

MATERIALS LIFECYCLE EMISSIONS - 2 BED SEMI-DETACHED HOUSE

	Material options	Unit of measure	Amount of each material option that would be necessary per unit	Equivalent CO ₂ emissions (tonnes)
Foundations	Concrete	m ³	2.1	0.9
Flooring				
Ground floor	Timber	tonnes	0.3	-0.4
	Chipboard	m ³	0.5	-0.4
	Concrete (150mm thick slab)	m ³	4.2	1.8
	EPS insulation	tonnes	0.04	0.0
	Extruded polystyrene insulation	tonnes	0.1	0.0
	Hardcore	tonnes	12.0	0.05
	Concrete screed on top of slab (75mm for ground floor)	m ³	2.1	0.9
Other floors	Timber	tonnes	0.3	-0.4
	Chipboard	m ³	0.5	-0.4
Ceilings	Plasterboard	m ³	0.7	0.2
Joists	Timber joists	tonnes	0.1	-0.1
External walls				
Timber frame and timber clad	Timber cladding	tonnes	0.85	-1.02
	Panelvent board	m ³	0.87	-0.59
	Timber frame	m ²	14.55	-0.02
	Cellulose insulation	tonnes	0.58	-0.71
	Plasterboard	m ³	1.21	0.42
Timber frame with brick outer leaf	Brickwork	m ²	97.00	4.75
	Sheathing (plywood)	m ³	0.87	-0.59
	Timber frame	m ²	14.55	-0.02
	Glasswool insulation	tonnes	0.34	0.37
	Plasterboard	m ³	1.21	0.42
Brick outer leaf with block internal leaf	Brickwork	m ²	97.00	4.75
	Glasswool insulation	tonnes	0.24	0.27
	Blockwork	tonnes	4.90	1.18
	Plasterboard	m ³	1.26	0.44
Internal walls	Blockwork	tonnes	1	0.3
	Timber frame	m ²	4	0.0
	Plasterboard	m ³	0.35	0.12
Doors - internal	Chipboard panel door	m ³	0.110	-0.1
Doors - external	PVC	tonnes	0.1	0.1
	Wood	tonnes	0.1	-0.1
Windows	Glass	tonnes	0.089	0.1
	Wood frame	tonnes	0.014	-0.02
	PVC frame	tonnes	0.023	0.0

Stairs				
		<i>Timber</i>	tonnes	0.056
				-0.1
Roof				
		<i>Timber rafters, rock wool insulation and Marley plain concrete</i>	m ²	41.7
		<i>Timber rafters, rock wool insulation, felt, battens and clay tiles</i>	m ²	41.7
				4.0
				2.9

Assumptions

Building dimensions

Foundation volume:		2.1 m ³ (working estimate)
Floor area:		56 m ² (working estimate)
External wall area:		97 m ² (working estimate)
Internal partition wall area:		28 m ² (working estimate)
Dimensions of joists:	length:	61.541 metres (working estimate)
	height:	0.10 metres (working estimate)
	width:	0.04 metres (working estimate)
Number of internal doors per unit:		8 (working estimate)
Number of external doors per unit:		2 (working estimate)
Area of each door:		2.152 m ² (working estimate)
Assumed thickness of door:		0.044 metres (Building Construction Handbook 1998)
Height of staircase:		2.6 metres
Assumed number of steps and risers in staircase:		22 (working estimate)
Assumed dimensions of steps and risers:	length:	0.8 metres (working estimate)
	thickness:	0.02 metres (working estimate)
	width:	0.2 metres (working estimate)
Assumed dimensions of runners:	length:	2.2 metres (working estimate)
	thickness:	0.04 metres (working estimate)
	width:	0.4 metres (working estimate)
Area of windows:		4.65 m ² (working estimate)
Assumed thickness of glass used:		0.004 metres (working estimate)
Roof area:		41.7 m ² (working estimate)

Timber frame with brick outer leaf

Thickness of Brick:	102 mm
Thickness of sheathing (plywood):	9 mm
Emissions factors are not available for plywood so emissions are assumed to be equivalent to those associated with chipboard	
Thickness of glasswool insulation:	140 mm
Thickness of plasterboard:	12.5 mm
Cross section dimension of timber stud (regularised timber):	140 mm
	44 mm
Length of stud:	2.4 m
Studs at centres of:	600 mm
Assume that total area of stud equals 15% of the total wall area:	15% (TRADA technology 2001 timber frame construction)

