



International perspective – preservative treatment

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BRE, United Kingdom

Part of the BRE Trust



Timber in ground contact

- Protection and treatment of wood to enhance its life in fencing and other ground contact applications
- Addressing the challenges and opportunities for home-grown timber in replacing non-renewable materials

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Sustainability

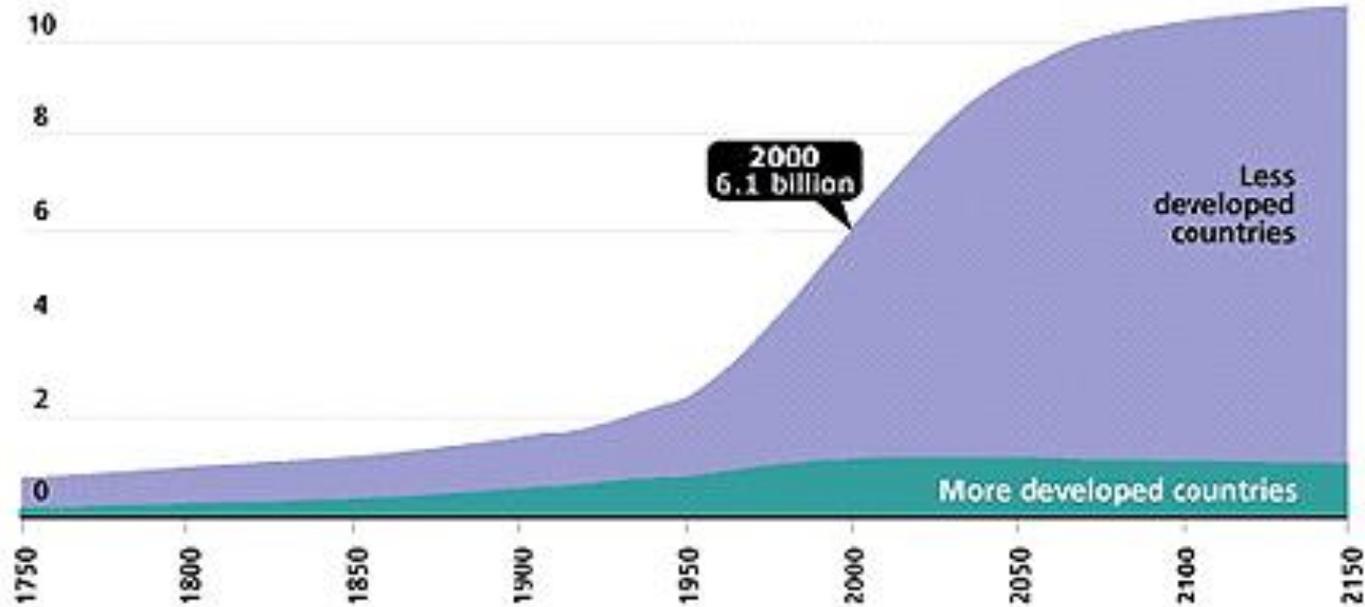


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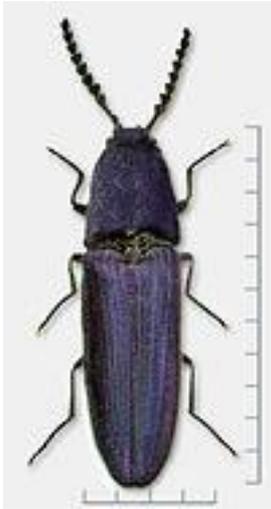
World Population Growth, 1750–2150

Population (in billions)



Source: United Nations, *World Population Prospects, The 1998 Revision*; and estimates by the Population Reference Bureau.

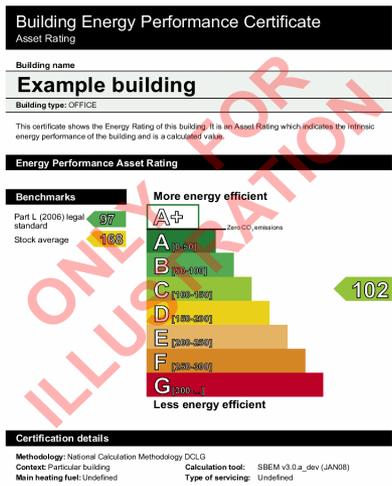
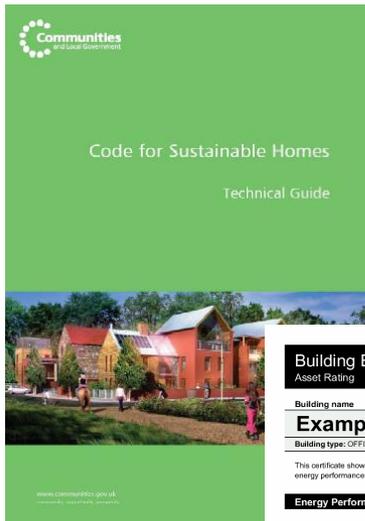




UK construction industry

- £80bn industry 10% GDP
- 1.4m people employed
- 420m tonnes materials used
- **Construction and the built environment impacts**
- 50% of all energy generated is operational energy for buildings
- 50% of water consumption
- 35% of landfill waste
- 13% of all raw materials used in the UK economy
- 94 million tonnes of demolition waste annually

Low carbon regulation



~~All new build homes to be zero carbon by 2016, allowable solutions~~

~~All non-domestic buildings to be zero carbon by 2019~~

An increase in renewable energy to 20% by 2020 and 27% by 2030

Kyoto – reduce UK carbon emissions by 80% by 2050

Energy Performance of Buildings Directive

Code for Sustainable Homes simplified and put into Building Regulations

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Wood protection

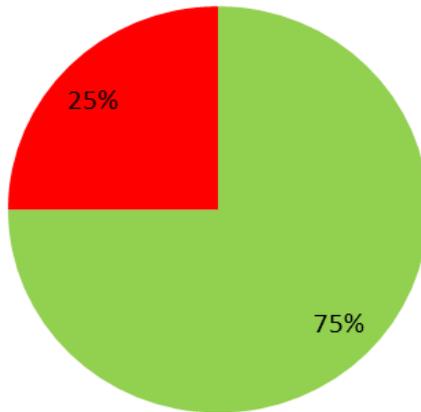
Wood preservation



Sustainability = Wood Protection?

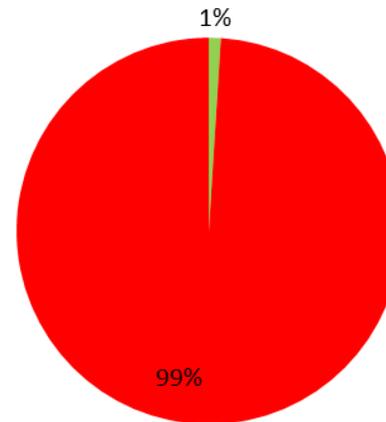
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Outside this room

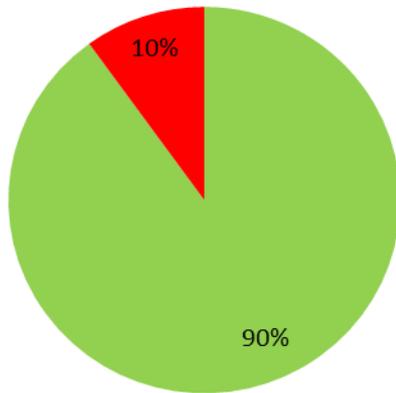
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Sustainability = Wood?

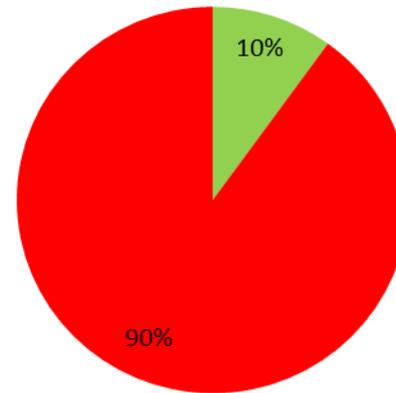
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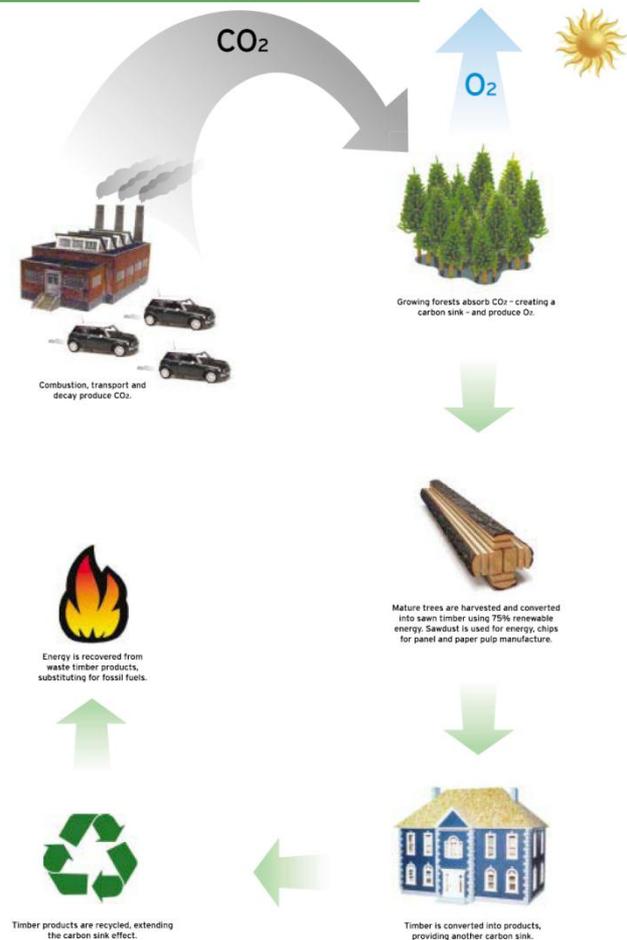


Maximising wood in construction to tackle climate change

- The role of forests and their products in mitigating climate change is at the forefront of forest policy and strategy
- Plant more forests
- Use more forest based biomass fuel
- **Increase the amount of wood in construction**

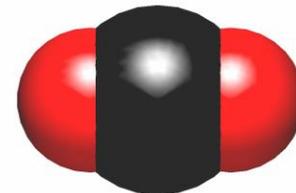
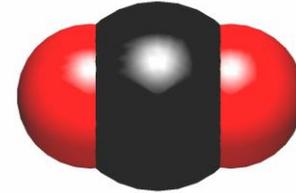
CARBON

The Carbon Cycle of wood building products.



