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Updated since AECB Annual Conference Friday 29th June 2007

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CarbonLite Programme in context

Direction

European Directives

Energy Performance of Buildings Directive 2002/91/EC

UK Interpretation & Enabling

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NGS GreenSpec: Policies & Strategies

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GreenSpec is the UK construction industry's definitive guide to 'green' building design, products, specification and construction. Inside GreenSpec you will find a wealth of information aimed at helping you to design more energy and resource efficient buildings, using materials and technologies that minimise damage to people and the environment.

ecobuild green shoots

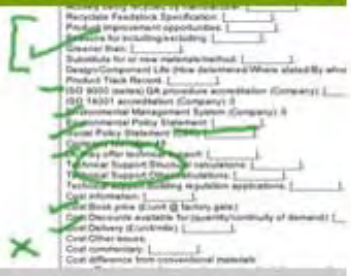
PRODUCTS

A directory of sustainable products available in the UK. Each product page comes with a description, brochure downloads and contact details.

MATERIALS

A guide to sustainable materials, both traditional and new. Materials such as masonry, roofing and flooring are compared based on their enviromental impacts.

CHECKLIST

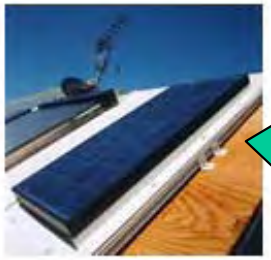


This CAWS menu-based checklist takes you through the construction process highlighting areas where sustainable construction best practice can be applied.

SPECIFICATIONS

ENERGY

IMAGE BANK



HOW WE SELECT PRODUCTS

CONTACT GREENSPEC

REGISTER YOUR PRODUCT

SPECIFICATIONS

NBS-compatible specs. GreenSpec specifications concentrate on Work Section areas supporting the sustainable agenda as well as dedicated product specs..

ENERGY

Guides to designing with zero and low carbon energy technologies.

IMAGE BANK

A collection of images of inspirational 'green' buildings ranging from the large commercial to the small domestic.

sustainable.building.supplies

Suppliers of modern, high performance, sustainable building systems and products

DESIGN

This section examines the techniques of sustainable construction through the combination of materials and renewable technologies.

DURABILITY

The durability of materials influences whole life costs. Common component options are described by the criteria which are expected to determine durability in the UK.

POLICY & STRATEGY

A collection of publications from the EU, UK government, local government and NGOs outlining climate chang sustainable construction policies and strategies.

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Policies and Strategies

1 Energy & Climate Change

UK Government

Building A Greener Future: Towards Zero Carbon Development (pdf)	'This publication is a consultation document seeking views on the Government's proposals to reduce the carbon footprint of new housing development. It sets out the Government's views on the importance of moving towards zero carbon in new housing. It explores the relationship between the planning system, Code for Sustainable Homes and Building Regulations in delivering our ambitions for zero carbon. And it proposes a timetable for revising the Building Regulations so as to reach zero carbon development in all new housing in England & Wales.' (*Communities and Local Government, Dec 2006*)
Energy Review 2006 (pdf)	'This work aims to put us in a position to meet the two major long-term challenges in UK energy policy: • we need to tackle climate change by reducing carbon dioxide emissions; and • we need to deliver secure, clean energy at affordable prices, as we move to increasing dependence on imported energy' (*DTI July 2006*)
Climate Change Programme 2006 (pdf)	'The new Climate Change Programme sets out our policies and priorities for action in the UK and internationally. Climate change is a global problem, so we will strive to secure global action on the scale needed to tackle it. But we will also take further action at home, to meet our commitments and demonstrate that climate change can be tackled without damaging our economy.' (*DEFRA March 2006*)
Potential for Microgeneration (pdf)	'An independent report: Potential for Microgeneration Study and Analysis was commissioned by DTI in 2005. It provides information on the feasibility of the various technologies in the marketplace, and estimates market development out to 2050.' (*DTI November 2005*)

NGOs

'A bright future' (pdf) Friends of the Earth's electricity sector model for	'The aim of this modelling exercise was to create realistic and transparent scenarios for future development of the energy sector...(it) has identified six possible outcomes that would help reduce emissions by large amounts and help achieve secure energy supplies' (*FOE March 2006*)

NGOs

'A bright future' (pdf) Friends of the Earth's electricity sector model for 2030	'The aim of this modelling exercise was to create realistic and transparent scenarios for future development of the energy sector...(it) has identified six possible outcomes that would help reduce emissions by large amounts and help achieve secure energy supplies' (*FOE March 2006*)
'Decentralising UK Energy'	'The World Alliance for Decentralised Energy (WADE) model compares traditional centralised energy systems to decentralised systems using local generation, under the same conditions of demand growth, fuel costs and so on.' (*Greenpeace 2006*)

Local Government

Planning and Climate Change (pdf)	'Planning Policy Statement 1 (PPS1): Delivering Sustainable Development sets out the overarching planning policies on the delivery of sustainable development through the planning system. This consultation seeks views and comments on a draft Planning Policy Statement' (*Communities and Local Government, 2006.*)
'Planning Policy Statement 22'	*Planning Policy Statement 22: Renewable Energy (2004)* PPS 22 states that 'local planning authorities may include policies in local development documents that require a percentage of the energy to be used in new residential, commercial or industrial developments to come from on-site renewable energy developments.'
'Green light to clean power' The Mayor of London's Energy Strategy	'This Strategy sets out a coherent energy policy for London for the next ten years and beyond. It aims to minimise negative impacts on health and on the local and global environment, while still meeting the essential energy needs of all those living and working in London.' (*Ken Livingstone 2004*)
'The Merton Rule' (doc)	'In October 2003 Merton became the first local authority in the UK to include a policy in its Unitary Development Plan that requires new non-residential developments to generate at least 10% of their energy needs from renewable energy equipment such a solar panels and wind turbines. '

2 Sustainable Construction

Europe

'The Energy Performance of Buildings Directive'	Introduced in January 2006, the Directive is intented to lead to substantial increases in investments in energy efficiency measures within both domestic and non-domestic buildings. This briefing paper was written by Andrew Warren, Director of the Association for the Conservation of Energy. (*CIBSE 2006*)

2 Sustainable Construction

Europe

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UK Government

'Code for Sustainable Homes'	'The Code for Sustainable Homes has been introduced to drive a step-change in sustainable home building practice. It is a standard for key elements of design and construction which affect the sustainability of a new home. It will become the single national standard for sustainable homes, used by home designers and builders as a guide to development, and by home-buyers to assist in their choice of home.' (*Department for Communities and Local Government: December 2006*)
'Code for Sustainable Homes - Technical Guide'	'This technical guidance manual sets out the requirements for the Code, and the process by which a Code assessment is reached' (*Department for Communities and Local Government: March 2007*)
'A cost review of the Code for Sustainable Homes'	• How compliance with Ecohomes Very Good is typically achieved and the performance of these homes in terms of water and energy efficiency • The extra-over costs and impact on environmental performance of housing complying with the Code rather than EcoHomes *Housing Corporation / English Partnerships, February 2007*
'Sustainable Construction Strategy Report'	'In 2000, the Government published its first Strategy for Sustainable Construction Building A Better Quality of Life which presented a way forward for Government and industry. This current document considers what has been achieved over the past five years and summarises progress made on specific initiatives identified in the original Strategy. It aims to provide an effective framework to guide future government policies where they are relevant to construction and outlines where the Government wishes to see the industry going in its future development.' (*DTI January 2006*)
'Stock Take: Delivering improvements in existing housing'	Homes already built account for 99% of the total housing stock. This report assesses the level of savings in resources, energy, water and waste that can be achieved by implementing the full range of technical options in those homes. (*Sustainable Development Commission, 2006*)
'Review of Sustainability of Existing Buildings.	The Energy Efficiency of Dwellings - Initial analysis (*Department for Communities and Local Government, November 2006*)
The Sustainable and Secure Buildings Act	The Act is a piece of enabling legislation and is not prescriptive. However, it does require building regulations (which are defined within the 1984 Buildings Act) to incorporate a number of fuel and power related obligations. The obligations relate to fuel and power usage, metering, building emissions and reporting on micro-generation facilities within housing stock.

The Energy Performance of Buildings Directive

A summary of its objectives and contents

Directive 2002/91/EC of the European Parliament and Council, on the energy performance of buildings, came into force on 4 January 2003. It will greatly affect awareness of energy use in buildings, and is intended to lead to substantial increases in investments in energy efficiency measures within these buildings. Legislation must be in place by 4 January 2006, and will affect all buildings, both domestic and non-domestic. The major responsibility for practical measures to meet the requirements will fall on building services engineers. This briefing explains the main provisions of the Directive.

Why was the directive introduced?

The 160 million buildings in the EU use over 40% of Europe's energy and create over 40% of its carbon dioxide emissions, and that proportion is increasing. Under the Kyoto protocol, Europe is committed to reducing emissions and the Directive is intended to contribute to achieving this.

Sustainable and Secure Buildings Act 2004

2004 Chapter 22

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The text of this Internet version of the Act is published by the Queen's Printer of Acts of Parliament and has been prepared to reflect the text as it received Royal Assent. A print version is also available and is published by The Stationery Office Limited as the **Sustainable and Secure Buildings Act 2004**, ISBN 0 10 542204 5. The print version may be purchased by clicking here. Braille copies of this Act can also be purchased at the same price as the print edition by contacting TSO Customer Services on 0870 600 5522 or e-mail: customer.service@tso.co.uk.

Further information about the publication of legislation on this website can be found by referring to the Frequently Asked Questions.

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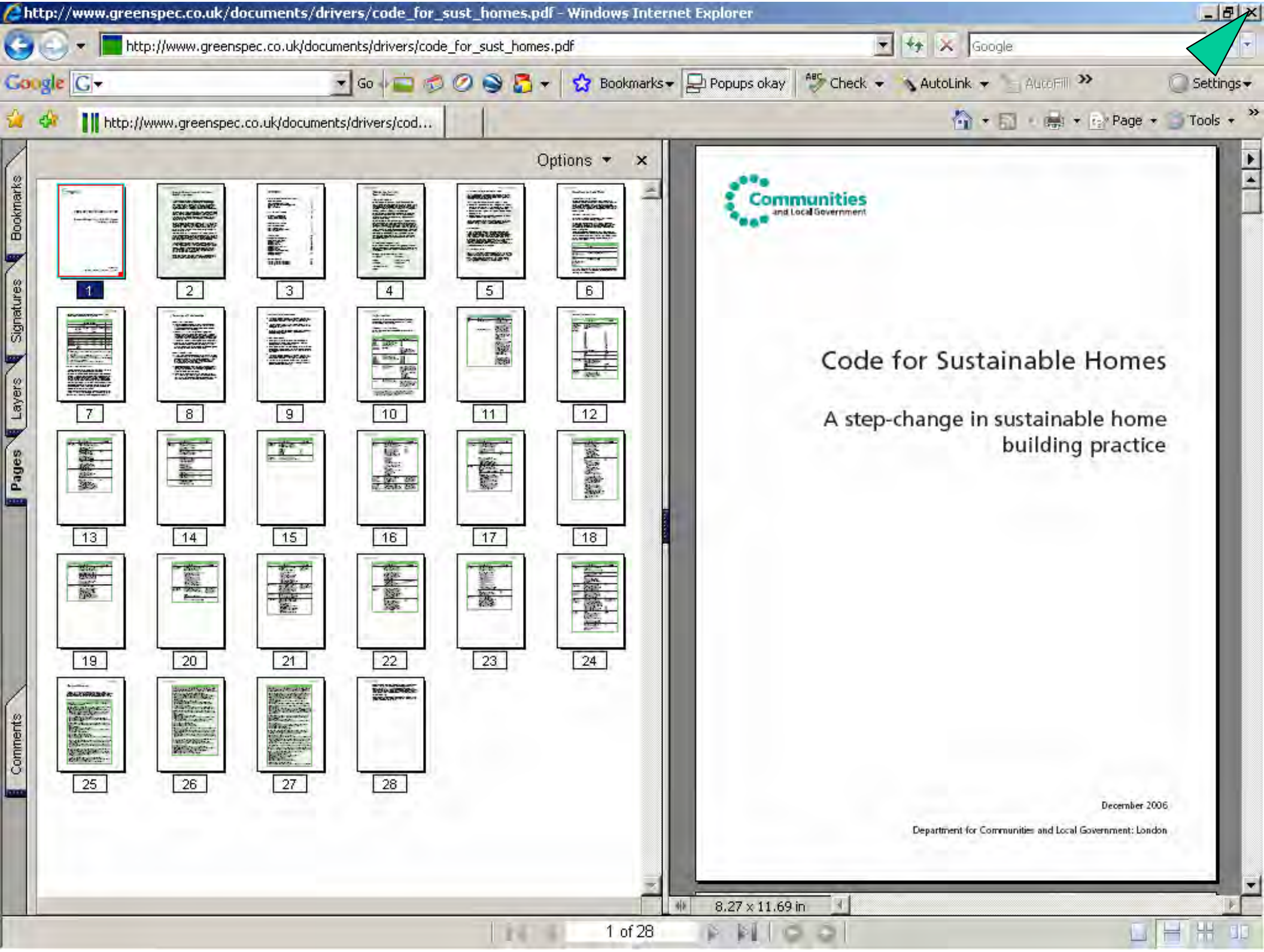
Sustainable and Secure Buildings Act 2004

2004 Chapter 22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A step-change in sustainable home building practice
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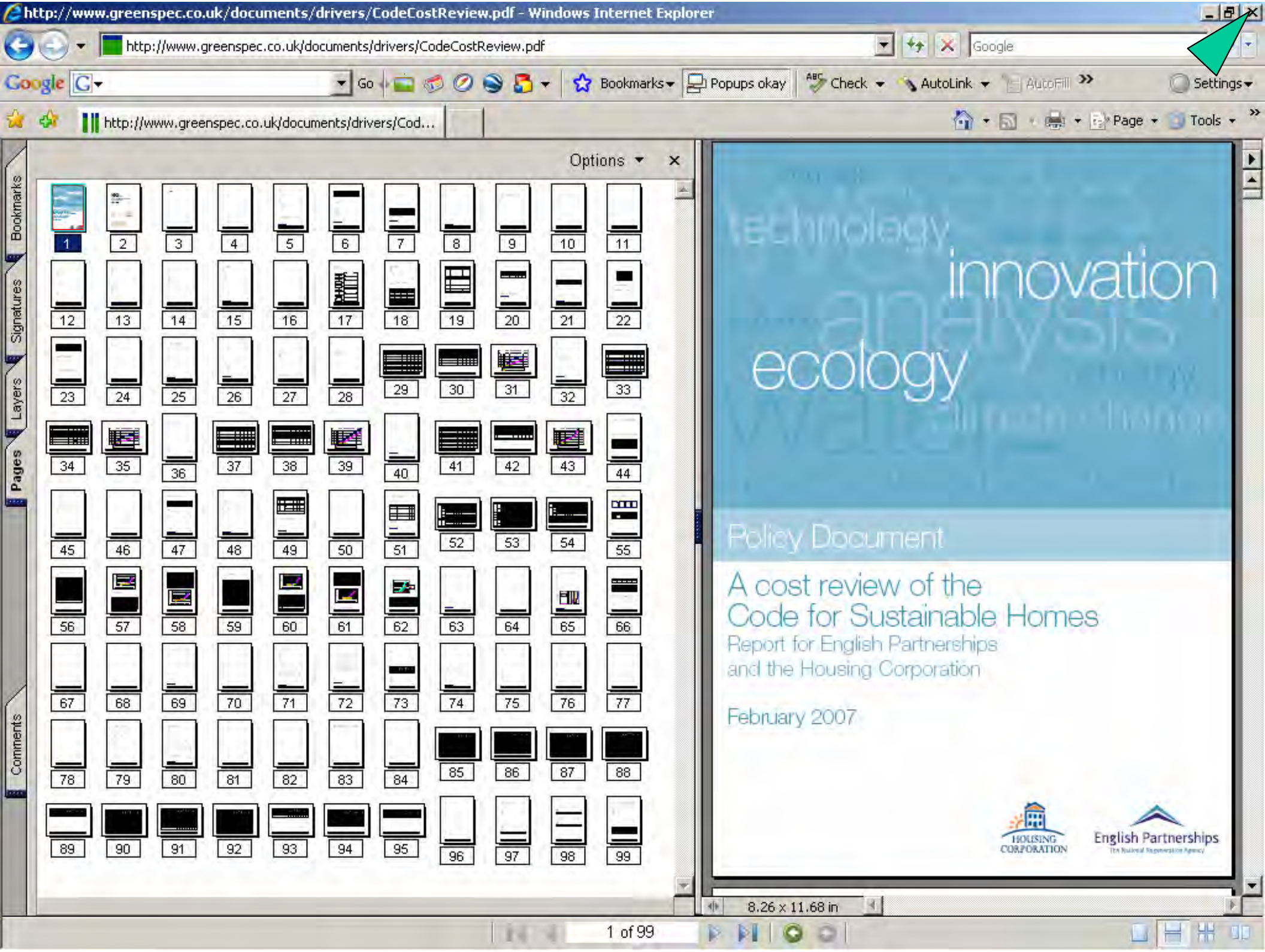
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Policy Document
A cost review of the Code for Sustainable Homes
Report for English Partnerships and the Housing Corporation
February 2007
HOUSING CORPORATION
English Partnerships
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Existing Buildings.	*Government, November 2006*)
The Sustainable and Secure Buildings Act	The Act is a piece of enabling legislation and is not prescriptive. However, it does require building regulations (which are defined within the 1984 Buildings Act) to incorporate a number of fuel and power related obligations. The obligations relate to fuel and power usage, metering, building emissions and reporting on micro-generation facilities within housing stock.
'Procuring the Future'	Sustainable Procurement National Action Plan: Recommendations from the Sustainable Procurement Task Force.

Local Government

'Planning Policy Statement 1'	*Planning Policy Statement 1: Delivering Sustainable Development (2005).* PPS 1 outlines the Government's objectives for the planning system. It states that 'regional planning authorities and local authorities should promote resource and energy efficient buildings; community heating schemes, the use of combined heat and power, small scale renewable and low carbon energy schemes in developments; the sustainable use of water resources; and the use of sustainable drainage systems in the management of run-off.'
'Sustainable Design and Construction' The London Plan SPG	This document sets out the Mayor of London's essential and preferred standards on a whole array of issues related to sustainable design and construction. Being the status of Supplementary Planning Guidance, the document does not set policy. 'However the SPG can be taken into account as a further material consideration so has weight as a supplement to the London Plan.'

NGOs

'40% House'	'The Royal Commission on Environmental Pollution reported that the UK needs to achieve a 60% reduction in CO2 emissions by 2050 if we are to contribute to an avoidance of significant climate change. The domestic sector is crucial to the achievement of this target as it represents almost a third of the UK's energy. The 40% House project studies behavioural and technological changes in the search for how UK households can meet the 60% target.' (*Environmental Change Institute 2005*)
'AECB Energy Standard(s)'	This document sets out the rationale for the proposed AECB energy standards for new buildings. It outlines what levels of energy efficiency and renewable energy use they would require. It explains what further work is needed before we can apply both standards to new buildings. (*David Oliver, 2005*)
'A low-carbon roadmap to 2050'	'Using ZEDstandards gives us a once-in-a-lifetime opportunity to change the way the construction industry produces infrastructure and buildings, enabling a higher quality of life and a step-change reduction in environmental impact.' (*BDa-ZEDfactory 2005*)

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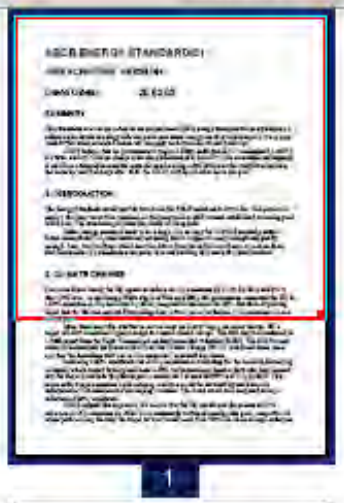


AECB ENERGY STANDARD(S)

'PRESCRIPTIVE' VERSION

David Olivier 20.02.05

SUMMARY

This document sets out the rationale for the proposed AECB energy standards for new buildings. It outlines what levels of energy efficiency and renewable energy use they would require. It explains what further work is needed before we can apply both standards to new buildings.

AECB believe that the government's target of a 60% reduction in CO_2 emissions by 2050 is too little, too late. Climate change demands a reduction of at least 85%. On reasonable assumptions, if the Silver Standard became the norm for new buildings after 2010, and the Gold Standard were the norm for new buildings after 2020, the UK's buildings could achieve this goal.

1. INTRODUCTION

The Energy Standards would provide two levels for AECB members to strive for. On a particular project, they may want to be pioneers, or they may wish to stick to more established technology and avoid risks. The standards give them the choice of doing both.

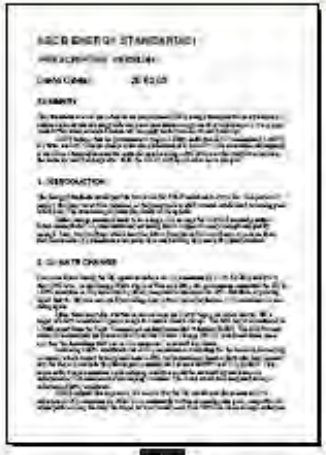
Either energy standard leads to such large CO_2 savings that it would markedly reduce future atmospheric CO_2 concentrations, assuming that it is applied *widely enough and quickly enough*. Thus, two buildings which meet the Silver Standard in full would save even more fossil fuel, and reduce CO_2 emissions even more, than one building that meets the Gold Standard.

2. CLIMATE CHANGE

Under the Kyoto treaty, the UK agreed to reduce its CO_2 emissions by 12.5% by 2012 relative to their 1990 level. In the Energy White Paper of February 2003, the government committed the UK to a 60% reduction in CO_2 emissions by 2050, compared to emissions in 1990. But there is growing doubt that the UK can meet its Kyoto obligations: after a period of decline, CO_2 emissions are now

Table 2. SUMMARY OF PRESCRIPTIVE STANDARDS.

FEATURE		SILVER	GOLD	UNITS
Design to suit site		Basic passive solar design required; suitable area of wall or roof to be set aside to retrofit solar heating or electricity if needed.	As for Silver but solar energy system(s) would normally be installed now.	
U-values (1)	Roof	≤0.15	≤0.15 overall	W/m^2K
	Walls	≤0.25		W/m^2K
	Floor	≤0.20		W/m^2K
	Extl. doors	≤0.8	≤0.6	W/m^2K
	Windows (2)	≤1.5	≤0.8	W/m^2K
Window min. visible light transmittance		63	63	%
Protection against overheating (3)		To be designed to avoid both summer & winter overheating	As Silver	
Air permeability (3)		≤3.0 for MEV or PSV, ≤1.5 for MVHR	≤0.75	m^3/m^2hr @ 50 Pa
Ventilation (4)		Balanced MVHR or whole-house MEV or passive stack ventilation (PSV). Max. specific fanpower = 1 W per l/s (MEV) or 2 W (MVHR). PSV still requires mechanical cooker extract.	Balanced MVHR, max. specific fanpower = 0.75 W per l/s and min. seasonal heat recovery = 90% (excl. fans).	
Space heating (5)		Radiators or underfloor, cond. boiler with maximum NO_x limit, earth-source heat pump or clean-burning biomass; e.g. liquid- or gaseous-fuelled CHP plant. Controls required so that; e.g., underfloor heating is compatible with passive solar design features. Water supply and return temps. at peak limited to max. of 60°C/ 40°C, as in Sweden and Denmark, for future flexibility.	Normally heater battery (fed from cond. boiler or heat pump) in ventln. ductwork. Min. pump efficiency. Max. supply and return temps.: as for Silver.	
Hot water		Cond. boiler or heat pump or clean-burning biomass as for space heating.	Ditto plus solar (min. solar fraction 70%).	
Cooking (6)		No requirement	Gas, LPG, electric induction or clean-burning biomass	
Lighting (7)		CFLs, T5 or T8 everywhere except cupboards. Integral ballast CFLs permitted where their greater miniaturisation can be shown to	Efficient CFLs (hard-wired) or T5 (hard-wired) with electronic ballasts used everywhere bar cupboards.	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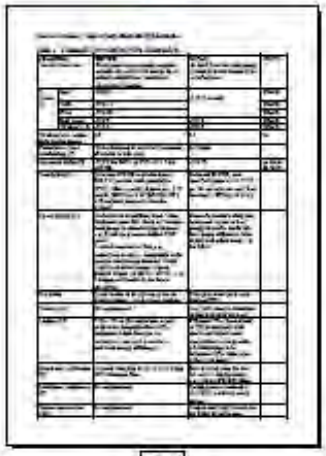
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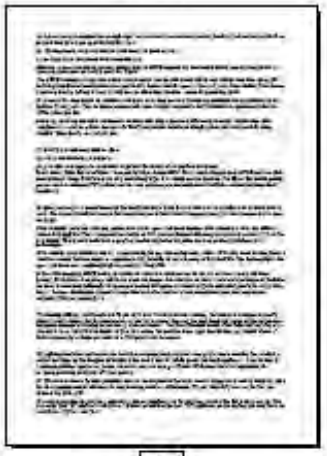
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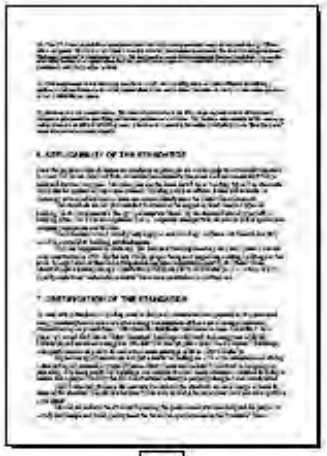
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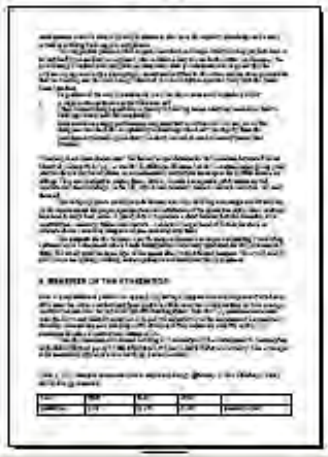

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The CLP Low Carbon House in GreenSpec

The Low-Carbon House: Contents

Low Carbon House:

- Contents
- Standards Level 4
- Standards Level 5
- Standards Level 6
- Siting & orientation
- Direct Solar Gain
- Thermal Walls
- Thermal Mass
- Construction details

The Low-Carbon House: Prescriptive Energy Standards: Level 4 / Carbonlite Step 1

- The following standards correspond to:
  - Code for Sustainable Homes Level 4
  - AECB Carbon Lite programme Step 1

Introduction

This page sets out the details of the prescriptive standards applying to Level 4 of the Code for Sustainable Homes. They explain as far as possible what measures designers and others must implement in order to comply with the standards. In the majority of countries where advanced energy standards have been tried, most designers have wanted some kind of prescriptive standard, because it provides them with clear guidance and assurance as to what is likely to be acceptable. It also reduces the risk of errors.

NB Designers must use the performance version of the standards if parameters such as the ratio of glazed area to floor area are outside the range listed.

Thermal performance

U- values (including y-values [2]) [1]		W/m^2K
Roofs		≤ 0.15 [1 + 3]
External walls		≤ 0.25
Floor		≤ 0.20
External opaque doors [4]		≤ 1.0
Whole window	Uninstalled	≤ 1.4
	Installed	≤ 1.5

Whole window	Uninstalled	≤ 1.4
	Installed	≤ 1.5
Whole window	Uninstalled	≤ 1.9
	Installed	≤ 2.0
Separating walls in terraces and semi-detatched houses [5]		≤ 0.5

Heat loss parameter [6]	≤ 1.05 W/K per m^2

Air permeability and ventilation

Air permeability of thermal envelope	≤ 3.0 m^3/m^2hr @ 50Pa
Ventilation [7]	MVHR or MEV. Specific fanpower ≤ 0.8 W per l/s (MEV) or 1.5 W per l/s (MVHR). Seasonal heat recovery ≥75% excl. fans.

Glazing

Glazing solar energy transmittance incl. frames [8]	≤ 35%
Glazing visible light transmittance incl. frames [9]	≤ 50%
Glazing area to floor area ratio incl frames [10]	18 – 30%
Glazing area to wall area ratio incl frames	≤ 45%
South glazing to floor area ratio [10]	8 – 25%
Glazing area to wall area ratio [11]	≤ 40%
Protection against overheating	Design to avoid overheating in winter and summer by passive means. Refrigerative cooling systems or reversible heat pumps are not permitted.

Space and water heating

Space heating system	Normally radiators or underfloor pipes. Fed from A rated gas, LPG or oil condensing boiler, CHP or, outside the gas supply area, earth-source heat pump (seasonal COP ≥ 3.0) or clean-burning biomass; i.e, liquid- or gaseous-fuelled. Wood pellet boilers are permitted outside the gas area but are not encouraged due to the exhaust.

