	TBA by WUFI	TBA by WUFI	TBA by WUFI	Not required	Weepholes
Performance											
Reaction to Fire (BS EN 13601-1)	At	At	TAT	IA1	IA2	A2-91, d0/A1	AT	A2-s1. d0	A2-s1, d0		A2-s1, d0
Thermal Conductivity (A)	0.032 W/mK	0.037 Vivres	0.034 Vermi	0.035 W/mK	0.045 W/mx	-	0.059 Wimk	0.018 WINK	0.015 W/mK	0.038 WIMK	0.019 Wink
Thickness to achieve 0.3 Wim ² K (assumes solid mesonry wall, 345mm London Stock brick)	85mm	85mm	100mm	75mm	90mm	titjenn (60mm/ 50mm)	Somm	SOmm	50mm	100mm	Somm
Vapour resistance (µ)	1	1	1	1.18	4	2 7 7 7 7	3.	60	5	3.3	5
	1111						20				
Case studues	1890	1890	Tenne		2065	1890	_			1674	1890
Project Vapour Control Layer	intallo	intello	2082 Tyvek	None	None.	None	None	TBA	TBA	Tyvek	Tyvek
reposit Control Cayer		-	Refective		-	14014	-	100	1 BA	Reflective	Reflective
Psi Value calculation complete	No	Yes	No	No	Na	No	No	No	Yes	No	Yes
BuildDesk calculation complete	Yes	Yes	Yes	Yes (Condensatio n dries in summer)	Yes	No	No	Yes	Yes	Yes	Yes
WUFI calculation complete	Yes	Yes	No.	No	Yes	Yes	No	No	740	Yes	Yes
Teperature factor (typical Frsi)	0.924	138	1985	0.9	0.928	0.925	N/A.	0.927	0.94	0.924	0.924
Embodied energy	TBA	TBA.	TBA.	TBA	TBA	TBA	TBA	TBA	TBA	TBA	TBA
Cost (supply and install)	£26 sm	¢26 sm	TBA	TBA	£78 sm.	TBA	TBA	TBA	TBA	TBA	£252 sm TB0
Availability	Good	Good	Good	Good	Medium	Medium	Medium	Medium	Low	Medium	Medium

Claridge House

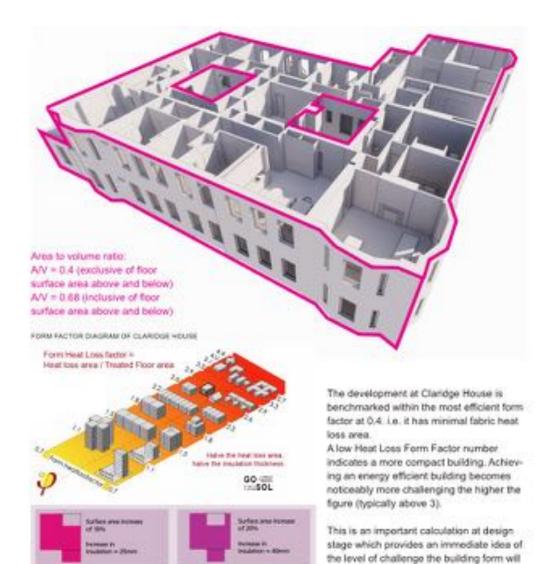
How to 'ZERO'



Special Street, and other party

Claridge House

Form factor



Specification and relations

give the project.



Claridge House

Client brief

Electrification of space heating





Page 9: Our carbon emissions forecast

Energy use in buildings (Scope 1, Scope 2 and Scope 3: Energy use by tenants)

Our net zero carbon pathway shows the impacts of reducing energy use intensity in each of our assets to comply with the more stretching of a) the CRREM 2030 EUI benchmarks for the relevant country and asset type or b) the net zero carbon definition set by the local Green Building Council or local regulation in the relevant country of applicables Further to this, our pathway assumes that all emissions from natural gas and oil (i.e. Scope 1 emissions) will be eliminated by 2030 through the electrification of heating systems or use of geothermal/district heat networks.

