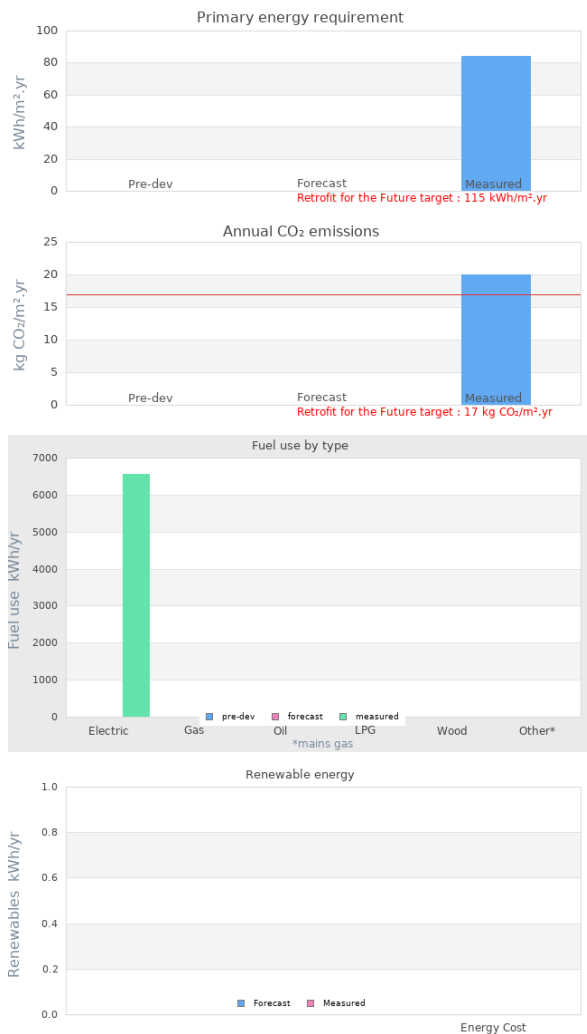


Project name Clapham Townhouse Retrofit

Project summary A complete refurbishment and retrofit of a Victorian cottage. This end of terrace house was extended and retrofitted to provide an exemplar development in energy efficiency and a test bed for various types of renewable technologies. Key to the success was a strategy of creating a thermally efficient and air tight building, coupled with an MVHR system to control ventilation and internal humidity.



Project Description

Projected build start date	08 Mar 2011
Projected date of occupation	23 Jun 2013
Project stage	Occupied
Project location	London, London, England
Energy target	Retrofit for the Future
Build type	Mixed
Building sector	Private Residential
Property type	End Terrace
Existing external wall construction	Solid Brick
Existing external wall additional information	

Existing party wall construction

Floor area	180 m ²
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Floor area calculation method	SAP
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Project team

Organisation	Granit
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Project lead	James Munro
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Client	Robert Wilson
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Architect	James Munro
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Mechanical & electrical consultant(s)	Granit
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Energy consultant(s)	Responsible Energy Management (REM)
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Structural engineer	Mitchinson Macken
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Quantity surveyor	N/A
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Other consultant	
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Contractor	Best Place 4u Ltd
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Design strategies

Planned occupancy	Designed for a family of 4.
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Space heating strategy	Underfloor heating through out linked to solar thermal store and integrated gas boiler back up.
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Water heating strategy	Solar thermal store connected to solar panels on south-west facing roof and integrated gas boiler back up.
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Fuel strategy	Mains gas. Mains electricity.
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Renewable energy generation strategy	N/A
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Passive solar strategy	N/A
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Space cooling strategy	Majority of glazing to North and North East Elevations to reduce solar gain and over heating potential. Large thermal mass and
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Daylighting strategy	Large expanse of glazing to rear of main house and rear/side extension. rooflight above internal shower room.
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Ventilation strategy	Whole house mechanical extract ventilation.
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Airtightness strategy	All penetrations on the fabric sealed. All plaster boards taped and sealed before skimming.
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Strategy for minimising thermal bridges	2m overlap of internal and external insulation at junctions.
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Modelling strategy	Sun path modelling used in Archicad to establish potential for overheating and solar heating.
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Insulation strategy

Application of EWI to all new solid and existing flank walls, IWI used on front elevation where historic details could not be altered. Warm roof construction to new roofs.

