PLASTIC DRIVES DOWN HOME ENERGY USE, GREENHOUSE GAS EMISSIONS

AMERICA'S PLASTICMAKERS
MAKING SUSTAINABLE CHANGE

Using energy efficient modern building products – such as house wrap and foam plastic insulation – helps dramatically reduce home energy needs. Improving home energy efficiency also is one of the easiest and most cost-effective ways for us to reduce greenhouse gas emissions... and to save money.

Too Much Wasted Energy

Nearly 40 percent of our nation's energy is consumed in our homes and buildings. Heating and cooling account for most of the energy used in a typical U.S. home, but much of it is wasted due to outdated building practices.

The building "envelope" – the physical barriers that separate the inside conditioned space from the outside world – provides barriers to outdoor heat/cold. Unfortunately, many buildings are under-insulated and under-sealed, leading to massive loss of energy used to heat and cool homes.

Plastic Helps Seal the Building Envelope

Each cubic foot of outside air that enters a home via infiltration must be heated/cooled to return the house to its thermostat set point. A typical home built in 2002 to 2003 replaces roughly 55% of its air volume every hour with unconditioned outside air. A well-insulated and sealed home replaces less than 10% of its air volume per hour.

To drive down energy use in our homes, newer construction practices rely heavily on energy-saving plastic building materials that improve insulation performance (R-value) and limit unwanted airflow.

Plastic building products – spray and rigid foam insulation, house wrap, window frames, caulks/sealants and more – play crucial roles in sealing a building envelope against heating/cooling losses, allowing us to save more energy and money and to reduce greenhouse gas emissions.

Plastic Reduces Energy Use in our Homes and Buildings

By improving R-value and helping seal the building envelope, plastic building materials save more energy than many alternatives serving similar functions. One study found that the energy saved by using plastic building and construction materials in one year is enough to meet the average annual energy needs of 4.6 million U.S. households.[1]

Another study: If all U.S. single-family homes used plastic spray foam insulation, potential aggregate energy savings would be 648.37 billion kWh per year[2], which could save homeowners up to nearly $750 per year in electricity costs.[3]

Plastic Reduces Greenhouse Gas Emissions in Our Homes and Buildings

Studies also find that plastic building materials help reduce greenhouse gas emissions from our homes and buildings. Study: Compared to common alternatives, foam plastic insulation "significantly increases the insulation R-value of walls, and therefore saves energy and reduces GHG emissions."[4]

Another study found that if all U.S. single-family homes used plastic spray foam insulation, the reduction in greenhouse gas emissions would be equivalent to taking nearly 40 million cars off the road each year.[5] It also could reduce greenhouse emissions related to home heating/cooling by a whopping 40%.[6]

Another study looked at reductions in greenhouse gas emissions when plastic "house wrap" became prevalent. Its use reduced greenhouse gas emissions up to 600+ million tons over 18 years, equivalent at the time to the vehicle combustion of 60 billion gallons of gasoline and saving consumers up to $68 billion dollars in energy costs.[7]

The Future: Net Zero Energy Homes

Net zero energy homes likely are the wave of the future. Net zero energy simply means that a home's energy generation is equal to or greater than the home's energy use – sometimes using power from the grid, sometimes giving it to the grid (net: zero energy).

These homes now are a reality, through a combination of energy sources such as solar, wind and geothermal, along with proper design with modern building products. Achieving net zero energy typically requires improving the home's thermal

envelope, such as by using foam plastic insulation and building products to improve R-value and reduce air infiltration.

A net zero energy home built by the National Institute of Standards and Technology (NIST) near Washington, DC, produced more energy than it used over a year, enough to "power an electric car for about 1,440 miles... The most important difference between this home and a Maryland code-compliant home is the improvement in the thermal envelope – the insulation and air barrier. By nearly eliminating the unintended air infiltration and doubling the insulation level in the walls and roof, the heating and cooling load was decreased dramatically." (NIST)

In the NIST example, the homeowner would have saved $4,400 per year in heating, cooling, and electricity costs... and driven down fossil fuel energy use and greenhouse gas emissions.

Plastic Materials Work Together to Reduce Energy Use, Greenhouse Gas Emissions

Regardless of the energy source, a leaky home likely will never achieve net zero energy... nor achieve maximum energy savings for the average homeowner. Creating a net zero energy home – or simply ramping up a home's energy efficiency -- typically requires a combination of plastic building products. Foam insulation's high R-value combined with house wrap and insulated windows and leak filling caulks/sealants and other materials work together to create a system that helps seal the building envelope. (Some products such as spray foam can both insulate and seal homes.)

In other words, by combining multiple modern plastic building products, homeowners and builders can dramatically reduce the amount of energy needed to power a home, in both net zero energy and conventional homes. Plus drive down energy costs and greenhouse gas emissions.

And these energy-saving plastic products are readily available today.

[1] Comparative Energy Evaluation of Plastic Products and Their Alternatives for the Building and Construction and Transportation Industries
[2] https://blog.americanchemistry.com/2021/03/spray-foam-helps-protect-whats-inside-as-well-as-whats-outside/
[3] Savings vary. Find out why in the seller's fact sheet on R-values. Higher R-values mean greater insulating power.
[4] Plastics Energy and Greenhouse Gas Savings Using Rigid Foam Sheathing Applied to Exterior Walls of Single Family Residential Housing in the U.S. and Canada – A Case Study, Franklin Associates, A Service of McLaren/Hart, 2000
[5] https://blog.americanchemistry.com/2021/03/spray-foam-helps-protect-whats-inside-as-well-as-whats-outside/
[6] https://polyurethane.americanchemistry.com/sustainability/SPF-Contributing-to-Sustainability-Reducing-Greenhouse-Gas-Emissions-from-Buildings.pdf
[7] 'Plastics' Energy and Greenhouse Gas Savings Using Housewrap Applied to the Exterior of Single Family Residential Housing in the U.S. and Canada/A Case Study, Franklin Associates, A Service of McLaren/Hart, 2000