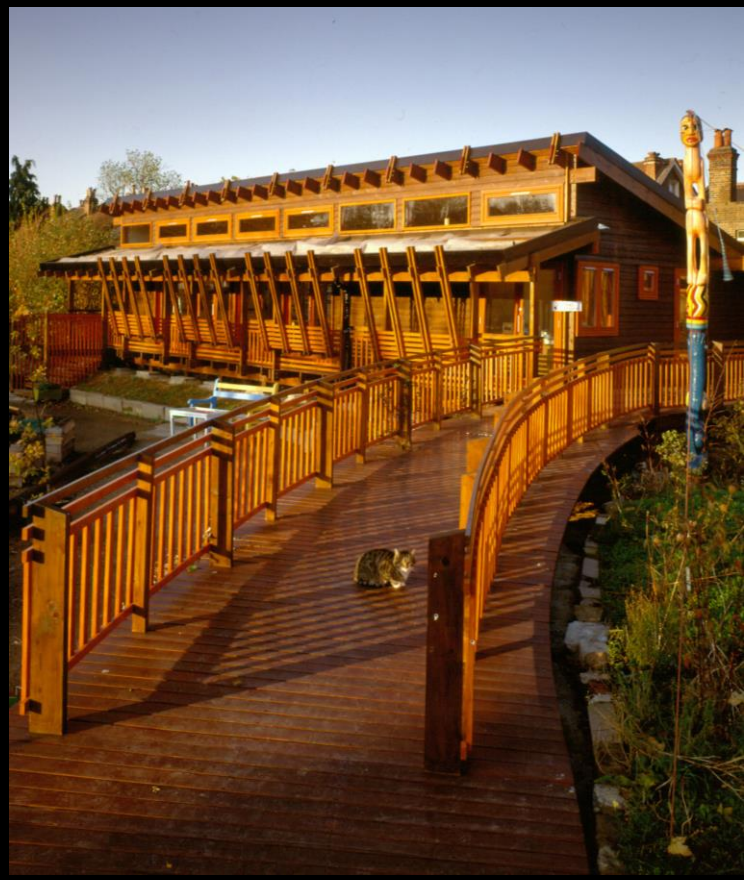
ARCHITYPE

London I Hereford I Edinburgh

Low Plastic, Low Carbon Architecture

Ben Humphries



Why an Ecological Specification?

More in tune with our planet

Reduced environmental impact

Lower embodied and lifecycle carbon

Better indoor air quality

Reduced VOCs and off-gassing

Less reliance on fossil fuel / petrochemical based products, e.g. PLASTICS

But Plastic is Great Isn't It?

Lightweight

Cheap

Water resistant

Flexible

Durable

Recyclable… sort of!

Polyethylene DPCs – recycled / recyclable

Polyethylene / Polypropylene air-tightness membranes - recyclable

Commonly
1
PET
Commonly
2
HDPE
Almost never
3
PVC
Sometimes
4
LDPE
Commonly
5
PP
Almost never
6
PS
Almost never
7
OTHER
BBC

FILM
PLASTIC
not currently
recycled

The Problem with Plastics

Reliance on fossil fuels

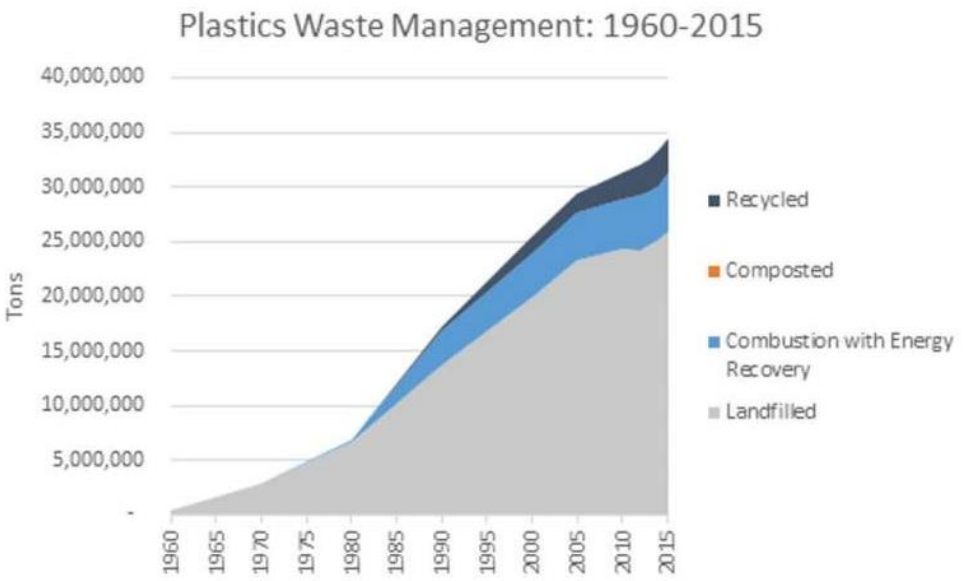
Durability! A long time to decompose

Leach harmful chemicals into soil

Ditto into water

Release harmful chemicals if burnt

Actually complex to recycle



“the most toxic plastic for children’s health and the environment”

The Center for Health, Environment and Justice (CHEJ)

Toxic Ingredients	**57% Chlorine, lead, phthalates, toxic flame retardants**
Toxic Production	**Dioxin production – human carcinogen**
Toxic Use	**Off-gassing**
Toxic Disposal	**Dioxins if incinerated, additives leach if buried**

“in homes that were 100% vinyl flooring (~9% of sampled homes), children’s urinary concentrations of the benzyl butyl phthalate metabolite were 15 times higher than children living in homes without any vinyl flooring”

H. Stapleton – Homes as sources of synthetic chemical exposure
American Association for the Advancement of Science annual meeting, Washington, D.C., February 17, 2019.

ASBP The Alliance for Sustainable Building Products

28/2/2017

uPVC Windows through the life cycle.

This report is authored for BWF by Dr Callum Hill, JCH Industrial Ecology with some input from Gary Newman and Simon Corbey, ASBP. We hereby wish to retain copyright and reserve the right to use the content.

Executive Summary

The total amount of PVC consumed globally since the early 1960's is estimated at some 400 million tonnes, of which half is still in use as long life products, such as window frames and water pipes. Demand for PVC products in Europe is close to 5 million tonnes per annum, with window profiles accounting for 28% or 1.4 million tonnes.

Indoor Air Quality and uPVC

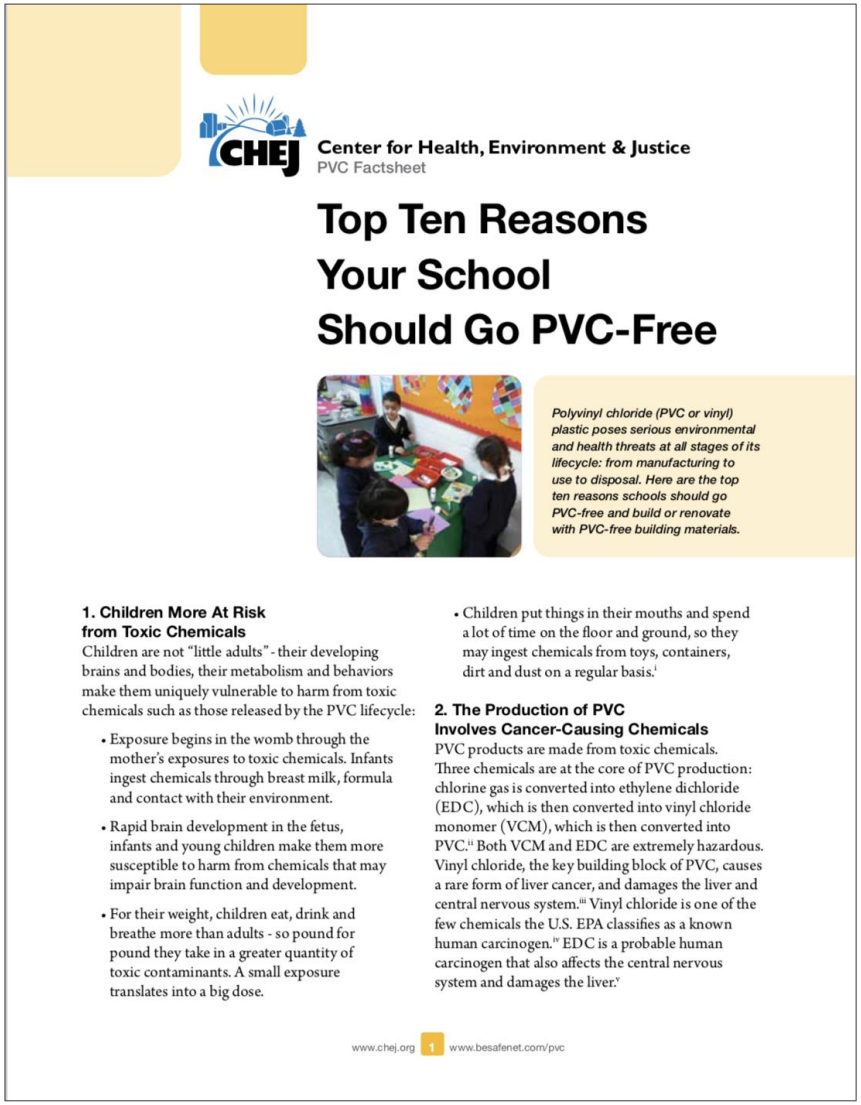
Based on a preliminary survey of the published science in this area, it is concluded that modern uPVC formulations are unlikely to off-gas VOCs to any significant extent to affect indoor air quality. That said, there clearly is degradation over time, evidenced by a yellowing effect and it would be interesting to conduct an accelerated ageing chamber study.

Environmental Impacts

The largest impact from uPVC is from its manufacture. Here are a few salient points.

- PVC is made from fossil fuels and chlorine gas….as used in WW1
- 8.06 million tonnes of chlorine was used to manufacture PVC in Europe in 2015
- The manufacture of chlorine is energy intensive. INEOS ChlorVinyls is a major chemical company operating throughout Europe. "*We produce 80 percent of the UK's chlorine. We are major users of both natural gas and electricity. Electricity is an essential raw material in the production of chlorine through the electrolysis of brine. We are one of the largest industrial consumers of both electricity and gas in the UK outside of the power generation sector*". [i]
- Mercury cell production to manufacture chlorine will not cease in the UK until 2020. A UK chlorine plant has a permit to allow 20.64 tonnes of mercury to be emitted to the air between 1997 and the end of 2020.

