Marsh, R. (2015) LCA-profiles for building components: strategies for the early design process. *Building Research & Information*.

DOI: 10.1080/09613218.2016.1102013

Supplemental data

Table A1: Materials used for each layer of the External Wall Typology 1 with internal heavyweight loadbearing layer, insulation and external heavyweight cladding

Layers of External Wall Typology 1	Number of variations
Internal layer: Heavyweight loadbearing	4
108 mm brickwork with mortar and render/paint finish	
100 mm lightweight concrete blocks with mortar and render/paint finish	
150 mm lightweight concrete elements with steel reinforcement and paint finish	
200 mm concrete with steel reinforcement and paint finish	
Insulating layer: Insulation & ties: (U-value: 0.15/0.12/0.09 W/m²K)	3
250/300/400 mm mineral wool insulation with stainless steel ties	
External layer: Heavyweight cladding	1
108 mm brickwork with mortar	
Total number of parametric variations (4 x 3 x 1)	12

Table A2: Materials used for each layer of the External Wall Typology 2 with internal heavyweight loadbearing layer, framing/insulation and external lightweight cladding

Layers of External Wall Typology 2	Number of variations
Internal layer: Heavyweight loadbearing	4
108 mm brickwork with mortar and render/paint finish	
100 mm lightweight concrete blocks with mortar and render/paint finish	
150 mm lightweight concrete elements with steel reinforcement and paint finish	
200 mm concrete with steel reinforcement and paint finish	
Insulating layer: Insulation & framing: (U-value: 0.15/0.12/0.09 W/m²K)	12
250/300/400 mm mineral wool insulation with C-post galvanised steel framing	
275/325/425 mm cellulose insulation with C-post galvanised steel framing	
250/300/400 mm mineral wool insulation with I-post timber framing	
275/325/425 mm cellulose insulation with I-post timber framing	
External layer: Lightweight cladding	7
25 mm pine timber cladding on timber battens on 8 mm fibre cement sheet	
25 mm larch timber cladding on timber battens on 8 mm fibre cement sheet	
10 mm fibre cement panel with finish on timber battens on 8 mm fibre cement sheet	
30 mm natural stone on galvanised steel profiles on 8 mm fibre cement sheet	
35 mm clay tile panel on galvanised steel profiles on 8 mm fibre cement sheet	
1.5 mm aluminium sheet on galvanised steel profiles on 8 mm fibre cement sheet	
1.0 mm zinc sheet on galvanised steel profiles on 8 mm fibre cement sheet	
Total number of parametric variations (4 x 12 x 7)	336

Table A3: Materials used for each layer of the External Wall Typology 3 with internal lightweight cladding, loadbearing framing/insulation and external lightweight cladding

Layers of External Wall Typology 3	Number of variations
Internal layer: Lightweight cladding	1
25 mm plasterboard with paint finish	
Insulating layer: Loadbearing framing & insulation: (U-value: 0.15/0.12/0.09 W/m²K)	12
C-post galvanised steel framing and cross-battens with polyethylene vapour barrier and 245/320/420 mm mineral wool insulation	
C-post galvanised steel framing and cross-battens with polyethylene vapour barrier and 270/345/445 mm cellulose insulation	
I-post timber framing and cross-battens with polyethylene vapour barrier and 245/320/420 mm mineral wool insulation	
I-post timber framing and cross-battens with polyethylene vapour barrier and 270/345/445 mm cellulose insulation	
External layer: Lightweight cladding	7
25 mm pine timber cladding on timber battens on 8 mm fibre cement sheet	
25 mm larch timber cladding on timber battens on 8 mm fibre cement sheet	
10 mm fibre cement panel with finish on timber battens on 8 mm fibre cement sheet	
30 mm natural stone on galvanised steel profiles on 8 mm fibre cement sheet	
35 mm clay tile panel on galvanised steel profiles on 8 mm fibre cement sheet	
1.5 mm aluminium sheet on galvanised steel profiles on 8 mm fibre cement sheet	
1.0 mm zinc sheet on galvanised steel profiles on 8 mm fibre cement sheet	
Total number of parametric variations (1 x 12 x 7)	84

Table A4: Linear regression analysis results showing relationship between the selected environmental impact categories

Environmental impact categories with a strong correlation with Global warming potential	Linear regression equation	y =	x =
Non-renewable primary energy	$y = 0.271x + 0.1027$ $R^2 = 0.72$	Global warming potential CO ₂ -equivalent kg/m ² year	Non-renewable primary energy kWh/m ² year
Ratio Renewable energy to Total primary energy	$y = -1.0562x + 1.1523$ $R^2 = 0.53$	Global warming potential CO ₂ -equivalent kg/m ² year	Ratio Renewable energy to Total primary energy %
Environmental impact categories with a strong correlation with Acidification potential	Linear regression equation	y =	x =
Global warming potential	$\ln(y) = 0.5579x + 0.0266$ $R^2 = 0.57$	Acidification potential SO ₂ -equivalent kg/m ² year	Global warming potential CO ₂ -equivalent kg/m ² year
Ozone depletion potential	$\ln(y) = 0.0069x + 0.131$ $R^2 = 0.64$	Acidification potential SO ₂ -equivalent kg/m ² year	Ozone depletion potential R11-equivalent kg/m ² year
Photochemical ozone creation potential	$\ln(y) = 2.0058x - 0.273$ $R^2 = 0.81$	Acidification potential SO ₂ -equivalent kg/m ² year	Photochemical ozone creation potential Ethene-equivalent kg/m ² year
Eutrophication potential	$\ln(y) = 2.1905\ln(x) + 0.3057$ $R^2 = 0.82$	Acidification potential SO ₂ -equivalent kg/m ² year	Eutrophication potential PO ₄ -equivalent kg/m ² year
Non-renewable primary energy	$\ln(y) = 0.1693x + 0.0331$ $R^2 = 0.52$	Acidification potential SO ₂ -equivalent kg/m ² year	Non-renewable primary energy kWh/m ² year