Design for a low carbon future

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RIBA President's Sustainability Advisor

FeildenCleggBradleyStudios


By far the most terrifying film
you will ever see.
aninconvenienttruth
A GLOBAL WARNING
www.climatecrisis.net

2006

Carbon as the currency of the future 2006

"Climate change is the greatest market failure the world has ever seen"

Act now

To avoid catastrophic climate change

To limit costs

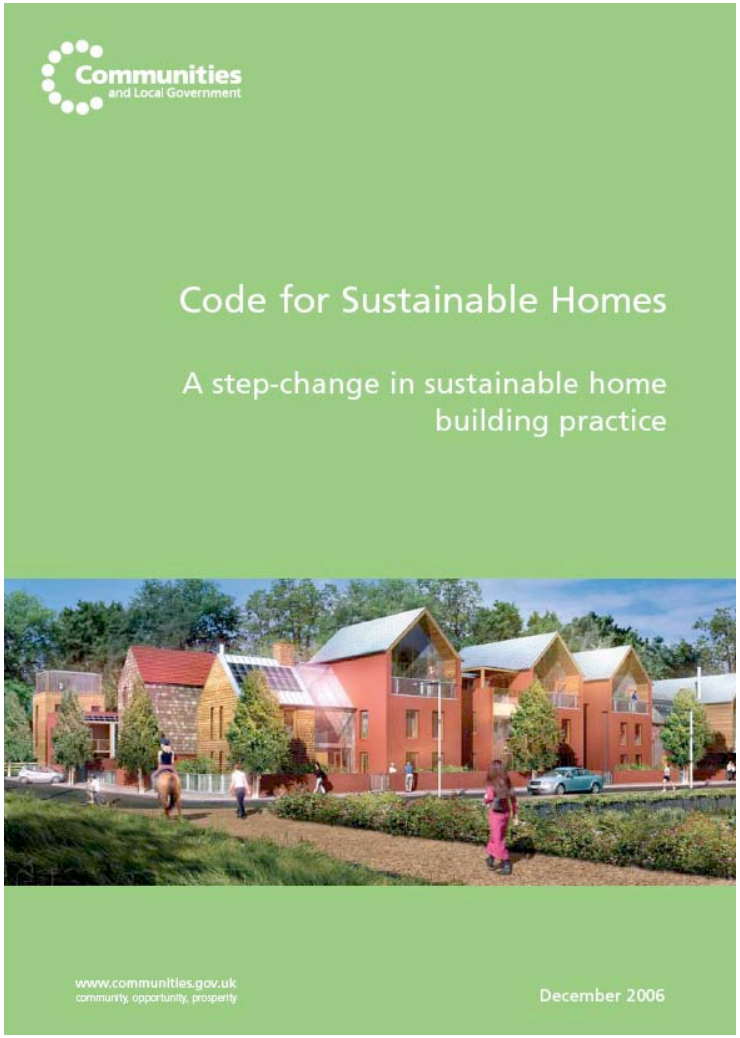
Address market failure by:

Taxation

Carbon trading

Regulation

A Greener Future…



Energy Performance Certificates 2007…

Image: Arup

Twin Challenges

Mitigation: Design to reduce emissions

Adaptation: Design for a different climate

Hotter drier summers

Wetter warmer winters

Extreme events more likely

Climate Change: Key Issues for the Profession

To recognise and **understand** the problem

To recognise our **potential** to help address the problem – a **design** issue

To raise **awareness** within the profession and with the wider public

To **collaborate** with others to develop a coordinated approach

To provide access to **tools** to help address the problem

To define realistic **targets** – **above the minimum**

To **check** how well the targets are met in practice.

+ DELIGHT

+ VISION

RIBA Strategy

Set an overarching framework

Evaluate and signpost appropriate tools and targets

Identify knowledge gaps

Lead by example

Campaign.

Contraction and Convergence: a fair share for all

Source: Global Commons Institute 2004: www.gci.org.uk

Leading by example: Improving our own behaviour

Measure

Analyse

Improve

Energy

Water

Transport

Supplies and Waste.