1. Children more at risk from toxic chemicals
2. The production of PVC involves cancer causing chemicals
3. PVC products contain phthalates & other toxic chemicals
4. PVC, asthma and autism – are school children, teachers, custodians at risk?
5. PVC and hazardous chemicals in our babies and bodies
6. PVC flooring and unhealthy cleaning products
7. PVC and dioxins
8. PVC and Environmental Justice
9. Dumping PVC in landfills leaches chemicals and forms dioxins
10. PVC contaminates and ruins



Center for Health, Environment & Justice
PVC Factsheet

Top Ten Reasons Your School Should Go PVC-Free

Polyvinyl chloride (PVC or vinyl) plastic poses serious environmental and health threats at all stages of its lifecycle: from manufacturing to use to disposal. Here are the top ten reasons schools should go PVC-free and build or renovate with PVC-free building materials.

1. Children More At Risk from Toxic Chemicals

Children are not "little adults" - their developing brains and bodies, their metabolism and behaviors make them uniquely vulnerable to harm from toxic chemicals such as those released by the PVC lifecycle:

- Exposure begins in the womb through the mother's exposures to toxic chemicals. Infants ingest chemicals through breast milk, formula and contact with their environment.
- Rapid brain development in the fetus, infants and young children make them more susceptible to harm from chemicals that may impair brain function and development.
- For their weight, children eat, drink and breathe more than adults - so pound for pound they take in a greater quantity of toxic contaminants. A small exposure translates into a big dose.
- Children put things in their mouths and spend a lot of time on the floor and ground, so they may ingest chemicals from toys, containers, dirt and dust on a regular basis.[i]

2. The Production of PVC Involves Cancer-Causing Chemicals

PVC products are made from toxic chemicals. Three chemicals are at the core of PVC production: chlorine gas is converted into ethylene dichloride (EDC), which is then converted into vinyl chloride monomer (VCM), which is then converted into PVC.[ii] Both VCM and EDC are extremely hazardous. Vinyl chloride, the key building block of PVC, causes a rare form of liver cancer, and damages the liver and central nervous system.[iii] Vinyl chloride is one of the few chemicals the U.S. EPA classifies as a known human carcinogen.[iv] EDC is a probable human carcinogen that also affects the central nervous system and damages the liver.[v]

www.chej.org 1 www.besafenet.com/pvc

PVC Alternatives Database

Building the Future

Why PVC is bad news

Globally, over 50% of PVC manufactured is used in construction, in products such as pipelines, wiring, siding, flooring and wallpaper. As a building material PVC is cheap, easy to install and easy to replace. PVC is replacing 'traditional' building materials such as wood, concrete and clay in many areas. Although it appears to be the ideal building material, PVC has high environmental and human health costs that its manufacturers fail to tell consumers.

From its manufacture to its disposal, PVC emits toxic compounds. During the manufacture of the building block ingredients of PVC (such as vinyl chloride monomer) dioxin and other persistent pollutants are emitted into the air, water and land, which present both acute and chronic health hazards. During use, PVC products can leach toxic additives, for example flooring can release softeners called phthalates. When PVC reaches the end of its useful life, it can be either landfilled, where it leaches toxic additives or incinerated, again emitting dioxin and heavy metals. When PVC burns in accidental fires, hydrogen chloride gas and dioxin are formed.

Greenpeace Pyramid of Plastics

For virtually all PVC applications, safer alternatives exist, using more sustainable, traditional materials - such as paper, wood or local materials. PVC can also be replaced by a variety of other, less environmentally damaging plastics, although most plastics pose some risk to the environment and contribute to the global waste crisis.

Greenpeace has developed a pyramid of plastics to assist those making material selection, to avoid PVC use. The guidance focuses on the toxic characteristics of the potential alternative materials. It provides a qualitative ranking based on environmental and health problems of PVC, addressing the production, additives, product emissions during use, disposal and recycling.

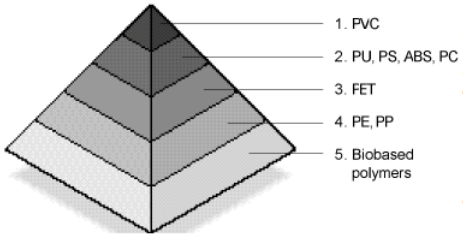
It does not include raw materials and energy inputs and therefore does not address all criteria of a life cycle analysis. It provides guidance for interim steps on the route to clean production. Ultimately we should ask why we are using these materials and whether or not they are necessary.

The pyramid of plastics is a ranking of plastics according to their hazardous characteristics. PVC, the most problematic plastic, is at the top of the pyramid, and biobased plastics, the least polluting of the plastics, are at the pyramid's base. It represents an ongoing process to qualify the main plastics in the economy. More plastics can be added as necessary and qualifications may change depending new information on the material, such as in production processes or the use of toxic additives.

Additives

The addition of toxic additives can significantly change the environmental impacts of a plastic. For example, chloroparaffins or brominated flame retardants in polyolefins or biobased plastic products with heavy metal stabilizers would significantly increase the hazard level of the plastic and therefore change its position on the pyramid of plastics. Furthermore, many additives are persistent organic pollutants (POPs) and can cause serious environmental damage.

It is essential that the production of biobased plastics does not involve the use of genetically modified organisms (GMO's) or allow the patenting of life.



1) Polyvinyl chloride (PVC) and other halogenated plastics

2) Polyurethane (PU), Polystyrene (PS), Acrylonitrile-butadiene-styrene (ABS), Polycarbonate (PC)

3) Polyethylene-terephthalate (PET), Polyolefins (PE, PP, etc.)

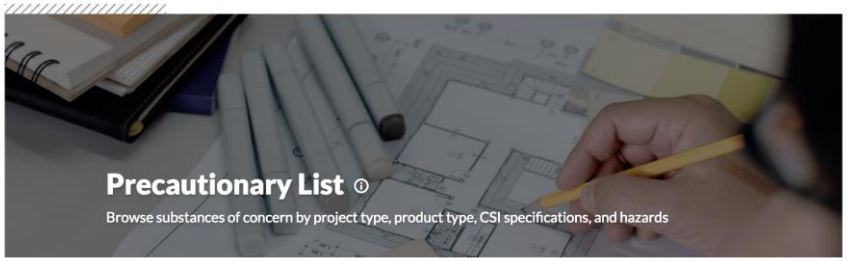
4) Biobased plastics

Notes:
· Metallocene technology is a new way to widen the range of properties and applications of polyolefins. This will in turn help replace many rigid and soft PVC applications.
· TPE's are thermoplastic elastomers that can be made from many different mixes of different plastic monomers/short polymer chains. Currently most of the building blocks are polyolefins, but can also contain other polymers such as polyurethane. Therefore, TPE's can not be generally ranked in the pyramid of plastics.

Polyvinyl chloride (PVC) is unique in its high chlorine and additives content, which makes it an environmental poison throughout its life cycle. Vinyl chloride is a known human carcinogen. PVC releases dioxin and other persistent organic pollutants during its manufacture and disposal and cannot be readily recycled due to it chlorine and additive content. Furthermore, additives are not bound to the plastic and leach out.

TRANSPARENCY

LEARN MORE / PRECAUTIONARY LIST / STAY INFORMED / FAQ



Precautionary List

Browse substances of concern by project type, product type, CSI specifications, and hazards

PRECAUTIONARY LIST / WATCH LIST / SUNSET LIST

SEARCH SUBSTANCES | PROJECT AREA + | MASTERFORMAT + | PRODUCTS + | HEALTH HAZARDS + | ENVIRONMENTAL HAZARDS +

Antimicrobials - marketed with a health claim
CASRN: Multiple*

Bisphenol A (BPA)
CASRN: 80-05-7

Chloroprene
CASRN: 126-99-8,184963-09-5

Formaldehyde
CASRN: 50-00-0

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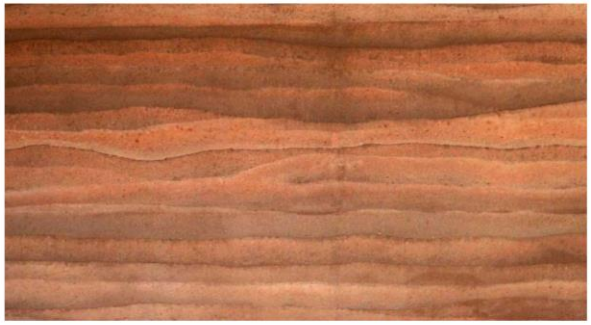
home > green building design > earth & clay: materials & design | Earth & Clay: Materials & Design

Green Building Design

- Why 'Green'?
- Building Materials: Impacts Compared
- Timber: Materials & Design
- Earth & Clay: Materials & Design
  - Rammed earth
  - Unfired clay bricks
  - Unfired clay bricks and structure
- Plaster: Render, Mortar & Boards
- Complex Components: Materials & Design
- Metals: Production & Environmental Impact
- Concrete: Production, impact and design
- Green Roofs & Planting
- Toxic Chemistry: Chemicals in Construction
- Building Physics
- Passivhaus
- Renewable Energy & Green Technology
- Housing Refurbishment / Retrofit
- Old Buildings
- Building Dismantling: Re-use & Recycling
- Embodied Carbon & EPDs
- Glossary of Green building
- Post Occupancy Evaluation (POE)

Earth & Clay: Materials & Design



Rammed Earth

Unfired Clay Bricks

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natureplus database.org | baubook | best wood SCHNEIDER

English | Deutsch

back to natureplus-website
natureplus-database
companies
- Building products
  - Ceiling and roof elements
  - Wall elements
  - Masonry
  - Solid wood, untreated
  - Constructive (solid) wood
  - Roof claddings
  - Facade claddings
  - Building slabs
  - Wall and plastering mortar
  - External thermal insulation composite system
  - Thermal insulation systems (glued) for internal use
  - Insulation materials
  - Window and window components
  - Doors
  - Sealing sheeting, vapour barriers, films
  - Floor coverings
  - Coatings and impregnation agents
  - Adhesives and fillers
  - Wall linings
  - Wall paints
- Superstructure

contact

The natureplus database lists all the products certified by natureplus. It contains information on the most important product specification data and test/assessment results for product evaluation. This information is free of charge and can be accessed without registering. It can be used by planners, tradesmen and consumers to compare sustainable building products which do not pose risks to health.

natureplus
No. 0000-0000-000-0

The data sets are updated on an annual basis by natureplus and the manufacturer, within the framework of the natureplus follow-up assessment procedure. The data are always checked using a system of dual control.

natureplus → general information / technical properties / environmental characteristics / service area ← natureplus INSTITUTE / manufacturer

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EPD-Online Tool | IBU.data | Members Area | Contact | FAQ | English

Institut Bauen und Umwelt e.V.

EPD

Association News EPD Sustainability International Serv

ECO Platform makes the dream of European

For a long time the provision of environmental information has been a time consuming and costly issue for the industry. Now the ECO Platform solves this problem with the ECO a truly European solution for all construction products.

The construction sector holds huge potential for savings!