Residence time

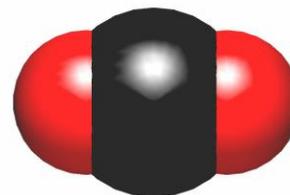
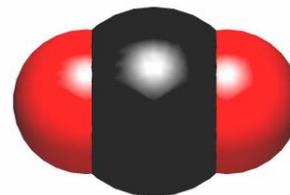
- Carbon dioxide in Palaeozoic air
- Photosynthesis – carbon become part of the cellulose in a tree fern
- Tree fern died in swamp and was overlaid by other plants
- 2005 mined as coal and burned to provide electricity to boil a kettle and power our gadgets
- Carbon dioxide returned to the atmosphere



100-200 years

Residence time

- Carbon dioxide in the air 1975
- Photosynthesis – carbon become part of the cellulose in a Sitka spruce
- Tree harvested
- Converted to C16 timber
- Included in house in 2011
- Building altered or demolished
- Timber recovered for energy
- Carbon dioxide returned to the atmosphere



Carbon and planning

- In 2010 UK's largest new build school Norwich Academy
- 3,500m³ timber and 2,900t CO₂ stored



Tall timber

- Timber is exciting the world of construction
- USDA \$1m prize for construction professionals to go tall
- UK, Sweden, Australia
- Forte apartment block, Melbourne
- Pushing on modernity and exemplary engineering

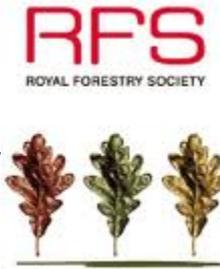


Beyond carbon: Health & Well-being

- We spend 88% of our time indoors
- Visual use of wood indoors is one way to reduce stress and promote health of building occupants
- Wood2New collaboration in Europe
- NHS Forest working with clinicians



Beyond carbon: Society





Creating a sustainable future for our woodlands and forests



Beyond carbon: Social value

- Local procurement
- Public Services (Social Value) Act (2012) secure added economic, social or environmental benefits for their local area.
- Securing supply
- Creating value in country
- National timber revolution



Public Services (Social Value) Act 2012

2012 CHAPTER 3

An Act to require public authorities to have regard to economic, social and environmental well-being in connection with public services contracts; and for connected purposes.
[8th March 2012]

BE IT ENACTED by the Queen's most Excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:—

1 Contracts of relevant authorities

- (1) If a relevant authority proposes to procure or make arrangements for procuring the provision of services, or the provision of services together with the purchase or hire of goods or the carrying out of works, by—
- (a) entering into a public services contract that is not a contract based on a framework agreement, or
 - (b) concluding a framework agreement as regards which public services contracts are likely to constitute the greater part by value of the contracts based on the agreement.

It must comply with the requirements in subsections (3), (6) and (7) before starting the process of procurement.

- (2) The authority is to be treated for the purposes of subsection (1) as having started the process of procurement as regards what is proposed to be procured as soon as it takes whichever of the following steps is the first to occur—

- (a) sending a notice to the Official Journal of the European Union for the purpose of inviting tenders, requests to be selected to tender or to negotiate or requests to participate in relation to a public services contract or framework agreement relating to what is proposed to be procured;
- (b) publishing an advertisement seeking offers or expressions of interest in relation to such a contract or framework agreement;
- (c) contacting a person in order to seek an offer or expression of interest in relation to such a contract or framework agreement;
- (d) contacting a person in order to respond to an unsolicited offer or expression of interest in relation to such a contract or framework agreement;
- (e) entering into such a contract or concluding such a framework agreement.

- (3) The authority must consider—

- (a) how what is proposed to be procured might improve the economic, social and environmental well-being of the relevant area, and
- (b) how, in conducting the process of procurement, it might act with a view to securing that improvement.

- (4) In subsection (3) "the relevant area" means the area consisting of the area or areas of the one or more relevant authorities on whose behalf a public services contract is, or contracts based on a framework agreement are, intended to be made.

- (5) For the purposes of subsection (4) the area of a relevant authority is an area consisting of the area or areas by reference to which the authority primarily exercises its functions, disregarding any areas outside the United Kingdom.

- (6) The authority must consider under subsection (3)(b) only matters that are relevant to what is proposed to be procured and, in doing so, must consider the extent to which it is proportionate in all the circumstances to take those matters into account.

- (7) The authority must consider whether to undertake any consultation as to the matters that fall to be considered under subsection (3).

- (8) If an urgent need to arrange the procurement in question makes it impractical to comply with the requirements in subsections (3), (6) and (7) before the time indicated by subsection (1), a relevant authority may disregard the requirements to the extent that it is not practical to comply with them.

- (9) Subsection (8) does not apply to the extent that the time available is reduced by undue delay on the part of the authority after this section has come into force.

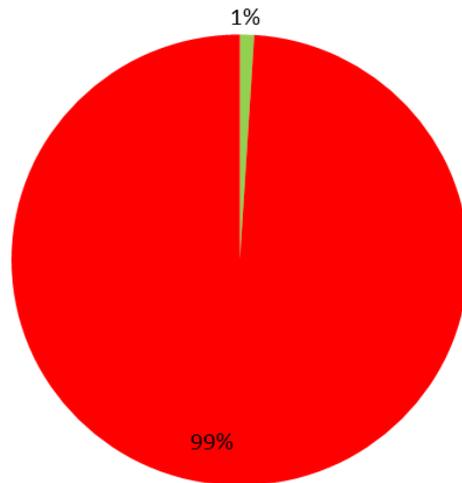
- (10) Failure to comply with subsection (1), (3), (6) or (7) does not affect the validity of anything done in order to comply with the Regulations.

- (11) The following are not required to comply with subsections (1), (3), (6) and (7)—

Sustainability = reliability and fitness for purpose?

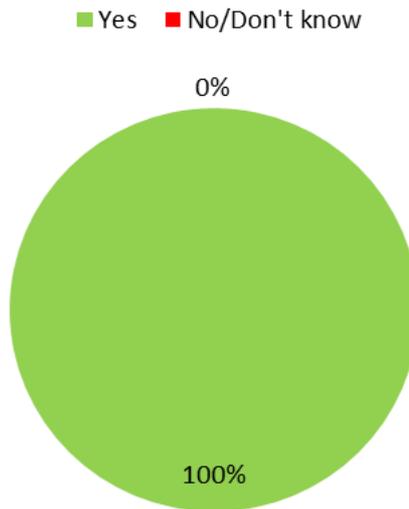
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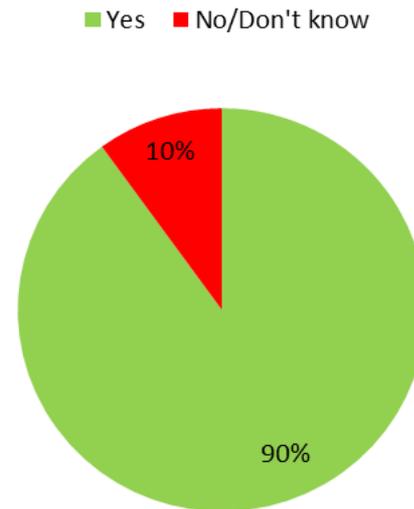


Sustainability ≠ throwaway society?

