Advancing a Circular Economy: Pilot Program Shows Plastic Waste Can Be Turned Into Fuel
Dow to Become One of the Largest Industrial Buyers of Renewable Energy

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Advancing a Circular Economy: Pilot Program Shows Plastic Waste Can Be Turned Into Fuel

Every day, Americans generate more than four pounds of waste per person.1 Despite the proliferation of recycling programs during the past three decades, more than half of all U.S. trash (135 million tons2) still ends up in landfills. As part of the Company’s exploration of plastic waste alternatives, Dow became a key collaborator in the Energy Bag Pilot Program, demonstrating that certain plastics that are not easily recyclable using traditional methods can be converted into synthetic crude oil for fuel – diverting them from a landfill.

The Program:
Dow, along with the Flexible Packaging Association, Republic Services, Agilyx, Reynolds Consumer Products and the city of Citrus Heights, California joined forces in 2014 to drive a collection pilot program to divert non-recycled plastics from landfills and optimize their resource efficiency across the lifecycle. From June to August, approximately 26,000 households in Citrus Heights were provided with purple bags – known as “Energy Bags” – for the collection of plastic items not currently eligible for mechanical recycling. Collected items included juice pouches, candy wrappers, plastic pet food bags, frozen food bags, laundry pouches, and plastic dinnerware.

The purple Energy Bags were collected from homes during the community’s regular bi-weekly recycling program, sorted at the recycling facility and sent to a plastics-to-energy plant. Using its patented thermal pyrolysis technology, which is complementary to current mechanical recycling programs, Agilyx converted the previously non-recycled plastics into high-value synthetic crude oil. The crude oil can be further refined and made into valuable products for everyday use, such as gasoline, diesel fuel, jet fuel, fuel oil, and lubricants; it can even be transformed back into plastic.

“We were extremely excited to work with all the partners involved on this first-of-its-kind pilot in the U.S,” stated Greg Jozwiak, North American commercial vice president, Dow Packaging and Specialty Plastics. “Through the power of this collaboration, we gained significant knowledge regarding an alternative method that complements plastics recycling and shows that non-recycled plastic waste can be diverted from landfills, extracted for its embedded energy and put to good use.”

The Results:
Pilot results show the potential for positive, long-term environmental improvements, including less landfill waste, more local energy resources and reduced fossil fuel energy dependence. The three-month program – comprised of six collection cycles – resulted in:

• **Nearly 8,000 purple Energy Bags** collected
• **Approximately 6,000 pounds** of typically non-recycled items diverted from landfills
• **512 gallons** of synthetic crude oil produced from the conversion
• **30 percent** citizen participation
• **78 percent** of citizens said they would be likely to participate if given another chance

The pilot proved that resource recovery of non-recycled plastics is a viable municipal process, bringing us one step closer to reducing plastic waste by converting it to energy. To learn more about the program and its impact on the Citrus Heights community, watch a brief video, visit Dow’s Energy Bag webpage or Read more.

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1 Environmental Protection Agency, http://www.epa.gov/epawaste/nonhaz/municipal/
3 At some point during the pilot
Dow to Become One of the Largest Industrial Buyers of Renewable Energy

Dow Accelerates Sustainability with New Wind Farm Agreement for Texas Facility

As a part of Dow’s Energy Plan and both its 2015 and newly launched 2025 Sustainability Goals, Dow has taken another step toward reducing its carbon footprint. Dow’s Energy business has signed a long-term agreement with a new wind farm currently under development in south Texas. The wind farm, to be completed in first quarter 2016, will span nearly 35,000 acres and will supply Dow’s largest manufacturing facility in Freeport, Texas with 200 megawatts (MW) of wind power. That is equivalent to the amount of electricity needed to power more than 55,000 homes.

Dow is the first company in the U.S. to power a manufacturing site with renewable energy at this scale, and will become the third largest corporate purchaser of wind energy in the United States. As one of the largest industrial energy consumers in the world, Dow has consistently been at the forefront of new energy technology improvements. Under Dow’s Sustainability Goals, Dow commits to continuing to reduce its footprint, including securing 400 MW of clean power by 2025.

“Dow is always looking for win-win solutions – good for the environment and good for business,” said Jim Fitterling, vice chairman of business operations at Dow. “By entering into this agreement, Dow is taking a serious approach to our future energy needs in Texas and cost-competitive wind energy is a great opportunity.”

A significant percent of the world’s wind turbine blades are made using Dow materials and Dow innovations. For example, Dow AIRSTONE™ Systems include epoxy and other thermoset systems for infusion, hand wet layup, tooling and adhesives. DOW ENDURANCE™ family of insulation materials for medium voltage (MV) underground (UG) power cables have a history of close to 30 years in-ground service, and are developed to last for many years. Dow UCON™ GL-320 Lubricant is a next-generation gear lubricant developed specifically for demanding applications in wind turbine and other gearboxes.

This new wind deal results from Dow’s long-term COAT vision and strategy as outlined in the Dow Energy Plan, a four pillared, global approach to Energy and Sustainability:

• Conserve by aggressively pursuing energy efficiency and conservation.
• Optimize, increase and diversify domestic hydrocarbon resources.
• Accelerate the development of cost effective clean energy alternatives.
• Transition to a Sustainable Energy Future.