Water heating system	Same as space heating system; plumbing to be as compact as possible.
Hot water system insulation	Tanks ≤ 100 mm PU foam(λ=0.024 W/mK) or equiv., pipes and valves ≤ 20 mm mineral fibre (λ=0.034 W/mK) or equivalent and cold pipes to have a vapour barrier.

Cooking	No requirement

Daylight and lighting

Daylight factor	All habitable rooms to have glazing area ≥18% of floor area.
Lighting	Electronically-ballasted CFLs, T5 or T8 everywhere bar cupboards. All table, desk and floor lamps to have CFLs or equiv. LEDs acceptable if/when their efficacy reaches that of CFLs. Weighted average lamp efficacy; i.e., including control gear, ≥55 lm/W and weighted average luminaire efficiency ≥65% or an equivalent combination.

Appliances

"Cold" electrical appliances	Minimum A+
"Wet" electrical appliances	Minimum top 50% of A class.
Clothes dryers	Gas, LPG or heat pump or integrated with MVHR or MEV system. Last two arrangements usually need condensate drain.
TVs	Screens to be CRT, LCD or equivalent
Lifts	Energy-efficient models.
Small electrical appliances [12]	No requirement

Renewable electricity

On-site or dedicated renewable electricity generation [13]	No requirement

Embodied energy

Embodied energy [14]	No requirement

Monitoring

Monitoring [15]	No requirement

Notes

[1] The elemental U-values must be met for all elements which separate a heated volume either from an unheated space; e.g., a porch or a cold cellar, or from the outside air. U-values of elements adjacent to such spaces may not be increased.

[2] The U-value under UK conventions includes all repeating thermal bridges. The y-value is a correction which is applied to all U-values to account for the impacts of non-repeating point and linear thermal bridges. Conventionally, y = +0.08 W/m^2K if one is using accredited details. The y-value is applied equally to all the elements in the building even though the thermal bridging is usually concentrated in certain areas of the building. y can be further reduced by using details which are specifically designed to limit thermal bridging.

[3] The roof U-value listed is a maxima. To meet the other limits to; e.g., the heat loss parameter, most buildings with a high surface area-to-volume ratio; e.g., small or medium-sized detached houses, and some semi-detached houses, will need lower opaque U values. In buildings such as flats row houses, these U-values will generally suffice.

[4] Corrections for the thermal bridging due to the installation detail means that the effective heat loss is slightly higher. The U-value including this is limited to 0.65 W/m^2K.

[5] Separating walls must normally be insulated, so that an attached dwelling can still be heated if the adjacent dwelling(s) is/are unoccupied for a prolonged period.

[6] The heat loss parameter is the building's specific heat loss divided by the building's floor area. If using the prescriptive version of the standards, buildings must meet the heat loss parameter and the elemental Uvalues. Buildings which exceed the limit are not necessarily always ruled out; e.g., high-mass buildings with an extremely large area of south-facing windows may perform satisfactorily, but they must use the performance version of the standard.

[7] Ventilation could be either a very efficient air-to-air heat exchanger OR a marginally less efficient heat exchanger plus earth tube(s) to preheat the ventilation air an equivalent amount.

[8] The g-value or total solar energy transmittance is a weighted average for all the windows and glazed doors which are installed in the proposed building. Care is needed with Passivhaus windows whose g-value is in the region of 50-55%. 50% is the minimum for residential buildings because the glazing plays a role in heating the building.

[9] Visible light transmittance is important to daylighting in all building types. The limit applies to the whole window including sashes, frames and couplings between windows in curtain walling-type systems. Window sizes are measured to the outside of the structural openings.

[10] The 8% limit applies to very low thermal capacity buildings; e.g., timber-frame or SIPs with timber floors on all levels, including the ground floor - thermal capacity ≤ 0.03 kWh/K per m^2. The 25% limit applies to very high thermal capacity buildings; e.g., dense masonry or concrete walls with concrete roofs and in situ concrete intermediate floors - thermal capacity ≥ 0.4 kWh/K per m^2. The proportions are based on windows which are unshaded.

[11] This limit is significant for reducing the risk of summer overheating but is usually only approached or exceeded on flats or large non-domestic buildings.

[12] Small electrical appliances are defined as all others; e.g., including but not limited to vacuum cleaners, hi-fi systems, electric toothbrushes and garden machinery. Small appliances are normally all provided by the occupants, who must purchase electricity-efficient models.
Until further notice, use the website www.topten.ch and treat the top five appliances listed in each class as acceptable. If a small appliance is of a category not listed on www.topten.ch, all those with a standby usage of ≤ 1W are acceptable.

[13] This requirement covers electricity-specific uses and sometimes cooking. So a dwelling which uses 1,400 kWh/year for lighting, appliances and ventilation under standard occupancy conditions and uses gas for space and water heating, cooking and clothes drying needs a wind, photovoltaic, hydro and/or other renewable electricity system which generates at least 1,400 kWh per annum, plus an allowance for grid losses in the electricity which is exported and used elsewhere.

hydro and/or other renewable electricity system which generates at least 1,400 kWh per annum, plus an allowance for grid losses in the electricity which is exported and used elsewhere.

[14] Of the total energy consumed by a new building over 100 years, embodied energy makes up about 5-7% of the total energy use for a dwelling of current UK construction and 8-10% for a dwelling of Passivhaus construction. The rest is operational energy. Consequently, embodied energy is unregulated.

[15] Maintenance and commissioning. Clear instructions are required to the homeowner, tenant or nondomestic building owner for the setting-up and maintenance of MEV & MVHR systems and other alterations to mechanical services. To be in accordance with CIBSE guidance on building logbooks..

Downloads

• Code for Sustainable Homes *(Department for Communities and Local Government: December 2006)*
• Code for Sustainable Homes - Technical Guide, *(Ibid, March 2007)*

Publications

• Blah
• *Blah*

Further information

• Blah, blah

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The Low-Carbon House: Contents

Low Carbon House:

- Contents
- Standards Level 4
- Standards Level 5
- Standards Level 6
- Siting & orientation
- Direct Solar Gain
- Thermal Walls
- Thermal Mass
- Construction details

The Low-Carbon House: Prescriptive Energy Standards: Level 5 / Passivhaus/ CarbonLite Step 2

- The following standards correspond to:
  - Code for Sustainable Homes Level 5
  - AECB Carbon Lite programme Step 2
  - the German Passivhaus Standard
- Passivhaus maximises the use of energy efficiency technology. If applied to UK housing, it would represent an estimated 80% reduction in CO_2 emissions.
- The technology involved is not readily available in the UK, though this is changing.

Introduction

This page sets out the details of the prescriptive standards applying to Level 5 of the Code for Sustainable Homes. They explain as far as possible what measures designers and others must implement in order to comply with the standards. In the majority of countries where advanced energy standards have been tried, most designers have wanted some kind of prescriptive standard, because it provides them with clear guidance and assurance as to what is likely to be acceptable. It also reduces the risk of errors.

NB Designers must use the performance version of the standards if parameters such as the ratio of glazed area to floor area are outside the range listed.

Thermal performance

U- values (including y-values [2]) [1]	W/m^2K
Roofs	≤ 0.15 [1 + 3]

The Low-Carbon House: Contents

Low Carbon House:

- Contents
- Standards Level 4
- Standards Level 5
- Standards Level 6
- Siting & orientation
- Direct Solar Gain
- Thermal Walls
- Thermal Mass
- Construction details

The Low-Carbon House: Prescriptive Energy Standards: Level 6 / CarbonLite Step 3

- The following standards correspond to:
  - Code for Sustainable Homes Level 6
  - AECB Carbon Lite programme Step 3

Introduction

This page sets out the details of the prescriptive standards applying to Level 6 of the Code for Sustainable Homes. They explain as far as possible what measures designers and others must implement in order to comply with the standards. In the majority of countries where advanced energy standards have been tried, most designers have wanted some kind of prescriptive standard, because it provides them with clear guidance and assurance as to what is likely to be acceptable. It also reduces the risk of errors.

NB Designers must use the performance version of the standards if parameters such as the ratio of glazed area to floor area are outside the range listed.

Thermal performance

U- values (including y-values [2]) [1]		W/m^2K
Roofs		≤ 0.15 [1 + 3]
External walls		≤ 0.15
Floor		≤ 0.15
External opaque doors [4]		≤ 0.65
Whole window	Uninstalled	≤ 0.80
	Installed	≤ 0.85

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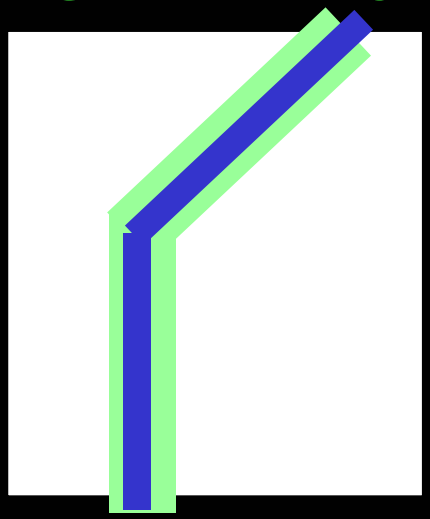
CarbonLite Programme Application

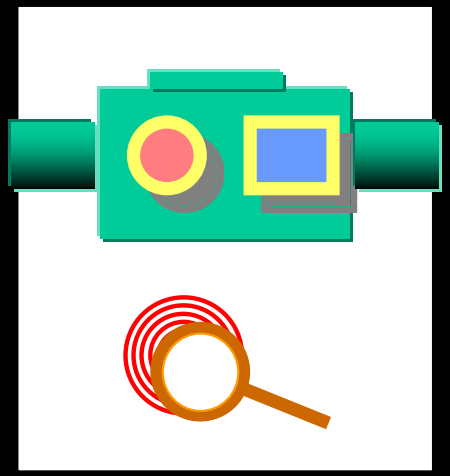
Systems

GreenSpec
www.greenspec.co.uk

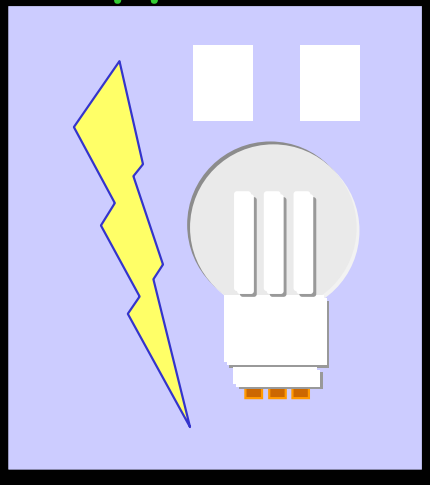
Buildings Fabric Systems



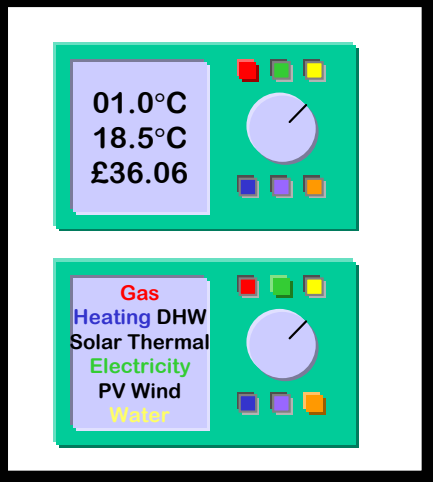
Ventilation Heating & Cooking



Electrical Power, Lighting & Appliances



Controls Monitoring Metering



AECB Carbon Lite

GreenSpec
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NGS GreenSpec Assembly Pages

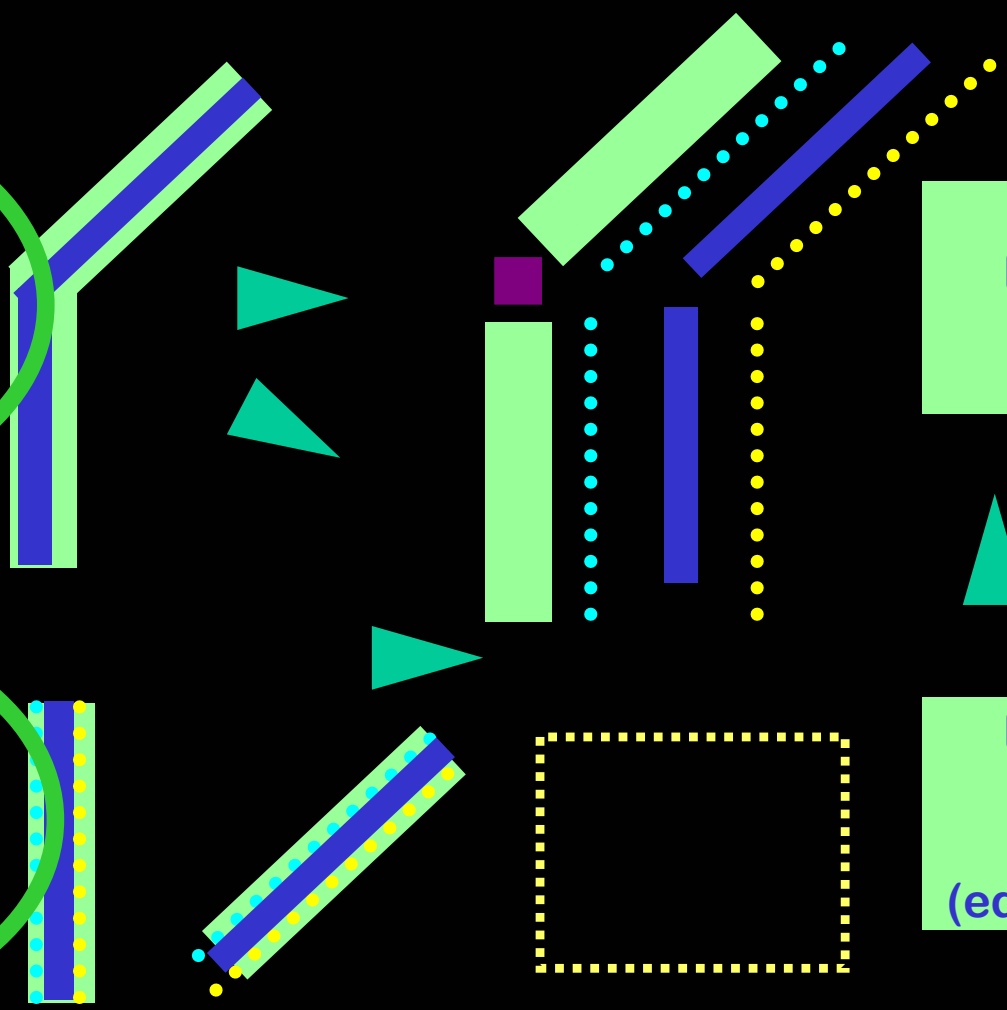
GreenSpec

Web Pages

Assembly List/Diagram Page

Assembly Diagram Pages

Industry Solution Assembly Diagram Pages



Product Specification Clauses

Product Pages

Product List Pages (equivalents)

Assembly pages & List pages

- Do not exist yet
- Will be created to bring together materials and product pages which are know solutions when assembled together
- Examples:
- Tradis Insulated panel: Masonite Compound Section, Hunton Boards, Excel Insulation
- Wall, Roof, Ground floor
- Eaves detail, upper floor/external wall

The Low-Carbon House: Contents

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The Low-Carbon House: Construction Details: Contents and Introduction

Contents

Introduction

In order to support 'early adopters' pioneering the draft standards, the AECB has produced this initial design guidance document. It concentrates on two of the areas where current UK practice most adversely affects building energy performance - thermal bridging and airtightness.

Although this guidance is written in the context of constructional examples based on Silver Standard U-values, part of the guidance is also relevant to projects where the building fabric is being designed to the Gold Standard. The key design and construction principles illustrated in this guide will be useful to all those who are attempting to design more thermally-efficient building envelopes.

Many of the examples used here have been used on "live" projects by various AECB members. They were adopted as part of a practical two day NVQ course run by the AECB for construction students, the details being built full-size in the college workshops by the students.

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Please use these constructional examples to inform the detailed design of your own project's building fabric. Applying the principles of reduced thermal bridging and increased airtightness to all fabric elements - walls, floors, roof, etc - and key junctions between elements will significantly reduce your building's overall energy use and CO2 emissions.

It is intended that these details be treated as constructional examples only, to illustrate the application of good thermal design principles as required by the AECB Silver Standard. Do not treat them as "approved" or "accredited" details as they have not been through the necessary peer review process to gain this additional authority.

Considerable care has been taken when compiling the information in these documents and it is believed to be accurate, but it is provided without liability. It is hoped that you can utilise the constructional examples which are provided in your own work, but you must assess their suitability for use under your own particular circumstances.

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The Low-Carbon House: Construction Details: CSH Level 4 / Carbon Lite Step 1

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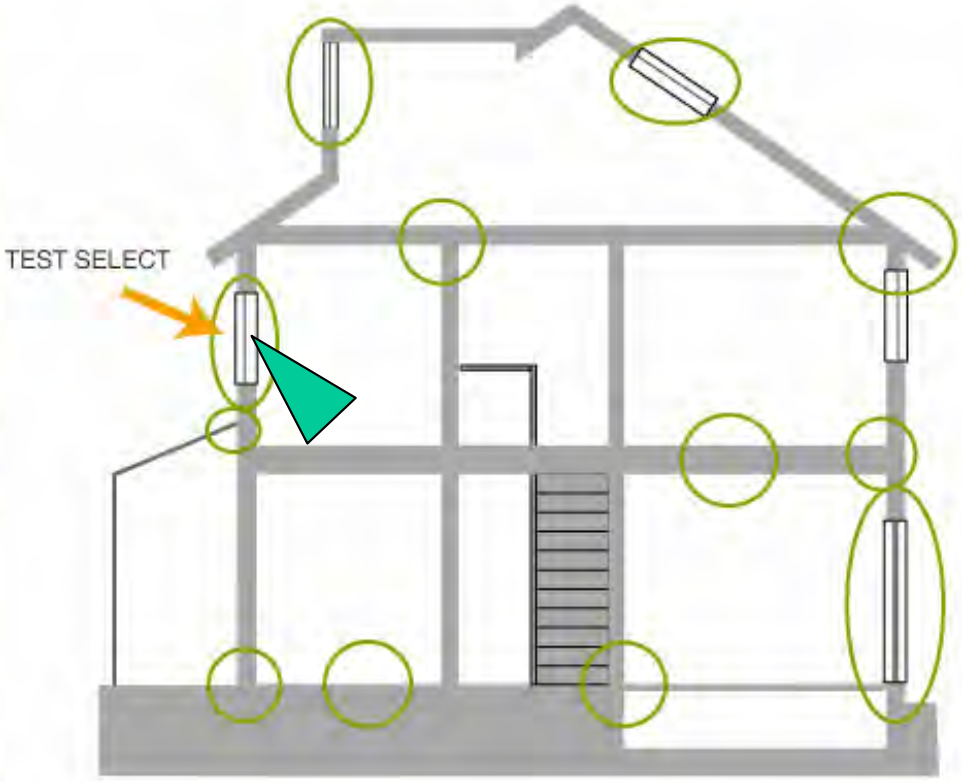

The Low-Carbon House: Construction Details: CSH Level 4 / Carbon Lite Step 1: Window Openings

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Masonry wall construction

Cavity wall
(Test Select)

External insulation

Etc.

Timber frame construction

Cavity wall
(Test Select)

External insulation

Etc.

Timber frame construction

Etc

Etc

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The Low-Carbon House: Construction Details: CSH Level 4 / Carbon Lite Step 1: Window Openings: Masonry: Cavity

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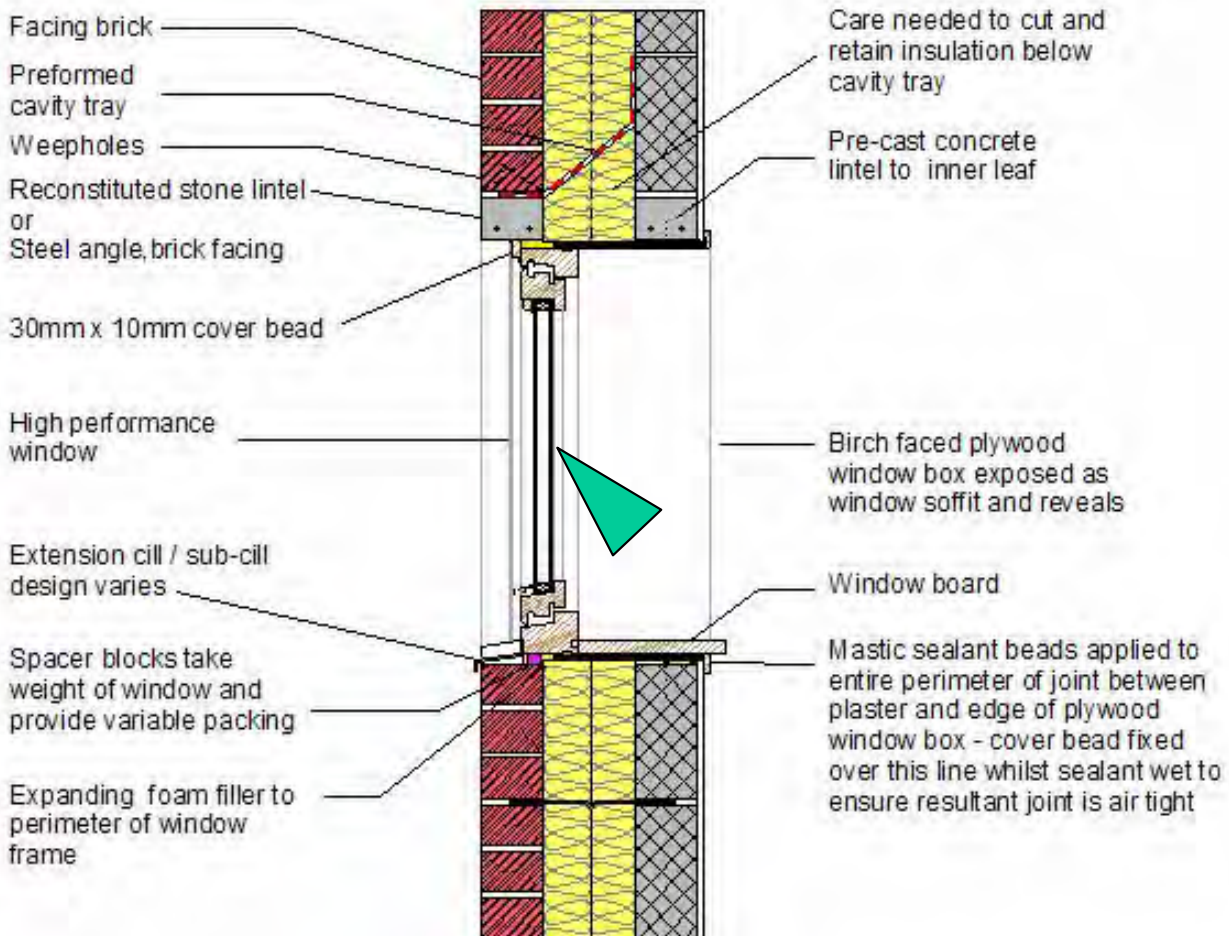

GreenSpec

Search

HOME
PRODUCTS
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SPECIFICATIONS (available 2007)
MATERIALS
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FORUMS
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DURABILITY
SUPPLIERS & INSTALLERS
FABRICATORS
RECLAMATION
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HOW WE SELECT PRODUCTS
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REGISTER YOUR PRODUCT

PRODUCTS CONTENTS
L2 Complete construction entities
L3 Structural and space division
L4 Access, barrier and circulation

L413 Windows

all types

Manufacturer	Product	Type			
Green Building Store	Ecoplus	high performance timber windows	✓	✓	
Green Building Store	Ecoclad	high performance timber / alu-clad windows	✓	✓	

Key

product / equipment with climate change reduction potential
sustainable product
product with recycled content

GreenSpec

Search

'Ecoplus' windows

High performance timber windows

• Manufactured from Forest Stewardship (FSC) 100% certified timber - available in European oak or redwood.
• Lamination and finger joint technology are utilised to minimise resource use and improve durability.
• Ultra-efficient double or triple glazing system with a centre pane U-value of 1.2 w/m^{2}k or 0.5 w/m^{2}k respectively.
• Warm edge spacers help maximise thermal efficiency and virtually eliminate cold edge condensation.
• Boron timber preservatives, considered the safest and most environmentally benign of all timber treatments.
• Durable and easy-to maintain OS Color wood-finishes. Biocide-free and based on natural plant oils.
• Manufactured in the UK and designed in conjunction with the Timber Research and Development Association (TRADA).'