Other relevant retrofit strategies

Other information (constraints or opportunities influencing project design or outcomes)

Property is in a conservation area.

Energy use

Fuel use by type (kWh/yr)

Fuel	previous	forecast	measured
Electric			6051
Gas			13
Oil			
LPG			
Wood			
mains gas			

Primary energy requirement & CO2 emissions

	previous	forecast	measured
Annual CO2 emissions (kg CO2/m ² .yr)	-	-	20
Primary energy requirement (kWh/m ² .yr)	-	-	84

Renewable energy (kWh/yr)

Renewables technology	forecast	measured
-		
-		
Energy consumed by generation		

Airtightness (m³/m².hr @ 50 Pascals)

	Date of test	Test result
Pre-development airtightness	-	-
Final airtightness	02 Jul 2013	3.54

Annual space heat demand (kWh/m².yr)

	Pre-development	forecast	measured
Space heat demand	290	200	78.58

Whole house energy calculation method

SAP Extension for Whole House

Other energy calculation method

Predicted annual heating load

-

Other energy target(s)

Building services

Occupancy	Single occupier and dog, plus guests
Space heating	Underfloor heating
Hot water	A gas condensing boiler, combined with a thermal store known as a GasSolarUnit combination (supplied by Rotex / RER) is topped up from solar panels fitted to the South facing front roof.
Ventilation	A high level of air tightness was targeted during the design and construction phases, to ensure the effectiveness of the MVHR system supplied by Air ow Ltd. All vents including trickle vents were omitted from the external fabric, and openings (i.e. windows and doors) were specified with air tightness in mind
Controls	
Cooking	Induction hob and oven
Lighting	100% low energy LED lighting
Appliances	
Renewables	A gas condensing boiler, combined with a thermal store known as a GasSolarUnit combination (supplied by Rotex / RER) is topped up from solar panels fitted to the South facing front roof. This provides all of the space heating and hot water demand for the house. Under floor heating was used on all floors, with timber or tiled floors to ensure thermal efficiency and comfort.

Strategy for minimising thermal bridges

Building construction

Storeys	3
Volume	450m ³
Thermal fabric area	235m ²
Roof description	The 2 roofs were highly insulated. New pitched roof consisting of eternit tiles with 150mm Celotex XR4000 between joists and 25mm Celotex PL4000 below joists. U value of 0.12 W/MsqK New flat roof constructed of Green roof system on GRP, on 126mm Celotex TD4000. U value of 0.16 W/ MsqK
Roof U-value	0.12W/m ² K

Walls description	The front elevation was left intact on the 2 lower floors, with a new front wall built in solid wall construction above. All existing solid brick walls were insulated internally with 60mm Celotex PL4000, built on battens to create 30mm void. Then 12.5mm taped plasterboard. U Value of 0.29 0W/MsqK All new walls were built in solid blockwork and insulated externally with 70mm Phenolic Weber Therm XP External wall insulation system. U value of 0.29 W/MsqK
Walls U-value	0.29W/m ² K
Party walls description	insulated externally with 70mm Phenolic Weber Therm XP External wall insulation system
Party walls U-value	0.30W/m ² K
Floor description	Ground floor was 100% renewed with 75mm Celotex FF4075 insulation under new 120mm concrete slabs. U Value of 0.21 W/MsqK
Floor U-value	0.21W/m ² K
Glazed doors description	New casement and feature glazing, Thermally broken Aluminium framed system with Triple glazing (Lumax system) U value of 1.9 W/MsqK
Glazed doors U-value	1.90W/m ² K installed
Opaque doors description	
Opaque doors U-value	uninstalled
Windows description	New sash windows, double glazed 24mm SoftCoast Argon heat film achieving an overall U value of 1.8W/MsqK
Windows U-value	1.80W/m ² K installed
Windows energy transmittance (G-value)	
Windows light transmittance	
Rooflights description	
Rooflights light transmittance	
Rooflights U-value	2.20W/m ² K installed

Project images



