In this room



Outside this room



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Measuring sustainability



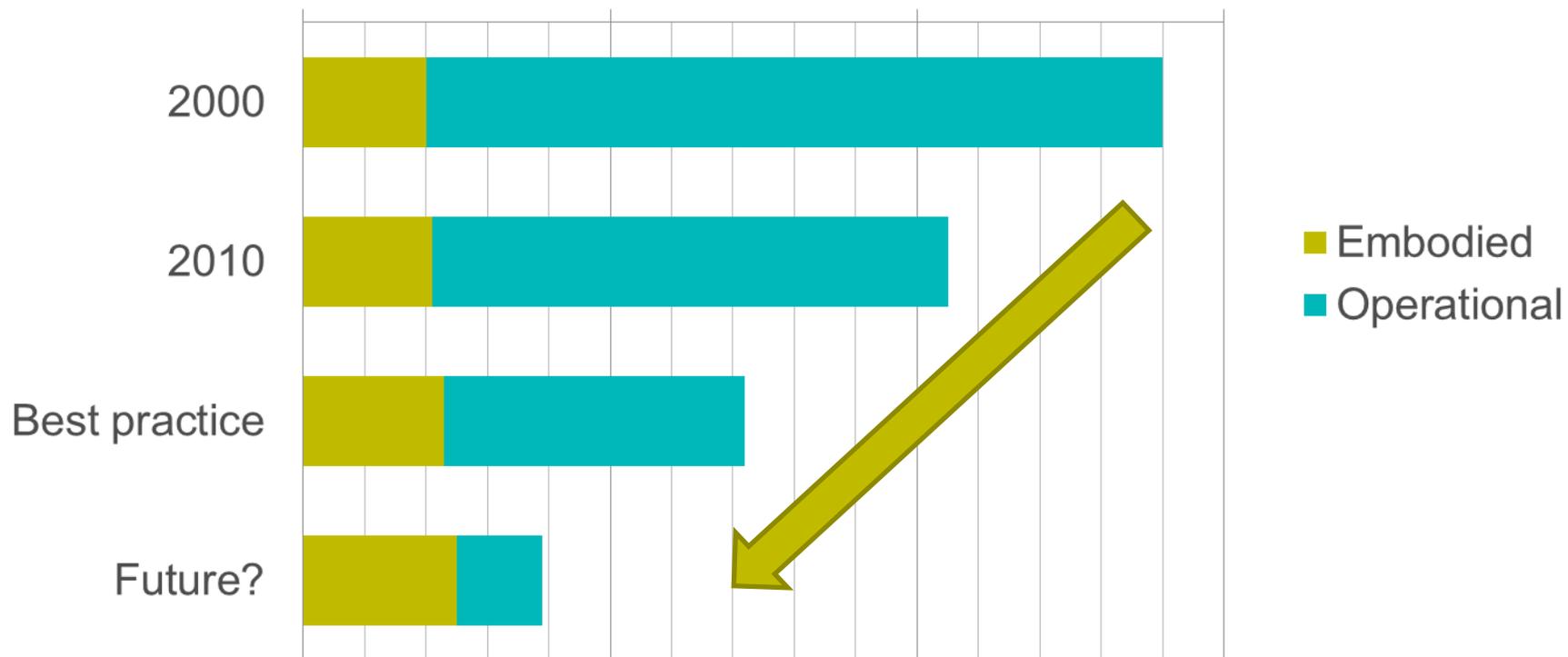
BREEAM

- Environmental assessment method and rating system for buildings
- 450,000 buildings with certified BREEAM assessment ratings and nearly 2 million registered for assessment
- Homes, Healthcare, Refurbishment, Commercial etc.
- Energy, water, pollution, materials, transport, waste

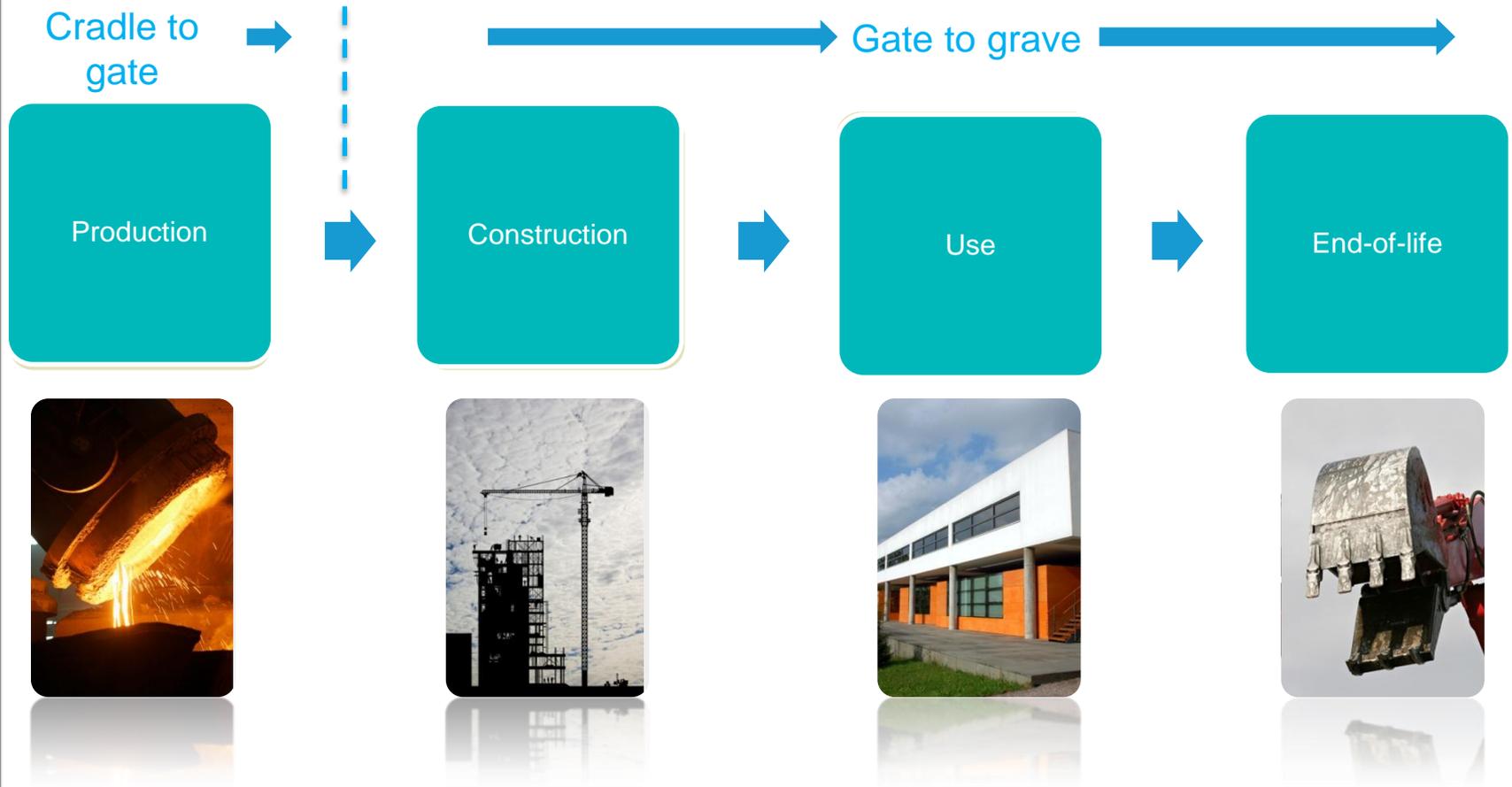


The consequences of lower energy buildings

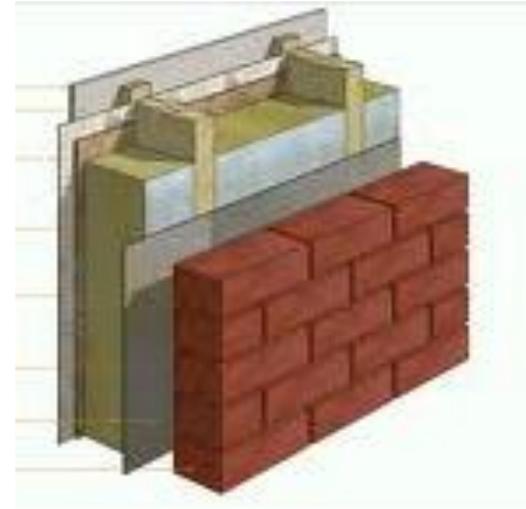
Kg CO₂/m²/year



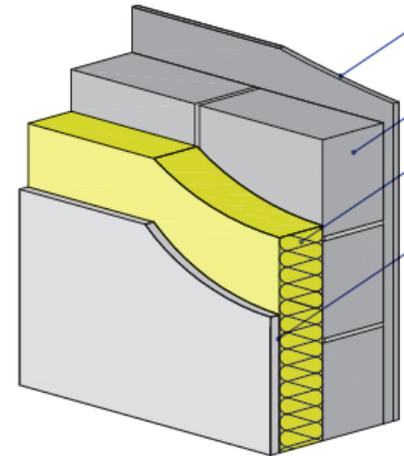
Life Cycle Assessment



Comparison at building element level using a functional unit



Timber versus blocks



Cradle to gate
Ecopoints per tonne

Cradle to grave
Ecopoints per m²

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Responsible sourcing

4



Messing about in boats... or boosting Africa's illegal arms trade?