Brick outer leaf with block internal leaf

Thickness of brick:	102 mm
Thickness of glasswool insulation:	100 mm
Thickness of aerated concrete block:	100 mm
Thickness of plasterboard:	13 mm

Timber frame with timber cladding

Thickness of timber cladding:	22 mm
Thickness of panelvent board:	9 mm
Emissions factors are not available for panelvent so emissions are assumed to be equivalent to those associated with chipboard	
Thickness of cellulose insulation:	140 mm

Thickness of plasterboard:	12.5 mm
Cross section dimension of timber stud (regularised timber):	140 mm
	44 mm
Length of stud:	2.4 m
Studs at centres of:	600 mm
Assume that total area of stud equals 15% of the total wall area:	15% (TRADA technology 2001 timber frame construction)
Material details	
T&G Weatherdeck	
Assumed thickness of the T&G weatherdeck floor:	0.03 metres (working estimate)
Assumed density of timber used:	400 kg/m ³ (BRE 1999e)
Concrete	
Equivalent CO ₂ emissions for pouring concrete:	0.425 tCO ₂ /m ³ concrete (Finnish Building Information Foundation 2004)
Assumed thickness of concrete slab:	0.15 metres (working estimate)
Assumed thickness of concrete screed:	0.075 metres (working estimate)
Hardcore	
Equivalent CO ₂ emissions for gravel:	0.0038 kgCO ₂ /kg (Finnish Building Information Foundation 2004)
Density of packed granular sub-base:	2,850 kg/m ³ (Finnish Building Information Foundation 2004)
Thickness of hardcore:	150 mm
Blockwork	
Blockwork is assumed to be aerated concrete blocks	
Density of blockwork:	505 kg/m ³ (BRE 1999c)
Estimated width of aerated concrete blocks:	0.14 metres
Equivalent CO ₂ emissions for blockwork:	0.24 tCO ₂ /t aerated blockwork used (BRE 1999c)
Brickwork	
Equivalent CO ₂ emissions for brickwork:	0.049 tCO ₂ /m ² brick used (BRE 1999b)
Timber	
Assumed density of timber used:	400 kg/m ³ (BRE 1999e)
Equivalent CO ₂ emissions for kiln dried timber:	-1.2 tCO ₂ /t timber used (BRE 1999e)
Equivalent CO ₂ emissions for internal timber frames:	-1.7 kgCO ₂ /m ² (BRE 2003)
Panel door	
Thickness of chipboard:	0.003 m (working estimate)
Width of sides and base:	0.045 m (working estimate)
Height of door:	2.04 m (working estimate)
Width of door:	0.914 m (working estimate)
Steel	
Equivalent CO ₂ emissions for steel work:	0.66 tCO ₂ /tonne steel used (RTS 1999a)
Equivalent CO ₂ emissions for steel work:	5.16 tCO ₂ /m ³ steel used (Finnish Building Information Foundation 2004)
Chipboard	
Equivalent CO ₂ emissions for chipboard:	-0.673 tCO ₂ /m ³ chipboard used (Finnish Building Information Foundation 2004)
Assumed thickness of chipboard floor:	0.019 m (CIBSE Guide A 2006)
Plasterboard	
Assumed thickness of plasterboard:	0.0125 m (working estimate)
Equivalent CO ₂ emissions for plasterboard:	0.346 tCO ₂ /m ³ plasterboard used (Finnish Building Information Foundation 2004)
PVC	
Equivalent CO ₂ emissions for PVC:	1.2 tCO ₂ /t PVC used (Plastic Europe)
Assumed density of PVC:	650 kg/m ³ (working estimate)
Windows	

