

# Polyiso Insulation's Low-GWP Blowing Agent Solution



## Insulation and Blowing Agents

Closed-cell foam insulation products like polyiso are manufactured with captive blowing agents. The blowing agents are primarily used to increase the final product's thermal resistance or R-value. The substances are also an integral part of the manufacturing process helping to produce the ideal cell structure.

In closed-cell products, the blowing agents are retained within the cell structure to provide long-term thermal performance. And while closed-cell insulation products can exhibit an initial drop in R-value due in large part to the diffusion of air into the foam, all polyiso insulation products are tested to reflect an aged (i.e., long-term) R-value.<sup>1</sup> For more information on polyiso's R-value and the applicable testing requirements, [visit the PIMA website](#).

Insulation products manufactured without captive blowing agents (e.g., expanded polystyrene, fiberglass, mineral wool) result in lower R-values per inch. Therefore, these products must be installed at greater thicknesses to equal the high R-value of polyiso insulation.

## Polyiso + Pentane = Environmental Leadership

Polyiso products are manufactured using pentane or pentane blends.<sup>2</sup> **Pentane is a hydrocarbon with zero ozone depletion potential<sup>3</sup> (ODP) and low global warming potential (GWP).** GWP is a measure of a substance's ability to trap heat in the atmosphere and is calculated over a specific period of time (commonly 100 years). Specifically, GWP measures how much energy the emissions of 1 ton of a gas will absorb over a given period of time, relative to the emissions of 1 ton of CO<sub>2</sub>.<sup>4</sup> A substance that traps more heat will contribute more to global warming (and will be assigned a higher GWP value). Therefore, products that incorporate low-GWP blowing agents provide insulation solutions that offer reduced environmental footprints.

**For over 20 years, the polyiso industry has utilized pentane in product formulations. These products replaced formulations using CFCs and HCFCs, which are no longer permitted for use in insulation products in major markets, including the United States and Canada.**



Polyiso wall insulation on a commercial building.



Polyiso roof insulation on a commercial building.

### Notes:

- <sup>1</sup> The U.S. Federal Trade Commission's R-value Rule requires that tests performed on samples of polyiso insulation reflect the effect of aging on the product's R-value (Labeling and Advertising of Home Insulation, 16 CFR Part 460).
- <sup>2</sup> *Pentane* is used as a general term to describe the different pentane isomers or mixtures of isomers used by polyiso manufacturers. Isomers are molecules with the same molecular formula, but different bonding patterns. In terms of environmental impacts, all pentane isomers have the same or similar GWP value.
- <sup>3</sup> Ozone depletion potential, or ODP, is a relative measure of substance's contribution to the degradation of the ozone layer. For more information, visit: <https://www.epa.gov/ozone-layer-protection/basic-ozone-layer-science>.
- <sup>4</sup> Visit the U.S. EPA's webpage, *Understanding Global Warming Potentials*, for more information: <https://www.epa.gov/ghgemissions/understanding-global-warming-potentials>.



Surround yourself with the best.

For over 20 years, the polyiso industry has utilized pentane in product formulations. These products replaced formulations using CFCs and HCFCs, which are no longer permitted for use in insulation products in major markets, including the United States and Canada. The transition to pentane blowing agents was preceded by years of research and development. As a result of these efforts, the polyiso industry was recognized by the U.S. Environmental Protection Agency with the Stratospheric Ozone Protection Award for leadership in the phase-out of CFCs and exceptional contributions to global environmental protection. Please refer to PIMAs Environmental Product Declarations for additional information regarding GWP and polyiso's overall environmental performance.

## Comparing Polyiso to Other Insulation Products

Not all closed-cell foam insulation products are created equal when it comes to the environmental impacts of their blowing agents. **Pentane has a GWP of less than 1 according to the World Meteorological Organization's *Scientific Assessment of Ozone Depletion (2022)*.**<sup>5</sup> Historically, other insulation products utilized hydrofluorocarbon (HFC) blowing agents, which can have a GWP of 1300 or higher.<sup>6</sup>

As a category, other closed-cell insulation products are transitioning to blowing agents with lower GWP in part as a response to international and domestic regulations. However, not all blowing agent substitutes are equivalent. In Canada, regulations prohibit the manufacture, import or sale of foam plastic insulation products that contain a blowing agent with a GWP greater than 150.<sup>7</sup> The U.S. Environmental Protection Agency has adopted a similar GWP limit for blowing agents used in foam insulation products effective January 1, 2025.<sup>8</sup> Additionally, several states have enacted prohibitions on the use of certain HFC blowing agents in foam insulation products manufactured or sold within their jurisdictions. A summary of international and domestic restrictions on the use of HFC substances is available on the PIMA [website](#).

## Environmental Product Declarations

GWP is an important measure of a product's impact on the environment, but there is a larger story to tell for insulation products like polyiso. The polyiso insulation industry provides stakeholders with information on the environmental impacts of its products through the publication of Environmental Product Declarations (EPDs). An EPD is an internationally recognized and standardized tool that reports the environmental impacts of products. EPDs report data on environmental metrics across a product's life cycle, including GWP, primary energy, resource depletion, and water use. Importantly, EPDs also provide an opportunity to disclose the environmental benefits of products. For example, the net return on environmental metrics like embodied energy, where polyiso's long-term energy savings benefits far exceed the energy used to manufacture the product.

The polyiso industry's third-party verified, ISO-compliant EPDs are available for download on the PIMA [website](#).

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Notes:

- <sup>5</sup> The World Meteorological Organization's *Scientific Assessment of Ozone Depletion (2022)* is available for download at <https://csi.noaa.gov/assessments/ozone/2022/downloads/>. The GWP values for pentanes and other substances are contained within Table A-5 in the Annex section of the assessment report.
  - <sup>6</sup> For example, XPS insulation was manufactured with HFC-134a. This compound has a GWP of 1430. Source: The Intergovernmental Panel on Climate Change, Fourth Assessment Report, Chapter 2 - Changes in Atmospheric Constituents and in Radiative Force (available at: <https://www.ipcc.ch/site/assets/uploads/2018/02/ar4-wg1-chapter2-1.pdf>).
  - <sup>7</sup> Effective on January 1, 2021 for plastic foam or rigid foam products. More information is available at: <https://laws-lois.justice.gc.ca/eng/regulations/SOR-2016-137/FullText.html>.
  - <sup>8</sup> In October 2023, the U.S. EPA issued its final rule under the AIM Act that restricts the use of high-GWP substances in foam end uses and other sectors. The prohibition on the use of high-GWP substances is effective January 1, 2025. More information on the rule is available at: <https://www.epa.gov/climate-hfcs-reduction/regulatory-actions-technology-transitions>.
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### About PIMA

Since 1987, PIMA has served as the voice of the North American rigid polyiso insulation industry. PIMA is a leading advocate for safe, cost-effective, sustainable, and energy-efficient construction. The Association is comprised of polyiso manufacturers and industry suppliers, and represents the public policy interests of its membership at the local, national, and international levels to advance high-performance building practices.

PIMA produces technical bulletins to address key topics related to polyiso insulation. These publications inform architects, specifiers, and contractors about the performance characteristics of polyiso insulation. Always consult individual manufacturers for product specific information, including product data sheets and installation instructions.

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