Canal cutters: but environmentalists are concerned that wood being used to repair Britain's waterways comes from controversial logging projects in west Africa. Photograph by David Marsell

Rainforests wrecked to rebuild Britain's canals



Responsible sourcing

- Increasing awareness and demand across professionals and private individuals:

Timber: Forest Stewardship Council, Programme for Endorsement of Forest Certifications



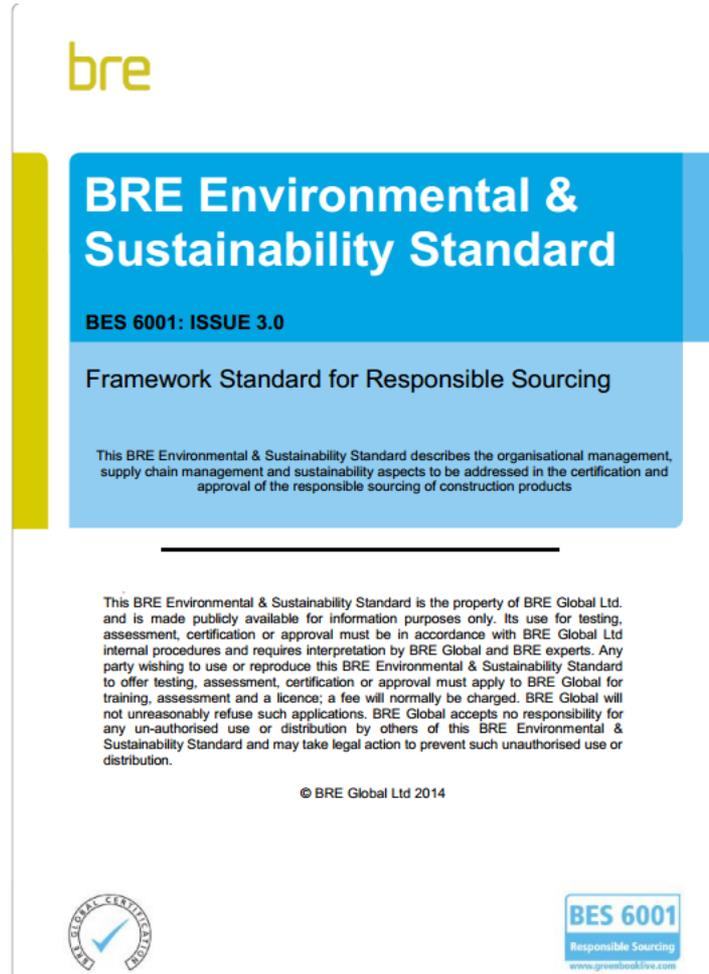
Fisheries: Marine Stewardship Council



Food: Fairtrade, Rainforest Alliance



BES 6001 – The Framework Standard for Responsible Sourcing



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Balfour Beatty

Balfour Beatty

Brookfield Multiplex



Clugston Construction Ltd



ISG



Lend Lease



Midas Group Ltd



Seddon



Sir Robert McAlpine Ltd



Volker Wessels UK



Willmott Dixon Holdings Ltd



BAM Construct UK



Carillion plc



Galliford Try plc



Keepmoat plc



M + W Group



Morgan Sindall Group plc



Severfield



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Wates Group Ltd



Bouygues



Clegg Group



Interserve plc



Kier Group



Mace



Osborne



Shepherd Construction Ltd

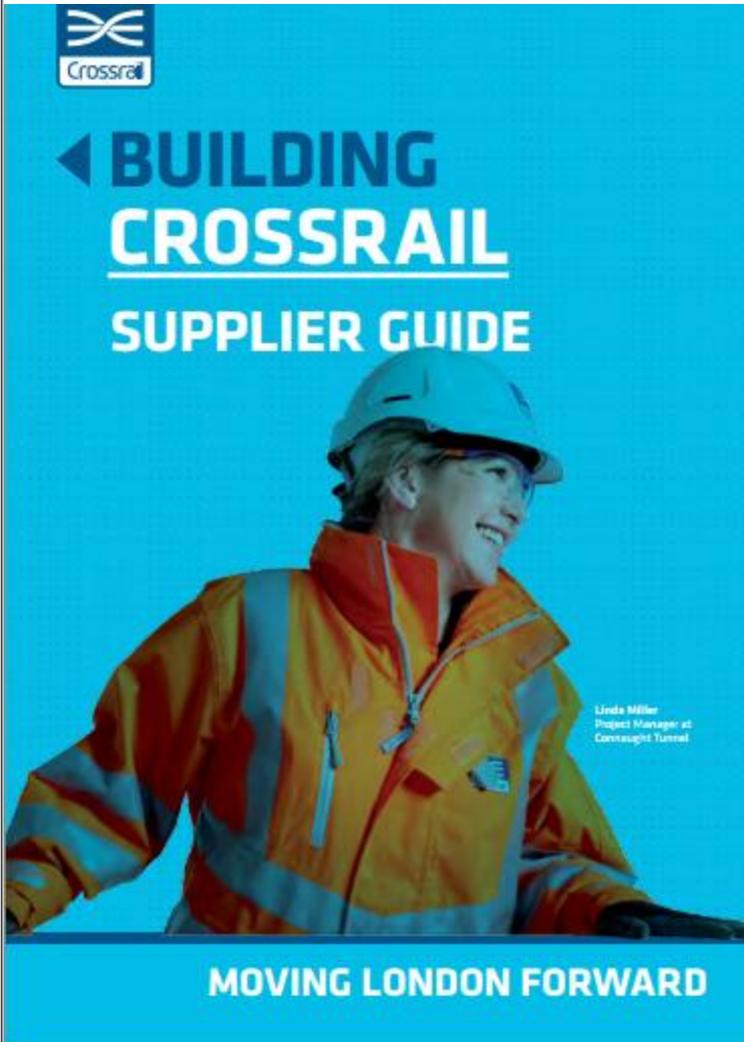


Vinci Plc



William Hare Limited





MAY 2013 - BRITISH LAND: A LEADER IN RESPONSIBLE SOURCING IN THE BUILT ENVIRONMENT



Bv British Land

Editor's Picks

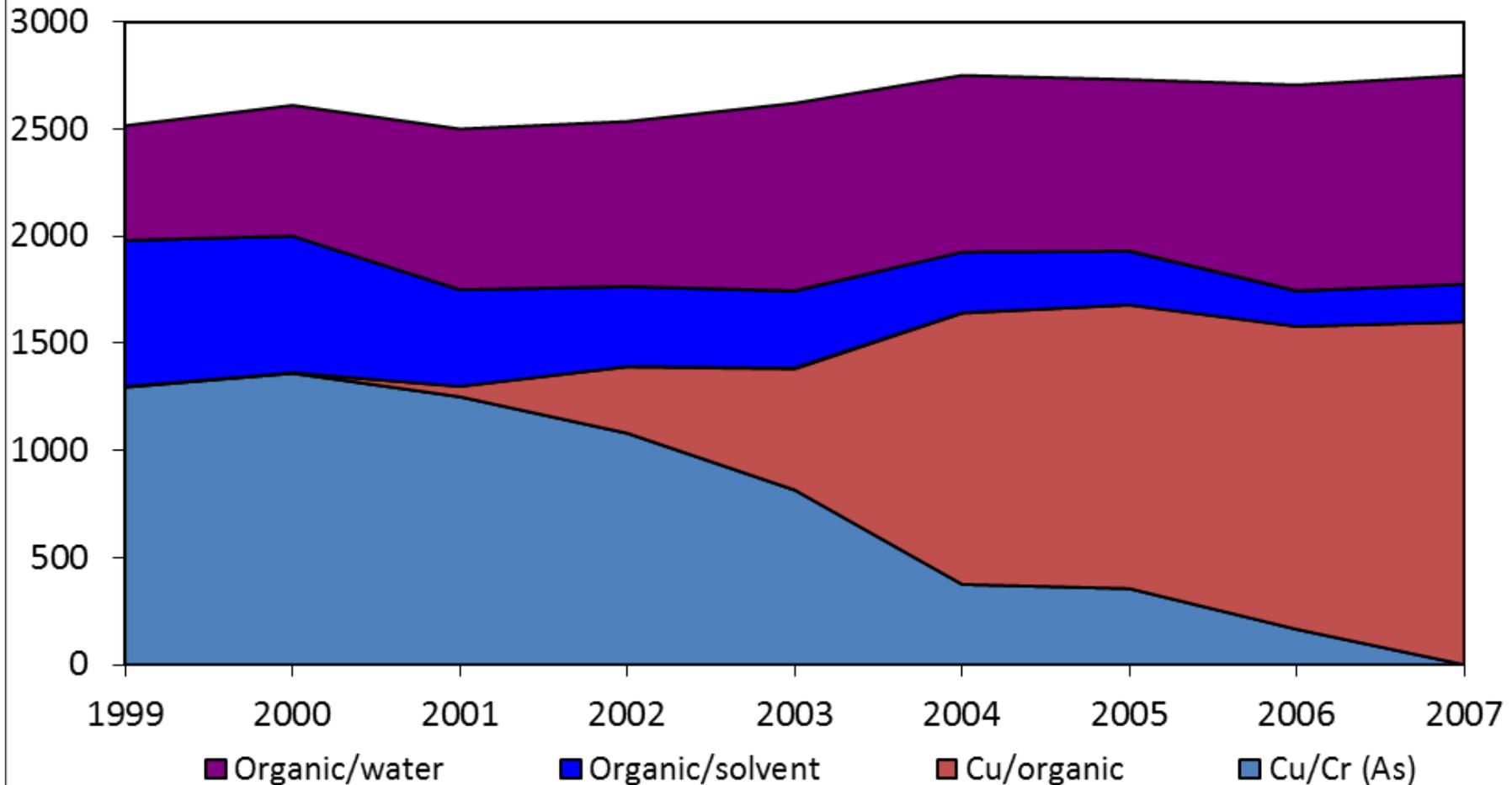
Changes in wood
preservation techniques



Changes in the UK market for industrial wood preservatives

- Up until the early 1990s, the industry was dominated by CCA (for all Use Classes) and light organic solvent based systems (LOSPs) for interior and protected exterior applications
- Introduction of micro-emulsion organic formulations in the 1990s to address concerns over pending European legislation to restrict solvent emissions
- In 2001, the first plants converted from CCA to copper organic systems - European Union moved to drastically reduce the permitted applications for CCA treated wood product
- 2002 and 2006 this change swept through the entire UK industry and the last CCA plant was converted in 2007