Density of glass:	2,800 kg/m ³ (www.allmeasures.com)
CO ₂ emissions for glass:	600 kgCO ₂ /tonne glass
Assumed thickness of glass doors:	0.01 m (working estimate)
Assumed percentage of opening area to be frame:	15% (working estimate)
Assumed percentage of opening area to be glass:	85% (working estimate)
Assumed thickness of window frame:	0.050 m (working estimate)
Insulation	
Thickness of polystyrene insulation:	100 mm
Glasswool:	1,100 kgCO ₂ /tonne (BRE 1999)
Cellulose:	-1.22 tCO ₂ /tonne (Finnish Building Information Foundation 2004)
EPS:	2.60 gCO ₂ /kg (Plastics Europe 2006)
Extruded polystyrene - factors are not available so they assumed to be equivalent to EPS:	2.60 gCO ₂ /kg (Plastics Europe 2006)
Density of glasswool insulation:	25 kg/m ³ (CIBSE Guide A 2006)
Density of cellulose insulation:	43 kg/m ³ (CIBSE Guide A 2006)
Density of EPS insulation:	15 kg/m ³ (CIBSE Guide A 2006)
Density of extruded polystyrene insulation:	40 kg/m ³ (CIBSE Guide A 2006)
Roof	
CO ₂ emissions for timber rafters, rock wool insulation and Marley plain concrete roof:	95 kgCO ₂ e/m ² (BRE 1999)
CO ₂ emissions for timber rafters, rock wool insulation, felt, battens and clay tiles roof:	70 kgCO ₂ e/m ² (BRE 1999)

MATERIALS LIFECYCLE EMISSIONS - 3 BED DETACHED HOUSE

	Material detail	Unit of measure	Amount used per unit	Equivalent CO ₂ emissions (tonnes)
Foundations				
	Concrete	m ³	4	1.7
Flooring				
Ground floor	Timber	tonnes	0.4	-0.5
	Chipboard	m ³	0.6	-0.4
	Concrete (150mm thick slab)	m ³	4.9	2.1
	EPS insulation	tonnes	0.05	0.0
	Extruded polystyrene insulation	tonnes	0.1	0.0
	Hardcore	tonnes	14.0	0.05
	Concrete screed on top of slab (75mm for ground floor)	m ³	2.5	1.0
Other floors	Timber	tonnes	0.8	-0.9
	Chipboard	m ³	1.2	-0.8
Ceilings				
	Plasterboard	m ³	1.2	0.4
Joists				
	Timber / joists	tonnes	0.5	-0.6
External walls				
Timber frame and timber clad	Timber cladding	tonnes	1.45	-1.74
	Panelvent board	m ³	1.49	-1.00
	Timber frame	m ²	24.75	-0.04
	Cellulose insulation	tonnes	0.99	-1.21
	Plasterboard	m ³	2.06	0.71
Timber frame with brick outer leaf	Brickwork	m ²	165	8.09
	Sheathing (plywood)	m ³	1.49	-1.00
	Timber frame	m ²	24.75	-0.04
	Glasswool insulation	tonnes	0.58	0.64
	Plasterboard	m ³	2.06	0.71
Brick outer leaf with block internal leaf	Brickwork	m ²	165	8.09
	Glasswool insulation	tonnes	0.41	0.45
	Blockwork	tonnes	8.33	2.00
	Plasterboard	m ³	2.15	0.74
Internal walls				
	Blockwork	tonnes	2	0.4
	Timber frame	m ²	5	-0.01
	Plasterboard (12.5 mm thick)	m ³	0.40	0.14
Doors - internal				
	Chipboard panel door	m ³	0.03	-0.02
Doors - external				
	PVC	tonnes	0.1	0.1
	Wood	tonnes	0.08	-0.1
Windows				
	Glass	tonnes	0.1	0.1
	Wood frame	tonnes	0.03	0.0
	PVC frame	tonnes	0.1	0.1
Stairs				

	<i>Timber</i>	tonnes	0.068	-0.1
Roof				
	<i>Timber rafters, rock wool insulation and Marley plain concrete</i>	m ²	47.3	4.5
	<i>Timber rafters, rock wool insulation, felt, battens and clay tiles</i>	m ²	47.3	3.3