While we are looking for ways to reduce our environmental impact on this planet, we realise that the building sector is responsible for roughly one third of all energy consumption and greenhouse gas emissions. A big part of that impact is linked to construction products. The use of resources and the related emissions from production, transportation, construction, quality, costs, as well as the potential of recycling, needs to be considered along with their effects during the stages of use over the building's lifetime. Sounds complex? It is. But there is no other way to learn about the real and full impact of various types of construction and choosing the best materials for the environment.

ECO PLATFORM

What is the most sustainable building product?

There is no easy answer to this. Sustainability describes the holistic view of environmental, economic and social impacts. Holistic means that the entire lifespan and all side effects considered. A sustainability assessment only makes sense at the building level because construction products are not final products but intermediates and in order to answer the question of what material is the most sustainable, the building context needs to be defined

Architype Design Collaboration Tool (DCT)

127 | Glassfibre reinforced plastic

130 | High density polyethylene

133 | Phenolic resin

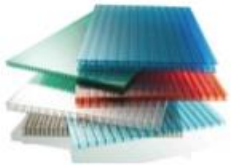
136 | Polyethylene, polythene PE

139 | Polystyrene

142 | Poly vinyl chloride, unplasticised

128 | Acrylonitrile butadiene styrene

131 | Epoxy

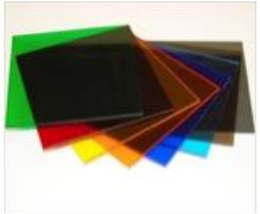


134 | Polycarbonate

137 | Polyisocyanurate PIR

140 | Polyurethane

143 | Urea formaldehyde



129 | Acrylic polymethyl methacrylate

132 | Polyamide

135 | Polyester

138 | Polypropylene

141 | Poly vinyl chloride, plasticised

144 | Vinyl

Architype Design Collaboration Tool (DCT)

91 | Hardwood

94 | Glulam

97 | Multi ply panels

100 | Oriented Strand Board

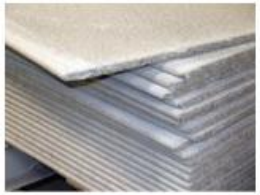
103 | Chipboard

106 | Leather

92 | Softwood

95 | Parallam

98 | Wood fibre board



101 | Wood cement particleboard

104 | Hardboard

107 | Silk

93 | Blockboard

96 | Veneers

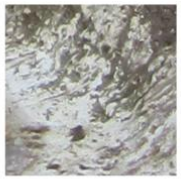
99 | Flaxboard

102 | Medium density fibreboard

105 | Hair

108 | Wool

materials map



Chalk
Norwich, Norfolk

Hemp
Lime Technology, Suffolk
or
Black Mountain, Suffolk

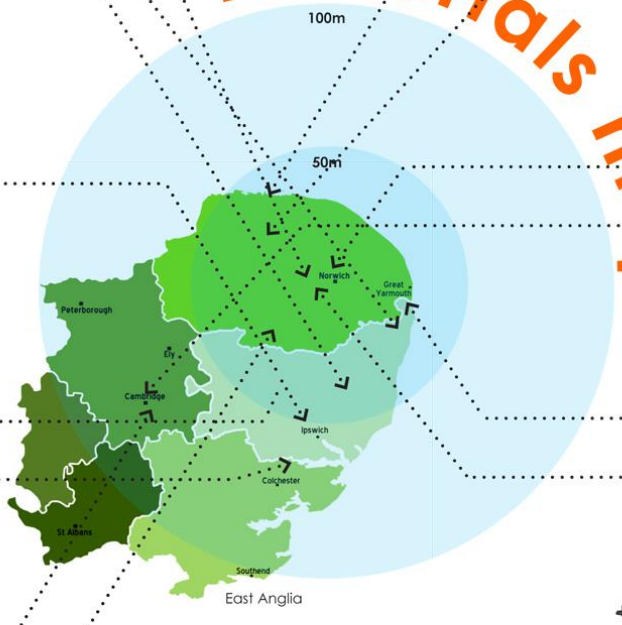
Earth and Reed
Needham Market, Suffolk

Lime Mortar
Ashfield Traditional
Needham Market, Suffolk

Anglia Lime
Sudbury, Suffolk

New World Timber Frame
Saffron Waldon, Essex

Timber
Thetford Forest, Norfolk



East Anglia

North Norfolk Reed Cutters Association
Cley-next-the-Sea, Norfolk

Flint Cobbles
Norfolk

Gerald Barnes
Norwich, Norfolk

H. Gingell Ltd
Hornsea, Cambridge

Paul Bellinger
Beccles, Suffolk

Norfolk Straw Products Ltd.
Dereham, Norfolk

A large proportion of materials will be sourced from East Anglia. Where this is not possible, the majority of materials will be sourced elsewhere within the UK.

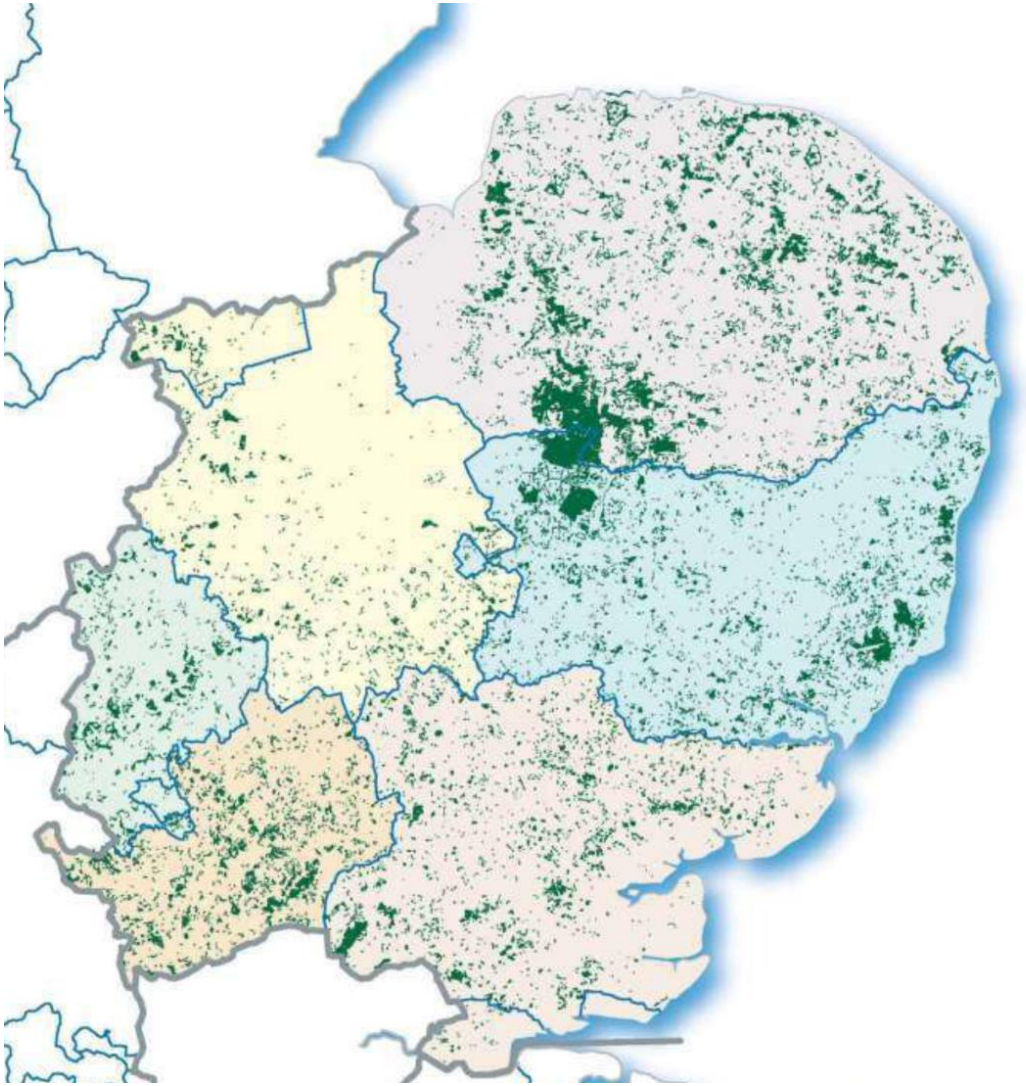
InCrops Project

Low carbon supply chains for forest products in the East of England

John French, Benedict Binns, Mark Coleman InCrops Ltd, UEA
Ed Suttie, Chris Holland and Martin Glynn BRE
Steve Scott, Mark Broadmeadow, Forestry Commission
Barry Haines, Norwich Business School, UEA

A report commissioned by the East of England Development Agency and produced by InCrops Ltd with BRE, Forestry Commission and Norwich Business School

ERDF EEDA UEA University of East Anglia



FARM&COUNTRY

in association with BROWN & Co

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It's the return of the reed cutters

For centuries they have symbolised a Broadland way of life but in recent years have become as threatened as the bittern. **STEPHEN PULLINGER** reports on pioneering Broads Authority plans to revive the number of reed cutters and increase the areas commercially harvested.

Pictures: ANTONY KELLY

CHECKING THE CROP: Paul Eldridge gets a closer look at some of the reeds growing at Hickling Broad. while, below, Rowan Nichols is engaged in cutting duties.

Until the tide of sweeping change brought by the first world war, the famed marshman was a common sight throughout the Broads, carrying out commercial reedcutting as one of his duties.

However, a gradual decline in numbers over the decades accelerated in the closing years of the last century to the point where there were fewer than 20 reed cutters working on the Broads.

The legendary and much photographed reed cutter, Eric Edwards, long since retired from the Broads Authority but still working the marshes into his 70s, rues the fact that modern-day youngsters have no appetite for the rigours of hard winter toil.

Uncertain pay dependent on the harvest, a scarcity of marsh work outside the January to March cutting season and increasing competition from imported reed have all conspired to deter a new generation of reed cutters.

While the formation of the Broads Reed and Sedgecutters Association (Brasca) in 2003 – promoting a fresh image of reed cutters using modern machinery rather than scythes – helped to stabilise numbers, the future of the industry has again been threatened in recent years by landowners taking sites out of commercial management.

However, the Broads Authority has announced a bold action plan to address the decline and significantly increase the area of Broads reed beds being commercially cut.

Andrea Kelly, the authority's senior ecologist, said: "We know there are almost 3,000 hectares of open fen on the Broads and our aim is to see 25pc of that managed commercially."

With less than 10pc of fens currently being commercially cut, achieving that target would require extending the cutting on certain reed beds and bringing other neglected ones back into production.

Working on a projected reed beds map of the Broads, she said that to preserve biodiversity it was important to surround fens being commercially cut by a "mosaic" of other habitats, including wet woodland areas and fens cut in the summer rather than winter for conservation purposes.

