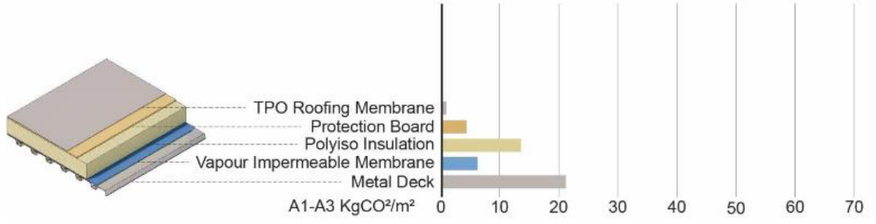
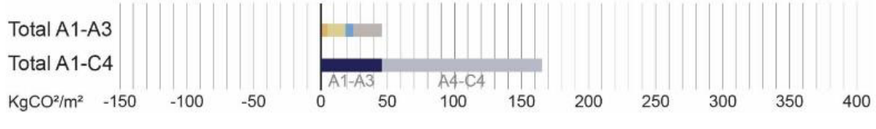
APPENDIX A **ROOF ASSEMBLY 01**

R01: Results Summary

Metrics	Results
Description	**Conventional Roof with Polyiso on Metal Deck**
Effective R-value	RSI-5.2 m²K/W | R-29.6 ft²·°F·h/BTU
Embodied Carbon per m² of Enclosure (A1-A3)	46.3 $kgCO_2/m^2$
Biogenic Carbon per m² of Enclosure	0 $kgCO_2/m^2$





R01: Assembly Effective R-value Calculation

Description	t_{SI}	t_{IP}	k	C (USI)	$RSI_{effective}$	$R_{effective}$	$R_{nominal}$
Units	mm	in	W/mK	W/m^2K	m^2K/W	ft^2-°F-h/BTU	ft^2-°F-h/BTU
Interior air film					0.11	0.61	
Corrugated metal roof deck	1.20	0.05	50.00	41530	0.00	0.00	
Self-adhered sheet-applied air barrier and vapour-impermeable membrane	0.80	0.03	-	-	-	-	
Rigid polyisocyanurate insulation, fully adhered (polyurethane adhesive)	127.00	5.00	0.003	0.26	4.93	28.00	28.00
Asphalt protection board, fully adhered (polyurethane adhesive)	4.80	0.19	-	-	0.14	0.79	
Waterproof roof membrane system	2.20	0.09	-	-	-	-	
Exterior air film					0.03	0.17	
TOTALS	**136.0**	**5.40**			**5.20**	**29.60**	**28.00**

R01: Embodied Carbon Emissions (A1 to A3 Life Stages) for 9m² Assembly Area

Category	Material	Description (from EPD)	Thickness	Material Volume	Carbon Emissions (A1-A3)	% of total
Units			mm	m^3	kgCO2e	%
Structure	Metal Deck	Steel roof and floor deck, 22-16 gauge (Steel Deck Institute) deck	1.204 (0.05")	0.010836	190	46.50%
Exterior Membrane	Vapour impermeable membrane	SBS polymer-modified bitumen membrane roofing, self-adhered, 6.69 kg/m2 (Certain Teed, Henry, IKO, Malarkey Roofing Products, Siplast, Soprema)	-	*	61	14.7%
Exterior Insulation	Polyiso	Polyisocyanurate (PIR) roof insulation boards, glass fiber reinforced cellulosic faced (GRF), boards	127 (5")	1.3716	120	28%
Insulation Protection	Protection Board	Roof cover board, fiberglass facing, 6.1 kg/m2, EVERBOARD™ - ¼ fiberglass faced (Continuous Materials, plant Philadelphia)	-	*	36	9%
Exterior Membrane	TPO Roofing Membrane	TPO Single ply waterproofing roof membrane (mechanically fastened) (Generic)	2.2 (0.1")	0.0198	10	3%
				TOTAL	**417**	100.10%

**Software auto-calculates the impact based on the area provided.*

R01: Environmental Emissions (A1 to C4 Life Stages) for 9m² Assembly Area

Lifecycle Stage		**A1 to C4**	A1-A3	A4-A5	B1-B5	C1-C4	A1-A3 Contribution to total
Category	Units	**Total**	Construction Materials	Transport to Site & Construction	Material Replacement & Refurbishment	Deconstruction	%
Global Warming	kg CO2e	**1500.44**	417.57	3.9	328.75	750.22	27.83%
Acidification	kg SO	**5.79E-05**	1.63E-05	1.03E-06	1.16E-05	2.89E-05	28.17%
Eutrophication	kg Ne	**5.6006**	1.908	0.0223	0.87	2.8003	34.07%
Ozone Depletion	kg CFC11e	**1.1659**	0.36179	0.00316	0.218	0.58295	31.03%
Formation of Tropospheric Ozone	kg O3e	**77.622**	25.63	0.631	12.55	38.811	33.02%
Fossil Fuel Primary Energy	MJ	**8260.22**	3262.53	111.16	756.42	4130.11	39.50%
Biogenic Carbon Storage	kg CO2e	**0**	0				