Assumptions

Building dimensions

Floor area per unit:		98 m ² (working estimate)
Area of internal partition walls per unit:		32 m ² (working estimate)
Area of external walls per unit:		165 m ² (working estimate)
Assumed dimensions of the timber joists:	length:	305.511 metres (working estimate)
	height:	0.10 metres (working estimate)
	width:	0.04 metres (working estimate)
Number of internal doors per unit:		16 (working estimate)
Number of external doors per unit:		2 (working estimate)
Area of each door:		2.152 m ² (working estimate)
Assumed thickness of door:		0.044 metres (Building Construction Handbook 1998)
Number of staircase stories:		2 (working estimate)
Height of one staircase:		2.6 metres
Assumed number of steps and risers in one staircase:		14
Assumed number of kites in one staircase:		1 (working estimate)
Assumed dimensions of steps and risers:	length:	0.8 metres (working estimate)
	thickness:	0.02 metres (working estimate)
	width:	0.2 metres (working estimate)
Assumed dimension of kite:	diagonal one:	0.82 metres (working estimate)
	thickness:	0.02 metres (working estimate)
	diagonal two:	0.28 metres (working estimate)
Assumed dimensions of runners:	length:	2.2 metres (working estimate)
	thickness:	0.04 metres (working estimate)
	width:	0.4 metres (working estimate)
Area of windows:		10.4 m ² (working estimate)
Assumed thickness of glass used:		0.004 metres (working estimate)
Area of roof:		47.3 m ² (working estimate)

Timber frame with brick outer leaf

Thickness of Brick:	102 mm
Thickness of sheathing (plywood):	9 mm
Emissions factors are not available for plywood so emissions are assumed to be equivalent to those associated with chipboard	
Thickness of glasswool insulation:	140 mm
Thickness of plasterboard:	12.5 mm
Cross section dimension of timber stud (regularised timber):	140 mm
	44 mm
Length of stud:	2.4 m
Studs at centres of:	600 mm
Assume that total area of stud equals 15% of the total wall area (timber frame construction)	15% (TRADA technology 2001 timber frame construction)

Brick outer leaf with block internal leaf

Thickness of Brick:	102 mm
Thickness of glasswool insulation:	100 mm
Thickness of aerated concrete block:	100 mm
Thickness of plasterboard:	13 mm

Timber frame with timber cladding

Thickness of timber cladding:	22 mm
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Thickness of panelvent board:	9 mm
Emissions factors are not available for panelvent so emissions are assumed to be equivalent to those associated with chipboard	
Thickness of cellulose insulation:	140 mm
Thickness of plasterboard:	12.5 mm
Cross section dimension of timber stud (regularised timber):	140 mm
	44 mm
Length of stud:	2.4 m
Studs at centres of:	600 mm
Assume that total area of stud equals 15% of the total wall area:	15% (TRADA technology 2001 timber frame construction)
Material details	
T&G weatherdeck	
assumed thickness of the T&G weatherdeck floor:	0.03 metres (working estimate)
Assumed density of timber used:	400 kg/m ³ (BRE 1999e)
Concrete	
Equivalent CO ₂ emissions for concrete:	0.425 tCO ₂ /m ³ concrete (Finnish Building Information Foundation 2004)
Assumed thickness of concrete slab:	0.15 metres (working estimate)
Assumed thickness of concrete screed:	0.075 metres (working estimate)
Hardcore	
Equivalent CO ₂ emissions for gravel:	0.0038 kgCO ₂ /kg (Finnish Building Information Foundation 2004)
Density of packed granular sub-base:	2,850 kg/m ³ (Finnish Building Information Foundation 2004)
Thickness of hardcore:	150 mm
Brickwork	
Equivalent CO ₂ emissions for brickwork:	0.049 tCO ₂ /m ² brick used (BRE 1999b)
Blockwork	
Blockwork is assumed to be aerated concrete blocks	
Density of blockwork:	505 kg/m ³ (BRE 1999c)
Equivalent CO ₂ emissions for blockwork:	0.24 tCO ₂ /t aerated blockwork used (BRE 1999c)
Timber	
Assumed density of timber used:	400 kg/m ³ (BRE 1999e)
Equivalent CO ₂ emissions for kiln dried timber:	-1.2 tCO ₂ /t timber used (BRE 1999e)
Equivalent CO ₂ emissions for internal timber frames:	-1.7 kgCO ₂ /m ² (BRE 2003)
Assume thickness of external timber:	0.022 m (working estimate)
Chipboard	
Equivalent CO ₂ emissions for chipboard:	-0.673 tCO ₂ /m ³ chipboard used (Finnish Building Information Foundation 2004)
Assumed thickness of chipboard floor:	0.019 m (CIBSE Guide A 2006)
Panel door	
Thickness of chipboard:	0.003 m (working estimate)
Width of sides and base:	0.045 m (working estimate)
Height of door:	2.04 m (working estimate)
Width of door:	0.914 m (working estimate)
Plasterboard	
Assumed thickness of plasterboard:	0.0125 m (working estimate)
Equivalent CO ₂ emissions for plasterboard:	0.346 tCO ₂ /m ³ plasterboard used (Finnish Building Information Foundation 2004)
PVC	
Equivalent CO ₂ emissions for PVC:	1.2 tCO ₂ /t PVC used (Plastic Europe)
Assumed density of PVC:	650 kg/m ³ (working estimate)
Windows	
Density of glass:	2800 kg/m ³ (www.allmeasures.com)