Manufacturer's evidence rating:*	★
Material/s:	FSC timber, glass and aluminium
Environmental statement:	yes
BRE Ecopoints:	unrated
BRE Environmental profile:	unrated
Other environmental standards:	none
3rd party accreditation:	FSC certified
3rd party product endorsement:	none
Reusability / Recyclability:	reusable and glass is recyclable
% of post consumer waste:	unknown
Life expectancy	unknown
Substitute for or new	

AECB Carbon Lite

GreenSpec
www.greenspec.co.uk

NGS GreenSpec
Many Products

The Low-Carbon House: Construction Details: CSH Level 4 / Carbon Lite Step 1: Window Openings: Masonry: Cavity

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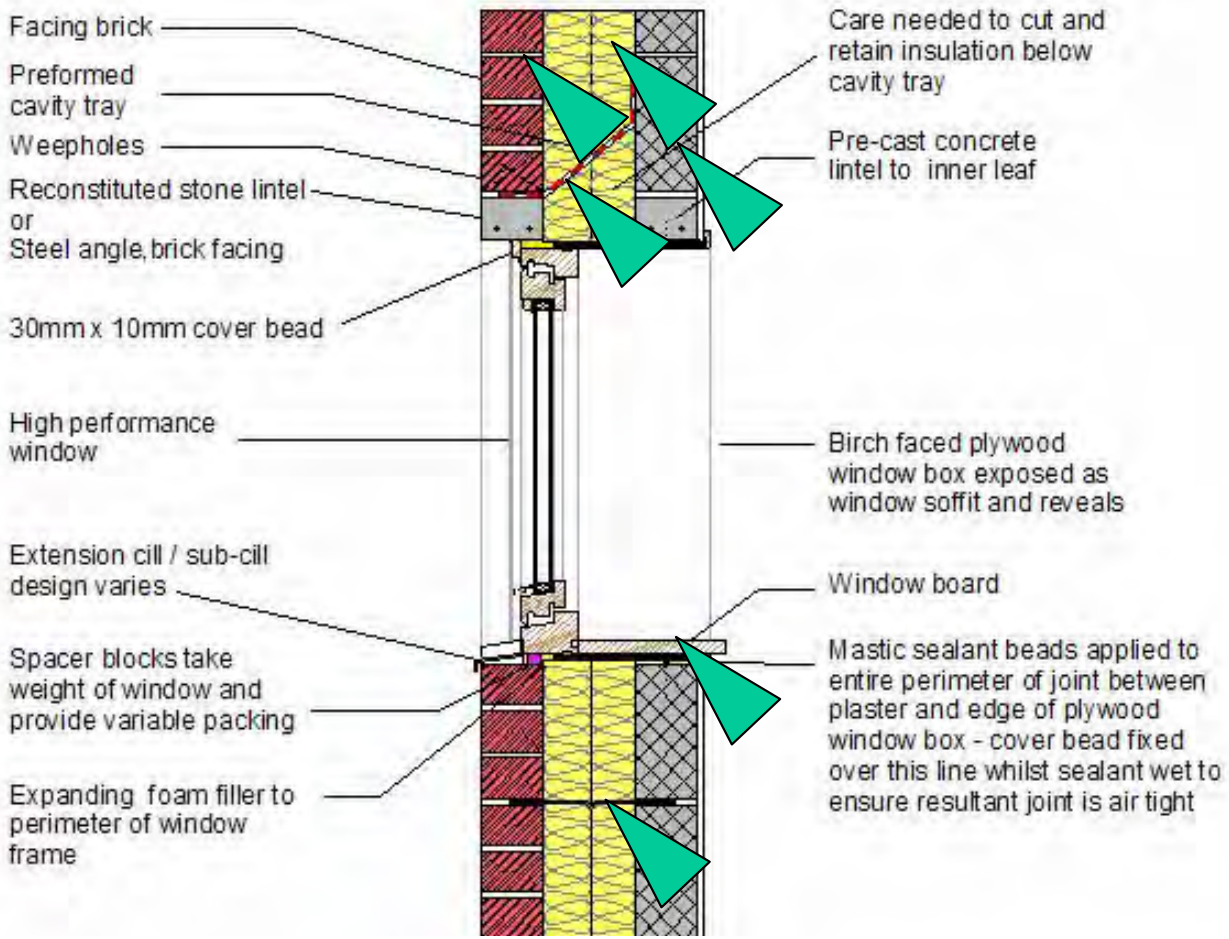

AECB Carbon Lite

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NGS GreenSpec
Many Elements
Many Assemblies

The Low-Carbon House: Construction Details: CSH Level 4 / Carbon Lite Step 1

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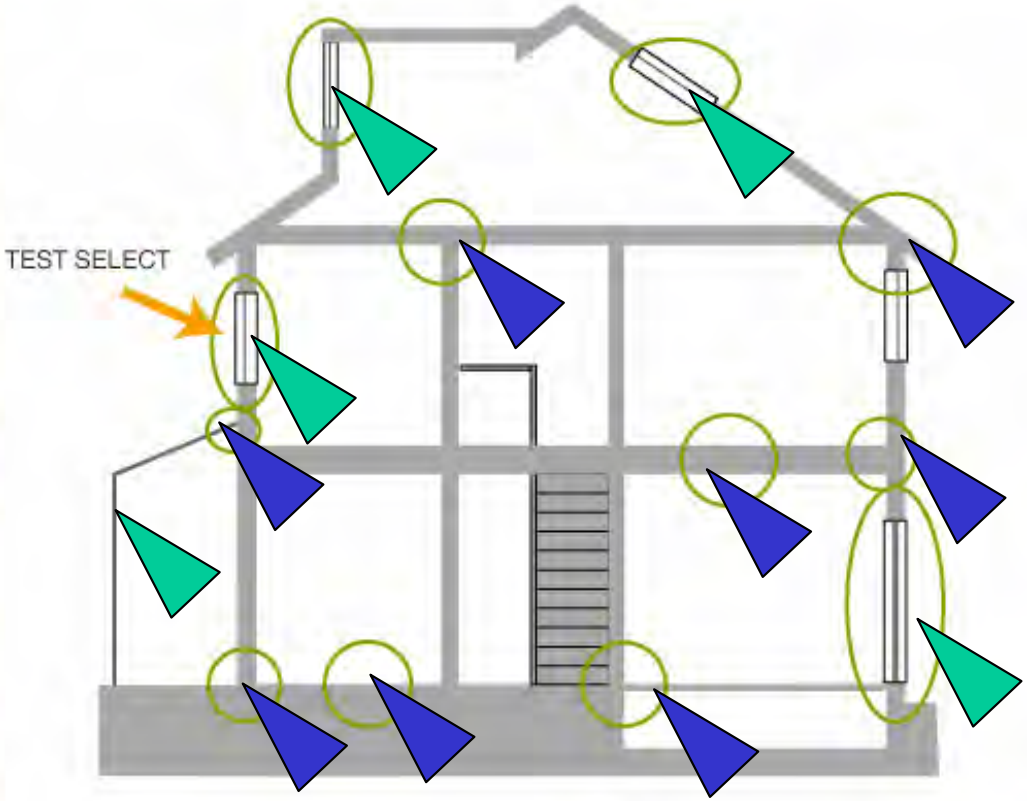


Inhabited
Loft room
Uninhabited
Attic
Unoccupied
Green House
Occupied
Conservatory
Un-insulated
Internal garage

GreenSpec

Search

L362 Fabricated components

structural timber panels

Manufacturer	Product	Type	♻
KLH Massivholz	XLSolid	structural timber panels	
Finnorest Merk	LenoTec	structural timber panels	

Key

♻ product with recycled content

GreenSpec

Search

L681 Thermal insulation

- external walls
- pitched roofs
- flat roofs
- intermediate and seperating floors
- ground floors
- internal walls / partitions
- services
- general applications

external walls

Manufacturer	Product	Type			
CR	Flax100	flax slab	✓	✓	
Termex	Termex	loose cellulose for timber frame construction	✓	✓	✓
Homatherm	flexCL 040	cellulose slab for timber frame and partial-fill cavity walls	✓	✓	✓
Homatherm	woodFlex 040	woodfibre slab	✓	✓	
Vital	Vital 040	cellulose slab for timber frame and partial-fill cavity walls	✓	✓	
Excel	Warmcell 500	loose cellulose for wood frames	✓	✓	✓
Plant Fibre Technology	Isonat	hemp and cotton slab	✓	✓	
Second Nature	Thermafleece	wool rolls for timber frame construction	✓	✓	
Gutex	ThermoWall	wood-fibre board	✓	✓	
Pavatex	Pavatherm	wood-fibre board	✓	✓	
	Diffutherm	wood-fibre board, interlocking render carrier	✓	✓	
	Isolair	wood-fibre board, water resistant, for ventilated facades	✓	✓	

Pavatex 'Pavatherm'

Wood fibre board insulation

'Application: wall, floor and roof insulation
Pavatherm is a wooden fibreboard to DIN 68755 Part 1: Fibreboards for building constructions; Insulation material for thermal protection. The board does not contain any glue or wood preservatives. Pavatherm is effective in reducing the U value (thermal transmittance), in improving acoustic sound protection and summer heat protection (phase postponement). Pavatherm can be used in new and renovation buildings.

Application: wall, floor and roof insulation

Thermal Conductivity (K) = 0.040 W/m.K '

Manufacturer's evidence rating:*	★
Material/s:	wood fibre
Environmental statement:	none
BRE Ecopoints:	unrated
BRE Environmental profile:	unrated
Other environmental standards:	none
3rd party accreditation:	none
3rd party product endorsement:	none
Reusability / Recyclability:	recyclable & reusable
% of post consumer waste:	unknown
Life expectancy	life of building
Substitute for or new materials / method:	insulation from non-renewable sources
Editors' comments:	
Country/s of manufacture:	Germany

AECB Carbon Lite

GreenSpec
www.greenspec.co.uk

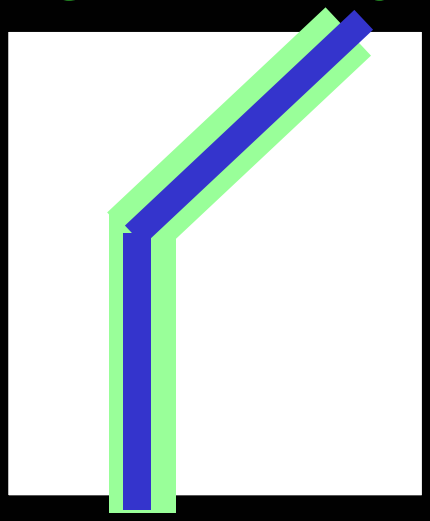
NGS GreenSpec
Many Services

AECB Carbon Lite

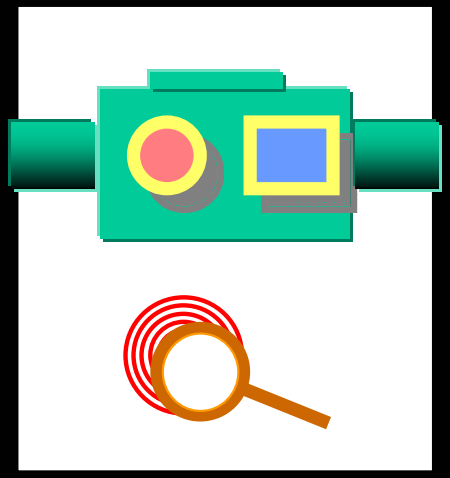
Systems

GreenSpec
www.greenspec.co.uk

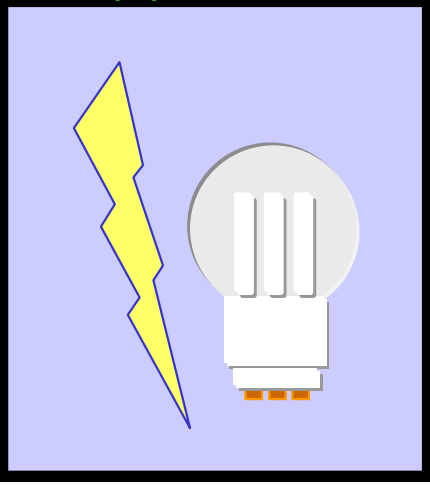
Buildings Fabric Systems



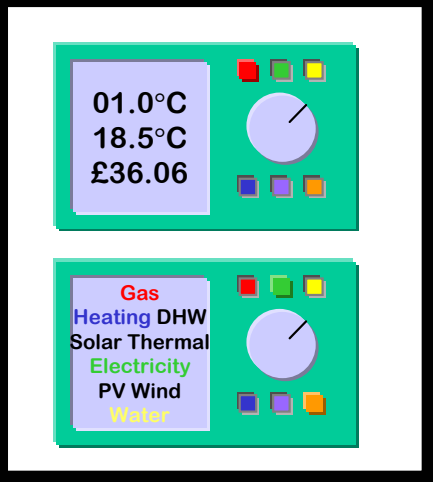
Ventilation, Heating & Cooking



Electrical Power, Lighting & Appliances



Controls Monitoring Metering



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Search

L752 Transformation & conservation of energy

wood / biomass fuel boilers

Manufacturer	Product	Type	
Binder	'RRK' series boilers	biomass boilers for commercial, industrial and large residential	✓
	'PK' series boilers	wood pellet boiler for domestic use	✓

wood fuel stoves

Manufacturer	Product	Type	
Tonwerk	Topolino	wood burning stove	✓
	T-ONE	wood burning stove	✓
	T-LOFT	wood burning stove	✓
Extraflame	'Extraflame' pellet stoves	wood pellet stove	✓

hot water solar collectors

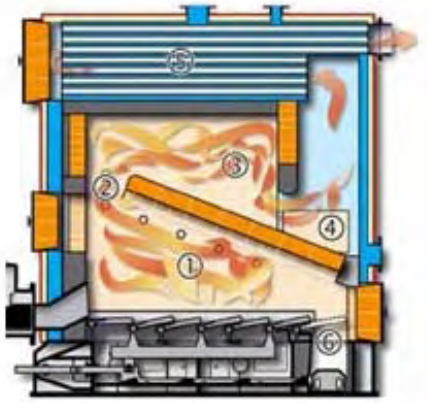
Manufacturer	Product	Type	
Energie Solaire	Azur	flat-plate collector	✓
	Solar Roof	integrated roof collector	✓
solarcentury	C21t : Solar hot water roof tile	collector tile	✓
	Solar Hot Water Sunstation	flat-plate collector	✓
Thermomax	Thermomax	evacuated tube collector	✓
	Solamax	evacuated tube collector	✓
	Mazdon	evacuated tube collector	✓
Solar Twin	Solartwin	flat-plate collector	✓

Binder 'RRK' series boilers

Biomass boilers for commercial, industrial and large residential

'The BINDER range of biomass boilers sets a bench-mark for convenience and comfort in handling:
• automated de-ashing*
• automatic cleaning of the heat exchanger*
• computer based capacity and combustion control* and accumulator tank management*
Start the boiler and have heat generated around the clock - with only bi-annual servicing for routine inspection and cleaning.

BINDER boilers achieve efficiency ratings of up to 92 percent*.
• The CVP control package* gives fully modulating capacity control from 25% to 100%.
• Speed-control* on all fans minimises the electric power consumption.
• The Lambda O2 regulation improves efficiency and brings out the most of your fuel.
• High quality engineering with a minimum on maintenance
required provides for high availabilty.



*...dependent on plant size and system configuration'

Manufacturer's evidence rating:*	★
Material/s:	unknown
Environmental statement:	no
BRE Ecopoints:	unrated
BRE Environmental profile:	unrated
Other environmental standards:	none
3rd party accreditation:	EN303-5
3rd party product endorsement:	none
Reusability / Recyclability:	reusable
% of post consumer waste:	unknown

Energie Solaire	Azur	flat-plate collector
	Solar Roof	integrated roof collector
solarcentury	C21t : Solar hot water roof tile	collector tile
	Solar Hot Water Sunstation	flat-plate collector
Thermomax	Thermomax	evacuated tube collector
	Solamax	evacuated tube collector
	Mazdon	evacuated tube collector
Solar Twin	Solartwin	flat-plate collector

heat pumps

Manufacturer	Product	Type	
Dimplex	Ground Source Heat Pump	domestic GSHP	✓
	Air to Water Heat Pump	domestic air to water heat pump	✓

hot water management systems

Manufacturer	Product	Type	
Sandler	M2 solar thermal system	thermal hot water management system	✓
	014-2 thermal system	thermal hot water management system	✓

energy managment controls

Manufacturer	Product	Type	
Sandler	FW Thermal System	renewable energy management contols	✓

Key

product / equipment with climate change reduction potential

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GreenSpec

Search

Sandler 'FW Thermal System'

Renewable energy management contols

The Sandler FW system integrates conventional and renewable energy sources to manage your space heating and to provide instant domestic hot water. It prioritises the use of green energy. The FW modules are pretested making design and build simple and performance is guaranteed. The system is future proof.

Heat can be taken from solar thermal collectors, heat pumps, district heating and conventional boilers - priority is given to renewable sources. Both low and high temperature emitters are controlled as standard. The systemt optimises the charging of a thermal buffer which avoids the pollution and wear and tear of short cycling boilers. Energy monitoring and system diagnostics are available as options with a modem link.

For larger buildings, e.g. offices, schools, hotels and factories, the Sandler 020 is the system of choice.

The Sandler is a complete heating and hot water system. It optimises your heating system and buffer heat store allowing multiple heat sources to be combined. The controller prioritises renewable energy and reduces the effect of Climate Change Levy.

Domestic hot water is heated instantly and at constant temperature.

Flow rates of 20, 30 & 40 (l/min) are available as standard with higher ones to order. The system optimises energy use saving 10-16% in the production and distribution of DHW with existing boilers. By providing hot water safely at 50°C instead of 60°C as usual, the energy savings increase to 20-25%. To get the best out of the controller we recommend using the Sandler STB Buffer.'

Manufacturer's evidence rating:*	★
Material/s:	control equipment materials
Environmental statement:	no
BRE Ecopoint:	unrated

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NGS GreenSpec Product List Page

CLP endorsement added to lists of products

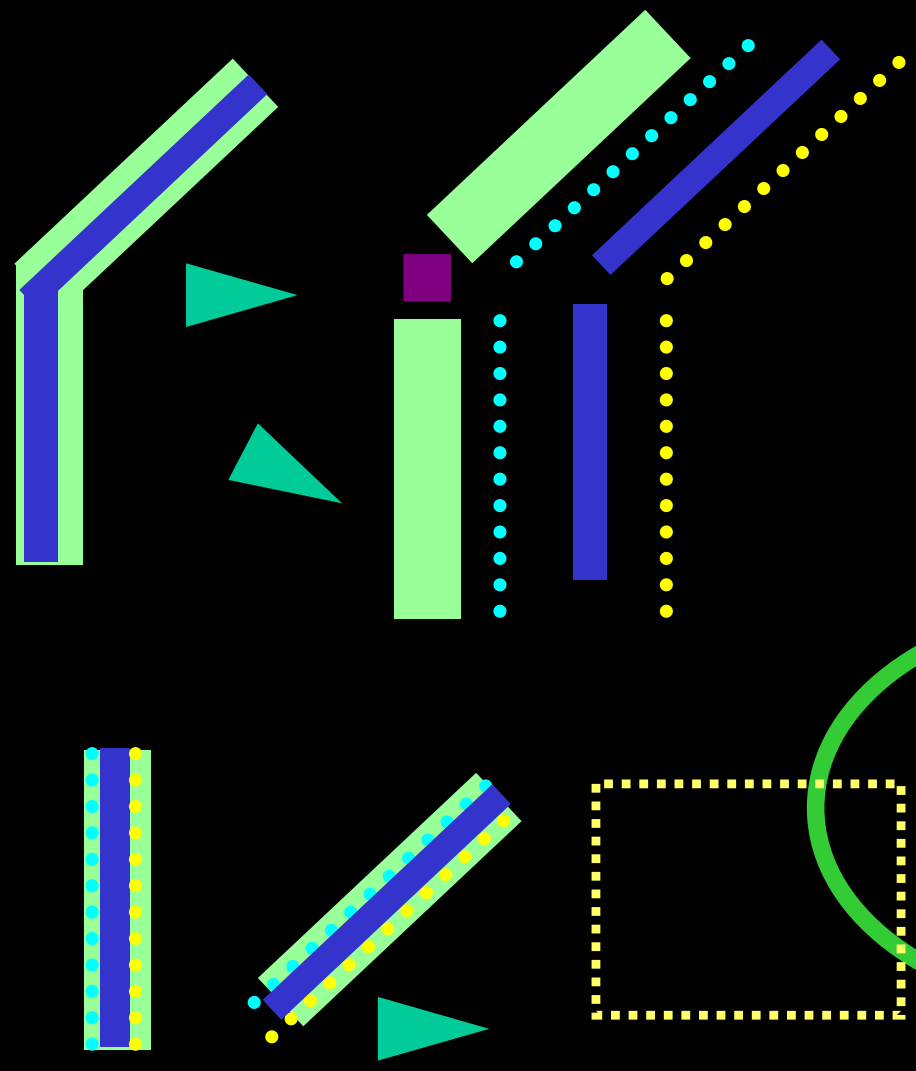
GreenSpec

Web Pages

Assembly List/Diagram Page

Assembly Diagram Pages

Industry Solution Assembly Diagram Pages



Product Specification Clauses

Product Pages

Product List Pages (equivalents)

GreenSpec

Search

L681 Thermal insulation

- external walls
- pitched roofs
- flat roofs
- intermediate and seperating floors
- ground floors
- internal walls / partitions
- services
- general applications

external walls

Manufacturer	Product	Type				CLP
	Flax100	flax slab	✓	✓		✓
Termex	Termex	loose cellulose for timber frame construction	✓	✓	✓	
Homatherm	flexCL 040	cellulose slab for timber frame and partial-fill cavity walls	✓	✓	✓	✓
Homatherm	woodFlex 040	woodfibre slab	✓	✓		
Vital	Vital 040	cellulose slab for timber frame and partial-fill cavity walls	✓	✓		✓
Excel	Warmcell 500	loose cellulose for wood frames	✓	✓	✓	
Plant Fibre Technology	Isonat	hemp and cotton slab	✓	✓		✓
Second Nature	Thermafleece	wool rolls for timber frame construction	✓	✓		
Gutex	ThermoWall	wood-fibre board	✓	✓		
Pavatex	Pavatherm	wood-fibre board	✓	✓		✓
	Diffutherm	wood-fibre board, interlocking render carrier	✓	✓		

GreenSpec

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PRODUCTS CONTENTS

- L2 Complete construction entities
- L3 Structural and space division

L681 Thermal insulation

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- services
- general applications

external walls

Manufacturer	Product	Type				CLP
	Flax100	flax slab	✓	✓		P5
Termex	Termex	loose cellulose for timber frame construction	✓	✓	✓	
Homatherm	flexCL 040	cellulose slab for timber frame and partial-fill cavity walls	✓	✓	✓	G6
Homatherm	woodFlex 040	woodfibre slab	✓	✓		
Vital	Vital 040	cellulose slab for timber frame and partial-fill cavity walls	✓	✓		S4
Excel	Warmcell 500	loose cellulose for wood frames	✓	✓	✓	G6
Plant Fibre Technology	Isonat	hemp and cotton slab	✓	✓		
Second Nature	Thermafleece	wool rolls for timber frame construction	✓	✓		S4
Gutex	ThermoWall	wood-fibre board	✓	✓		
Pavatex	Pavatherm	wood-fibre board	✓	✓		P5
	Diffutherm	wood-fibre board, interlocking render carrier	✓	✓		

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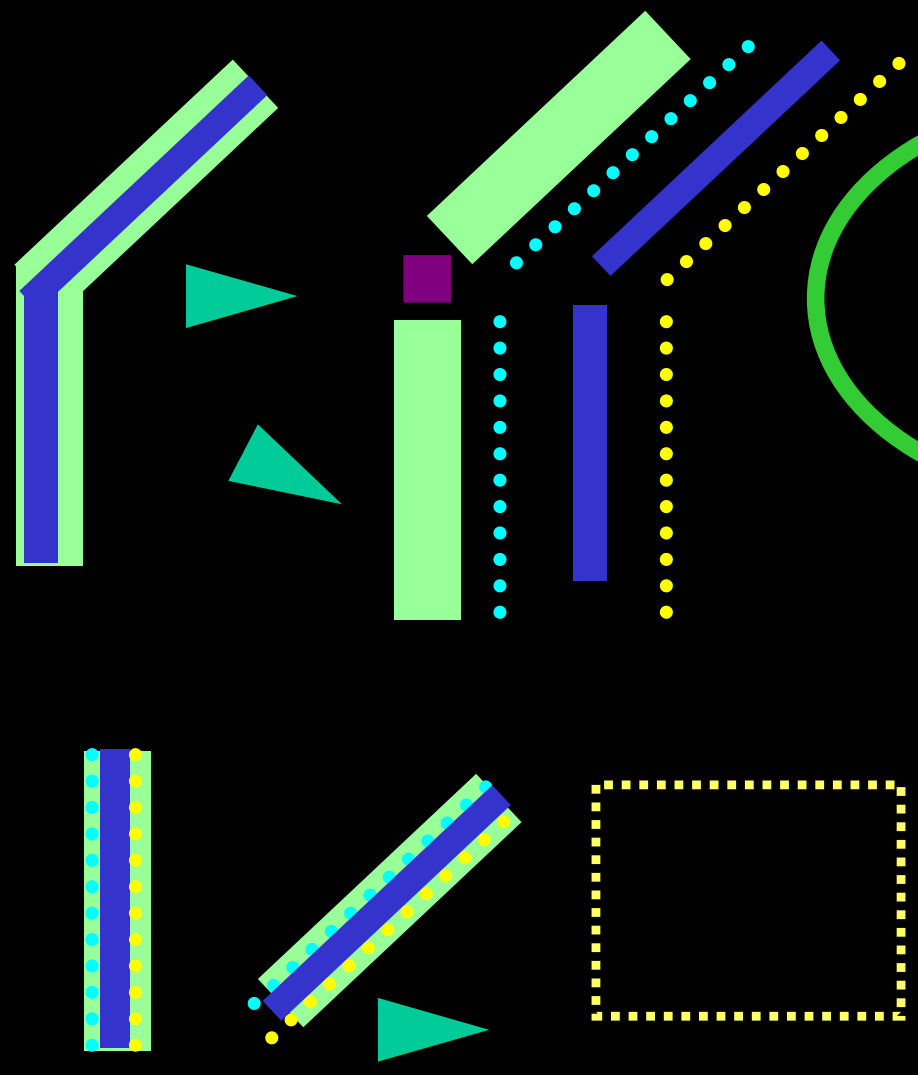
Web Pages

Assembly List/Diagram Page

Assembly Diagram Pages

Industry Solution Assembly Diagram Pages



Product Specification Clauses

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GreenSpec is the UK construction industry's definitive guide to sustainable construction. Inside GreenSpec you will find a wealth of information aimed at helping you to design more energy and resource efficient buildings using materials and technologies that minimise damage to people and the environment.

PRODUCTS

A directory of sustainable products available in the UK. Each product page comes with a description, brochure downloads and contact details.

MATERIALS

A guide to sustainable materials, both traditional and new. Materials such as masonry, roofing and flooring are compared based on their enviromental impacts.

CHECKLIST

This CAWS menu-based checklist takes you through the construction process highlighting areas where sustainable construction best practice can be applied.

The GreenGrid Modular Green Roof System
for simplicity and flexibility in design and budget
www.greengridroofs.co.uk Tel: 01698 464620

GREENGRID
The Natural Choice for Your Roof

SPECIFICATIONS

ENERGY

IMAGE BANK

GreenSpec

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Search results

Search: Go

all words any words exact ph

Displaying results: 1 - 7 Total results: 7

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- PRODUCTS CONTENTS
- L2 Complete construction entities
- L3 Structural and space division

Excel 'Warmcel 500'

Cellulose thermal insulation for walls, roofs and floors

'Developed for EVT Technology applications, Warmcel 500 combines high levels of insulation with excellent breathability. Used for EVT walls, roofs and floors; timber frame walls and warm roofs, Warmcel 500 can be either TurboFill installed or damp spray installed.

With an impressive thermal conductivity value (k) of only 0.036 W/mK, Warmcel's 'in use' performance is further enhanced by its ability to create a high level of air-tightness to prevent thermal convection currents.'

Manufacturer's evidence rating:'	★★★
Material/s:	recycled newspaper with non-toxic additives
Environmental statement:	yes
BRE Ecopoints:	0.005
BRE Environmental profile:	A
Other environmental information:	none
3rd party accreditation:	BBA cert 94/3027 for timber frame construction
3rd party product endorsement:	LPCB accredited CfSH Level 4, CLP Step 1: Silver
Reusability / Recyclability:	reusable as insulation
% of post consumer waste:	100% recycled newsprint
Life expectancy	lifetime of the building
Substitute for or new materials / method:	insulation from non-renewable sources
Editors' comments:	
Country/s of manufacture:	UK

Absolute Score

Relative Rating

NGS GreenSpec - Products - <!-- TemplateBeginEditable name="Product name" -->Product name <!-- - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites
Address http://www.greenspec.co.uk/html/product-pages/index.php?id=252
Go
Google Go Bookmarks Popups okay Check AutoLink AutoFill Send to Settings

Reusability / Recyclability:	reusable as insulation
% of post consumer waste:	100% recycled newsprint
Life expectancy	lifetime of the building
Substitute for or new materials / method:	insulation from non-renewable sources
Editors' comments:	
Country/s of manufacture:	UK
UK distribution location:	Gwent
Downloads:	Product brochure
Product specification clause:	-
Work sections:	-
Manufacturer:	Excel Industries
Address:	Maerdy Industrial Estate, Rhymney, Gwent NP22 5PY
Telephone:	01685 845 200
Email:	sales@excelfibre.com
Website:	www.excelfibre.com
Available direct:	yes
Suppliers:	Direct from manufacturer
Alternative products:	Thermal insulation
Further information:	Insulation materials compared
Information last updated:	Monday 24th, July 2006

The product has been selected on the above average performance in the following areas:

-	Abiotic depletion	-	Acidification
✓	Global warming	-	Eutrophication
-	Ozone layer depletion	✓	Solid Waste

NGS GreenSpec - Products - <!-- TemplateBeginEditable name="Product name" -->Product name <!-- - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites
Address http://www.greenspec.co.uk/html/product-pages/index.php?id=252
Go
Google Go Bookmarks Popups okay Check AutoLink AutoFill Send to Settings

Telephone:	01685 845 200
Email:	sales@excelfibre.com
Website:	www.excelfibre.com
Available direct:	yes
Supplied by:	Direct from manufacturer
Alternative products:	Thermal insulation
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-	Abiotic depletion	-	Acidification
✓	Global warming	-	Eutrophication
-	Ozone layer depletion	✓	Solid Waste
-	Human toxicity	-	Radioactivity
-	Fresh water aquatic ecotoxicity	-	Minerals extraction
-	Terrestial exotoxicity	-	Water extraction
-	Photochemical oxidation		

*Note:
Manufacturer's evidence rating
* One star rating: The product has been included based on an assessment of the manufacturer's own product information.
*** Three star rating: The product has been included on the basis of a third party, independent, Life Cycle Analysis (BRE Ecoprofile or similar).

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NGS GreenSpec Registering Products

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- REGISTER YOUR PRODUCT

Register your product on GreenSpec

Why your product should be on GreenSpec:

1 Make your information available to thousands of designers looking to specify green products

2 Have your product accredited as a 'Green' product by industry experts

3 Be part of a rapidly growing market place

What is GreenSpec?

GreenSpec provides information and specifications, particularly of 'sustainable'/'green' building products, to construction professionals.

GreenSpec is a product of government and construction industry drives towards sustainability. The database and website has been established by a collaboration between architects, specifiers, information suppliers, contractors, the DTI and the Building Research Establishment.

If you produce building components with 'sustainable' credentials, we welcome your submissions to the GreenSpec catalogue.

