FAQ: BASF and the New EC3 Tool

Q: People typically associate carbon emissions with transportation. What role do buildings play in the emissions equation?

A: The built environment accounts for almost 40% of all greenhouse gas emissions globally. Carbon emissions associated with the extraction, creation, distribution and installation of building materials constitute almost 50% of the global warming potential (GWP) of a new building throughout its life cycle.

Q: Can you help me better understand embodied carbon?

A: When you're thinking about carbon in the building industry, there are two buckets. There's operational carbon, or the emissions from the energy used for lighting, heating, cooling, etc. There's been a focus on operating efficiency and reducing these impacts for a long time now, and we are making good progress. When we talk about 'getting to zero' in buildings, it usually refers to the operational carbon.

But there's another bucket called embodied carbon. That's part of the emissions associated with extraction, manufacturing, transportation and installation of all the materials needed to construct a building. These "upfront" emissions are everything up to the point of turning on the lights and starting to operate. In terms of understanding and reducing embodied carbon, we're about where we were 25 years ago with operating carbon, but we don't have 25 years to make the impact that is needed.

Q: Why has it taken so long for the building industry to focus on embodied carbon?

A: The principal reason the industry has been focused on operational carbon is energy used for building operations is most visible, most obvious, and clearly very important. Another reason is that understanding the carbon footprint of the entire supply chain for materials and construction has lagged. Research and development aimed at reducing embodied carbon has been starved for resources. The result is that millions of people know something about LEED standards for energy efficiency but, until recently, few had ever heard of embodied carbon, even inside the building industry. That is now beginning to change in a big way.

Q: What is the Embodied Carbon in Construction Calculator ("EC3") tool, and how does it work?

A: The EC3 tool, which launched Nov. 19, is a free web platform that enables people in the building industry to evaluate the carbon emissions associated with the manufacture

of building materials. The tool accesses an open-source database of Environmental Product Declarations (EPDs) for thousands of building materials from suppliers across the industry. It allows users to search by material performance, location and carbon intensity. The EC3 tool relies on sophisticated, research-based methodologies to support the analysis and representation of the carbon footprint of common building materials and introduces a new digital EPD to make it easy to accurately compare similar materials.

In short, the EC3 tool will make it easier for those in the building industry to select materials that will lower the carbon footprint of their projects.

Q: Who would use the EC3 tool? What are the benefits?

A: It's our hope that everyone in the building sector will benefit. The EC3 tool includes input from owners, builders, designers and material manufacturers to make sure it addresses the needs of the community. Architects can use the tool to understand how they can specify products to reduce embodied carbon, builders can identify low carbon suppliers, and design teams and owners can set embodied carbon reduction targets with the help of the tool. Manufacturers are engaged to ensure that their products are fairly represented and benefit by differentiating themselves with low embodied carbon product options.

Q: Why did BASF participate in the development of the EC3 tool?

A: Sustainability is at the core of what we do. In fact, we have defined sustainability focus areas within our corporate strategy. We've also committed to keeping our greenhouse gas emissions at 2018 levels through 2030 even as we increase our production. Besides our own operations, our products help our customers with their sustainability goals. One example that directly relates to the EC3 tool is Neopor® GPS insulation, which gives planners, architects and contractors a solution to help lower the carbon footprint of their buildings. We are proud to be a pilot partner in the development of the EC3 tool.

Q: So should our priority be reducing embodied carbon?

A: Reducing embodied carbon should be a priority, but not the only one. BASF advocates a holistic view because there are several causes of carbon emissions as it relates to buildings. One is human behavior that exponentially increases CO_2 emissions, like the extracting, refining transporting, and burning fossil fuels. There are also emissions related to operating a building, such as HVAC systems, lighting and appliance use. These occur in addition to embodied carbon emissions.

Q: What role do insulation materials play in the embodied carbon of a building project?

A: For a building to reach net-zero energy, the thermal performance of the building envelope must be significantly better than a building meeting minimum code requirements. Graphite polystyrene (GPS) has proven, through life cycle assessment (LCA) and product-specific EPDs, to display lower embodied carbon than any other rigid insulation in North America, including expandable polystyrene (EPS), extruded polystyrene (XPS), polyiso and mineral wool. It uses 30% less material mass than XPS for the same R-value. It also offers 20% more thermal resistance than EPS at the same thickness.

It's also important to consider the impact of blowing agents on global warming potential (GWP). Using high GWP blowing agents can offset the benefits of insulation and increase the material's embodied carbon. For instance, XPS in North America tends to be extruded with greenhouse gases HFC-134a or HFC-142b. The GWP of HFC-134a is 1,430 times more harmful to the atmosphere than carbon dioxide while HFC-142b is 2,310 times more harmful.

Q: How does Neopor GPS fit into this effort?

A: Neopor GPS displays lower embodied carbon than any other rigid insulation, using 30% less raw material than XPS for the same R-value. This lowers costs, saves resources and reduces the environmental effects of construction.

The chemistry that enables Neopor GPS means that low embodied carbon was designed from the beginning. Neopor GPS is a graphite polystyrene insulation, composed of small black beads of polystyrene (EPS) containing blowing agent, which makes it expandable. The graphite reflects radiant heat energy like a mirror, increasing the material's resistance to the flow of heat, or R-value.

Neopor GPS doesn't rely on a blowing agent that off gasses to boost its R-value. Neopor GPS is a non-HFC foam insulation and complies with the latest requirements published as part of the Significant New Alternatives Policy (SNAP, 2015) by the U.S. Environmental Protection Agency.

Neopor GPS adheres to the same ASTM standards of traditional EPS and XPS (ASTM C578); however, its performance characteristics are different enough that the main specification tools in the AEC Industry in North America (BSD Speclink and MasterSpec) have created a new "Graphite Polystyrene" category to help product specifiers identify its attributes.

Q: How can I learn more about Neopor GPS?

A: Visit the Neopor GPS product page.