

# Comparing the GWP of Common Exterior Wall Insulation Materials



## An Overview of Global Warming Potential

Global atmospheric concentrations of greenhouse gases (GHGs) have all risen significantly over the last few hundred years.<sup>1</sup> Most of the increase has been caused by human activities, such as construction, transportation and industrial processes.<sup>2</sup> The collection of GHGs in the atmosphere reflects heat from the sun's rays back to the earth and "warms" the earth's temperature (i.e., global warming).

The Global Warming Potential (GWP) index was developed to measure the impact of these different gases on global warming as some GHGs more effectively warm the planet than others.<sup>3</sup> Per the U.S. Environmental Protection Agency, the largest source of GHG emissions from human activities in the United States comes from burning fossil fuels for electricity, heat and transportation. Another significant contributor to GHG emissions is the building and construction sector. These emissions are composed of both the embodied carbon emissions (materials and construction process) and the operational emissions (running the building). This document reviews the GWP impact of polyisocyanurate (polyiso) wall insulation versus other common insulation products used for exterior walls across the products' full life cycles.

## The Role of Buildings in GWP Emissions

Buildings as a whole are estimated to produce 40% of the global GHG emissions.<sup>4</sup> Building operations account for 28% of the total emissions attributable to buildings and construction materials account for 11% of total emissions with materials such as concrete, steel and aluminum being heavy contributors. Energy efficiency practices can help reduce operational energy use and related emissions. These practices include installing insulation as part of the building envelope, which provides a thermal barrier between the environment and conditioned spaces reducing energy waste in buildings. Other such practices include reducing air leakage, upgrading to energy-efficient equipment as well as specifying construction materials with lower embodied environmental impacts.

One such product with low environmental impacts is polyisocyanurate (polyiso) insulation. Polyiso insulation is a closed-cell product, which means that its blowing agents are retained within the cell structure to provide higher, long-term thermal performance. For more than two decades, polyiso products have been and continue to be manufactured using pentane or pentane blends. Pentane is a hydrocarbon with zero ozone depletion potential (ODP) and low GWP<sup>5</sup>

Understanding how buildings and building materials contribute to GWP emissions is important. Architects and designers rely on this information together with other key product performance and attribute considerations to

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### References:

1. [EPA Climate Change Indicators](#)
  2. [EPA Sources of Greenhouse Gas Emissions](#)
  3. [Understanding Global Warming Potentials](#)
  4. [Architecture 2020](#)
  5. [Polyiso Insulation's Low-GWP Blowing Agent Solution](#)
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ensure that building designs minimize environmental impacts through energy-efficient construction practices and responsible material selection.

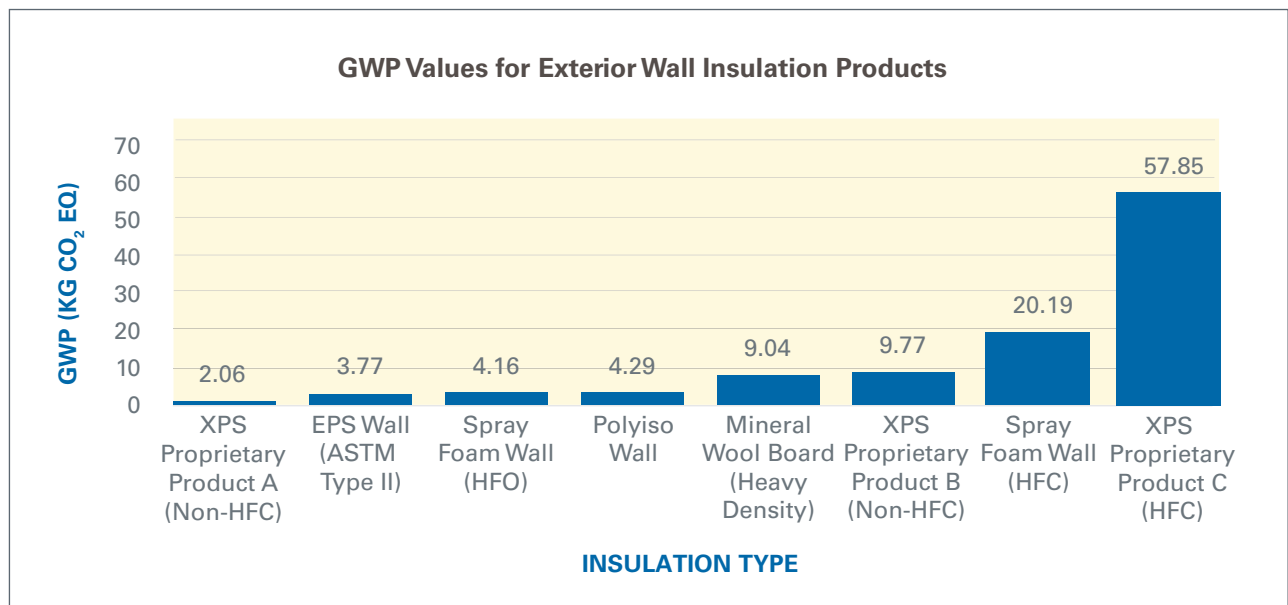
## Environmental Product Declarations

One tool in understanding the sustainability profile of different construction materials is an Environmental Product Declaration (EPD). This is a globally recognized and standardized tool that enables users to make decisions regarding sustainable material design. EPDs report data on environmental metrics across a product's life cycle, including GWP, primary energy, resource depletion and water use. EPDs also provide an opportunity to disclose the environmental benefits of products. For manufacturers, EPDs can drive continuous improvement processes and product development innovations that reduce the environmental footprint of materials.

## Wall Insulation Comparison: Global Warming Potential

The global warming potential of certain insulations used for exterior wall applications can be relatively high compared to the other insulations. This is due to a variety of factors, including the use of certain blowing agents, raw materials and the energy intensity of production processes.

The graph below compares the GWP values associated with commonly used insulation products for exterior wall assemblies. The information is based on publicly available EPDs. Unless otherwise specified, the reported information is based on an industry-average EPD.



## Conclusion

When compared to other wall insulation products, the GWP emissions associated with the production and life cycle of polyiso wall insulation is relatively low. With the increasing need for sustainable building materials, polyiso provides a low-GWP, energy-efficient, continuous insulation option. For more information about why polyiso is the sustainable insulation choice for many projects and to learn about additional performance benefits and attributes, visit [Polyiso Benefits](#).

## PIMA

For more than 30 years, the Polyisocyanurate Insulation Manufacturers Association (PIMA) has served as the voice of the rigid polyiso industry, proactively advocating for safe, cost-effective, sustainable, and energy-efficient construction. Organized in 1987, PIMA is an association of polyiso manufacturers and industry suppliers. Polyiso is one of North America's most widely-used and cost-effective insulation products.

PIMA produces technical bulletins to address frequently asked questions about polyiso insulation. These publications update and inform architects, specifiers, and contractors about and build consensus on the performance characteristics of polyiso insulation. Individual companies can provide specific information about their respective polyiso products.

For more information on polyisocyanurate insulation, visit [www.polyiso.org](http://www.polyiso.org)