Ms Kelly said: "There will be benefits to people, protecting the opportunities for them to live and work on the Broads, and we will also facilitate new uses for reed crops, such as compost and bio-energy to help manage the Broads."

Underlining the importance of managing the landscape to preserve the fens' rich biodiversity, she said: "We all know the government are expecting society to find other ways to pay for conservation management.

"This plan will help to put land management on a sustainable footing."

She said landowners, who would still have a duty to manage protected sites even if they lost government conservation payments, had already been very positive about the initiative and were beginning to employ the local cutters to undertake all sorts of wetland work.

Aiming to start implementing the action plan as early as next winter, she said: "No other organisation is working with cutters in the same way."

Part of the plan has already seen the provision of training for new reed cutters and addressing the issue of availability of work by providing them with scrub clearance contracts outside the cutting season.

Efforts would also be made to expand the market by looking for opportunities to sell lower-grade reed for thatching outbuildings. The first step has been the appointment of reed cutter Gary Elliott, 43, to carry out a survey of Broads reed beds.

Mr Elliott, who was brought up in Catfield and cuts reed at Barton Turf and Boardman's Marsh, Catfield, will be contacting about 60 landowners and visiting sites all around the Broads to assess the quantity and quality of reed.

Priority areas will be the Ant and Bure valleys and one of the sites Mr Elliott will be inspecting is the Broads Authority-owned Buttle Marsh, near Ludham, to see if the site – creased out of grazing marsh about 10 years ago – has potential for commercial cutting.

A reed cutter for 20 years, Mr Elliott said: "Until you get to the marsh and feel the quality of the reed in your hand, you don't know."

He said he would be checking the viability of sites for expansion, looking at issues such as access and how easy it would be to remove the reed.

On reed beds which had partly turned to scrub, he would be estimating how costly it would be to restore them to a commercial quality.

Highlighting his love for the job, deeply connected to a passion for wildlife – "at Barton Turf I have even had harrier chicks visiting my lunchbox" – Mr Elliott praised the action plan to preserve the area's heritage and "keep people in the Broads".

"We can see a future for living and working on the Broads now whereas before there did not appear to be any future," he said.

While 12pc of reed is currently imported from places as far afield as China and Ukraine, he said there was a quality assurance in the case of reed cut locally.

He said: "There is a link between the cutter, thatcher and householder. Sometimes we might be supplying reed to a house in our village so we are not going to be giving them poor quality reed."

Mr Elliott said the potential for expanding the business was shown by the fact that "everything we cut is sold before we cut it".

His optimism is shared by Paul Eldridge, 31, and Rowan Nichols, 29, who represent the new breed of reed cutters having entered the industry five years ago on a Broads Authority training scheme funded by the Heritage Lottery Fund.

Mr Eldridge, a former industrial chemist, and Mr Nichols, who used to work as a landscape gardener, cut reed together on the Norfolk Wildlife Trust reserve at Hickling Broad.

> **"Every thatcher we have supplied was previously having to import reed and they are very excited to have English reed again. They prefer it to the foreign stuff; one reported having to take three weeks to clean out a container load of imported reed.**
>
> Paul Eldridge

Despite a frosty start to the day, Mr Eldridge, who lives with his partner Natalie Delidjani in Norwich, is completely sold on his new outdoors life despite annual earnings of only £17,000 – £5,000 for reed cutting and £12,000 for conservation work.

"Although Natalie, who is a teacher, thinks I am mental, I enjoy the outdoors life and being my own boss," he said.

"I also love the wildlife – I spotted a bittern last week and saw the cranes earlier this week."

As he and Mr Nichols have grown in experience they have doubled the pace of their work and "on a good day" cut up to 200 bundles of reed.

Praising the Broads Authority's new action plan, Mr Eldridge said the appetite for local reed was clear.

"Every thatcher we have supplied was previously having to import reed and they are very excited to have English reed again," he said. "They prefer it to the foreign stuff; one reported having to take three weeks to clean out a container load of imported reed.

"And their customers are also delighted to find out where the reed has come from locally."

The pair, who also cut reed at Ranworth, St Olaves, Somerleyton and How Hill, agree that the co-operation of landowners – for example in controlling water levels – will be crucial for the expansion plans to work.

Brasca chairman Richard Starling, 46, who lives in Somerton and cuts reed at nearby Martham Broad, said he was "very positive" about the new initiative which he saw as a way of "reconnecting conservation with sustainable management again".

He said: "At the moment, thatchers have little choice but to use imported reed owing to the limited availability of UK reed.

"Sadly, traditional and sustainable reed bed management ceased on many sites in favour of longer-term rotational cutting and burning.

"Other issues impacting on production include access problems, changing water-level regimes, the widening of traditional dykes resulting in excessive areas of spoil and scrub encroachment."

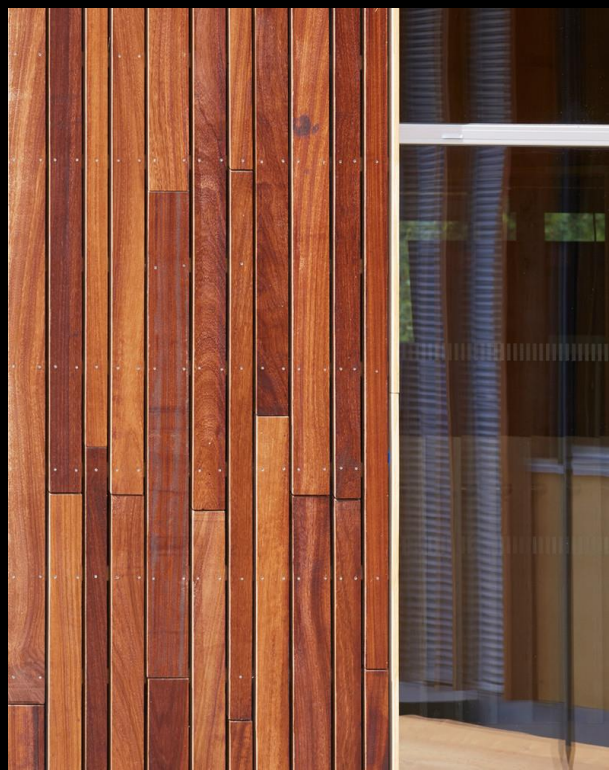
Mr Starling said the Broads Authority's new initiative should be developed across the UK to create new employment opportunities.

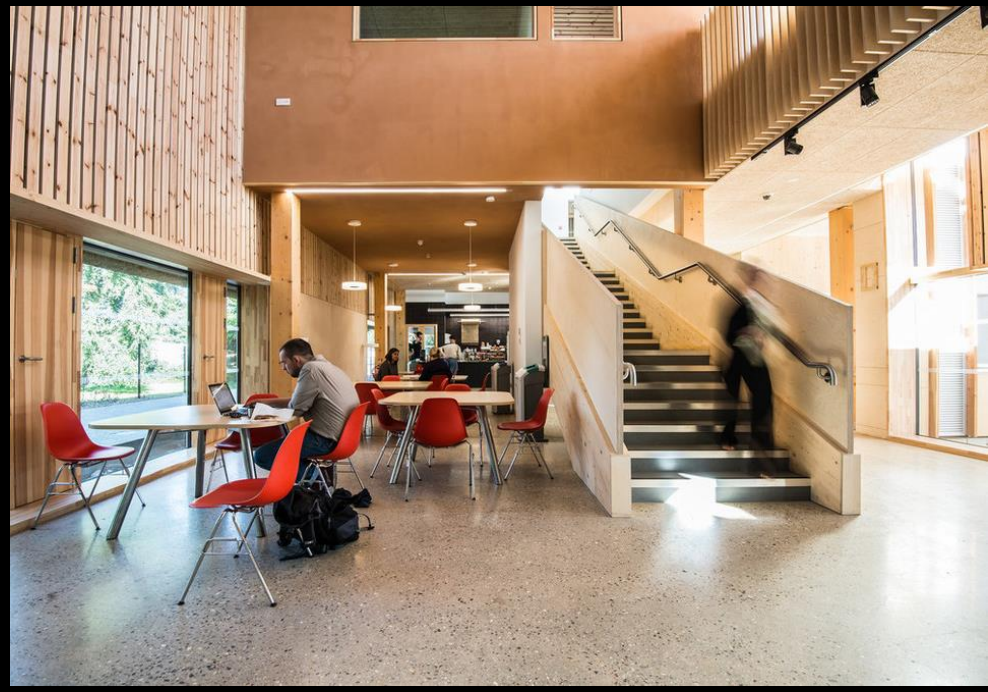
"There are several thousand hectares of reed beds throughout the UK but I understand that it is only in the Broads where there is a desire to encourage further commercial participation in reed bed management," he added.

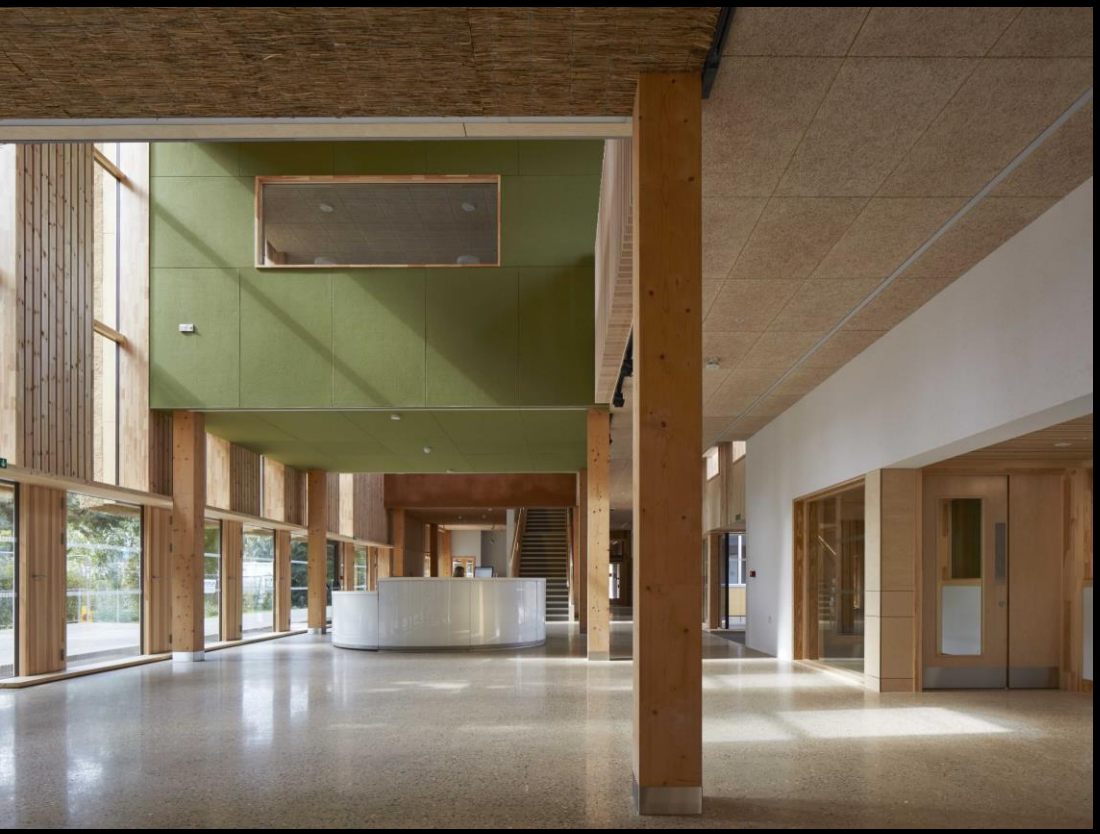
■ To watch a video of Eric Edwards demonstrating reed cutting visit www.edp24.co.uk