Raising awareness

Promoting a Common Currency of Carbon

Awards

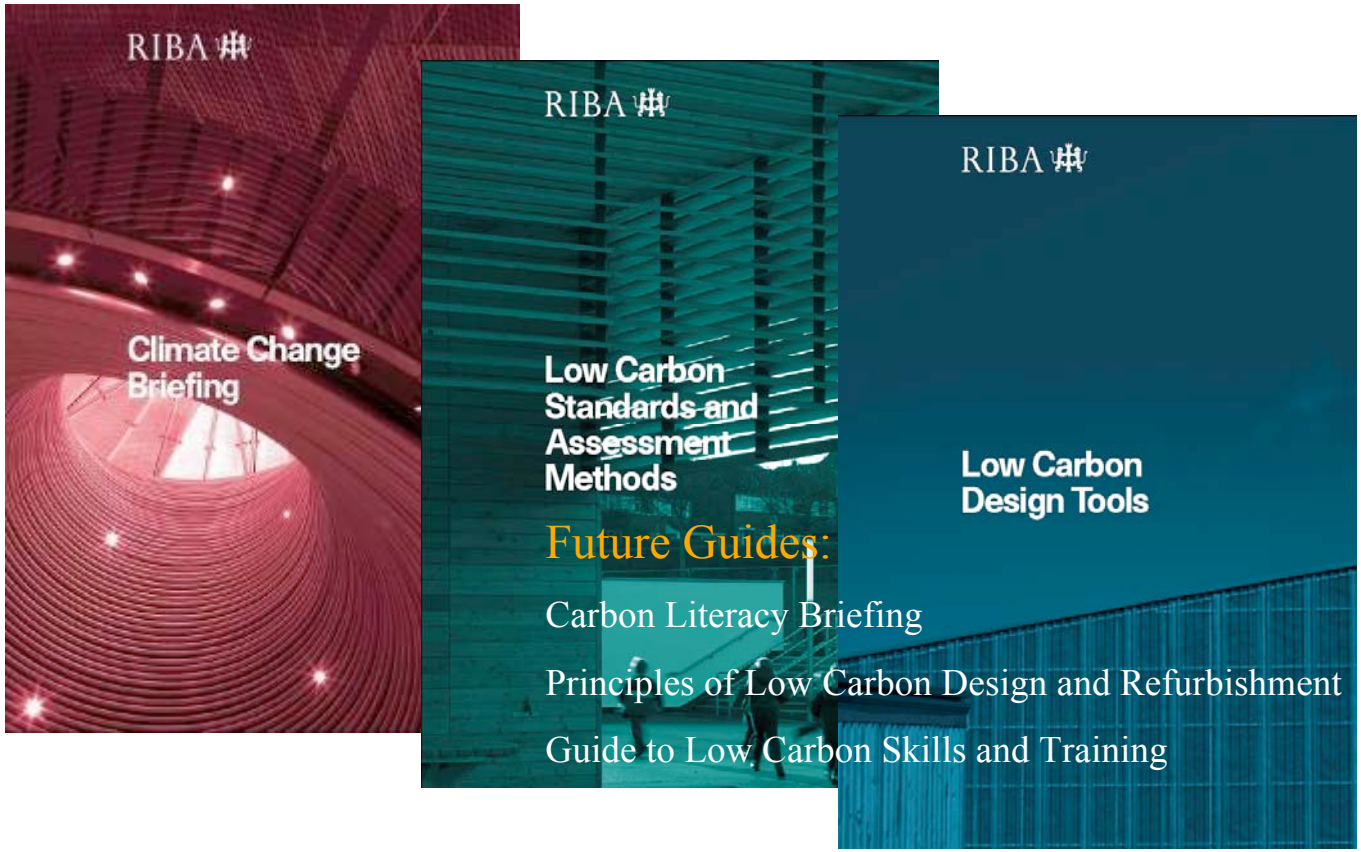
Publications

Raising awareness

Promoting a Common Currency of Carbon

Awards

Publications



www.architecture.com/FindOutAbout/ClimateChange

Raising awareness

Promoting a Common Currency of Carbon

- Awards
- Publications

Lectures and events

Lobbying Government, public and private organisations.

Tools and targets– broad and narrow

Sustainability Spectrum – University of the West of England

Eco-footprinting – Best Foot Forward, The Stockholm Institute

Sustainable Development checklists - BRE, SEEDA

BREEAM (Building Research Establishment Environmental Assessment Method)

