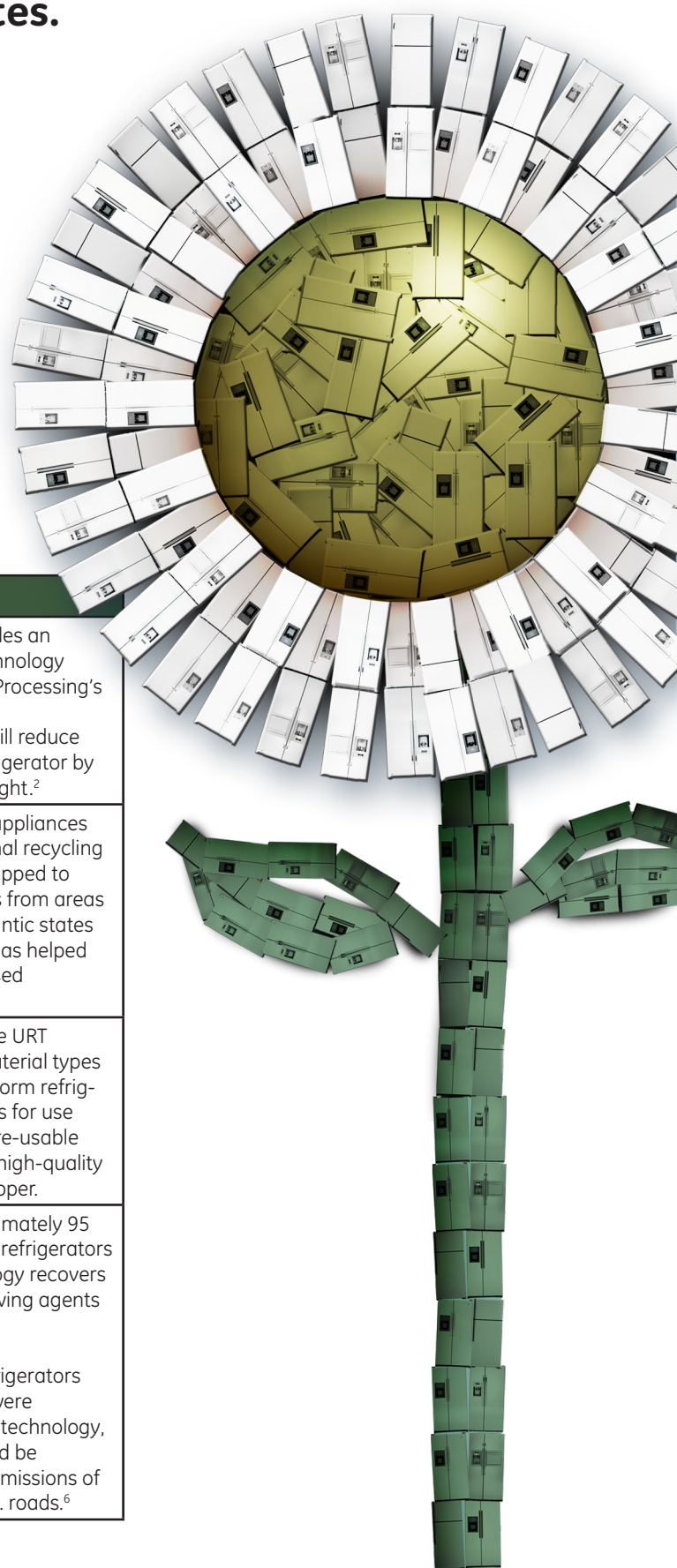
How "RAD"

GE and ARCA Reduce Refrigerator Landfill Waste and Greenhouse Gas Emissions in 12 states.

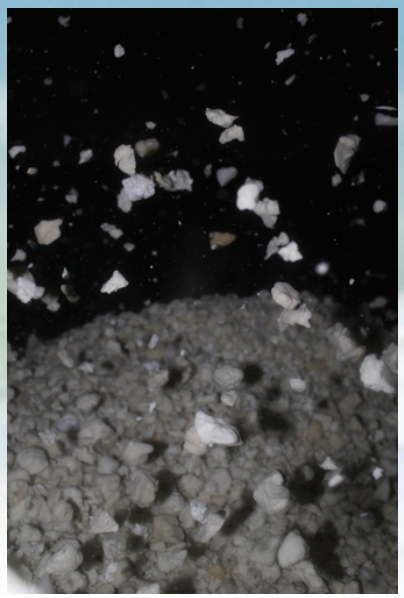
As the first and only appliance manufacturer to partner with the Environmental Protection Agency (EPA) on its Responsible Appliance Disposal (RAD) Program, GE Appliances & Lighting is working with Appliance Recycling Centers of America (ARCA) to drastically reduce landfill waste and greenhouse gas (GHG) and ozone-depleting substance (ODS) emissions of appliance recycling – with a focus on refrigerators and freezers – in 12 states in the Mid-Atlantic and Northeast regions of the U.S.

Compared to industry recycling practices, GE and ARCA's approach is really quite RAD.