- 'Being on GreenSpec has promoted our business and provided us with many new enquiries from designers looking to specify our products' *Ailsa Irwin, Trelleborg Elastomers*
- 'An invaluable guide to products with green credentials' *The Independent*
- 'GreenSpec is an online CPD for sustainable construction' *Pat Borer, architect and author*
- GreenSpec is the only such service provider to be endorsed by the RIBA

Why GreenSpec is important to the construction products market

REGISTER YOUR PRODUCT

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- Case studies
- A library of downloadable documents covering aspects of sustainable construction
- Links to suppliers, installers and sub-contractors
- A CPD service
- All information is freely accessible

Search Engine Rankings

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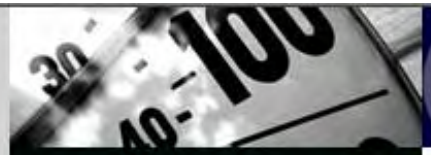

GreenSpec

Search

Research and Papers

1 Construction

'Sustainable Construction: Whole Life Cost Benefits'	A report by Cyrill Sweetts comissioned by Kent County Council / Interreg IIIA to establish the **cost of alternative materials** commonly used in sustainable construction. The survey results are tabulated to allow direct comparison and illustrate true value.
'Coping with Substitution'	**Avoiding Substitution** - The substitution of sustainable materials with non-sustainable products by contractors is a major barrier to sustainable construction. By using dedicated specifications instead of the popular generic type, the buildling designer can regain control. (*Brian Murphy, GreenSpec, 2006*)
'Commercial Green Buildings'	**Delivering Sustainable Design in the Real World** - Commercial constraints quite often stunt the ambitions of the building designer. In this paper, a strategy for breaking down these barriers is explored an the practical implications for the design of buildings in the future are discussed. (*Andrew Pettifer, Gifford & Partners, 2003*)
'UK Housing and Climate Change'	**Heavyweight vs lightweight construction** - This important report demonstrates that as UK temperatures climb,' lightweight' buildings are ill-prepared to meet the challenge. 'Heavyweight' construction that borrows from traditional cooling techniques in Southern Europe is setting the model for future housing developments. (*Ove Arup and Bill Dunster Architects, 2005*)
'Thermal Mass for Housing'	**Concrete solutions for the changing climate** - This guide provides information on the simple, passive design techniques that can be applied in masonry and concrete dwellings to take advantage of their inherent thermal mass on a year-round basis. (*The Concrete Centre, 2006*)
'Earth Brick Construction'	This report presents the results of a two-year research programme to monitor and evaluate the performance of **earth masonry in modern wall construction**. The programme made a detailed study of one new building through the complete construction process, including design, procurement and occupation. It also took into consideration several other projects that used these materials. Tom Morton is currently writing '*Earth Masonry: Design & Construction Guidelines*' to be published by the BRE in Spring 2007.
'Intro to the Green Guide'	**An Introduction to the Green Guide to Specification** - This introduction looks at the fundamentals of the Green Guide and how it works for building designers (*Tuija Halonen, BRE, 2005*)
'GreenSpec and the Market'	Far from leading the way, the **GreenGuide preserves the status quo** and stifles the market in green products. By lowering the bar to green product accreditation, GreenSpec creates an alternative

GreenSpec

GREENSPEC AND THE GREEN MARKET

by Sandy Patience

INTRODUCTION

The identification and inclusion in our buildings of materials/products that minimise damage to the environment plays a crucial role in sustainable construction. Most materials are derived from natural resources. Some natural resources are plentiful and even renewable, but many are becoming increasingly scarce. Building products can contribute to the pollution of the environment in their manufacture and use as well as providing a source of danger to our health.

It makes sense that we develop a building materials strategy that minimises the use of diminishing resources and minimises the use of energy in manufacturing- and reduces the impact of buildings on our health and wellbeing.

Such a strategy should have as one of its essential characteristics a system by which the more environmentally friendly materials can be distinguished from the less environmentally friendly. Ideally, the strategy will help to define a market within which all green products, both traditional and innovative, prosper.

AN EMERGING STANDARD

The proposed 'Code for Sustainable Homes' lists 'Use of materials' as an 'essential element'. Use of the Code requires the relevant 'Minimum Standard' to be a 'log book inventory' for the homeowner of materials/products used in the construction of the home. Quite what a list of components means to a householder and how that progresses the case, needs a plausible explanation. However, the Code goes on to explain how further points can

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GreenSpec

COPING WITH SUBSTITUTION

by Brian Murphy

QUALITY

"There is hardly anything in the world that some man cannot make a little worse and sell a little cheaper, and the people who consider price only are this man's lawful prey." John Ruskin (1819-1900)

With the growth in Design and Build, Construction Management, Management Contracting and their many hybrids, we have seen changes in specification that have eroded the position of the designer and the quality of the completed building. Increasingly the requirements and methods of these forms of procurement have influenced the practices of contractors working under traditional contracts. Significantly it has become more commonplace for contractors to offer alternative products to those specified, usually offering potential savings.

If tender figures are returned that match the project budget, there should be no need to consider alternatives. However, if savings subsequently need to be made, it is the responsibility of the QS to identify areas of efficiency within the design and not that of the contractor who will inevitably governed by wholly different priorities.

PRODUCT QUALITY AND DESIGN LIFE

It should be understood that potential savings usually mean diminished quality and life expectancy. Often cheaper initial costs mean more expensive in-use costs: running, maintenance and replacement costs and increases in maintenance and replacement frequency.

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Search Popups okay Check AutoLink AutoFill Options

116 → SPECIFICATION·SUBSTITUTION:¶

A → Where·a·substitution·for·a·specified·material,·component·or·system·is·proposed·as·part·of·the·alternative·tender,·give·reasons·for·substitution,·submit·all·evidence·showing·its·equivalency,·compare·it·with·equivalent·information·for·the·specified·material,·highlighting·the·relevant·characteristics·showing·where·there·is·equivalent·or·improved·performance(s).¶

B → Where·required·provide·certified·translations·to·English.¶

C → Ensure·such·information·includes·(where·relevant):¶

→ Manufacturer's·illustrative·and·technical·literature,¶

→ Performance·characteristics,¶

→ Performance·test·results·and/or·assessments,¶

→ Third·party·independent·accreditation,¶

→ Environmental·criteria·and·characteristics,¶

→ Environmental·Profiles,¶

→ Specification,¶

→ Drawings,¶

→ Method·statements,¶

→ CDM·Risk·assessment·and·COSHH·data·sheet·review.¶

Manufacturer:·Quality·Assurance,·Environmental·Management,·Environmental·Policy·and·Social·Policy·statements.¶

→ Environmental·assessment·of·manufacturer,·materials,·transport,·embodied·energy,¶

→ Environmental·profile·of·product,·materials,·transport,·embodied·energy,¶

→ Life·Cycle·Costing,·Cradle·to·Cradle,·if·unavailable·Cradle·to·grave.¶

→ Component·Life·Assessment.·(based·on·HAPM,·BPG·&·BLP·Component·Life·Manual)¶

→ Information·of·availability·of·spares·and·maintenance·materials·in·the·UK.¶

D → Where·no·evidence·is·provided,·substitution·will·not·be·considered.¶

E → If·further·specification·substitutions·are·proposed·during·the·[Contract]·provide·all·such·information·with·at·least·1·months·notice·of·date·of·ordering·materials,·to·allow·evaluation·by·the·[CA],·to·meet·the·Programme.¶

F → Any·substitutions·carried·out·without·such·submission·will·be·required·to·be·replaced·with·the·specified·materials[.¶

G → See·also·A30/535A·&·A31/200A,·201A·&·210A.]¶

H → See·A90/117.¶

¶

117 → ENVIRONMENTAL·PURCHASING·POLICY:·TRANSPORT¶

Whilst·public·body·procurement/financing·must·not·create·technical·barriers·to·restrict·the·purchase·of·materials·to·local·sources·and·must·open·this·up·to·manufacturers·in·other·EU·states·to·the·benefit·of·the·EU's·economy·as·a·whole.¶

This·often·leads·to·very·open·specifications·and·materials·are·being·procured·outside·the·EU·with·no·

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REGISTER YOUR PRODUCT

http://www.greenspec.co.uk - The GreenSpec 'Product Page' - Microsoft Internet Explorer

GreenSpec

'PRODUCT PAGE' FEATURES

TBS Elastomers 'Ecoseal'

TPO roofing membrane

'Ecoseal EP roofing membranes are based on thermoplastic polypropylene (TPO) compounds. While behaving like the more widely used PVC roofing systems in terms of installation and appearance, Ecoseal does not contain any environmentally harmful chemicals commonly found in other roofing membranes such as plasticisers, toxins, dioxins and halogens.

The base resin and manufacturing process allows development of a flexible sheet membrane in thicknesses of 1.2mm, 1.52mm and 2.1mm capable of being joined by hot air welding.

As there are no plasticisers to leach from the product, this has the added benefit of not causing harmful runoff into the water courses, however the membrane still retains its flexibility over time providing a long lasting waterproofing solution.

Ecoseal can be installed using solvent free adhesives enabling full climate protection without environmental damage. The membrane is complimented by a complete range of sealants and metalwork and is available in an attractive range of colours enabling aesthetic appeal to a variety of roof shapes.

Ecoseal has an extensive listing with FM Global for system performance with some of the highest wind uplift ratings available and is agreement approved by leading European and international standards.

Ecoseal Roofing Systems are Energy Star rated, a growing trend in the UK, ensuring minimum additional energy is required to cool the building using air conditioning during warmer periods.

All in all, Ecoseal Roofing Systems offer full climate protection with minimum environmental impact when compared with alternative means of waterproofing and as such, have been used extensively on large commercial, industrial and public projects worldwide for over ten years.'

Description of your product

Pictures of your product

Environmental data

Product brochure / datasheet downloads

Contact details and links to your website

Suppliers

Why your product was selected

Done

Internet

• Using an internet search engine is a common way to find information about building products, so its important that a product name rates highly on search engine lists.
• Typically around 35% of all visitors come to GreenSpec via internet search engines.
Though rating positions can't be guaranteed, GreenSpec performs spectacularly. On average:
• **38%** of all products registered on GreenSpec achieve **1st place** in the Google rankings.
• **81%** of all products achieve places within the **top 5** Google rankings.
• Where manufacturers' own websites are ranked on Google, **54%** of GreenSpec entries appear HIGHER in the rankings.

What products does GreenSpec select?

The products we select are commercially available products / materials (currently available in the UK) that embody one or more positive environmental attributes or qualities that distinguish it from other products or materials in the same function category.
More about assessment methodology and criteria.....

Our service to you

• Once you have submitted details of your product it will be assessed by the GreenSpec selection panel.
• If your product is selected, we will ask you to provide us with further information.
• With the information you provide us we will enter your product's 'product page' into the GreenSpec database for publication.
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What it all costs

GreenSpec is a non-profit making organisation. All income subsidises the production of information, maintenance and marketing.
• The charge for a basic 'Product Page' on GreenSpec is £295 plus VAT per annum.
• There is a pro-rata reduction rate if you should wish to include more than one product page.
• **See the GreenSpec subscription rates**

What to do next

If you should like your product included on GreenSpec, please contact us initially by completing and

GreenSpec

Search

- HOME
- PRODUCTS
- MANUFACTURERS
- SPECIFICATIONS (available 2007)
- MATERIALS
- ENERGY
- CHECKLIST
- DESIGN
- IMAGE BANK
- REFURBISHMENT
- FORUM
- SITE WASTE
- DURABILITY
- SUPPLIERS & INSTALLERS
- FABRICATORS
- RECLAMATION
- CRAFTSMEN
- POLICIES & STRATEGIES
- RESEARCH & PAPERS
- RESOURCES
- CPD
- **HOW WE SELECT PRODUCTS**
- CONTACT GREENSPEC
- REGISTER YOUR PRODUCT

How products are selected for GreenSpec

Green Product Definition

For the purposes of *GreenSpec* , a 'green' product / material is:

A commercially available product / material (currently available in the UK) that embodies one or more positive environmental attributes or qualities that distinguish it from other products or materials in the same function category.

The selection process

1 Submit → 2 Evaluate → 3 Accredit → 4 Publish

Information

Selection Panel

Quality of evidence

GreenSpec

Website

1 Submission of information

The submission by the manufacturer will comprise of one or more of the following documents:

- Manufacturer's literature including details of the manufacturing process and component material(s)
- Independent environmental certification (eg Eco Profiling or other LCA)
- Independent verification of manufacturer's claims
- Manufacturer's own support of claims
- Environmental Management Certification (ISO 14001 series) or other uncertified certification system
- Complience with Construction Products Directive Essential Requirments and or EC Mark
- Complience with British Standard(s)
- BBA Certification

• Using an internet search engine is a common way to find information about building products, so its important that a product name rates highly on search engine lists.
• Typically around 35% of all visitors come to GreenSpec via internet search engines.
Though rating positions can't be guaranteed, GreenSpec performs spectacularly. On average:
• **38%** of all products registered on GreenSpec achieve **1st place** in the Google rankings.
• **81%** of all products achieve places within the **top 5** Google rankings.
• Where manufacturers' own websites are ranked on Google, **54%** of GreenSpec entries appear HIGHER in the rankings.

What products does GreenSpec select?

The products we select are commercially available products / materials (currently available in the UK) that embody one or more positive environmental attributes or qualities that distinguish it from other products or materials in the same function category.
More about assessment methodology and criteria.....

Our service to you

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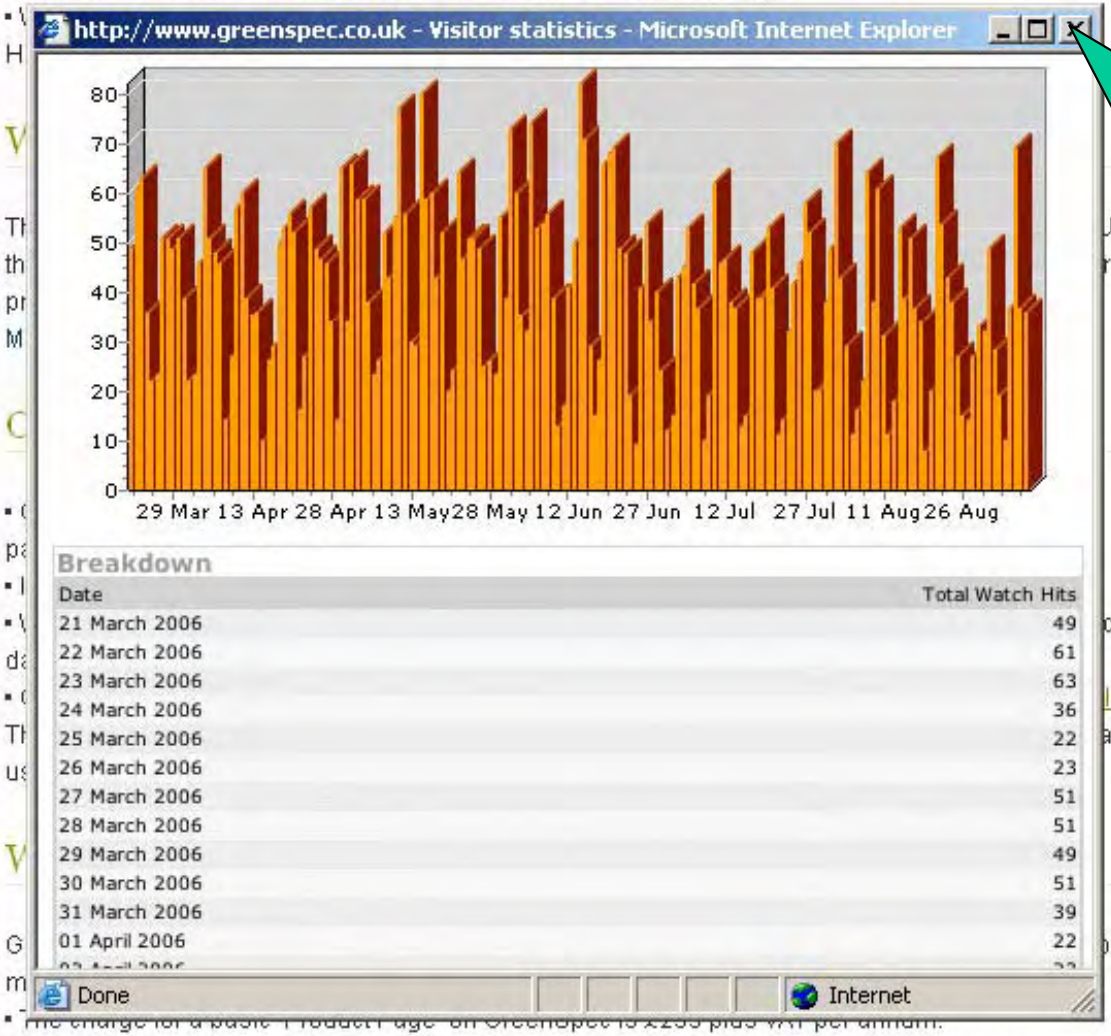

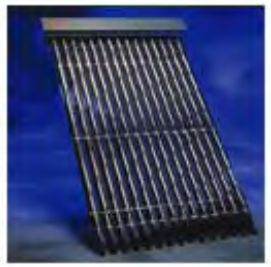

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What to do next

If you should like your product included on GreenSpec, please contact us initially by completing and

GreenSpec

Search

Subscription rates

Select a **1 year** subscription - Price per 'Product Page' :

1 page	2 pages	3-5 pages	5-10 pages	10+ pages
£295*	£250 each*	£200 each*	£150 each*	£125 each*

OR subscribe for 2 years and save up to £80 per page on 2 one year subscriptions

Select a **2 Year** Subscription – Price per 'Product Page' :

1 page	2 pages	3-5 pages	5-10 pages	10+ pages
£495*	£425 each*	£325 each*	£225 each*	£200 each*

Examples showing savings by subscribing for 2 years

Example 1: you have 1 product to register

1 year subscription:
You have one product that you want to register for one year:
1 x £295 = £295 plus VAT
2 year subscription
You have one product that you want to register for two years:
1 x £495 = £495 plus VAT (the equivalent of £247.50 per page per year)

Example 2: you have 7 products to register

1 year subscription:
7 x £225 = £1050 plus VAT
2 year subscription
You have 7 products that you want to register for two years

- See the GreenSpec subscription rates

What to do next

If you should like your product included on GreenSpec, please contact us initially by completing and submitting the form below. We will then contact you with further information:

Contact Information

Name: *
enter your name

Company: *
enter your company

Email Address: *
enter your email address

Email

Product: *
enter the product name

Details: *
enter details of what makes the product 'green'

(maximum of 5000 characters)

Send Email

Fields marked with * are required.

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AECB Carbon Lite

GreenSpec
www.greenspec.co.uk

Materials Characteristics Comparison Pages: Insulation

GreenSpec

Search

- HOME
- PRODUCTS
- MANUFACTURERS
- SPECIFICATIONS (available 2007)
- MATERIALS
- ENERGY
- CHECKLIST
- DESIGN
- IMAGE BANK
- REFURBISHMENT
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- FABRICATORS
- RECLAMATION
- CRAFTSMEN
- POLICIES & STRATEGIES
- RESEARCH & PAPERS
- RESOURCES
- CPD
- HOW WE SELECT PRODUCTS
- CONTACT GREENSPEC
- REGISTER YOUR PRODUCT

GreenSpec is the UK construction industry's definitive guide to sustainable construction. Inside GreenSpec you will find a wealth of information aimed at helping you to design more energy and resource efficient buildings using materials and technologies that minimise damage to people and the environment.

PRODUCTS

A directory of sustainable products available in the UK. Each product page comes with a description, brochure downloads and contact details.

MATERIALS

A guide to sustainable materials, both traditional and new. Materials such as masonry, roofing and flooring are compared based on their enviromental impacts.

CHECKLIST

This CAWS menu-based checklist takes you through the construction process highlighting areas where sustainable construction best practice can be applied.

The GreenGrid Modular Green Roof System
for simplicity and flexibility in design and budget
www.greengridroofs.co.uk Tel: 01698 464620

GREENGRID
The Natural Choice for Your Roof

SPECIFICATIONS

ENERGY

IMAGE BANK

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PRODUCTS
SPECIFICATIONS
MATERIALS
ENERGY
CHECKLIST
DURABILITY
DESIGN
IMAGE BANK
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WASTE
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SUPPLIERS
FABRICATORS
RECLAMATION
CRAFTSMEN
GOVERNMENT
ARTICLES
RESOURCES
CPD
ABOUT US
CONTACT GREENSPEC
REGISTER YOUR PRODUCT

MATERIALS COMPARED:
Bricks
Blocks

Materials - Contents

Materials / components compared:

- Bricks
- Blocks
- Insulation
- Pitched roo[illegible]rings
- Flat roof coverings
- Window frames
- Composite boards
- Joinery paints and stains
- Wall paints
- Smooth flooring
- Carpet and matting

Material / component guides:

- Reclaimed materials
- Lime mortar and render
- Glass and glazing
- The environmental impact of producing plastics
- Cement substitutes

Wood

Insulation materials compared

Key issues

• Reducing the amount of energy used from fossil fuels is the most important factor in promoting sustainability.

• Insulation has the greatest potential for reducing CO_2 emissions.

• Energy conserved through insulation use far outweighs the energy used in its manufacture. Only when a building achieves a 'LowHeat' standard does insulation's embodied energy become significant.

• Insulation performance is the key selection criteria.

• The durability of insulation affects its performance eg settlement, physical degradation, vapour permeability and air movement.

• Careful detailing is needed to avoid the risk of moisture ingress into the insulation.

• Most of the materials below differ in their capacity to reduce heat flow. This means that different materials require different thicknesses to achieve the same effect. These differences need to be considered when planning wall cavity widths.

• Good insulation performance requires careful site supervision.

• Insulation only provides reduction of heat loss through the building fabric. Equally important is the energy lost through ventilation and glazing.

Types of insulation

There is a potentially bewildering array of insulating materials for the specifier to select from. They range from the familiar polystyrene and mineral wool through to alternatives now entering the market

MATERIALS COMPARED:
Bricks
Blocks
Insulation
Pitched roof coverings
Flat roof coverings
Window frames
Composite boards
Joinery paints & stains
Wall paints
Smooth flooring
Carpet and matting

MATERIALS GUIDES:
Reclaimed materials
Lime mortar & render
Glass & glazing
Plastics production
Cement substitutes
Wood:
Green roofs:

Types of insulation

There is a potentially bewildering array of insulating materials for the specifier to select from. They range from the familiar polystyrene and mineral wool through to alternatives now entering the market such as sheeps wool and hemp. In an attempt to give some semblance of order to the array, we have grouped insulation materials according to provenance:

1 Insulation derived from organic sources
2 Insulation derived from naturally occurring minerals
3 Radiant barriers
4 Insulation derived from fossilized vegetation

When selecting an insulation material, primacy should be given to performance in the construction context. Very few insulation materials are capable of performing all the functions called for eg sheeps wool is perfectly suitable for ventilated wall construction but not in unventilated cavities. The choice of insulation will be governed by choice of construction and vice-versa.

Though selection by performance continues to be the most important consideration, the current evolution of the market in 'green' products will complicate the choice for specifiers. Life cycle data is available for some products but other, often newer products have not had their claims verified by third party research. While this state of affairs continues, manufacturers' claims in a competitive market will be open to contention. This fact should be borne in mind when considering the nature of the information we have provided below. Not until all products have undergone LCAs will accurate comparisons be possible.

1 Insulation derived from organic sources

Sheep's wool batts and rolls (BBA certified available)

+	Recyclable
+	Renewable resource
+	Low embodied energy (but can increase significantly if imported)
+	Safe to install; non-hazardous fibre
+	Biodegradable in landfill
+	High natural content
−	Has been argued that wool demand will stimulate methane production

1 Insulation derived from organic sources

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↑	High natural content
↓	Has been argued that wool demand will stimulate methane production
↓	Organophosphates in sheep dips are linked to illness in farmers; they can also damage fish stocks when released into the water courses.
◷	Durability: Wool can absorb some moisture whilst remaining an efficient insulant. This feature can help prevent condensation in cavity wall construction by maintaining the temperature above dew point. Wool is naturally resistant to decay and fungal attack.
—	0.037 W/m°C - 0.040 W/m°C
G	Green Guide rating: unrated

sheep's wool

Cellulose batts

↑	Recycled and recyclable if kept dry
↑	Safe to install; non-hazardous fiber
↑	Biodegradable in landfill
↑	Low embodied energy
↓	Possible odor and formaldahyde outgas (small amount) from printing inks and additives (vapour barriers between the insulation and the living space will prevent this). Mold also appears to be a widely publicised current issue- though only, it would seem, in exceptional cases
↓	Contains additives for fire retardancy, a fungicide, and sometimes a binder to reduce settling. Borax is recommended over aluminum sulphates
◷	Durability: Performance can be compromised if brought into contact with moisture.
—	0.038 W/m°C - 0.040 W/m°C
G	Green Guide rating: A

raw material

AECB Carbon Lite

GreenSpec
www.greenspec.co.uk

NGS GreenSpec Product Selection

How GreenSpec selects products for the website content

GreenSpec

Search

- HOME
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- MANUFACTURERS
- SPECIFICATIONS (available 2007)
- MATERIALS
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GreenSpec

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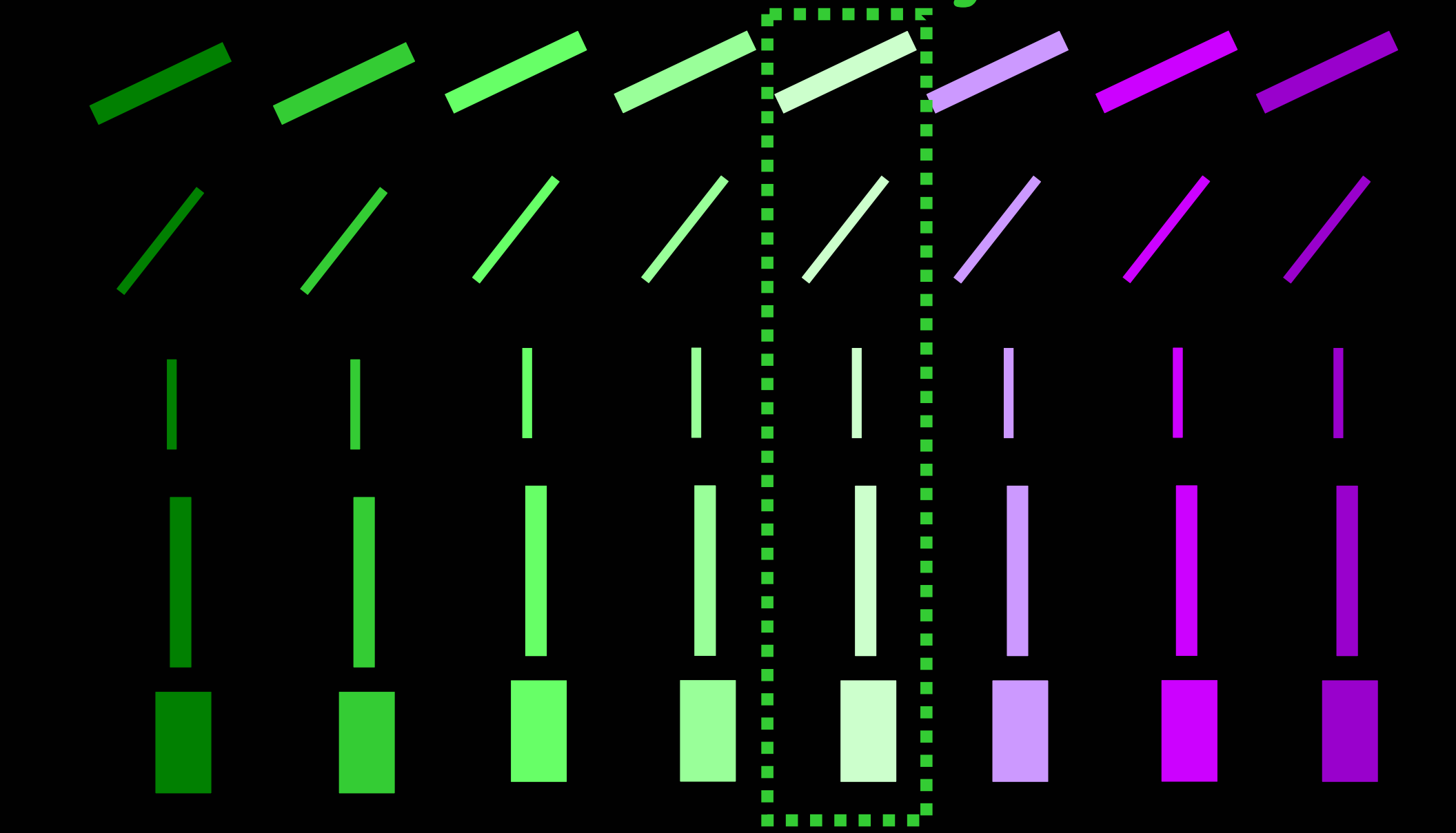
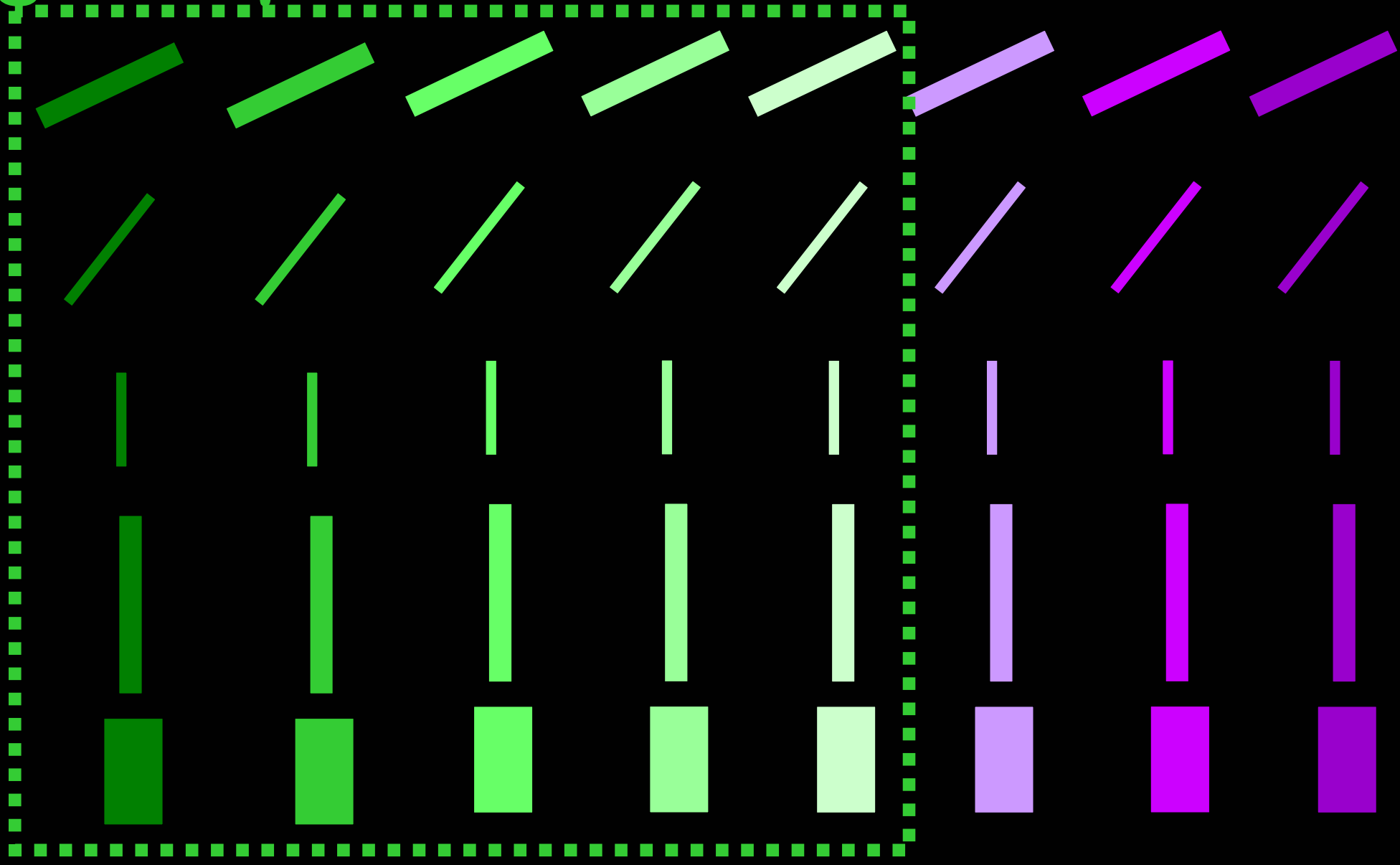
- Manufacturer's own support of claims
- Environmental Management Certification (ISO 14001 series) or other uncertified certification system
- Complience with Construction Products Directive Essential Requirments and or EC Mark
- Complience with British Standard(s)
- BBA Certification