Claridge House

Client brief

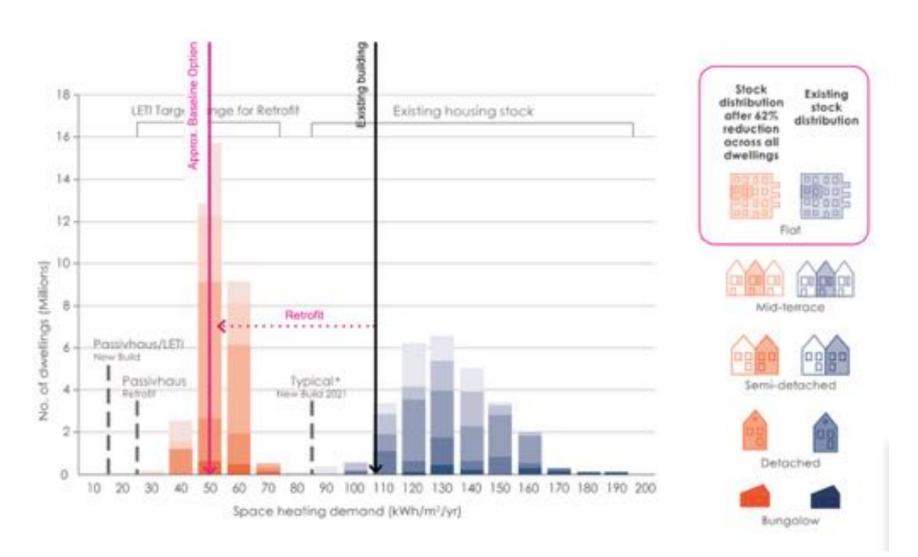
		(Market)	Our Existing Buildings 2020-2025	CALLES AND
Offices >1,000m²	Base building energy	NABERS UK star rating	4.5	5
Retail >250m ² and other non-residential >1000m ²	Whole building energy	DEC	D90	C65
Retail<250m ² and other non-residential <1000m ²				
- Cafes	Whole building energy	kWhe/m² (GIA)	389	280
- Clubs	Whole building energy	KWhelmi (GIA)	140	100
Fitness club/Gym	Whole building energy	kWhe(m² (GIA)	165	119
Hairdressers & beauty salons	Whole building energy	kWhu/m² (GIA)	289	208
- Hotels	Whole building energy	kWhe/m² (G/A)	213	153
Large non-food shops	Whole building energy	kWhorm ² (GIA)	132	95
- Offices	Whole building energy	kWhe/m² (GIA)	130	90
- Pubs	Whole building energy	kWhe/m² (SIA)	242	174
Restaurants & takeaways	Whole building energy	kWherer (GIA)	771	554
Showrooms	Whole building energy	Whelst (SIA)	105	75
- Small non-food shops	Whole building energy	XWherm* (SIA)	82	59



pre-retrofit **EUI 233**post retrofit **EUI 68**

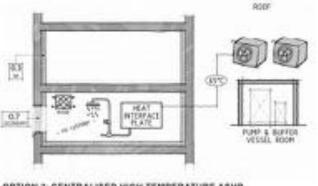
Claridge House

Context

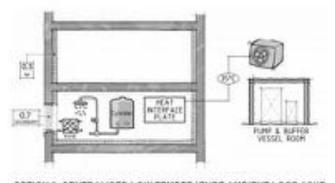


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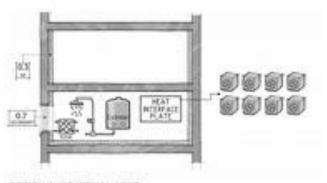
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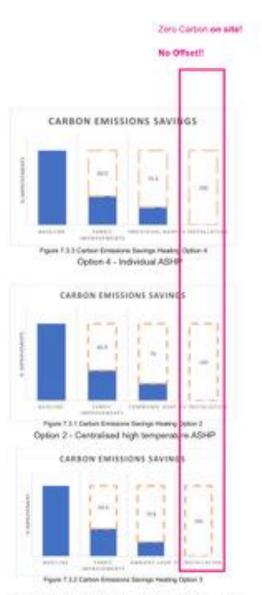
OPTION 2: CENTRALISED HIGH TEMPERATURE ASHP