Ecohomes/ Code for Sustainable Homes

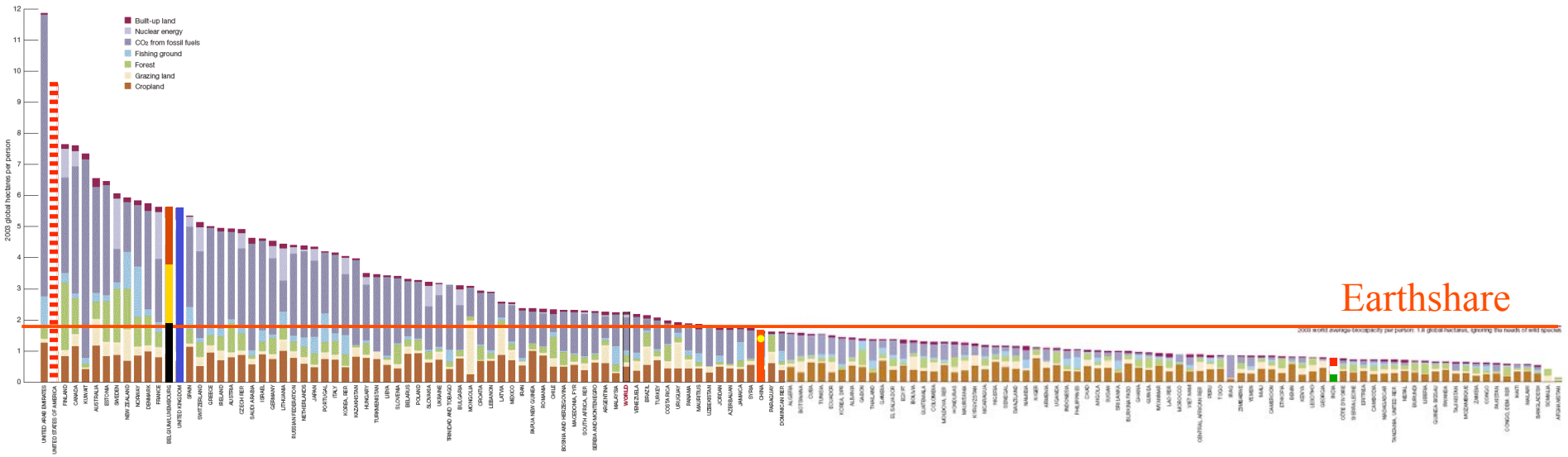
Energy Savings Trust Good, Best and Advanced Practice Standards

AECB (Association of Environment Conscious Building) Gold and Silver Standards

Sustainability Matrix and **Renewable Footprint** - FCBa + UBT

Eco-footprinting

The area of bioproductive land and water required to support the material standard of living using prevailing technology