Dow and the science of applied chemistry will continue to make a difference in how we enhance energy sources, optimize use and minimize energy losses. As a sustainable business leader, Dow recognizes that today’s unprecedented challenges also represent a tremendous opportunity for those who dare to envision a different future. To view the full spectrum of Dow’s innovations which enable renewable energy, please visit our website. Read more.
New Composites Institute Provides Collaborative Platform for Carbon Fiber Innovation
The U.S. Obama Administration has selected Dow, its DowAksa joint venture, and a consortium of composites-related businesses, academic leaders and government organizations, to establish the Institute for Advanced Composites Manufacturing Innovation (IACMI). IACMI will help advance the commercialization of carbon fiber composites technology in response to market demands for strong, lightweight materials. The Institute will create a platform to overcome technological and cost barriers to the wide-scale adoption of carbon fiber composites in a variety of industrial sectors, including pressure vessel, infrastructure, wind, and automotive. A key example is the collaboration between Ford and DowAksa to develop manufacturing innovations in automotive-grade carbon fiber. IACMI creates a strategic platform for ongoing collaboration between the two companies, which began in 2012 with a joint development agreement between Ford and Dow to develop lost-cost, high-volume carbon fiber composites. Read more.

Best International Innovative Product Award for PacXpert™ at Plasticon
Dow recently received the Best Innovative Finished Product/Process (International) Award at the 7th annual Plasticon Awards competition for its PacXpert™ Packaging Technology. PacXpert™ is a cutting-edge application which enables the transition from larger, traditional, rigid containers to flexible packaging. Stand-up pouch packaging technology is higher-performing, with greater flexibility and sustainability benefits. The winners for each category are selected by an independent panel of jurists. The flexible packaging market in India has grown in recent years to become Asia’s third largest, valued at $7.2 billion in 2013. The rising affluence and changing lifestyles of India’s middle class will continue to drive a stronger demand for packaging and plastics solutions that provide increased convenience and functionality. PacXpert™ packaging technology also received the ABRE Gold Award from the Brazilian Packaging Association in 2013, the WorldStar Packaging Award from the World Packaging Organization in 2013–2014 and the Sustainable Package Technology Award in China. Read more.

Collaboration on Abu Dhabi Concentrated Solar Power Project
Dow is collaborating with the Norwegian firm NEST (New Energy Storage Technology) on a Thermal Energy Storage (TES) pilot project in Abu Dhabi, UAE, in association with Masdar Institute of Science and Technology. The project, to be undertaken at Masdar’s “Beam Down” Concentrated Solar Power (CSP) installation in Masdar City, will study the feasibility and benefits of a novel TES system developed by NEST. Dow will supply 2.6 metric tons of DOWTHERM™ A Heat Transfer Fluid and provide associated technical support throughout the project. CSP uses parabolic mirrors to reflect and magnify heat from the sun onto a closed circulating loop containing DOWTHERM A Heat Transfer Fluid. The fluid collects the heat energy and transports it to a power station, where it is used to produce steam that drives turbines to generate electricity. Worldwide, 40 CSP plants filled with DOWTHERM™ A provide enough electrical generation capacity to meet the needs of more than one million homes, saving approximately 4.5 million metric tons of carbon dioxide (CO₂) emissions per year. Read more.

Top Partner of Most Innovative Companies in China
Dow was recently named to the list of “2014 Partners of the Most Innovative Companies in China” by the Chinese edition of Fast Company, a premiere business publication with a unique editorial focus on innovation in technology, ethical economics, leadership and design. The ranking evaluated companies that have demonstrated leadership in driving innovation along their value chains, in addition to their own industry-leading innovation capabilities. Dow was selected by a panel of judges after reviewing 2,000 companies for their contributions to innovation in China. Judges included journalists and editors of both the Chinese and English editions of Fast Company, senior journalists of 21st Century Media, professors from leading Chinese business schools, and industry observers and experts.
Partners for Change

We are leaders in advancing all aspects of sustainability, openly collaborating with customers, suppliers, communities, civil society and governments.

Expanded Support for FIRST® to Promote STEM Education

Dow recently announced a $1 million commitment with For Inspiration and Recognition of Science and Technology (FIRST®) to promote STEM education. FIRST, a not-for-profit organization founded by inventor Dean Kamen to inspire young people's interest and participation in science and technology, has designated Dow as a strategic partner. Through this new commitment, Dow will connect new and existing FIRST teams with Dow mentors. In addition, more than 75 new FIRST teams will be created in strategic Dow communities. The commitment between Dow and FIRST will also help send teams to FIRST regional and district championships, provide support for the annual championship event, and drive new team growth in Europe and emerging geographies. Read more.

Science-based Learning at Dow’s Science Park in Thailand

As a reflection of Dow’s commitment to enhancing STEM education outside the classroom, the company collaborated with the Ban Chang District of Thailand to organize “Science Park 2015” on Children’s Day at the municipal stadium in Rayong province. More than 2,000 participants were engaged in science-based learning activities, including stations on scientific experiments, scientific quizzes and a do-it-yourself activity station. Dow volunteers also presented a wastewater treatment simulation process to raise awareness about pollution prevention and promote understanding of the effects of releasing untreated wastewater.

Partnering to Build STEM Skills in Key Dow Communities

The U.S. Department of Commerce estimates that there will be 1.2 million unfilled science, technology, engineering, and math (STEM) jobs by 2018 due to lack of qualified, trained workers. STEM jobs are expected to grow by 17 percent, nearly double the rate of jobs in other sectors. Dow and Project Lead The Way (PLTW) recently announced a significant partnership to increase K-12 students’ access to high-quality education programs. Through a $400,000 commitment, Dow will fund PLTW programs in 17 schools in Indiana, Louisiana, Michigan and Pennsylvania. Combined, these 17 schools enroll more than 14,000 students. These schools join more than 6,500 schools in all 50 U.S. states and the District of Columbia currently offering PLTW programs in engineering, biomedical science and computer science. In addition to STEM curricula, PLTW also provides professional development opportunities to each teacher who instructs a PLTW course. Read more.

Dow Announces Affiliation with the Value of Water Coalition

Water resource management impacts almost all aspects of the economy, especially health, food production and security, domestic water supply and sanitation, energy, industry and environmental sustainability. Dow has joined leading public and private sector companies in the fight to revitalize aging and underfunded water infrastructure in the U.S. United in elevating the importance of water to the economic, environmental and social well-being of the U.S., the Value of Water Coalition is comprised of local and national leaders who promote awareness about the value of water at a time when water is often overlooked in the national discussion of infrastructure investment. The strength of the coalition is bringing strong voices from the public, private and non-profit sectors together to shine light on urgent water issues and inspire positive action that will strengthen the nation. Read more.