OPTION 3: CENTRALISED LOW TEMPERATURE AMBIENT LOOP ASHP

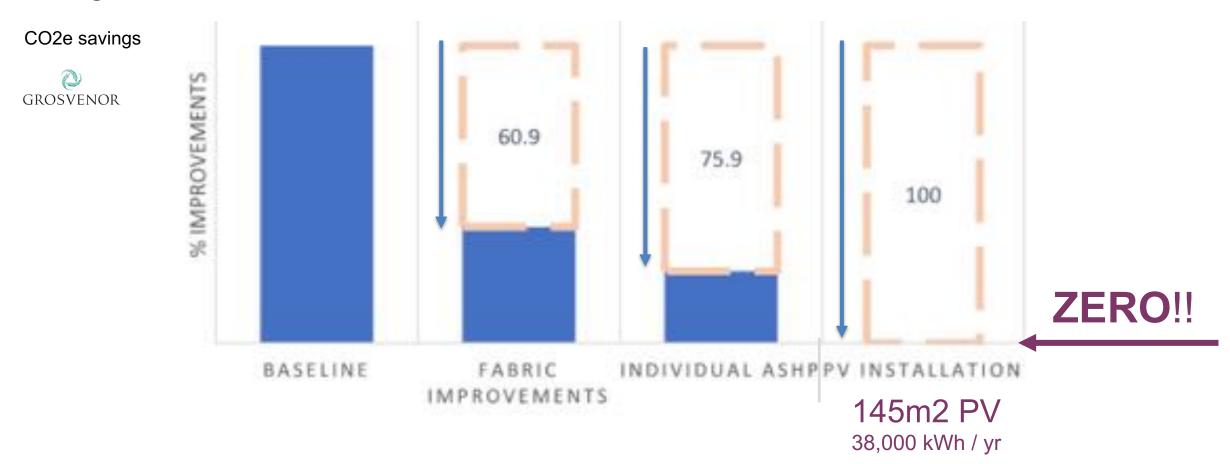


OPTION 4: INDIVIDUAL ASHP



Option 3 - Centralised low temperature Ambient loop ASHP

Claridge House



ZERO emissions - **ZERO** offset

Training &
Key publications

PAS 2035 whole building approach















Training required

Make Retrofit real to people

Showing what a good retrofit looks like.

Addresses:

- Awareness gap carbon literacy
- o Knowledge gap where do you start?
- Skills gap who can do?

LONDON
ENERGY
TRANSFORMATION
I NITIATIVE

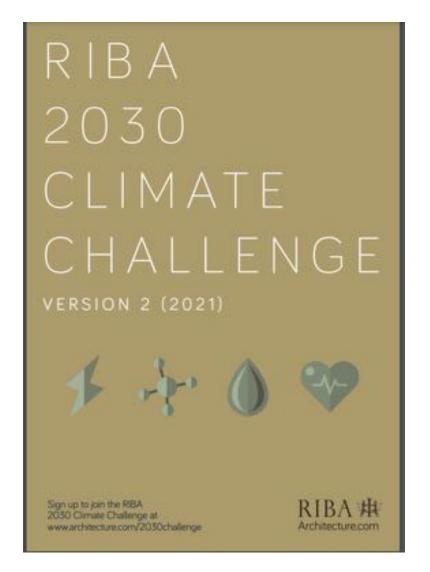
GLA Guidance to come in Sept



Guidance: LETI Retrofit Guide

RIBA 2030 Climate Challenge target metrics	s for domestic	/ residential
--	----------------	---------------

RIBA Sustainable Outcome Metrics	Business as usual (new bald, compliance approach)	2025 Targets	2030 Targets	Notes
Operational Energy / kWh/m²/y	120 kWh/m²/y	< 60 kWh/m²/y	< 35 kWb/m²/y	Targets based on GIA Figures include regulated & unregulated energy consumption irrespective of source [grid/renewables]
				BAU based on median all electric across housing typologies in CIBSE benchmarking tool.
				Use a Yabric First approach Minimise energy demand Use efficient services and low carbon heat Maximise onsite renewables.
Embodied Carbon kgCO _J e/m²	1200 kgCO _x e/m²	< 800 kgCOje/m²	< 625 kgCO ₃ e/m²	Use RICS Whole Life Cerbon (modules A1-A5, 81-85, C1-C4 incl sequestration). Analysis should include minerum of 95% of cost, include substructure, superstructure, finishes, fixed FF&E, building services and associated refrigerant leakage.
				Whole Life Carbon Analysis Use circular economy strateges Minimise offsetting & use as last resort. Use accredited, verifiable achieving (see checklist).
				BAU aligned with LETI band £ 2025 target aligned with LETI band C and 2030 target aligned with LETI band B
Potable Water Use Litres/person/day	125 l/p/day (Building Regulations England and Wales)	< 95 l/p/day	<751/p/day	CIBSE Guide G.



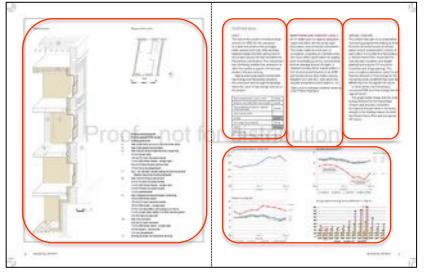
Guidance: RIBA 2030 Climate Challenge



Content:

- ID card + summary of measures
- Description of each strategy
- Vital statistics
- Detailed isometric section
- Costs (material & labour)
- Monitoring data:Energy & Internal comfort
- Special feature





Retrofit Coordinator – PAS 2035

PAS 2035 requires that all domestic retrofit projects incorporate a Retrofit Coordinator whose job is to oversee the management and design of all retrofit measures. To carry out this vital role, it is necessary for Retrofit Coordinators to attain the Level 5 Diploma in Retrofit Coordination and Risk Management.



Guidance: Retrofit Academy



Train 'en masse': PDP London Low Carbon Retrofitters