

1.6.5 Embodied Energy of Other Commercial Roof Assemblies in the U.S.

	Embodied Energy (MMBtu/SF) (1)	CO2 Equivalent Emissions (lbs/SF)
<u>Precast Hollow-Core Concrete</u>		
EPDM Membrane	0.17	21.23
PVC Membrane	0.26	30.89
Modified Bitumen Membrane	0.26	31.94
4-Ply Built-Up Roofing System	0.44	51.68
Steel Roofing System	0.11	20.24
<u>Precast Double-T</u>		
EPDM Membrane	0.15	17.42
PVC Membrane	0.24	27.05
Modified Bitumen Membrane	0.25	28.13
4-Ply Built-Up Roofing System	0.43	47.86
Steel Roofing System	0.10	16.42
<u>Suspended Concrete Slab</u>		
EPDM Membrane	0.24	37.32
PVC Membrane	0.33	46.96
Modified Bitumen Membrane	0.33	48.04
4-Ply Built-Up Roofing System	0.51	67.75
Steel Roofing System	0.18	36.33
<u>Open-Web Steel Joist, Steel Decking (2)</u>		
EPDM Membrane	0.17	15.28
PVC Membrane	0.26	24.93
Modified Bitumen Membrane	0.26	26.01
4-Ply Built-Up Roofing System	0.45	45.72
Steel Roofing System	0.12	14.29

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, and latex paint. All assemblies 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. 2) Includes gypsum board.

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