Safe Drinking Water for the People of Barú, Colombia

For the first time, Colombia will carry out a comprehensive plan on the island of Barú to provide safe drinking water, which will be based on Dow technologies and includes constructing and managing a desalination plant. The project is designed to provide the island with a definitive solution for supplying drinking water via pipe within five years. The desalination plant to be installed in the Bay of Barú will use DOW FILMTEC™ Reverse Osmosis Membranes to treat seawater to remove components that are not suitable for human consumption. This project will also involve teaching the community about the impacts of implementing these types of technologies and the benefits they will bring.
Natural-Capital Tool for Businesses to Value Externalities

The collaboration between Dow and The Nature Conservancy, which began in 2011, is aimed at helping Dow and the greater business community to recognize the value that nature has in business decisions and goals. The result of the collaboration to date is detailed in the 2014 Annual Progress Report. After completing two successful pilot projects, a new effort beginning this year will provide a blueprint for a corporate process to: establish a baseline understanding of the value of ecosystem services across multiple sites; screen multiple decisions for their benefits and impact on nature; and evaluate the most promising natural-capital opportunities in depth based on how they benefit business, society and nature. The Ecosystem Services Identification & Inventory (ESII, pronounced “easy”) Tool will be used to help companies estimate the business value from nature on and adjacent to their sites and the public value from lands on-site. The team expects to finalize the tool for sharing across Dow and among a select set of external corporate users in 2015, with wider availability in early 2016. Read more.

Improving Chemistry Education in North America

Dow and the American Association of Chemistry Teachers (AACT) are partnering to invigorate chemistry education and support STEM education in the nation’s schools. Dow and AACT will work together to convene a series of teacher summits and create more than 750 lesson plans, multimedia resources, demonstrations and other teaching materials for use in K-12 classrooms. The work will be supported by a $1 million contribution from Dow to AACT, spread over a four-year period. Dow and AACT will host the teacher summits in cities around the U.S., with the first summit occurring this summer in Midland, Michigan. Approximately 30 chemistry teachers from surrounding communities will attend the weeklong summit to identify improvement opportunities in K-12 classroom resources and develop lesson plans, multimedia presentations and other materials that meet their needs. Materials developed at the summits will be available to AACT members via the association’s website, www.teachchemistry.org. Read more.

Corporate Social Responsibility Innovation Award in China

Dow was recently honored with the Corporate Social Responsibility Innovation Award from the China Youth Communist League in Beijing. The corporate citizenship award recognizes Dow’s outstanding contributions in sustainability education for more than 260,000 Chinese elementary school students through the “Our City” program. More than 60 international and local enterprises were nominated, with 32 recipients selected in four categories. Besides Our City, which instills basic sustainability ideas to third- and fourth-graders in China, Dow also nourishes future sustainability leaders among all age groups, including primary school students with Dow Chemistry Labs, high school students with the Chinese Chemistry Olympiad Competition, and Master’s-level students with the Taiwan Sustainability Entrepreneurship Competition.
Smart Solutions for Today

Our technologies enable our customers, and their customers, to develop more sustainable products and services.

Imagine Homes Named First Certified Outperformance Home + Solar Builder

Imagine Homes is Dow's first Certified Outperformance Home + Solar Builder in North America. The company – a San Antonio, Texas-based homebuilder leading the nation in high-performance, green building technology – has unveiled plans to build more than 100 homes in the San Antonio area that will incorporate both the Outperformance Homes system from Dow Building Solutions and the award-winning DOW POWERHOUSE™ Solar Shingles as standard features. This combined offering gives homebuyers the benefits of Outperformance Homes – an integrated system of Dow solutions that work together to better protect the home from air and water infiltration, temperature fluctuations and energy loss – plus DOW POWERHOUSE™ Solar Shingles, an integrated solar roofing system that protects the home and generates electricity. The collaboration between Imagine Homes and Dow is helping to take green living to another level in the community, and will further align San Antonio’s and Build San Antonio Green’s goals to increase the use of solar power and reduce overall energy consumption in the area. Read more.

BETAMATE™ Structural Adhesives Win Design News Golden Mousetrap Award

Recently, Design News presented the winners of the 2015 Golden Mousetrap Awards, a program that celebrates the companies, products and people energizing North American design, engineering and manufacturing. BETAMATE™ 1630 Structural Adhesive is a high-performance, one-component, toughened epoxy adhesive for bonding automotive lightweight vehicle body structures to enable significant weight reductions – about 70-100 kg lighter than previous models. The principal application is in body-structure bonding, but it can also be used to bond vehicle closures, such as doors, hoods, trunks and deck lids. This technology provides increased load-bearing capability, energy absorption and increased static and dynamic body stiffness. These performance characteristics contribute to improved safety and crash behavior, reduced vibrations and noise, an optimized ride, improved driving and handling, extended vehicle life, and greater long-term value via higher durability. Read more.

Delivering Premium Rice Packaging in Brazil with DIAMANTO™ Films

In Brazil, DIAMANTO™ Films are helping customers stand out through new pouch packaging. DIAMANTO™ technology applies Dow’s expertise in polyethylene (PE) resin design and process control to create multilayer polyethylene films with a balance of stiffness, seal-ability and aesthetics that have never before been achieved. Dow collaborated with Plaszom, a converter, at Pack Studios São Paulo to help a brand owner differentiate its premium rice products with newly designed packaging made from DIAMANTO™ Film. The packages are recyclable in communities with existing PE recycle streams. In the past, premium rice products were typically packaged in laminated pouches that are more expensive to produce and not recyclable. DIAMANTO™ Films offer cost and sustainability benefits, and the premium rice packages match or surpass the aesthetics and performance of the original packages.

