

# Carbon drawdown in your next construction project

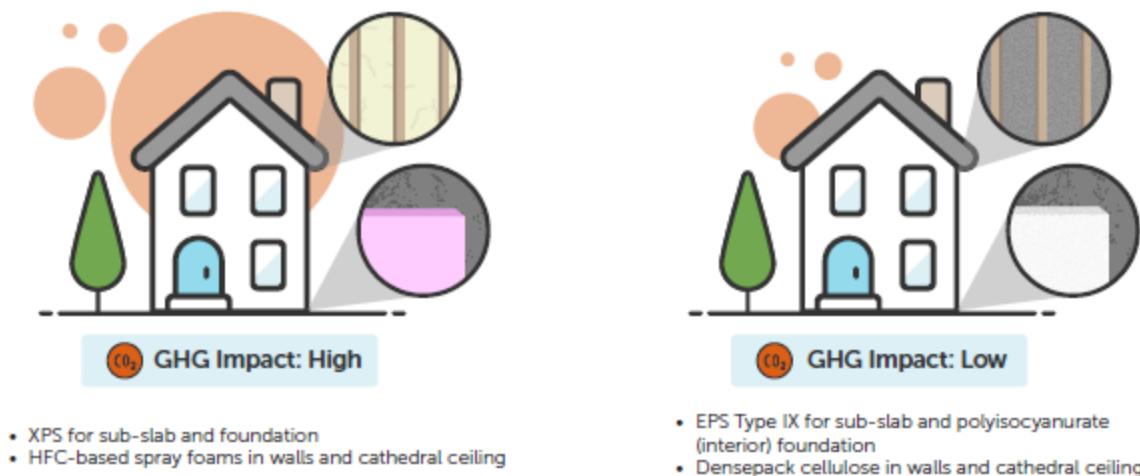
## Choosing insulation materials with the lowest greenhouse gas impact

Embodied carbon refers to the greenhouse gas (GHG) emissions that went into the production of materials. A summary of common insulation materials appears in the table below. Materials that contain carbon and/or require less energy to produce have the lowest (best) GHG impact. At the other end, materials with high-GHG refrigerants tend to have the worst carbon footprint.<sup>1</sup>

Material	Example manufacturers / products	GHG Impact <sup>2</sup>	Notes
Wood fiber	Steico, Gutex	Lowest / Best	Boardstock, batts
Cellulose	Cleanfiber, GreenFiber	Lowest / Best	Densepack, loosefill
Fiberglass	CertainTeed Sustainable, Knauf EcoBatt	Low	Batts, boardstock, loosefill/densepack
Polyisocyanurate	DuPont Thermax	Low	Boardstock; Blowing agent: pentane
EPS (expanded polystyrene)	Atlas, BASF Neopor	Low	Boardstock; Blowing agent: pentane
Open cell spray foam	Demilec APX, Lapolla Foam-Lok 450	Low	Site-blown; Blowing agent: water
Phenolic foam	Kingspan Kooltherm	Low	Boardstock; Blowing agent: pentane
Mineral wool	Rockwool, Owens Corning	Medium	Batts, boardstock
Closed cell spray foam, HFO	Demilec Heatlok HFO Pro, Lapolla ProSeal HFO	Medium	Site-blown; Blowing agent: HFOs
Closed cell spray foam, HFC	Demilec Heatlok XT, Dow Froth-Pak	Highest / Worst	Site-blown; Blowing agent: HFCs
XPS (extruded polystyrene)	Dow Styrofoam (blueboard), Owens Corning (pinkboard)	Highest / Worst	Boardstock; Blowing agent: HFCs

Partners have shared that many material substitutions are not only easy to implement, they can actually save money. Furthermore, many lower-GHG materials are less toxic to workers and/or building occupants.<sup>3</sup>

**Example:** A 2-story, 2000 square foot home making insulation substitutions detailed below avoids approx. 55,000 kg CO<sub>2</sub>e, roughly equal to *not* driving 136,000 miles or *not* burning 60,000 pounds of coal. Provided the installed R-value is the same and proper air sealing is done, there is no significant difference between the two homes' operational energy.



<sup>1</sup> Our analysis is based on Cradle to Gate: extraction of resources from the earth until the point that a product leaves the factory. This corresponds to Life Cycle Assessment product stages A1, A2, and A3. We also include A5 for materials manufactured on-site (such as spray polyurethane foam that emits refrigerant at installation) and B1 (which is important to consider for insulations which off-gas refrigerants over time).

<sup>2</sup> Lowest: < 0 kgCO<sub>2</sub>e including carbon content per 1 m, RSI-1. Low: 0-5. Medium: 5-10. High > 10.

<sup>3</sup> A useful summary of cost, health, and environmental considerations of insulation materials is available at: [https://www.buildinggreen.com/sites/default/files/BG\\_Insulation\\_Recommendations.pdf](https://www.buildinggreen.com/sites/default/files/BG_Insulation_Recommendations.pdf)

Figure 5. One-page summary of GWP impacts, for staff and external use.