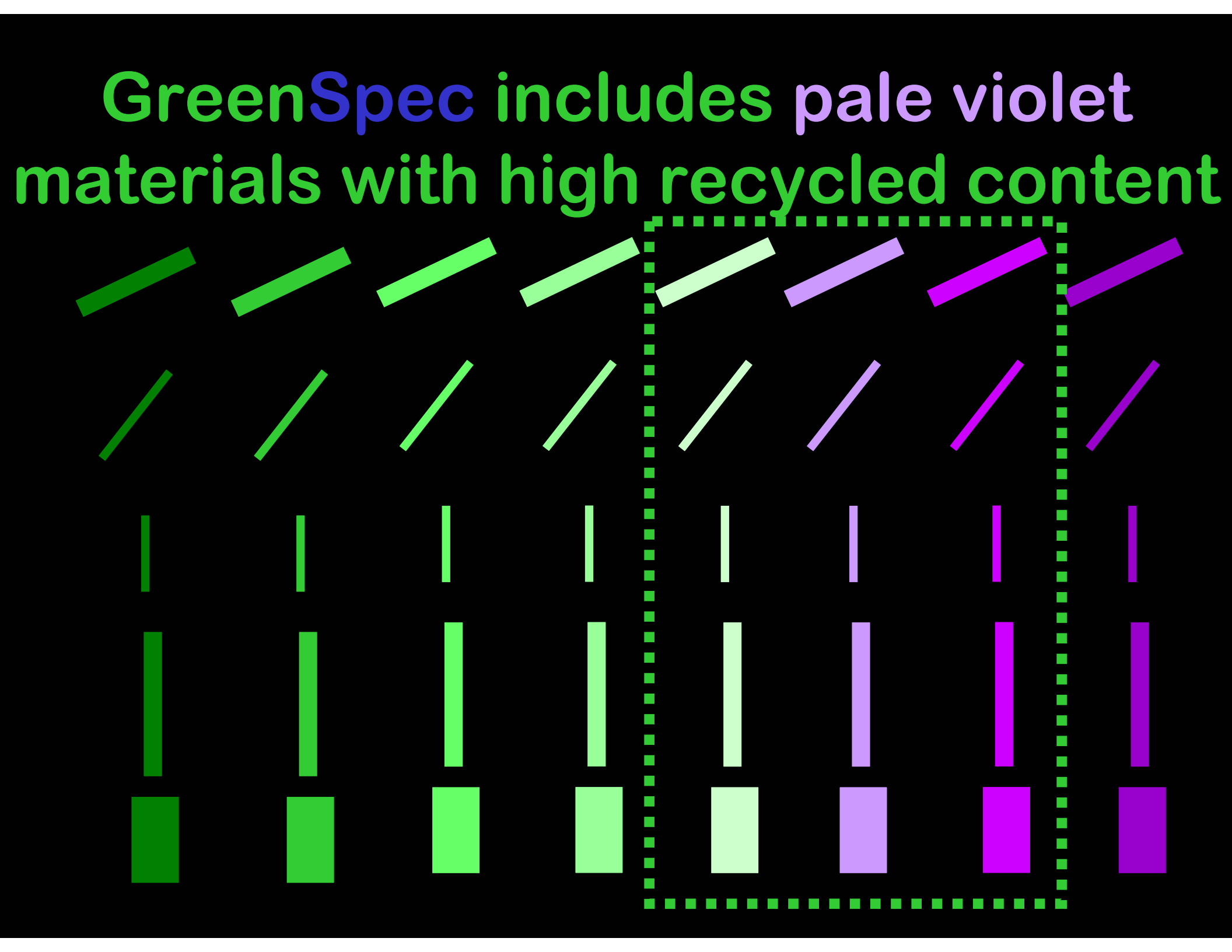
GreenSpec compare environmental characteristics of many materials



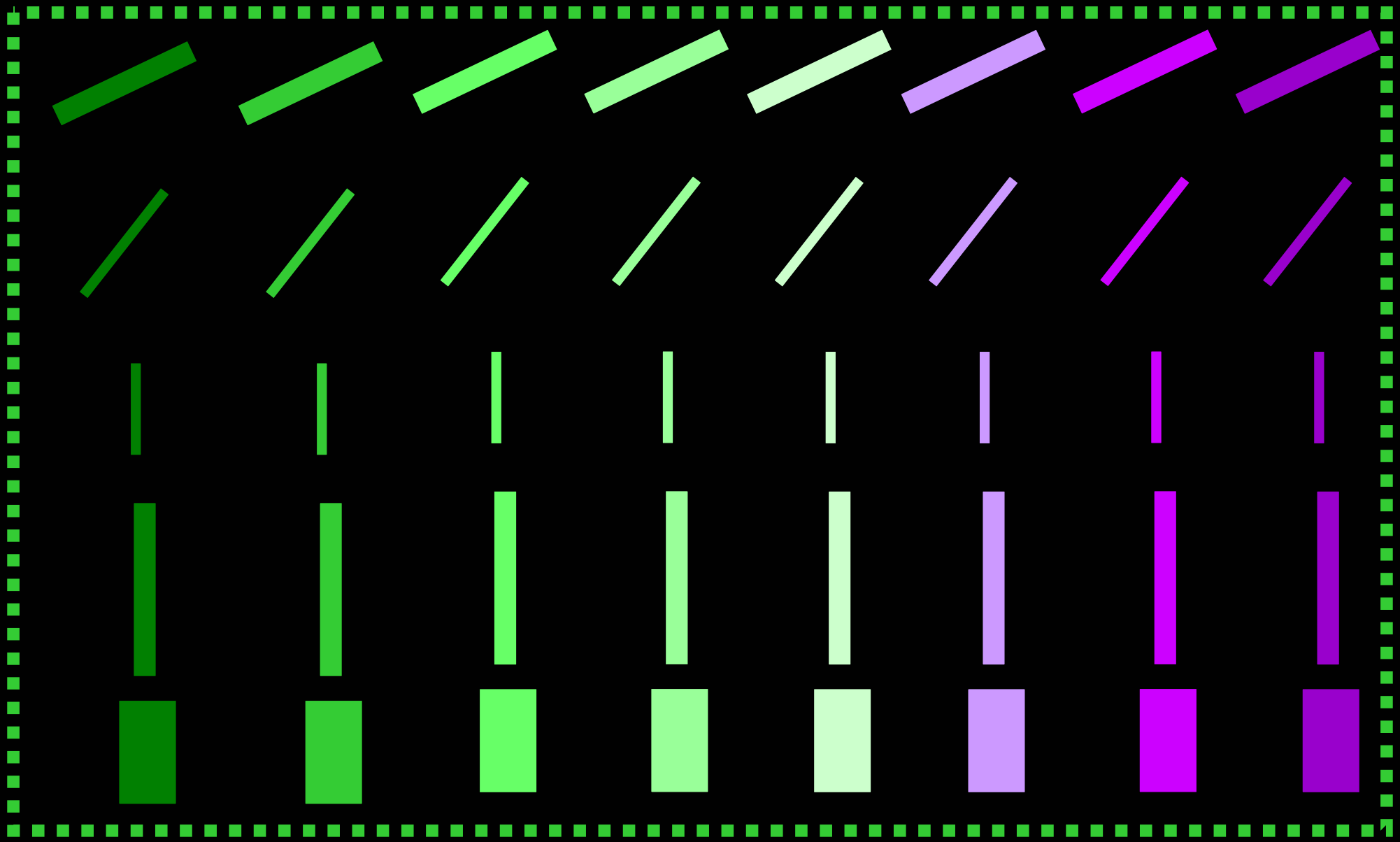
GreenSpec includes dark & light green products but excludes violet



GreenSpec includes pale violet materials with high recycled content



AECB CLP includes dark green, light green & violet



AECB Carbon Lite

GreenSpec
www.greenspec.co.uk

NGS GreenSpec Specification Clauses

Performance Generic & Prescriptive Specification clauses


CLP Performance Requirements
AECB Carbon Lite
GreenSpec
Product Specification Clauses
Project Specification
Client's Brief To Design Team
Project Specification
Prescriptive Specification
Design & Build Spec
Employer's Requirements
GBS A90 Performance Specification

NGS GreenSpec Performance Specification

A90 with CLP building Performance Specification clauses

AECB

Carbon lite Programme

Principles:
Insulation Airtightness Cold Bridge Avoidance

Performance Requirements:
Buildings Elements/Assemblies Services

GreenSpec

A90 Performance Specification
Buildings Elements Services

A-Z Prescriptive Specification

Material & Component
Generic Specifications

Manufacturer's
Product Specifications

Government Funded Project Specs

Private Funded Project Specs

GreenSpec

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A90 Performance Specification
Buildings Elements Services

A-Z Prescriptive Specification
Buildings Elements Services

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Generic Specifications

Manufacturer's
Product Specifications

Government Funded Project Specs

Private Funded Project Specs

Generic Specs

Level 6 Gold

Dedicated Products Specs

Generic Specs

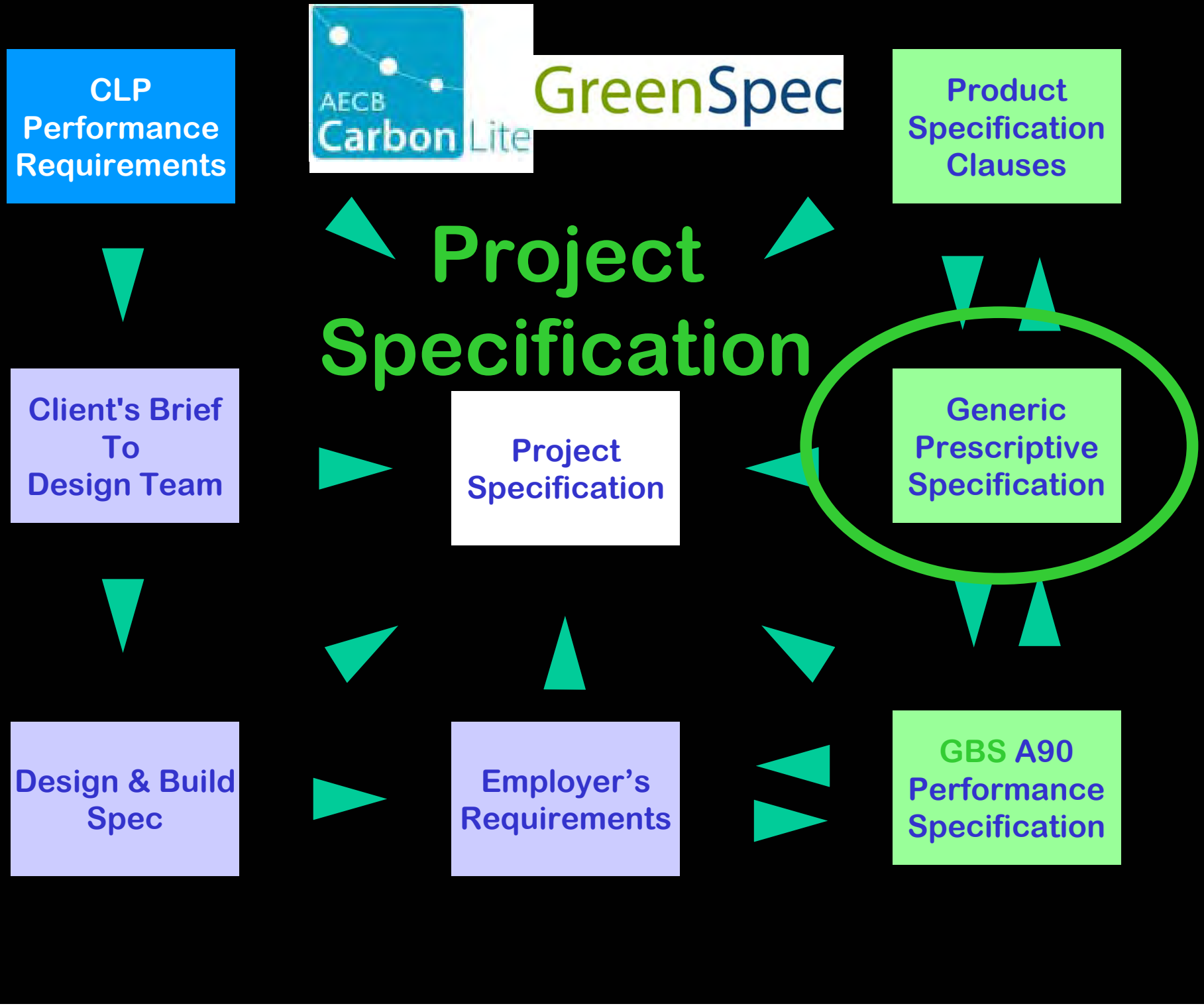
Level 5 Passivhaus

Dedicated Product Specs

Generic Specs

Level 4 Silver

Dedicated Product Specs


CLP Performance Requirements
AECB Carbon Lite
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Product Specification Clauses
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Client's Brief To Design Team
Project Specification
Generic Prescriptive Specification
Design & Build Spec
Employer's Requirements
GBS A90 Performance Specification

AECB Carbon Lite

GreenSpec
www.greenspec.co.uk

NBS Generic Specification Clauses

Materials or Product clauses without naming manufacturer and product

Generic NBS Specification

P10 Thermal Acoustic & Fire Proofing

110 ROCK MINERAL FIBRE

- Application: somewhere
- Manufacturing Standard: BS 1234
- BSI Kitemark: Required
- BBA Certificate: Required
- K value: 0.33 – 0.45
- Acoustic performance: 30-35 dB
- Density: 100-125 kg/m3
- Thickness: 50 - 300 mm.

- Manufacturer & Product Reference: Contractors Choice Submit proposals to CA for review
- OR
- Manufacturer: InsulMan
- Reference: ManMadeInsul
- Or equivalent (by virtue of NBS Preliminaries requirements)

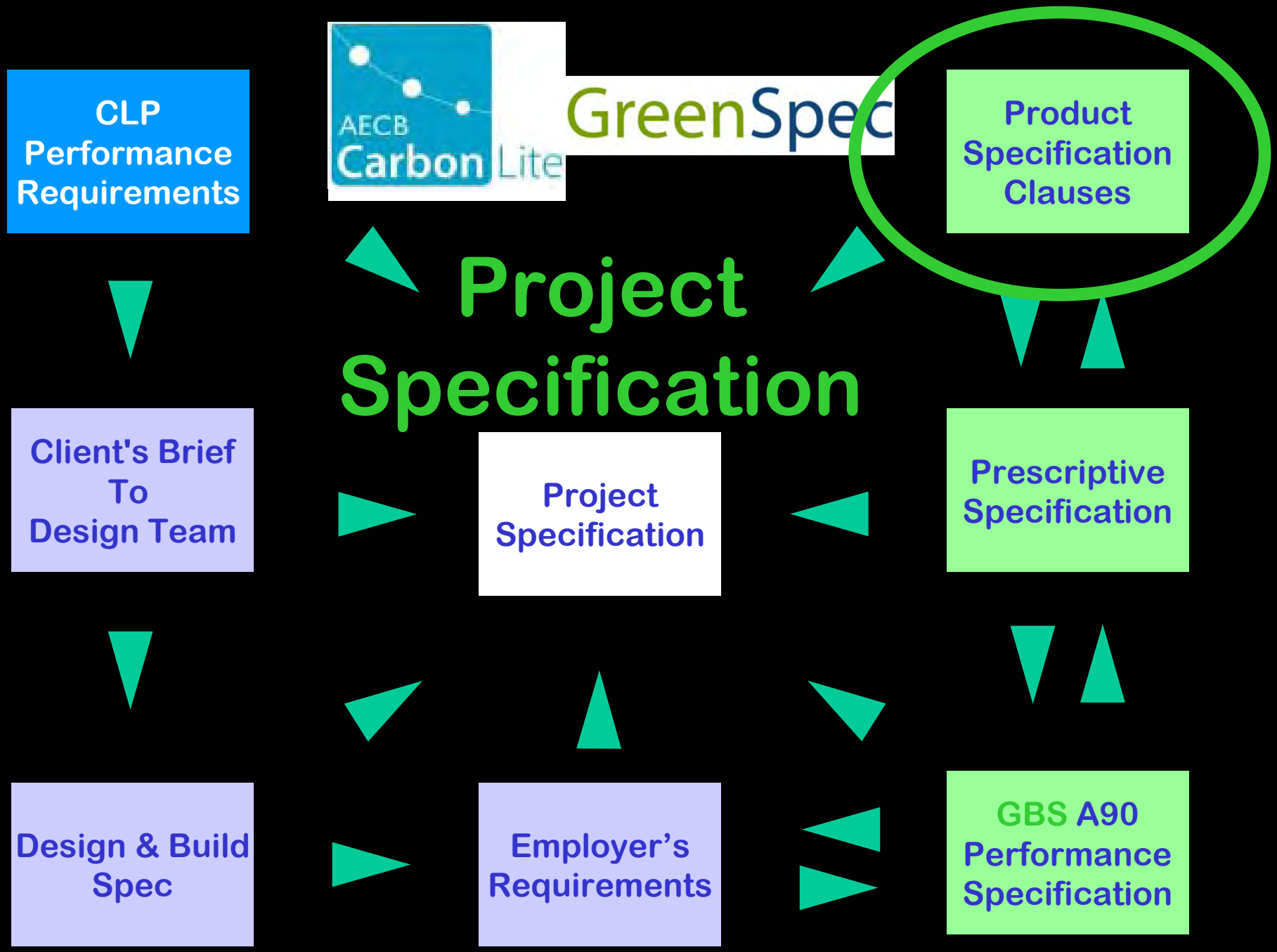
Prone to substitution

Prone to surreptitious substitution

Prone to abuse by many parties:

Contractors, Buying department,

QS, Employer


CLP Performance Requirements
AECB Carbon Lite
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Prescriptive Specification
Design & Build Spec
Employer's Requirements
GBS A90 Performance Specification

AECB Carbon Lite

GreenSpec
www.greenspec.co.uk

NGS GreenSpec Specification Clauses

Dedicated product clauses

Performance > Spec > Product

AECB Carbon Lite

GreenSpec

Manufacturers

Performance Spec Prescriptive

Performance Requirement

Performance Requirement

Performance Requirement

Performance Requriement

A90 Perf. Spec.

P10 Insulation

Products
Products
Products
Products
Products
Products
Products

Dedicated Prescriptive Green Building Specification

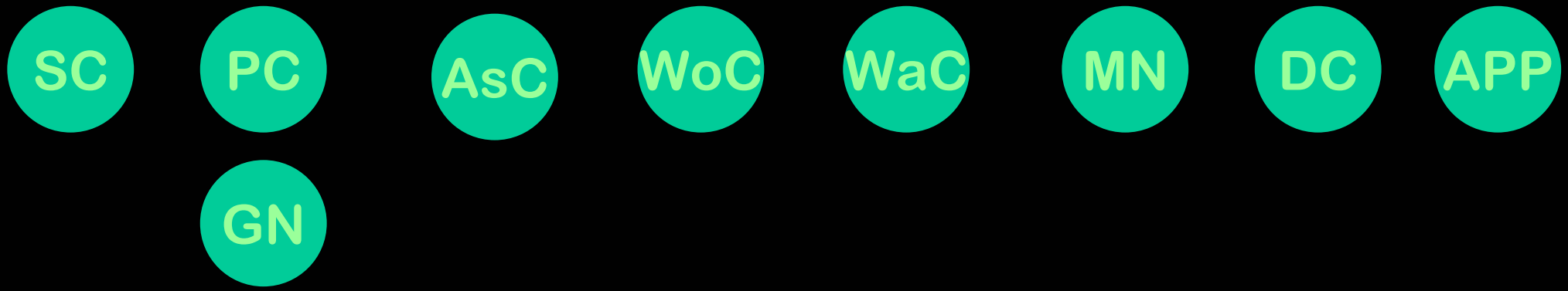
P10 Thermal Acoustic & Fire Proofing

100 THERMAL INSULATION

- Performance Achieved:
- Test Evidence: Report 33/2006
- Manufacturing Standard(s): BS 1234
- Installation Code of Practice: CP 103
- 3rd Party Accreditations: _____
- BSI Kitemark: KM 1234
- BBA Certificate: 00/0001
- Manufacturer: Insumaker
- Product Reference: ManMadeInsul
- Contact Details: T F E W; Rep M

- K value: 0.4
- G value: 5
- Sy value: 2.3
- Density: 100 kg/m3
- Thermal mass: 66
- BRE GGtS rating: A
- BRE Environmental Profile: No
- EcoPoints: 1077
- EcoHomes, BREEAM: credits: 1
- 3rd Party Endorsements: AECB Carbon Lite Programme: Gold+
- Recycled content: 60% post consumer
- ZODP: Yes

Specification clauses:



- Made up of many parts:
- Specification clause, Product Clause, Guidance Note, Assembly/Application clause, Workmanship clause, Waste clause, Maintenance Note, Demolition/Dismantling clause, Appendix,
- To be split down as NGS Green Building Specification progresses

http://www.greenspec.co.uk/rtf/G21.rtf - Microsoft Internet Explorer

File Edit View Insert Format Tools Table Go To Favorites Help

Back Search Favorites

Address http://www.greenspec.co.uk/rtf/G21.rtf Go

Google Search Popups okay Check AutoLink AutoFill Options

TYPE(S)·OF·LOAD-BEARING·TIMBER·BLOCK·WALLING¶

¶

110 → MODULAR·LOADBEARING·COMMON·GLUED·TIMBER·BLOCK·WALLING·TO·[_____]:¶

Manufacturer:·Steko·Switzerland,¶

Reference:·The·Steko·Building·System,¶

or·equivalent·and·approved.¶

UK·Agent:·Ecological·Building·Centre.·¶

Construction·Resources·(Elink·Ltd),·16·Great·Guildford·Street,·London,·SE1·0HS.¶

Telephone:·020·7450·2211,·Fax:·020·7450·2212.¶

Email:·info@ecoconstruct.com¶

Website:·www.ecoconstruct.com¶

Bond:·stretcher·half·lap,¶

Joints:·close-fit·dry·stacking,¶

Surface·board·grade:·Class·[C],¶

Species:·[Spruce·or·Fir],¶

Timber:·renewable·source·softwood·of·small·dimension,¶

Timber·treatment:·[See·G21/103],¶

Moisture·content·at·time·of·construction:·20%·+/-·2%·maximum.¶

Module·size:·Vertical:·80·mm.·Horizontal·(longitude·and·latitude):·160·mm.¶

Module·block·size(s):·¶

→ Generally:·[¶

→ 4·chamber·unit:·160·mm.·thick·x·240·mm.·high·x·640·mm.·long,¶

→ 4·chamber·unit:·160·mm.·thick·x·320·mm.·high·x·640·mm.·long],¶

→ Other·Sizes:·[¶

→ 3·chamber·unit:·160·mm.·thick·x·240·mm.·high·x·480·mm.·long,¶

→ 2·chamber·unit:·160·mm.·thick·x·240·mm.·high·x·320·mm.·long,¶

→ 1·chamber·unit:·160·mm.·thick·x·240·mm.·high·x·160·mm.·long,¶

→ 3·chamber·unit:·160·mm.·thick·x·320·mm.·high·x·480·mm.·long,¶

→ 2·chamber·unit:·160·mm.·thick·x·320·mm.·high·x·320·mm.·long,¶

→ 1·chamber·unit:·160·mm.·thick·x·320·mm.·high·x·160·mm.·long],¶

Weight:·[4·chamber·320·mm·high·unit:·6]·kg.¶

Features:·¶

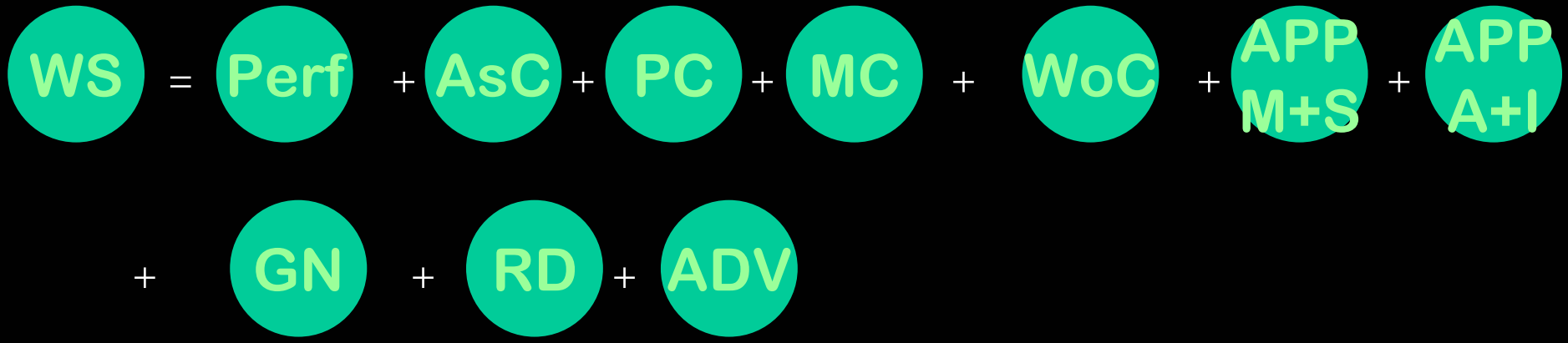
→ DPC·to·G21/185,¶

→ Mortar·bed·to·G21/186,¶

Special·elements·of·system:¶

→ Sill·Plate·to·G21/120,¶

Specification work sections



- Specification work section: made up of many parts
- Performance Requirements: Trade or element specific (A90 Project)
- Assembly clauses, Products and Materials, Workmanship
- Appendix: Manufacturers and Suppliers,
- Appendix: Applicators and Installers
- Guidance Note, Reference Documents, Advisory Bodies, Documents and Websites
- To be split down as NGS Green Building Specification progresses

W21_SA_M+S_Projection.doc - Microsoft Word
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CAWS TITLE Arial 10 100% Clear

W21·APP·M&S → APPENDIX·W21·PROJECTION:·MANUFACTURERS·&·SUPPLIERS¶

To·be·read·with·Preliminaries/General·Conditions·A10-A55·and·Work·section·W21¶

¶

209 → MATERIALS·SUPPLIERS:¶

Obtain·materials·of·one·type·from·only·one·source,·unless·specified·or·agreed·otherwise·in·advance.¶

Obtain·from·only·one·of·the·following·material·suppliers¶

Inform·CA·of·selected·supplier·at·an·early·date.¶

Select·from·local·companies·to·support·local·economy·and·local·employment.¶

See·Preliminaries·A90·Performance·Specification·A90/117.¶

¶

209A → MANUFACTURER:·HIGH·CONTRAST·PAINTED·SCREENS:¶

See·W21/209¶

Manufacturer:·Goo·Systems,·4·Harvey·Street,·Kingston·ONTARIO,·Canada,·K7K·6A9↵

T → free·phone → Canada·(888)·541-0299¶

T → Canada·(613)·541-0299 → F → Canada·(613)·541-1765¶

Contact:·Kevin:·Sales·&·Marketing → E → kevin@goosystems.com↵

Technical·Support:· → E → techsupport@goosystems.com↵

W → www.goosystems.com¶

Goo·Products·-·http://www.goosystems.com/index.php?cont=products↵

Which·Goo?·-·http://www.goosystems.com/index.php?cont=which↵

Screen·Goo·-·http://www.goosystems.com/index.php?cont=screen↵

Goo·Tips·and·FAQ·-·http://www.goosystems.com/index.php?cont=tips¶

¶

209B → MATERIAL·SUPPLIERS:·PAINT·SYSTEMS¶

See·W21/209¶

UK·REGIONS:¶

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ENGLAND:·LONDON¶

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Interactive·View,·15·Bowling·Green·Lane,·London,·EC1R·0BJ.¶

T → 020·7566·0433 → F → 020·7490·8404¶

E → enquiries@interactiveview.co.uk → W → www.interactiveview.co.uk·¶

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Bridgend,·Vale·of·Glamorgan,·Rhonda·Cynon·Taff·and·Cardiff¶
Other·information:·http://www.hdg.org.uk/·>·List·of·Plants·>·Area·8·Wales¶
¶
Joseph·Ash·Galvanizers·Bridgend,·Prince's·Way,·Bridgend·Industrial·Estate,·Bridgend,·Mid·Glamorgan,·CF31·3AQ,·Wales¶
T → 01656·668735 → F → 01656·767139¶
E → bridge@josephash.co.uk → W → www.josephash.co.uk¶
Registered·to·BS·EN·ISO·9002·Yes¶
Bath·Size:·4.6·x·1.5·x·2.1·m.¶
Double·Dipping:·not·permitted¶
Maximum·Lift·4·tonnes¶
¶
Cardiff·Galvanizers·(1969)·Ltd.·Cambria·House,·East·Moors·Road,·Cardiff,·CF24·5EG,·Wales¶
T → 02920·480321 → F → 02920·483728¶
E → sales@cardiffgalvanizers.co.uk → W → ¶
Registered·to·BS·EN·ISO·9002·Yes¶
Bath·Size:·7.0·x·1.5·x·3.0m,·9.0·x·1.1·x·0.3m·and·4.6·x·1.5·x·3.4·m.¶
Double·Dipping:·not·permitted¶
Maximum·Lift·4·tonnes¶
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Other·information:·http://www.hdg.org.uk/·>·List·of·Plants·>·Area·8·Wales¶
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Registered·to·BS·EN·ISO·9002·Yes¶
Bath·Size:·7.0·x·1.22·x·3.73·m.¶
Double·Dipping:·not·permitted¶
Maximum·Lift·6·tonnes.¶
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NGS GreenSpec Specification Work sections

Work sections supporting dedicated product clauses

Launching soon:
The Green Building Specification

Introduction

The Green Building Specification is a service that responds to the rapidly growing environmental agendas associated with construction such as waste, sustainable materials, the performance of components and new methods of construction. It will address the needs of those designers and specifiers designing to evolving 'green' standards such as those associated with BREEAM, EcoHomes and the forthcoming Code for Sustainable Homes.