Dow Supplies Bonding Adhesives for the Ford F-150

Dow is proud to be the structural adhesives supplier for the 2015 Ford F-150, which launched in November 2014. With a front-end, cab, box and tailgate made out of aluminum alloy and a frame made out of high-strength, lightweight steel, the F-150 utilizes BETAMATE™ Structural Adhesives for durability, weight reduction and improved manufacturing efficiencies. Dow Automotive Systems has worked closely with Ford to customize an adhesive solution for the F-150 that supports the automaker’s specifications for design, manufacturing and sustainability. The Ford F-150 is an exciting demonstration of the strength of aluminum in meeting lightweight objectives and is an impressive industry milestone. Dow also supplies BETASEAL™ Glass Bonding Adhesives for the windshield in the F-150. Read more.

Breakthrough Bicycle Lane Solution Recognized in Shanghai

Waterborne ECOGROUND™ AEH Hybrid Binder solution from Dow was successfully applied in the Chongming bicycle lane project in Shanghai and was recognized as the first large demonstration project for this application. The novel product from Dow is uniquely suited to this application due to its outstanding ultraviolet (UV) resistance, excellent mechanical performance, long-term durability and fast-curing profile at very low volatile organic compound levels. ECOGROUND™ AEH Hybrid Binder was selected for its eco-friendly characteristics that meet various strict requirements set for international bicycle racing as well as national fitness activities. The acrylic-epoxy hybrid binder was initially created for industrial coatings applications.
A Sustainable Solution for Powder Detergent Producer in Latin America

Dow worked with the second largest powder producer in Latin America on a new powder detergent formulation that would deliver not only final product performance but also manufacturing process optimization with regard to energy consumption, productivity and environmental, health and safety attributes. Using new methods, process and product offerings, Dow was able to develop an entirely new value proposition for the producer, based on ACUSOL™ 445N Dispersant. The product contributes to an efficient use of resources in different categories including a lower carbon footprint with emissions reduced by using less natural gas during production (savings up to 5 percent). The solution offers a better environmental health profile than the past process with significantly less air pollution, and the uniformity of the granules reduces exposure risk for workers. Productivity is also increased due to an enhanced process using the same input to gain more output – saving 20 percent in energy consumption while gaining a three-percent volume increase. In the end, the economics of producing the final product improved substantially, while also gaining significant sustainability benefits.

Enlist™ System Demo Plots Engage Agriculture Industry and Farmers in Argentina

More than 500 advisors, farmers, distributors, licensees and regulatory representatives recently attended regulated field trials showing the Enlist System for exceptional weed control. Demo plots were held in two important locations in Argentina: Pergamino in Buenos Aires Province, and Vicuña Mackenna in Córdoba. Both regions showed the excellent performance of Enlist Technology for weed control in Conyza, Amaranthus, grasses and more. The trials were based on key concepts of the Enlist System, showing the benefits the technology has in soybeans and corn: efficacy, tolerance, volatility and minimized potential for physical drift. COLEX-D™ Technology was also shown through a drift simulator specially developed together with INTA Castelar to demonstrate the attributes of this innovative formulation. Key aspects of Enlist Protect were presented in a best-practices program. Conkesta™ Seed, a new insect-resistant trait from DowAgroSciences that fights lepidopteran in soybeans, was also presented in field trials. Conkesta Seed will be commercialized together with the Enlist™ weed control system.

A More Sustainable Running Track in China

In China, polyurethanes are the most commonly used construction materials for running tracks and have been well received by the market. However, the potential release of isocyanates and organic solvents during installation of polyurethane running tracks has driven development of an alternative solution with an improved health and environmental profile. Dow developed a new running track binder based on waterborne acrylic technology modified by additives. This new binder is toluene diisocyanate (TDI) free, with lower levels of volatile organic compounds (VOC) and odor. As a result, the human health and environmental profile is greatly improved. The new waterborne running track binder allows Dow customers to offer the end users a differentiated running track system that also meets the high national code requirements.

Cadmium-free, Ultra High-definition Televisions with Quantum Dot Technology

Dow has partnered with LG Electronics to provide cadmium-free quantum dot technology for LG’s new Ultra HD TV with quantum dots, unveiled recently at the 2015 Consumer Electronics Show. Dow’s quantum dot technology, licensed from Nanoco Group plc, enables brilliant color in displays and allows LG to plan its quantum dot requirements with confidence. Quantum dots are nanocrystals made of semiconductor materials, which can be used in solar cells, LEDs and diode lasers. Nanoco’s quantum dots do not contain cadmium, a heavy metal that is currently restricted under European environmental law. Dow’s quantum dot technology takes LG’s latest LCD TVs to a new level of picture quality and further establishes LG as a leading provider of the most diverse and innovative TV display technologies in the industry. In 2013, Dow Electronic Materials and Nanoco entered into a global licensing agreement for Nanoco's cadmium-free quantum dot technology. The manufacturing process will utilize Nanoco’s patented, molecular-seeding technology, which enables high-volume cadmium-free manufacturing. Read more.

Texas Beef Processor Saves $250,000 Annually from Wastewater Reuse

A cattle slaughterhouse experiencing escalating water costs (due to drought conditions and a 20 percent jump in municipal rates) saw an opportunity to save 150,000 gallons of water per day by reusing treated wastewater to clean the drum screen at the front of their wastewater treatment train. Reusing dissolved air flotation effluent would require screening out solids that could clog the drum screen spray bars, but the presence of solids in the wastewater would make this impractical for traditional filters. The plant decided to pilot the TEQUATIC™ PLUS Filter to more efficiently screen out solids from the effluent, potentially saving $250,000 annually on its water utility bill by reusing the treated effluent water while also avoiding drawing upon already dwindling water resources in the region.
Responsible Operations

Our infrastructure has a positive impact on our Company, our communities and ourselves. Our operations are a model for others, wherever we operate.