CO ₂ emissions for glass:	600 kgCO ₂ /tonne glass
Assumed percentage of opening area to be frame:	15% (working estimate)
Assumed percentage of opening area to be glass:	85% (working estimate)
Assumed thickness of window frame:	0.050 m (working estimate)
Steel	
Equivalent CO ₂ emissions for steel work:	0.66 tCO _{2e} /tonne steel used (RTS 1999a)
Equivalent CO ₂ emissions for steel work:	5.16 tCO _{2e} /m ³ steel used (Finnish Building Information Foundation 2004)
Glass	
Density of glass:	2800 kg/m ³ (www.allmeasures.com)
CO ₂ emissions for glass:	600 kgCO ₂ /tonne glass
Assumed thickness of glass doors:	0.01 m (working estimate)
Insulation	
Thickness of polystyrene insulation:	100 mm
Glass wool:	1,100 kgCO ₂ /tonne (BRE 1999)
Cellulose:	-1.22 tCO ₂ /tonne (Finnish Building Information Foundation 2004)
EPS:	2.60 gCO ₂ /kg (Plastics Europe 2006)
Extruded polystyrene - factors are not available so they assumed to be equivalent to EPS:	2.60 gCO ₂ /kg (Plastics Europe 2006)
Assumed thickness of insulation:	0.05 m (working estimate)
Density of glass wool insulation:	25 kg/m ³ (CIBSE Guide A 2006)
Density of cellulose insulation:	43 kg/m ³ (CIBSE Guide A 2006)
Density of EPS insulation:	15 kg/m ³ (CIBSE Guide A 2006)
Density of extruded polystyrene insulation:	40 kg/m ³ (CIBSE Guide A 2006)
Roof	
CO ₂ emissions for timber rafters, rock wool insulation and Marley plain concrete roof:	95 kgCO _{2e} /m ² (BRE 1999)
CO ₂ emissions for timber rafters, rock wool insulation, felt, battens and clay tiles roof:	70 kgCO _{2e} /m ² (BRE 1999)

MATERIALS LIFECYCLE EMISSIONS - 4 STOREY FLAT

Material	Material detail	Unit of measure	Amount used per unit	Equivalent CO ₂ emissions (tonnes)
Foundations				
	Concrete	m ³	11.02	4.7
Flooring				
Ground floor	Timber	tonnes	1.6	-1.9
	Chipboard	m ³	2.5	-1.7
	Concrete (150mm thick slab)	m ³	19.9	8.4
	EPS insulation	tonnes	0.20	0.0
	Extruded polystyrene insulation	tonnes	0.5	0.0
	Hardcore	tonnes	56.6	0.22
	Concrete screed on top of slab (75mm for ground floor)	m ³	9.9	4.2
Other floors	Timber	tonnes	4.8	-5.7
	Chipboard	m ³	7.6	-5.1
	Concrete	m ³	79.5	33.8
Cellings				
	Plasterboard	m ³	6.6	2.3
Joists				
	Timber I joists	tonnes	2.64	-3.2
Structural steel				
	Steel	tonnes	23.50	15.4
External walls				
Timber frame and timber clad	Timber cladding	tonnes	4.13	-4.96
	Panelvent board	m ³	4.22	-2.84
	Timber frame	m ²	70.39	-0.12
	Cellulose insulation	tonnes	2.82	-3.45
	Plasterboard	m ³	5.87	2.03
Timber frame with brick outer leaf	Brickwork	m ²	469	22.99
	Sheathing (plywood)	m ³	4.22	-2.84
	Timber frame	m ²	70.39	-0.12
	Glasswool insulation	tonnes	1.64	1.81
	Plasterboard	m ³	5.87	2.03
Brick outer leaf with block internal leaf	Brickwork	m ²	469	22.99
	Glasswool insulation	tonnes	1.17	1.29
	Blockwork	tonnes	23.70	5.69
	Plasterboard	m ³	6.10	2.11
Internal walls				
	Timber frame	m ²	155	-0.3
	Blockwork	tonnes	52	12.6
	Plasterboard (12.5 mm thick)	m ³	12.95	4.48
Doors - internal				
	Chipboard panel door	m ³	0.7	-0.4
Doors - external				
	PVC	tonnes	0.5	0.6
	Wood	tonnes	0.3	-0.4
Windows				
	Glass	tonnes	0.5	0.3
	Wood frame	tonnes	0.1	-0.2
	PVC frame	tonnes	0.2	0.3