Wood preservative treated wood market share in UK '000m³



Additional background

- PLUS our standards changed - shift to end results based standards from process standards 1998-2002
- 'End results of treatment' standard BS8417 developed linked to desired service life
- We use a lot of spruce in ground contact fencing
- Quality control in the UK treated wood fencing market had been weak
- 2008 the first reports arose of failures of copper treated fencing posts - some of this material had only been in the ground for 3 or 4 years
- Commercial applications of incising technology begin 2010

BS8417 Preservation of wood – Code of practice

Table 4 Treatment using preservatives tested in accordance with BS EN 599-1

Component	Use class	Service factor	Preservative requirements											
			Desired service life = 15 years				Desired service life = 30 years				Desired service life = 60 years			
			Permeable wood		Resistant wood		Permeable wood		Resistant wood		Permeable wood		Resistant wood	
			Penetration ^{A)}	Retention ^{B)}	Penetration ^{A)}	Retention ^{B)}	Penetration ^{A)}	Retention ^{B)}	Penetration ^{A)}	Retention ^{B)}	Penetration ^{A)}	Retention ^{B)}	Penetration ^{A)}	Retention ^{B)}
Internal joinery	1	A	No treatment required ^{C)}				No treatment required ^{C)}				No treatment required ^{C)}			
Roof timber dry	1	B	NP1	R ₁ x 1	NP1	R ₁ x 1	NP1	R ₁ x 1	NP1	R ₁ x 1	NP1	R ₁ x 1	NP1	R ₁ x 1
Roof timbers dry (<i>Hylotropes</i> area)	1	D	NP1	R ₁ x 1	NP1	R ₁ x 1	NP1	R ₁ x 1	NP1	R ₁ x 1	NP1	R ₁ x 1	NP1	R ₁ x 1
Roof timbers (risk of wetting)	2	C	NP1 ^{D)}	R ₂ x 1	NP1 ^{D)}	R ₂ x 1	NP1 ^{D)}	R ₂ x 1	NP1 ^{D)}	R ₂ x 1	NP1 ^{D)}	R ₂ x 1	NP1 ^{D)}	R ₂ x 1
External walls/ground floor joists	2	C/D	NP1 ^{D)}	R ₂ x 1	NP1 ^{D)}	R ₂ x 1	NP1 ^{D)}	R ₂ x 1	NP1 ^{D)}	R ₂ x 1	NP1 ^{D)}	R ₂ x 1	NP1 ^{D)}	R ₂ x 1
Sole plates (above dpc)	2 ^{E)}	D	NP2	R ₃ ^{E)} x 1	NP2	R ₃ ^{E)} x 1	NP2	R ₃ ^{E)} x 1	NP2	R ₃ ^{E)} x 1	NP2	R ₃ ^{E)} x 1	NP2	R ₃ ^{E)} x 1
External joinery (non load-bearing, coated) ^{M)} and cladding (coated)	3 ^{F)} coated	C/D	NP2	R _{3c} ^{G)} x 1	NP2	R _{3c} ^{G)} x 1	NP2	R _{3c} ^{G)} x 1.25	NP2	R _{3c} ^{G)} x 1.25	NP3	R _{3c} ^{G)} x 1.5	NP3 ^{G)}	R _{3c} ^{G)} x 1.5
Fence rails, deck boards and joists, external joinery (non load-bearing, uncoated) and cladding (uncoated)	3 ^{F)} uncoated	C/D	NP5	R ₃ x 1	NP2	R ₃ x 1	NP5	R ₃ x 1.25	NP3 ^{H)}	R ₃ x 1.25	l)			
Fence and deck posts	4 ^{F)}	C/D	NP5	R ₄ x 1	NP3 ^{H)}	R ₄ x 1	NP6 ^{H), N)}	R ₄ x 1.5	12/6 mm ^{H), J), N)}	R ₄ x 1.5	l)			
Poles (round with no exposed heartwood)	4 ^{F)}	D	NP5	R ₄ x 1	NP4 ^{H)}	R ₄ x 1	NP5	R ₄ x 1.5	NP5 ^{H)}	R ₄ x 1.5	l)			
Sleepers	4 ^{F), K)}	D	NP5	R ₄ x 1	NP5 ^{H)}	R ₄ x 1	NP6 ^{H)}	R ₄ x 1.5	NP6 ^{H)}	R ₄ x 1.5	l)			
Wood in fresh water	4 ^{F)}	D	NP6	R ₄ x 1	NP6 ^{H)}	R ₄ x 1	NP6 ^{H)}	R ₄ x 1.5	NP6 ^{H)}	R ₄ x 1.5	l)			
Wood in salt water	5	D	NP6	R ₅ x 1	NP6 ^{H)}	R ₅ x 1	NP6 ^{H)}	R ₅ x 1.75	NP6 ^{H)}	R ₅ x 1.75	l)			
Cooling tower timbers (fresh water)	4 ^{F)}	D	l)				l)				l)			
Cooling tower timbers (salt water) ^{L)}	4 ^{F)}	D	l)				l)				l)			



BS 8417:2011+A1:2014
 Preservation of wood – Code of practice

Incising home-grown timber

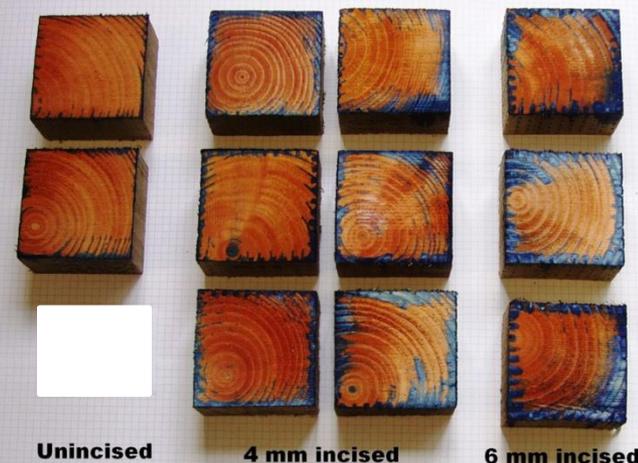


Table 1 Absorption of preservative and mean service life of incised spruce

Preservative	Incisions (mm)		'Permeable' spruce			'Resistant' spruce		
	Stagger	Depth	Absorption (kg/m ³)	Number failed	Life (years)	Absorption (kg/m ³)	Number failed	Life (years)
None	No incisions		—	20	11.9	—	20	11.0
0.1% CCA	No incisions		0.22	10	15.4	0.15	10	14.3
	3	6	0.34	10	15.1	0.30	10	13.0
	4.5	6	0.32	10	12.7	0.30	9 [†]	15.2
	3	9	0.37	10	14.3	0.31	10	14.3
3.0% CCA	No incisions		3.24	6	28.8*	2.82	6	27.2*
	3	6	6.60	0	>55	6.75	1	43.4*
	4.5	6	6.09	0	>55	6.66	1	44.8*
	3	9	7.29	0	>55	6.81	1	43.4*
5.0% CCA	No incisions		5.15	6	30.4*	3.55	4	32.8*
	3	6	10.90	0	>55	10.05	0	>55
Creosote	No incisions		79	0	>55	34	5	29.6*
	3	6	136	0	>55	89	0	>55

* Predicted service life using the method of Purslow²³

† One sample missing

The service life of >55 years is predicted using the method of Purslow²³ assuming a stake fails at the next inspection (March 2006).

The spruce was sorted into nominal heartwood ('resistant') and nominal sapwood ('permeable') as determined by grain orientation and curvature.



Pillar 1: Benchmark



Pillar 2: Product Approval Scheme



Wood Preservative Product Approval Scheme
Schedule of approved preservative retentions
 Date first published: 29 May 2014 Date of this issue: 23 June 2014

1. Introduction

The Wood Protection Association (WPA) has a strategic objective to raise UK market confidence in the performance of preservative treated wood. To this end, in 2011, the association established the Benchmark scheme, a third party quality certification scheme to verify that a named timber commodity has been treated correctly for its intended use and desired service life. Now, to provide confidence in preservative efficacy, the WPA has established an independent approval scheme for wood preservatives. The first preservative products to be approved under this scheme are presented in Table 1 of this document.

2. About the WPA's Wood Preservative Approval Scheme

The WPA Wood Preservative Approval Scheme (WPAS) breaks new ground by providing the UK treatment industry with an expert, independent assessment of the laboratory and field test data used by manufacturers to give their customers guidance in the use of a preservative. The WPAS was developed for the WPA by a task group comprising WPA technical consultants, all the major suppliers of preservatives in the UK and independent research consultants.

The main features of the WPAS are:

- a) it is for preservatives applied by penetrating processes, typically vacuum-pressure or double-vacuum;
- b) it has been launched initially for external above ground uncoated (use class 3 uncoated) and ground contact (use class 4) applications but will subsequently be expanded to include other use classes;
- c) manufacturers applying for WPA approval of a preservative must provide the laboratory and field test data as prescribed in the scheme document for the use class and service life combinations for which approval is requested;
- d) approval is based on the minimum retention to be found in the analytical zone after treatment to meet BS 8417 requirements for use class and service life (15 or 30 years) combinations;
- e) assessment of data is carried out by a panel made up of leading independent experts drawn from the industry, BRE and TRADA;
- f) the independent panel reports to the WPA and its decision is final;
- g) participation in the scheme is voluntary for WPA manufacturer members.