Record-Setting Environment, Health and Safety Performance in 2014
In 2014, all Dow manufacturing sites achieved one full year with zero compliance orders, zero high severity process safety incidents, zero fatalities and zero major reactive chemical incidents. Although there were slight increases in notices of violation and reportable quantity releases, sites were able to end 2014 with strong environment, health and safety (EH&S) performance. Dow experienced its best year ever for loss of primary containment incidents and ended 2014 with record-setting EH&S performance.

Annual Global Conservation Report Highlights Activities Around the World

Dow appreciates nature for its intrinsic value and also recognizes our dependency on the critical services nature provides. As part of the Company’s 2015 Sustainability Goals and ongoing commitment to “Protecting our Planet,” Dow highlighted its 2013-2014 global conservation efforts in one comprehensive report, focused on two key areas: ecosystem services and philanthropic conservation activities.

Nature provides a variety of valuable services to individuals, communities and businesses; however, these benefits are complex and can be difficult to quantify. The report highlights Dow’s progress in our journey to better understand and adopt ecosystem services – not only as part of our own operations, but also by sharing the learnings to help others do the same. Dow also helps conserve nature through philanthropic giving, and it is common to see Dow volunteers active in their communities and Dow nature preserves in regions where we do business.

New Sustainable Chemistry Index Report Published

Today’s global challenges – which include climate change, water scarcity, food production, declining ecosystem services, human development and the overall transition to a sustainable society and planet – require solutions of unprecedented scale. Dow recognizes that chemistry can enable development of solutions to many of today’s most pressing problems. To help strengthen this link between its science-based solutions and these global challenges, Dow created its sustainable chemistry concept, which applies life-cycle thinking to help evaluate the sustainability value delivered by its product and solutions. As part of its 2015 Sustainable Chemistry goal, Dow developed the Sustainable Chemistry Index (SCI), a metric used to assess the relative sustainability performance of its product portfolio based on the sustainability attributes of its products. In 2013, Dow reached its 2015 Sustainable Chemistry target of achieving 10 percent of sales from highly advantaged products, marking a significant improvement from the baseline performance of 1.7 percent in 2007. Additionally, the Dow aggregate SCI score reached an all-time high of 24.4 points, up from the 2007 baseline score of 20.4. These accomplishments reflect the shift in Dow’s portfolio toward products that deliver value to society based on their ability to address sustainability challenges.

Two Employees Recognized with Women in Manufacturing STEP Award

Currently, women represent 51 percent of the total potential workforce, but only 25 percent of the workforce in manufacturing. Teresa Keating, business manufacturing technology director for Dow Building Solutions, and Kathleen O’Connell, global director of display technologies R&D, were recently recognized with a Women in Manufacturing STEP (Science, Technology, Engineering, and Production) award by The Manufacturing Institute. The awards honor women who have demonstrated excellence and leadership in their careers at all levels of the manufacturing industry. Keating is responsible for leading and directing the operations and technology center of Dow’s 21 global Styrofoam™ Insulation plants. O’Connell led a team to produce cutting-edge photoresist technology, which is used to fabricate microelectronic chips in computers, tablets and cell phones. The STEP awards are part of a larger STEP Ahead initiative, launched to examine and promote the role of women in the manufacturing industry that focuses on the attention, development, advancement and retention of high-potential female talent.

dow.com/sustainability
Freeport, Texas Conservation Efforts Save More than a Billion Gallons of Water

Much of the world's fresh water is frozen in ice caps and glaciers – leaving less than one percent of total water resources on earth for human use. In fact, fresh water scarcity has grown to a point where about one billion people in the developing world do not have access to safe drinking water. As a result, water conservation has become a pressing need. Dow has saved more than a billion gallons of water at its site in Freeport, Texas, by implementing innovative solutions. The company is employing a Six Sigma-influenced technique to manage 80 cooling tower systems in a way that optimizes resource use in its operations. The resulting water savings are equal to the volume of water used by 40,000 people in one year. Dow is also working with Nalco on a technology called 3D TRASAR Technology for Cooling Water, which is in use at sites around the world and has helped save about 75 billion gallons of water to date. Read more.

Training the Trainers for Chemical Process Safety in China

Dow and China's State Administration of Work Safety (SAWS) recently hosted a two-week workshop on chemical process safety for 25 key representatives from government, industry associations, companies and universities across China. The training, known as the “Workshop for Backbone Staff on Advanced Chemical Process Safety,” is part of the third phase of the Hazardous Chemicals Safety Management Project focused on chemical process safety management for process safety managers and personnel. Dow's partnership with SAWS began in 2006, when phase one of the project was launched to benefit more than 4,000 hazardous chemical safety regulators and managers through 18 safety-training seminars. Phase two followed in January 2011, with a focus on process safety, leak detection management and safety standardization.

St. Charles Operations Significantly Reduces Loss of Primary Containment Incidents

Using Six Sigma methodology, the St. Charles Operations Loss of Primary Containment (LOPC) Reduction Team drove multiple efforts to reduce leaks, breaks and spills. The team used technical methodology, use of quality data and a fun campaign, to engage employees and drive change. They identified areas of opportunity for improvement, leading to a creative list of solutions that was then prioritized based on the potential to prevent LOPCs. The team also looked at high-potential trigger criteria to detect and respond to trends. The success of the effort was significant, reducing LOPC incidents by approximately 85 percent. The progressive, holistic approach is now being shared among other Dow sites globally.