brown-co.com 01603 629 871 BROWN & Co

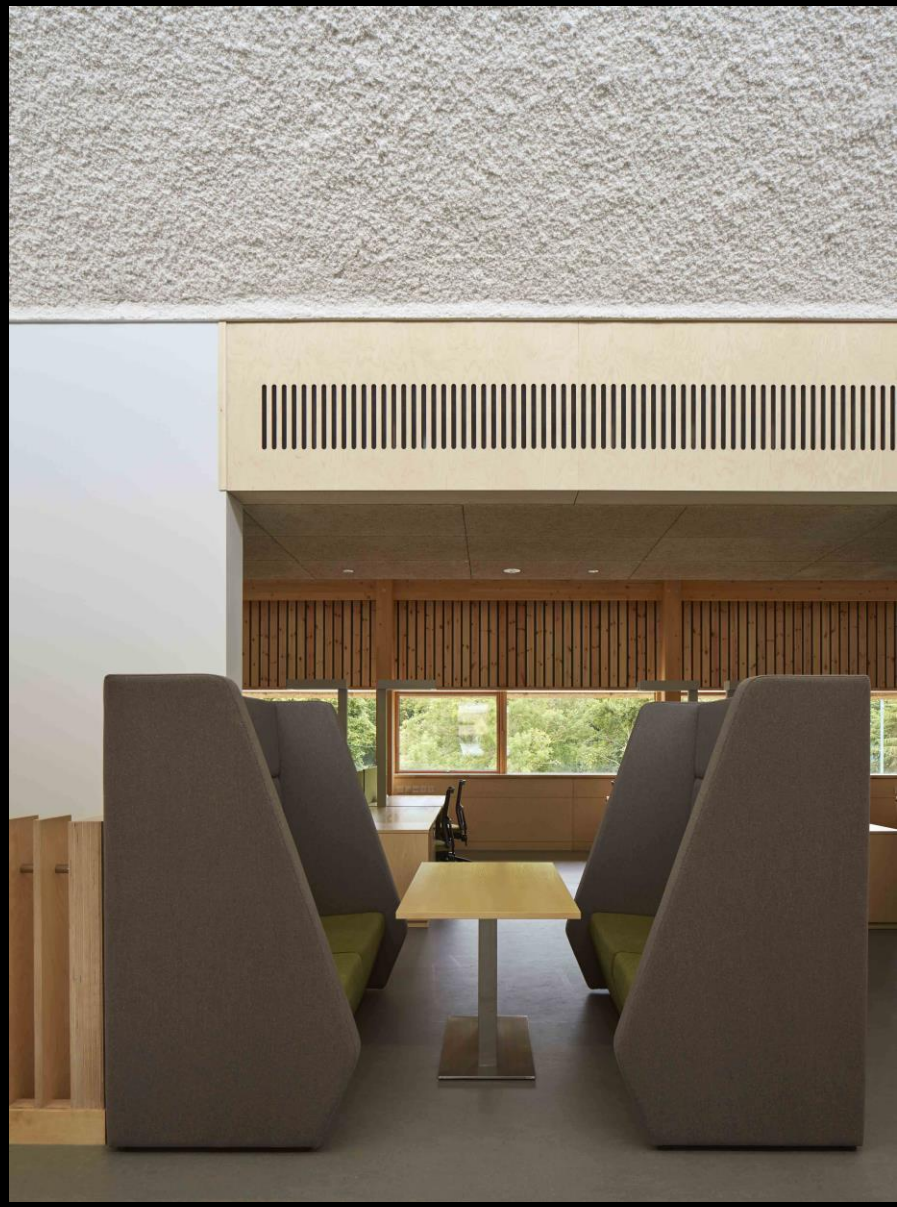
LIGHT SANDED
SAWN
PLAINED
FULL SANDED







UEA
Module Documents
UEA



BUS Survey

“Comfortable, well designed, well lit”

“Fantastic, uplifting, inspirational”

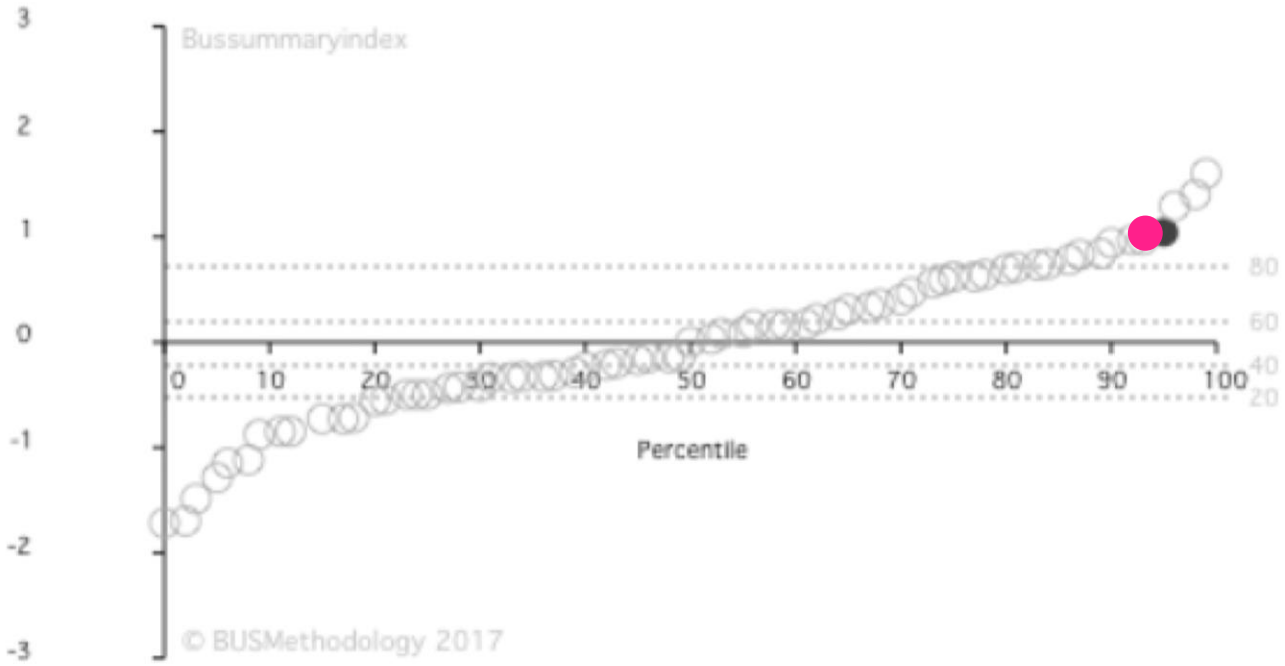
“Bright, energetic, creative”

“Internally it is very calm and peaceful”

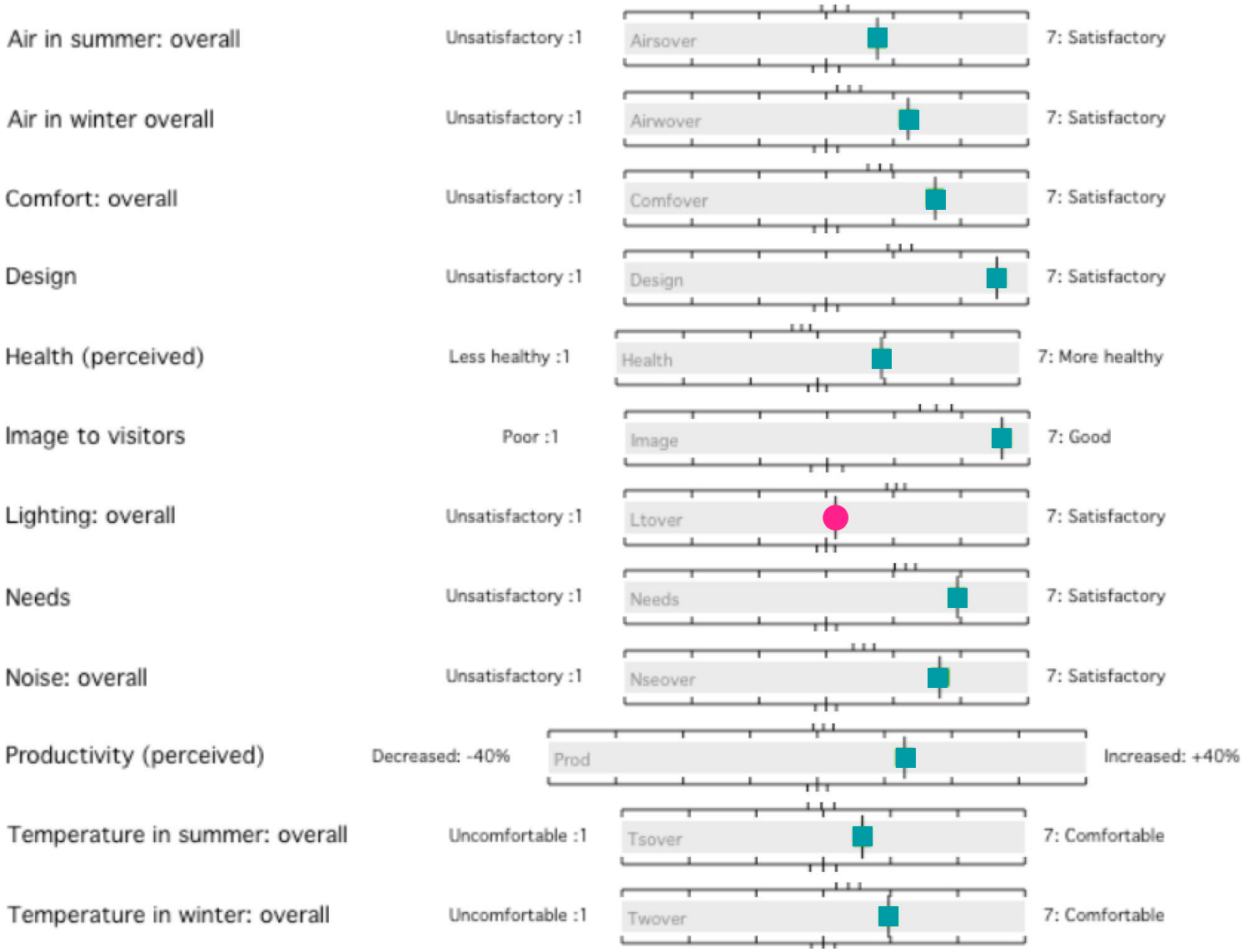
“Enjoy use of natural light and views from every window”