Stairs				
	Concrete	m ³	2.6	1.1
Roof				
	Timber rafters, rock wool insulation and Marley plain concrete	m ²	246.7	23.4
	Timber rafters, rock wool insulation, felt, battens and clay tiles	m ²	246.7	17.3

Assumptions

Assume that the joist dimensions of a 4 storey flat are proportionally equivalent to that of a three bed detached house.

Ratio of floor area to timber joists - three bed detached:
 Ratio of floor area to total joist length - three bed detached:

3.2 (working estimate)
 3.1 (working estimate)

Building dimensions

Number of flats per block: 8 (working estimate)
 Total floor area: 530.0 m² (working estimate)
 Total internal partition wall area: 1036.2 m² (working estimate)
 Total external wall area: 469.2 m² (working estimate)
 Total roof area: 246.69 m² (working estimate)
 Number of internal doors per flat: 6 (working estimate)
 Number of external doors per flat: 1 (working estimate)
 Number of additional external door per block: 2 (working estimate)
 Area of each door: 2.152 m² (working estimate)
 Assumed thickness of door: 0.044 metres (Building Construction Handbook 1998)
 Number of staircases: 4 (working estimate)
 Height of one staircase: 2.6 metres
 Assumed number of steps and risers in staircase: 15
 Assumed dimensions of steps and risers:
 length: 1 metres (Scottish Building Regulations)
 thickness: 0.17 metres (Scottish Building Regulations)
 width: 0.25 metres (Scottish Building Regulations)
 Total area of windows: 49.27 m² (working estimate)

Structural Steel

Dimension of column: 152 mm (working estimate)
 Density of column: 152 mm (working estimate)
 Number of columns: 37 kg/m (working estimate)
 length: 17 m (working estimate)
 number per floor: 3 (working estimate)
 length: 8 m (working estimate)
 number per floor: 5 (working estimate)
 Total height: 12 m (working estimate)
 number of vertical columns: 15 (working estimate)
 Number of structural levels: 5

Timber frame with brick outer leaf

Thickness of Brick: 102 mm
 Thickness of sheathing (plywood): 9 mm
 Emissions factors are not available for plywood so emissions are assumed to be equivalent to those associated with chipboard
 Thickness of glasswool insulation: 140 mm
 Thickness of plasterboard: 12.5 mm
 Cross section dimension of timber stud (regularised timber): 140 mm
 44 mm
 Length of stud: 2.4 m
 Studs at centres of: 600 mm
 Assume that total area of stud equals 15% of the total wall area (timber frame construction) 15% (TRADA technology 2001 timber frame construction)

Brick outer leaf with block internal leaf

Thickness of Brick:	102 mm
Thickness of glasswool insulation:	100 mm
Thickness of aerated concrete block:	100 mm
Thickness of plasterboard:	13 mm

Timber frame with timber cladding

Thickness of timber cladding:	22 mm
Thickness of panelvent board:	9 mm
Emissions factors are not available for panelvent so emissions are assumed to be equivalent to those associated with chipboard	
Thickness of cellulose insulation:	140 mm
Thickness of plasterboard:	12.5 mm
Cross section dimension of timber stud (regularised timber):	140 mm
	44 mm
Length of stud:	2.4 m
Studs at centres of:	600 mm
Assume that total area of stud equals 15% of the total wall area (timber frame construction)	15% (TRADA technology 2001 timber frame construction)