Dr. John Klier Elected to NAE for Creating More Sustainable Coatings

Dr. John Klier, global R&D director for Dow Performance Materials and Chemicals, has been elected to membership in the National Academy of Engineering (NAE). Election to membership is one of the highest professional distinctions in the engineering field. The Academy honors those who have made outstanding contributions to engineering research, practice or education, pioneering new and developing fields of technology, making major advancements in traditional field of engineering, or developing/implementing innovative approaches to engineering education. Klier was recognized specifically for his contributions to the development of novel coatings, polymer dispersions, and low volatile organic compounds (VOC) technologies, including microemulsions, which helped drive the transformation of the industry toward high performance and sustainable waterborne paints, coatings and formulations. For example, FORMASHIELD™ Acrylic Emulsions are a formaldehyde-abatement technology that works after the paint dries. This breakthrough technology doesn't just reduce paint’s impact on indoor air quality; it actively helps improve it. Read more.

European Label for Sustainable Transport Awarded

Green Freight Europe (GFE) has awarded Dow Europe GmbH with its “first leaf” – an award given to companies that have shared CO₂ data and information on policies, strategy and intentions to reduce CO₂ emissions stemming from transport operations. In 2008, Dow officially declared its participation in Responsible Care®, an initiative of the global chemical industry to safely handle products from inception in the research laboratory, through manufacture and distribution, through their final reuse, recycle and disposal and to involve the public in our decision-making processes. In 2012, Dow Europe GmbH co-founded GFE, a leading industry-driven program designed to support companies in improving the environmental performances of freight transport in Europe. The “first leaf” of GFE is part of a four-tier labeling program, which embraces a group of 100+ companies – including multinational shippers, carriers, retailers and associations – and recognizes members for their efforts to reduce CO₂ emissions. Dow will continue to work with GFE with the aim to obtain the “second leaf”, sharing our CO₂ emissions reduction strategies and setting realistic targets. Leaf three will be attained through the implementation of verifiable measurements, and leaf four will be earned by showing year-to-year CO₂ reductions.
Dow’s **Breakthrough to World Challenges** commitment identifies products and technologies that deliver significant contributions to societal challenges over time. To be selected, breakthrough technologies are subjected to a rigorous evaluation process that measures many candidates in Dow’s business portfolio against a variety of criteria, from positive impact on millions of human lives, to minimal environmental impact throughout the product’s lifecycle. Dow recently surpassed the target established in 2006 as part of its **2015 Sustainability Goals**.

### Criteria for Determining Breakthroughs

The Breakthroughs to World Challenges goal is unique among the chemical industry; no other company has publicly announced a focus on innovation of breakthrough products to solve world challenges. Dow established basic screens to evaluate innovations for their impact toward addressing these challenges, which include:

- **Alignment** – The innovation aligns with one or more of the five key categories of world challenges: energy and climate change, water, food, housing and health.

- **Significance** – The innovation makes a positive impact today or in the near future. Breakthroughs are intended to be implementable rather than theoretical, providing significant measurable impact. The measure of significance can vary depending on the type of innovation and the challenge addressed, but in all cases it must positively impact millions of human lives.

- **Benefits** – The benefits of implementing the innovation significantly outweigh any potential challenges.

- **Life Cycle View** – Each stage of the solution’s “life cycle” – from development through manufacturing, distribution, use and end-of-life – is carefully vetted with regard to raw materials, energy use, water use, hazard profile, disposal and other social and environmental considerations.

- **Transparency** – The positives and negatives of the innovation are publicly disclosed and openly discussed with key stakeholders. Multiple aspects of the innovation are candidly and transparently evaluated.

Once all criteria are met, the breakthrough candidates will be reviewed by Dow’s Sustainability External Advisory Council (SEAC), which is composed of thought leaders from around the world and is chaired by a senior Dow executive. Dow’s Board of Directors has the ultimate authority to approve a breakthrough before public announcement.

### Where are We Today?

In 2014, Dow exceeded the Breakthrough to World Challenges target with a variety of breakthroughs across the Company, including: Omega-9 Oils, DOW FILMTEC™ ECO Reverse Osmosis (RO) Elements, BETAMATE™ Structural Adhesives and breakthrough collaboration of Dow and Unilever on Lifebuoy™ Soap Featuring POLYOX™ Water-Soluble Polymers.

Today, the revenue generated from Dow’s Breakthroughs to World Challenges and thousands of highly advantaged products account for more than $6 billion. Most importantly, they have saved tens of billions of dollars for Dow’s customers, consumers and society. These accomplishments are reflected in new, end-market-aligned products that deliver value to society based on their ability to address sustainability challenges. With a robust pipeline of innovations, Dow looks forward to delivering more breakthroughs and continuing to bring benefits to society.
Goal Updates

Sustainable Chemistry

The 2015 Goal for Sustainable Chemistry is to increase the percentage of total Company sales to 10 percent for products that are “highly advantaged” by Sustainable Chemistry, as measured by Dow’s Sustainable Chemistry Index (SCI). Sustainable chemistry is Dow’s “cradle-to-cradle” concept that drives the Company to use resources more efficiently, minimize its footprint, provide value to its customers and stakeholders, deliver solutions for customer needs and enhance the quality of life of current and future generations.

The SCI is an internal index based on Dow’s analysis of eight sustainability factors of the Company portfolio at a detailed level and is updated annually. In 2013, the percentage of sales from Dow products that are highly advantaged by sustainable chemistry increased from 7.1% to 10.0%. Most of the 2012 highly advantaged sales remained highly advantaged for 2013, and as a group these sales grew faster than the Company. New highly advantaged sales were achieved due to improved manufacturing efficiency and opportunities realized in the areas of agriculture, water, automotive, infrastructure, energy and consumer products.

In 2013, the Company’s aggregated SCI increased from 22.0 to 24.4. All index factors were improved from 2012 performance, except resource management, which remained the same. Dow will report 2014 annual results in 2Q 2015. The SCI continues to be an important point of discussion during business strategy reviews, as business interest and engagement around sustainability continues to increase and deepen across Dow’s portfolio.

