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UNDERSTANDING THE IMPACT AND RESPONSE TO EMBODIED CARBON

Buildings account for approximately 40 percent of global carbon emissions.[1] While operational carbon — the emissions from heating, cooling and lighting — has declined thanks to advances in insulation, heat pumps, solar panels and other energy efficient appliances and electronics, another category has come into focus: embodied carbon.

Embodied carbon refers to the greenhouse gas emissions generated by the processes required to build: extracting raw materials, manufacturing building products, transporting them to the job site, and installing them and eventually disposing of them.

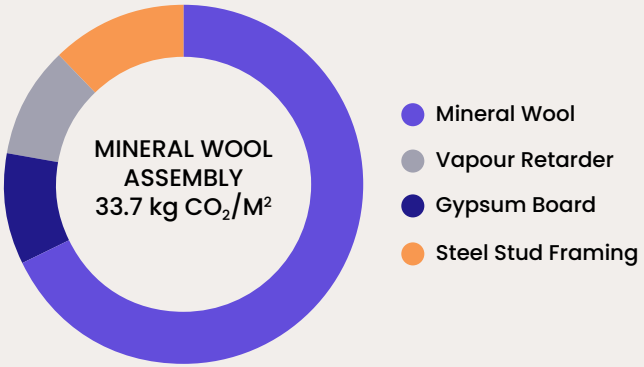
Today, embodied carbon accounts for roughly 25 percent of a building's total emissions[1], and as operational efficiency improves, that share is only growing.

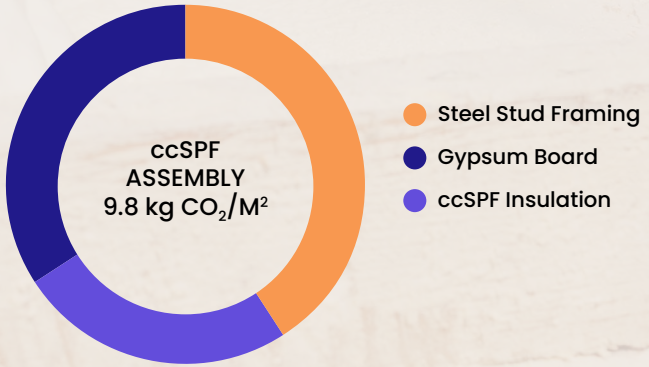
SPRAY FOAM INSULATION AS A COUNTER TO EMBODIED CARBON

Solstice® LBA-based spray foam insulation offers a meaningful advantage when embodied carbon is a priority. The transition from hydrofluorocarbon (HFC) to hydrofluoroolefin (HFO) blowing agents has dramatically improved the carbon profile of polyurethane foam, making it one of the lowest-embodied-carbon insulation options available.

A 2025 study[2] compared the embodied carbon of different retrofit exterior masonry wall assemblies modeled to meet the Toronto Green Standard and found that HFO-blown spray foam contributes minimally to embodied carbon compared to mineral wool. In one scenario, an existing masonry wall with interior mineral wool insulation had an embodied carbon of 33.7 kg CO_2e/m^2, where mineral wool accounted for 66% of that total.

The same wall using HFO-blown closed-cell spray foam came in at just 9.8 kg CO_2e/m^2, with the spray foam representing only 26 percent of the assembly's carbon. That's a 71 percent reduction in embodied carbon.





ccSPF Assembly: Less Materials 71% Reduction in Embodied Carbon

A GLOBAL RESPONSE

The 2030 Architectural Challenge is a global effort to evaluate embodied carbon in building assemblies. To support this effort, the industry formed an advisory panel of building science firms, universities, government agencies, architects and manufacturers to develop a catalog of various building materials and wall assembly designs for architects to use as reference when considering embodied carbon.

Additionally, in the EU, all member states will soon be required to report embodied carbon for major construction projects. In the U.S., states like California, Colorado, New York and Oregon have already mandated embodied carbon reporting for specific construction materials.

As whole-life carbon — the total greenhouse gas emissions produced over a building's entire life cycle — regulations expand, HFO-blown spray foam insulation offers a straightforward way to reduce embodied carbon while meeting performance and code requirements.

For More Information Visit
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Sources
[1] Global BC – Global Status Report (2018)
[2] 2025 "Embodied Carbon Honeywell Enclosures" by RDH Building Science page 45-46

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