The Green Building Specification is designed to operate in parallel with the NBS. It will provide complementary clauses that enhance existing NBS work sections as well as providing wholly new preliminaries and work sections that address environmental issues not covered by the NBS.

Over the coming months a comprehensive library of specifications will be built up through a series of 'releases' of groups of specifications.....

The first release of work sections will include:

(Key: * new work sections)

A Preliminaries / General / Conditions

- A32 Management of the Works
- A33 Quality standards/control
- A36 Facilities/temporary work/services
- A38 Construction waste management / minimisation*
- A39 Packaging resource efficiency*
- A90 Performance specification

Green Building Specification

G21 Load-bearing Timber Block Walling

Title:	G21 Load-bearing Timber Block Walling
Revision:	A - 7 Feb 2007
Notes:	A - fire retardant clause added
Format:	NBS-compatible text
A4 Pages:	16
Price:	£2.50 plus VAT

Buy this document

• More specifications....

Key Clauses

- Work Section:
- Specification;
- Type(s) of Load-bearing timber block walling;
- Reinforcing / fixing accessories;
- Damp proof courses;
- Workmanship generally;
- Installation of DPCs;
- Laying;
- Erection and installation;
- Sills/lintels/padstones;
- Additional requirements for facework;
- Miscellaneous items;

Using this specification

G21 should be used for Lorem ipsum dolor sit amet, consectetur adipscing elit, sed diam nonnumy eiusmod tempor incidunt ut labore et dolore magna aliquam erat volupat. Ut enim ad minimim veniaml quis nostrud exercitation ullamcorpor suscipit laboris nisi ut aliquip ex ea commodo consequat. Duis autem vel eum irure dolor in reprehenderit in voluptate velit esse molestaie son consequat.

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enter your company

Email Address: *
enter your email address

Email

Product: *
enter the product name

Details: *
enter details of what makes the product 'green'

(maximum of 5000 characters)

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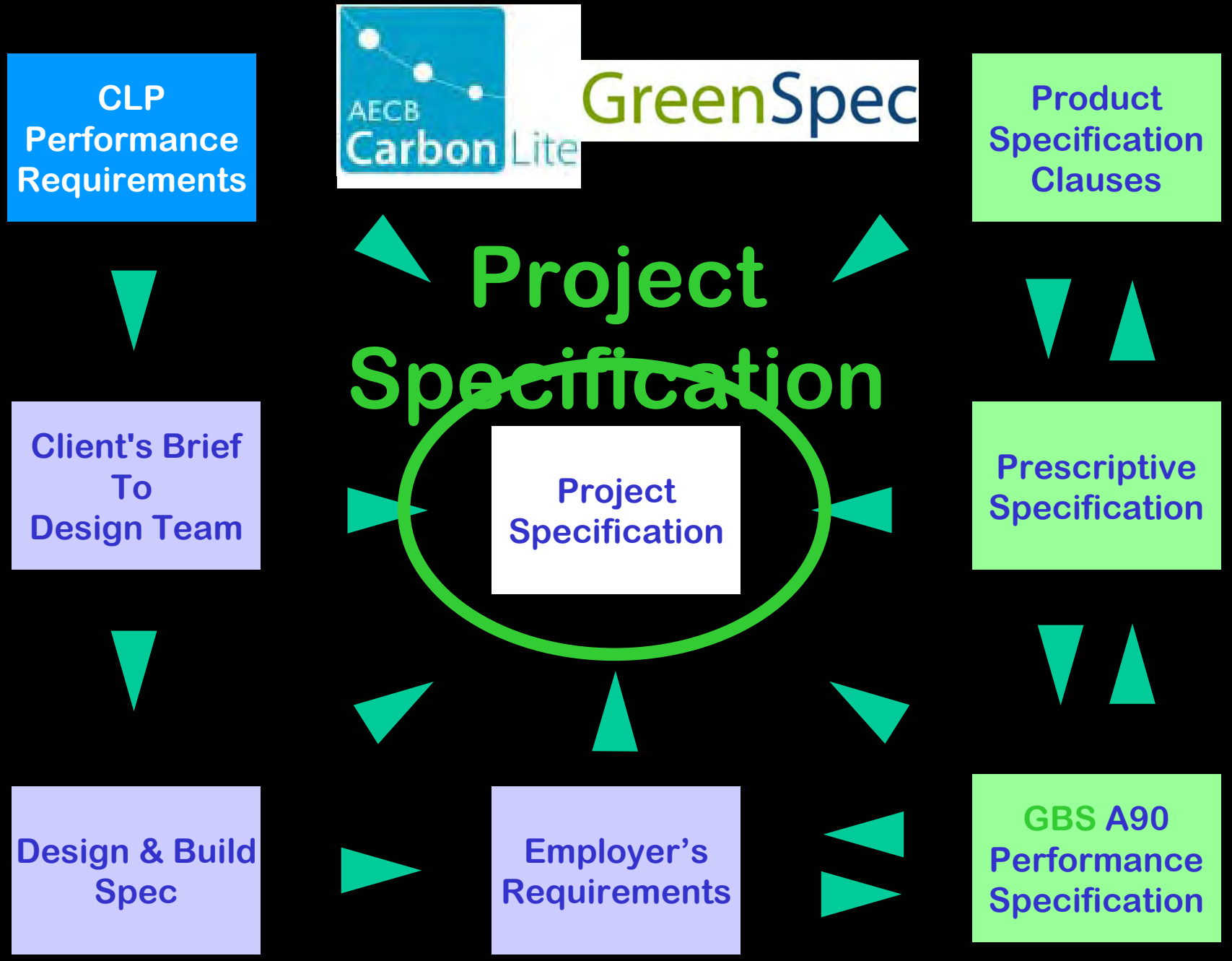
NGS GreenSpec Project Specifications

GreenSpec try to avoid doing project spec

but collaborative work on practice spec is ok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Product Specification Clauses
Project Specification
Client's Brief To Design Team
Project Specification
Prescriptive Specification
Design & Build Spec
Employer's Requirements
GBS A90 Performance Specification

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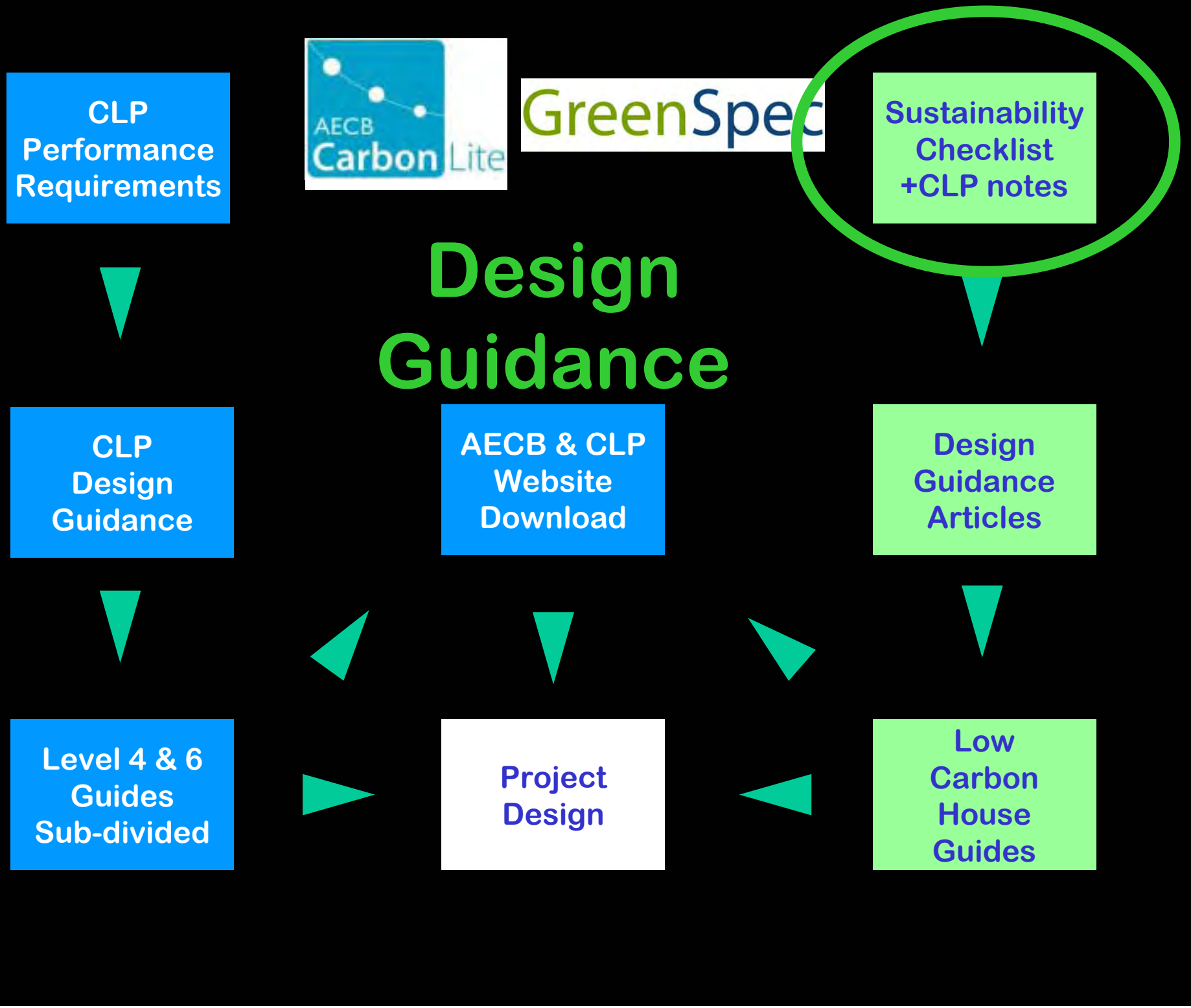
NGS GreenSpec Sustainability Checklist

Will be embellished with CLP advice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Checklist - Contents

F Masonry

Contents

F10 Brick/Block walling

CONSIDER:
• Surface mount conduits, or run wiring in surface mounted skirtings/dados, etc.
• Perforated bricks and blocks which use less energy to 'cook', and are lightweight to transport and handling.
• Make door openings block multiple widths and heights.
• Co-ordinate window and door opening with brick sizes and blocks modules.
• Start full course of blocks on floors.

CLAY BRICKS:
• In the UK we make a further 3 million bricks each year.
• Fletton commons which uses gasses from clay to fuel the kilns.

Checklist - Contents

P Building Fabric Sundries

Contents

P10 Sundry Insulation/Proofing Work/Fire Stops

CONSIDER:
• Cement Substitution See E10
Aggregate Substitution See E10
Car park marking reinstated to maximise efficiency of car park layout

AVOID:
• Non-hygroscopic (rock and glass mineral wool) insulation in timber framed construction, they can hold moisture against timber which consequently needs preservative treatment.

HAZARDOUS WASTE :
• Asbestos cement and products containing them.

P11 Foamed/Fibre/Bead Cavity Wall Insulation

CONSIDER:
• U Values Above Building Regulations Approved Document: L1 & L2.

P11 Foamed/Fibre/Bead Cavity Wall Insulation

CONSIDER:
- U Values Above Building Regulations Approved Document: L1 & L2.
- Optimum thicknesses: 300 - 600 mm.
- Blowing or spraying cavities with cellulose fibre insulation.
- Newspaper: Cellulose fibre thermal insulation in walls and roof.
- Bag up offcuts of insulation in original packaging (for identification purposes) return to manufacturer.
- Off-site segregation and bulking operations can collect sufficient to return to manufacturer.

AVOID:
- Urea formaldehyde foam insulation.
- Non-hygroscopic (rock and glass mineral wool) insulation in timber framed construction, they can hold moisture against timber which consequently needs preservative treatment.

P20 Unframed Isolated Trims/Skirtings/Sundry Items

AVOID:
- PVC See Z50
- Virgin Plastics See Z50
- Flush skirtings impairing fire or acoustic performance of stud partitions, or demanding additional layers of plasterboard and demanding additional offcuts of plasterboard.

P22 Sealant Joints

CONSIDER:
- Sealants are often used to fix air leaky buildings when carrying out airtightness testing.

DELETERIOUS SUBSTANCES:
- The European Waste Catalogue identifies materials contaminated with sealants as deleterious substances

P23 Movement Joints

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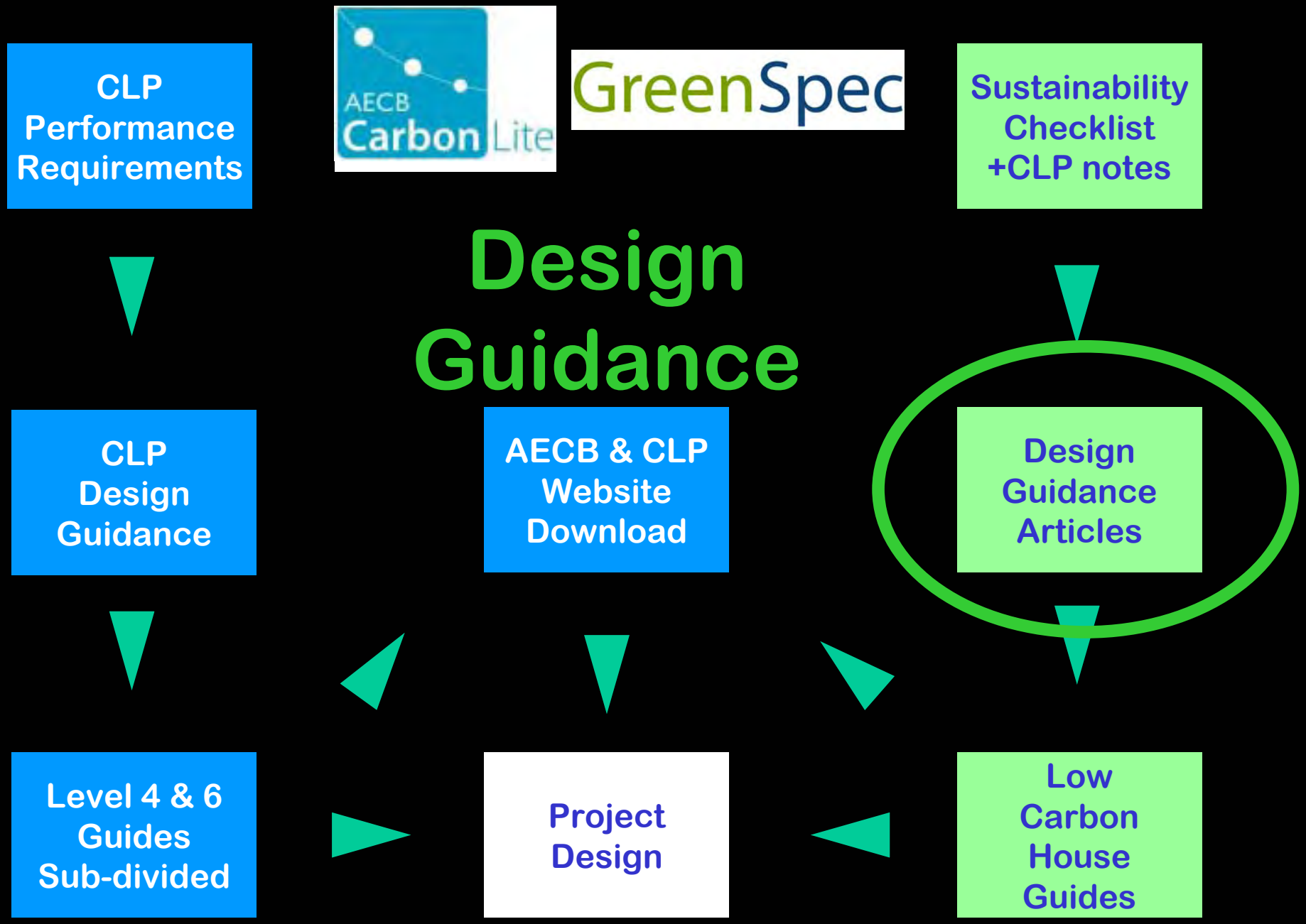
NGS GreenSpec Design Guidance

Will include links to CLP output documents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Design - Contents

Case Studies

BedZED: 'Construction materials report'. *Nicole Lazarus.*

- Credits, background and introduction
- Summary
- Materials in construction
- Measuring the environmental impacts of materials
- Material selection (examples): Window frames, reclaimed steel and recyled sand.

Housing Associations and sustainable construction. *Jenny Wain.*

- Introduction, lessons and resources
- Prime Focus on prefabrication - Watton Green
- Ealing Family on super insulation - Wilton Road
- Gwalia on conserving heritage - Swansea Foyer
- Housing Solutions and new technologies - Greenfields - 1NTERGER
- Arches and refurbishment- Valley Road

Construction techniques.

- Small-scale hand-made cob construction in Stoke Newington.

Recycling, re-use and reclamation

Ealing Family on super insulation - Wilton Road, Reading

Scheme summary

The scheme comprises 25 ultra low energy homes (12 flats and 13 houses) built on a brown field site. They offer affordable rents to residents and ensure reduced environmental impact in use. Environmental efficiency measures exceeded a SAP of 100 and it achieved BRE's Environmental Standard Award. Completed in 2000.

Scheme details

The scheme was developed using the benefits of experience gained with the THERMIE project of 50 energy efficient homes at Amersham Road (see previous case study). It reused a derelict laundry site in a residential part of Reading.

The scheme was developed as an Integrated Housing Initiative. This provides homes where both landlord and resident running costs are reduced, and where environmental performance is improved. This is achieved through increased levels of insulation, improved construction air-tightness, and improved water efficiency.

As part of the initiative the following issues were considered at the design stage:

- energy efficiency – embodied and in use
- economical water usage
- environmental impact
- cost and life of building components.

Environmental features

As with many brownfield sites contamination issues needed to be addressed. Prefabricated foundations were used to save time on site mitigation works. Pre-cast piles and ground beams with an extruded floor and 200mm of mineral wool insulation were chosen over traditional piled foundations and cast in situ ground beams.

A lightweight steel frame system from Forge-Llewellyn was used to enable fast erection times and allow high insulation levels to be added on site.

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Low Carbon House Siting & Orientation

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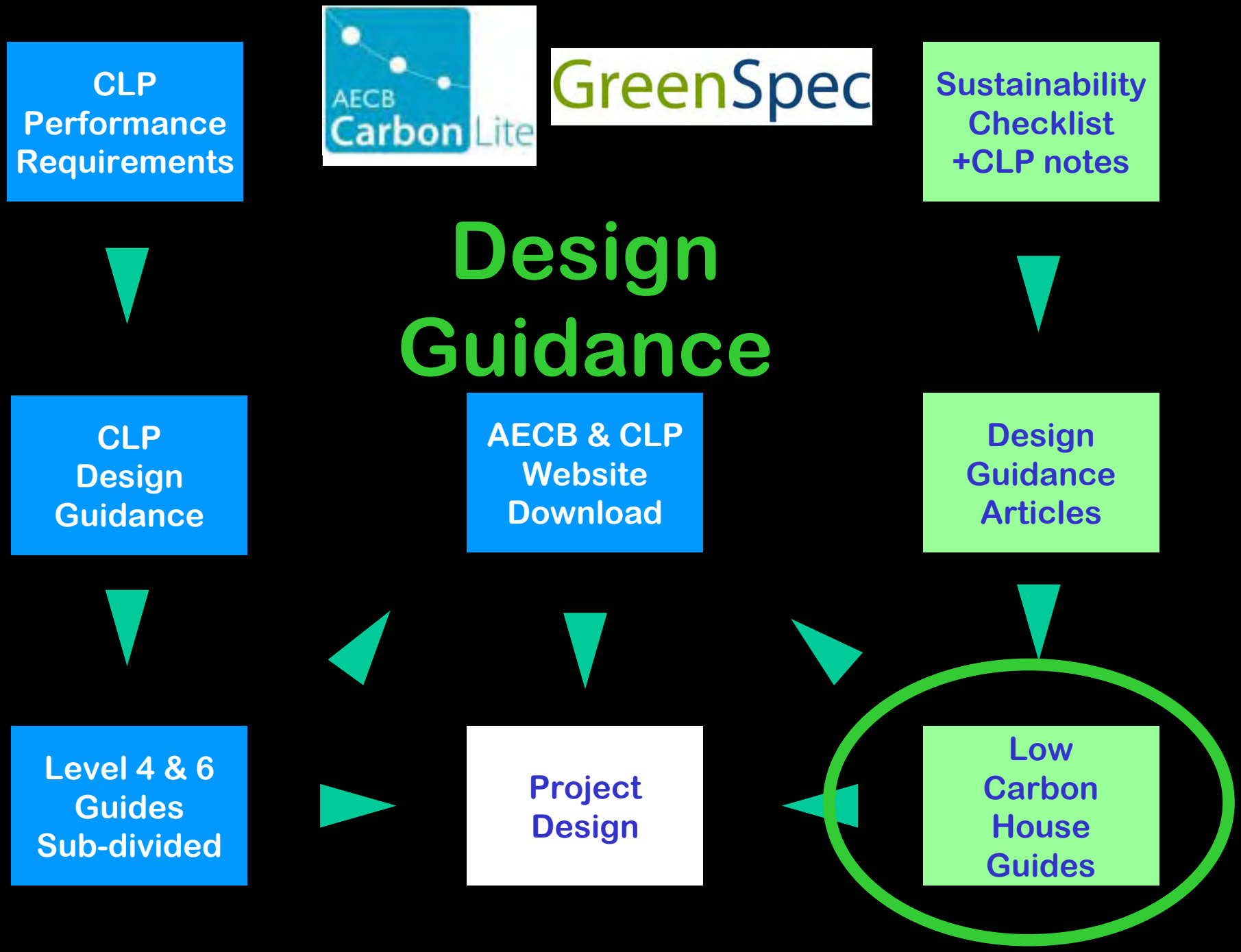
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The Low-Carbon House: Contents

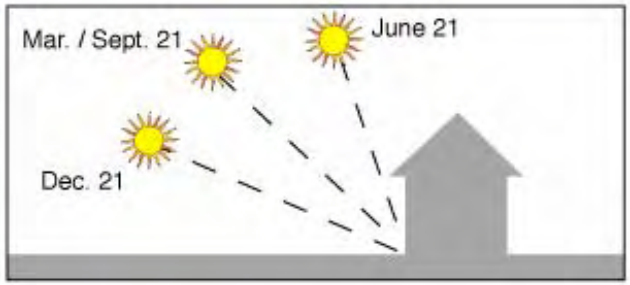
Low Carbon House:

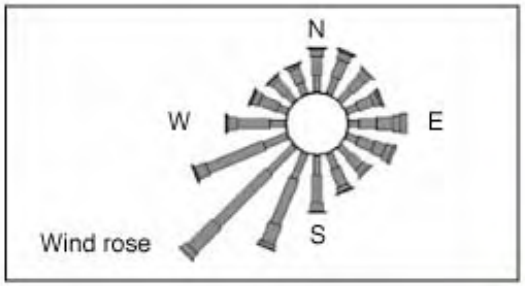
- Contents
- Standards Level 4
- Standards Level 5
- Standards Level 6
- Siting & orientation
- Direct Solar Gain
- Thermal Walls
- Thermal Mass
- Construction details

The Low-Carbon House: Siting and Orientation

Passive solar design and providing a benign site microclimate both enhance the energy and environmental performance of a building. Ideally the building has good access to solar radiation and daylight, with a site which itself is pleasantly warm and sunny, with good shelter from the wind.

Site analysis





- Determine the position of the sun throughout the year.
- Establish temperature ranges – both seasonal and daily.
- Identify the direction of the prevailing wind.
- Determine seasonal characteristics eg cold northerly winds in winter.
- Identify topographical features that might optimise or degrade the performance of the building(s) eg slopes, tree belts, the shape and orientation of the site.

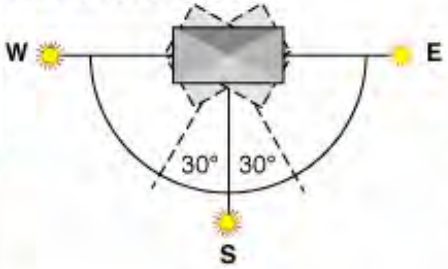
Orientation

The individual house

The main orientation of the building should be within 30° of

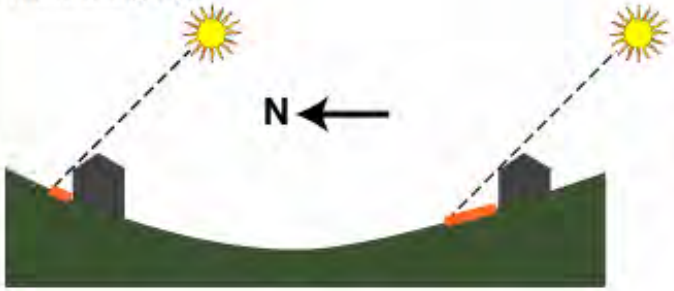
Orientation

The individual house



The main orientation of the building should be within 30° of south. Houses oriented east of south will benefit from the morning sun. Those orientated west of south will catch the late afternoon sun – which can help delay the evening heating period.