Preserving confidence in treated wood

A copy of the Wood Preservative Approval Scheme Document is available from the WPA. The WPA Benchmark quality scheme is available to all operators of industrial impregnation plant who require third party verification that a specified product has been treated in accordance with British Standard requirements – details available on request.

WPA Approval Scheme for wood preservatives

To provide confidence in preservative efficacy, the WPA has established an independent approval scheme for wood preservatives. The first preservative products to be approved under this scheme are presented in the table below. A more detailed copy of the Schedule of Approved Retentions and summary of the schemes can be found [here](#).

WOOD PRESERVATIVE	Approved retention ¹ kg/m ³			
	Use Class 3 uncoated		Use Class 4	
	Srvc life 15 years ²	Srvc life 30 years ²	Srvc life 15 years ²	Srvc life 30 years ²
Impra ACQ 2200D	13.2	16.5	21.5	32.3
Tanalith E 8000 ³	8.5	10.6	17.5	26.3
Wolmanit CX-8	5.4	7.1	17	25.5
Wolmanit CX-10	4.3	5.7	13.6	20.4
The following product has been assessed by the independent panel and will be included in the list of WPA approved products when the HSE approval is granted.				
Celcure C4	9.8	12.3	14.7	22.1

Pillar 3: National field trial

Birnie Wood, Elgin



BRE, Garston



Speyside Scotch whisky distillery map

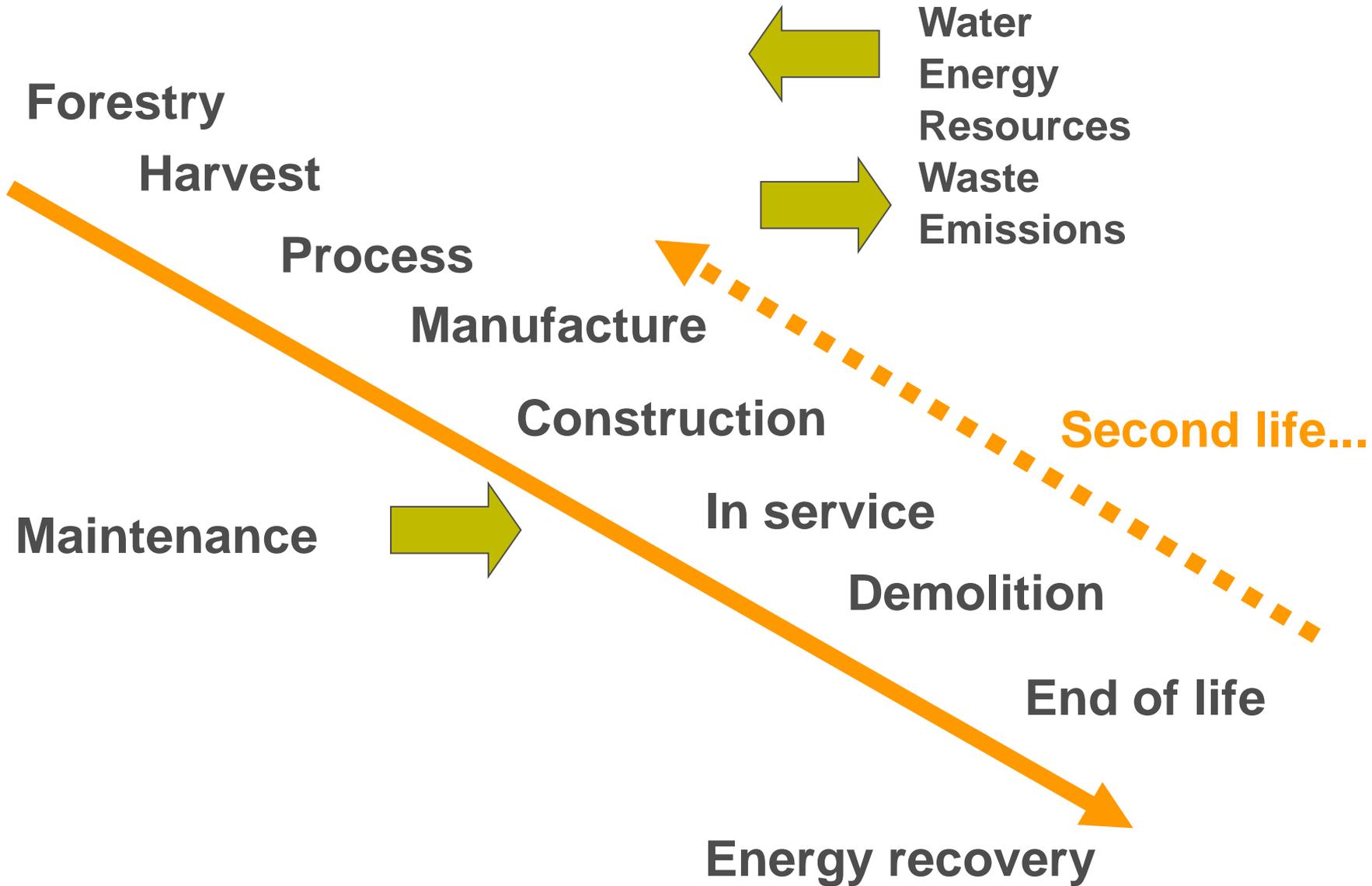


Birnie Wood, Elgin

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Service life

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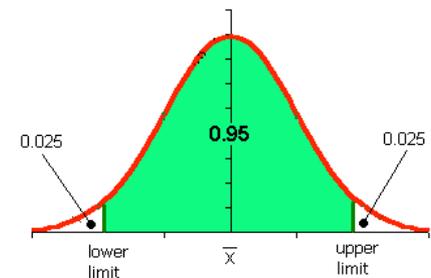
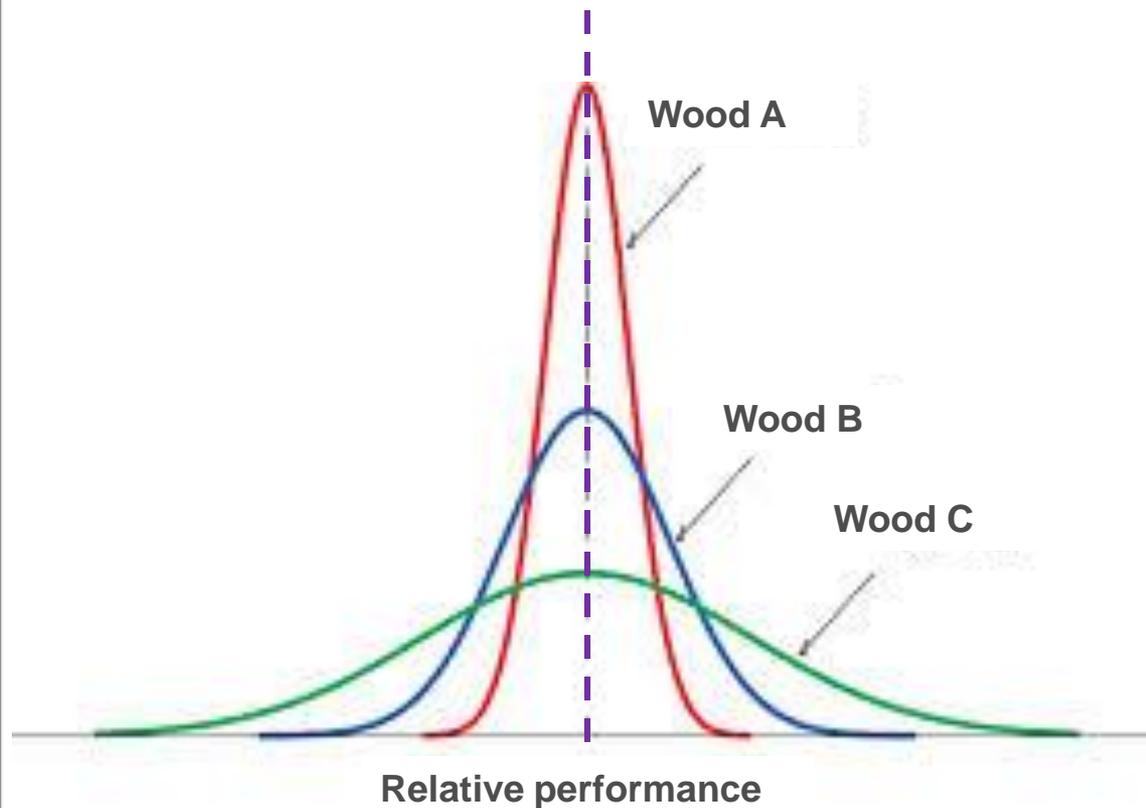


Importance of life span in LCA

- Study period for the LCA
- Replacement and maintenance intervals for products
- Less replacements the lower overall environmental impact
- Premature failure is disastrous...

