Wood for Good

INTRO

FOLLOW THE TREE

The story of carbon in trees

How much carbon is stored in a tree? How does that translate into cut timber and wood products? And how much carbon can be 'banked' by using timber for building houses in the UK? These questions have been raised and answered in a set of short animated films and set of Case Study images created by Carbon Visuals for Wood for Good, the UK's wood promotion campaign.

Wood for Good aims to promote the suitability and sustainability of wood as a building material to the construction and logistics sectors and associated professionals such as architects and design engineers. The purpose of this campaign was to find a better way to communicate the positive carbon benefits of wood and timber in the UK construction sector to a non-informed audience - not just construction professionals but also policy makers and the public.

Because of the wide nature of the brief the client agreed to start the project with a Scoping Phase during which it was decided to split the film into three sections rather than design a single complex narrative. In addition we agreed to create a set of Case Study 'best practice' images showing the carbon 'banked' in high profile buildings and timber products.

Working closely with the client in this phase we were able to spend time working up a communications plan, sourcing and examining appropriate data and creating draft film storyboards. This enabled a delivery schedule over several months, culminating in all visual materials available for September campaign launch.

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DATA

OVERALL

General CO_2 Data	
Density of carbon cioxide at standard pressure and 15 °C (kg/m³)	1.87
Sphere packing density	0.64
Pile angle of repose	45°
Wood Data	
Relative molecular mass CO_2 (g/mol)	44.01
Relative atomic mass carbon (g/mol)	12.01
Density of wood from sitka spruce[1] (kg/m³)	350
Sitka spruce carbon content (kg C per m³)	175
Sitka spruce carbon content (kg CO_2 per m³)	641.23

1 Value supplied by Wood for Good

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THE TREE STORY

Volume of wood per tree (m^3)	1.14
Therefore mass CO_2 per tree (kg)	742
Wood plank dimesions (m)	2.4 x 0.1 x 0.05
Plank volume (m^3)	0.012
Number of planks in 1.14 m^3 (Average volume of wood in clearfell tree)	95

[2]

2 Value supplied by Wood for Good

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THE HECTARE STORY

Age	Stage	Number Trees/ha remaining	Thinnings Harvested (m^3)	Sawlog Harvested (m^3)	CO_2 Sequestered (kg)
20	1st Thinning	1,064	70	0	44,886
25	2nd Thinning	700	65	5	44,886
30	3rd Thinning	521	41	29	44,886
35	4th Thinning	412	21	49	44,886
40	Clearfell	0	252	419	303,303
		Total	832	503	482,849

[3]

Age	Stage	Cumulative Thinnings (m^3)	Height of stack (metres) with base dimensions 9.4 m x 9.4m	Cumulative Sawlog (m^3)	Height of stack (metres) with base dimensions 9.4 m x 9.4m
20	1st Thinning	70	0.79	0	0
25	2nd Thinning	205	2.32	5	0.07
30	3rd Thinning	382	4.32	35	0.40
35	4th Thinning	580	6.56	84	0.95
40	Clearfell	832	9.42	503	5.69

[4]

3 *Thinning - The first return,* John Casey

4 *Wood properties and uses of Sitka spruce in Britain,* J Moore

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THE HOUSE STORY

The House (Typical timber framed house)	
Volume of wood (m^3)	29.74
Volume CO_2 (m^3)	10,220
Mass carbon dioxide (kg)	19,065
Number of spheres (1 kg)	19,065

The Estate (84 Houses)	
Volume of wood (m^3)	2,091.38
Volume CO_2 (m^3)	858,517
Mass carbon dioxide (kg)	1,602,427.63
Number of spheres (1 tonne)	1,602
Height of pile (m)	102.91

All New Homes in UK (200,00 Houses)	
Volume of wood (m^3)	4,979,470
Volume CO_2 (m^3)	2,044,089,166
Mass carbon dioxide (kg)	3,813,100,000
Number of spheres (1 tonne)	3,813,100
Height of pile (m)	1,374.17

5 *Greenhouse Gas Emissions Comparison*, Jill Burnett

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THE HOUSE STORY

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Structure	Width	Depth	Length	m^3	Number	Area	m^3	kg CO_2 Factor	kg CO_2
Ground Floor Joists	0.050	0.200	6	0.060	18		1.080	641	801
First Floor Joists	0.050	0.200	6	0.060	18		1.080	641	801
Loft Floor Joists	0.050	0.200	6	0.060	18		1.080	641	801
Floor Finish GF, FF & Loft 18mm OSB	6.000	0.018	7	0.756	3		2.268	641	1,683
External Walls									
150 x 50 studs @ 600 Centres	0.050	0.150	4.8	0.036	45		1.620	641	1,202
Sheathing Internal 15 mm OSB		0.015				137	2.055	641	1,525
Sheathing External 10 mm Timber vent		0.010				137	1.370	641	1,017
Sole Plates & Headers 150 x 50	0.050	0.150	164.4				1.233	641	915
Insulation Warmcel Recycled Newspaper 50 kg m3	0.350	0.150	5	0.263	64		16.800	38	638
Internal Walls									
100 x 50 Studs at 400 centres	0.050	0.100	5		34		0.850	641	631
Sole Plates & Headers 100 x 50	0.050	0.100	78				0.390	641	289
Sheathing Internal 10 mm OSB		0.010	5		100		5.000	641	3,710
Skirtings	0.015	0.100			100		0.150	641	111
Doors 40 x 900 x 2100 Solid Core	0.900	0.040	2.1		10		0.756	641	561
Architraves 50 x 15	0.050	0.015	5.1		10		0.038	641	28
Windows Confirm with BWF	0.050	0.100	4.8	0.024	14		0.336	641	249
Roof 200 x 50 Joists @ 30° Pitch		0.050			19	1.418	1.347	641	1,000
Roof Sheathing		0.010				50.4	0.504	641	374
Purlins	0.050	0.200	7		3		0.210	641	156
Cladding 18 mm Cedar		0.018				75	1.350	641	1,002
Roofing Cedar Shingles		0.010				50.4	0.504	641	374
Flooring 15 mm wood Floors		0.015				80	1.200	641	890
Stairs 900 wide							0.476	641	353
								Total	19,065

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CASE STUDIES

	Wood used (m^3)	Embodied CO_2 (kg)	Source / Link
Alec Reed Academy	1,075	797,650	165 Sir Alec Reed Academy, London Application Form (Wood Awards 2013)
Bridport House	1,536	1,139,712	http://www.asbp.org.uk/uploads/documents/resources/Jon%20Forvargue%20EURBAN%20ASBP%2026.03.2013.pdf
St Gregory's School	368.82	236,500	http://www.white-design.com/architecture/all-projects/st-gregs-st-marks-joint-sixth-form-centre/
A Typical Window	0.022	14.5	http://www.woodwindow-alliance.com/sites/professional/assets/files/reports/LCA_Report.pdf
24 Court Orchard (The House)	29.74	19,065	Information supplied by White Design

REFERENCES

1

Moore, J. (2011). *Wood properties and uses of Sitka spruce in Britain*, Forestry Commission Research Report.

http://www.forestry.gov.uk/pdf/FCRP015.pdf/$FILE/FCRP015.pdf

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John Casey (2002). *Thinning - the first return*, Teagasc – the Agriculture and Food Development Authority,

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Jill Burnett (2006). *Greenhouse Gas Emissions Comparison - Carbon benefits of Timber in Construction,* Forestry Commission Scotland

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http://www.woodwindowalliance.com/sites/professional/assets/files/reports/LCA_Report.pdf