Source: WWF Living Planet Report 2006

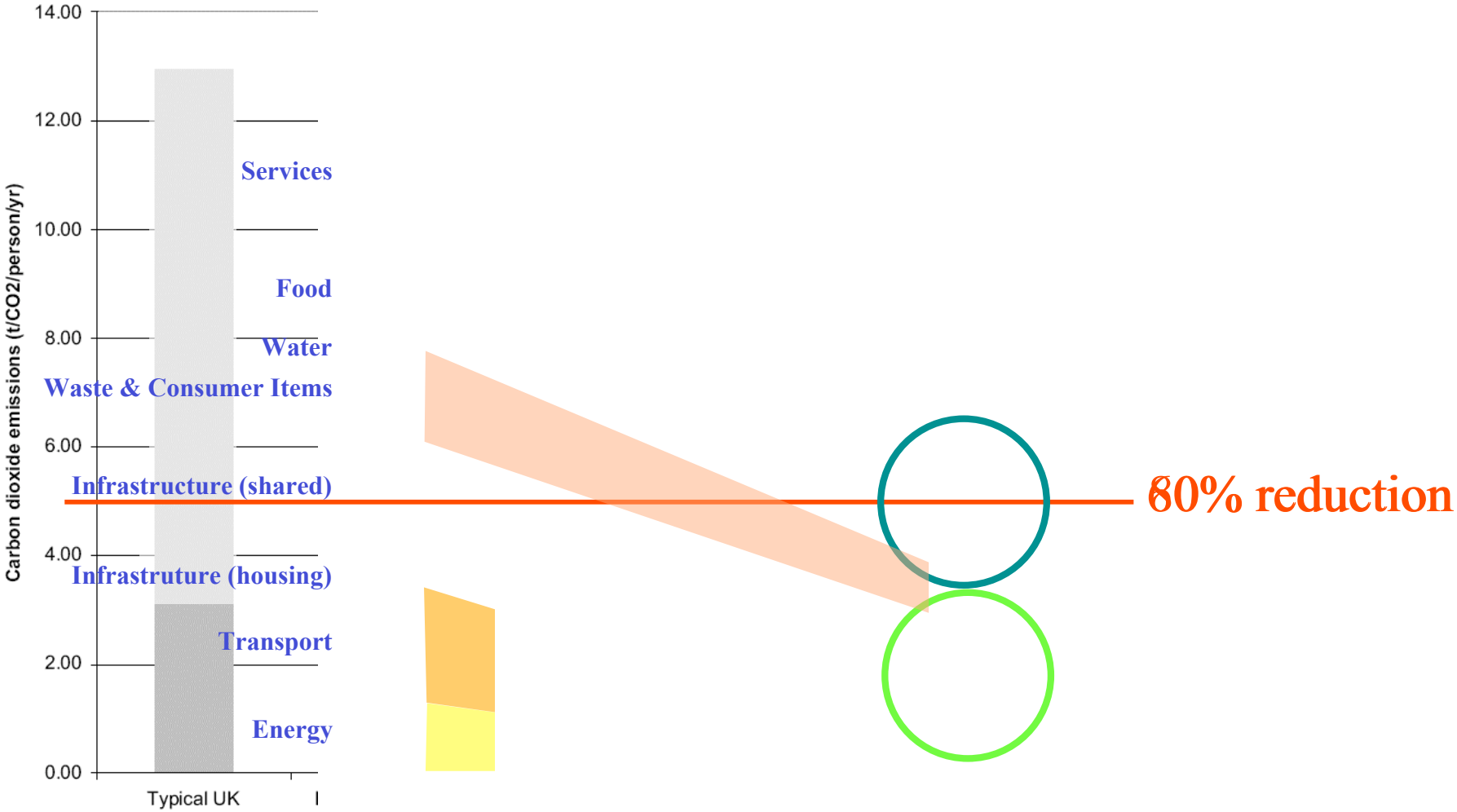
Ecofootprint of London

293 times its own area

2 times the size of the UK

same size as Spain…

Sharing the Carbon Challenge



Source: Bioregional + Stockholm Institute + WWF 2003

Tools: BREEAM

Building Research Establishment Environmental Assessment Method

Carbon dioxide emissions

Water consumption and conservation

Lighting

Transport implications of buildings

Healthy building features

