1.6.4 Embodied Energy of Commercial Wood-Based Roof Assemblies in the U.S.

	Embodied Energy (MMBtu/SF) (1)	CO2 Equivalent Emissions (lbs/SF)
Glulam Joist with Plank Decking		
with EPDM membrane	0.16	11.05
with PVC membrane	0.25	20.70
with Modified bitumen membrane	0.25	21.78
with 4-Ply built-up roofing	0.43	41.49
with Steel Roofing	0.10	10.05
Wood I-Joist with WSP Decking		
with EPDM membrane	0.14	10.10
with PVC membrane	0.23	19.75
with Modified bitumen membrane	0.24	20.81
with 4-Ply built-up roofing	0.42	40.54
with Steel Roofing	0.09	9.11
Solid Wood Joist with WSP Decking		
with EPDM membrane	0.15	10.36
with PVC membrane	0.24	20.02
with Modified bitumen membrane	0.24	21.10
with 4-Ply built-up roofing	0.43	40.81
with Steel Roofing	0.10	9.39
Wood Chord/Steel Web Truss with WSP Decking		
with EPDM membrane	0.17	14.09
with PVC membrane	0.26	23.74
with Modified bitumen membrane	0.26	24.80
with 4-Ply built-up roofing	0.44	44.53
with Steel Roofing	0.11	13.10
Wood Truss (Flat) with WSP Decking		
with EPDM membrane	0.15	10.71
with PVC membrane	0.24	20.37
with Modified bitumen membrane	0.24	21.43
with 4-Ply built-up roofing	0.42	41.16
with Steel Roofing	0.09	9.72
Wood Truss (4:12 Pitch) with WSP Decking		
with 30-yr. fiberglass shingles	0.11	7.80
with 30-yr. organic shingles	0.12	8.38
with Clay tile roof	0.16	19.36
with Steel roof	0.09	9.19

Note(s): Assumptions: 60 year building lifetime. Low rise building. Values are general estimations for the U.S. All roof assemblies include R-20 continuous insulation, polyethylene membrane, latex paint, and gypsum board. All assemplies are insulated to IECC 2009 minimums for zones 3 and 6. 1) Embodied Energy: Energy use includes extraction, processing, transportation, construction, and disposal of each material.

Source(s): Athena Institute. Athena EcoCalculator for Assemblies v.3.5.2. 2010. Available at www.athenasmi.org/tools/ecoCalculator/index.html