Material details**Timber**

Assumed thickness of the T&G weatherdeck floor:	0.03 metres (working estimate)
Assumed density of timber used:	400 kg/m ³ (BRE 1999e)
Equivalent CO ₂ emissions for kiln dried timber:	-1.2 tCO _{2e} /t timber used (BRE 1999e)
Equivalent CO ₂ emissions for internal timber frames:	-1.7 kgCO _{2e} /m ² (BRE 2003)
Assumed width of timber joists:	0.04 metres (working estimate)

Concrete

Equivalent CO ₂ emissions for concrete:	0.425 tCO _{2e} /m ³ concrete (Finnish Building Information Foundation 2004)
Assumed thickness of concrete slab:	0.15 metres (working estimate)
Assumed thickness of concrete screed:	0.075 metres (working estimate)
Assumed thickness for concrete floor slab - upper floors:	0.2 metres (working estimate)

Hardcore

Equivalent CO ₂ emissions for gravel:	0.0038 kgCO _{2e} /kg (Finnish Building Information Foundation 2004)
Density of packed granular sub-base:	2,850 kg/m ³ (Finnish Building Information Foundation 2004)
Thickness of hardcore:	150 mm

Chipboard

Equivalent CO ₂ emissions for chipboard:	-0.673 tCO _{2e} /m ³ chipboard used (Finnish Building Information Foundation 2004)
Assumed thickness of chipboard floor:	0.019 m (CIBSE Guide A 2006)

Panel door

Thickness of chipboard:	0.003 m (working estimate)
Width of sides and base:	0.045 m (working estimate)
Height of door:	2.04 m (working estimate)
Width of door:	0.914 m (working estimate)

Brickwork

Equivalent CO ₂ emissions for brickwork:	0.049 tCO _{2e} /m ² brick used (BRE 1999b)
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Blockwork

Blockwork is assumed to be aerated concrete blocks	
Density of blockwork:	505 kg/m ³ (BRE 1999c)
Equivalent CO ₂ emissions for blockwork:	0.24 tCO _{2e} /t aerated blockwork used (BRE 1999c)

Plasterboard

Assumed thickness of plasterboard:	0.0125 m (working estimate)
Equivalent CO ₂ emissions for plasterboard:	0.346 tCO _{2e} /m ³ plasterboard used (Finnish Building Information Foundation 2004)

Steel	
Equivalent CO ₂ emissions for steel work:	0.66 tCO ₂ e/tonne steel used (RTS 1999a)
Equivalent CO ₂ emissions for steel work:	5.16 tCO ₂ e/m ³ steel used (Finnish Building Information Foundation 2004)
PVC	
Equivalent CO ₂ emissions for PVC:	1.2 tCO ₂ e/t PVC used (Plastic Europe)
Assumed density of PVC used:	650 kg/m ³ (working estimate)
Glass	
Assumed thickness of glass used:	0.004 metres (working estimate)
Density of glass:	2800 kg/m ³ (www.allmeasures.com)
CO ₂ emissions for glass:	600 kgCO ₂ e/tonne glass (working estimate)
Assumed percentage of opening area to be frame:	15% (working estimate)
Assumed percentage of opening area to be glass:	85% (working estimate)
Assumed thickness of window frame:	0.05 m (working estimate)
Insulation	
Thickness of polystyrene insulation:	100 mm
Glass wool:	1,100 kgCO ₂ e/tonne (BRE 1999)
Cellulose:	-1.22 tCO ₂ e/tonne (Finnish Building Information Foundation 2004)
EPS:	2.60 gCO ₂ /kg (Plastics Europe 2006)
Extruded polystyrene - factors are not available so they assumed to be equivalent to EPS:	2.60 gCO ₂ /kg (Plastics Europe 2006)
Density of glass wool insulation:	25 kg/m ³ (CIBSE Guide A 2006)
Density of cellulose insulation:	43 kg/m ³ (CIBSE Guide A 2006)
Density of EPS insulation:	15 kg/m ³ (CIBSE Guide A 2006)
Density of extruded polystyrene insulation:	40 kg/m ³ (CIBSE Guide A 2006)
Roof	
CO ₂ emissions for timber rafters, rock wool insulation and Marley plain concrete roof:	95 kgCO ₂ e/m ² (BRE 1999)
CO ₂ emissions for timber rafters, rock wool insulation, felt, battens and clay tiles roof:	70 kgCO ₂ e/m ² (BRE 1999)