Air quality and ventilation

Risk of Legionnaire's Disease

Minimising ozone depletion and acid rain

Recycling and reuse of material

Environmental impacts of construction materials

Ecology of the site

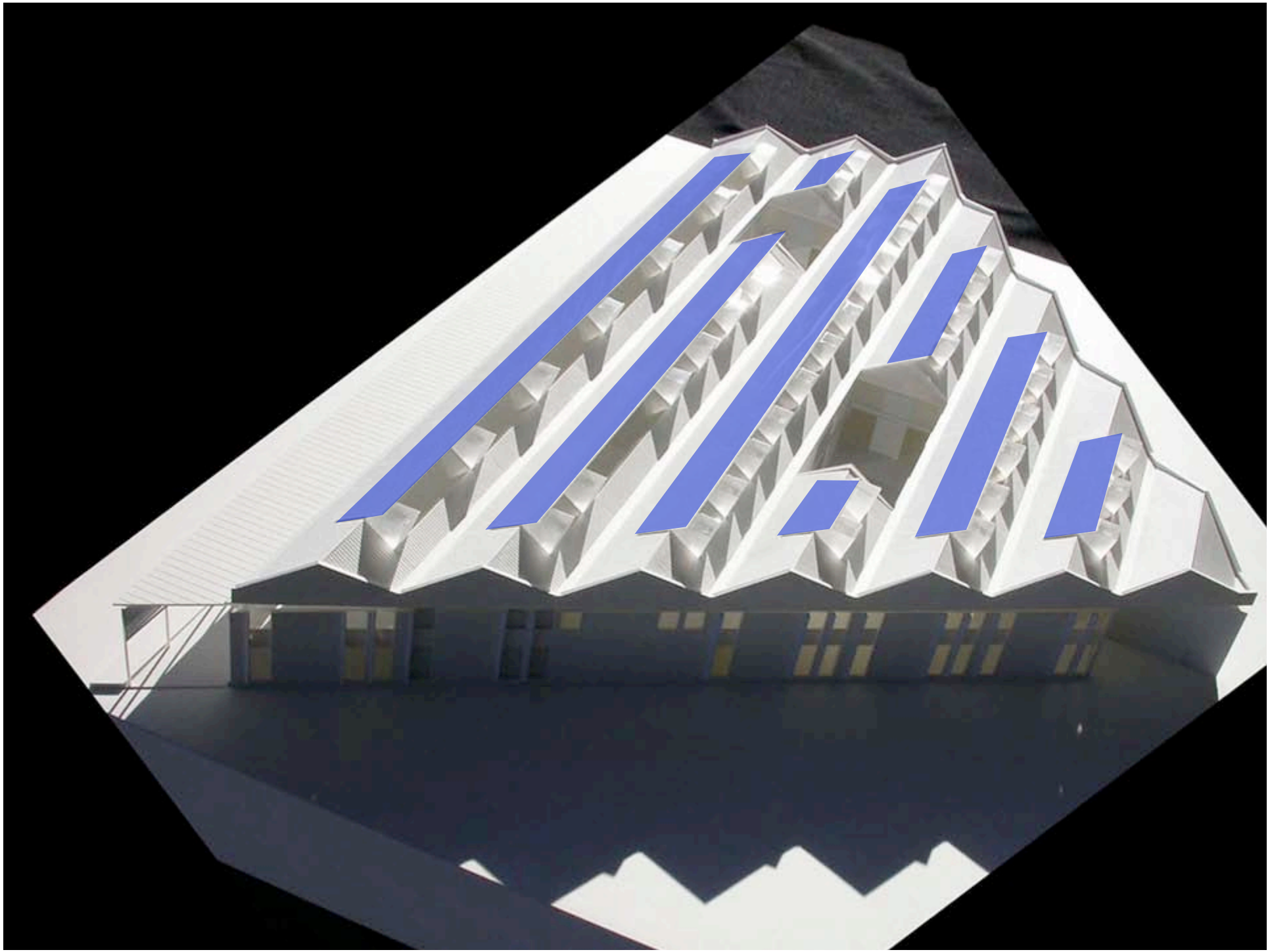
Noise

Pass **Good** **Very Good** **Excellent**

for more information see www.BREEAM.co.uk

Collaborating for success: National Trust Headquarters, Swindon

Feilden Clegg Bradley Architects LLP + Max Fordham and Partners + Adams Kara Taylor + Davis Langdon



