



Sustainable Manufacturing for Sustainable Homes

New Chemical Technology in Whirlpool Corporation Refrigerators Will Help Builders Sell More Sustainable Kitchens and Homes



CASE STUDY

In the small hamlet of Amana, Iowa, history is repeating itself.

In 1949, the world's first side-by-side refrigerator was manufactured in Amana, changing residential kitchens forever. Now, 65 years later, the town is again home to an industry-first development that is poised to change the American home for the better. But this time around, the result won't just be an improvement for the kitchen; it will be an improvement for the environment.

At the start of 2014, Whirlpool Corporation, the world's largest manufacturer of major household appliances, became the first in its industry to implement Honeywell Corporation's Solstice® liquid blowing agent (LBA) into its refrigerator production. By doing so, Whirlpool Corporation will dramatically lower the emissions related to the insulation of its refrigerators and freezers, and in the process, every refrigerator and freezer produced in the U.S. by Whirlpool Corporation will perform better, be more environmentally sustainable and allow the homebuilding industry to deliver greener homes to their clients.

"It's a no-compromise approach for the masses that is an 'and' strategy rather than an 'or' strategy. We are making products that perform better, but at the same time doing so with a smaller environmental footprint."

Ron Voglewede

Global Sustainability Director,
Whirlpool Corporation

A New Approach

To understand the impact of the Whirlpool Corporation decision to use Solstice®, it is helpful to understand how refrigerators are assembled. Just like the homes they go into, refrigerators require insulation to help them maintain temperatures. The insulation used in refrigerators is a closed-cell, spray-foam insulation applied between the refrigerator cabinet and interior liner. For the insulation to work, a special additive known as a liquid blowing agent is required to accelerate the foam's expansion.

"To put it in perspective, using Solstice is the equivalent of removing 400,000 cars from the road."

Bob Bergeth, General Manager,
Builder Sales for Whirlpool Corporation

Until the advent of Solstice®, spray-foam insulation carried a cost to the environment. For example, blowing agents used up until the 1970s included chlorofluorocarbons (**CFCs**), a group of compounds that, while stable and nonflammable, contain ozone-depleting properties. Today, the industry has transitioned primarily to blowing agents that contain hydrofluorocarbons (**HFCs**). These compounds do not have ozone-depleting properties, but they do have a Global Warming Potential (**GWP**) score of around 1030, which means the release of HFCs into the atmosphere would trap 1,030 times as much heat as would the same amount of carbon dioxide (**CO₂**).

A Breakthrough Technology for the Appliance Industry

Solstice® on the other hand, is transformative, Voglewede says. It is nonflammable, not a volatile organic compound and has received U.S. Environmental Protection Agency (**EPA**) approval under the Significant New Alternatives Policy (**SNAP**) Program, the EPA's program to evaluate and regulate substitutes for the ozone-depleting chemicals that are being phased out under the stratospheric ozone protection provisions of the Clean Air Act. The GWP score for Solstice® is 1, the same GWP as the air you exhale from your lungs. Additionally, it contains no ozone-depleting products and, as an added bonus, improves the insulation energy performance by 4 percent.

"Widespread adoption of Honeywell's Solstice® solutions could revolutionize multiple industries, offering safe, cost-effective and easily adopted ways for leading manufacturers such as Whirlpool Corporation to dramatically reduce greenhouse gas emissions associated with their products," said Andreas Kramvis, president and chief executive officer of Honeywell Performance Materials and Technologies. "We are pleased to see the Whirlpool Corporation at the vanguard of this global effort to combat climate change while retaining the high performance that consumers have come to expect from their products."

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According to the EPA's greenhouse gas calculator, if Solstice® LBA were used to insulate all the refrigerators sold in the U.S., the reduction in greenhouse gas emissions would be equivalent to the annual emissions of 1.4 million passenger cars or the total energy used by 340,000 residential homes. As it stands, the adoption of Solstice® by Whirlpool Corporation alone will be equivalent to the effect of removing 400,000 cars from the road, or the equivalent of 180,000 homes — about the size of the city of Atlanta.

With dramatic benefits to the environment available, Whirlpool Corporation moved quickly to change over its two refrigerator and freezer assembly plants. Conversion of the Amana plant began in November 2013 and was completed in March. Meanwhile, conversion at the Ottawa facility began in March and was completed in April, ahead of schedule.

Building Industry Benefits

A study from McGraw-Hill Construction Market Forecasting Service recently found that, by 2016, it's estimated that the green homebuilding market will account for \$87 – \$114 billion worth of the entire U.S. homebuilding industry. With so many architects, designers, builders, remodelers and homeowners focusing on green building,

the importance of sustainable home products becomes all the more important, said Bergeth.

Whirlpool Corporation has been working closely with Honeywell for years to become the first appliance manufacturer in the world to use Solstice on a large scale, Voglewede said, and that investment is now paying off for both Whirlpool Corporation and Honeywell.

“Our commitment to use Solstice has allowed Honeywell to invest in building a new U.S.-based plant that is creating green jobs,”

Ron Voglewede, Global Sustainability Director, Whirlpool Corporation

“Additionally, our investment and partnership with Honeywell in co-developing Solstice® has established the Amana plant as a world leader in environmentally responsible manufacturing, and Whirlpool Corporation refrigerators as some of the most sustainable refrigerators on the market.” said Voglewede.

Refrigerators manufactured using Solstice® will be more efficient than any currently produced by the appliance industry — up to 12 percent more than refrigerators that have insulation that uses c-pentane (LG, Samsung and GE), and

2 percent more efficient than refrigerators that have insulation that uses 245fa/R134a (Electrolux, SubZero and GE).

“Building and remodeling trends continue to move toward greater sustainability with each passing year, which means the building trades and their customers are increasingly seeking out more sustainable products,” said Bergeth. “Thanks to Solstice, our contract channel partners who specify refrigerators and freezers from the Amana, Whirlpool, Maytag, KitchenAid, or Jenn-Air brands will be able to provide their clients with some of the most efficient and sustainable appliances; and that is the kind of differentiation that makes a positive impact on sales.”

For more information on the Whirlpool Corporation use of Solstice®, or to learn how Whirlpool Corporation delivers an inside advantage to its building industry customers, visit www.InsideAdvantage.com.