The housing layout



A location on a south facing slope optimises solar access whilst minimising overshadowing from adjacent buildings. It also allows for higher density planning.

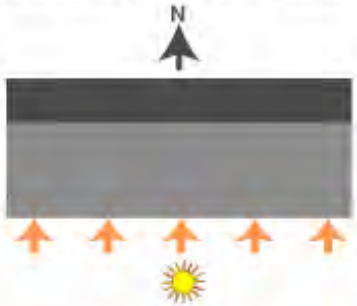
- Neighbouring houses to the east and west can provide protection from low east and west sun
- roads should ideally run east-west to facilitate south-facing front or rear housing layouts
- design layouts to be self-sheltering from cold winds
- use tree belts around the site to promote sheltering. Arcs across the north of the site will be particularly useful against cold northerly winds.

Building form

- Design to minimise the building surface to volume area.

• Design to minimise the building surface to volume area.

• Terrace housing and blocks provide more efficient envelopes than semi and detached houses.



• Orientate the house east-west to ensure a long side to face the sun. Minimising east and west facing walls and windows reduces excessive summer heat gain.

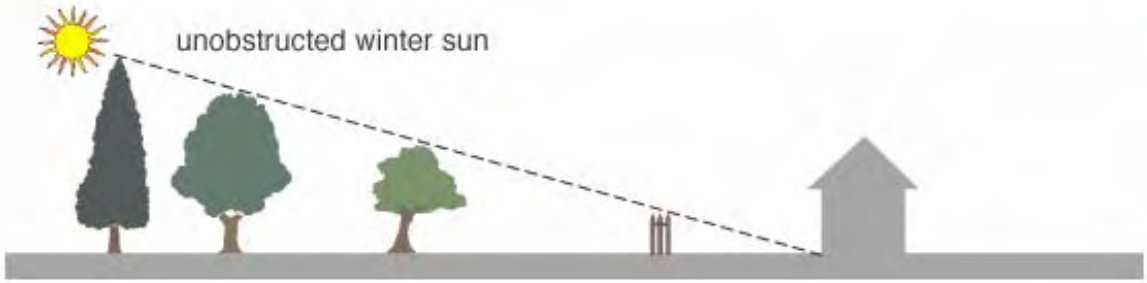
• Plan the rooms so that cooler service spaces are located with a northerly aspect and habitable rooms take advantage of the warmer southerly aspect.

• Avoid the exposed areas of the site and use any natural shelter offered.

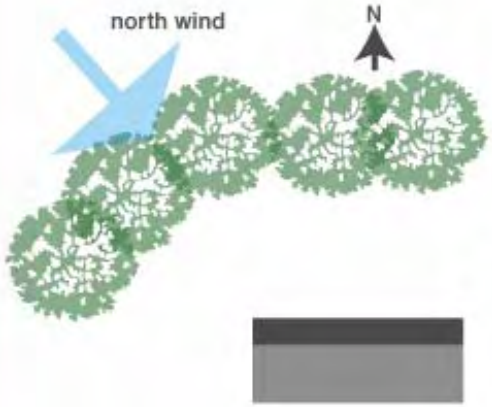
• Minimise wind chill from the prevailing wind by presenting a narrow frontage in that direction.

• Think about using vegetation against walls to increase wind drag and provide an extra thermal buffer.

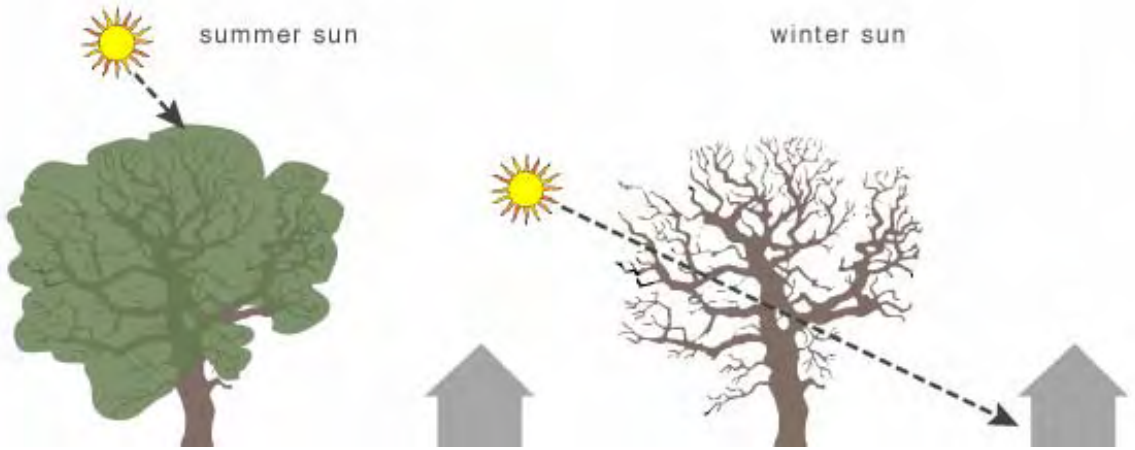
External environment



• Optimise solar gain in winter - ensure that south-facing windows are not overshadowed between 9am – 3pm



• Use trees and planting to shelter from, particularly cold northerly, winds. The most effective height for trees is the height of the building and placed 1-3 heights away, or 3-4 heights where solar access is required. Use evergreen trees where solar access is not required to provide year-round shelter.



• Trees to create summer shading:

Deciduous trees should be planted to optimise shading in the summer whilst permitting sun to penetrate at low winter angles. Ensure that the planting is not too dense that it limits daylight.

Downloads

• UK Housing and Climate Change, *Arup Research and Development, 2005*
• Planning for Passive Solar Design, *BRE/Carbon Trust, 1998*

Publications

• Solar Architecture in Cool Climates, *Porteous with MacGregor, Earthscan, 2005*
• Sustainable Solar Housing, *Hastings and Wall, Earthscan, 2007*
• Solar House, *Galloway, Architectural Press, 2004*
• The Whole House Book, *Borer and Harris, CAT, 2005*
• EcoHouse 2, *Roaf et al, Elsevier, 2003*

Further information

• BSRIA: Building Services Research and Information Association
• CIBSE: Chartered Institute of Building Services Engineers

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Low Carbon House
Direct Solar Gain

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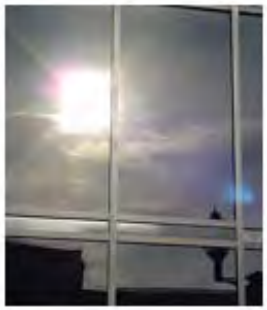
- Thermal Mass
- Construction details

The Low-Carbon House: Direct Solar Gain

Simple

Needs highly efficient thermal glazing or supplementary shuttering to prevent heat loss.

'Direct Gain' is the most basic form of solar gain. Solar energy enters through south-facing glazing and is absorbed by thermal mass incorporated into the floor and walls. Heat is stored in the thermal mass during the day and later released during the night into the living space. This re-radiation of collected heat can maintain a comfortable temperature during cool nights and can extend through several cloudy days without 'recharging'.



- Up to 75% of the solar energy striking the glass is converted into thermal energy.

- Solar radiation can provide a significant proportion of a buildings heating requirements.

- The area of glazing is determined in response to the duration and severity of winter temperatures; the building size; and the amount of interior thermal mass. A correct balance between these factors

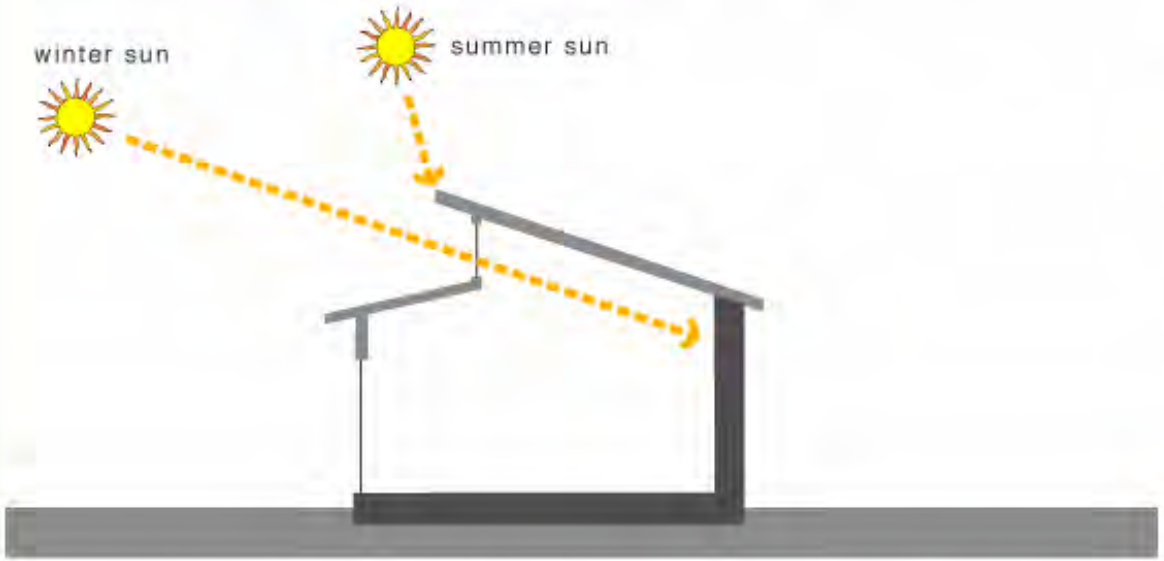
• The area of glazing is determined in response to the duration and severity of winter temperatures; the building size; and the amount of interior thermal mass. A correct balance between these factors must be established in order to avoid large daily temperature fluctuations that could result in overheating, even in winter.

• Though solar energy is most effectively absorbed by direct radiation, convective air currents can transmit energy to areas of mass that are not directly illuminated by the sun.

• Comfort in a living space is improved if mass is evenly distributed. Increasing the surface area reduces the incidence of localised hot and cold spots.

• The location and sizing of glazing is also dependent upon the building layout and types of spaces eg., frequently used spaces vs. infrequently used spaces.

• Since the absorption of solar energy is most effective through direct radiation, careful planning of the building is required. Direct absorption from south facing glazing implies that walls and floor need to be close to the source. With façade glazing only, the heated room is restricted to a relatively shallow depth, typically no more than 1.5 x the height of the glazing. .

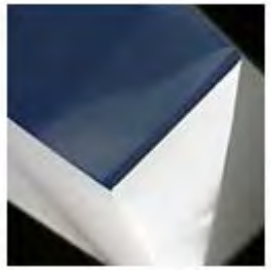


• By using clerestories and roof lights, the depth of penetration of solar radiation can be extended further into the building so to allow for a deeper plan. A secondary benefit is the extra daylight

• By using clerestories and roof lights, the depth of penetration of solar radiation can be extended further into the building so to allow for a deeper plan. A secondary benefit is the extra daylight provided to reduce the need for artificial lighting.

• A clerestorey roof angle should be approximately the same angle as the sun at the time of the winter solstice.

Downloads



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Low Carbon House Thermal Walls

NGS GreenSpec
Design Guidance

The Low-Carbon House: Contents

Low Carbon House:

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- Standards Level 4
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- Direct Solar Gain
- Thermal Walls
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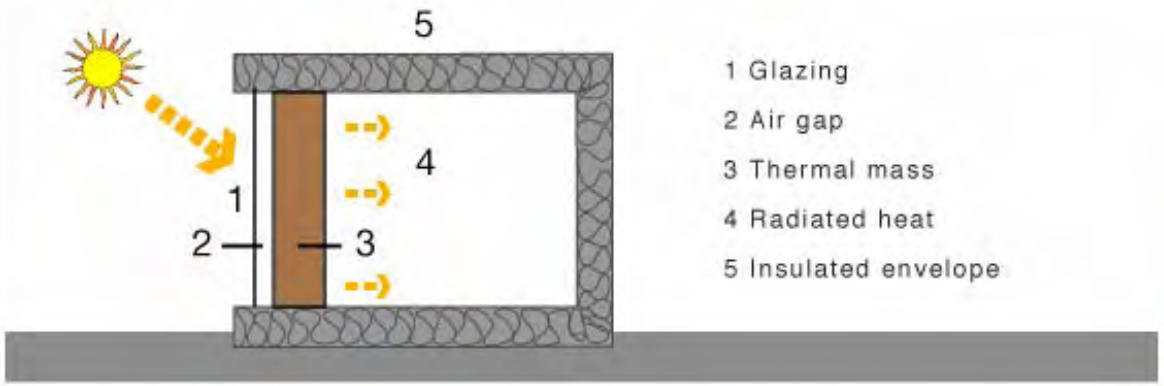
- Construction deta

The Low-Carbon House: Indirect solar gain: Thermal walls

'Direct Solar Gain' is the heating of a space using the sun's energy directly through windows in the building envelope. 'Indirect Solar Gain' systems operate by transferring solar energy through conduction (thermal mass walls) or convection (sunspaces) from the outside of the envelope to the heated space.

Basic Mass / Solar / Thermal Storage Wall



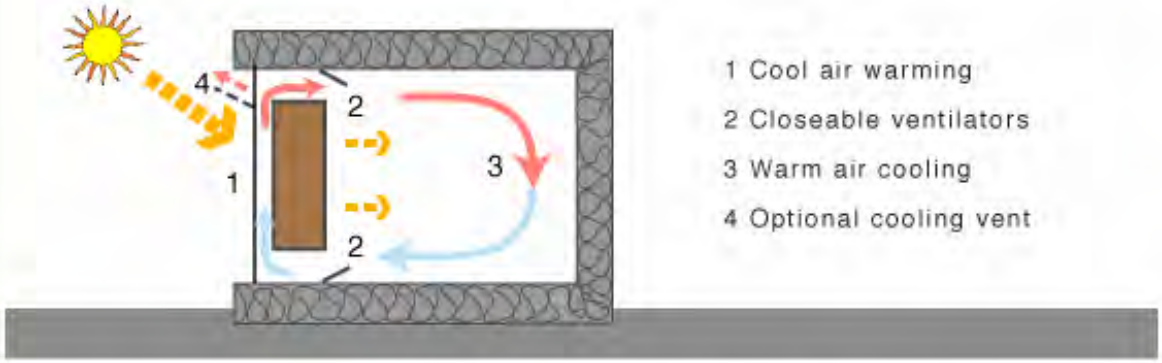
The basic Mass Wall consists of a wall of 200 – 400mm of masonry or other material of high thermal mass, facing south, with a dark, heat-absorbing material on the external surface. The wall is faced with a single or double layer of glass. The glass is placed from 20 – 50mm from the wall to create a small airspace.

Solar radiation passing through the glass is absorbed by the dark surface, stored in the wall, and conducted over a period of hours through the wall.

The heat absorbed migrates through the wall, reaching the rear surface in the late afternoon or early evening. This means that the room receives slow, even heating for a long period after sunset. The rate of conduction of heat and the period of heating is determined by the thermal characteristics and thickness of the wall.

- Simple in concept and execution
- No moving parts
- Heat is lost outwards through the glass in overcast conditions and at night
- Largely ineffective in UK climatic conditions.

Trombe Wall



1 Cool air warming
2 Closeable ventilators
3 Warm air cooling
4 Optional cooling vent

The Trombe Wall, developed by Jacques Michel and Felix Trombe in 1967, is the best known variant of the thermal wall template.

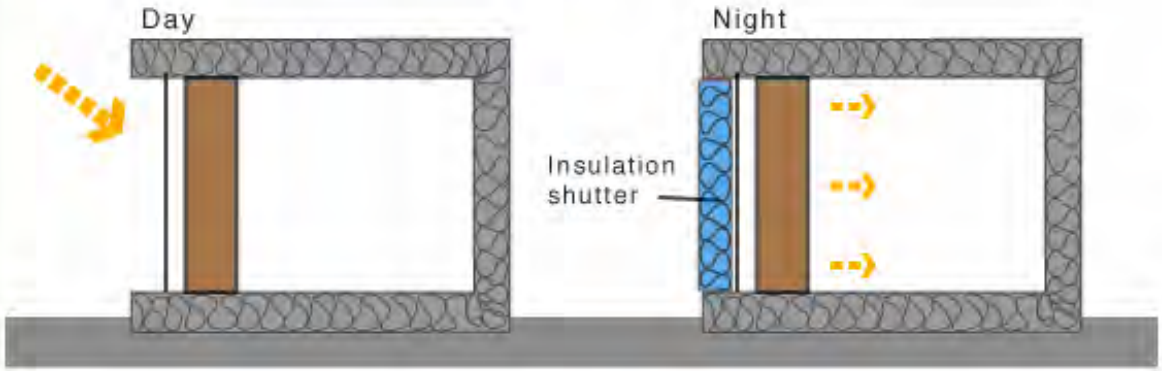
In addition to the thermal mass effects of the Mass Wall, the air between the glazing and the wall warms and rises. During hours of solar gain, the warmer air moves through the vents at the top of the wall and into the room whilst cool air from the room enters at vents near the bottom of the wall. At night and in overcast conditions the vents are closed, leaving heat stored in the wall to radiate into the room.

A third vent located through the top of the glazing is an option that provides cooling in warm conditions. Opening the vent induces a 'solar chimney' effect up through the wall/glass air gap.

- Controlled heat can be provided to a room without the disadvantages of glare and overheating

- Controlled heat can be provided to a room without the disadvantages of glare and overheating associated with direct solar gain.
- Heat is lost outwards through the glass in overcast conditions and at night.
- Residents can misunderstand the use of the vents, resulting in heat mis-management.
- Can cause uncomfortable draughts in cool or cold weather.
- Overall effectiveness in UK climatic conditions debatable.

Mass wall with movable insulation



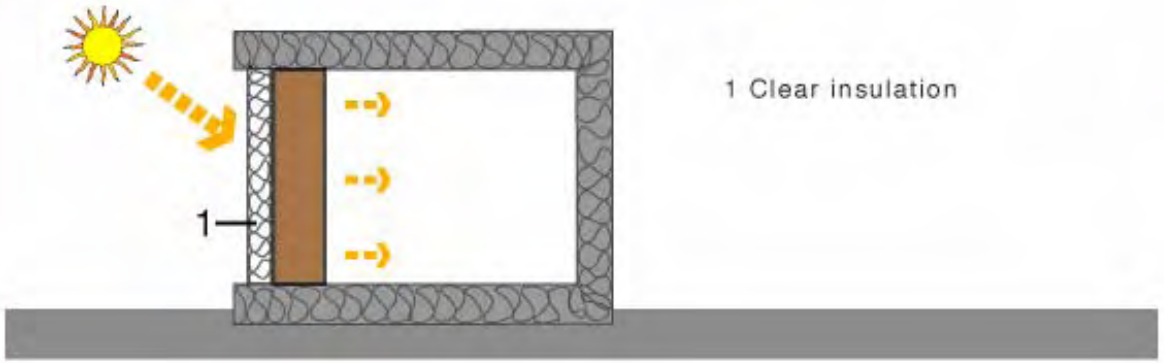
The main reason for thermal wall inefficiency is the degree of heat loss in overcast conditions and at night. During these conditions, heat stored in the wall is radiated both into the room but also back through the glass. This problem can be solved by the application of insulation to the outside of the wall during the periods of no or very low solar gain.

- Heat loss is prevented
- Overheating can be prevented by using shutters in very hot conditions.
- Requires a high level of resident understanding and control. Where used in public housing, one example (Christopher Taylor Court, Birmingham) was monitored to show that around a 30% of residents didn't use the shuttering at all and another 60% did not use them properly.

Mass wall with transparent insulation (TI)

1 Clear insulation

Mass wall with transparent insulation (TI)

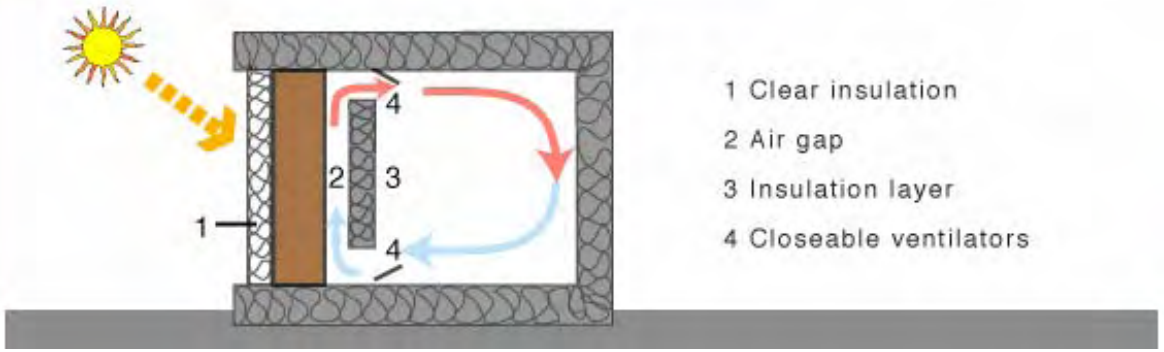


1 Clear insulation

Taking advantage of developing technologies, the application of transparent insulation to the thermal wall concept provides a solution to the problem of heat loss in the wall's basic form. TI is introduced into the cavity between the glass and the wall. During periods of solar gain, sunlight can pass through the glass and the TI to be absorbed by the thermal mass. During periods of low or no solar gain, heat loss to the outside is prevented by the TI. TI is available in different technology formats eg plastic honeycombs, capillaries, small bubbles, beads. Aerogel is the latest technology on the block - showing considerable promise both in thermal walls and high-performance glazing.

- Heat loss is prevented
- Passive insulation does not require resident intervention.
- Overheating can be a problem requiring controllable levels of ventilation from other sources.
- TI is relatively expensive

Trombe wall with transparent insulation (TI)

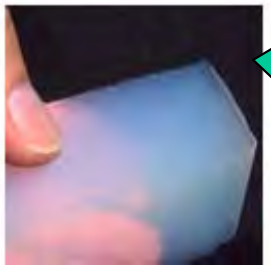


1 Clear insulation

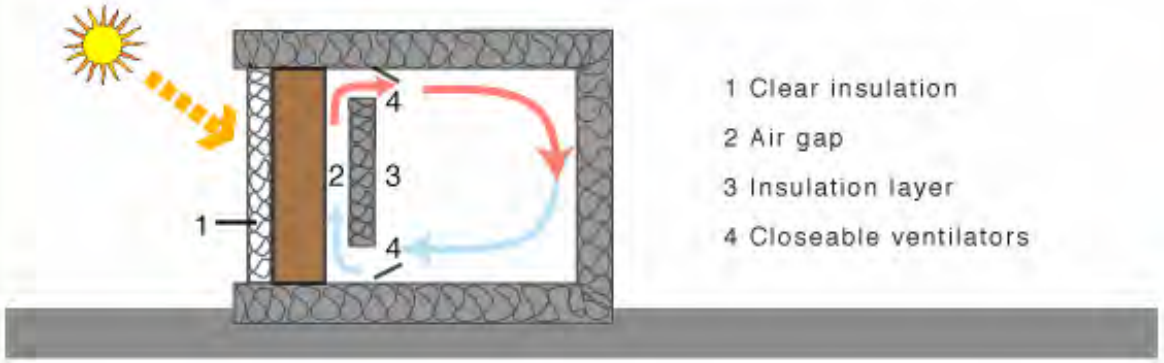
2 Air gap

3 Insulation layer

4 Closeable ventilators



Trombe wall with transparent insulation (TI)



An interesting recent development has been in the combination of transparent insulation with the Trombe wall. Whereas a conventional Trombe wall induces air to pass between the glass and the wall to enable direct convection heating, this particular variant enables control of the heat from the thermal mass. This control effectively conserves heat within the wall until required by the residents.

Heat is absorbed into the thermal mass through solar radiation and eventually radiates into an air gap between the inside face of the wall and a layer of insulation. Convection of warm air is induced by radiation into the air gap and through to the room by means of closeable ventilators located through the top and bottom of the insulation layer.

- Insulating the thermal mass on both sides allows for heat to be 'stored'
- Allows for high levels of resident control
- Heat loss to the outside prevented.
- Overheating can be controlled by 'switching off' the air flow.
- Relatively untried concept
- Requires a level of resident understanding of the concepts involved.
- TI is relatively expensive

Downloads

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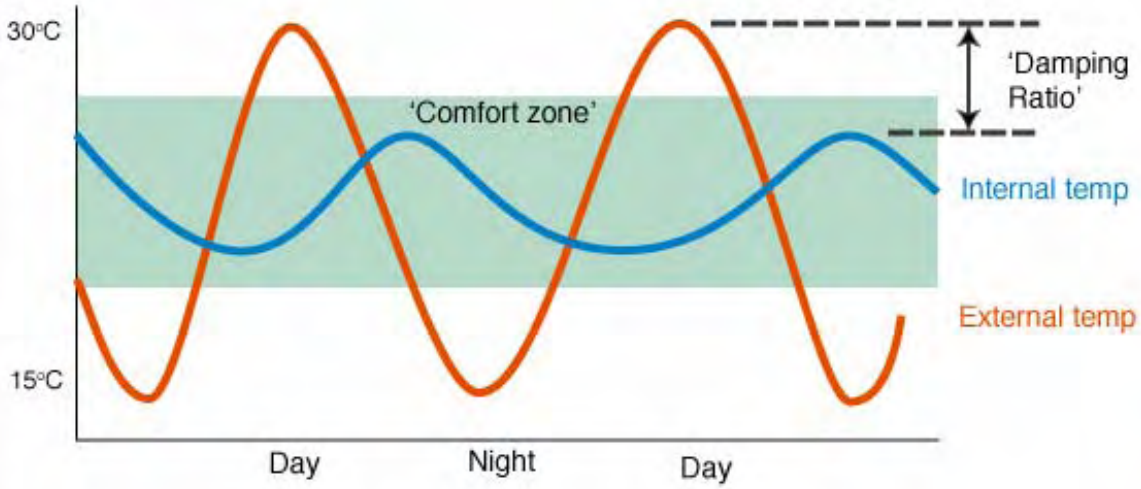
The Low-Carbon House: Thermal Mass

• Thermal mass acts as a 'thermal battery'

• Thermal mass plays an important role in the performance of a building by moderating fluctuations in space temperature. This role becomes more important as summer temperatures in the UK increase.

• The use of heavyweight construction materials with high thermal mass can reduce total heating and cooling requirements.



• The diagram shows the effect of thermal mass on indoor temperature. Whilst external temperatures in summer fluctuate between wide extremes, internal temperatures are moderated by thermal mass to within an acceptable comfort zone.

• There is no necessary correlation between thermal mass and structure. Both traditional masonry and more recent timber frame methods of construction can accommodate thermal mass.

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Thermal mass and Climate Change

• Research carried out by Arups (*UK Housing and Climate Change* – Arup Research and Development, 2005) reveals the likely failure of conventional and particularly lightweight forms of construction to meet with the demands of increasing temperatures in the UK. Arups demonstrate that thermal mass reduces the need for air conditioning whilst also reducing the consumption of winter heating fuel.

• In concluding their research paper '*Thermal Mass, Insulation, and Ventilation in Sustainable Housing*' (University of Stratchclyde, 2004), Tuohy et al concur with Arups: 'Thermal mass, ventilation, shading and shuttering are shown to have a large influence on summer peak temperatures with high thermal mass construction having a consistent beneficial effect.' They also noted that the IEA Sustainable Solar Housing demonstration houses reflected an increasing use of thermal mass in buildings towards southern Europe, 'apparently driven by summer cooling'. The role of thermal mass in northerly locations was observed to be more marginal.

Definition

• Materials characterised by the expression 'Thermal mass' (aka 'Thermal storage capacity') are those that absorb heat, store it, and at a later time, release it.

Measurement

• Thermal mass is measured in terms of 'Volumetric heat capacity'. Volumetric heat capacity is the quantity of heat per unit mass per degree of temperature change or kJ/m^3K.

• The effectiveness of Thermal Mass to absorb and emit heat is measured in terms of thermal conductivity. High conductivity implies a more rapid ability to absorb and emit heat. Conductivity is the

Measurement

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The thermal properties of some common materials

Material	Conductivity W/mK	Vol heat capacity kJ/m^3K
Water	1.9	4186
Dense concrete block	1.8	2300
Granite	2.1	2154
Sandstone	1.6	1800
Clay tiles	0.52	1770
Cast concrete (dense)	1.4	1760
Rammed earth	1.1	1675
Clay plaster	0.91	1650
Brick	0.72	1360
Dense plaster	0.05	1300
Flooring screed	0.41	1000
Plasterboard	0.17	800
Lightweight plaster	0.16	600
Lightweight concrete block	0.11	600
Fibreboard	0.06	300
Timber flooring	0.14	780
Carpet	0.07	260
Rockwool insulation	0.035	42
Fibreglass insulation	0.04	9

Characteristics of effective thermal mass

Characteristics of effective thermal mass

- High heat capacity (the ability to store large amounts of heat)
- Moderate conductance (must be able to transfer heat fairly well through conduction)
- Moderate density (cannot be too heavy or too light)
- High emissivity (must be able to easily emit, or give off, heat)

Other material characteristics

Thermal Lag (hours)

Thermal lag is a term describing the amount of time taken for a material to absorb and then re-release heat, or for heat to be conducted through the material.