Sustainability matrix

Issues

Targets

Operational Energy Consumption and CO^2 Emissions

	GOOD PRACTICE	BEST PRACTICE	INNOVATIVE	PIONEERING	Notes
1. CO^2 Emission Target	5kgCO/m²/yr	30kgCO/m²/yr	15kgCO/m²/yr	"Carbon neutral" 0kgCO/m	Industry standard EEO targets
2. Heating Load Target	50kWh/m²/yr	47kWh/m²/yr	30kWh/m²/yr	20kWh/m²/yr	Industry standard EEO targets
3. Electrical Load Target	50kWh/m²/yr	43kWh/m²/yr	35kWh/m²/yr	25kWh/m²/yr	Industry standard EEO targets
4. U Values: Wall	0.35	0.25	0.2	0.1	good practice=current building regulations pioneering=Bedzed values
Average Window	2.2	1.8	1.4	0.8	
Roof	0.2	0.16	0.15	0.1	
Ground Floor	0.25	0.22	0.2	0.1	
5. Airtightness	<5m³/h/m²	<3m³/h/m²	<2m³/h/m²	<2m³/h/m²	All measures require careful attention to details and monitoring construction.
6. Ventilation	Natural ventilation where possible. Mechanical ventilation where not.	Designed natural ventilation with automatic openers, mechanical ventilation to WCs etc.	Mechanical ventilation with heat recivein in winter and BMS controlled natural ventilation in summer.		BMS with manual overrides preferable on all windows.
7. On Site Energy Generation		Solar domestic water heating to WCs.	Solar domestic water heating to WC zones. Cost effective PV installation using PVs to shade rooflights. Gas fired CHP installation.	Solar water heating to kitchens. Maximum PV installation using most efficient PVs. Wood/waste fired CHP.	Potential 50% grant available from DTI for water water heating, up to 65% for PV installation.
8. Daylighting	"reasonable" to BS8206 pt 2. A 2% daylight factor	80% office space daylit to meet criteria of BS8206 part 2.	100% of office space daylit to BS8206 part 2		Ensure prevention of solar heat gain/glare by building form/shading systems
9. Artificial Lighting Controls	PI detectors in WCs etc. w energy fittings roughout.	Luminance and presence detectors throughout building. No dimming.	Luminance and presence detection at all fittings with dimming to zero and BMS override.		Personalised controls strongly recommended by Rob Jarman
10. Cooling Systems/ Sources	no ozone depletion frigerants in high efficiency mfort cooling/air nditioning systems.	Night time structural cooling with automatic window vents.	Evaporative cooling to rooms with high internal heat gains.	Borehole/ground water cooling to rooms with high internal heat gains.	Need to provide for areas where cooling is required and provide upgrade path for entire building.
11. Embodied Energy in Structural Materials	eel and concrete frame optimised to minimise ass of materials.	Use of cement replacements eg GGBFS in concrete. Use recycled steel.	Timber structure in lieu of steel or concrete but retaining concrete floors. Use of recycled aggregates in structural concrete.	All timber structure with thermal mass provided using minimum amount of concrete.	NB. Rob Jarman particularly keen on use of timber for low embodied energy
Materials Used in t e Construction Process					
12. Toxicity of Materials	oid high VOC content nts sealants etc and all	Eliminate PVC cabling, change to LSF. Avoid all 'C' rated materials	Eliminate PVC drainage - change to Cast Iron. Avoid all 'B' and 'C' grade	Eliminate all use of VOCs in paints and timber. 80% of	See BRE Design Guide to Sustainable Building
13. Materials Sourcing	ste preference to locally ourced materials. All timber be FSC certified.	Specify all heavyweight materials to be from local sources. Consider recyclability and lifecycle costing of all materials.	All materials to be UK sourced with preference for N.T. timber etc.	All materials to come from 50 mile radius from the site.	POBA to research building materials production. NT to specify availability of materials sourced from NT land.
14. Insulation Materials	no ODP insulation	Use non petro-chemical based insulation materials wherever	Prohibit use of petro-chemically based insulants.	Use only insulation materials from regenerative sources eg	
15. Recyclability of Materials	oidance of potential roblems with dismantling g. using pre-stressed ements.	High grade materials e.g. bricks to be designed for recyclability e.g. using lime mortar.	Avoid composite materials to allow for recyclability.	Prefabrication and erection to allow for easy dismantling.	
16. Waste Production during Construction	ntractor to comply with dustry standards on waste operation minimisation. < 10.5m³/100m². Avoid export of excavated terial from site.	Contractor to commit to targets on waste production from site. Encourage prefabrication.	Apply for financial constraints to reduce waste production from site. Maximise prefabrication.	All superstructure to be fabricated off site to reduce wastage.	NB need to evaluate transportation impact of prefabrication.
Water and Waste					
17. Water Usage	w flush WCs (4 litre), w/ taps and 'A' rated shen appliances.PIR tection on urinal flushing stems.	Waterless urinals. Hand PIR on tap operation.	Mains water only used for drinking water. Rainwater harvesting for WC use.	Grey water recycling for WC flushing. On site sewage treatment with vortex separation and filtration	Grey water recycling and on site sewage treatment inappropriate for open plan space. Check Vitidis (2002) and M41 standards.
18. Drainage Systems	nventional mains rainwater drainage for as around building.	Use Sustainable Urban Drainage Systems soak aways etc to reduce burden on sewage system.	Integrate S.U.D.S. with wetland swales to provide attenuation on site.		
Transportation					
19. Biodiversity in Landscaping	ntify areas for tree nting and soft dscaping.	Give preference to local species and select from local seed sources.	Increase intensity/diversity of planting around the building (creating a protected garden space). Specify green roofs/green exterior wall covering (creepers and climbers etc.).		NT Board concerned about robustness of landscape. Swindon B.C. keen on original vegetation "Rowan, Gorse and Bullrushes".
20. Transportation	vered cycle storage to courage bicycle use.	Lockable covered secure cycle storage and provision of showers.Incentivisation of car sharing and public transport use.	Minibus service to and from station. Employment/car parking policy to discourage (prevent) local employees to use their car to go to work	Electric vehicle "loan" available for visitors coming by rail, capable of using Brunel tunnel).	Note significance of all measures to be covered within the Green transport plan.
Management and M onitoring					
21. Commissioning and Staff	w involvement in mmissioning and staff	Commissioning company retained to monitor over the first energy use patterns.	Staff involvement in ongoing monitoring or performance.	Instigation of one/five year monitoring and evaluation	
22. Facilitating Recycling	dequate space for storing cyclable waste.	Managed recycling processes. Working space for separating and collecting recyclable waste.		On site composting for vegetation and office paper waste.	Green Cone systems not now possible. Very little Green Waste available.

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PV Footprint

2x National Trust

7x Good practice A/C office

20x Typical A/C HQ

The challenge of a low carbon future

The problems we have today cannot be solved by thinking the way we thought when we created them.

Albert Einstein