

# AMERICA'S INNOVATION LAB

The chemical industry—which supports nearly 25% of our nation's GDP—is investing billions of dollars in R&D to help companies develop sustainable products.

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**THE FUTURE OF URBAN TRANSPORT:** Lightweight plastic materials made by LANXESS are used on some buses in Paris to make them more fuel-efficient and more resistant to weather conditions.

**W**HEN YOU THINK of innovation, the chemical industry isn't always the first to come to mind. Yet over the last few decades, the \$674 billion American chemical industry—the largest in the world—has made major breakthroughs that affect the way we all live. Everything from our medicine, housing, and clothing to even our food and water can be improved through chemistry: more energy-efficient insulation for our homes, more effective water purification systems, better drugs, and lighter materials and new biofuels that boost mileage for our cars. In fact, approximately \$3,000 worth of chemistry products reside in a typical lightweight, energy-efficient vehicle, and each new home contains more than \$16,000 of chemistry products. Another way to look at it is that 96% of all manufactured goods today are directly touched by the chemical industry.

To celebrate the achieve-

ments of the industry, the United Nations has named 2011 the International Year of Chemistry. This year marks the 100th anniversary of Marie Curie's Nobel Prize for her discovery of radium and polonium, and the UN wants to raise the public's awareness about the role chemistry plays in society.

Cal Dooley, CEO of the American Chemistry Council (ACC), the industry trade association, argues that the chemical industry—which accounts for more than 10% of U.S. exports—will be key to America's economic recovery. Says Dooley: "The industry provides more than 800,000 highly skilled, good-paying American jobs, and for every one of them, we create 5.5 more jobs in industries as

diverse as construction, transportation, real estate, and agriculture, among many others."

All this innovation comes at no small price. The U.S. chemical industry invested \$49.9 billion in R&D in 2009, a 57% increase over the 1999 total. What's driving all this? Dr. Kevin Swift, an economist at the ACC, points to sustainability—the effort by corporations to reduce greenhouse gas emissions: "We're part of the solution. A lot of R&D money is going into new areas like nanotechnology and bioengineering. We're helping make products of the future."

The industry is becoming more sustainable in two ways. First, it is shrinking its carbon footprint through manufacturing efficiencies, waste reduction, and better packaging and shipping practices. The evidence suggests that this approach has been working: From 1990 to 2009—a period when business was expanding—the industry reduced its greenhouse gas emissions by 23%, according to the EPA and the ACC.

**96%**

The percentage of all manufactured goods today touched by the chemistry industry.

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**A MODEL OF SUSTAINABILITY:** The eco-commercial conference center built by Bayer is composed of new materials to make insulation, thermal windows, and rooftop solar panels more efficient.

The second path to sustainability involves helping industrial customers create more energy-efficient products. A recent McKinsey & Co. study found that the efficiency gains have been striking. The consulting firm looked at the global chemical industry and found that for every ton of CO<sub>2</sub> that the industry emits in making its products, its customers avoid emissions of roughly 2.5 to 3 tons.

What's spurring green inno-

vation? Randy Dearth, president and CEO of LANXESS Corp., a \$6.8 billion-a-year chemical company with North American headquarters in Pittsburgh, says that his customers are demanding more sustainable products these days, not only for environmental reasons but also because they see a huge opportunity to save money.

Innovation at LANXESS is coming from all angles. "We have a lot of established chemicals that are finding a new life, and we are developing new ones to meet new needs," he says. LANXESS, for example, works with the automotive industry to help make vehicles more fuel-efficient by providing lightweight plastic materials that can substitute for heavier metals. The patented hybrid technology

combines plastics with metal, and is used in approximately 70 auto applications. The company also makes a new, high-performance material for auto tires in part with the metal neodymium. Integrating this rubber into a tire reduces rolling resistance, which in turn improves gas mileage. In Europe, governments have instituted ENERGY STAR-type labels for tires that will guide consumers toward more fuel-efficient models. Dearth believes that the U.S. will eventually adopt a similar tire-rating system.

The automotive sector is not the only place the chemical industry is making great strides. Greg Babe, CEO of Bayer Corp.'s North American operations, sees tremendous opportunity ahead for chemical innovation

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in the construction industry. Buildings in the U.S. account for roughly 40% of the nation's CO<sub>2</sub> emissions, and the percentage will only increase as the population grows. Making buildings more energy-efficient will help reduce future energy costs and mitigate the worst effects of climate change. "The need for greater efficiency is being driven," says Babe, "by climate and energy trends. There's a new sensitivity and level of information, and understanding of climate impact."

Bayer Corp., also headquartered in Pittsburgh, with 2009 net sales of \$10.7 billion and more than 15,000 employees, is working on new materials to make insulation, thermal windows, and even rooftop solar panels more efficient. In its Eco-

Commercial Building Program, Bayer is working with architects and contractors to build net-zero-energy buildings—structures that actually give back to the electrical grid more energy than they consume. It has already helped build a net-zero day-care center in Germany, and is building an office structure in India.

In the U.S., working with Penn State University, Bayer has installed an eco-commercial building that resides on its Pittsburgh corporate campus, which it uses as a conference center to demonstrate that the technology works. Bayer has developed high-efficiency polyurethane foam to insulate the roof and perimeter walls of this eco-commercial building. It has also developed a heat-reflecting white

roof coating to keep the building cooler in the summer. Some of Bayer's films are used as part of the frames for photovoltaic roof systems to boost efficiency. And its polycarbonates are being used for low-energy LED lighting.

Improvements like these are only a few of the thousands that are being developed in chemical R&D labs around the globe. If the world is to feed, house, and clothe a total population that is slated to grow from about 6 billion people today to 9 billion in the year 2050, it will need the resources and know-how of one of our largest and most innovative industries. ●

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**11 out of every 100 patents are granted to companies involved in the chemical business.**

**The chemistry industry expects a 5.4% gain in global output in 2011, according to the American Chemistry Council. During the next two years, the most rapid growth will occur in emerging markets.**

## SUSTAINABILITY ENERGIZED BY LANXESS

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