Thermal Lag times are influenced by:

- Temperature differentials between each face.
- Exposure to air movement and air speed.
- Texture and coatings of surfaces.
- Thickness of material.
- Conductivity of material.

Thermal Admittance (W/m^2 K)

Thermal Admittance is a useful factor in assessing the likely performance of different materials during the design process. Thermal Admittance describes the controlling property of a material to exchange heat with the internal space due to a change in temperature over a period of time (usually 24 hours). It is measure in W/m^2 K, where temperature is the difference between the mean value and actual value within the space at a specific point in time.
It is high for heavyweight construction, and low for insulation

Thermal Admittance is influenced by:

- Thermal capacity
- Conductivity

Thermal Admittance is influenced by:

- Thermal capacity
- Conductivity
- Density
- Surface resistance
- Ultimately admittance has an upper limit determined by the rate of heat transfer from the material's surface to the adjacent air – though this can be increased through ventilation providing convective heat transfer.

How thermal mass works

The thermal capacity of the building's elements delays the heat transfer to the interior of the building, by soaking up excessive heat for several hours. During the night, when the external temperature is lower, the stored heat is slowly expelled to the environment by radiation and by convection.

1 Heat is radiated through the surface of the mass by a warmer object (such as sun, lights, people, or equipment).

2 Heat is conducted from the warmer surface of the mass to the cooler interior of the mass, effectively "storing" heat in the mass.

3 When the mass surface becomes warmer than other objects surrounding it, the mass radiates heat to these objects (meaning the mass radiates heat back into the house).

4 Heat from the warmer interior of the mass is conducted to the surface of the mass as the mass cools (a reversal of step 2).

Materials

Materials

• The most effective construction materials are those with the highest volumetric heat capacity. In general, dense materials will generally have a higher thermal mass than less dense products. For example, dense concrete blockwork, rammed earth and mud bricks have a high effective thermal mass when compared to lightweight blockwork or wood.

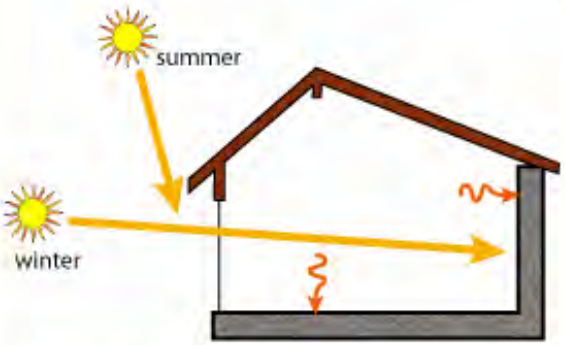
• For thermal mass to be effective there must be minimal thermal resistance between the occupied space and the mass of the structure. The temperature fluctuations within the building fabric are greatest at the surfaces. Relatively thin layers of plaster can have a significant effect on the thermal mass by providing thermal resistance.

The seasonal effects of thermal mass

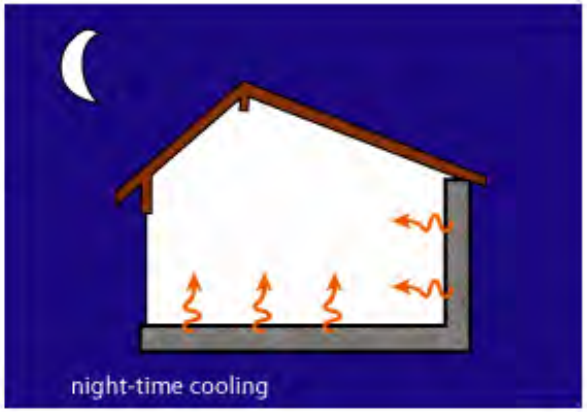
Summer

• In summer, thermal mass absorbs heat that enters the building. In hot weather, thermal mass has a lower initial temperature than the surrounding air and acts as a heat sink. By absorbing heat from the atmosphere the internal air temperature is lowered during the day, with the result that comfort is improved without the need for supplementary cooling.

• At night the heat is slowly released to passing cool breezes (natural ventilation), or extracted by exhaust fans, or is released back into the room itself.



absorption through direct radiation and convection



Winter

Winter

• In winter, thermal mass in the floor or walls absorbs radiant heat from the sun through south, east and west-facing windows. During the night, the heat is gradually released back into the room as the air temperature drops. This maintains a comfortable temperature for some time, reducing the need for supplementary heating during the early evening.

• The most difficult period in winter is the early morning. The heat released during the night has dissipated, temperatures have dropped and the sun has yet to begin the heating process. During this time it will probably be necessary to use supplementary heating to warm the thermal mass before the air temperature rises.

Locating thermal mass

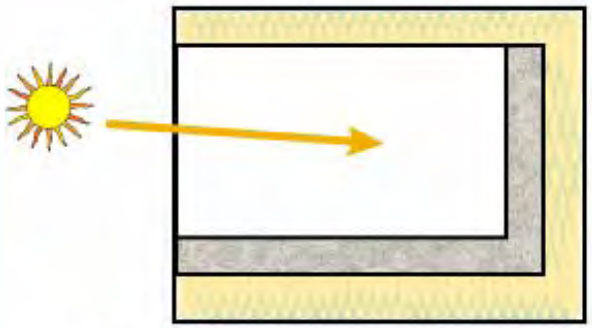
• Thermal mass is most effective where exposed to direct sun radiation.

• Where not exposed to direct radiation, thermal mass relies on efficient convection.

• Comfort is improved if the mass is distributed evenly within a room.

• Thermal mass should be insulated from external temperatures for maximum effectiveness.

• Materials that make for effective thermal mass usually perform badly as insulators.



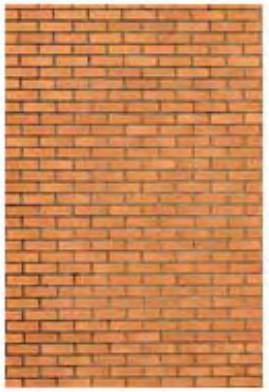
insulating the thermal mass

thermal mass and insulation at BedZED

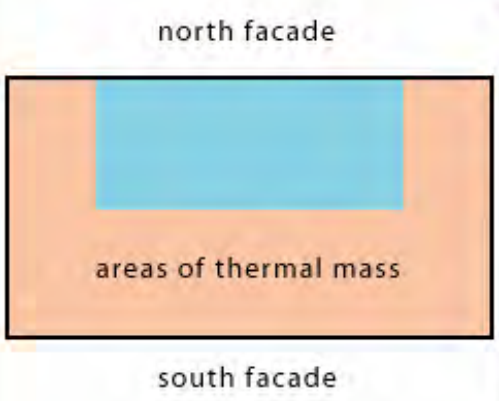
• The most important location for thermal mass is in south-facing rooms. To heat thermal mass effectively in winter, it should be optimised for exposure to direct winter sun.

• As the area of south-facing window increases, the more thermal mass is required to maintain a stable temperature.

• Thermal mass located within north-facing rooms is relatively un-important. It is frequently argued



• Thermal mass located within north-facing rooms is relatively un-important. It is frequently argued that thermal mass should be avoided altogether in bedrooms, so reducing an associated nocturnal rise in temperature.



• Summer conditions can lead to overheating to eastern and western facades. Consideration should be paid to locating thermal mass in these locations.

• Locate additional thermal mass near the centre of the building, particularly if a heater is positioned here.

How much to use

• **Area:** The amount of useful thermal mass is determined by multiplying a material's volumetric heat capacity (above) by the total accessible (that surface area exposed to the heat source) volume of the material.

Example:

A living room has 20 m^2 of thermal mass walling comprising exposed 100mm brickwork.

Volume of brickwork = 20 x 0.1 = $2m^3$

Volumetric heat capacity of brick = 1360 kJ/m^3K

Therefore the amount of useful thermal mass = 2 x 1360 = 2720 kJ for every increase in degree of temperature

• **Thickness:** The effectiveness of thermal mass is conditioned by the volumetric thermal capacity and its thermal conductivity. In practice walls acting as thermal mass should have a thickness of no more than 150mm. Performance variation between 100 – 150mm is small. Marked transition occurs

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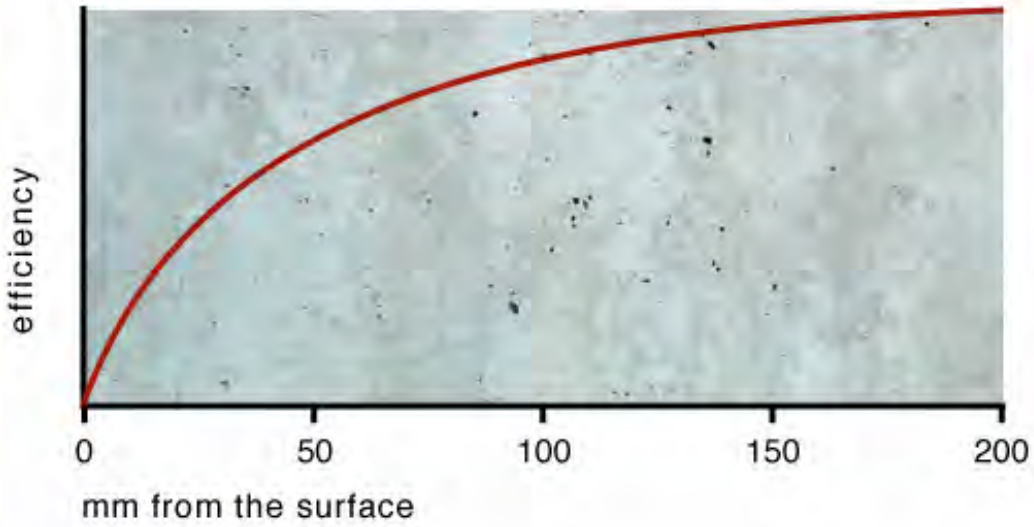

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Further information

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Products and materials

- Unfired bricks
- Concrete blocks
- Clay, lime and gypsum plasters

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NGS & Eco Refurbishment

NGS GreenSpec

Brian Murphy BSc Dip Arch (Hons+Dist)

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On the GreenSpec Website

Refurbishment - Contents

Housing

- **The Quick Guide to Housing refurbishment:**
  - Context
  - Air tightness
  - Ventilation
  - Wall Insulation
  - Roof insulation
  - Ground floor insulation
  - Windows and doors *(to be published)*
  - Heating *(to be published)*
  - Water conservation *(to be published)*

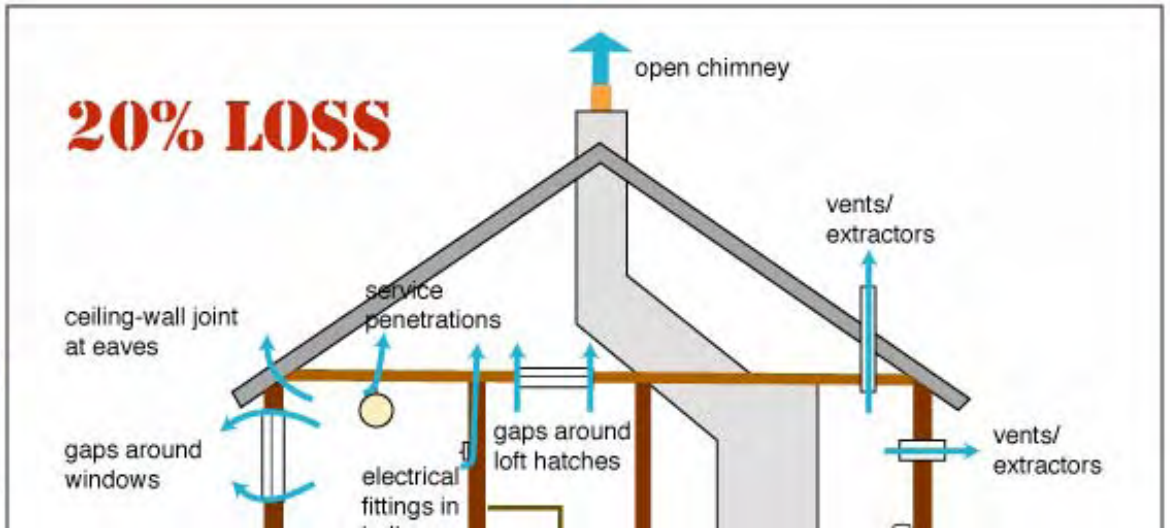
- **Ongoing case study:** Carshalton Grove by Parity Projects

Housing refurbishment: Airtightness

Issues

- 'Build tight, ventilate right'
- Airtightness refers to the 'leakiness' of the building fabric
- 'Leakiness' is responsible for around 20% of heat loss from space heating
- Air filtration is the uncontrolled flow of air through the building fabric
- Air infiltration is unacceptable as a form of ventilation
- A 'culture' of airtight construction needs to be engendered throughout the design and construction process
- EST 'Best Practice' air permiability is 5$m^3/h/m^2$. Best practice for dwellings with balanced mechanical ventilation is 3$m^3/h/m^2$ (based on CIBSE TM23 2000).

Where it all goes.....



Housing refurbishment:
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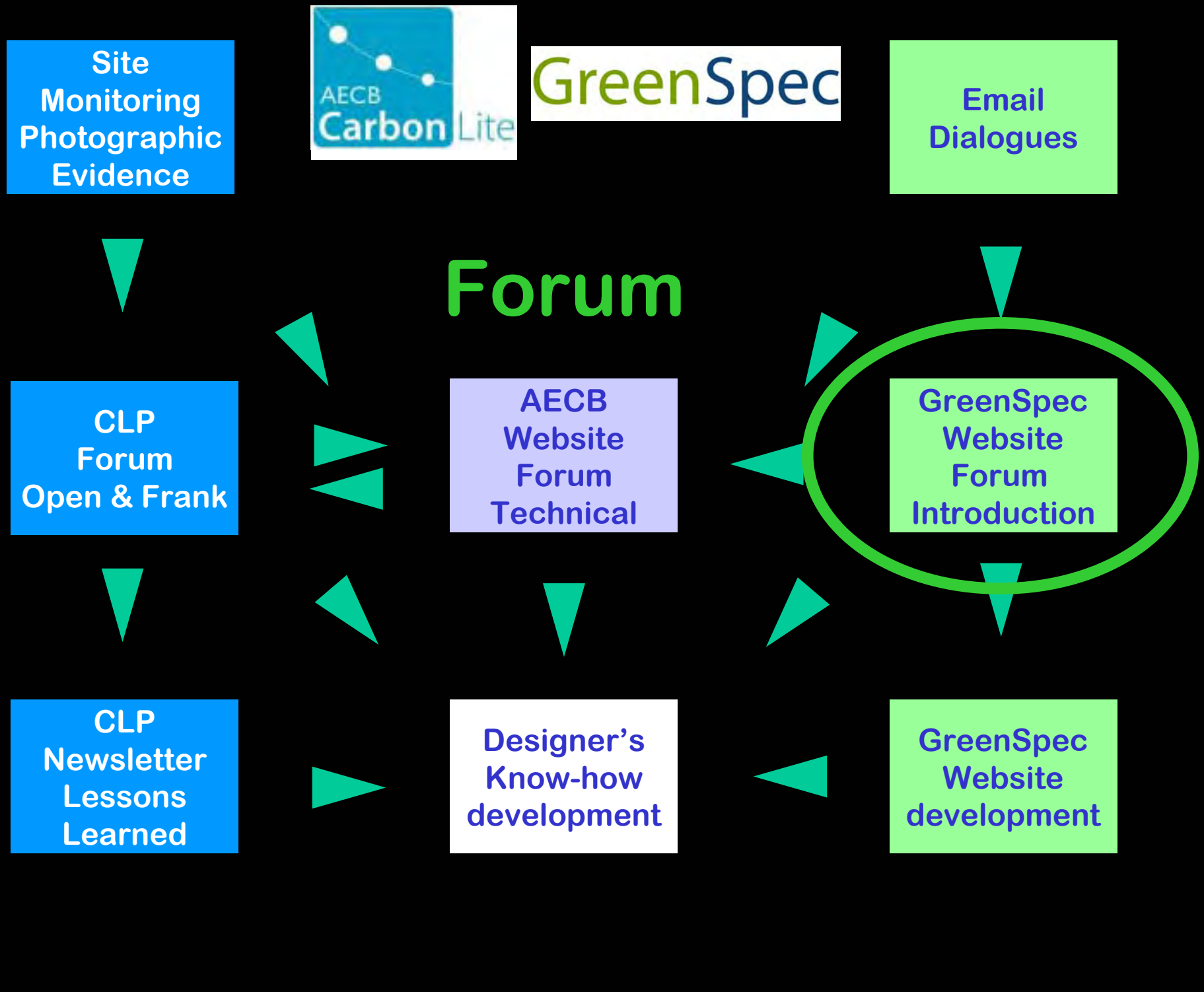
Site
Monitoring
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Evidence
AECB
Carbon Lite
GreenSpec
Email
Dialogues
Forum
CLP
Forum
Open & Frank
AECB
Website
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GreenSpec Forums

Welcome back; your last visit was: *Today, 10:13 AM*

User Name ••••••

GO

General

Forum	Topics	Replies	Last Post Info
General issues For postings concerning issues not yet covered by forums listed below	4	4	May 31 2007, 03:48 PM **In:** Network across the value chain **By:** amythink

Help/advice needed

Forum	Topics	Replies	Last Post Info
Help with finding materials / components / products Use this forum if you want help in finding particular materials and products	4	3	Jun 14 2007, 07:32 AM **In:** Rainwater goods **By:** BrianSpecMan
Help with design / construction Use this forum if you need advice with design / construction	6	21	May 28 2007, 09:31 AM **In:** U-values for low impact materi... **By:** Guest_BrianSpecMan_*

Government policies

Forum	Topics	Replies	Last Post Info
Code for Sustainable Homes - the Government's new initiative to drive a sustainable housing industry	1	1	Jan 26 2007, 10:18 AM **In:** Does it have teeth? **By:** Mr Sustainable

GreenSpec forum

Flooring insulation

Options

Philippa — Jun 4 2007, 11:03 AM — Post #1

Guests

I am interested in installing underfloor heating in our ground floor.
We have concrete beam and block with screed.
We don't want to raise the height of the floor too much, or go to all the time and trouble of removing the exsiting screed.
I like the look of the variocomp flooring, (which seems designed for just this purpose) however, I know it still requires insulastion.

What is the minimum hieght of insulation we could use?

Also, does the overall level of insulaton need to be less if we give up the idea of UFH and go for radiators?

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CPD Seminars

GreenSpec offers a comprehensive collection of CPD seminars. To date, the organisation has run several hundred successful events including those involving architects, structural and civil engineers, surveyors, interior designers, contractors, interiors designers, landscape architects, planners and product manufacturers.

What people have said:

'I have been to many sustainability events and paid lots of money and got nothing useful out of it. This is the best event I have attended. It's about real practical things I can do something about in my work. Thank you so much!'
Helen Taylor, RIBA Council

'Your infectious enthusiasm and detailed knowledge really drove the day and gave us a remarkable level of participation from the other delegates. Your presentations have provided us with a great deal of valuable information and food for thought.'
Matt Adams, Groundwork, Merton

'You have really inspired us to look at the issues you brought up and I'm sure the GreenSpec website will be getting good use'
Haverstock Associates

Seminars

Below is a list of seminars that GreenSpec can offer. It is by no means exhaustive and potential users should feel free to discuss their particular needs.

1 What sustainability means to you

Includes looking at definitions, differentiating sustainable from conventional construction, design, specification and materials.

Seminars

Below is a list of seminars that GreenSpec can offer. It is by no means exhaustive and potential users should feel free to discuss their particular needs.

1 What sustainability means to you

Includes looking at definitions, differentiating sustainable from conventional construction, design, specification and materials.

2 Using GreenSpec

This seminar looks at the features that GreenSpec offers and how to use them. The various features include specifications, the checklist, product data and information sources as well as others.

3 Overcoming Barriers

This seminar investigates the barriers to adopting sustainable construction methods and how to overcome them. The seminar looks at the problems respective parties encounter in the supply and construction chain.

4 Government Drivers

This seminar identifies government and local government legislation relating to energy and sustainable construction including the Code for Sustainable Homes, the Building Regulations and Local Authority planning guidance.

5 The Sustainable Construction Checklist

Based on the GreenSpec 'Checklist', this seminar looks at the issues involved in making the design and construction process more sustainable.

6 Specification

Specification is a key tool of the designer of sustainable buildings. The contract specification can make the difference between the failure and success of the designer's ambitions. This seminar examines the tools of the trade including how to integrate GreenSpec specifications with NBS.

7 Manufacturers' Claims

7 Manufacturers' Claims

This seminar examines the claims manufacturers make concerning the environmental credentials of their products. It explains how manufacturers mislead and obfuscate and identifies how you can sort out 'the wheat from the chaff'.

8 The Costs of Going Green

This seminar looks at the real and perceived costs involved in producing a sustainable building including overcoming barriers presented by clients and quantity surveyors, value engineering and lean construction.

9 Lean Construction

This seminar examines the processes that generate resource efficiency in the construction process from co-ordination of production information, health and safety through to waste elimination.

10 Refurbishment

Too often looked upon as new-build's poor relation, refurbishment has a vital contribution to make to the carbon reduction agenda. This seminar examines the various initiatives dedicated to developing construction methodologies applicable to a wide range of buildings.

11 Waste Management in Design, Construction and Use

Millions of tonnes of construction waste have traditionally headed from site to landfill. But things are changing. On the one hand government legislation promoting recycling and on the other there is the realisation that there is money to be made from reducing waste. This seminar looks at the evolving legislative landscape and examines the tools for reducing waste from production and packaging through to lean design and site waste disposal.

12 Reclamation and Reuse

There is a massive potential to reuse building materials arising from unwanted buildings. There is an already sizeable market in reclaimed materials that runs parallel to the construction industry. Yet reclamation rarely engages with the supply change. This seminar examines the barriers involved in specify reclaimed materials together with ways of overcoming them.

Seminar Costs

Seminar Costs

Pre-prepared seminars such as those listed above are charged at £250 plus VAT plus travel. Bespoke seminar costs vary according to research and preparation time. Please enquire. Workshops are charged at between £500 and £2500 depending on topics and event duration.

Contact

Please contact GreenSpec for further information using the form below.

Contact Information

Name: *
enter your name

Company: *
enter your company

Email Address: *
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Telephone: *
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Details: *
enter which CPD seminar(s) you are interested in

(maximum of 5000 characters)

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Fields marked with * are required.

GreenSpec CPD

- 510 PowerPoint files created
- Recording 6 years of learning and 30 years of experience
- Sustainability, Environmental, Specification and Procurement
- Presented to any audience including student Architects and Technologists at BSc to MSc, Architects CPD, etc.

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website content

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NGS & Eco Refurbishment

NGS GreenSpec

Brian Murphy BSc Dip Arch (Hons+Dist)

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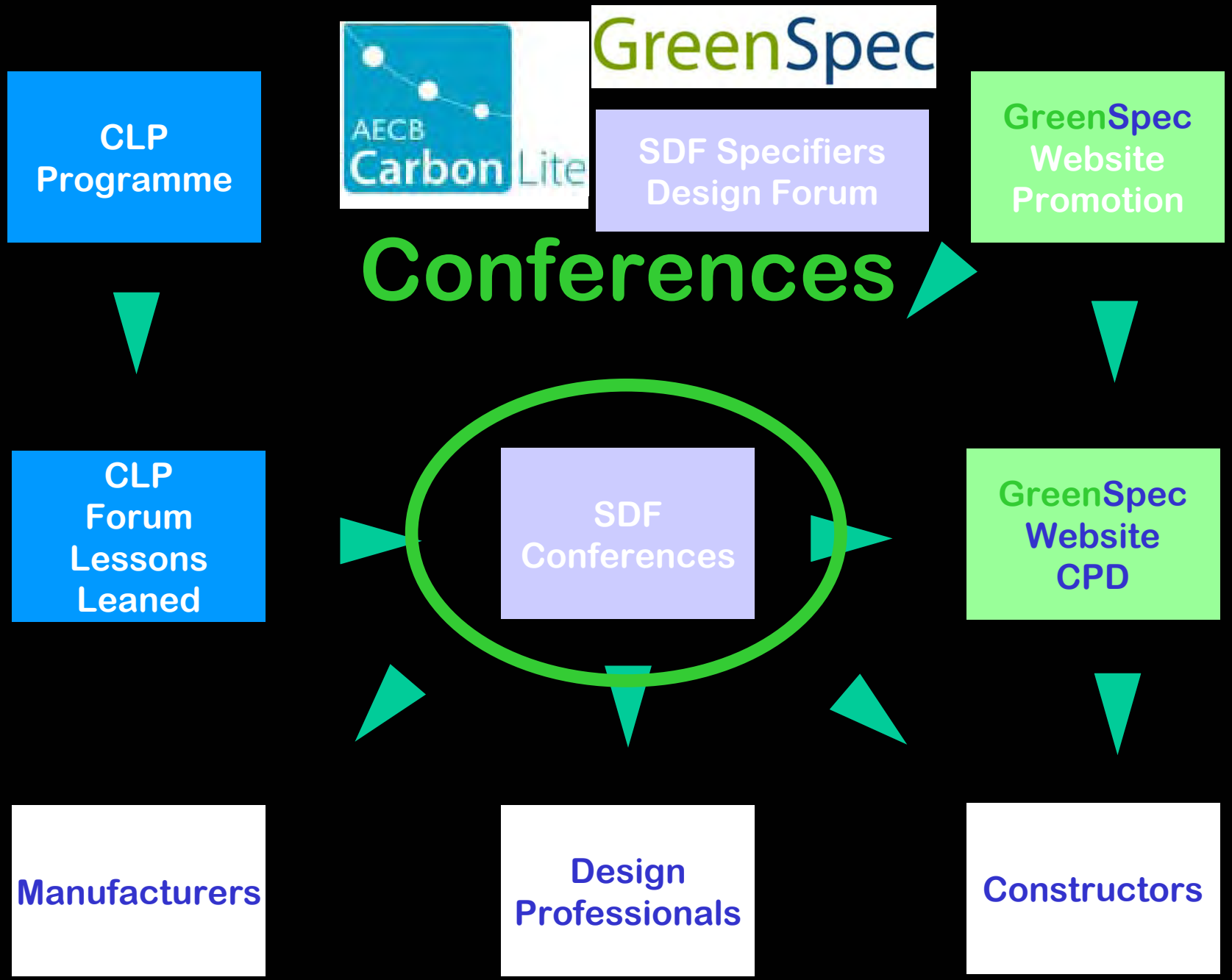
SDF Specifiers' Design Forum Conferences



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Following the success of the Specifiers' Design Forum 'Specification is the Design Process' in 2006 we are proud to invite you to join us in exploring

The Building Envelope Performance'
Specifiers' Design Forum 2007

Key Note speakers will show how the exterior must be made to perform while maintaining the integrity of the design vision

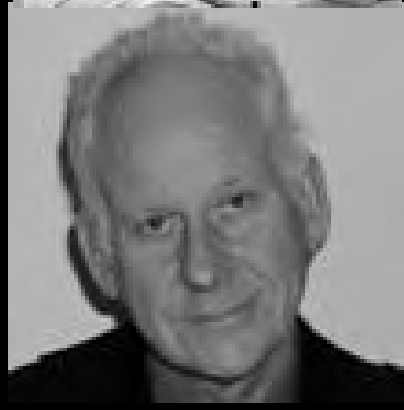
Featured Speakers:

- Mike Foster of Tooley and Foster (chairman)
- Howard de Mont of Sidell Gibson Architects (host)
- Peter Caplehorn of Scott Brownrigg Architects
- Alan Jones of SKM Anthony Hunts
- Brian Murphy, National Green Specification
- Stephen Cherry from Horden Cherry Lee
- Andrew Stanway, developer and psychologist

Thursday 29th March 2007
9am – 1pm
(Registration from 8.30am)
41 Portland Place, London W1N 4BN

Tickets cost £20 (+vat) and can be purchased using the form on the back.
For further information call the SDF team at Fuel PR on 0207 498 8211
Email- sdf@fuelrefuel.com

For more information you can also visit:
http://www.greenspec.co.uk/html/features/conference/SpecConference.html
http://www.architecture.com/go/Architecture/Events_499.html



SDF Specifiers' Design Forum Conferences

- Cheap to attend
- Topical half or whole day seminars
- Expert speakers
- Stuff useful in everyday work
- Disseminate Low Carbon House design
- Offer to disseminate CLP outputs

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NGS GreenSpec supporting CLP

Updated after AECB Annual Conference
Friday 29th June 2007