“The offices are well laid out and suitably spacious”

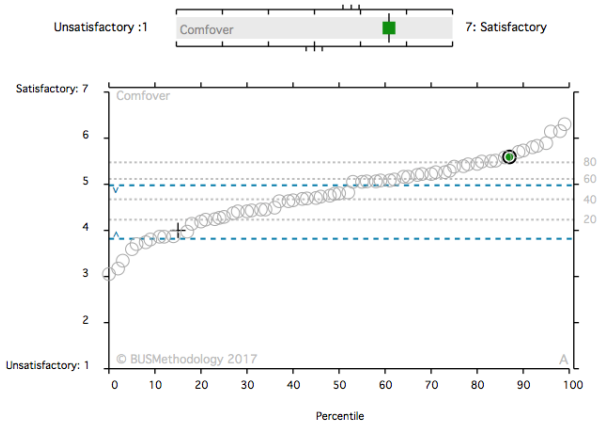
“I have got fitter, feel more positive and have a better quality of living”

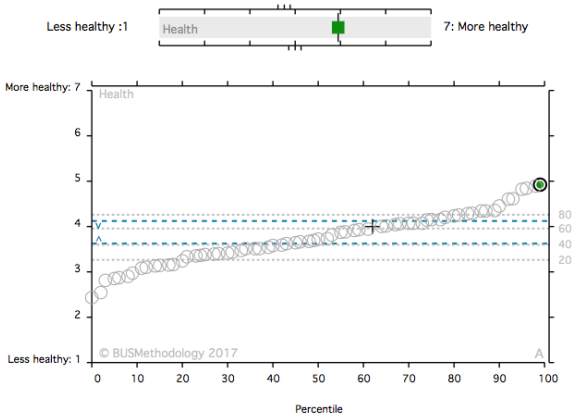


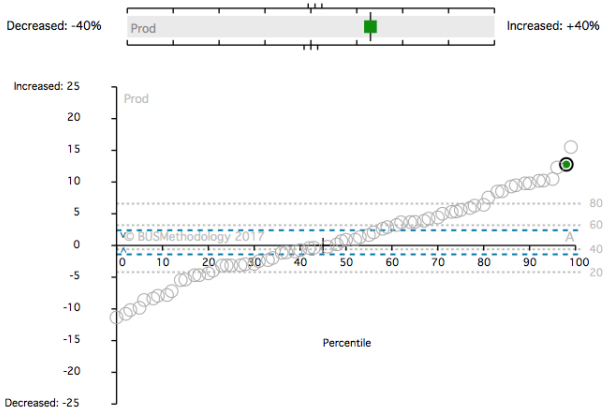
BUS Survey – overall variables



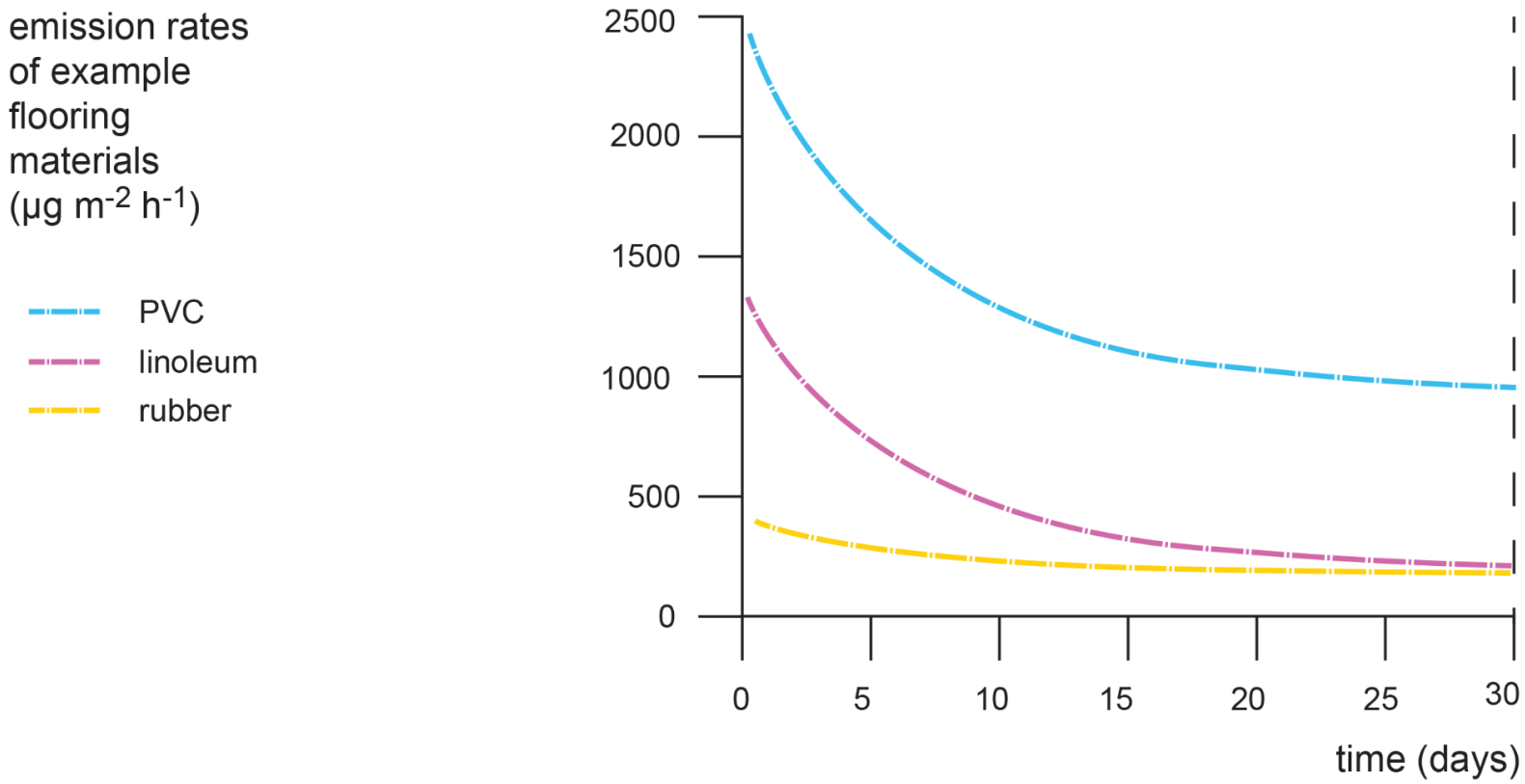
BUS Survey – comfort overall, health (perceived) and productivity (perceived)







Finishing materials palette effect on IAQ: most materials emit VOCs but emissions can vary in type as well as magnitude.

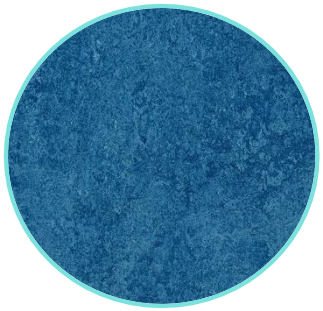


Graph reproduced from Wilke et al. (2004)

Alternative specifications for classroom flooring

Preliminary monitoring results from passive sampling in PH primary school classrooms

Confirmed no or minimal contribution from the specified products on indoor air concentrations of compounds selected as typical of emission from these types of materials.

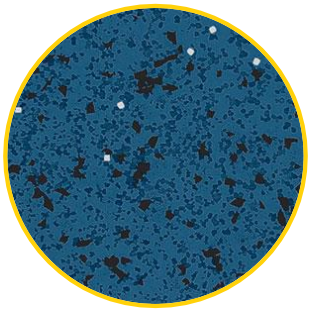


Linoleum

Forbo Marmoleum sheet

43% recycled content
97% of raw materials are natural

Nature Plus Certified



Rubber

NoraPlan Ultragrip rubber sheet

No plasticisers, no PVC, no halogens (chlorine compounds)