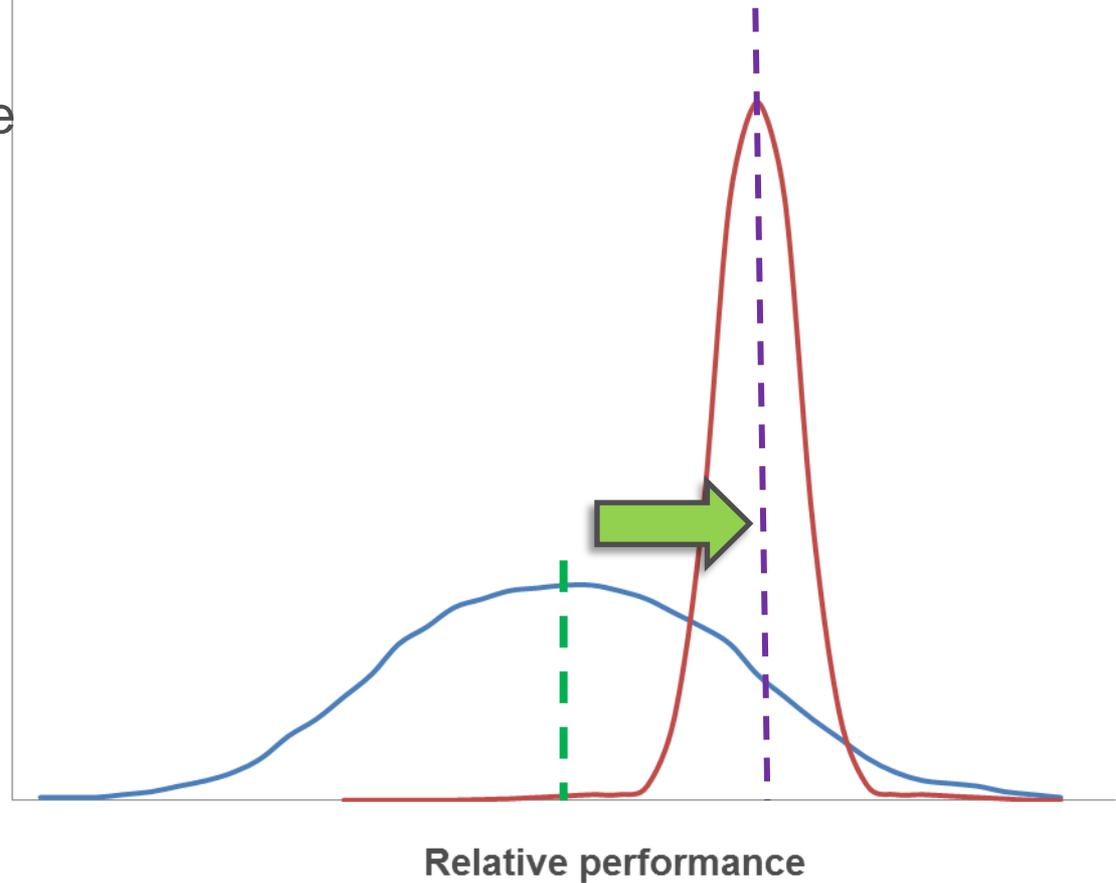
Importance of reliability

- Same average performance
- Massively different reliability!
- Engineers use reliability



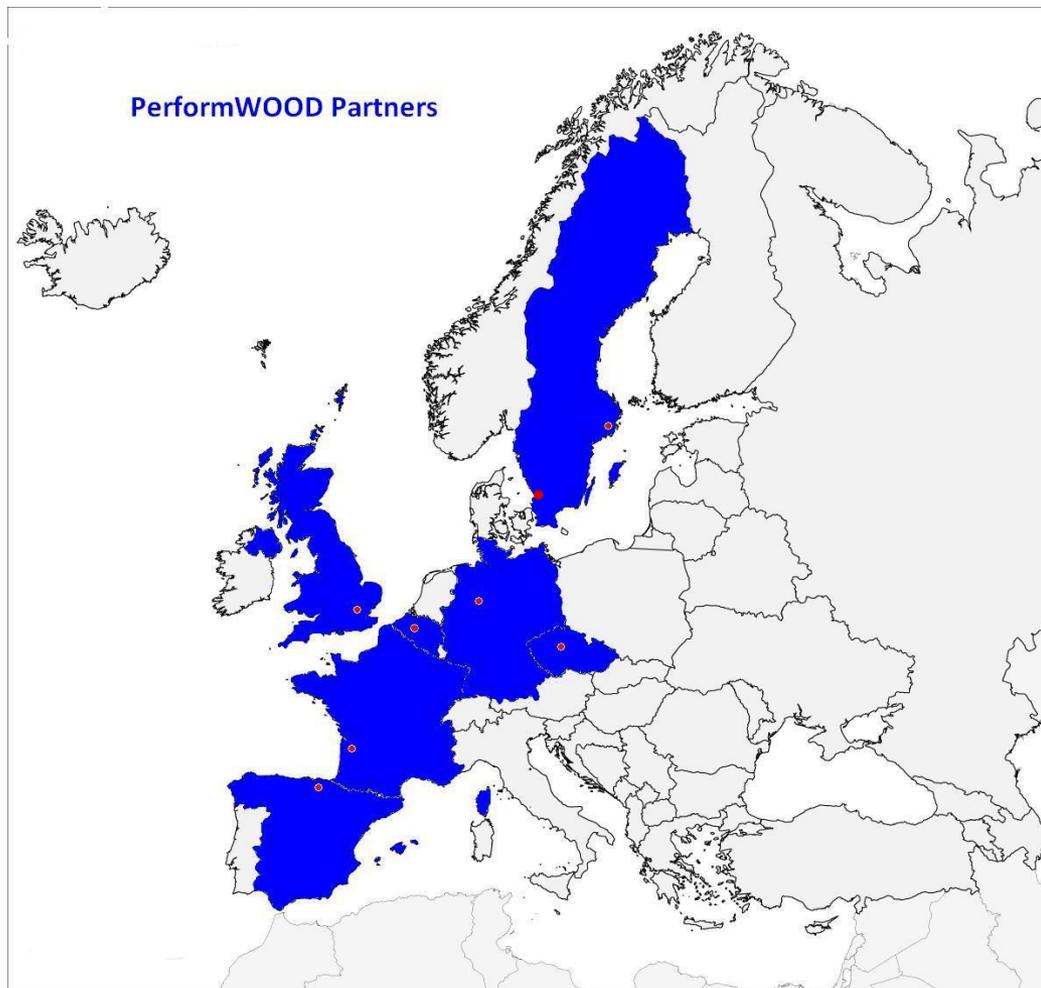
What is wood preservation doing?

- Enhancing durability
- Enhancing reliability
- Delivering service life



PerformWOOD: Performance standards for wood in construction - delivering customer service life needs



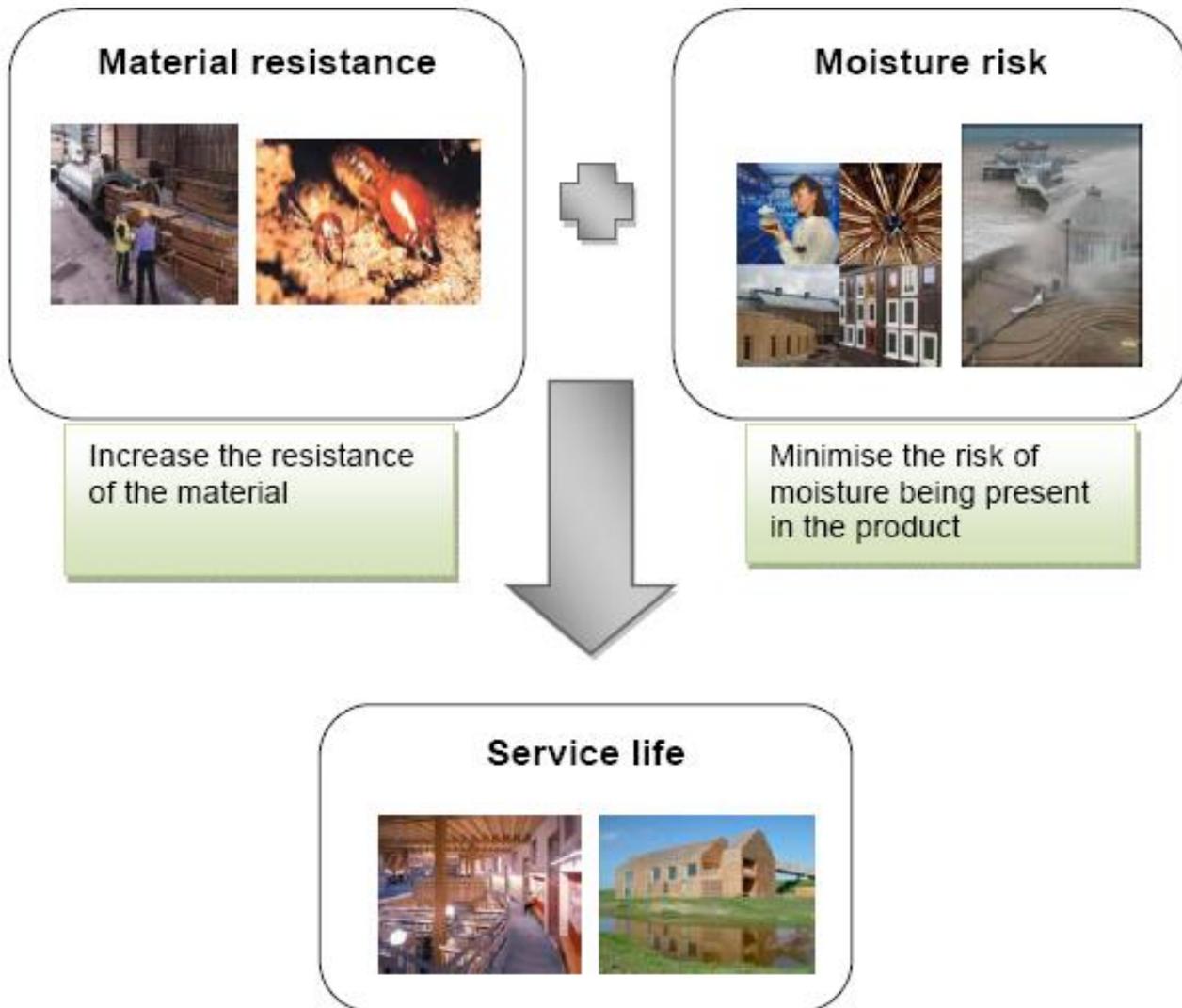


How long?