The Industry Way	The RAD Way
About 55 pounds of a typical refrigerator ends up in a landfill.[1]	GE's agreement with ARCA includes an innovative UNTHA Recycling Technology (URT) system in ARCA Advanced Processing's (AAP) regional recycling center in Pennsylvania. The URT system will reduce the typical landfill waste of a refrigerator by approximately 85 percent by weight.[2]
Approximately 40 percent of appliances collected by retailers are resold each year – putting inefficient, used models back on the grid.[3]	GE is focused on recycling used appliances – not reselling them. AAP's regional recycling facility in Philadelphia, Pa., is equipped to process 750,000 used appliances from areas within 12 Northeast and Mid-Atlantic states annually. Since March 2010, GE has helped deliver approximately 365,000 used appliances to AAP for recycling.
90 percent of used refrigerators in the U.S. are shredded for their metal. The remaining foam and other materials typically go to a landfill.[4]	Going beyond metal recovery, the URT system separates a variety of material types for recycling and can even transform refrigerator insulating foam into pellets for use as fuel or other products. Other re-usable refrigerator by-products include high-quality plastics, steel, aluminum, and copper.
During the shredding of refrigerators, a substantial amount of GHG and ODS emissions from refrigerator-insulating foam are released into the atmosphere.	The URT system recovers approximately 95 percent of the insulating foam in refrigerators in a sealed system. This technology recovers approximately 95 percent of blowing agents from the foam.[5] If the foam from the 9 million refrigerators disposed of annually in the U.S. were processed through this recycling technology, the GHG emissions avoided would be equivalent to the annual CO2-e emissions of more than 2.4 million cars on U.S. roads.[6]

The URT system can process approximately one refrigerator per minute.



The URT system recovers approximately 95 percent of the insulating foam in refrigerators in a sealed system, reducing green-house gas and ozone-depleting substance emissions compared to what typically happens in the industry today.

ARCA Advanced Processing (AAP) anticipates 150,000 used refrigerators will be processed in the URT system annually.

The URT system can transform refrigerator insulating foam into pellets for use as fuel or other products.

"Industry Way" – one refrigerator's shredded insulating foam, which is typically landfilled (three large blue barrels). "The RAD Way" – one refrigerator's de-gassed and pelletized insulating foam, which can be used as fuel or other products (lower, far right bucket).

A Cradle-to-Cradle Approach to Sustainability

GE Appliances & Lighting takes a cradle-to-cradle approach to managing the life cycle of an appliance, from the manufacturing of refrigerators with more environmentally sustainable insulating material, to more responsible end-of-life disposal.

The first in North America, the URT system is a 40-foot tall engineering marvel.

- "Birth" – GE's manufacturing facilities are moving to more sustainable processes. As an example, GE became the first full-line appliance manufacturer in the U.S. to adopt a foam-blowing agent, known as cyclopentane, in 2011 to significantly reduce GHG emissions of the refrigerator insulating process in its Decatur, Ala., factory. The use of cyclopentane reduces GHG emissions of the foam-blowing process in the plant by 400,000 metric tons of CO2-equivalent annually – which is equal to the annual emissions of 78,000 cars on U.S. roads.[7]

- "Life" - GE was recently awarded the ENERGY STAR® "Sustained Excellence" Award for the sixth straight year, recognizing GE's commitment to delivering high-efficiency products to consumers. GE offers more than 420 ENERGY STAR-qualified appliances.

- "End of life" – GE became the first appliance manufacturer to partner with the EPA on its RAD Program to help protect the ozone layer and reduce GHG and ODS emissions during refrigerator recycling and disposal. This voluntary program focuses on refrigerator appliance-recycling best practices, including the recovery of insulating foam in used refrigerators.

- "Reincarnation" – In a true cradle-to-cradle approach, GE and ARCA transform materials – including high-quality steel, plastics, copper and even foam – that were once destined for landfill into materials for use as fuel and other products.

What Consumers Want

Today's consumers will go out of their way to find a retailer that recycles, making RAD partnership a desirable goal for many appliance retailers.

- 70 percent of consumers want all or part of their appliances recycled.
- 82 percent will go out of their way to purchase from a retailer that recycles.
- 67 percent are willing to pay more for an appliance if a retailer has recycling programs.[8]

A Cradle-to-Cradle Case Study: GE Locomotives

Nothing says "cradle-to-cradle" sustainability like the steel from a recycled GE refrigerator at AAP being used to build new GE Locomotives. This is a prime example of how the cradle-to-cradle life cycle loop continues as a result of GE's recycling initiative:

- Steel recovered from appliances at ARCA Advanced Processing's regional recycling facility in Philadelphia, Pa., is sold to a steel supplier for processing.
- GE Transportation's Locomotive division purchases steel deck plate from the processor for use in the manufacturing of new GE Locomotives, which are sold all over the world.

AAP appliance steel by-product is made into deck bottom plates, which serve as the foundation for new GE locomotives.

Notes:
1. ARCA Advanced Processing 2010 Landfill Data, based on the component listing found in the American Plastics Council 1994 Composition, Properties and Economic Study of Recycled Refrigerators Report.
2. ARCA Advanced Processing 2010 Landfill Data, based on the component listing found in the American Plastics Council 1994 Composition, Properties and Economic Study of Recycled Refrigerators Report.
3. U.S Environmental Protection Agency. "Appliance Disposal Practices in the United States." http://www.epa.gov/ozone/partnerships/rad/raddisposal_factsheet.html.
4. Based on results from a survey undertaken by the Association of Home Appliance Manufacturers (AHAM) as reported in UNEP 2005 and recently reported by ICF International in April 2010 report.
5. Based on ARCA Advanced Processing letter dated December 2010 re:PUR recovery rates.
6. Based on the Stevenson Company data and calculations using U.S. Environmental Protection Agency global warming potential (GWP) equivalents: http://www.epa.gov/cleanenergy/energy-resources/calculator.html.
7. Assuming the average rate of CO_2 emissions per U.S. passenger car is 5.11 MT CO_2 per year. Source: U.S. Environmental Protection Agency (EPA) Emission Facts: Greenhouse Gas Emissions from a Typical Passenger Vehicle.
8. Based on results from a 2010 survey conducted by the Stevenson Company on behalf of GE Appliances & Lighting.

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