Blue Angel Certified

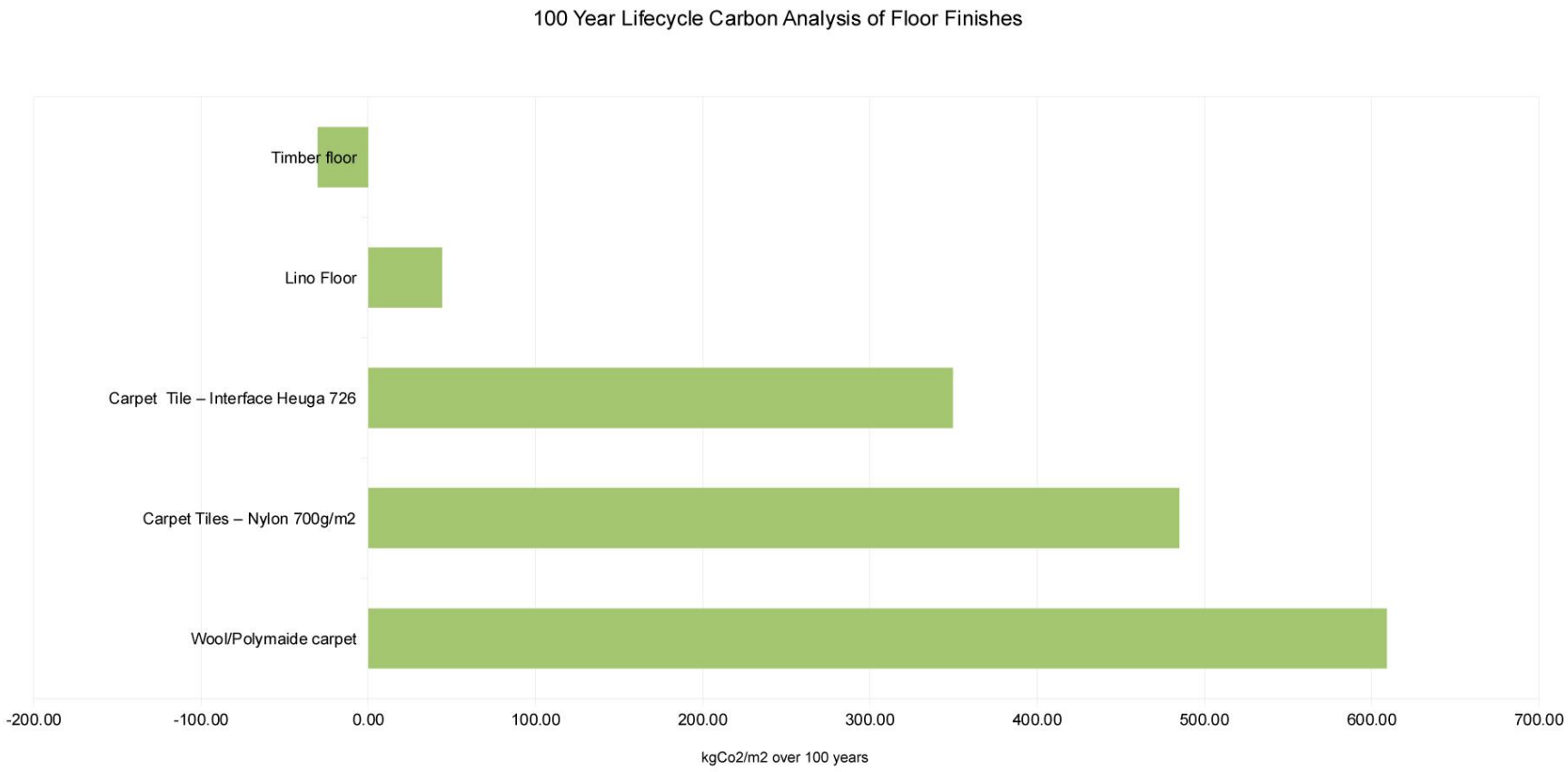
SEAHA ARCHITYPE Historic England UCL

	Alternative designs and 60-year life cycle costs				
Design decision	Base Case	Alt 1	Alt 1(A)	Alt 2	Alt 3
Energy source	Mains gas £1,786,000	Anaerobic digester + mains gas £1,842,000	Anaerobic digester + district heating £1,850,000	Air source heat pumps £1,954,000	District heating £1,771,000
Building overheating	Fermacell wall board £77,000	Plasterboard £97,000			
Roof covering and PV	Metal roof + crystalline PV £295,000	Membrane roof + crystalline PV £267,000		Membrane roof + thin film PV £302,000	
Window frames	All wood frames £963,000	Wood frames + aluminium external facing £745,000			
Hard landscaping	Purbeck stone + timber deck £1,013,000	Resin gravel + timber deck £1,029,000		Resin gravel throughout £887,000	Purbeck stone throughout £880,000
Internal lighting	LED (with some CFL/T5) £285,000	CFL/T5 (with some LED) £356,000			
Floor finishes	Mixed scheme (carpet, wood, lino) £532,000	Wood flooring throughout £902,000		Carpet tiles throughout £347,000	

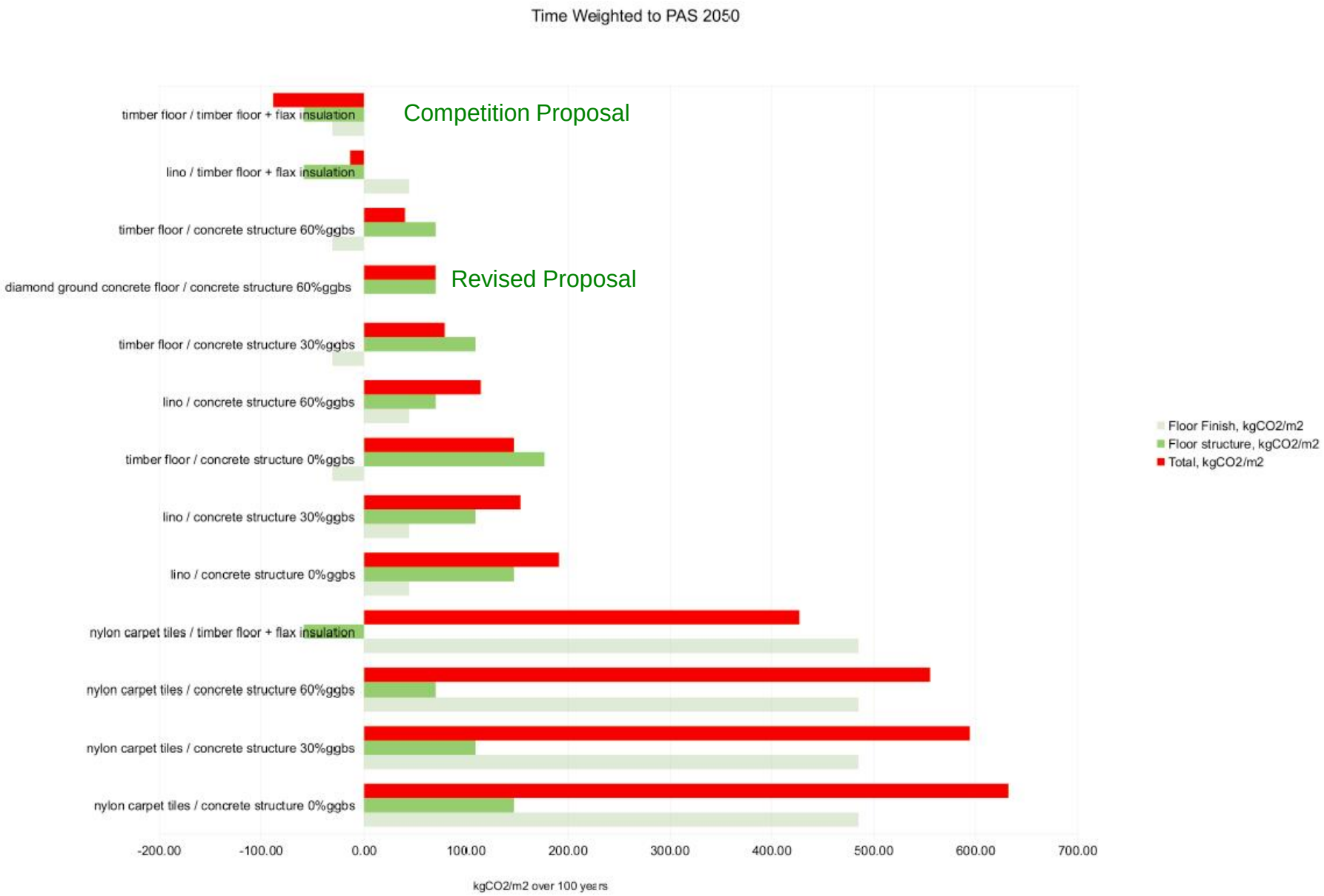
Life Cycle Carbon Analysis of Floor Finishes

Date: *01/01/13* Rev: *A* By: *Gareth Selby*

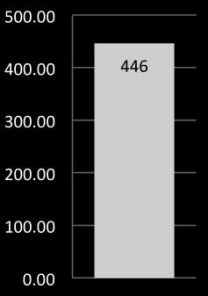
Floor construction	***Time Weighted Total, kgCO2/m2***	***Non Time weighted Total, kgCO2/m2***
Wool/Polymaide carpet	609.12	1163.76
Carpet Tiles – Nylon 700g/m2	485.15	925.36
Carpet Tile – Interface Heuga 726	349.59	664.67
Lino Floor	44.25	73.24
Timber floor	-30.10	-28.90



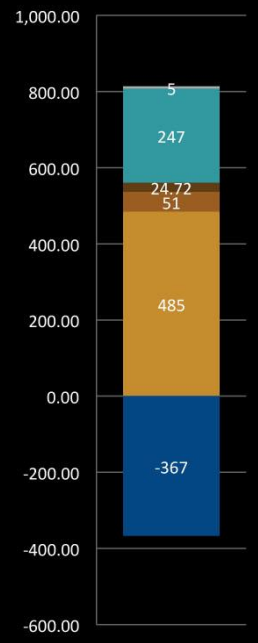
Complete Floor Construction Lifecycle Carbon Analysis



Total Embodied Impact



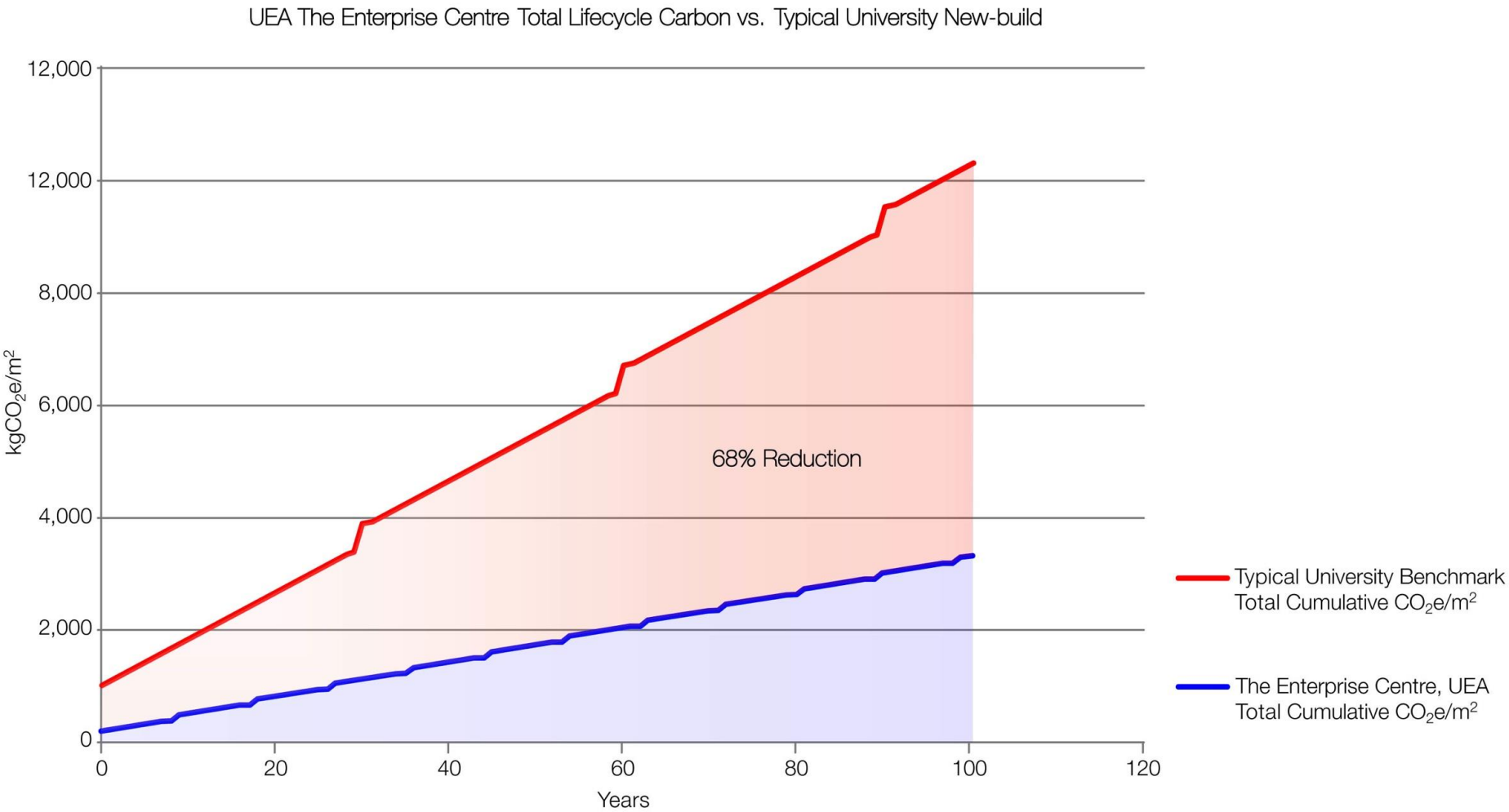
Total Embodied Lifecycle Emissions



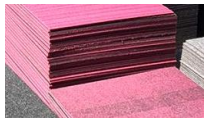
Lifecycle Embodied Carbon Emissions by Building Element