Dow recently presented its SCI work to a very receptive audience of sustainability professionals at an international conference. The abstract and presentation can be found here. A detailed white paper on the SCI and its impact can also be found here.

Addressing Climate Change, Energy Efficiency and Conservation

In 1Q 2012, Dow added an absolute greenhouse gas (GHG) commitment to its own Climate Change goal: Maintain GHG emissions below 2006 levels on an absolute basis. Dow will find ways to grow without growing GHG emissions. Related to this additional metric to manage our footprint, Dow is developing a Net Impact Tracking Tool, a technique that will sharpen the Company’s focus on the full life-cycle benefits of our products.

A sustainable energy future requires constant improvement in manufacturing efficiency, while maximizing the contributions of products to improve efficiency and expand the availability of affordable alternatives. Energy is an enabler of global economic growth, and energy efficiency remains critical to meeting the world’s energy demands. Dow’s innovation engine is driving energy solutions that meet society’s needs and provide a competitive advantage to the Company and our customers.

2015 Goal

- Increase the percentage of sales to 10% for products that are highly advantaged by sustainable chemistry

2015 Goal

- Maintain absolute greenhouse gas emissions below 2006 levels
- Reduce our energy intensity 25%
- Use 400 MW of clean energy by 2025
Dow's goal is to maintain greenhouse gas (GHG) emissions below 2006 levels on an absolute basis for all GHGs, thereby growing the Company without increasing its carbon footprint. While the revenue of the Company increased from $49 billion in 2006 to $58 billion in 2014, Dow's GHG emissions were reduced from 47 to 35 million metric tons per year, more than 12 million metric ton per year below 2006 levels.

Dow's energy efficiency management efforts have significantly reduced the Company's GHG emissions footprint. As a result, the Company has prevented more than 320 million metric tons of GHG emissions from entering the atmosphere since 1990. Dow will continue to focus on managing the Company's footprint and delivering solutions to help customers manage theirs. For example, Dow's insulation products contribute to greater energy efficiency, helping avoid millions of metric tons of GHG emissions per year.

Dow regularly reports on a target to grow the use of clean power to exceed 400 megawatt (MW) equivalents by 2025. At the end of 2014, Dow has approximately 266 MW that are either low-carbon or from renewable sources. Additionally, Dow has identified future prospects that could yield as much as 200 MW of additional clean power. This goal is helping the Company pursue opportunities to incorporate economically viable, clean-technology energy alternatives into its operations.

Since 2003, Dow has reported to the Carbon Disclosure Project, a not-for-profit organization working to understand the risks and to drive GHG emissions reduction from business. In 2014, Dow reported on its 2013 GHG performance and commitment to providing solutions for the climate change challenge. The report scored 85 out of a possible 100 points, highlighting the Company's commitment to strong governance and complete disclosure through transparent emissions reporting.

Avoided emissions resulting from the use of Dow products are important contributions to reduce the overall footprint of human activities. A Life Cycle Assessment documented that emissions saved by Dow insulation products are about seven times greater than total Company direct and indirect Kyoto and non-Kyoto GHG emissions. This calculation was made by quantifying the GHG emissions at all stages of the life cycle of the Dow insulation product and comparing these with the GHG emissions savings from the use of the insulation products in buildings and pipe systems. The estimated GHG avoided emissions for 2013 from the use of Dow's insulation products is 292 million MT CO₂eq.
By 2015, Dow has a goal to achieve an additional 25% improvement in Energy Intensity (BTUs/lb produced), with average Energy Intensity for the year 2005, adjusted for mergers and acquisitions, used as the basis for calculating performance. Dow’s goal for Energy Intensity for the full year of 2014 is 3,220 BTU/lb, or 77.5% of the value in 2005. Dow’s actual performance of 2014 was 4,102 BTU/lb, which is 98.7% of the 2005 baseline.

Dow has reduced annual energy use by 20% since 2005; however, we do not expect to achieve the level of performance we anticipated when our Energy Intensity goal was established. Dow’s products can lead to significant energy reductions for our customers, and virtually every industry becomes more efficient through what we make and do. However, the Company is shifting toward higher-value, more technology-driven specialty products that are by nature more energy-intensive, and operating rates have also been reduced to match demand, resulting in less efficient asset use.

Product Safety Leadership

In 2014, 579 Product Safety Assessments (PSAs) were posted to Dow’s product safety website, with PSAs completed now accounting for 95% of Dow’s annual revenue. Additionally, all of Dow’s 185 High-Priority Chemicals are now covered by a PSA. Since 2Q 2014, the number of High-Priority Chemicals has decreased due to divestitures and the discontinuation of several High-Priority Chemicals. We are on track to meet our 2015 goal to have a PSA publically available for applicable Dow products.

PSAs are written for the lay public and cover topics such as basic hazards, exposure potential and risk management measures. They complement other product safety, handling and stewardship documents, which are part of the product responsibility package offered by Dow to strengthen relationships with communities and customers. Dow is dedicated to providing the public with accurate information and building trust as we use technology to develop better products, and this holistic approach enables Dow customers and the communities in which Dow does business to stay informed about the Company’s products and the plants that produce them.
Dow’s Breakthrough to World Challenges commitment identifies products and technologies that deliver significant contributions to societal challenges over time. To be selected, breakthrough technologies are subjected to a rigorous evaluation process that measures many candidates in Dow’s business portfolio against a variety of criteria, from positive impact on millions of human lives, to minimal environmental impact throughout the product’s lifecycle. Dow has surpassed the target established in 2006 as part of its 2015 Sustainability Goals. Dow’s previously announced breakthroughs include:

### A Model for the Future

Dow believes the result of its Contributing to Community Success work in the 10 pilot communities is a best practice and a breakthrough model for all sites globally. This disciplined approach to data gathering, information sharing and strategic implementation is a reputational game-changer for the company and a life-changer for residents of our communities.

