

Low Carbon Case Study

Tree House, Clapham, London

The Design

Inspired by the sycamore tree which occupies much of the site, Will Anderson's Tree House demonstrates how environmental considerations of energy, materials and water need not impact on the quality of life for the occupants.

Energy

Designed to be self-sufficient in energy across a year, not autonomous as surplus electricity from the PV array is exported to the grid, and bought back as required.

Materials

Predominantly built with building materials of a very low environmental impact, including extensive finishes in wood (sustainably sourced), Cumbrian slate and natural paints. Reclaimed and recycled materials include the teak flooring, brick garden walls, plastic roof tiles and newspaper wall insulation. Concrete was used for ground works – necessary to stabilise the sloping site which was very close to other houses and nestled amongst tree roots!

Water

Efficient taps and showers, ultra-low flush toilets, appliances with excellent water efficiency and short pipe runs for hot taps. Rainwater is stored underground and is pumped out to replenish the pond and water the garden.

Design Summary

Built form	Detached 3 storey house, built 2005, total floor area 124m ²
U-values (W/m ² K)	Solid ground floor 0.1
	Timber frame walls 0.18
	Main monopitch roof 0.13
	Small timber flat roof 0.2
	Triple glazing (low E) 1.2
Air permeability rate	3.4 m ³ /hm ² (@ 50Pa)
Heating system	Main: Ground source heat pump
	Secondary: None
	Water heating: From main heating, 260 litre combined solar store, 60mm spray foam insulation
Ventilation system	Mech vent with high efficiency (90%) heat recovery
Renewables	PV array 5kWp
	Solar thermal flat plate 4.4 sq m
Thermal bridging	Accredited construction details (y-value 0.08)



“self-sufficient
in energy
across a year”



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Results

TER ¹	35.26	
DER	-4.84	Adjusted DER -0.33 (4.51 added to allow for cooking and appliances emissions as per Code element Ene 1. 114% improvement over the TER)
HLP	1.34	
SAP	98	Band A
NHER	14.1	Predicted annual running costs ² are -£125 (including lights, cooking and appliances) i.e. a net income over the year.
Code Level	5	Although Tree House does meet the emissions target for Level 6 Zero Carbon ³ the HLP does not meet the required level.

¹ Tree House saves 4.4 tonnes of carbon dioxide per year, over and above that required by the current building regulations (2006).

² Will has negotiated a parity agreement for exported electricity to be credited at the same rate at which he buys it in. This is estimated to cause a difference of £370/annum to the running cost produced by the software (£244/annum), so Tree House is predicted to generate enough electricity to provide an income of around £125/annum.

³ Carbon emissions are low enough to satisfy Code Level 6 but the Heat Loss Parameter is 1.34 and this must be <=0.8 for Level 6 "Zero Carbon Home" definition to be achieved. The definition is in the Code for Sustainable Homes Technical Guide (March 2007) Criterion Ene 1.

All figures calculated using NHER Plan Assessor v3.0 (September 2007).

Comments/Experiences

Will has no regrets. He set a zero carbon performance goal for the house at the very beginning of the design process - long before the idea was fashionable! - and from his own metering he has proved that he has achieved his ambition. In its first year of occupation the house exported more energy than it imported, thereby achieving its central performance target.

To top it all, Will says Tree House is "a delight to live in."

Contact

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Will Anderson has written a book documenting the build. Called "Diary of an Eco-builder" it is published by Green Books (01803 863260) and is also available through online book shops.

If you are involved in a low carbon development then why not share your experiences in an NHER case-study? Contact heather.stamp@nesltd.co.uk for further details.



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