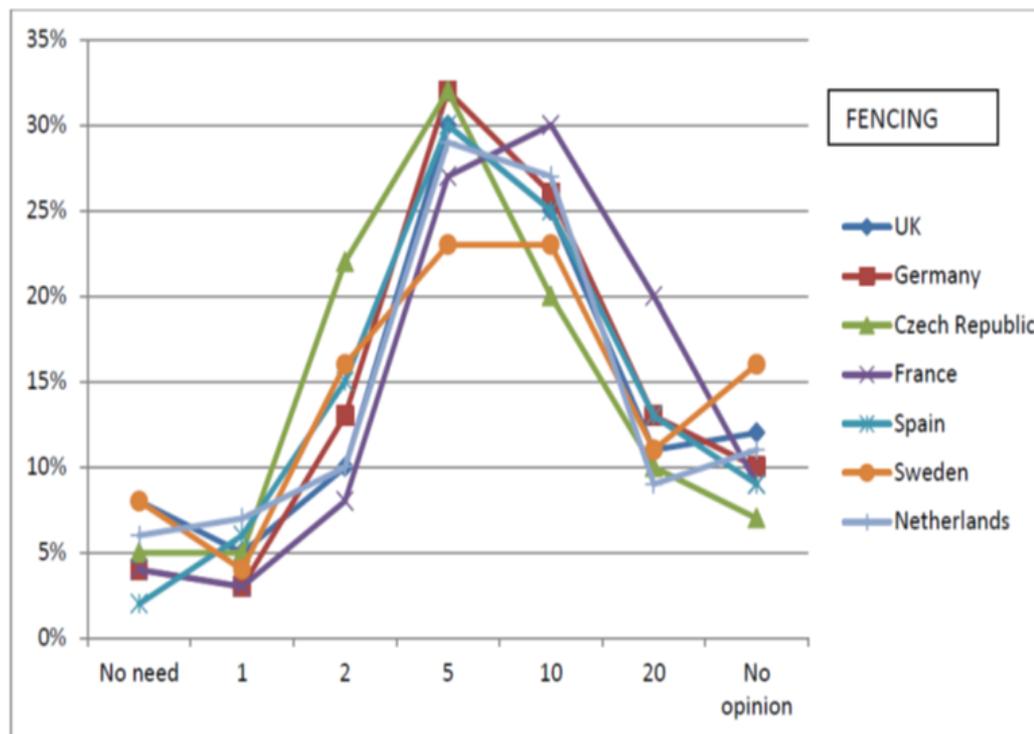
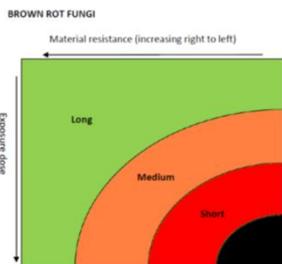
Motivation

- Construction Product Regulations
 - Reliable components
 - Seven essential requirements fulfilled for a 'reasonable service life'
- Warranty providers
 - Housing standards, mortgage lenders, risk management
- End users
 - I need to know how long! Service Life Planning, asset management
- LCA and Environmental Product Declarations
 - Critical in-use phase for products



Meeting customers expectations

- Performance classification
- New standards CEN/TC38
- Ask the customer!
- Guarantees and warranties



EN460 User interface

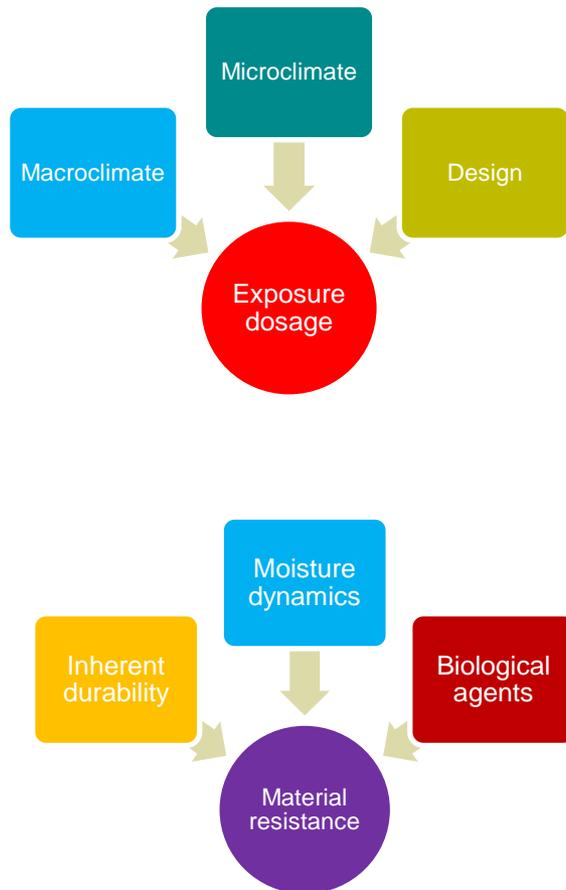


Table 1 — Wood-destroying fungi — Guidance on the durability classes of wood species for use in hazard classes

Hazard class	Durability class				
	1	2	3	4	5
1	o	o	o	o	o
2	o	o	o	(o)	(o)
3	o	o	(o)	(o) — (x)	(o) — (x)
4	o	(o)	(x)	x	x
5	o	(x)	(x)	x	x

Key

- o natural durability sufficient.
- (o) natural durability is normally sufficient, but for certain end uses treatment may be advisable (see Annex A).
- (o) — (x) natural durability may be sufficient, but depending on the wood species, its permeability (see 6.1), and end use (see Annex A), preservative treatment may be necessary.
- (x) preservative treatment is normally advisable, but for certain end uses natural durability may be sufficient (see Annex A).
- x preservative treatment necessary.

NOTE Sapwood of all wood species should be regarded as durability class 5.

New shape for EN460

- Consequence of failure
- Material resistance
- Exposure dose
- Critical biological hazards
- Performance classification

Some challenges for the wood preservation sector

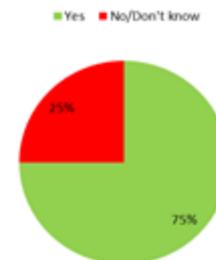
- The public perception of chemicals
- End of life options
- The availability of naturally durable timber
- Wood modification techniques (such as thermal modification and acetylation)
- Bio-based composites
- Relentless promotion of non-bio, non-renewable materials

Bridging the gap

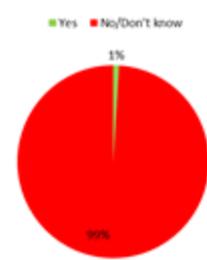
- Evidence
- Best practice
- Language

Sustainability = Wood Protection?

In this room



Outside this room



Communicate wood protection values

- Modernity and Heritage
- Land management
- Rural economy
- Low impact products
- Biodiversity and ecosystem services
- Reliable, fit for purpose products

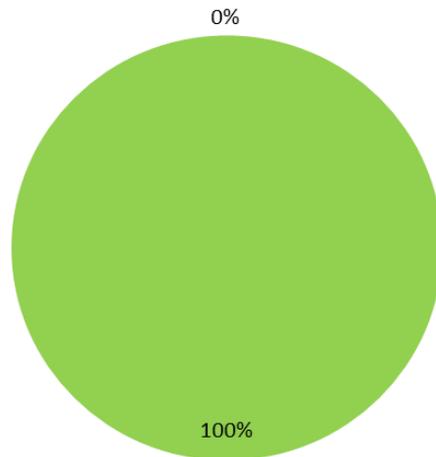


Making the most of wood

- Making the most of wood protection
- Sustainable use of low durability European timber resource
- Environmentally conscious
- Societally conscious
- Economically conscious

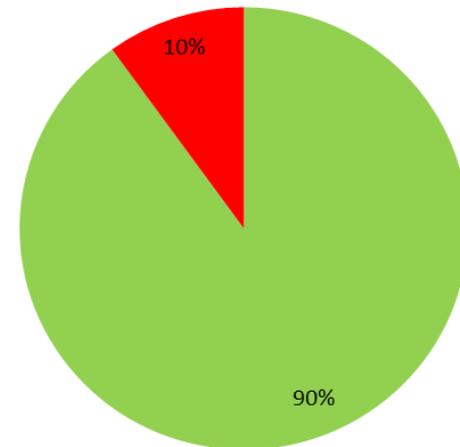
In this room

■ Yes ■ No/Don't know



Outside this room

■ Yes ■ No/Don't know



Sustainability = Wood Protection



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