

Cladding	G&T Cost	Life time	Embodied carbon	Whole-life carbon*	Incremental benefit**	
Description	(£/m²)	(Year)	(kgCO ₂ e/m²)	(kgCO ₂ e/m²)	(kgCO ₂ e/m²)	Issues to consider
1. Unitized curtain walling						
Base case (used for baseline building)	600	20-30	268.0	723	0.0	1. Unitized curtain walling
Unitized curtain walling with powder coated finishes, aluminium with market average recycled content						Life span of about 20-30 years. The whole system will need replacing. Quick assembly and reduced waste through off site construction
Option 1a Unitized curtain walling with powder coated finishes, aluminium 70% recycled content	600	20-30	184.0	527.5	0.0	Similar to base case. Increasing recycled content of aluminium reduces embodied carbon
Option 1b As 1a above, with triple glazing throughout	680	20-30	295.0	798.5	Uplift of embodied carbon: 75.5 Operational carbon saving: 52.5 Net impact: +23.0	Similar to base case. Triple glazing reduces operational energy but increases embodied carbon content.
Option 1c As 1a above, double glazing on NE & SW facades & triple glazing on NW & SE facades	640	20-30	281.5	760.7	Uplift of embodied carbon: 37.7 Operational carbon saving: 42 Net impact: -4.2	As 1a above, double glazing on NE & SW facades & triple glazing on NW & SE facades
2. Metal frame						
Option 2a Double glazed aluminium windows installed over steel framing with cement board, rigid polyurethane insulation, spandrel panels, powder coated aluminium sections	380	25-40	185.7	384.2	0.0	Compared to base case, construction times on site increase marginally, but systems can often be pre- assembled off-site. Embodied carbon content and costs are generally lower than base case
Option 2b Composite timber-aluminium double glazed windows installed over steel framing, spandrel panels and powder coated aluminium sections.	380	25-40	114.8	255.1	0.0	This combines a durable low maintenance exterior with a structural component of low embodied carbon
Option 2c As 2b above, with triple glazing throughout	410	25-40	121.6	268.6	Uplift of embodied carbon: 13.5 Operational carbon saving: 26.3 Net impact:-12.8	Improved operational energy performance. Higher embodied carbon content of triple glazed windows may outweigh benefits
Option 2d (Best low carbon option) As 2b above, double glazing on NE & SW facades & triple glazing on NW & SE facades.	395	25-40	118	261.8	Uplift of embodied carbon: 6.7 Operational carbon saving: 21 Net impact: -14.3	Targets materials where they are needed most
3. Blockwork						
Option 3a Aluminium windows with rain-screen, installed into blockwork surrounds with rigid polyurethane insulation, spandrel panels, powder coated aluminium sections	410	25-40	179.3	377.0	0.0	Blockwork systems require wet on-site construction, which can be messy, time-consuming and costly, although overall costs and embodied carbon content are relatively low
Option 3b As for option 3a but with extra over for anodizing rather than powder coating aluminium sections	430	25-40	180.0	378.9	0.0	Anodized aluminium can not be recycled into new sections. (Future reprocessing belongs to the lifecycle of the building)
Option 3c Using stainless steel rather than powder coating aluminium sections and spandrels	Cost varies	25-40	199.4	422.1	0.0	Stainless steel has a lower embodied carbon content than aluminium but higher density
Option 3d Stone rainscreen block and insulation behind, aluminium windows	450 to 750	25-40	174.1	374.5	0.0	System will last only as long as waterproofing behind, repairs can be costly
Option 3e Terracotta rainscreen block and insulation behind, aluminium windows	410	25-40	167.4	359.2	0.0	This is similar to option 11 – terracotta may be preferred to stone for aesthetic reasons although it is less durable
4. Louvers						
Option 4a Add aluminium louvers to the external face of the window	250	20-25	25.7	72.2	Operational carbon saving: 389 Net impact: -316.7	Reduce amount of sunlight entering building. Good design can mean impact on lighting requirements are minimal
Option 4b Use timber louvers in place of aluminium	250	10	5.0	57.7	Operational carbon saving: 389 Net impact: -331.2	Lower embodied carbon content. Whole-life carbon impact may be higher, as it is less durable and requires maintenance
Option 4c As 4b but all timber goes to landfill after lifespan	250	10	5.0	123.5	Operational carbon saving: 389 Net impact: -264.5	Methane emissions from wood waste increases green house gas emissions