	1.1 Substructure	2.1 Frame	2.2 Upper Floors	2.3 Roofs	2.4 Stairs and ramps	2.5 External walls	2.6 Windows & External Doors	2.7 Internal Walls	2.8 Internal Doors	3.1 Wall Finishes	3.2 Floor Finishes	3.3 Ceiling Finishes	4. Fittings, Furnishings & Equipment	5. Services	8. External Works
Biogenic carbon stored yr 0, kgCO2e/FU	0.00	-45.61	-45.62	-112.57	-6.84	-95.53	-30.34	-19.28	-2.33	-0.05	-1.42	-6.64	0.00	0.00	-0.73
C1-C4, disposal, kgCO2e/FU	0.00	0.00	0.40	1.75	0.03	0.80	0.51	0.39	0.06	0.02	0.16	0.26	0.00	0.00	0.64
B1-B5, maintenance, repair and replacements, kgCO2e/FU	0.00	0.00	13.25	58.20	0.93	26.57	17.03	13.15	2.04	0.59	5.43	8.69	0.00	80.00	21.23
A5, Site works, kgCO2e/FU	3.93	2.31	2.89	3.44	0.92	1.96	4.01	4.04	0.00	0.39	0.66	0.15	0.00	0.00	0.00
A4, transport, kgCO2e/FU	6.94	3.99	6.22	11.39	0.04	9.14	2.08	7.25	0.33	0.05	0.14	0.20	0.00	0.00	3.68
A1-A3, design and manufacturing, kgCO2e/FU	177.52	14.42	48.73	76.12	0.93	52.72	19.35	21.52	1.35	0.39	1.69	5.28	0.00	24.39	40.28

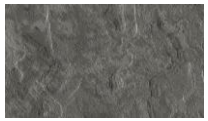
Compared to typical university building benchmarks



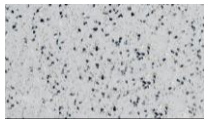
Cambridge Institute for Sustainability Leadership



Carpet



Rubber

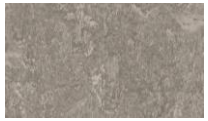


Vinyl

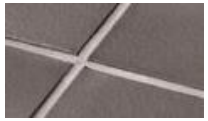
Interface Carpet

Bolon

Hardwood

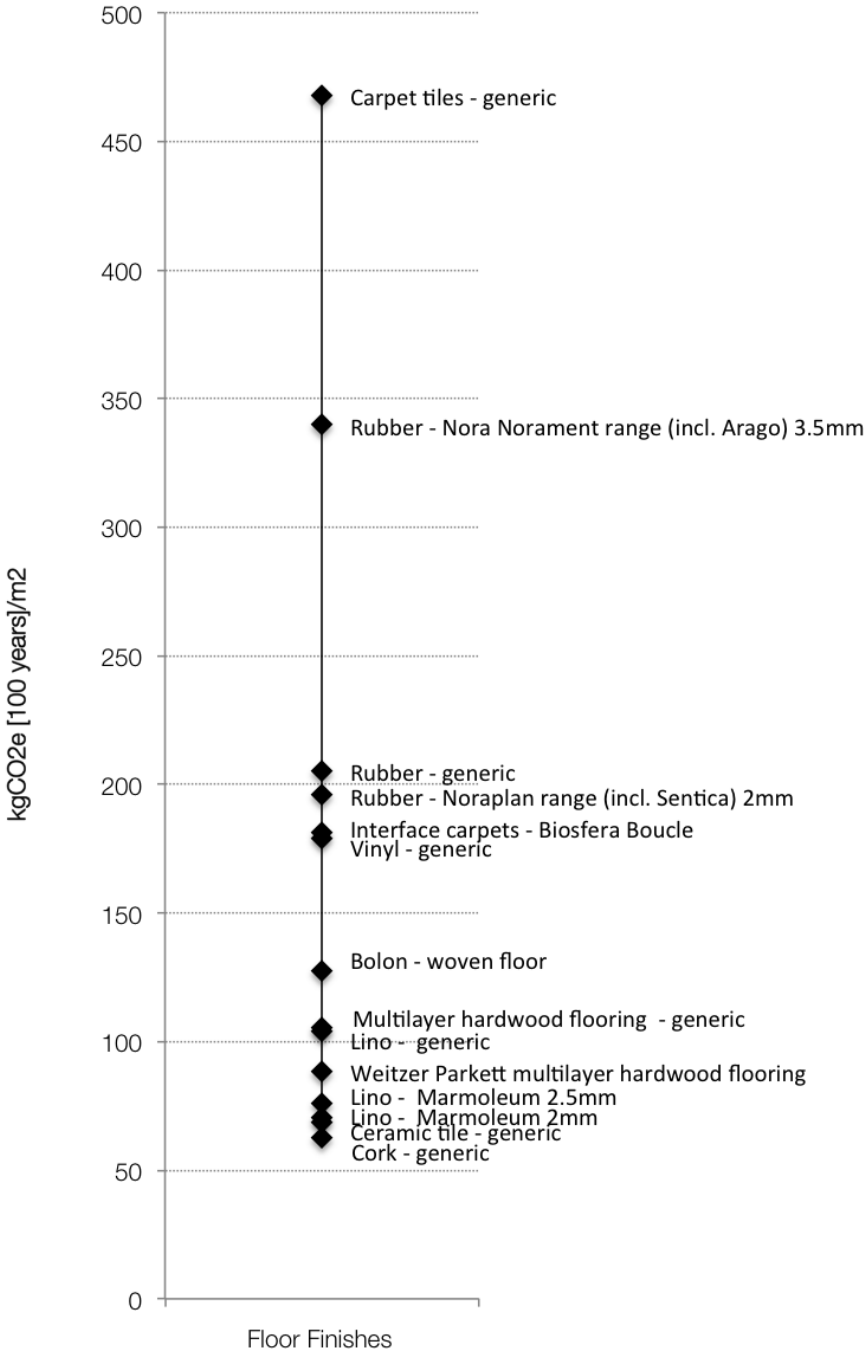


Lino



Ceramic Tile

Cork



Cambridge Institute for Sustainability Leadership

White EPS

Grey EPS

Rockwool

Sheeps Wool

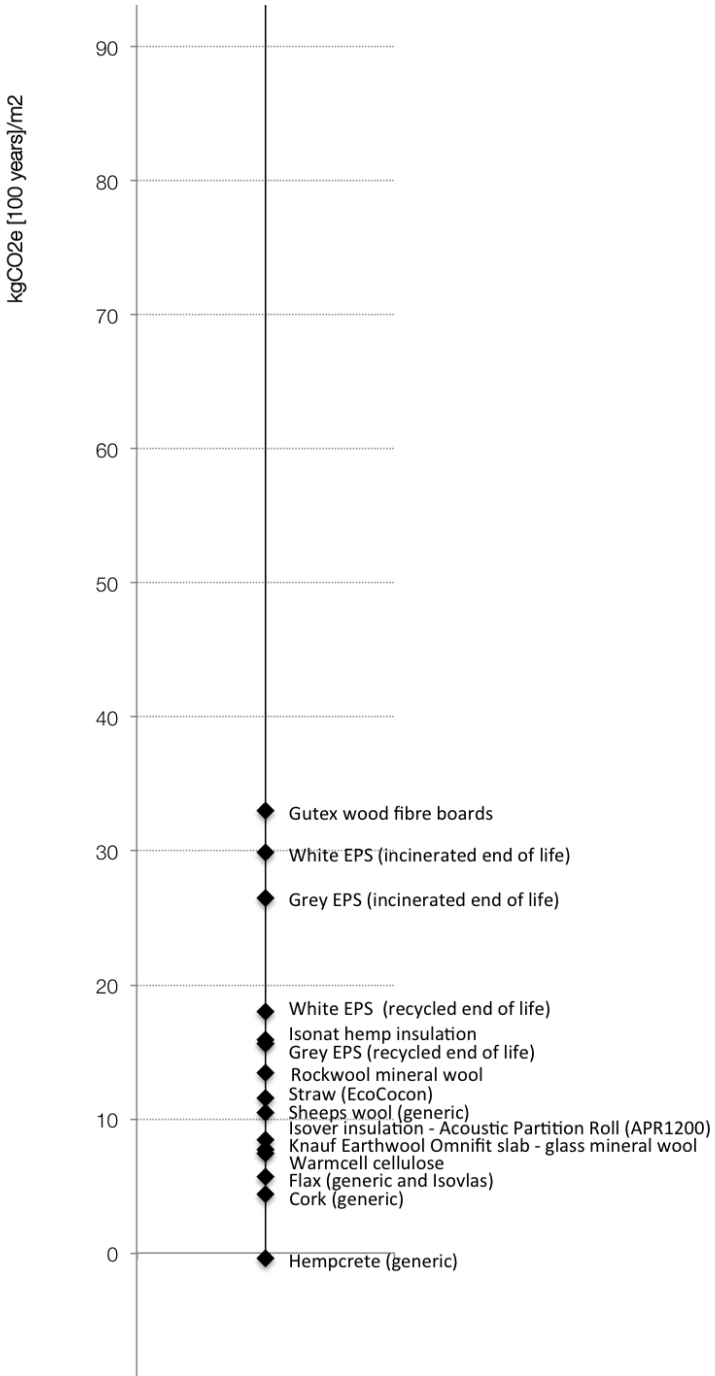
Isover insulation

Knauf Earthwool

Warmcel Cellulose

Flax

Cork



ARCHITYPE

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Thankyou

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