A new wave of implementation has begun at smaller sites around the Dow world. In late 2013, Dow launched its newly developed Community Success Toolkit to help define appropriate actions to implement the Community Success Goal locally. Now any site, regardless of size and resources, can apply the disciplined process to its outreach. For more stories of impact and ongoing updates about implementation, go to: http://www.dow.com/sustainability/goals/community.htm.

### Contributing to Community Success

Dow is continuing its nearly 10-year journey to enhance quality of life in communities where we have a presence, with the ongoing implementation of the “Contributing to Community Success” process. The first phase of work done at selected manufacturing sites has been completed. This means Dow is playing a positive role in improving our communities. Our priority now is to maintain the momentum and expand this process to every Dow site globally.

### Community Acceptance Ratings – Plays a Positive Role on Quality of Life

![Community Acceptance Ratings Graph]

*China score based on very low familiarity compared to all other sites, and should be considered more directional than definitive.*

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**2015 Goal**

- Achieve at least three breakthroughs that will significantly help solve world challenges

**2015 Goal**

- Achieve individual community acceptance ratings for 100% of Dow sites where we have a major presence
Local Protection of Human Health and the Environment

Powered by a fierce focus on providing a safe work environment for employees and contractors, Dow ended the first quarter of 2015 strong with impressive numbers. The intense commitment to protecting our workforce is illustrated through an Injury and Illness rate of 0.15, which is a 21 percent improvement over 2014. Dow’s Injury and Illness Severity rate was 0.49 percent, beating last year’s mark by 22 percent. Meanwhile, the Motor Vehicle Accident rate continues to be better than our 2015 target at 0.13 accidents per million miles of driving. Dow continues to increase its efforts to improve Process Safety Incident (PSI) performance and Loss of Primary Containment (LOPC) incidents. After the first three months of 2015, Dow is on track to better last year’s numbers for PSIs and LOPCs.

Injury and Illness Rate

At the end of 1Q 2015, the Injury and Illness rate was 0.15 per 200,000 hours of work. This is a 21% improvement compared to 2014. The 2015 goal of 0.12 per 200,000 hours is a 75% improvement from 2005.

Injury and Illness Severity Rate

At the end of 1Q 2015, the Injury and Illness Severity rate was 0.49 per 200,000 hours of work. This is 22% better than 2014 and is on track toward the 2015 Goal of 0.67 per 200,000 hours. The 2015 goal is a 70% improvement from 2005.
At the end of 1Q 2015, the Company experienced 43 Loss of Primary Containment (LOPC) incidents. When annualized, the implied total of 172 would be a decrease from the 177 incidents experienced in 2014. The 2015 goal of 130 or fewer incidents is a 90% reduction from 2005.

At the end of 1Q 2015, the Company experienced one Process Safety Incident (PSI). When annualized, the implied total of four would be a decrease from the 10 incidents experienced in 2014, and remains significantly below the 2015 goal. The 2015 goal is to be experiencing less than 20 PSIs.

Process Safety Incidents

At the end of 1Q 2015, the Company experienced one Process Safety Incident (PSI). When annualized, the implied total of four would be a decrease from the 10 incidents experienced in 2014, and remains significantly below the 2015 goal. The 2015 goal is to be experiencing less than 20 PSIs. Process Safety Incidents are classified in terms of the Center for Chemical Process Safety and American Chemistry Council definitions.
At the end of 1Q 2015, Dow experienced two Hazmat Transportation Loss of Primary Containment events, and none was classified as highly hazardous. The 2015 goal to reduce all Hazmat Transportation incidents to 14 or fewer is a 75% improvement from 2005.

At the end of 1Q 2015, the Severe Motor Vehicle Accident incident rate was 0.13 accidents per million miles driven, which remains better than the target for 2015. Severe Motor Vehicle Accident rate was not measured in the heritage Rohm and Haas Company. The 2007–2009 values represent the heritage Dow population.

By reducing the number of tonne-miles of Highly Hazardous materials, Dow reduces the chance of in-transit incidents that could impact communities and areas through which Dow’s products travel. Supply chain redesign is a long-term effort, and changes in sourcing points sometimes take multiple years to implement.

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At the end of 1Q 2015, 149 million tonne-miles were shipped via road and rail. Annualized figures indicate that we would experience about 594 million tonne-miles shipped via road and rail. The 2015 Goal is to reduce these shipments to less than 705 million tonne-miles, which would be a 50% reduction from the baseline in 2005.
This quarter, Dow is providing an update for metrics that target achieving a 30% reduction in emissions levels by 2015. In each case, the results are better than Dow’s goal line as of the end of 2014.

Volatile organic compounds (VOCs) are organic chemicals with high vapor pressures and react photochemically with the atmosphere. VOC emissions were down by 37% compared to 2005.

Nitrogen oxides (NOx) are produced during combustion, especially at high temperature, and contribute to acid rain. NOx emissions were reduced 39% since 2005.

Priority Compounds are a category of chemicals defined by Dow. Priority Compounds are comprised of chemicals with persistent, bioaccumulative, and toxic hazards, and chemicals with carcinogenic, mutagenic, and reproductive hazards. Priority Compounds emissions were down by 55% compared to 2005.
Science for a Sustainable World

We only have one planet, with limited resources. So everything we do and how we do it matters. Dow is committed to minimizing our own footprint and to delivering solutions that help our customers and the rest of society do the same. The world needs solutions for big challenges like energy, climate change, water, food, housing and health. And Dow has some of the world’s best scientists and engineers dedicated to solving world challenges through innovation. When we do that, it’s not just good for the planet; it’s also good for business.

Dow remains committed to continuously improving its performance and publicly reporting its progress. Please visit dow.com for the latest Dow sustainability, business and performance news, and to share your comments or submit questions.